UN environment programme

CTCN UN Climate Technology Centre & Network

Joint Report: D2.1/D3.1 Stakeholder Consultations

***November** 2022*

Prepared for: **United Nations and MoE**

Prepared by: **ICEM**

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

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DISCLAIMER

This document was prepared for the World Bank by an ICEM consultant team engaged to undertake the UN-CTCN project – *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
Prepared for	UN-CTCN
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ABBREVIATIONS

CAMDI	Cambodia Disaster Damage and Loss Information System
DCC	Department of Climate Change
EWS1294	Early Warning System 1294
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
MoWRAM	Ministry of Water Resources and Meteorology
MTPC	Ministry of Telecommunications
NCDD	National Committee for Sub-national Democratic Development
NCDM	National Committee for Disaster Management
PRISM	Platform for Real-time Impact and Situation Monitoring
RGC	Royal Government of Cambodia
UN-CTCN	United Nations Climate Technology Centre and Network

TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

This *Joint Report on D2.1/D3.1 Stakeholder Consultations* addresses the requirements of two project deliverables: *D2.1 Report on the kick-off meeting and stakeholder consultations* and *D3.1 Report on the consultations to select the most appropriate municipality to design LISA*. These two reports have been combined into a single report as the selection of a municipality for the *Local Climate Information System for Climate Change Adaptation* (LISA) was a key discussion point of the initial stakeholder consultations.

The initial project kick-off meeting was held online on 12 January 2022 with representatives of the United Nations Climate Technology Centre and Network, project proponent (Department of Climate Change) and the International Centre for Environmental Management (ICEM). Subsequent consultations with key three key government agencies were held in June 2022 - National Committee for Disaster Management (NCDM), National Committee for Sub-national Democratic Development (NCDD), and Ministry of Women's Affairs (MoWA). The purpose of these meetings was to help inform implementation of the project and to ensure that the concerns and needs of government are responded to in the project.

The stakeholder consultations with NCDD and NCDM focused on three key areas, including discussions on existing climate information systems in Cambodia; selection of a municipality in for conducting the climate risk assessment and development of the LISA platform; and options for hosting the web-based LISA application. The consultation with MoWA especially focused on how to ensure gender issues are embedded into project implementation.

The discussions on existing climate information systems highlighted three existing systems in use in Cambodia: the Early Warning System (EWS) 1294[1], Platform for Real-time Impact and Situation Monitoring (PRISM)[2], and Cambodia Disaster Damage and Loss Information System (CAMDI)[3]. These are all separate (unlinked) systems.

The NCDM has trained Provincial Committees for Disaster Management (PCDMs) in use of the EWS1294 system. The EWS1294 depends on cooperation from three mobile phone companies, which provide free registration, and users of the system receive advanced warnings (on water levels) on their mobile phones. Interest was expressed in the possibility of linking the LISA platform to EWS1294 for future use. The PRISM system is an initiative of the World Food Programme (WFP). PRISM is similar to EWS1294 in that information is collected at sub-national to national levels, with a provincial focal point required to approve data before it is entered into the system at local level. However, one challenge to data collection is the lack of a good template used for data collection. NCDM would similarly like to upgrade the platform to include climate projections and satellite information. The CAMDI system, supported by UNDP, is a database system used to store information related to disasters.

Battambang municipality was selected as the site for conducting the climate risk assessment and development of the LISA application. Battambang was recommended for selection at the three consultations with 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. The recognized climate threats to Battambang, availability of information resources and commitment of the authority to address climate change, favour the selection of this municipality. While there are two consultations that remain to be conducted with MoWRAM and MPTC (the team is awaiting MoE approval for these meetings), it is unlikely that these discussions would change the decision to select Battambang as the project study site. However, stakeholder consultations with MoWRAM and MPTC will be planned in the future to inform future design of the LISA platform to ensure the platform also meets the needs of these ministries.

[1] Early Warning System 1294: https://www.peopleinneed.net/cambodias-early-warning-system-1294-8693gp
[2] Platform for Real-time Impact and Situation Monitoring: https://innovation.wfp.org/project/prism
[3] Cambodia Disaster Damage and Loss Information System: http://camdi.ncdm.gov.kh

The consultations indicated that it may be challenging to host the LISA platform at municipality level. Given the nature of the LISA platform, which is not a simple website, but a relatively complex integration of open-source software components that require adequate hardware and experienced IT administrators to manage effectively. From ICEM's experience in developing and hosting these systems elsewhere, the team will explore the option of hosting the system with the Department of GeoSpatial Services of the Ministry of Environment, who are most likely to have the relevant expertise to manage the application. ICEM will provide training to the department at project completion.

Regarding gender issues, it was highlighted that gender is a cross-cutting issue, thus implementation of activities under the project will all integrate gender. The project implementation team includes a gender expert. The LISA platform can be a significant source of information on climate change to users including gender committees on climate change. It was suggested that the team meet with H.E. Khov Sar, the secretary of state focal point on gender.

1 INTRODUCTION

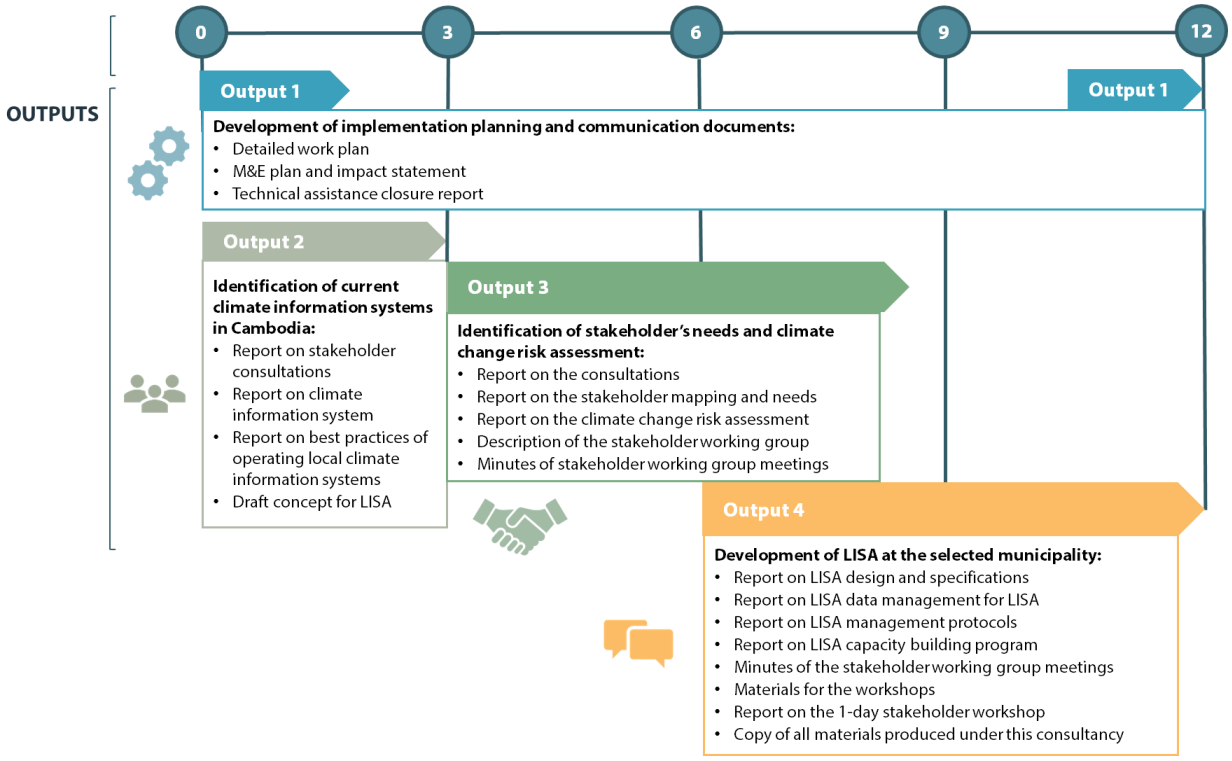
1.1 Project overview

This *Joint Report on D2.1/D3.1 Stakeholder Consultations* addresses the requirements of two key project deliverables: *D2.1 Report on the kick-off meeting and stakeholder consultations* and *D3.1 Report on the consultations to select the most appropriate municipality to design LISA*. These two deliverables have been combined into a joint single report as the selection of a municipality for the *Local Climate Information System for Climate Change Adaptation* (LISA) was a key discussion point of the initial stakeholder consultations.

The document presents proceedings of meetings since project start-up (12 Jan 2022), consultations with government agencies (NCDD, NCDM, MoWA) in June 2022, and the progress update presentation delivered to the MoE's General Directorate of Policy and Strategy (20 Sept 2022). A key recommendation out of the stakeholder consultations and meeting with the General Directorate of Policy and Strategy is the selection of Battambang municipality as the location to conduct the climate risk assessment and develop LISA.

There are four key outputs in the project (Figure 1): Output 1: Development of implementation planning and communication documents; Output 2: Identification of the current status of the climate information systems in Cambodia; Output 3: Identification of stakeholder's needs and climate change risk assessment at the selected municipality; and Output 4: Development of LISA at the selected municipality. The stakeholder discussions undertaken in *Activities 2.1 (A kick-off meeting and stakeholder consultations)* and *3.1 (Consultations to select the most appropriate municipality to design LISA)* are documented in this report.

Figure 1. Timeline of project outputs over 12-month project



1.2 Objectives of meetings

The purpose of the initial project kick-off meeting, which was held online on 12 January 2022, was to bring together all people involved on the project – the United Nations Climate Technology Centre and Network, project proponent (Department of Climate Change) and International Centre for Environmental Management (ICEM) – and to discuss the project plan and the immediate next steps in project implementation.

The purpose of the subsequent consultations with key government agencies (held in June 2022) was to help inform implementation of the project and to ensure that the concerns and needs of government are responded to in the project. The meeting agenda for each consultation discussed (i) details on project implementation; (ii) existing climate information systems in Cambodia; (iii) selection of a municipality for developing the LISA platform; (iv) gender-balanced representation; and (v) determination of where the LISA application can be hosted and managed. Prior to the meeting, key discussion points and a project brochure (in Khmer) were shared with the government agencies (Appendix 1).

The consultation with H.E. Vann Monyneath, Director General, General Directorate of Policy and Strategy, MoE, provided an opportunity for ICEM to present progress on the LISA project and also the recommendation to select Battambang municipality based on an extensive scientific analysis (Appendix 2).

The remainder of this report provides an account of the proceedings of the three stakeholder consultations with NCDD, NCDS and MoWA; the presentation given to H.E. Vann Monyneath including the rationale for selecting Battambang municipality to conduct the climate change risk assessment and development of LISA; and immediate next steps for the project.

2 PROCEEDINGS OF CONSULTATIONS

2.1 Project kick-off meeting

Date and time: 12 Jan 2022 | 14.00-15.00 Cambodia time
Venue: Virtual meeting
Participants:

Clara Landeiro (Regional Manager, Asia Pacific, CTCN, UN Climate Change Technology Mechanism)
Sambit Nayak (Climate Change Specialist, CTCN)
Hak Mao (Director, Department of Climate Change, MoE)
Jeremy Carew-Reid (Director, ICEM)
Richard Cooper (ICEM: Team Leader, Project Manager, LISA project)
Lay Chanthy (ICEM: Climate Change and Local Coordination Expert)
Tous Sophorn (ICEM: Gender Expert)
Joe Ogden (ICEM: Expert in web design and development)
Nguyen Bich Ngoc (ICEM: Project Coordinator)

The purpose of the project kick-off meeting, which was held online on 12 January 2022, was to bring together all people involved on the project – the United Nations Climate Technology Centre and Network, project proponent (Department of Climate Change) and International Centre for Environmental Management (ICEM). During this meeting, participants introduced themselves for the first time (Figure 2), and discussed the project plan and immediate next steps in project implementation. The latter included preparation of implementation planning and communication documents (Outputs 1.1, 1.2 and 1.3 that were submitted in February 2022) and the identification of focal points and organization of stakeholder consultations.

Figure 2. LISA project kick-off meeting

Following the introduction of participants, Mr Sambit Nayak outlined the implementation planning and communication documents that collectively comprise Output 1 of the project. Project implementation steps were discussed, with the 'Response plan' indicated as the main guiding document for the project. Each output of the project would need to be approved by the Department of Climate Change (DCC) prior to submitting to CTCN. The participatory approach to the project was emphasised, as well as gender balance in project activities. Ms Clara Landeiro indicated some other projects that may be informative to review for the LISA project, including in Malaysia.

Next steps included the identification of focal points in the Royal Government of Cambodia (RGC); preparation of a meeting with the DCC to present the project work plan; and ICEM to prepare the first set of deliverables (detailed work plan monitoring and evaluation (M&E) plan and impact statement, and technical assistance closure report. Mr Sambit would share templates of the latter documents with the ICEM team.

Note: Outputs 1.1, 1.2 and 1.3 were submitted to CTCN in February 2022 and subsequently approved.

2.2 Stakeholder Consultation Meeting with National Committee for Sub-national Democratic Development (NCDD)

Date and time: 20th June 2022 | 09.00 – 11.00 am
Venue: NCDD Meeting Room
Participants:

H. E Ny Kim San, Deputy Head of NCDD
Mr. Sorn Sunsopheak, Deputy Director of Program Management Support Division, NCDD
Mr. Nean Vanny, Deputy Head of Office, NCDD
Ms. Phann Sreyroth, IT Technical Officer, NCDD
Mr. Lay Chanthy, LISA/ICEM
Ms. Thida Tieng, LISA/ICEM

Main discussion points

A. Introduction to LISA project implementation

The UN LISA project was presented by the ICEM team (Figure 3, Figure 4, Table 1), with the following comments received from participants.

H.E Ny Kim San noted that the project should also reflect (be aligned) with the National Program (NP2). A question was raised with regard to the end users of the application, and the focus of the platform, whether it is for agriculture, infrastructure, or roads? His Excellency suggested that a municipality focus may be too small for infrastructure, and noted the establishment of new cities including Poipet, Soung, Borvet, and Bokor, of which Poipet was especially vulnerable. Can this TA focus on cross-border issues, as Poipet municipality is vulnerable to flooding from Thailand?

Mr. Sorn Sunsopheak also indicated the need for alignment with NP2, which addresses reform of the role of Provincial Committee for Disaster Management (PCDM), including adaptation. A question was raised as to who would receive training, and the need to decide on which municipality could participate in the study. The source of climate information services was queried, as well as sustainability such as the need for updating and maintenance of the system.

H.E Ny Kim San gave the example in Battambang City which is at risk from seasonal flooding.
Mr. Chanthy responded that the team would focus on infrastructure for the project and Poipet could the municipality of focus given it faces flooding each year.
Mr. Sorn Sunsopheak commented that they are currently working on Smart and Green Cities.

Figure 3. Team meeting with NCDD

The following comments were made in relation to issues raised by the team:

B. Review of existing climate information systems

B.1.1 Existing climate information system in Cambodia

Currently an ADB project is working on developing a platform for digital administration to deliver better public services. There is no climate information accessible through the NCDD website.

