

Country:	Myanmar
Request Identification Number:	20160000035

Title:	Promoting data for climate change, drought and flood management in Myanmar
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Summary of the CTCN Technical Assistance

According to the United Nations, Myanmar is categorized least developed country (LDC). It relies heavily on the agricultural sector for income, survival, and economic growth - With 75% of the population relying on the agriculture, livestock and fisheries sectors for their livelihoods and food security, climatic changes will have a disproportionately negative impact within the country (UNEP, 2012).

Myanmar's National Adaptation Programme of Action (NAPA) states there is an urgent need for Myanmar's communities and economic sectors to adapt to climate change and variability (UNEP, 2012). The Department of Meteorology and Hydrology has indicated that Myanmar's climate is changing, with some observable trends over the last six decades. These include an increase in mean temperature, an increase in overall rainfall in most areas with a late onset and early termination of the south-west monsoon. The effects of climate change on the natural environment in Myanmar present security concerns for the nation's people. Increased temperatures, variable precipitation extremes, rising sea levels, droughts, floods, and powerful storms will have severe impacts on all aspects of life. Deforestation, loss of biodiversity, energy shortages, and public health issues will all become more prevalent, but the most significant impacts will be on people's livelihoods through changes to the agricultural sector (Slagle, 2012).

The CTCN technical assistance relates to **Promoting data for climate change, drought and flood management in Myanmar**. The objective of the CTCN assistance is to improve the data and information base which is being used to make decisions on climate adaptation as well as to facilitate climate resilient measures within the agriculture and water sector in Myanmar. The CTCN assistance will focus on the establishment of a web based data portal containing reliably and timely data to be used for climate change assessments, drought and flood management. All the data will be freely available and based on satellite data. The specific data types will be discussed with the stakeholders during the inception phase.

The CTCN assistance will contain capacity building within government and relevant organisations combined with making the web based data portal available. The current environmental law is from 2015 and the Environmental Conservation Department was only established in 2012 and has yet limited capacity, which the requested assistance could improve greatly by providing a science and web based data and information portal. The Myanmar Climate Change Alliance (MCCA) was established, with support from UNEP in 2014/2015.

The national ownership of the web based data portal is proposed to be anchored within the Hydroinformatics center (HIC) and the department of Meteorology and Hydrology. The two organisations will be responsible for further dissemination and outreach after the completion of the CTCN assistance project.

The objective of this technical assistance is to facilitate transfer and capacity building for climate change adaptation focusing on the information base for climate resilient solutions. The proposed support will use existing knowledge and capacity and further develop and validate these for application to local issues within Myanmar. Synergies with ongoing projects in Myanmar and the ASEAN region will be identified to benefit the proposed CTCN assistance.

1. Overview of the CTCN technical assistance

1.1 Technology aspects

Myanmar is among the countries in the world most prone to the impact from climate change and natural disasters (floods, droughts, landslides etc.). This becomes a critical challenge seen in the context of the historic development in the country, which has left Myanmar with almost no available ground observations or stations for water resource or climate change assessments. The current status is that very little information exist, despite this being one of the critical boundary conditions for climate change adaptation in several sectors. This is most urgent and noticeable in the agriculture and water sectors (agriculture is the main economic sector and employer in country), which are the main sectors in need of adaptation technology and approaches to deal with the impacts of climate change.

The specific technologies supported by the CTCN assistance will be related to establishing an information base for climate adaptation assessments within Myanmar, ensuring that the required information is available by utilising existing satellite based data sources. Data will be made freely available in near real time and in formats supporting a clear linkage between data and applications of relevance for the agriculture and water sector within Myanmar. Through this, the outcomes of this technical assistance will be able to support building the capacity to make science-informed adaptation decisions and build the agriculture and water sector resilience to climate change. The outcomes could also potentially feed into the political processes through informing of crucial adaptation requirements, and baseline for future policies and management practises.

It is anticipated that the technical assistance will contain the following technological aspects:

Data and information portal. Some of the key requirements will be:

- Technology platform based on a web solution with no license or fees associated to it;
- Enabling relevant organizations and stakeholders to access the required information for climate adaptation;
- Available data should be updated in near real time (maximum delay of a few days to weeks);
- It is expected that the technology will be based on satellite information, as currently very little information is available on the ground. (Acquiring and establishing sensor equipment is seen to be outside the scope and feasibility of this request).

Available information should cover required data for the agriculture and water sectors, such as historic and forecasted climate data, drought related data (relevant drought indices) and flood related data. The specific data types are to be determined at the inception workshop in collaboration and consultation with country counterparts.

Use case for validation of the outcomes. The developed information base (web based data portal) is expected to be based on satellite data as very few ground stations are available in Myanmar. The main advantage of this approach is that satellite data are available for the last 5 to 15 years (depending on the sensor), and long time records of different data types could be made available for the stakeholders. A use case will be selected for validation and testing of the selected information and data. The use case will be selected so that it reflects the importance and need for information within the agriculture and water sectors, and the focus will be on the ability to use the data for climate change assessments, drought management and flood management. The linkage between technology and policy will also be explored as part of the use case, as the developed information base will provide an improved basis for new policies and management options within climate change adaptation.

