2020 Annual NIE Seminar for accredited NIEs

Transformative technologies for adaptation

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• Technologies defined in climate change adaptation

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Overview of technology trends in climate change adaptation
Technology trends in climate change adaptation

- Innovation
- Ecosystem-based adaptation (EbA)
- Urban adaptation / resilience
- Cross-sectoral (multi-sectoral) approach
- Bottom-up approach
- Women & gender, youth, indigenous community
- SDGs, COVID-19, Build Back Better
Global TNA project supports developing countries to identify and prioritise their technology needs and develop their action plans on climate technologies in their effort to pursue the targets under the Paris Agreement. UNEP through UNEP-DTU Partnership administers the project with funding from Global Environment Facility (GEF). Technical assistance, capacity building and guidance are provided by UNEP and UNEP-DTU Partnership in collaboration with its regional centres for the project.

Source: UNEP-DTU Partnership (2020) Regional technology brief: Asia-Pacific, Africa and Latin America and the Caribbean (LAC)
Technology trends of developing countries in climate change adaptation – Technology Needs Assessment (TNA) (cont.)

Technology needs for adaptation in agriculture sector in Asia-Pacific, Africa and LAC

- (a) 21 countries in Asia-Pacific
- (b) 27 countries in Africa
- (c) 18 countries in LAC

Source: UNEP-DTU Partnership (2020) Regional technology brief: Asia-Pacific, Africa and Latin America and the Caribbean (LAC)
Technology trends of developing countries in climate change adaptation – Technology Needs Assessment (TNA) (cont.)

< Technology needs for adaptation in water sector in Asia-Pacific, Africa and LAC >

(a) 21 countries in Asia-Pacific
(b) 27 countries in Africa
(c) 18 countries in LAC

Source: UNEP-DTU Partnership (2020) Regional technology brief: Asia-Pacific, Africa and Latin America and the Caribbean (LAC)
Technologies defined in climate change adaptation
Climate change adaptation technology

“Application of technology in order to reduce the vulnerability, or enhance the resilience of a natural or human system to impacts of climate change”

Source: UNFCCC (2005)

• Three categories of climate change adaptation technology (Christiansen et al., 2011)
  • **Hardware**: Hard technology
  • **Software**: ① Capacity and processes involved in the use of technology, ② Knowledge and skills and ③ Education and training
  • **Orgware**: Ownership and institutional arrangements of the community or organisation where the technology will be used

<table>
<thead>
<tr>
<th>Sector / Technology type</th>
<th>Hardware</th>
<th>Software</th>
<th>Orgware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Crop switching</td>
<td>Farming practices, research on new crop varieties</td>
<td>Local institutions</td>
</tr>
<tr>
<td>Water resources and hydrology</td>
<td>Ponds, wells, reservoirs, rainwater harvesting</td>
<td>Increase water use efficiency and recycling</td>
<td>Water user associations, water pricing</td>
</tr>
<tr>
<td>Coastal zones</td>
<td>Dykes, seawalls, tidal barriers, breakwaters</td>
<td>Development planning in exposed areas</td>
<td>Building codes, early warning systems, insurance</td>
</tr>
<tr>
<td>Health</td>
<td>Vector control, vaccination, improved water treatment and sanitation</td>
<td>Urban planning, health and hygiene education</td>
<td>Health legislation</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Climate proofing of buildings, roads and bridges</td>
<td>Knowledge and know-how</td>
<td>Building codes and standards</td>
</tr>
</tbody>
</table>

Source: Christiansen et al. (2011) Technologies for adaptation - perspectives and practical experiences
Scope of climate change adaptation technology

- UNEP-DTU Partnership – *Taxonomy in consideration with technology needs from developing countries*