B.1.2 Climate information at NCDD

On the NCDD website homepage, the focus is on reform and does not yet include any climate information. NCDD is currently looking at how to incorporate climate measures into project tracking. NCDD receives climate data from other institutions with relevant technical expertise.

B.1.3 Gaps between data providers and users

Short-term (one week in advance) national weather data are available. Medium-term weather forecasts, such as available in Thailand (e.g., 3-monthly rainfall forecasts) are not available at the sub-national level. Medium-term forecasts are required by farmers to reduce risk to investments. At the national level, only one-week advance weather forecasts are provided. However, much of the satellite information come from the private sector and there are restrictions on data access. Access to downscaled climate data is also limited. A climate information system should respond to the needs of users and the information needs to be up-to-date.

B.1.4 Does NCDD have any mechanism or plan to provide weather/climate services information at sub-national level

The NCDD would like to obtain information to inform decision making. For example, on road construction, improved information would support the design of more resilient roads. It is important that the project responds to planning needs and relevant user groups are identified. Integrating climate considerations into

decisions on investments would require additional resources and technical expertise, and data availability is still limited.

B.1.5 Ideas and recommendations on the establishment of a climate information system at one municipality to support city resilience
The selection of a municipality will require an assessment of the expertise available, technology and data availability. there are other existing systems and the integration of the new platform with these should be considered. Furthermore, considerations of sustainability and hosting at the municipality are also important.

C. Municipality selection
Three criteria were proposed for selecting a municipality: livelihoods, long-term vision, and policy/strategy.

Battambong and Poipet were recommended for selection, However, regarding Poipet, the municipality lacks resources and their commitment to addressing climate change is unclear.

C.1.1 Does the selected city have a climate information system?
Battambong municipality has stated their commitment to addressing climate change, and they also have existing relevant data and information resources. It was suggested that the team access their capacity to support the project objectives.

C.1.2 Contact for the selected city
Mr. Thou Sokun, Deputy Head of Battambong Municipality, Phone: 069 571 798

D. Where should LISA be hosted
The capacity to host the website will need to be checked with the local authority.

D.1.1 Does the supporting institution have the appropriate main web server to host LISA and trained technical IT staff to manage the application
The capacity of the municipality should be assessed. Battambang is known to have more data resources than other municipalities.

E. Other notes
It was proposed that the Provincial Committees for Disaster Management (PCDM), be engaged with regard to the process of implementing climate change adaptation. It was suggested that the existing People in Need (PIN) system be considered for integration with the new platform.

A capacity needs assessment of Battambang City should be conducted to assess human resources, technology and equipment availability for hosting and maintenance of the system. Further discussions should be held with other national stakeholders to inform selection of an appropriate municipality.

Figure 4. Team meeting with NCDD

Table 1. NCDD meeting participants

No.	Name	Title	Agency
1	H. E Ny Kim San	Deputy Head	NCDD
2	Mr. Sorn Sunsopheak	Deputy Director of Program Management Support Division	Program Management Support Division, NCDD
3	Mr. Nean Vanny	Deputy Head of Office	NCDD
4	Ms. Phann Sreyroth	IT Technical Officer	NCDD
5	Mr. Lay Chanthy	Climate change and local coordination expert	ICEM
6	Ms. Thida Tieng	National Operations Coordinator	ICEM

2.3 Stakeholder Consultations Meeting with National Committee for Disaster Management (NCDM)

Date and time: 21st June 2022 | 09.00 – 10:30 am

Venue: NCDM

Participants:

H. E Kim Vattana, Deputy Secretary of State, NCDM
H.E Soth Kimkolmony, Advisor and Director of Planning and Relation Department, NCDM
Mr. Sim Pisey, Director of Information Department, NCDM
Mr. Em Samnang, Deputy Director of Information Department, NCDM
Mr. Lay Chanthy, LISA/ICEM
Ms. Tous Sophorn, LISA/ICEM
Ms. Tieng Thida, LISA/ICEM

Main discussion points

A. Introduction to LISA project implementation

The UN LISA project was presented by the ICEM team (Figure 5, Figure 4, Table 1), with the following comments received from participants.

H.E Mony (NCDM) noted that the project is important due to increasing risks from disaster and it is also aligned with the government priority for strengthening data used for disaster risk management. Climate information is still not adequate, particularly with respect to data analysis, which is important for policy makers including the agricultural sector.
Chanthy (ICEM) mentioned that the LISA team had discussed the LISA project with NCDD and that they gave recommendations with regard to municipality selection, proposing Battambang, as the city typically experiences flooding.
H. E Mony highlighted that municipality selection required consideration of criteria, and asked as the how NCDD come to recommend Battambang.
Chanthy responded that NCDD had suggested Battambang given that the city usually experienced flooding.
H. E Mony mentioned that they have two provinces in mind: Bantey Meanchey and Battambang as they commonly experience storms and flash flooding and offer a mix of land use types, with agriculture being the main type. They also require weather forecasts from Thailand given that the province is situated on theThai-Cambodian border.

The following comments were made in relation to specific issues raised by the team:

B. Review of existing climate information systems

B.1.1 Existing climate information systems in Cambodia

There are two relevant systems to consider. There is the PRISM platform (Platform for Real-time Impact and Situation Monitoring) which is a database of disaster impacts that have occurred at commune to national level, and CAMDI which is another system for storing information on disasters.

B.1.2 Climate information at NCDM

The People In Need (PIN) organization provide support to NCDM in managing the *Early Warning System (EWS) 1294* system.[4] NCDM have provided capacity building across all of Cambodia (24 provinces). Weather information is received from MoWRAM. With PIN, NCDM supports community access to disaster information. NCDM has trained Provincial Committees for Disaster Management (PCDMs) in use of the

[4] https://www.peopleinneed.net/cambodias-early-warning-system-1294-8693gp

system. The EWS1294 depends on cooperation from three mobile phone companies, which provide free registration (Cellcard, Smart, Metpone), and users of the system receive advanced warnings (on water levels) on their mobile phones.

So far, NCDM has installed 34 water level gauges in all 24 provinces, but not but not all provinces have the capacity to use this equipment. Additionally, MoWRAM monitors water levels on major waterbodies, such as the Mekong River and at Tonle Sap. NCDM has installed water level monitoring stations along smaller waterways. The PIN organization has now transferred management of EWS1294 to NCDM.

The PRISM system is an initiative of the World Food Programme (WFP).[5] As with EWS1294, information is collected at sub-national to national levels. A provincial focal point is required to approve data before it is entered into the system at local level. However, one challenge to data collection is the lack of a good template to guide data collection. NCDM would like to upgrade the platform to include climate projections and satellite information.

The CAMDI system is supported by UNDP, which is used to store information related to disasters.[6]

Chanthy indicated that the LISA platform will include climate projections.

H.E Mony expressed interest in the possibility of linking the climate projections in LISA to EWS1294 for future use.

B.1.3 Gaps between data providers and users
At the national level, relevant data is currently only received from MoWRAM, though long-term projections are not provided. At regional level, NCDM receives some information from ASEAN.

Currently, NCDM does not have gender-aggregated data by commune, but would like to ensure that each family has at least one mobile phone. Voice messages are used to inform users in the EWS1294 system, given the low level of community literacy. For minority/ethnic groups the community relies on the focal point on the ground to deliver warning messages in their own language. EWS1294 will alert users based on the phone number registered in the system. Messages are sent are sent out 3 times and the system monitors if the message is accessed by the user. NCDM trained focal points at commune/district level to disseminate information. NCDM is also exploring the use of other dissemination channels for warning information such Facebook, YouTube, and Telegram.

B.1.4 Does NCDM have any mechanism or plan to provide weather/climate services information at sub-national level?
NCDM is exploring the possibility of allowing non-registered users to receive warning alerts and to include other dissemination channels in EWS1294.

B.1.5 Ideas and recommendations on the establishment of CIS at one municipality to support resilience of the city
Improved resilience of energy and more generally infrastructure were proposed.

C. Municipality selection
Besides municipalities of concern (Battambang and Serey Sophoan) are at risk from disasters and should be prioritized for improving climate resilience.

Battambang municipality was proposed for selection.

[5] https://innovation.wfp.org/project/prism
[6] http://camdi.ncdm.gov.kh

C.1.1 Does the selected city have a climate information system?
Battambang has more climate information than Serey Sophoan.

C.1.2 Contact for the selected city
NCMD suggested follow-up discussions with the provincial authority.

D. Where should LISA be hosted
NCDM asked whether the LICA platform could be hosted under the current or separate domain. An agreement is required for maintenance and hosting of the platform.

D.1.1 Does the supporting institution have the appropriate main web server to host LISA and trained technical IT staff to manage the application
Information dissemination is a priority for the government, with EWS1294 considered the most convenient tool at the moment. Finance received through the WFP ensured that the poorest in society can afford a mobile phone to receive alerts from EWS1294.

E. Other notes
NCDM emphasized that they want to strengthen activities related to EWS1294, and asked if ICEM would be interested in upgrading EWS1294.

The following comments were provided by **H. E Kim Vattana** (Deputy Secretary of State, NCDM). H. E Kim Vattana suggested that the project team look at the priority of each institution, such as their 5-year plans as these describe priority areas for each ministry. For selection of the municipality for the LISA platform, considerations should include support and sustainability, and linkage to existing systems. It was noted that some private firms are currently working in this area. Regarding gender issues, it was suggested that the team meet with H.E. Khov Sar, the secretary of state focal point on gender.

At the conclusion of the meeting **H.E Mony** emphasized his support of the LISA project and stressed the importance of building a system that is sustainable with regard to finances and technical capacity of the municipality.

Figure 5. Team meeting with NCDM

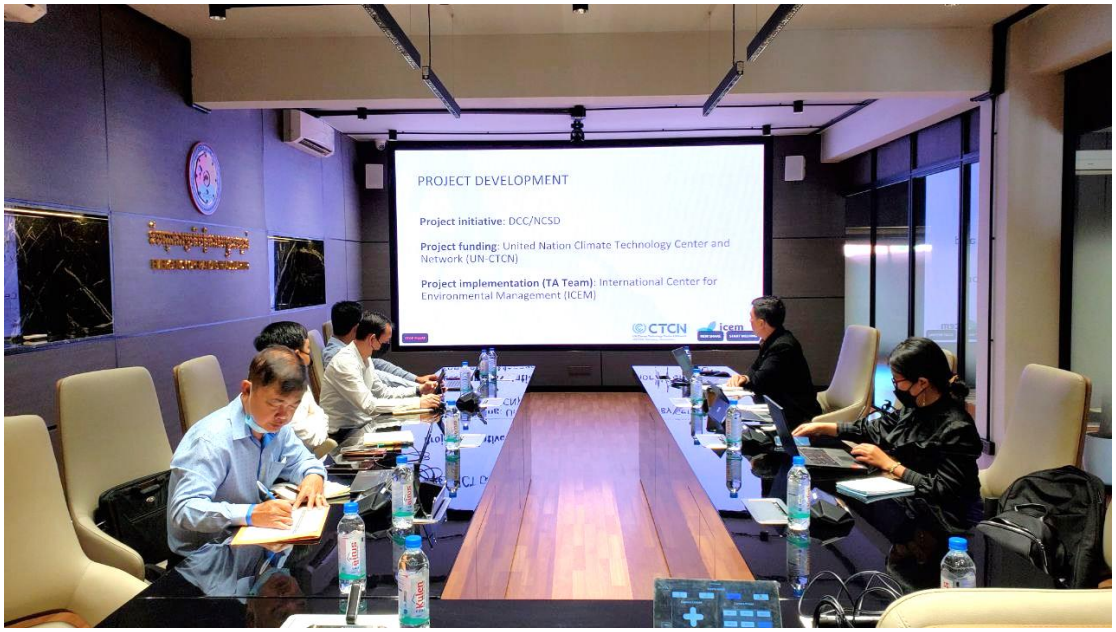


Figure 6. Team meeting with NCDM

Table 2. NCDM meeting participants

No.	Name	Title	Agency
1	H. E Kim Vattana	Deputy Secretary of State	NCDM
2	H.E Soth Kimkolmony	Advisor and Director of Planning and Relation Department	NCDM
3	Mr. Sim Pisey	Director of Information Department	NCDM
4	Mr. Em Samnang	Deputy Director of Information Department	NCDM
5	Mr. Lay Chanthy	Climate change and local coordination expert	ICEM
6	Ms. Tous Sophorn	Gender expert	ICEM
7	Ms. Tieng Thida	National Operations Coordinator	ICEM

2.4 Stakeholder Consultation Meeting with Ministry of Women's Affairs (MoWA)

Date and time: 23rd June 2022 | 2.00 – 3:30 pm
Venue: MoWA Climate Change Meeting Room

A. Participants
H. E. Mey Hol, Under Secretary of State, MOWA
Mr. Sum Vansan, Deputy Secretary General, MOWA,
Ms. Sao Kimseurn, Deputy Director General, MOWA
Mr. Meas Chivon, Head of Office, MOWA
Mr. Tim Chanra, Deputy Head of Office of MOWA
Ms. Phev Makara, Deputy Head of Office, MOWA
Mr. Lay Chanthy, ICEM
Ms. Tous Sophorn, ICEM

Main discussion points
A. Introduction to LISA project implementation
The UN LISA project was presented by the ICEM team (Figure 7, Figure 8, Table 3), with the following comments received from participants.

H.E Mey Hol opened the meeting and Dr Chanthy was introduced to give an introduction to the project, after which the participants were asked for their feedback on the LISA project.

H.E Mey Hol asked the team what were the thoughts of the earlier institutions that were met on the selection of a municipality for the project?

Chanthy responded that NCDDS recommended Battambang town for the candidate city for the team to consider. Battambang experience both flash flooding from intense rainfall and flooding from Sangkae River. However, the town has good resources, including its legislation, policies, plans and institutiosn and has goo commitment to responding to climate change. NCDM provided two options of towns to be selected - Banteay Meanchey and Battambang, however, due to resources and commitment of the municipality, NCDM recommended Battambang municipality as well.

H.E Mey Hol noted that Serey Sophorn at a lower risk to climate change impacts compared to Battambang. Battambang is threatened by floods from the Sangkae River and intense rainfall. Furthermore, there is substantial forest clearance upstream in Samlout district in the last decade to make way for agriculture.

Ms. Sao Kimseurn commented that from a 'clean city' consideration, Battambang was identified and selected under a UNESCAP project as a 'clean city' of Cambodia. Siem Reap city was also considered under UNESCAP project as a second 'clean city' in Cambodia. With their experience of the UNESCAP project, the residents of Battambang would be better aware of environmental and climate change matters. Thus, Battambang is a suitable city for the LISA project. The project would likely have be more successful in Battambang.

Ms Sao Kimseurn then queried who would be the beneficiaries from LISA, as the LISA project does not clearly specify women as beneficiaries.

Dr. Chanthy responded that the main target groups of LISA are city planners and decision makers. The LISA platform can inform decision makers and planners on city development activities and the mainstreaming of climate resilience into development activities/projects. Unlike the Early Warning System (EWS) 1294, LISA will provide present and future climate change projection and interpretation.