Dissemination and outreach. Tools and media for dissemination and outreach will be evaluated in close collaboration with the stakeholders. The specifications of these will be determined through direct dialogue on requirements with the stakeholders.

All the mentioned technologies will be made freely available for the stakeholders and will not be associated with any license or maintenance cost. The web based information and data portal will be hoisted and made available for a period of 5 years after the closure of the CTCN assistance project.

1.2 Objectives (outcomes)

Broadly, the objective of this technical assistance is to facilitate transfer of technologies and capacity building for improved information base for climate change adaptation in Myanmar, focusing on key vulnerable sectors – agriculture and water resources. The CTCN response plan is designed to enhance the capacity of relevant local government agencies to address a number of climate change related issues and be able to improve their planning tools for building resilience to climate change.

The specific objectives of this technical assistance are to:

- a. Establish a science and web based data and information portal based on satellite data of relevance for climate change adaptation within Myanmar;
- b. Enhance the capacities of staff within the concerned government agencies in the use and application of the data and information portal;
- c. Enable decision makers and stakeholders to use the transferred knowledge, practices and technologies actively in climate related planning towards the water or agriculture sector (provide linkage between data and information and planning).

The overall contribution of the CTCN technical assistance will be to promote utilization of key data for climate change, drought and flood management in Myanmar. This will be achieved through the establishment of a scientific information base for future climate change adaptation planning activities focusing on the water resource and agriculture sectors.

1.3 Results (outputs expected from CTCN assistance)

The expected outputs from the CTCN assistance will be aligned with the national political processes, and the expected outputs are as follows:

- a. The developed web based data and information portal is actively used by stakeholders in Myanmar for climate change adaptation planning with specific focus on flood and drought management;
- b. Capacity of decision-makers is increased for addressing the need for climate change adaptation measures within the water and agriculture sectors in Myanmar;

The CTCN outputs will be an important tool for providing scientific base for future climate change adaptation projects in Myanmar and the region.

1.4 Expected use of outputs

The expected outputs from the CTCN assistance will be tailored to the conditions in Myanmar and thus will be of immediate use to support the goals of the current political strategies in Myanmar. It will also be an important starting point for a science-informed future TNA (Technology Needs Assessment) related to the water and agriculture sectors in Myanmar.

It is proposed that the outputs should be anchored within the Hydroinformatics center (HIC) and the Department of Meteorology and Hydrology, as both organizations rely on timely available data and both have the capacity to absorb this technology. The outcomes of the assistance will support the Hydroinformatics center in their mandate within basin management and their role of supporting national organisations with updated data and information. For the Department of Meteorology and Hydrology the data and information portal will support their ongoing activities within drought and flood warnings, as it will update and enhance their current information base.

The requested CTCN assistance will be aligned with Myanmar's national adaptation programme of actions (NAPA). It contains a number of priority projects, which will be able to take advantage of the outcomes as the CTCN assistance, especially the valuable information regarding near real time climate information required for the execution of projects under NAPA. The NAPA projects all rely on sensor or station data, which are costly to implement and take time before the long data records are available. For this reason, the CTCN assistance will provide an immediate and valuable information base for these projects.

The outputs of the CTCN assistance address a critical knowledge gap and provide an essential platform for future projects and funding. Lack of baseline and reliable climate data are often a serious impediment for the ability to execute meaningful climate adaptation projects, thus the outcomes of this assistance will also be able to serve as a catalyser for financing of larger projects focusing on climate adaptation within Myanmar.

2. Description of the Assistance

2.1 Activities

The activities have been assigned into 3 main categories, as detailed below. The first activity consists of identifying the needs of relevant stakeholders and detail the required technology. The second activity focuses on development of the requested technologies and validation within an assigned use

case in Myanmar, while the third activity contains the final technology transfer through workshops and training events in Myanmar and outreach within the region.

Activity 1 – Stakeholder consultation

The activity aims at presenting the scope of the request to a wide range of stakeholders in Myanmar and identify the information and data needed for supporting climate change adaptation with specific focus on climate change, drought and flood management.

Activity 1.1 – Bilateral interviews and meetings

Prior to the national workshop a number of bilateral interviews will be conducted with selected stakeholders to get an overview of the needs, constraints and potentials for the outcomes. The bilateral interviews will focus on stakeholders not engaged during the scoping of the response plan, which could be water utilities, NGO's, industry or other organisations.

The main outcomes of activity 1.1 will be:

- Identify key stakeholders to be invited to the national workshop
- Identify gaps and needs related to the CTCN assistance

Deliverables	Delivery date
<i>Minutes from interviews and meetings</i>	<i>Week 2</i>

Activity 1.2 – National workshop to identify priorities for the CTCN assistance

A national workshop with relevant stakeholders will be organized (2-day workshop with a maximum of 15 participants) in order to present the scope of the CTCN assistance, prioritise the outcomes and finalise the work plan. The NDE and the applicant will assist in identifying the relevant stakeholders for the workshop. The scope of the workshop will be to present the scope of the CTCN response plan, the current work plan and objectives and identify the current gaps related to the information base for climate change adaptation and planning in Myanmar. The linkage between the outcomes and the political process will also be explored as part of the workshop (documented as part of the roadmap developed in activity 3). The national workshop will be divided into a first day of high level discussions aiming at anchoring the CTCN assistance within the relevant organisations followed by a second day focussing on the technical specifications and requirements.

