UNITED NATIONS
OFFICE FOR OUTER SPACE AFFAIRS

TEN YEARS OF THE UN-SPIDER BEIJING OFFICE

UNITED NATIONS

Right: Original cover image
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This publication has not been formally edited.
Publishing production: English, Publishing and Library Section, United Nations Office at Vienna.

UNITED NATIONS OFFICE
FOR OUTER SPACE AFFAIRS

TEN YEARS OF THE UN-SPIDER BEIJING OFFICE

UNITED NATIONS
Vienna, 2019

BRINGING THE BENEFITS OF SPACE TO HUMANKIND

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MESSAGE FROM THE DIRECTOR, UNOOSA

UNOOSA Director Simonetta Di Pippo.
Photo credit: UNIS

As natural disasters exacerbated by climate change threaten to jeopardize sustainable development around the world, timely insights into natural hazards and the risks they pose to societies are more critical than ever. Understanding the exposure of people and assets to hazards, forecasting and preparing for the impacts of disasters, and planning emergency response operations require accurate and easy-to-access information. Space technologies such as Earth observation satellites, telecommunication technologies and global navigation satellite systems can provide this information, supporting disaster risk reduction, preparedness, response and recovery.

Since its establishment in 2006 as a programme of the Office for Outer Space Affairs (UNOOSA), the Platform for Space-based Information for Disaster Management Emergency Response (UN-SPIDER) has supported countries all over the world, in particular developing countries, in accessing and making use of space technologies for addressing natural and technological disasters, and in implementing the Sendai Framework for Disaster Risk Reduction 2015–2030.

Asia is particularly struck by disasters; 86 per cent of all people reported as affected by climate-related disasters between 1998 and 2017 were located on the continent.[1] Cyclone Fani and Typhoon Mangkhut are just two examples of extremely powerful storms that recently hit the region.

Since its inception in 2009, the UN-SPIDER Beijing office has been working with national stakeholders as well as regional and international organizations to strengthen disaster management capacities in the region. Through its technical advisory support activities, training courses and annual conferences in Beijing, the office has contributed to building the capacity of Member States to use space-based information in disaster management and emergency response.

Marking the tenth anniversary of the UN-SPIDER Beijing office, this booklet highlights its key achievements through the contributions of its regional support offices and other partners.

[1] Pascaline Wallemacq and Rowena House, Economic Losses, *Poverty & Disasters: 1998-2017*. Report by the United Nations Office for Disaster Risk Reduction (UNDRR) and the Centre for Research on the Epidemiology of Disasters (CRED) (Brussels/Geneva, 2018).

I want to express our sincere gratitude to the Government of the People's Republic of China for hosting the office and providing logistical, financial and technical support as well as contributing staff.

I also want to thank the growing network of regional support offices of UN-SPIDER worldwide for their contributions to the success of the activities of UN-SPIDER in Asia and worldwide.

As we mark the achievements of the Beijing office so far, we are also conscious of the challenges ahead. Together with its stakeholders and partners, UNOOSA will continue supporting countries in using space technologies to benefit societies in Asia and beyond.