H.E May Hol suggested that there should be a consideration of the integration of the existing EWS1294 system and LISA, so that project will get a greater benefit and impact.

Ms. Sophorn remarked that LISA can be a significant source of information on climate change to users including gender committees on climate change. This is a one-year project, pilot project, and there will be a great opportunity to scale-up the project to cover other cities of Cambodia. This project clearly identifies those who will input information for the system and who are the users. We will discuss how information can be input including climate information and gender information of vulnerable groups. We consider strongly the issue of gender inclusion in this project.

Ms. Sao Kimseurn noted that this project has four outputs but these outputs do not reflect the gender gap, nor gender inclusion as yet. If a partner in this project, how would MoWA contribute ot this project? MoWA has a Gender and Climate Change Action Plan, 2021-23 and Gender and Master Plan on Climate Change. Referring to the Neary Ratanak Strategic Plan, climate change is in component 6 with four strategies, and LISA overlaps with the fourth strategy on the development of database and information sharing. Thus, to involve MoWA in LISA, there should be at least an activity that MoWA can directly contribute.

Ms. Sophorn said that this project was initiated by MoE and the UN-CTCN, and five key stakeholders at national level including MoWA were identified to consult and to collect, comments, concerns, good practices and lesson learned. We will also discuss how planners and decision makers can use this information effectively.

Dr. Chanthy noted that the four outputs of LISA don't directly reflect gender but gender is a cross-cutting issue, thus implementation of activities under the project will all integrate gender. The project implementation team includes a gender expert.

Ms. Sao Kimseurn responded that this project requires greater gender inclusion but it does not have a gender component. How can the project report about gender at the end? Is there an opportunity for the project to design a component on gender? If no gender component, how can MoWA sign evaluate the project on gender at the time of project completion?

Ms. Sophorn mentioned that gender will be included in the process of project implementation. At the end, there will a gender finding to be prepared that we can provide conclusions and recommendation on how gender can be mainstreamed into the process of project implementation. Gender analysis should be done, however this stakeholder meeting aims to identify gaps and to address gender issues in project implementation.

The project will establish a stakeholder working group and members of the working group will be from six key stakeholders including MoE and MoWA. Thus, discussions will be made during the process of implementation of LISA.

H.E May Hol recommended that contact persons from MoWA should include two staff, one of whom will be responsible for climate change and the other person in charge of disaster risk management. These two staff will become LISA working group members from the MoWA side when the working group is established.

Mr. Meas Chivon asked why the project targets a city and not a district? Besides the city recommended by NCDDS and NCDM, research should be conducted to select from the 27 cities of Cambodia. With this research to identify a city, we can include questions to explore gaps on inclusiveness and gender gaps.

Dr. Chanthy responded that LISA focuses on climate information at sub-national level. There are three levels at sub-national level including capital/province, district/city, and commune. There are almost 200 districts distributed over Cambodia. LISA work at city level because the city is intermediate between province and commune and there are only 27 cities in Cambodia. The city is a place where development activities/projects, including urban infrastructure and services, and climate change impacts are more significant compared to a district. Thus, if the project works at city level, then it is easier for the project to scale-up to other cities in the future.

Your comment on research to identify a potential city from the 27 cities is good. This LISA project timeframe is one year only. The project has identified selection criteria that the selected city should have good availability of climate, environmental, social, and economic information; a city that has better information resources and a strong commitment to climate change, and a city that is under threat by climate change impacts. Thus, based on these criteria, NCDDS and NCDM recommended Battambang city.

Mr. Meas Chivon commented that there is a big gap between women, men, children, and old people in receiving messages from EWS1294. Most women in rural areas have limited knowledge in using a smart phone, and most of them use a traditional/standard phone that is voice only. The EWS 1294 system also requires smart phone users to register to receive message alerts. Women in rural areas do not know how to register for the EWS1294 service on their phone. Thus, LISA should work with the EWS1294 system to address gaps and to improve its reach to all target groups.

Mr. Tim Chanra reported that, as observed by MoWRAM, women and old people do not know and are not interested in the EWS1294 system.

Dr. Chanthy remarked that to address these gaps, NCDM is considering to allow people to use EWS1294 without registration. NCDM is seeking support from telephone companies to allow smart phone holders to receive message from the 1294 system without requiring registration.

Ms. Sao Kimseurn inquired how MoWA and LISA should work together after the meeting, noting that to her understanding they should work together on the climate information system and LISA working group. At policy level, who will participate in developing policy guidelines for LISA from the MoWA side? How will beneficiaries of the system (vulnerable groups of women, children, disabled people, old people,) be supported by MoWA?

Ms. Sophorn noted that in addition to this stakeholder meeting, we will organize a stakeholder consultation workshop to collect additional inputs/thoughts from stakeholders. The project will also work on capacity building for stakeholders and information dissemination.

Ms. Sao Kimseurn said that MoWA developed a document on gender assessment on climate change in 2014 and updated in 2018. The document also identifies how climate change impacts affect men and women differently. MoWA promised to share this document with the team later.

Ms. Phev Makara asked if a letter could be prepared for MoWA by MoE to request nomination of 2-3 staff from MoWA to belong to the LISA working group.

MoWA strongly recommended Battambang as the most suitable city for the LISA project.

Figure 7. Team meeting with MoWA

Figure 8. Team meeting with MoWA

Table 3. MoWA meeting participants

No.	Name	Title	Agency
1	H. E. Mey Hol	Under Secretary of State	MOWA
2	Mr. Sum Vansan	Deputy Secretary General	MOWA
3	Ms. Sao Kimseurn	Deputy Director General	MOWA
4	Mr. Meas Chivon	Head of Office	MOWA
5	Mr. Tim Chanra	Deputy Head of Office	MOWA
6	Ms. Phev Makara	Deputy Head of Office	MOWA
7	Mr. Lay Chanthy	Climate change and local coordination expert	ICEM
8	Ms. Tous Sophorn	Gender expert	ICEM

2.5 Project Progress Update: Meeting with the General Directorate of NCSD

Date and time: 20 Sept 2022 | 3.00 – 4.30 pm
Venue: Hybrid format: in-person at NCSD office and online with Zoom

A. Participants
H.E. Dr Vann Monyneath (Director General, General Directorate of Policy and Strategy)
Dr Lay Chanty (LISA, ICEM)
Ms Tous Sophorn (LISA, ICEM)
Mr Sum Cheat (LISA, ICEM)
Mr. Eng Senghak (LISA, ICEM)
Dr Richard Cooper (LISA, ICEM, online from Hanoi)
Ms Hoa Truong Tung (LISA, ICEM, online from Hanoi)

Main discussion points

Dr Cooper gave an overview of the current status of the implementation of the LISA project (Appendix II), which was then followed by a discussion. The presentation provided a project overview and detailed key deliverables, progress to-date, selection of the municipality, and immediate next steps.

H.E Monyneath asked who is the key leading agency at national and sub-national level? As answered by **Richard** and **Dr Chanthy**, the LISA project was initiated and is a project of DCC. Thus DCC/MOE is the leading and coordinating agency at national level.

H.E Monyneath asked if there is an official letter of agreement (LoA) between MoE and UN-CTNC on the LISA project that states MOE is the leading agency at national level. Mr. Sum Cheat, who is the representative of DCC, noted that he needs to check with the director of DCC, Dr. Hak Mao about the letter. H.E Monyneath noted that he needs the support of the LOA when requesting the Minister to sign any approvals related to the LISA project. In response to the question, Mr. Sum Cheat will check with Dr. Hak Mao if the LOA has been issued. If not, **the LOA will need to be issued first before proceeding further with activities** including meetings with MoWRAM and MPTC and organising any stakeholder consultative workshop at the end of October.

H.E Monyneath was happy to see **the selection of Battambang city was based on scientific evidence** as presented by **Richard**. However, he needs to consult with the MoE Minister to seek his agreement on this selection.

H.E Monyneath expressed concern about the capacity of government at subnational level to understand and use the LISA Platform, since LISA is highly technical. **Dr. Chanthy** responded that the team will provide capacity building to target agencies at city level on the LISA platform, including identifying target stakeholders who will use LISA and how climate information can be used within LISA.

H.E Monyneath stated concern on how LISA can be linked with subnational investment planning at city and commune level. Dr. Chanthy responded that the target group for using LISA will include decision makers and city planners who are responsible for investment activities in the city and for disaster preparedness and response. LISA is a climate information platform or climate interactive tool that will provide climate change projections for the city. It will enable decision makers or city planners to make their development decisions with regard to climate change and hazards.

The **key next steps** are as follows:

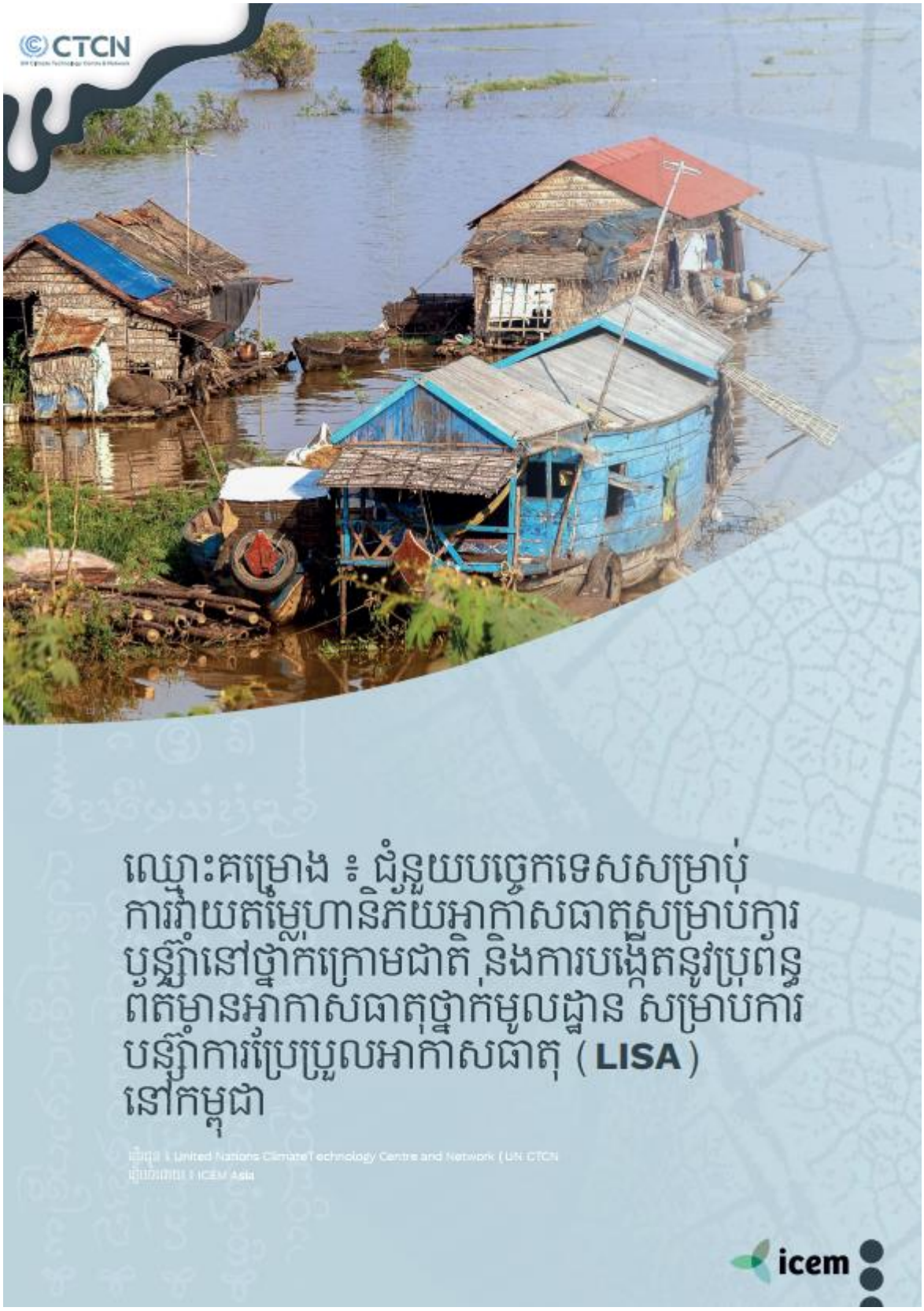
1. Ensure that the Letter of Agreement (LoA) between MoE and UN CTCN has been issued. Mr Sum Cheat to follow up on this matter[7].

2. ICEM proposed that the project is implemented at Battembang municipality, and H.E. Monyneath will consult with the Minister of MoE to seek agreement on this selection.

3. Subsequent meetings, including stakeholder consultations with MoWRAM and MPTC, can be organised once the LoA has been issued.

[7] An official letter from ICEM to MoE was sent to follow up on the meeting and to request resolution of the Letter of Agreement between UN-CTCN and MoE, and selection of Battambang municipality for LISA project implementation.

APPENDIX I: LISA PROJECT BROCHURE (KHMER VERSION)



ប្រវត្តិនៃគម្រោង

កម្ពុជាត្រូវបានទទួលស្គាល់ថាជាប្រទេសដែលងាយរងគ្រោះទៅនឹងគ្រោះមហន្តរាយធម្មជាតិ ហើយត្រូវបានចាត់ថ្នាក់លេខរៀងទី១៦ក្នុង ចំណោមប្រទេសដែលមានហានិភ័យបំផុតក្នុងពិភពលោក។ ដោយសារសមត្ថភាពបន្សាំនៅមានកម្រិត ហេដ្ឋារចនាសម្ព័ន្ធទន់ខ្សោយ និងការពឹងផ្អែកស្ទើរទាំងស្រុងទៅលើការប្រើប្រាស់ធនធានធម្មជាតិ ប្រទេសកម្ពុជាជាប្រទេសដែលងាយរងគ្រោះពីផលប៉ះពាល់នៃ ការប្រែប្រួលអាកាសធាតុ។ នៅទូទាំងប្រទេស កម្រិតទឹកភ្លៀង និងព្រឹត្តិការណ៍ទឹកជំនន់ធ្ងន់ធ្ងរក្នុងរដូវវស្សាត្រូវបានព្យាករណ៍ថា នឹងមានការកើនឡើង រួមជាមួយការកើនឡើងនូវសីតុណ្ហភាពមធ្យមប្រចាំឆ្នាំពី ០,៧-២,៧oC ក្នុងកំឡុងទសវត្សឆ្នាំ២០៦០ និង ១,៤-៤,៣oC ក្នុងកំឡុងទសវត្សឆ្នាំ២០៩០។ យោងទៅតាមរបាយការណ៍វាយតម្លៃលើកទី៦របស់ IPCC បានបញ្ជាក់ថា រយៈពេលនៃទឹកជំនន់នឹងអូសបន្លាយវែងជាងមុន ហើយកម្ពស់ទឹកជំនន់នឹងមានការកើនឡើងផងដែរ ដែលកត្តាទាំងនេះបណ្តាល មកពីការប្រែប្រួលអាកាសធាតុរួបផ្សំនឹងសកម្មភាពមនុស្ស។