The main outcomes of activity 1.2 will be:

- List of relevant stakeholders for the national workshop
- Presentation of the CTCN assistance with objectives and outcomes for the key national stakeholders;
- Identification of current gaps and requirements related to the technical assistance;
- Further specification related to the proposed data portal. The specifications will focus on data types, usability, ownership etc.
- Identification of potential use cases or programmes for validation and testing of the data and information from the web based data portal.

Deliverables	Delivery date
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<i>List of relevant stakeholders drafted</i>	<i>Week 2</i>
<i>National workshop (minutes from workshop) reports</i>	<i>Week 8</i>

Activity 1.3 – Technology description

The outcomes from the national workshop will lead to a more detailed description of the proposed technology (web based data portal) in a technology specification report. The following issues will be described in the technology specification report:

Technology to be deployed: detailed specifications for the developed web based data portal, this includes development of the user interface, the included data and information, and how the data should be made available for the stakeholder. This refers to the implementation of activity 2.1.

Testing and validation of the technology: specifications for how the web based data portal should be tested and validated. This includes technical use cases to validate the functionality of the data portal, and specifications for an in-situ validation on a selected location in Myanmar. This refers to the implementation of activity 2.2.

The technology specification report should be approved before activity 2 is initiated.

The main outcomes of activity 1.3 are:

- Detailed description of the technologies to be included in the CTCN assistance

Deliverables	Delivery date
<i>Technology specification report (maximum of 30 pages)</i>	<i>Week 14</i>

Activity 2 – Validation and use case

The activity aims at developing the required technology for supporting the information base and validating or demonstrating the information on a specific use case within Myanmar. The developed technology is described in activity 2.1 and the use case in activity 2.2.

Activity 2.1 – Technology customised to local conditions

This sub-activity consists of the establishment and development of the required technologies for the CTCN assistance. This includes:

Data and information portal. The CTCN assistance will develop and establish a data and information portal consisting of reliable and timely satellite based data and information for Myanmar to be used for climate change assessments, drought and flood management. Some of the key requirements will be:

- Technology platform based on a web solution with no license or fees associated to it;
- Technology platform, enabling relevant organizations and stakeholders to access the required information for climate adaptation;
- Available data should be updated in near real time (maximum delay of a few days to weeks);

- Satellite information is expected to be the main data source as very little information is available on the ground. Acquiring and establishing sensor equipment is outside the scope of this request.

The activity will develop and establish the data and information portal based on the criteria outlines in the technology specification report (activity 1.2). The specific data types to be included will be decided together with the key stakeholders. Key requirements for all selected data will be i) freely available data, ii) near real time data, iii) data to be used for climate change assessments (e.g. climate change factors), and iii) different indices to be used for drought and flood management.

Dissemination tools/media are critical to disseminate results and information related to climate change adaptation to decision makers and non-technical stakeholders. Specific focus on tools and media for dissemination of the technical outputs to relevant stakeholders will be given as part of this activity. This will be in the form of reporting or analysis tools supporting dissemination of key information to decision makers and non-technical stakeholders.

The main outcomes of activity 2.1 are:

- Data and information portal – web based tool allowing free access to required data and information
- Dissemination tools supporting the linkage between data and the future applications
- Document describing the technical validation and testing of the tools

Deliverables	Delivery date
<i>Methodology for validation and testing</i>	<i>Week 15</i>
<i>First version of the web based data portal for testing by the main applicant and the key stakeholders</i>	<i>Week 35</i>

Activity 2.2 - Validation through selected use case in Myanmar

The developed web based data portal will be validated on a specific use case within Myanmar. The specific use case is to be selected during the national workshop in collaboration with the key stakeholders and the main applicant. The use case could be an area with existing station data and prone to drought or flood impacts, where climate change impacts are expected. The use case will include a validation of the satellite data to station data, and an evaluation of how the data could be used in applications related to climate change adaptation, drought management or flood management. The linkage between technology and policy will also be explored as part of the use case, as the developed information base will provide an improved basis for new policies and management options within climate change adaptation.

The objective of this activity is to ensure that validated outcomes are produced in a correct and timely manner and supporting relevant stakeholders. The specific content of the validation will be determined as part of Activity 1.1 (National workshop).

The main outcomes of activity 2.2 are:

- Validation report (documented in the Technology validation report);
- Recommendations for linkage with the political process (to be documented as part of the roadmap in Activity 3.3);
- Review report;

- User guide and description of the tools (documented in the Technology description and user guide).

Deliverables	Delivery date
<i>Review report from main applicant</i>	<i>Week 40</i>
<i>Technology validation report</i>	<i>Week 45</i>
<i>Technology description and user guide</i>	<i>Week 45</i>

Activity 3 – Awareness raising and capacity building

The activity aims at ensuring transfer of knowledge and technology to the local and regional stakeholders.