<table>
<thead>
<tr>
<th>Agriculture &amp; forestry</th>
<th>Cross-sectoral enablers &amp; approaches</th>
<th>Marine &amp; fisheries</th>
<th>Renewable energy</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Agro-forestry, silviculture &amp; mixed farming</td>
<td>• Capacity building &amp; training</td>
<td>• Fisheries management</td>
<td>• Bioenergy</td>
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<td>• Farming systems and crop management</td>
<td>• Communication &amp; awareness</td>
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<td>• Forest management</td>
<td>• Economics &amp; financial decision making</td>
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<td>• Increasing crop resilience</td>
<td>• Ecosystems &amp; biodiversity</td>
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<tr>
<td>• Irrigation systems</td>
<td>• Governance &amp; planning</td>
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<td>• Land management training</td>
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<td>• Livestock management</td>
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<td>• Seed, grain &amp; food storage</td>
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<tr>
<td>• Terrestrial ecosystems management</td>
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<tr>
<td>Coastal zone</td>
<td>Early warning &amp; environmental assessment</td>
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<tr>
<td>• Integrated coastal zone management</td>
<td>• Early warning systems &amp; forecasting</td>
<td>• Alternative water sources</td>
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<tr>
<td>• Protection (hard engineering)</td>
<td>• Hazard mapping</td>
<td>• Integrated planning</td>
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<tr>
<td>• Protection (soft engineering)</td>
<td>• Monitoring systems</td>
<td>• Limiting nutrient leaking</td>
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<td>• Riverine flooding protection</td>
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<td>• Water augmentation (increasing capture and storage of surface run-off)</td>
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<td>• Water conservation</td>
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<td>• Water efficiency &amp; demand management</td>
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<td></td>
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<td>• Water management</td>
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<td>• Water supply system &amp; storage</td>
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<td>• Water treatment</td>
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</table>

Source: [https://tech-action.unepdtu.org/countries-technologies/](https://tech-action.unepdtu.org/countries-technologies/)
## Scope of climate change adaptation technology (cont.)

- Green Technology Center, South Korea – *Taxonomy in consideration with research and development (R&D) of technology*

<table>
<thead>
<tr>
<th>Agriculture / livestock</th>
<th>Water</th>
<th>Climate change prediction and monitoring</th>
<th>Ocean / fishery / coast</th>
<th>Health</th>
<th>Forest / land</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Genetic resources and gene improvement</td>
<td>- Water system and aquatic ecosystem management</td>
<td>- Climate prediction and modelling</td>
<td>- Marine ecosystem</td>
<td>- Infectious disease management</td>
<td>- Promotion of forest production</td>
</tr>
<tr>
<td>- Crop cultivation and production</td>
<td>- Securing and supplying water resources</td>
<td>- Climate information alarm system</td>
<td>- Fishery resources</td>
<td>- Food safety and preventative healthcare</td>
<td>- Reduction of forest damage</td>
</tr>
<tr>
<td>- Livestock disease management</td>
<td>- Water treatment</td>
<td></td>
<td>- Coastal disaster management</td>
<td></td>
<td>- Ecology, monitoring and restoration</td>
</tr>
<tr>
<td>- Processing, storage and distribution</td>
<td>- Water disaster management</td>
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</tr>
</tbody>
</table>

*Source: Green Technology Center (2019) White paper 2019 on Green Climate Technology*
### Scope of climate change adaptation technology (cont.)

- **Project sectors in the Adaptation Fund**

  - Agriculture
  - Coastal zone management
  - Disaster risk reduction
  - Food security
  - Forests
  - Multisector projects
  - Rural development
  - Urban development
  - Water management

*Source: [https://www.adaptation-fund.org/projects-programmes/project-sectors/](https://www.adaptation-fund.org/projects-programmes/project-sectors/)*
Access to technology for climate change adaptation: 
\textit{Introduction to the CTCN technical assistance}
Mission: To promote the accelerated development and transfer of climate technologies at the request of developing countries for energy-efficient, low-carbon and climate-resilient development.
Climate Technology Centre & Network (CTCN) (cont.)

CTCN Services

TECHNICAL ASSISTANCE

KNOWLEDGE SHARING

COLLABORATION & NETWORKING

Mitigation

- Reduce GHG Emissions

Adaptation

- Strengthen Climate Resilience

CTCN Focus Areas

- Agriculture & Forestry
- Coastal Zones
- Early Warning & Environmental Assessment
- Human Health
- Infrastructure & Urban Planning
- Marine & Fisheries
- Water

Agriculture
Carbon Fixation & Abatement
Energy Efficiency
Forestry
Industry
Renewable Energy
Transport
Waste Management
Countries Receiving Technical Assistance

- 100 countries
- 206 technology transfer interventions (as of 28 Aug. 2020)
- Increasing multi-country requests

<Type of the assistance>
- Decision-making tools and/or information provision
- Feasibility of technology options
- Financing facilitation
- Piloting and deployment of technologies in local conditions
- Private sector engagement and market creation
- Recommendations for law, policy and regulations
- Research and development of technologies
- Sectoral roadmaps and strategies
- Technology identification and prioritisation
Interested parties in developing countries contact their national focal point (National Designated Entity, NDE) to request technical assistance.

