



# Training on Digital Technologies for Disaster Risk Management

## Background

Asia and the Pacific is among the world's most disaster-impacted regions and the number of disasters caused by the natural hazards in the region has increased drastically in recent years. According to UNDRR's Global Assessment on Risk 2019, the risk is systemic and crises are cascading. Information and communication technologies (ICTs) have tremendous potential in disaster risk management due to their ability to instantly and continuously facilitate the rapid flow of information in real time. The use of ICTs during all phases of disaster risk management presents substantial opportunities to reduce disaster risks, enhance resilience, and facilitate inclusive preparedness and response.

The full potential of ICTs, however, can only be realized if individuals and institutions have the capacities to integrate and utilize it appropriately. To address the need to build capacities in disaster risk management, APCICT/ESCAP has developed an Academy Module on "ICT for Disaster Risk Management" to equip the policymakers and civil servants at the national and local government levels with the essential knowledge and skills to understand the overall framework of disaster risk management and the practical use of ICTs in disaster mitigation and preventions, preparedness, response and recovery.

In an effort to strengthen the capacities of government officials from ministries and departments responsible for disaster risk management of Armenia, APCICT, in partnership with the Ministry of High-Tech Industry and in collaboration with the Geoinformatics Center/Asian Institute of Technology and ITC-University of Twente will conduct a virtual training from 18-22 July 2022.

## Objectives

By the end of the training, participants will:

- Be familiar with DRM and its associated terminologies, including the linkages between the Sendai Framework for Disaster Risk Reduction and the Sustainable Development Goals;
- Be able to identify the data necessary for DRM, such as remote sensing data, digital elevation data, thematic data and historical disaster data;



- Understand how risk information can be used for selecting appropriate disaster risk mitigation and prevention measures at various levels, and for making decisions by considering likely future risk scenarios;
- Be aware of the freely available satellite-based resources and products for emergency mapping, mobile apps for reporting disaster incidents, and robots for search and rescue operations;
- Know the ways in which ICTs can be used to support the disaster recovery, including post-disaster building damage assessment and post-disaster recovery monitoring; and
- Recognize the role of ICTs in addressing issues related to gender inequality in DRM

### Resource Persons

Prof. Cees van Westen, Department of Earth System Analysis (ITC), University of Twente  
Dr. Manzul Hazarika, Director, Geoinformatics Center, Asian Institute of Technology

### Participants' profiles

The training is open to government officials from ministries and departments responsible for disaster management, and development subjects.

### Modality

The training will be organized into 5 daily sessions of 3 hours (10:00 – 13:00 Yerevan time/8:00-11:00 Amsterdam time/13:00-16:00 Bangkok time) via Zoom and learning materials will be stored in the CANVAS platform.

### Certification

A certification of completion will be issued to participants who met the evaluation criteria.

### For information, please contact:

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**ICT and Disaster Risk  
Reduction**



# PROGRAMME AGENDA

## Virtual Session in details

18-22 July 2022

(10:00 – 13:00 Yerevan time/8:00-11:00 Amsterdam time/13:00-16:00 Bangkok time)

Time *	Monday 18 July 2022
10:00 – 13:00	<p><b>Opening</b></p> <ul style="list-style-type: none"><li>• Welcome remarks by Mr. Kiyoung Ko, Director, APCICT</li><li>• Remarks from Mr. Vahan Hovsepyan, Adviser to the Minister, Ministry of High-Tech Industry of the Republic of Armenia</li><li>• Group Photo</li></ul> <p><b>Session 1: Introduction to ICT for Disaster Risk Management</b></p> <p>Part 1: Introduction (Cees)</p> <ul style="list-style-type: none"><li>• Introduction to the course and learning objectives (5 minutes)</li><li>• Short overview of the participants.</li><li>• How does the Canvas work &amp; house rules (5 minutes)</li></ul> <p>Part 2: Introduction lecture (Manzul)</p> <ul style="list-style-type: none"><li>• Gloomy side - Problems coming from climate change (urban heat increasing, sea-level rise, tropical cyclones increasing), increase in exposure, urbanization</li><li>• Brighter side – advances in ICT can address better than before (satellites, big-data, AI/ML, IoT, 5G, Social Media etc.)</li><li>• Applications of ICT for DRM</li></ul> <p><b>Break: 10 minutes</b></p> <p>Part 3a: Discussion in groups (Cees)</p> <ul style="list-style-type: none"><li>• Explanation on how this works and how people are subdivided into groups of around 5 persons.</li><li>• Assign a team leader who will guide the discussion, and a reporter who will make the presentation. The reporter will make a PowerPoint slide.</li><li>• Make first a round of introductions within the group. The reporter will make a slide with the names and the roles within the organization (10 minutes).</li><li>• Then they discuss the following questions:<ul style="list-style-type: none"><li>○ What are the main breakthroughs in your own organization in DRM through ICT? Are these breakthroughs recognized by other participants? Give a few clear examples (10 minutes).</li><li>○ In which phases of Disaster Risk Management is ICT most important (10 minutes)?</li><li>○ Does the application of ICT lead to fewer casualties and economic damage?</li><li>○ What are the main challenges and obstacles in the application of ICT in DRM in your country (10 minutes)?</li></ul></li></ul> <p>Part 3b: Reporting (Manzul)</p> <p>Back to the plenary session. The seven groups are asked to present the outcomes of the discussions.</p> <ul style="list-style-type: none"><li>• Presentations from the groups: 7 x 5 minutes = 35 minutes</li><li>• Write reactions and further questions in the chat. These can be considered in the coming days.</li></ul>