Activity 3.1 – Second national workshop to create awareness and knowledge of the outcomes

A second national workshop will be held with relevant stakeholders and organisations in Myanmar with the aim of creating awareness and knowledge of the outcomes from the CTCN assistance. The workshop will include a maximum of 15 participants for a duration of 1 day. At the workshop, the validation case will be presented in detail in order to provide in-depth information on the use and benefits of the data portal. A summary report describing the key outcomes of the workshop will be produced.

The data portal will be available for the stakeholders after the workshop, and there will be an opportunity to comment and provide suggestions for minor adjustments to the current version.

The main outcomes of activity 3.1 are:

- Awareness and outreach of the project outcomes for national stakeholders in Myanmar (documented in the summary report)

Deliverables	Delivery date
<i>Summary report of the second national workshop including feedback and comments on the current version</i>	<i>Week 50</i>

Activity 3.2 – Technical training

A technical training (5 days) for selected staff within the key organizations (maximum 5 organisations and a total of 15 participants) will be organised with the objective of providing detailed knowledge and capacity in using the transferred technologies in Myanmar on an ongoing basis. Five organizations to send trainees to this workshop will be selected by the implementers together with the main applicant. The technical training will focus on how the developed web based data portal will be used to secure basic data for applications related to climate change assessments, drought and flood management. The main objective will be to build the capacity and knowledge of how the data and information could be used within Myanmar for applications related to climate change, flood and drought management. IT persons from each of the key stakeholders will be trained in the backend systems, and the IT requirements for the system. All training material will be made available to the trainees for further use after the training. In addition, a short summary report with outcomes of the

training will be produced. This report will identify key areas where further capacity building is required.

The main outcomes of activity 3.2 are:

- Capacity and knowledge for using the project outcomes on future climate adaptation projects

Deliverables	Delivery date
<i>Technical training material (including exercises, presentations)</i>	<i>Week 50</i>
<i>Summary report of the technical training (including key outcomes, list of participants)</i>	<i>Week 50</i>
<i>Final version of the web based data portal</i>	<i>Week 50</i>

Activity 3.3 – Outreach and dissemination

The outreach and dissemination activity aims at providing awareness and knowledge of the technology to relevant organizations. This activity includes:

- Presentations for key ministries, institutes and relevant partners in Myanmar through separate meetings (maximum of 3 meetings). The CTCN contractor will organize and attend the meetings and will report the outcome of these meetings to the main applicant. The minutes will be published in the lessons-learned report.
- Lessons-learned report from the use case and the initial use of the data portal in Myanmar (maximum of 30 pages). The report will be submitted to the main applicant.
- Roadmap documentation describing recommendations for transfer of the technology and scaling up within future projects. The roadmap will also include recommendations for linkage between the project outcomes and the policy development in Myanmar (maximum of 20 pages).
- Dissemination of reports, materials and tools to all relevant stakeholders. This will be done through the main applicant, where the CTCN contractor will make the required documents and tools available.
- Evaluate funding options through regional partnerships and donors for post response interventions. This could be further development or linkage to ongoing national or regional projects. This will be reported in the roadmap document.

Deliverables	Delivery date
<i>Lessons-learned and recommendations report (maximum of 30 pages)</i>	<i>Week 52</i>
<i>Roadmap documentation in transfer of technology and scale up, including the potential linkages with the political process (maximum of 20 pages)</i>	<i>Week 52</i>

2.2 Synergies and Baseline Setting

There are a number of past and ongoing initiatives, which the CTCN assistance will have to link to or take into consideration. Potential linkages to systems or databases affecting the specifications the

CTCN outcomes will have to be explored during the national workshop. Examples of relevant projects or initiatives are:

- **National Sustainable Development Strategy (2009)**
 - Published by the Ministry of Forestry and includes climate change under 'Environmental quality management and enhancement', a sub-category under Sustainable management of natural resources
- **National Biodiversity Strategy and Action Plan (2011)**
 - Increasing availability and accessibility of data on climate change from the CTCN support can help inform pathways to adaptation approaches
- **Myanmar National Climate Change Strategy, Action Plan and Policy**
 - Currently under development, but expected to be important for the CTCN assistance
- **Flood and drought Management Tools project (<http://fdmt.iwlearn.org/en>)**
 - GEF funded project implemented by UNEP and executed by DHI and IWA aiming at delivering tools for embedding flood and drought issues into water related planning at basin and catchment scale. The developed tools are to be applied at a global level and could be used as the starting point for the CTCN support.

There is a number of upcoming initiatives in Myanmar in connection with a large World Bank initiative and potential linkages will be evaluated as part of the initial workshop.