The NDE confirms the alignment of the request with its national climate priorities and passes it along to the CTCN.

The CTCN collaborates with the NDE and applicants to develop a tailored technology transfer plan.

The Climate Technology Centre selects a Network member to implement the technology solution.
TA requests at a glance

Source: CTCN website (as of 28 Aug. 2020)

Source: CTCN website (as of 28 Aug. 2020)
TA requests at a glance (cont.)

Data source: CTCN website (as of 28 Aug. 2020)

< Distribution of TA requests by type of assistance >

- Technology identification and prioritisation
- Sectoral roadmaps and strategies
- Research and development of technologies
- Recommendations for law, policy and regulations
- Private sector engagement and market creation
- Piloting and deployment of technologies in local conditions
- Financing facilitation
- Feasibility of technology options
- Decision-making tools and/or information provision

< Distribution of TA requests by geographical scope >

- Regional multi-country: 71.3%
- National: 19.7%
- Sub-national: 4.2%
- Community-based: 10.5%
- Other multi-country: 3.8%

Source: CTCN website (as of 28 Aug. 2020)
Engagement of the Network Members

- 592 organisations work with the CTCN as Network Members (as of 28 Aug. 2020).

<table>
<thead>
<tr>
<th>Type of Network Members</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private sector organisation</td>
<td>48.6</td>
</tr>
<tr>
<td>Research and academic institution</td>
<td>21.3</td>
</tr>
<tr>
<td>Non-governmental organisation</td>
<td>11.2</td>
</tr>
<tr>
<td>Not for profit organisation</td>
<td>7.2</td>
</tr>
<tr>
<td>Public sector organisation</td>
<td>6.9</td>
</tr>
<tr>
<td>Intergovernmental organisation</td>
<td>2.0</td>
</tr>
<tr>
<td>Partnership</td>
<td>1.4</td>
</tr>
<tr>
<td>Financial institution</td>
<td>0.7</td>
</tr>
<tr>
<td>Initiative</td>
<td>0.5</td>
</tr>
<tr>
<td>Regional organisation</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Data source: CTCN website (as of 28 Aug. 2020)
Up-scaling financial opportunities through TAs

- The CTCN can support National Implementing Entities (NIEs) in preparation and design of the project.
  - Provide technical support required at early stage of project development cycle (e.g. feasibility assessments of technology options, recommendation for law, policy and regulations, etc.)
  - Address specific challenges and technology barriers
  - Deploy adaptation-related technical solutions (pilot study)

- Outputs from the TAs can be used as inputs in developing and submitting a funding proposal to the Adaptation Fund Board, etc.

- As a country-driven process, TA requests are signed and submitted by the national focal point (NDE) to the CTCN.

Find the NDE of your country through a link as below:

https://unfccc.int/ttclear/support/national-designated-entity.html
TA requests from countries that have NIEs

Collaboration with the CTCN under UNFCCC Technology Mechanism is ongoing in your countries.

Data source: CTCN website (as of 28 Aug. 2020)
[TA in Laos] City climate vulnerability assessment and identification of ecosystem-based adaptation (EbA) intervention

- Provision of necessary information to identify a set of suitable EbA options for 6 cities in Laos
  - 6 Cities: Luang Prabang, Vientiane, Paksan, Thakek, Savannakhet and Pakse
- Assessment of climate change impacts at city levels
- Assessment of ecosystem services and their vulnerability to climate change (e.g. flood)
- Identification and prioritisation of EbA options suitable for each city

- Example of the EbA options considered in the TA
  - Reforestation & Forest conservation
  - Wetland restoration or conservation
  - Water harvesting & Establishing flood bypasses
  - Green roofs/spaces & Permeable pavements, etc.