ការប្រែប្រួលអាកាសធាតុអាចបណ្តាលអោយមានផលប៉ះពាល់ទៅលើវិស័យជាច្រើន។ ទឹកជំនន់ និងភាពរាំងស្ងួតបានគម្រាមកំហែងដល់វិស័យកសិកម្ម និងវិស័យធនធានទឹក ដែលការប្រែប្រួលអាកាសធាតុអាចមានឥទ្ធិពលទៅលើទិន្នផលស្រូវ តាមរយៈការប្រែប្រួលនៃសីតុណ្ហភាពនិងកម្រិតទឹកភ្លៀង។ ទឹកជំនន់ពីមុនៗ បានបន្សល់ទុកនូវការខូចខាតយ៉ាងធ្ងន់ធ្ងរដល់ហេដ្ឋារចនាសម្ព័ន្ធ ពិសេសសហគមន៍ដែលពឹងផ្អែកលើហេដ្ឋារចនាសម្ព័ន្ធទាំងនោះ។ ការបាត់បង់ និងខូចខាតទៅលើផ្លូវជាតិ និងផ្លូវជនបទ ពីព្រឹត្តិការណ៍ទឹកជំនន់ពីអតីតកាលក្នុងឆ្នាំ២០១១ និង២០១៣ ត្រូវបានប៉ាន់ប្រមាណថាមានតម្លៃប្រហែល ៣៥២,៨០ លានដុល្លារអាមេរិក។ ទឹកជំនន់គឺជាមូលហេតុចំបងដែលនាំអោយមានការខូចខាតដល់ហេដ្ឋារចនាសម្ព័ន្ធផ្លូវថ្នល់ ជាងគ្រោះរាំងស្ងួតនិងខ្យល់ព្យុះ។ ដើម្បីដោះស្រាយផលប៉ះពាល់ទាំងនេះ វាមានសារៈសំខាន់ដែលព័ត៌មានទាក់ទងនឹងគ្រោះមហន្តរាយនិងហានិភ័យអាកាសធាតុត្រូវបានប្រមូល រក្សាទុក វិភាគ ដំណើរការជាទៀតទាត់ និងប្រើប្រាស់ទៅក្នុងសកម្មភាពអាចធ្វើទៅបាននៅកាលៈទេសៈផ្សេងៗ អនុញ្ញាតអោយភាគីពាក់ព័ន្ធធ្វើការប្រើប្រាស់នូវព័ត៌មានទាំងនោះនៅក្នុងដំណើរការនៃការសម្រេចចិត្តនិងការរៀបចំផែនការ។

គម្រោងនេះនឹងរៀបចំជាប្រព័ន្ធព័ត៌មានអាកាសធាតុថ្នាក់មូលដ្ឋានសម្រាប់ការបន្ស៊ាំទៅនឹងការប្រែប្រួលអាកាសធាតុ ដែលហៅកាត់ថា LISA។ LISA នឹងធ្វើការប្រមូលផ្តុំ បង្កើតនូវទំព័រផ្សព្វផ្សាយផ្ទុកនូវទិន្នន័យពេញលេញនិងងាយស្រួលសម្រាប់អ្នកអាន ដែលប្រព័ន្ធនេះនឹងអនុញ្ញាតអោយអ្នកប្រើប្រាស់អាចធ្វើការស្រាវជ្រាវ ពិនិត្យមើលនូវសេណារីយ៉ូអាកាសធាតុក្នុងពេលអនាគត និងទទួលបានអត្ថប្រយោជន៍ក្នុងការព្យាករណ៍នូវផលប៉ះពាល់ដែលនឹងអាចកើតមាន និងការបង្កើតជម្រើសបន្សាំសម្រាប់ផែនការបង្កើនភាពធន់នឹងអាកាសធាតុនៅពេលអនាគត។ ការរៀបចំនូវគម្រោងLISAនឹងផ្តោតទៅលើការរកឃើញពាក់ព័ន្ធនឹងការវាយតម្លៃស្ថាប័ន ព័ត៌មានអាកាសធាតុ តម្រូវការអ្នកប្រើប្រាស់ និងហានិភ័យនៃការប្រែប្រួលអាកាសធាតុនៅកម្រិតក្រុង។

សារៈសំខាន់នៃប្រព័ន្ធព័ត៌មានអាកាសធាតុ គឺចូលរួមក្នុងការរៀបចំផែនការអភិវឌ្ឍន៍ប្រកបដោយចីរភាពនៅកម្ពុជា និងឆ្លុះបញ្ចាំងនៅក្នុងគម្រោងនានា និងនៅក្នុងគម្រោងមួយទៀតដែលកំពុងធ្វើការរៀបចំដោយ ICEM។ គំនិតផ្តួចផ្តើមថ្មីនេះរួមមាន ការរៀបចំនូវ ឧបករណ៍គាំទ្រការសម្រេចចិត្តដោយផ្អែកលើចំណេះដឹង ដើម្បីធ្វើការពង្រឹងផែនការចីរភាពក្នុងបរិបទនៃការប្រែប្រួលអាកាសធាតុក្នុងតំបន់ដីសណ្តទន្លេមេគង្គ និងនៅកម្រិតខេត្ត និងមូលដ្ឋាននៃប្រទេសកម្ពុជា។ រូបភាពទី១ គឺត្រូវបានរៀបចំឡើងដើម្បីគាំទ្រដល់អណត្តិរបស់ក្រសួងពាក់ព័ន្ធនានារបស់រាជរដ្ឋាភិបាលកម្ពុជា លើការអភិវឌ្ឍន៍ធន់នឹងអាកាសធាតុ។

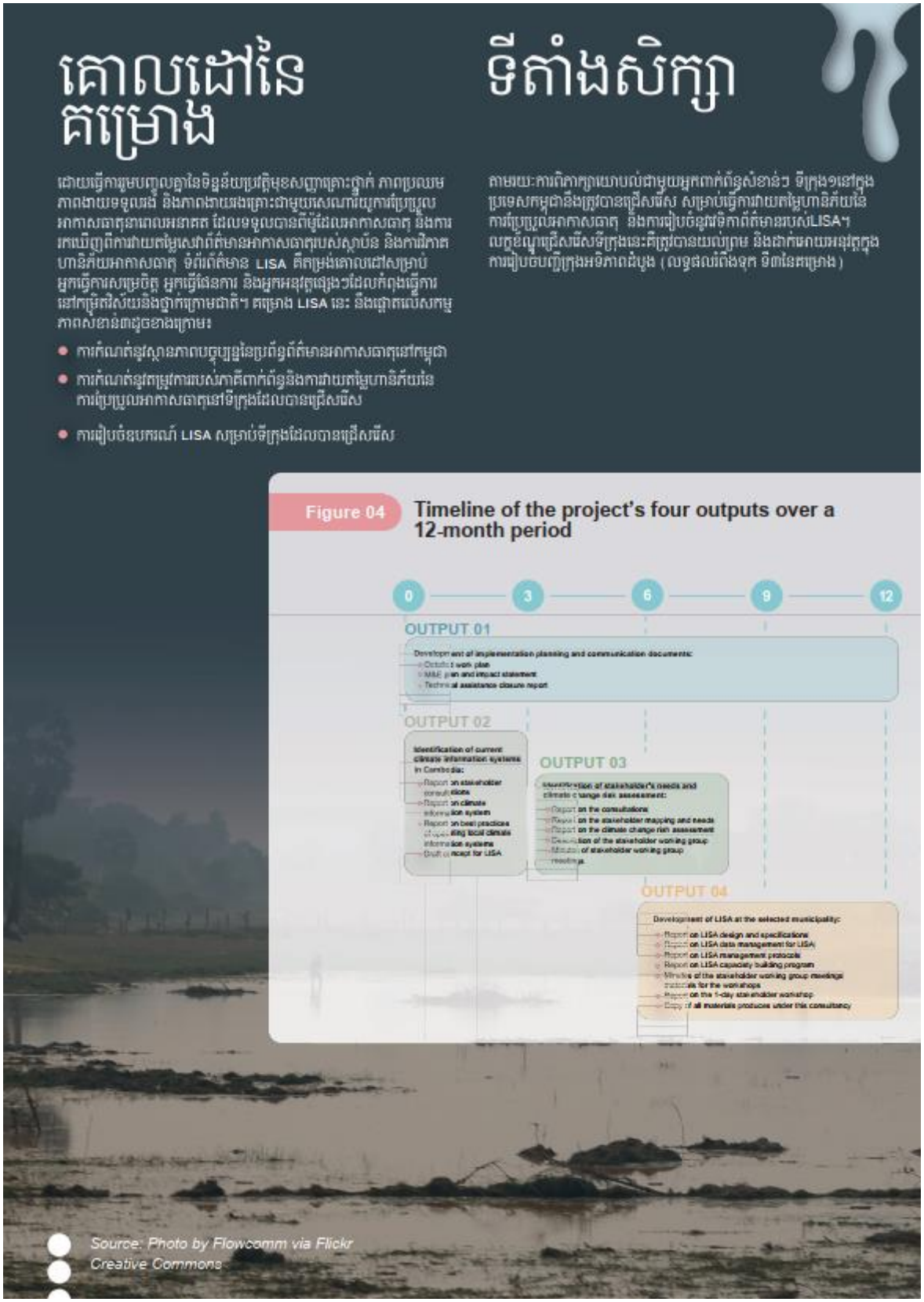
Figure 01 Cambodia Mekong Delta Digital Atlas: national and rural roads in the Cambodian Mekong Delta

Figure 02 Cambodia Climate Change Toolbox

ឧបករណ៍ព្យាករណ៍ការប្រែប្រួលអាកាសធាតុនៅកម្ពុជា ដែលដាក់ដំណើរការដោយ ICEM នៅឆ្នាំ២០២០ គឺជាលទ្ធផលដ៏ធំមួយក្នុងកិច្ចការបញ្ជ្រាបនូវភាពធន់នឹងអាកាសធាតុទៅក្នុងផែនការអភិវឌ្ឍន៍ និងក្នុងគម្រោងនៅកម្ពុជា។ ឧបករណ៍ព្យាករណ៍ការប្រែប្រួលអាកាសធាតុនៅកម្ពុជា (រូបភាពទី២) គឺអាចចូលប្រើដោយចំហ ដែលវាផ្តល់នូវការព្យាករណ៍ជាមុន និងទិន្នន័យពីប៉ារ៉ាម៉ែត្រអាកាសធាតុនៅកម្ពុជា នៅថ្នាក់ជាតិ ខេត្ត ស្រុក និងមូលដ្ឋាន។

ឧបករណ៍គាំទ្រដល់ការសម្រេចចិត្តមួយទៀតដែលស្ថិតក្នុងដំណាក់កាលនៃការរៀបចំ សម្រាប់រាជរដ្ឋាភិបាលកម្ពុជា គឺគម្រោងរួមគ្នាសម្រាប់ការគ្រប់គ្រងនូវគ្រោះទឹកជំនន់និងរាំងស្ងួតនៅក្នុងតំបន់អាងទឹករងទន្លេមេគង្គ 9C-9T។ ការបែងចែកនៅក្នុងតំបន់អាងទឹករងទន្លេមេគង្គ 9C-9T រួមមានអាងស្តុកទឹកផ្នែកខាងលើនៃប្រភពទឹកបឹងទន្លេសាបដែលមានទីតាំងក្នុងប្រទេសថៃ និងស្ទឹងមង្គលបូរីដែលជាអាងស្តុកទឹក ផ្នែកខាងក្រោមស្ថិតក្នុងប្រទេសកម្ពុជា។ គោលបំណងនៃការធ្វើផែនទីតំបន់អាងទឹករងទន្លេមេគង្គ 9C-9T គឺដើម្បីជូនដំណឹងអំពីការរៀបចំផែនការ ការគ្រប់គ្រង និងការវិនិយោគនៃអាងទន្លេមេគង្គក្នុងការកសាងនូវភាពធន់ទៅនឹងទឹកជំនន់ និងគ្រោះរាំងស្ងួត (រូបភាពទី៣)។

Figure 03 9C9T Subbasin Atlas


គោលដៅនៃគម្រោង
ទីតាំងសិក្សា
ដោយធ្វើការរួមបញ្ចូលគ្នានៃទិន្នន័យប្រវត្តិមុខសញ្ញាគ្រោះថ្នាក់ ភាពប្រឈមភាពងាយទទួលរង និងភាពងាយរងគ្រោះជាមួយសេណារីយូការប្រែប្រួលអាកាសធាតុនាពេលអនាគត ដែលទទួលបានពីម៉ូដែលអាកាសធាតុ និងការកេឃើញពីការវាយតម្លៃសេវាព័ត៌មានអាកាសធាតុរបស់ស្ថាប័ន និងការវិភាគហានិភ័យអាកាសធាតុ ទំព័រព័ត៌មាន LISA គឺគម្រង់គោលដៅសម្រាប់អ្នកធ្វើការសម្រេចិត្ត អ្នកធ្វើផែនការ និងអ្នកអនុវត្តផ្សេងៗដែលកំពុងធ្វើការនៅកម្រិតវិស័យនិងថ្នាក់ក្រោមជាតិ។ គម្រោង LISA នេះ និងផ្តោតលើសកម្មភាពសំខាន់ៗដូចខាងក្រោម៖
តាមរយៈការពិភាក្សាយោបល់ជាមួយអ្នកពាក់ព័ន្ធសំខាន់ៗ ទីក្រុង១នៅក្នុងប្រទេសកម្ពុជានឹងត្រូវបានជ្រើសរើស សម្រាប់ធ្វើការវាយតម្លៃហានិភ័យនៃការប្រែប្រួលអាកាសធាតុ និងការរៀបចំនូវទិន្នាព័ត៌មានរបស់LISA។ លទ្ធផលជ្រើសរើសទីក្រុងនេះគឺត្រូវបានយល់ព្រម និងដាក់មកយោរអនុវត្តក្នុងការរៀបចបញ្ជីក្រុងអទិភាពជំបូង (លទ្ធផលពីឯកសារ ទីពាក់ព័ន្ធគម្រោង)
Figure 04
Timeline of the project's four outputs over a 12-month period
0
3
6
9
12
OUTPUT 01
OUTPUT 02
OUTPUT 03
OUTPUT 04
Source: Photo by Flowcomm via Flickr Creative Commons

លទ្ធផលសំខាន់ៗ

លទ្ធផលទី១ ៖

ការបង្កើតនូវការងារចំនួន៣៖ ១)ផែនការការងារលេម្អិត (រូបភាពទី៤), ២) ផែនការការងារតាមដាននិងវាយតម្លៃ(ME) និងការកំណត់ផលជៈ នៃគម្រោង, ៣)របាយការណ៍បិទបញ្ចប់ជំនួយបច្ចេកទេស។

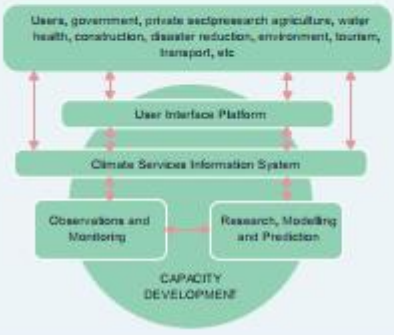
លទ្ធផលទី២ ៖

ការកំណត់នូវស្ថានភាពបច្ចុប្បន្ននៃប្រព័ន្ធព័ត៌មានអាកាសធាតុនៅក្នុង ប្រទេសកម្ពុជា។ លទ្ធផលនេះ៖ គឺមានការងារមួយចំនួនដូចខាងក្រោម៖