2.3 Timeline

Activity	Weeks											
	4	9	13	17	22	26	31	36	40	44	49	52
1 Stakeholder consultation												
1.1 Bilateral interviews and meetings												
1.2 National workshop to identify priorities for the CTCN assistance												
1.3 Technology description												
2 Technology validation and use case												
2.1 Technology development to local conditions												
2.2 Technology validation through selected use case												
3 Capacity building and training												
3.1 Second national workshop to create												

	<i>Expertise on climate data technologies (expected input: International expert 60 to 70 days and IT/web developer 20 to 30 days)</i>
<i>Activity 2.2 – Technology validation through selected use case</i>	<i>Experience with climate change adaptation in Myanmar and the region Expertise in satellite based data and information Knowledge of local conditions and settings in Myanmar Proficient analytical and writing skills (English) (expected input: 20 to 35 days)</i>
Activity 3 – Technology transfer and dissemination	
<i>Activity 3.1 – Second national workshop to create awareness and knowledge of the outcomes</i>	<i>Experience in stakeholder consultation and knowledge of the institutional setup in Myanmar Expertise in climate change adaptation and water resource planning Expertise in satellite based data and information (expected input: 8 to 10 days)</i>
<i>Activity 3.2 – Technology training</i>	<i>Expertise in climate change and water resource planning Expertise in satellite based data and information (expected input: 8 to 10 days)</i>
<i>Activity 3.3 – Outreach and dissemination</i>	<i>Experience in stakeholder consultation and knowledge of the institutional setup in Myanmar Expertise in outreach and dissemination (expected input: 12 to 20 days)</i>

2.5 Main partners

Stakeholder	Role to support the implementation of the CTCN assistance
<i>Myanmar Institute for Integrated Development (MIID)</i>	<i>Main applicant and assisting the CTCN contractor in the implementation of the CTCN assistance technology. In addition, the MIID will provide technical assistance in:</i> <ol style="list-style-type: none"> <i>1. Requirements for needs assessment</i> <i>2. QA and review of the proposed technologies</i> <i>3. Review of the validation report</i> <i>Host for the national and regional workshops</i>
<i>Department of Meteorology and Hydrology, Ministry of Transport and Communication</i>	<i>Provides meteorological information since they collect, process, archive and analyse meteorological data. Should be encouraged to take ownership of the output from the CTCN assistance.</i>
<i>Hydroinformatics center (HIC)</i>	<i>As part of the Ayeyarwady Integrated River Basin Management Project (AIRBM) a hydroinformatics centre is being established. The mandate of HIC is not</i>

	<i>yet fully determined but the objective is to establish HIC below the Directorate of Water Resources & Improvements of River systems (DWIR) and HIC should act as a data and information centre for the ministries and agencies in Myanmar. Should be encouraged to take ownership of the output from the CTCN assistance.</i>
National Water Resources Committee (NWRC)	<i>APEX body that transforms the segregated pattern of piece-wise and often overlapping water resources development and management by various government departments and line agencies into one consolidated coordination mechanism that oversees, monitors, directs and supports all water related activities leading to inclusive water governance.</i>
Directorate of Water Resources and Improvement of River Systems - Ministry of Transport and Communications	<i>Responsible for monitoring and managing Myanmar's rivers, including for transport.</i>
Ministry of Agriculture, Livestock and Irrigation	<i>Responsible for irrigation and ground water development in rural areas</i>
Ayeyarwady Integrated River Basin Management Project funded by World Bank loan	<i>The project aims to strengthen the government's ability to sustainably manage the Ayeyarwady River by developing water resources management institutions and enabling informed decisions about future investments in developing the river.</i>
Ministry of Education	<i>Responsible for higher education institutes, including universities</i>
Ministry of Natural Resources and Environmental Conservation	<i>Responsible for forestry and mining sector as well as general environmental management in conjunction with development activities</i>
National Search and Rescue Committee	<i>Committee recently established by new government to coordinate assistance during natural disasters</i>

2.6 Indicative budget

Activities	Estimated Budget (USD)
Activity 1	33,000
Activity 2	128,000
Activity 3	85,000
Audit	2000
Total	248,000

Implementation of this Response Plan will be led by the Climate Technology Centre (including selection, contracting, supervision and monitoring of implementation partners) in close coordination with the corresponding National Designated Entity and relevant national actors. Implementation will be led by an International Consortium or Network Partner of CTCN.

2.7 Gender considerations

Improving the information base for climate change adaptation is an important step towards securing a robust and climate resilient water management within the agriculture and water sector in Myanmar. Both sectors are vital for vulnerable groups as a stable water and food supply is one of the key criteria for sustained livelihoods. The impact of climate change is also most likely to affect the vulnerable population most, as they have generally lower resilience and fewer options for implementation of mitigation measures, such as income diversification. Vulnerable population here is defined as: "Vulnerable population includes children, pregnant women, elderly people, malnourished people and people who are ill or immunocompromised (WHO, 2016)". The improved information base and the increased use of more advanced technologies and enhanced knowledge of climate related impacts on water and agriculture will be a driver towards more sustainable planning and climate resilient decisions, resulting in improved conditions for the vulnerable population in Myanmar and increasing the resilience to climate change.

The CTCN assistance will also aim at promoting greater gender equality within the participants of the workshops and training events in order to achieve gender equality.