	<ul style="list-style-type: none"> <li>• <b>Wrap-up</b> and homework for Day 2. The homework for the second day will be: to read chapter 2 of the Guidebook (5 minutes).</li> </ul>
Time *	Tuesday 19 July 2022
10:00 – 13:00	<p><b>Session 2: Data Necessary for Disaster Risk Management</b></p> <p>Part 1: Introduction (Cees)</p> <ul style="list-style-type: none"> <li>• What is the aim of this day, and how is it structured (5 minutes)?</li> <li>• Aspects of data in relation to DRM: time, detail, availability, uncertainty (5 minutes)</li> </ul> <p>Part 2: Remote Sensing data (Manzul)</p> <ul style="list-style-type: none"> <li>• Introduction to Remote Sensing.</li> <li>• Electromagnetic spectrum, bands, visible, infrared, radar.</li> <li>• Passive remote sensing, active remote sensing.</li> <li>• Main types of data</li> <li>• Examples of data and data portals.</li> </ul> <p>Part 2b: Small quiz (Cees)</p> <ul style="list-style-type: none"> <li>- This quiz deals with knowledge on geospatial aspects related to natural hazards and risk, and tests the level of the participants</li> </ul> <p>Part 3: Digital Elevation Model (Manzul)</p> <ul style="list-style-type: none"> <li>• Introduction to Digital Elevation Model (DEM)</li> <li>• Applications of DEM: measuring trees, measuring building heights, calculating landslide displacements etc.</li> </ul> <p><b>Break: 10 minutes</b></p> <p>Part 4: Group exercise (Cees)</p> <p>We divide into groups based on main hazard types: Flooding, Earthquake/tsunami, Tropical Storms, Drought, Wildfires, Landslides. A poll on to identify who is interested in which hazard. Break-out groups will be made based on pooling results and each group will discuss the following points for their specific (assigned) hazard for 30 minutes.</p> <ul style="list-style-type: none"> <li>• Characterize the hazard in terms of its spatial, temporal, and spectral properties.</li> <li>• Based on these properties, what spatial data types are essential for: <ul style="list-style-type: none"> <li>○ Prediction/Early warning of the hazard events?</li> <li>○ Monitoring the hazard event.</li> <li>○ Damage assessment</li> </ul> </li> <li>• Go through the checklist provided to identify the remote sensing needs for assessing the risk of the selected hazard.</li> <li>• Part 4b: Reporting back (15 minutes) (Cees)</li> </ul> <p>Part 5: Spatial Data Infrastructure (Manzul)</p> <ul style="list-style-type: none"> <li>• Framework, stakeholder involvement, infrastructure</li> <li>• Data standards, metadata,</li> <li>• Example: GeoNode. How is it organized and how does it work?</li> </ul>
Time *	Wednesday 20 July 2022



10:00 –	<b>Session 3: ICT risk assessment and visualization</b>
13:00	<p>Part 1: Introduction lecture (Cees)</p> <ul style="list-style-type: none"> <li>• What is risk? Basic components, Hazard, exposure vulnerability.</li> <li>• Hazard characteristics &amp; complications</li> <li>• Hazard interactions</li> <li>• Elements-at-risk</li> <li>• Vulnerability</li> <li>• Loss and risk assessment</li> </ul> <p>Part 2: Exercise (Cees)</p> <ul style="list-style-type: none"> <li>• Quiz with specific assignments. <ul style="list-style-type: none"> <li>○ Think Hazard: <a href="https://thinkhazard.org/en/">https://thinkhazard.org/en/</a></li> <li>○ INFORM Risk: including socio-economic factors. Question: where can it be used for: <a href="https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Subnational-Risk/Map">https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Subnational-Risk/Map</a></li> <li>○ Preview: <a href="https://preview.grid.unep.ch/index.php?preview=map&amp;lang=eng?">https://preview.grid.unep.ch/index.php?preview=map&amp;lang=eng?</a></li> <li>○ INARISK: <a href="http://inarisk.bnpp.go.id/">http://inarisk.bnpp.go.id/</a></li> <li>○ Tajikistan: <a href="http://tajirisk.ait.ac.th/">http://tajirisk.ait.ac.th/</a></li> </ul> </li> </ul> <p><b>Break: 10 minutes</b></p> <p>Part 3: Exercise (Cees)</p> <ul style="list-style-type: none"> <li>• Assignment:</li> <li>• Exercise in Excel on how to calculate risk. Example: <i>Flooding</i>. Using a simple map with 4 floor depths, elements-at-risk map (land use types), Flood vulnerability curves (link to global flood vulnerability curves). Calculate exposure for a small part. Calculate vulnerability for a small part, calculate losses, calculate risk.</li> </ul> <p>Part 4: Lecture (Cees)</p> <ul style="list-style-type: none"> <li>• Types of risk</li> <li>• Multi-hazard risk</li> <li>• Different methods for estimation risk</li> <li>• Scale of risk assessment</li> </ul> <p>Part 5: Discussion and wrap up: (Cees)</p> <ul style="list-style-type: none"> <li>• Which method to use in which case?</li> </ul>
Time *	Thursday 21 July 2022