- D2.1 របាយការណ៍ស្តីពីកិច្ចប្រជុំចាប់ផ្តើមគម្រោង និងការពិគ្រោះ យោបល់ជាមួយភាគីពាក់ព័ន្ធ
- D2.2 របាយការណ៍ស្តីពីការពិនិត្យមើលពីប្រព័ន្ធព័ត៌មាន អាកាសធាតុនៅប្រទេសកម្ពុជា
- D2.3 របាយការណ៍ស្តីពីការអនុវត្តល្អៗនៃការអនុវត្តប្រព័ន្ធព័ត៌មាន អាកាសធាតុនៅមូលដ្ឋាន
- D2.4 ការផ្តើមគំនិត និងសេចក្តីព្រាងលើកដំបូង LISA

កិច្ចពិភាក្សានៃភាគីពាក់ព័ន្ធនឹងផ្តល់នូវឱកាសដល់ក្រុមការងារបច្ចេកទេស TA team) ដើម្បីធ្វើការពិនិត្យលើប្រព័ន្ធព័ត៌មានអាកាសធាតុក្នុង ប្រទេស កម្ពុជា ដែលស្របតាមការណែនាំពីក្របខណ្ឌសកលរបស់WMO សម្រាប់សេវាកម្មព័ត៌មានអាកាសធាតុ(រូបភាពទី៥)។ ដើម្បីធ្វើការ វាយតម្លៃការអនុវត្តល្អៗនាពេលបច្ចុប្បន្ន ក្នុងការប្រើប្រាស់ទិន្នន័យនិង ព័ត៌មានអាកាសធាតុរបស់ក្រុងនានា ក្រុមការងារបច្ចេកទេសនឹងធ្វើការ ពិនិត្យលើឯកសារដែលមានស្រាប់ទាក់ទងនឹងប្រព័ន្ធព័ត៌មានអាកាសធាតុ ដែលមាននៅក្នុងប្រទេសអភិវឌ្ឍន៍ និងប្រទេសកំពុងអភិវឌ្ឍន៍។ ឧបករណ៍ អាកាសធាតុទាំងនេះនឹងត្រូវបានវាយតម្លៃ ជួយក្នុងការរៀបចំប្រព័ន្ធ LISA និងការជ្រើសរើសនូវភាគីពាក់ព័ន្ធសមស្រប។ គំនិតក្នុងការរៀបចំនូវ បសាយLISAនឹងត្រូវបានគាក់តែងឡើងដោយក្រុមការងារបច្ចេកទេស ដោយធ្វើការសហការជាមួយនាយកដ្ឋានប្រៃប្រួលអាកាសធាតុនៃ ក្រសួងបរិស្ថាន និងអ្នកពាក់ព័ន្ធផ្សេងៗទៀត។

Figure 05 **Guiding framework for the assessment of the current status of climate information systems**



លទ្ធផលទី៣ ៖

ការកំណត់នូវតម្រូវការរបស់អ្នកពាក់ព័ន្ធ និងការវាយតម្លៃហានិភ័យ ការប្រែប្រួលអាកាសធាតុ នៅទីក្រុងដែលបានជ្រើសរើសព័ត៌មាន អាកាសធាតុនៅក្នុងប្រទេសកម្ពុជា។ លទ្ធផលទី៣នេះ៖ គឺមានសកម្មភាព ចំនួន៥ ដែលត្រូវធ្វើក្នុងរយៈពេល៦ខែ៖

- D3.1 របាយការណ៍ស្តីពីកិច្ចពិភាក្សាដើម្បីធ្វើការជ្រើសរើសនូវ ទីក្រុងដែលសមស្របដើម្បីរៀបចំLISA
- D3.2 របាយការណ៍ស្តីពីការធ្វើផែនទីអ្នកពាក់ព័ន្ធដែលមានសក្តានុ ពលនៅថ្នាក់ក្រុង និងការស្វែងយល់ព័ត៌តម្រូវការរបស់ពួកគាត់
- D3.3 របាយការណ៍ស្តីពីការវាយតម្លៃហានិភ័យការប្រែប្រួល អាកាសធាតុ សម្រាប់ក្រុងដែលបានជ្រើសរើស
- D3.4 ការបើយាយលម្អិតនៃក្រុមការងារ អ្នកពាក់ព័ន្ធរួមមាន ឈ្មោះ ព័ត៌មានទំនាក់ទំនងរបស់សមាជិក ស្ថាប័នរបស់ពួកគាត់និង យេនឌ័រ
- D3.5 របាយការណ៍ស្តីពីកិច្ចប្រជុំនៃក្រុមការងារបច្ចេកទេស ដោយមានឈ្មោះ និងព័ត៌មានអ្នកចូលរួម យេនឌ័រ សម្ភារៈដែលបាន ប្រើប្រាស់ និងសេចក្តីសង្ខេបនៃកិច្ចពិភាក្សា

ការវាយតម្លៃហានិភ័យការប្រែប្រួលអាកាសធាតុ ដែលត្រូវធ្វើឡើងនៅក្នុង ទីក្រុង គឺនឹងធ្វើតាមវិធីសាស្ត្រ CAM's methodology របស់ ICEM។ វិធីសាស្ត្រនេះ៖ គឺមានបញ្ចូលនូវការអនុវត្តល្អនានាពីបទពិសោធក្នុងវិទ្យាសាស្ត្រ ការប្រែប្រួលអាកាសធាតុ ជាមួយវិធីសាស្ត្រវាយតម្លៃដែលមានអណាៈអ ណាចរឹងមាំ។ ជាយន្តការមួយ ដែលត្រូវបង្ហាញពីការបង្កើត LISA នោះ៖ និងមានកិច្ចប្រជុំតាមអនឡាញមួយ ដើម្បីជម្រាបដល់ភាគីពាក់ព័ន្ធនានា អំពីកន្លែងដែលលទ្ធផលនៃការវាយតម្លៃហានិភ័យការប្រែប្រួល អាកាសធាតុ និងសកម្មភាពដំបូងដែលបានធ្វើ បានចែករំលែក។

លទ្ធផលទី៤ ៖

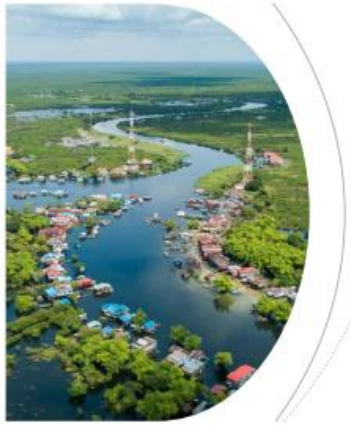
ការរៀបចំប្រព័ន្ធ LISA នៅទីក្រុងដែលបានជ្រើសរើសើស លទ្ធផលនេះ៖ រួមមានការរៀបចំនូវ លទ្ធផលចំនួន៨ ដែលមានសកម្មភាពចាប់ផ្តើម នៅក្នុងខែទីផ្នែកគម្រោង និងត្រូវបន្តក្នុងរយៈពេល៦ខែរហូតដល់គម្រោង បញ្ចប់៖

- D4.1 របាយការណ៍នៃការរៀបចំមាតិកា និងព័ត៌មានស្តីអំពីLISA ដោយរួមមានការសាកល្បងដំបូងនៃប្រព័ន្ធ(ផបសាយ) និងលទ្ធផល សាកល្បង
- D4.2 របាយការណ៍នៃការរៀបចំដាក់ដំណើរការគ្រប់គ្រងទិន្នន័យ របស់LISA
- D4.3 របាយការណ៍នៃពិធីសារគ្រប់គ្រងLISA
- D4.4 របាយការណ៍នៃកម្មវិធីកសាងសមត្ថភាពសម្រាប់ការប្រើ ប្រាស់ប្រកបដោយប្រសិទ្ធភាពនៃLISA
- D4.5 របាយការណ៍នៃកិច្ចប្រជុំក្រុមបច្ចេកទេសភាគីពាក់ព័ន្ធ ដោយមានរួមបញ្ចូលនូវបញ្ជីឈ្មោះអ្នកចូលរួម យេនឌ័រ សម្ភារៈ ប្រើប្រាស់ និងសេចក្តីសង្ខេបនៃកិច្ចពិភាក្សា
- D4.6 សម្ភារៈសម្រាប់សិក្ខាសាលា ផ្តេចាបមបង្ហាញ ស៊ុ ការស្វង់មតិស្តីពីការពេញចិត្ត
- D4.7 របាយការណ៍នៃសិក្ខាសាលាអ្នកពាក់ព័ន្ធមានរយៈ១ថ្ងៃ សម្រាប់ពាក់ព័ន្ធភាគីបាលនិងភាគីពាក់ព័ន្ធ
- D4.8 ចម្លងនូវឯកសារ ដែលបានផលិតដោយក្រុមទីប្រឹក្សា អនុវត្តគម្រោងនេះ៖ រួមទាំងកូដកម្មវិធី និងទិន្នន័យដើមគ្រា)

APPENDIX II: PRESENTATION: PROJECT PROGRESS UPDATE MEETING WITH THE GENERAL SECRETARIAT OF NCSD

1. Presentation on Project updates

11/14/2022



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

Project Progress Update Meeting with the General Secretariat of NCSD

20 Sept 2022

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11/14/2022

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)

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Outline

- Project summary and TA Team Members
- Project overview and key deliverables
- Progress to-date
- Selection of municipality
- Immediate next steps
- Government focal points

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TA TEAM MEMBERS

2

11/14/2022

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.

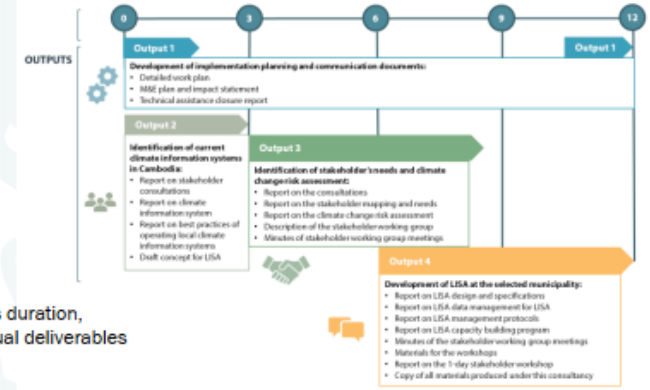
11/14/2022

OUTPUT 2: Identification of the current status of the climate information systems in Cambodia

2.1 A kick-off meeting and stakeholder consultations

- Introduction of TA team
- Overview of project objectives, activities and deliverables
- Understand and assess the expectations of stakeholders about the TA
- Understand the process of climate change information generation and dissemination at local/national levels in Cambodia

PROJECT OVERVIEW AND KEY DELIVERABLES



- 12 months duration,
- 20 individual deliverables

OUTPUT 2: Identification of the current status of the climate information systems in Cambodia

2.2 Review of the climate information systems in Cambodia

11/14/2022

OUTPUT 2: Identification of the current status of the climate information systems in Cambodia

2.3 Investigation of best practices of operating local climate information systems

- Best practices:
  - Generation and dissemination of climate data information
  - Adopted web-based systems (data platforms/software frameworks)
  - International experiences for municipalities:
    - UN agencies (consult with CTCN)
    - Identify existing local municipal climate information systems

11/14/2022

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

- Potential criteria include the following:
  - The availability of climate, environmental, social and economic data and information
  - The history of hydrometeorological events that have caused significant social, environmental and economic impacts to the municipality.
  - Working relationship between national government and municipality
  - Battambang is looking as the preferred choice based on discussions with MoWA, NCDD and NCDM

OUTPUT 2: Identification of the current status of the climate information systems in Cambodia

2.4 Initial considerations and draft concept for LISA

- Users
- Content/features/functionality
- Software framework
- Government capacity to host
- Training requirements

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

- **Battambang** is looking as the preferred choice following discussions with MoWA, NCDD and NCDM
- Impacted by flooding caused by intense rainfall and river overflow
- Relatively good access to data and information
- Commitment to addressing impacts from climate change

Output 3: Identification of stakeholder's needs and climate change risk assessment at the selected municipality

3.2 Mapping of potential stakeholders at the selected municipality and survey of their needs

- Questionnaire to identify primary beneficiaries and needs

Output 3: Identification of stakeholder's needs and 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
- E3 Meeting with the stakeholder working group (needs and risk assessment) (linked to activity 3.5) sharing outputs from activities 2.3, 3.2 and 3.3. Feedback to feed into Activity 4.1.

Output 3: Identification of stakeholder's needs and climate change risk assessment at the selected municipality

3.3 Climate change risk assessment at the selected municipality

- The results of the assessment will include climate risk mapping at the selected municipality and for prioritized sectors (e.g., agriculture, human health, water, etc.)
- CAM methodology

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

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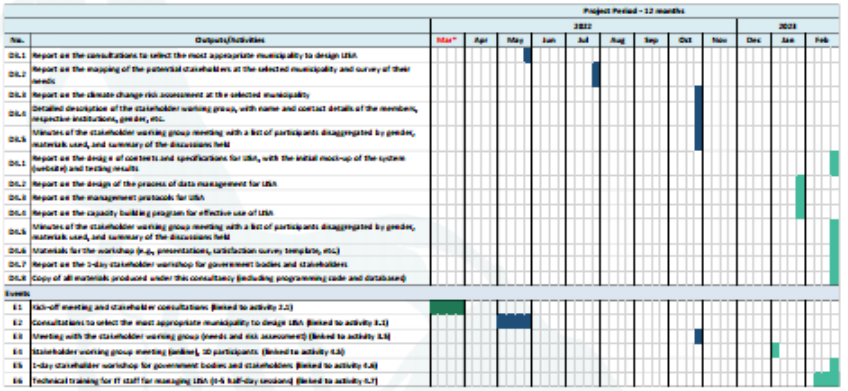
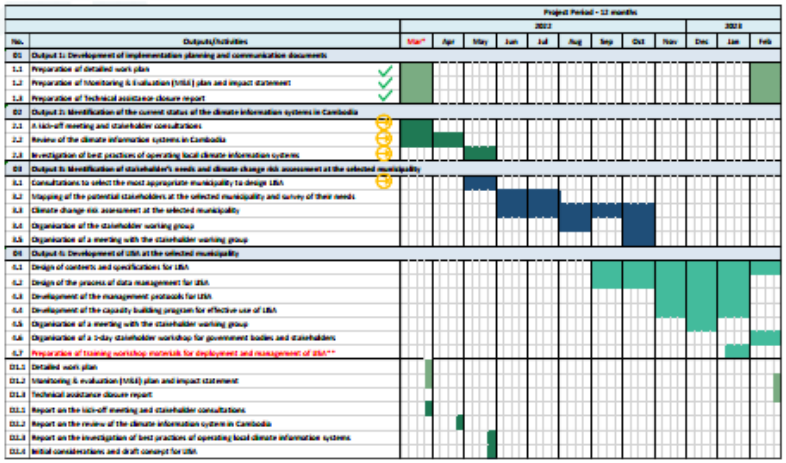
Output 4: Development of LISA at the selected municipality

- 4.5 Organization of a meeting with the stakeholder working group
  - E4. stakeholder working group meeting. The results of Activities 4.1, 4.2, 4.3 and 4.4 will be shared.
- 4.6 Organization stakeholder workshop for government bodies and stakeholders
  - E5. stakeholder workshop for government bodies and stakeholders (linked to activity 4.6)





Progress to-date

Completed tasks:

- ✓ Preparation of detailed work plan
- ✓ Preparation of M&E plan and impact statement
- ✓ Preparation or Technical Assistance Closure Report
- A kick-off meeting and stakeholder consultations:
  - ✓ MoE
  - ✓ NCDD
  - ✓ NCDM
  - ✓ MOWA
  - ✗ MoWRAM
  - ✗ MPTC

  } Awaiting approval from MoE

Progress to-date

Ongoing activities:

- Review of climate information systems in Cambodia
- Investigation of best practices in operating climate information systems
- Initial considerations and draft concept for LISA

Expected completion by end of Oct 2022.