2.8 Risk identification and risk mitigation

Risk	Consequence	Probability	Mitigation measure
Inadequate information or data not available for the CTCN assistance	The information base which is one of the main outputs will not be developed.	Less than 5 %	The information system will be based on satellite data and information will be secured directly from the data providers (NASA, ESA etc.)
Inadequate stakeholder mapping	Required information for the local conditions in Myanmar might not be embedded	Less than 10 %	The applicant and the NDE will be responsible for the stakeholder mapping and they have extensive knowledge of the local stakeholders
Political instability or other forms of unrest	Impact the local presence in the country	Less than 20 %	Myanmar is very stable and calm at the moment but the situation will be monitored before every mission to the country.
Difficulties in identifying use case or	Technologies not validated within the	Less than 25 %	The NDE and the applicant will be

location for validation of the information (satellite data)	project period		involved in selecting a use case for validation of the information base. Special focus will be on selecting a use case of relevance for either the agricultural or water sector in Myanmar reflecting the areas of potential climate change impacts.
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3. Long-term impacts of the assistance

3.1 Expected climate change-related benefits

	CTCN climate technology impact	Anticipated contribution from CTCN assistance
1	Climate technologies adapted to national context are identified and prioritized to enable their deployment and/or transfer in the requesting countries	The technologies will be adapted to the local context in Myanmar through a series of workshops and training sessions. The main applicant will be responsible for ensuring the final technologies to be embedded into a local context.
2	New national Technology Needs Assessment (TNA) and Technology Action Plan (TAP) as a result of the response	The CTCN assistance will be valuable for development of a future TNA. At present time there is no TNA available for Myanmar.
3	Progress made against mitigation objectives (i.e. energy and carbon intensity reduction) as a result of the response	
4	Progress made against adaptation or resilience objectives (e.g. climate vulnerability index improvement) as a result of the response	The technologies will improve the information base for future adaptation measures and climate resilient solutions within Myanmar.
5	New mitigation or adaptation technology projects/initiatives implemented as a result of the response	The results will identify focal areas for new adaptation initiatives, e.g. technical, structural or community, and provide recommendations and/or guidelines to achieve the objectives.
6	New or strengthened policies/ laws	The recommendations resulting from the assistance could be used to strengthen the

	developed, approved and enacted as a result of the response	regulatory framework within climate mitigation and adaptation policies.
7	New policies/laws where climate change was mainstreamed as a result of the response	Technologies could be used as the basis to develop new policies or laws aiming at climate resilient solutions or adaptation measures.
8	Country integrating climate change mitigation and/or adaptation issues into its planning and policies as a result of the response	The technical assistance is aligned with the National adaptation programmes of action (NAPAs) for Myanmar and the National climate change strategy and the resulting technologies will enhance the capacity to integrate new solutions and technologies into planning and policies.
9	New or strengthened Public-Private Partnerships (PPP) created directly as a result of the response	There is likely to be an enhanced partnership between the technology recipient (public) and local industries, farmers or farming corporative. Further development of the technology will likely strengthen this partnership.
10	New or strengthened twinning arrangement created as a result of the response	The assistance will be looking at creating new partnerships with regional organisations.
11	Capacities to access and attract public and private finance increase to enable financing of technology deployment	The initial stakeholder workshops will be used to identify options for local financing mechanisms to be used in the response.
12	Post-response intervention funding attributable to the response.	The response will evaluate funding options through regional partnerships and donors for post response interventions.
13	Framework and analysis of local production developed to enable deployment of national production of climate technologies	The technology transfer will increase the capacity and role of the main applicant within climate change adaptation in the region, and result in an increased focus on deployment and production of climate technologies in relation to climate change adaptation.

3.2 Co-benefits

	Sustainable Development Goal	Contribution from CTCN assistance
1	End poverty in all its forms everywhere	Improved water management for the agriculture and water sector within Myanmar. Higher resilience of key vulnerable groups, including the poor.
2	End hunger, achieve food security and improved	Improved climate change data allowing

	nutrition, and promote sustainable agriculture	for improved planning and management of resources to increase resilience of agriculture and water sectors to climate change, reducing the risks of crop failures and destruction.
3	Ensure healthy lives and promote well-being for all at all ages	Impacts on the agriculture sector will improve the well-being and livelihood through a more robust and stable food supply. Better planning for floods and droughts will reduce risks related to health and loss of life.
4	Ensure inclusive and equitable quality education and promote life-long learning opportunities for all	
5	Achieve gender equality and empower all women and girls	Gender equality will be promoted as part of the workshops and training and focus will be on gender equality through the capacity building and dissemination of the outcomes.
6	Ensure availability and sustainable management of water and sanitation for all	Increased information of climate change impacts and vulnerabilities will enable improved water resources management according to resource availability, avoiding depletion and raising resilience to seasonal changes and extremes.
7	Ensure access to affordable, reliable, sustainable, and modern energy for all	Improved information base will contribute to climate resilient solutions benefitting the energy sector as well, particularly in relation to planning for hydropower.
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Improved climate information will facilitate implementation of robust and climate change resilient solutions for the agriculture sector, contributing to economic growth through a more stable food production.
9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Real time climate data will assist planning and implementation of climate proof and resilient infrastructure solutions in future.
10	Reduce inequality within and among countries	A robust and climate resilient water resource management will reduce the inequality within and among the countries.