<p>10:00 – 13:00</p>	<p><b>Session 4.a: ICT for Disaster Mitigation &amp; Prevention</b></p> <p>Part 1: Introduction lecture (Cees)</p> <ul style="list-style-type: none"> <li>• How does risk change through time? Climate change, land-use change, population change</li> <li>• How does risk change when implementing risk reduction measures?</li> <li>• Some examples of tools</li> </ul> <p>Part 2: Demonstration exercise</p> <ul style="list-style-type: none"> <li>• Example of Risk Changes exercise. Go through the procedure.</li> <li>• Current hazard, risk reduction alternatives, future scenarios., CBA, outcomes.</li> <li>• Quiz: Stakeholder workshop? Selection of optimal risk reduction measure?</li> <li>• They can download the exercise and do this by themselves. Link to online course opportunity.</li> </ul> <p><b>Break: 10 minutes</b></p> <p><b>Session 4.b: ICT for Disaster Preparedness</b></p> <p>Part 1: Introduction lecture (Manzul)</p> <ul style="list-style-type: none"> <li>• Forecasting system – Predicts the level of danger based on indicators at a regional scale and regular intervals;</li> <li>• Monitoring system – Increases the understanding of natural processes but can also be utilized to plan further actions; and</li> <li>• Warning system – Detects significant changes in the environment (as precursors for mass movements) before the event occurs.</li> </ul> <p>Part 2: Demonstration (Manzul)</p> <ul style="list-style-type: none"> <li>• Demonstration of a disaster management system.</li> </ul> <p>Part 3: Discussion (Manzul)</p> <ul style="list-style-type: none"> <li>• Are there good examples from your own country? What worked well, and where are the bottlenecks with respect to ICT and Early Warning?</li> </ul>
<p>Time *</p>	<p>Friday 22 July 2022</p>
<p>10:00 – 13:00</p>	<p><b>Session 5.a: ICT for Disaster Response (1 hour)</b></p> <p>Part 1: Introduction lecture (Manzul)</p> <ul style="list-style-type: none"> <li>• Remote Sensing based disaster response. Disaster Charter.</li> <li>• Palu earthquake example.</li> </ul> <p>Part 2: Demonstrations (Manzul)</p> <ul style="list-style-type: none"> <li>• Demonstration of Sentinel Asia</li> </ul> <p>Part 2: Search information yourself for the hazard assigned on Day 1 in your country (15 minutes) (each group)</p> <ul style="list-style-type: none"> <li>• UNITAR-UNOSAT: <a href="https://www.unitar.org/maps">https://www.unitar.org/maps</a></li> <li>• Seninel Asia: <a href="https://sentinel-asia.org/">https://sentinel-asia.org/</a></li> <li>• Disaster Charter: <a href="https://disasterscharter.org/web/guest/home;jsessionid=0EDB4CDCD3CB08C028C0511D3C50A63B.APP1">https://disasterscharter.org/web/guest/home;jsessionid=0EDB4CDCD3CB08C028C0511D3C50A63B.APP1</a></li> </ul> <p>Question: how useful have been these satellite-derived damage datasets in your experience?</p>



**Break: 10 minutes**

**Session 5.b: ICT for Disaster Recovery**

Part 1: Introduction lecture (Cees)

- What is disaster recovery
- Build Back Better / Resilience
- Monitoring disaster recovery
- Remote Sensing
- Collaborative mapping
- Wenchuan earthquake atlas (15 minutes) (Cees)

Part 2: Recovery/Reconstruction Monitoring (Manzul)

- Example from Palu, Indonesia.

**Conclusion and Closing**

- Other training possibilities.... Distance education course ITC. Postgraduate training AIT (Cees: 5 minutes).
- Time for oral feedback and suggestions for improvement (Manzul: 10 Minutes)
- Evaluation form & certificates (5 minutes).
- Closing (5 minutes)

(\*) Yerevan time (UTC+4)