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

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
   - Preliminary Atlas:
   - https://1drv.ms/u/s!AoHzL3uXbH31jgu1xilN5ABSKdfy?e=JCqMpS
5. Ongoing ICEM projects in region and professional network
   - WB, ADB, GIZ/MRC.
6. Data analysis to support selection

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)	Poverty rate	% urban area	Population	Wet season rainfall change	Sum of score	Ranked	Data available	Commitment to CC
Serei Saophoan	BANTEAY MEANCHEY	0.65	5.8	94,979	18.25	3	2	4	4	13	5		
Paoy Paet	BANTEAY MEANCHEY	0.92	3.4	110,691	19.42	4	3	4	2	13	5		
Bat Dambang	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 Chhnang	KAMPONG CHHNANG	1.20	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 Khmau	KANDAL	21.54	5	74,273	7.36	1	5	4	3	13	5		
Khemarakphumint	KOH KONG	1.59	-5.4	38,671	7.43	1	4	1	0	6	24		
Kratcheh	KRATIE	2.00	5.4	31,673	18.96	4	4	1	3	12	8		
Saen Monourom	MONDUL KIRI	0.05	5.6	14,213	21.03	5	1	1	4	11	10		
Preah Vihear	PREAH VIHEAR	0.07	4	23,602	22.42	5	1	2	2	9	17		
Prey Veaeng	PREY VENG	0.95	6.1	25,579	10.09	1	3	1	4	9	17		
Pousat	PURSAT	0.03	4.2	67,055	18.87	4	1	4	2	11	10		
Ban Lung	RATANAK KIRI	0.14	5	30,483	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 Traeng	STUNG TRENG	0.04	3.8	31,214	21.03	5	1	1	2	9	17		
Svay Rieng	SVAY RIENG	1.90	6.7	47,037	13.27	2	4	3	5	14	3		
Bavet	SVAY RIENG	0.14	6.5	39,744	10.99	2	2	2	5	11	10		
Doun Kaev	TAKEO	0.98	3	44,130	13.86	2	3	3	1	9	17		
Samraong	OTDAR MEANCHEY	0.01	7	62,615	27.53	5	1	3	5	14	3		
Kaeb	KEP	0.00	-2.3	21,018	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	9.13	1	2	2	4	7	22		

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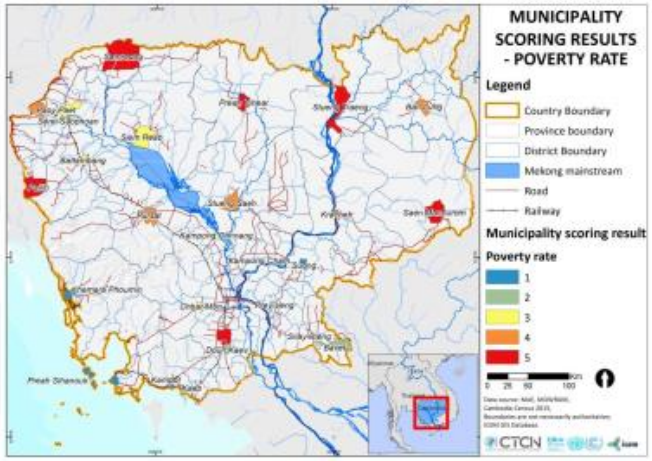

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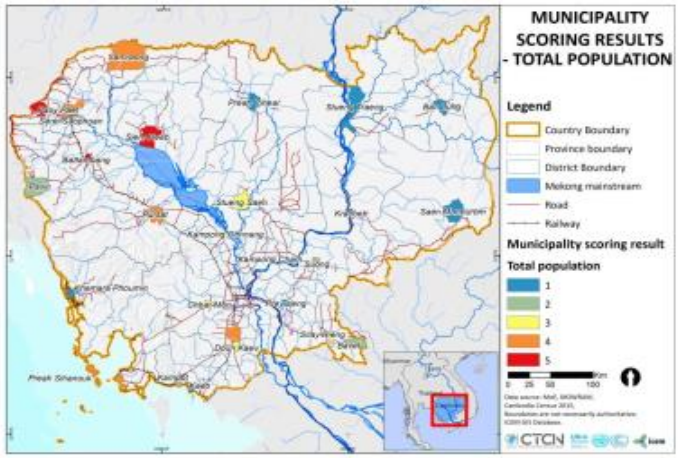

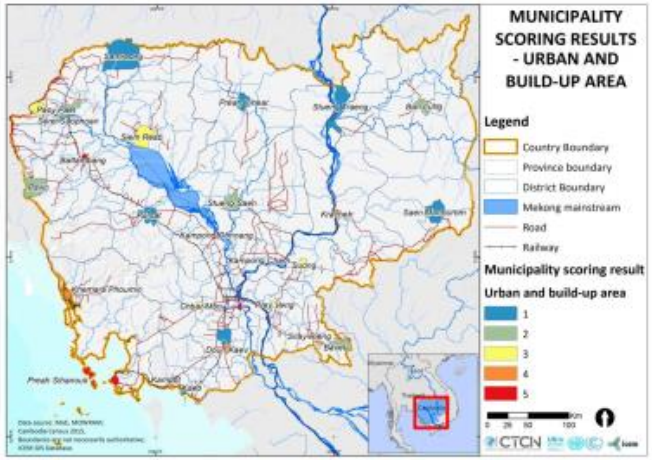

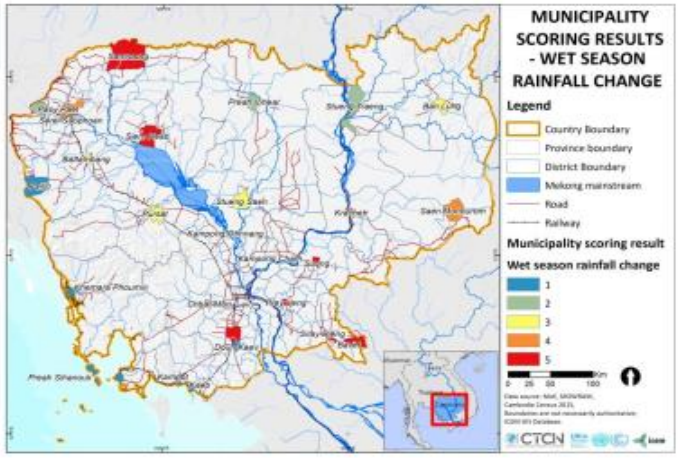

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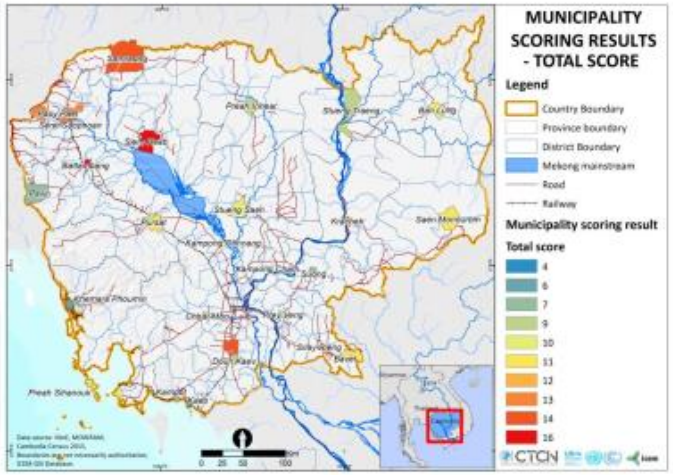

Immediate next steps

- We would like to propose Battambang as municipality:
  - Seek approval from MoE for selection?
- Address project implementation delays:
  - Is there a need for a meeting for municipality selection?
    - Challenge bringing together everyone at agreed date and time given other commitments? Yet to meet MoWRAM, MPTC?
    - If meeting needed, virtual/remote short meeting on 26 Oct 2022 ?
  - Modify Implementation Plan to facilitate project implementation:
    - In the TA Response Plan ToR: 'To allow for the design of LISA to be conducted within the limited time of the TA, the municipality to be selected should be the one with adequate access to data.'
- Meet with MoWRAM and MPTC: approval letters
- Identify LISA stakeholders/establish group in municipality
- Conduct climate change risk assessment (after municipality selection).

Preliminary Atlas of Battambang

https://1drv.ms/u/s!AoHzL3uXbH31jgu1xiIN5ABSKdfy?e=JCqMpS

Government focal points

Institution	Name	Contact
National Committee for Sub-national Democratic Development Secretariat (NCDD)	Mr. Sorn Sunsopheak	Email: sssopheak@ncdd.gov.kh Phone: 012 922 123
Ministry of Water Resources and Meteorology (MoWRAM)	Mr. Thach Sovanna	Email: thachsovanna@yahoo.com Phone: 012 890 321
Ministry of Women Affair (MoWA)	Ms. Chhan Ratha	Email: ratha.my.chhan@gmil.com Phone: 017 642 261
National Committee for Disaster Management (NCDM)	Mr. Leng Heng An	email: lengheng_an@yahoo.com Phone: 01282 6402
Ministry of Post and Telecommunication (MPTC)	TBD	email: Phone:

15

16

2. Presentation on Atlas for Battambang Municipality

11/14/2022

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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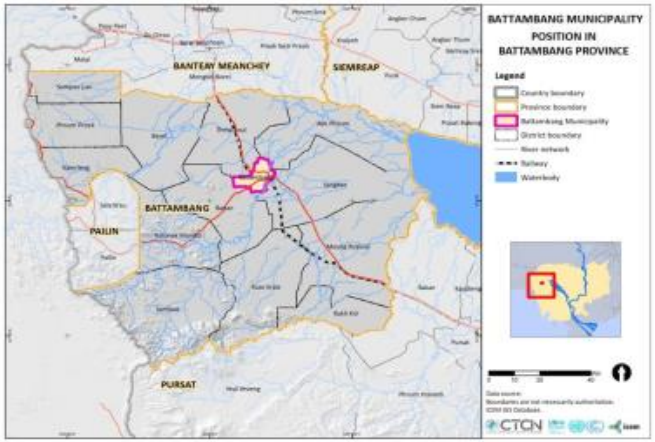
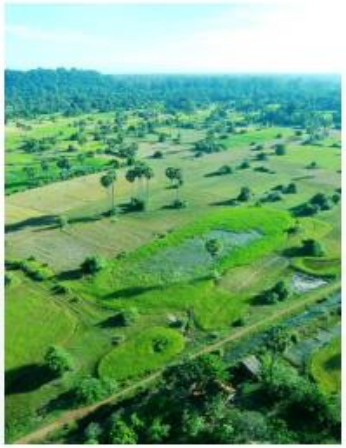
Location

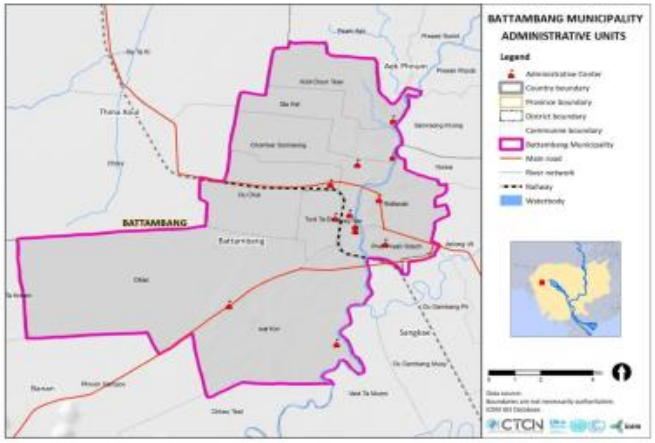


Administrative units

- Province/ Municipality/ District
- Commune
- Settlements/population density



Administrative units



2

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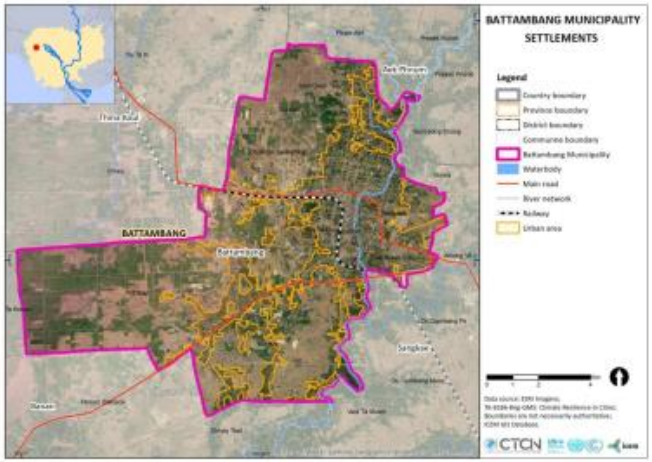
Municipality settlements

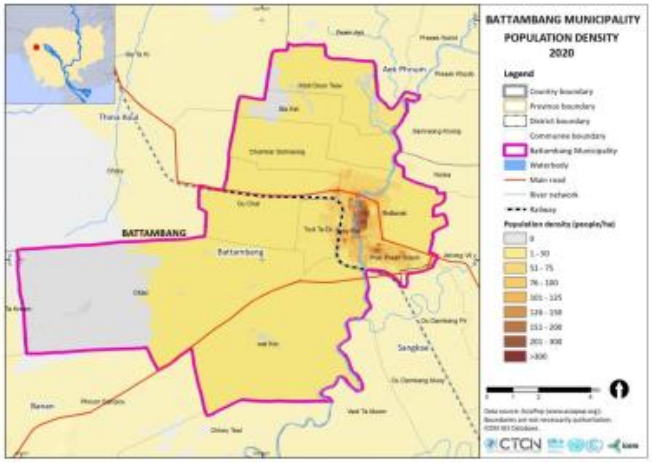


3

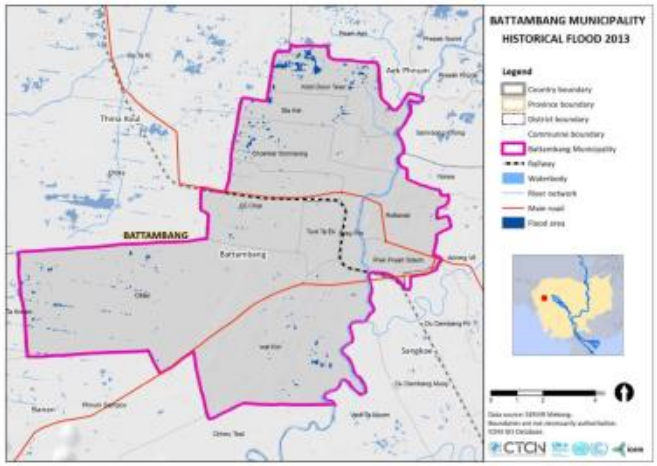
Hazards

- Flood
  - Historical flood
  - Future
- Landslide/erosion
- Wildfire
- Cyclone
- Climate Change
  - Temperature
  - Rainfall