11	Make cities and human settlements inclusive, safe, resilient and sustainable	Improved information base used within the water sector will contribute to sustainable and resilient urban areas.
12	Ensure sustainable consumption and production patterns	
13	Take urgent action to combat climate change and its impacts	The response plan will ensure improved technologies and information to combat climate variability and climate change, facilitating science-informed adaptation measures.
14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	
15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	The technologies for improved information base could assist in reversing land degradation and desertification through improved water management during the dry season.
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	
17	Strengthen the means of implementation and revitalize the global partnership for sustainable development	The response will interact with regional organisations with the aim of strengthening synergies in building resilience to climate change in the region

3.3. Post-assistance plans and actions

Post assistance plans include actions that may support and increase the ownership of the outcomes, the scaling up of the technologies and deployment in the region outside of Myanmar. The specific post-assistance activities will be determined as part of the second national workshop (activity 3.1) and the technical training (activity 3.2), as the stakeholders at that time will have the knowledge of the outcomes to provide more details regarding the post-action plans. Below are specified some of the immediate actions for the key stakeholders (HIC and Department of Meteorology and Hydrology):

- The web based data and information portal will be used actively in the daily work at both organisations.
- For HIC it will provide an addition to the existing station data, and will provide valuable data for the development of the upcoming basin management plans. It will also increase their capacity for monitoring and evaluation as near real time data will be available;
- For the Department of Meteorology and Hydrology it will strengthen their ongoing work in providing flood and drought warnings to the public through the improved information base;
- The CTCN assistance will improve the capacity within both organisation for climate change assessments and flood and drought management due to the increased availability of data and information.

Some of the more general post-assistance plans and actions will be:

- The outcome of the CTCN assistance will be valuable for the future development of a TNA for Myanmar;
- The CTCN assistance will provide a valuable platform for future projects as it will establish near real time data and information for Myanmar related to climate change, drought and flood management ;
- The CTCN assistance will be used to strengthen the linkage to regional organisations and institutes to pursue further collaboration on climate change adaptation in the region; and
- Evaluate funding options through regional partnerships and donors for post response interventions.

3.4 Monitoring and Reporting of technical assistance results and impacts

Expected activities and milestones under this assistance are explicitly described in section 2.1 and the performance indicators table below (see also log frame in annex). Activities progress and deliverables will be monitored closely by the CTCN contractor of this Response Plan with the collaboration of the NDE, the main applicant and CTCN. The CTCN contractor is responsible for verifying project progress against timeline and associated milestones and communicates these results to the NDE and CTCN. At the end of each activity, the CTCN contractor will provide a short summary of lessons learned of the activity reflecting on the progress, successes and challenges encountered during the activity. Every month a teleconference with country and international partners is held to communicate the state of advancement of the project, challenges, possible needs for adjustments etc. The CTCN contractor is responsible for planning these. All suggested changes to the activities, processes and/or approaches as outlined in current response plan must be accepted by the CTCN and NDE before they can be applied.

Response output (linking to sec 1.2)	How output will be used to ensure creation of result	Expected result	Expected outcome of result (linking to sec 1.1)	Anticipated impact that outcome will produce (linking to section 3)
Science based data and information portal increasing data availability for climate change adaptation	Data availability is one of the key issues in Myanmar and needed for future applications within the water and agriculture sector	Data availability sufficient for orderly climate change assessments within the water resource and energy sector.	Web based data and information portal enabling free access to relevant data and information for climate change adaptation, drought management and flood management	Increased capabilities for climate change planning and management within the water and agriculture sector in Myanmar.
Enhance awareness and capacity for climate change adaptation and planning within Myanmar	Enhanced knowledge of information and adaptation measures for climate resilient solutions are critical for the sustainability of the proposed technologies.	Increased focus and engagement in the proposed CTCN response from all relevant stakeholders in Myanmar.	Technologies for dissemination and outreach of the outcomes of the CTCN assistance.	Increased focus on climate change adaptation for climate resilient solutions within the ministries and organisations in Myanmar.
Validate the performance of the technology by providing linkage to ongoing programmes or projects of relevance	Linkage to ongoing programmes or projects are important to ensure the sustainability of the proposed technologies.	Increased focus on the CTCN activities with a potential for added outreach and use of the technologies.	Use case for validation of the developed technologies.	Increased reliability and confidence in the outcomes increasing the ability to include the technologies from the CTCN assistance in future projects and programmes.
Enable decision makers and stakeholders to use the transferred knowledge, practices and technologies	Capacity for using the transferred knowledge is required for ensuring the sustainability of the technologies after the proposed response.	Engaged stakeholders with the needed understanding and knowledge of climate change adaptation within the water and agriculture	Technical training for selected staff within selected organizations with the objective of providing detailed knowledge and capacity in using the	Increased capacity for climate change and climate variability adaptation within Myanmar. Ability to utilize the technology from the CTCN assistance.