- Development of necessary inputs to the GCF funding proposal
[TA in Laos] Designing ecosystem-based solutions for building urban resilience

- Provision of economic and engineering analyses, the results of which were required to revise and fine-tune the funding proposal to the GCF

<table>
<thead>
<tr>
<th>Economic analysis</th>
<th>Engineering analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Conduct a cost-benefit of EbA intervention (6 cities)</td>
<td>• Describe the topography in each site</td>
</tr>
<tr>
<td>• Identify expected beneficiaries</td>
<td>• Identify potential pollution remediation issues</td>
</tr>
</tbody>
</table>

- Support for revision/resubmission of the GCF funding proposal
  - 11.5m USD project (10m USD GCF Grant) on ecosystem-based solutions approved
  - Approx. 899,600 beneficiaries expected (12% of country population)

- Contribution to paradigm shift in adaptation from grey to green infrastructure for reducing flood vulnerability at city levels

Source: GCF website
Example of technology implementation for climate change adaptation:

*Cases of the CTCN’s intervention in Asia-Pacific*
Technology implementation (CTCN’s intervention) for climate change adaptation

• Coastal zones sector
  • (Kiribati, Marshall Islands, Palau & Solomon Islands) Capacity development to address risks in coastal zones

  Development of *the bathymetric (standardised bathymetric grids and digital elevation grids) and the wave models* for four Pacific island states would provide a coastal modeling tool that outlines ‘high hazard’ areas and could be used in coastal zone risk management and planning.

• (Bangladesh) Technology for monitoring & assessment of climate change impact on geomorphology in the coastal areas of Bangladesh

  Development of *the methodology for use of earth observation (EO) tool* would enhance capacity of technical staff and decision makers to utilise modern EO techniques to monitor climate change challenges and provide early warning of bank erosion in the coastal zone of Bangladesh.
Technology implementation (CTCN’s intervention) for climate change adaptation (cont.)

- Early warning and environmental assessment sector
  - **(Myanmar)** Promoting data for climate change, drought and flood management in Myanmar
    
    Development of the web portal would provide free and easy access to data and information for flood and drought management, supporting government officials and stakeholders in Myanmar engaged in climate change adaptation and management of water resources and extreme events.

  - **(Thailand)** Strengthening Bangkok’s early warning system to respond to climate induced flooding
    
    Development of the urban flood early warning system (web-based) would improve municipal planning in Bangkok to reduce loss of economic productivity and property due to flooding (increase in safety and transportation efficiency of the city).
Technology implementation (CTCN’s intervention) for climate change adaptation (cont.)

- Infrastructure and urban planning sector
  - **(Sri Lanka)** Development of Kurunegala as a climate smart city
    
    Development of the adaptation action plan (water scarcity and heat stress) and the manual for local adaptation planning would help local government officials in Sri Lanka take action to reduce climate risk at city/local levels.

  - **(Indonesia)** Hydrodynamic modelling for flood reduction and climate resilient infrastructure development pathways in Jakarta
    
    Development of the high-resolution hydrodynamic model and socio-cultural survey would improve capacity of relevant government agencies to formulate policy and action plans to reduce flooding and support sustainable city planning in Jakarta.
Technology implementation (CTCN’s intervention) for climate change adaptation (cont.)

- Water sector
  - **(Bangladesh)** Saline water purification for households and low-cost durable housing technology for coastal areas of Bangladesh
    
    *Identification and prioritisation of the technologies for low-cost, domestic, climate resilient housing as well as desalination at household levels would enhance climate resilience of local communities in the climate-vulnerable coastal areas of Bangladesh.*

  - **(Cambodia)** Application of the gravity-driven membrane (GDM) technology for supplying sustainable drinking water to rural communities
    
    *Implementation of the small-scaled, decentralised, energy-efficient water treatment technology would supply safe drinking water to communities in rural Cambodia affected by prolonged drought.*
Climate technology knowledge portal

- CTCN website [www.ctc-n.org](http://www.ctc-n.org) hosts nearly 17,000 publications, case studies, tools and webinars on climate change adaptation and mitigation, women and gender, etc.

Source: CTCN website
Thank you

Email: h.chon@unido.org

Supported by