Population



Flood - Historical



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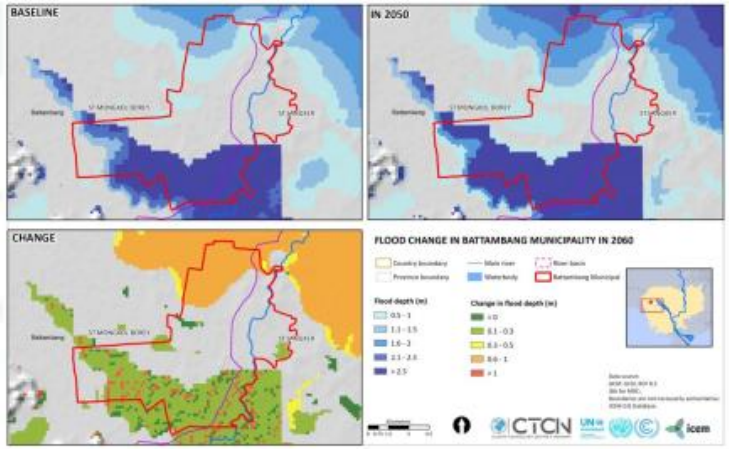
Flood - Scenarios



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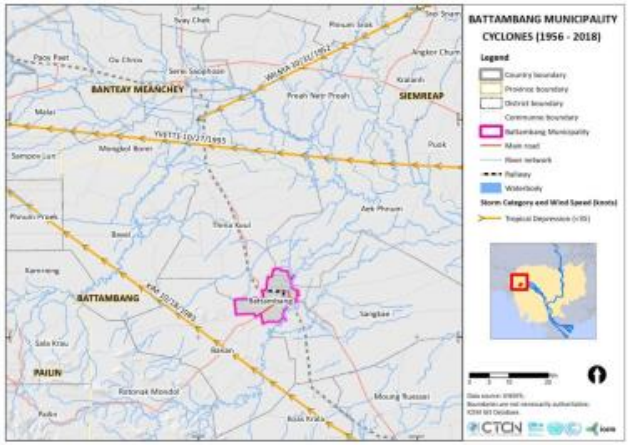
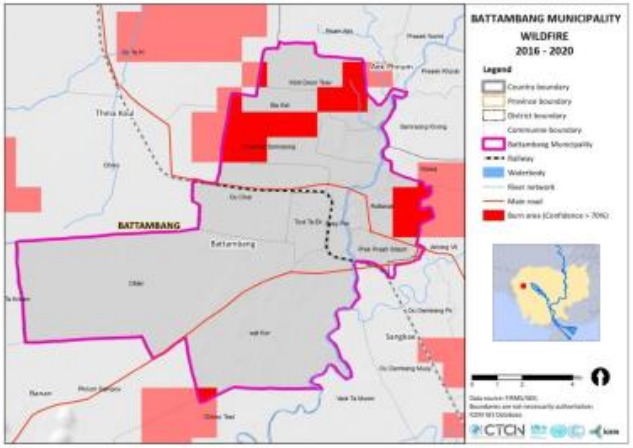
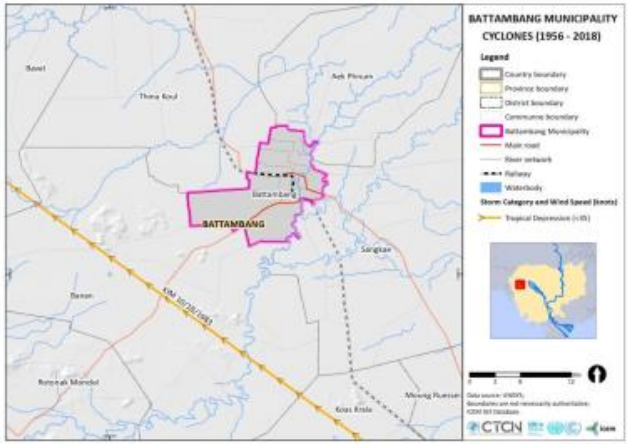
Cyclones



Wildfire



Cyclones



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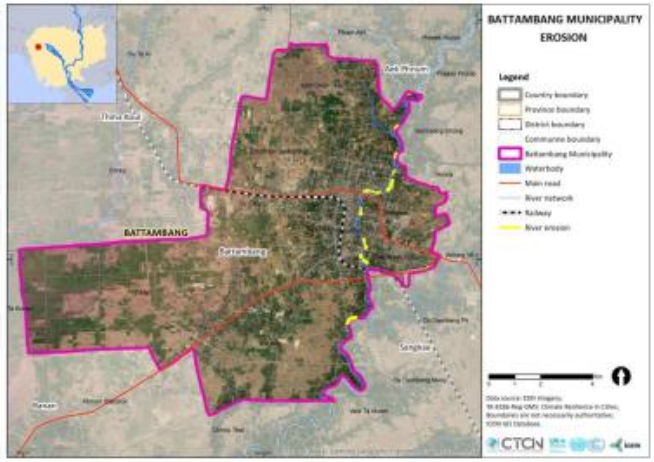
Erosion



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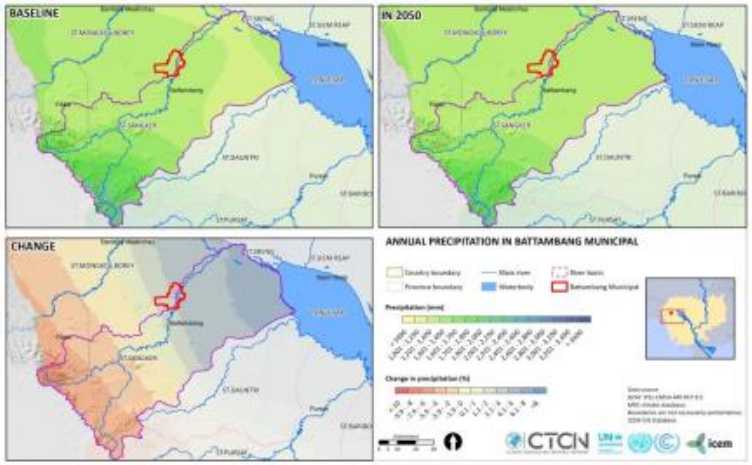
Climate Change – Precipitation



Climate change

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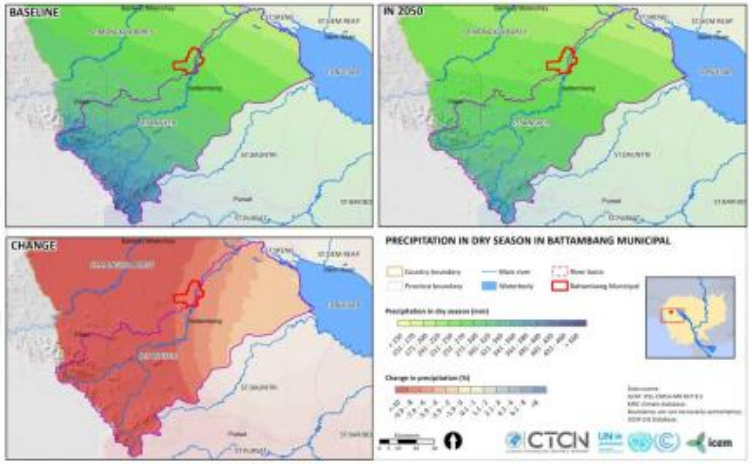
Climate Change – Precipitation



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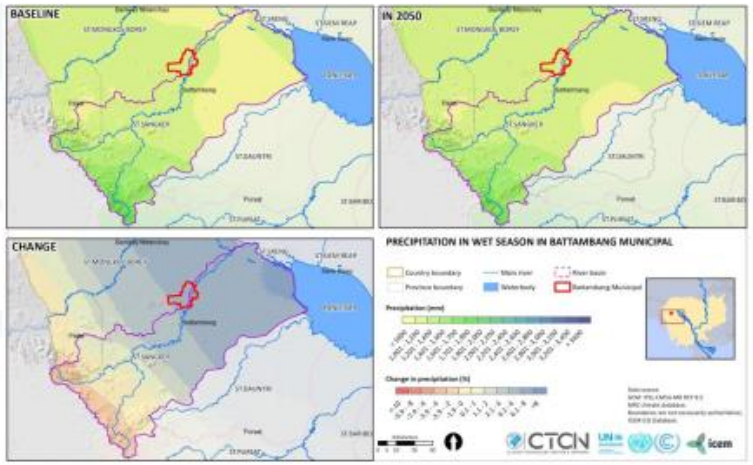
Climate Change – Precipitation



Precipitation Change

Season	Pr Baseline (mm)	Pr 2050 (mm)	Change (%)
Annual	1295.2	1320.5	1.9
Dry season	250.6	234.4	-8.9
Wet season	1,045	1,092	4.5

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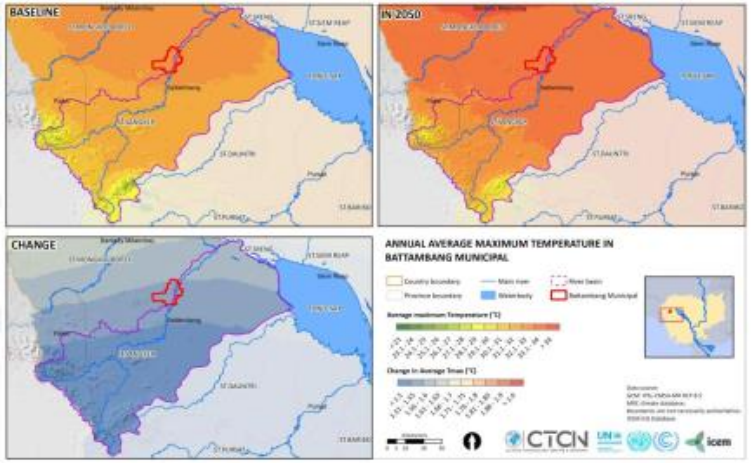
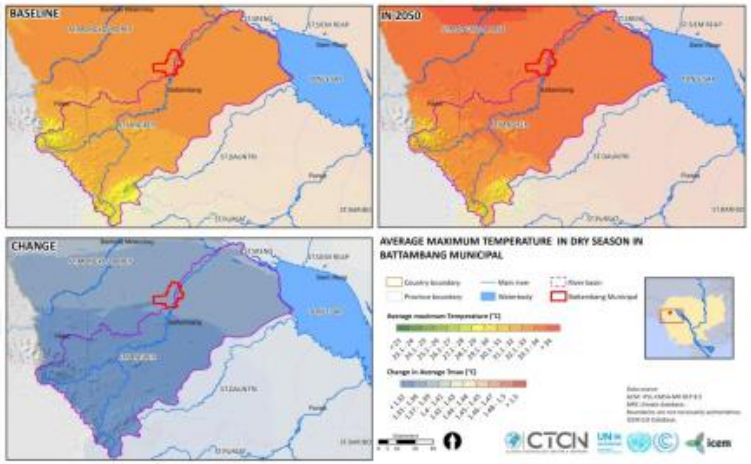
Climate Change - Temperature



Climate Change - Temperature



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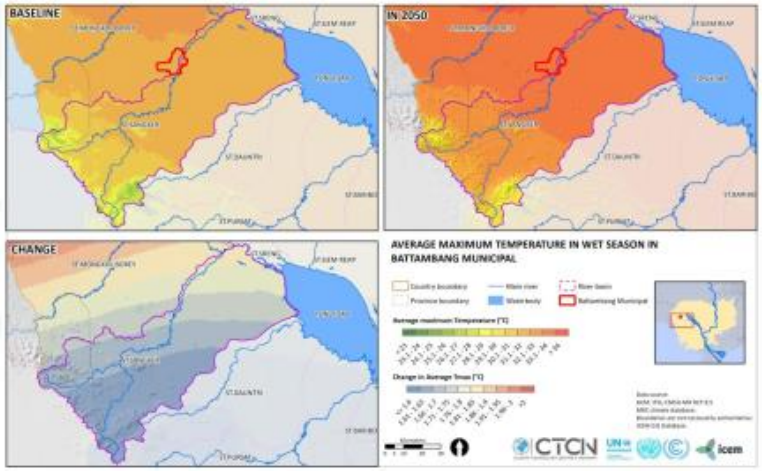
Climate Change - Temperature



Land use / land cover

- Existing land use
- Master Plan 2030
- Land cover 2017
- Public facilities

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Temperature Change

Season	Temp Baseline (°C)	Temp 2050 (°C)	Change (%)
Annual	32.1	33.7	1.5
Dry season	32.4	33.7	1.3
Wet season	31.9	33.6	1.7

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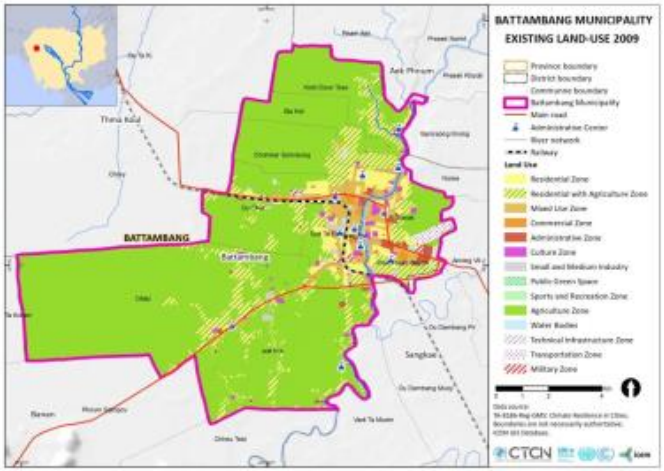
Land-use - Existing