**CTCN Technical Assistance
Response Plan**

actively in climate related planning towards the water or agriculture sector		sector.	transferred technologies.	
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4. Signatures

Signatures of the requesting country

NDE	Request Proponent
<p>Name: <i>Mr. Min Maw</i> Title: <i>Director, Pollution Control Division, Environmental Conservation. Department, Ministry of Natural resources and Environmental Conservation</i> Date: <i>31 Jan 2017</i> Signature: <i>[Handwritten Signature]</i></p>	<p>Name: <i>Mr. Joern Kristensen</i> Title: <i>Executive Director, Myanmar Institute for Integrated Development (MIID)</i> Date: <i>13/1-2017</i> Signature: <i>[Handwritten Signature]</i></p>

Signatures of the CTCN

CTCN Director	Climate Technology Manager
<p>Name: Title: Date: Signature:</p>	<p>Name: Title: Date: Signature:</p>

Annex 1: Response Logframe

Activity (link to sec 2)	Description of sub-activities conducted by the CTCN	Output/ Deliverable (link to sec 2.1)	Expected Outcome (link to sec 1.2)	Main national partners involved	Objectively Verifiable Indicator (see Annex 5 guidance)	Means of Verification (data source, method of collection, responsibility and periodicity)
<i>Activity 1: Stakeholders consultation</i>	<i>Activity 1.1: National workshop</i> <i>Activity 1.2: Technology description</i>	List of stakeholders Minutes from workshop Technology specification report	Enhance awareness and capacity for climate change adaptation and planning within Myanmar	Applicant	Recommendations and feedback received from stakeholders Number of participants Number of meetings with stakeholders in Myanmar Description of the technology	Reported as part of the output. Responsibility: implementing organisation
<i>Activity 2: Technology validation and use case</i>	<i>Activity 2.1: Technology development to local conditions</i> <i>Activity 2.2: Technology validation through selected use case in Myanmar</i>	Methodology for validation and testing Draft version of tools Review report from local stakeholders Technology validation report Technology description and user guide	Validated and tested technology available for application within a local context in Myanmar.	Applicant	Feedback and review from national partners Selected validation location Validation report drafted User guide drafted	Reported as part of the output. Responsibility: implementing organisation
<i>Activity 3: Capacity building and training</i>	<i>Activity 3.1: Second national workshop to create awareness and knowledge of the outcomes</i> <i>Activity 3.2: Technical</i>	Workshop minutes Training outputs Lesson learned and recommendation report Roadmap for scale up	Decision makers and stakeholders to use the transferred knowledge, practices and technologies	Applicant	Number of participants trained or training days received Number of female participants Post training evaluation	Reported as part of the output. Responsibility: implementing organisation

<p>CTCN Technical Assistance Response Plan</p>
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<p><i>training</i> <i>Activity 3.3: Outreach and dissemination</i></p>	<p>and linkage to the political process</p>	<p>actively in climate change adaptation</p>	<p>and feedback Feedback or recommendations from regional organizations Lesson learned drafted Road map drafted</p>
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Annex 2: Indicative list of performance indicators

Overall Activity	Specific Activity	Indicator
Capacity Building	<ul style="list-style-type: none"> ▪ development and delivery of workshops ▪ development and delivery of trainings (e.g. webinars, e-learning, ad-hoc) ▪ development and delivery of toolkits 	Number of participants trained or training days received; Post training evaluation and feedback (and minutes); CTCN Knowledge Management System (KMS) users; Webinar content/minutes/feedback; e-learning content/feedback
Advisory	<ul style="list-style-type: none"> ▪ development of needs assessment/ studies/ reports/ etc. ▪ establishment/development of recommendations 	Diversity of sources used; Response Implementer efforts days; Recommendations; Scope of dissemination; Level of detail used; Feedback; Uptake of recommendations
Policy development	<ul style="list-style-type: none"> ▪ development of strategy ▪ drafting of implementation plan ▪ formulation inputs to policy/ law 	Strategy available and adapted to local context and national priorities; Number of interview/events conducted to developed the strategy/ plan; Strategy/Plan dissemination; Number of technologies recommended in the strategy/plan; Scope of changes recommended by the strategy/plan.
Project implementation	<p>Mitigation</p> <ul style="list-style-type: none"> ▪ Energy supply ▪ Energy use ▪ Industry ▪ Transport ▪ Agriculture ▪ Waste management ▪ Forestry <p>Adaptation</p> <ul style="list-style-type: none"> ▪ Water ▪ Infrastructure, transport and urban design ▪ Early warning and environmental assessment ▪ Coastal zones ▪ Agriculture and forestry 	Outputs available and adapted to local context and national priorities; Level of private sector participation; Planning/Outputs distributed to decision makers with feedbacks; Integration of outputs/outcomes into planning of host country; implementation of outputs/outcomes by host country or other multi/bi-lateral organisation; Level of cooperation between Response Implementer, NDE and Response Proponent(s).



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CTCN Technical Assistance

Response Plan

Overall Activity	Specific Activity	Indicator
	<ul style="list-style-type: none">▪ Human health▪ Marine and fisheries	
Development of a new partnership or strengthening of an existing one	<ul style="list-style-type: none">▪ Development/ Establishment of basis for Twinning▪ Development/ Establishment of basis for PPP▪ Development/ Establishment of basis for knowledge partnership	