11

12

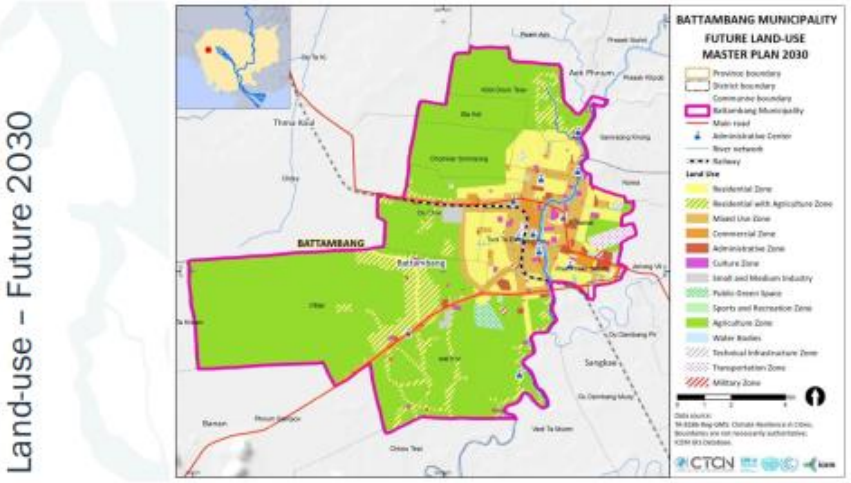
11/14/2022

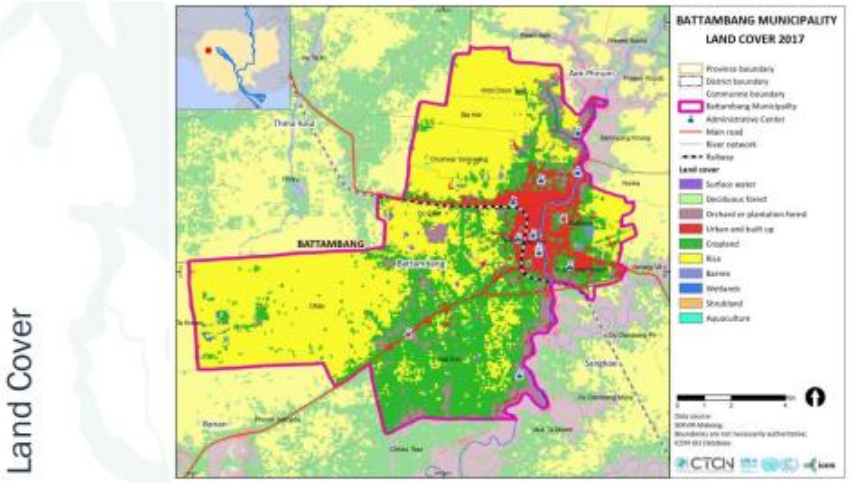
Area of Land-use types by commune - in 2009 (ha)

Area (ha) / Commune Name	Administrative Zone	Agriculture Zone	Commercial Zone	Culture Zone	Military Zone	Mixed Use Zone	Public Green Space	Residential with Agriculture Zone	Residential Zone	Small and Medium Industry	Sports and Recreation Zone	Technical Infrastructure Zone	Transportation Zone	Water Bodies	Total
Anlong Vil		0.4											0.0		0.5
Chheu Teal		0.0												5.5	5.5
Chomkar Somraong	7.7	644.8	2.1	4.8		67.3	1.8	53.9	89.1	2.0				1.7	877.1
Chrey		2.6						1.4							4.1
Kdol Doun Teav	3.6	737.3		2.4		9.5		126.3	9.7	1.0				15.7	905.5
Norea		10.1												2.5	12.6
Ohtal	7.5	3,410.3		9.1		8.4		310.7	2.1	9.3					3,757.4
Ou Char	5.3	838.1		0.9	8.3	83.9	0.0	150.1	71.1	15.2		3.5			1,176.3
Ou Dambang Muoy		0.1				0.1		1.1	0.2					10.1	11.6
Ou Dambang Pir		1.9						11.1	0.7	1.5					15.2
Ou Ta Ki		0.2													0.2
Peam Aek		0.0													0.0
Phnum Sampov		0.1						1.3							1.4
Preaek Khpob														13.8	13.8
Preaek Luong														6.3	6.3
Preaek Norint														7.8	7.8
Prek Preah Sdach	26.7	7.3	10.3	3.6	0.3	53.4	0.3	123.4	39.8	5.6	0.3			8.3	279.4
Rottanak	36.7	232.4	1.3	39.1	9.5	102.7	6.6	73.6	81.0	1.2	6.4		60.4	16.7	667.8
Samraong Knong						0.1								13.8	14.0
Sla Ket	2.8	517.9		5.8		34.2		188.9	3.5	0.3		7.0		3.4	763.9
Svay Por	26.4		28.4	10.0	7.2	74.3	8.7		48.7		2.3		2.3	8.9	217.3
Tuol Ta Ek	1.8	122.6		10.2	4.0	80.3		51.7	76.2	17.1			1.6	5.9	371.4
Vaot Ta Muem		2.9						0.1						39.5	42.4
vaot Kor	14.1	2,005.1		18.5	0.3	70.2		309.7	34.6	13.1				14.0	2,479.7
Total	132.7	8,534.1	42.1	104.4	29.6	584.5	17.5	1,403.3	456.7	66.3	9.1	10.5	64.2	175.8	11,630.9

Estimated area of Land-use types by commune - in 2030 (ha)

Area (ha) / Commune Name	Administrative	Administrative Zone	Agriculture Zone	Commercial Zone	Culture Zone	Low-Cost Housing Zone	Military Zone	Mixed Use Zone	Public Green Space	Residential and Agriculture Zone	Residential Zone	Small and Medium Industry	Sports and Recreation Zone	Technical Infrastructure Zone	Transportation Zone	Water Bodies	Unknown	Total
Anlong Vil			0.2								0.0							0.2
Chheu Teal			0.0							0.0						5.5		5.5
Chomkar Somraong		16.0	642.8	3.6	4.8	0.5		80.9	9.8		106.4	5.5				3.7		877.1
Chrey			2.8						2.3	0.0	0.0							4.1
Kdol Doun Teav		4.8	705.7		2.4			13.3	6.5	126.7	26.1					15.8		905.6
Norea		0.0				3.2					6.9					2.5		12.6
Ohtal		13.2	3,116.2	3.5	9.2			96.0		122.6	97.3						1.3	3,759.3
Ou Char		8.6	692.0	14.0	0.9	17.7	0.2	108.0	16.7	92.2	176.9	66.1	0.0	3.2				1,176.5
Ou Dambang Muoy			0.0			0.2		1.2	0.1							10.1		11.6
Ou Dambang Pir						2.2		8.9			1.6	2.8						15.6
Ou Ta Ki			0.3															0.3
Peam Aek			0.0															0.0
Phnum Sampov			0.4					1.0										1.4
Preaek Khpob																13.8		13.8
Preaek Luong																6.3		6.3
Preaek Norint																7.8		7.8
Prek Preah Sdach	0.3	28.2		28.2	3.5	9.6	0.3	71.6	6.3		119.0	4.0	0.6	0.4		5.7		279.4
Rottanak	14.0	25.6	83.8	8.1	36.6	7.7	10.3	105.1	25.0		158.1		6.0	8.5	97.2	16.7	0.4	666.9
Samraong Knong								0.1								13.8		14.0
Sla Ket		6.8	630.4	1.6	0.9	11.6		56.2	13.1	1.0	239.4			3.1		3.4	0.8	763.9
Svay Por		22.3		59.0	8.1		1.1	93.6	11.8		7.0		6.6		6.8	8.9	0.2	223.3
Ta Kmum			0.5															0.5
Tuol Ta Ek		1.7		4.8	10.2			166.8	6.0		168.2				12.8		1.7	371.4
Vaot Ta Muem			2.9							0.1						39.5		42.6
vaot Kor		88.4	1,748.6	10.1	18.7		6.2	129.9	77.9	180.7	108.8	30.5				14.0	8.6	2,479.7
Total	14.3	194.3	7,297.0	124.1	99.8	52.7	21.1	1,084.9	178.0	976.3	1,211.2	48.8	13.1	23.1	104.0	167.6	11.0	11,697.6





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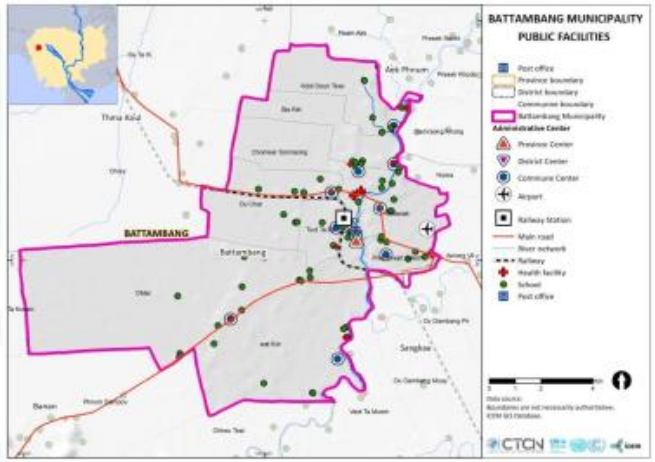
Public facilities



15

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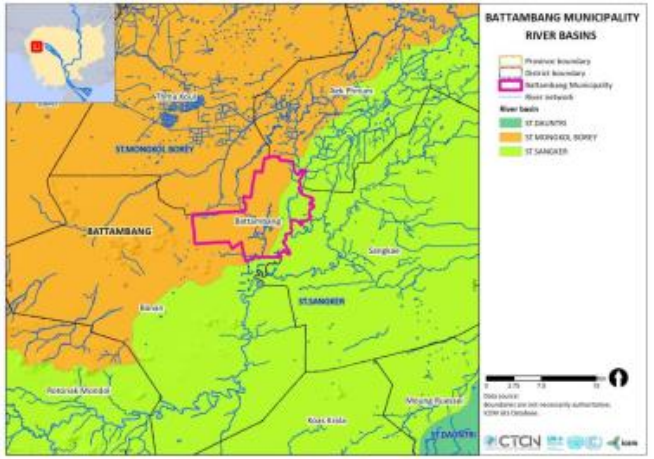
River basins



16

Hydrology

- River basins
- River network
- Topography

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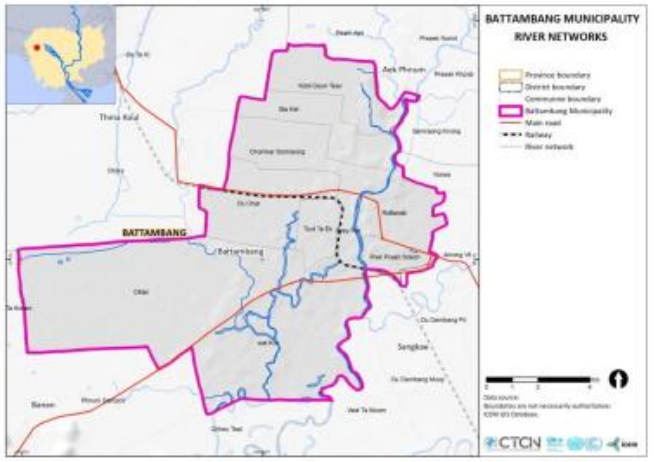
River network



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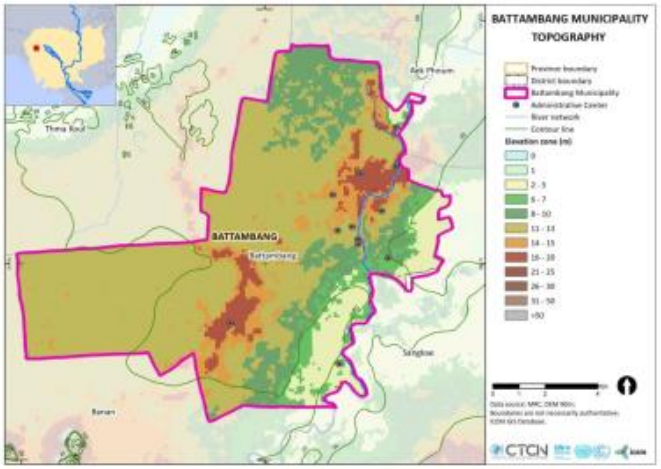
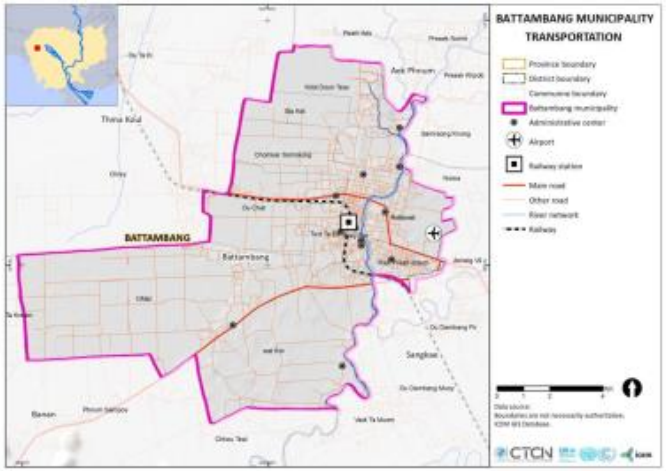
Topography



Transportation



Transportation

- National roads
- Urban roads
- Rural roads
- Rail
- Airport

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Energy

Power generation/ transmission

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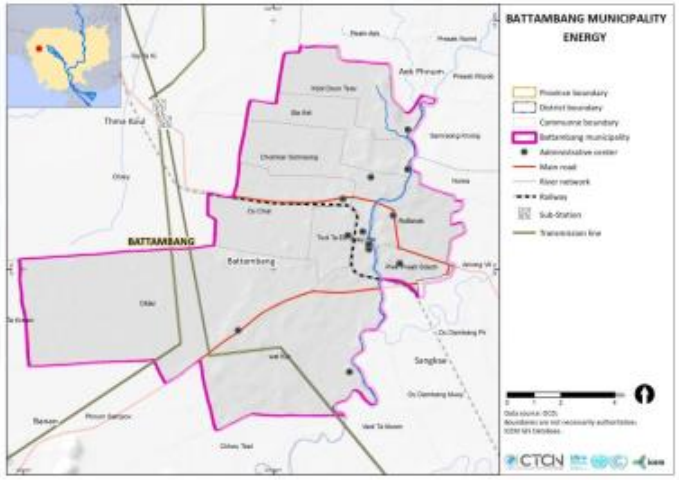
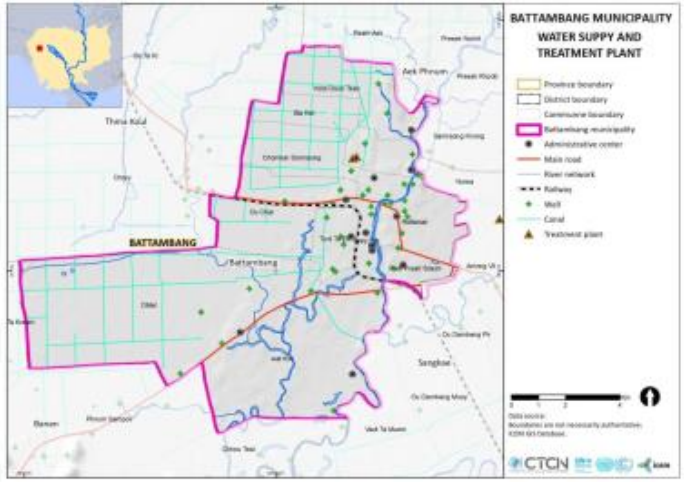
Energy



Water supply - water treatment



Water

- Water supply
- Water treatment

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Thank you

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