Simonetta Di Pippo
Director, Office for Outer Space Affairs

01. UN-SPIDER AT A GLANCE

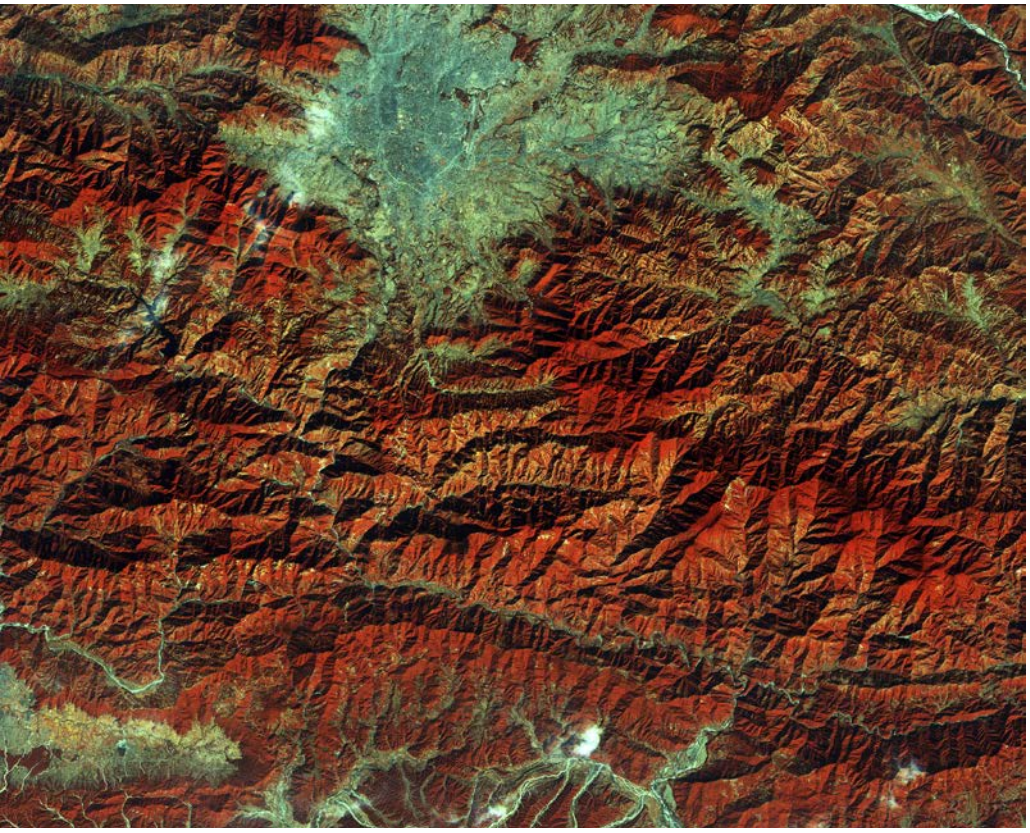
This section introduces the role, responsibilities and activities of UN-SPIDER such as its technical advisory services, capacity-building, knowledge management and outreach to strengthen the disaster management capacity of developing countries.

The United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) is a programme of the United Nations Office for Outer Space Affairs (UNOOSA) that assists developing countries in using space-based information for all phases of disaster management – from preparedness to response and recovery. Besides Vienna, where UNOOSA is based, UN-SPIDER has offices in Bonn and Beijing. Since its establishment in 2006 as a programme of UNOOSA, UN-SPIDER has supported developing countries in accessing and making use of space technologies for addressing disasters. Since 2015, UN-SPIDER has been involved in supporting countries in the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030.

UN-SPIDER carries out technical advisory missions, capacity-building activities and awareness generation through workshops and conferences, and disseminates knowledge on space-based information for disaster management. The programme also acts as a bridge between the space and disaster management communities at regional, national and international levels.

Knowledge management is at the core of UN-SPIDER activities: its Knowledge Portal (www.un-spider.org) hosts information on all activities conducted by the programme and provides easy digital access to resources related to the use of space technologies in disaster management. In 2018, traffic on the Knowledge Portal reached half a million users, more than 40 per cent higher than in 2017.

Sentinel-2 satellite image of Bangkok.
Photo credit: contains modified Copernicus Sentinel data (2019), processed by ESA, CC BY-SA 3.0 IGO



False colour image of parts of Nepal, which shows vegetation in red, while waterways and buildings appear light green and blue.
Photo credit: contains modified Copernicus Sentinel data (2015), processed by ESA, CC BY-SA 3.0 IGO

UN-SPIDER has conducted 37 technical advisory missions so far, resulting in unique recommendations to countries with regard to policy and coordination; data access, availability and sharing; capacity-building; institutional and disaster risk reduction strengthening; early warning; and preparedness and emergency response efforts. Through these technical advisory missions, UN-SPIDER establishes long-term cooperation with disaster management stakeholders in Member States and fosters the institutionalization of the use of space technologies.

When a disaster takes place, UN-SPIDER supports emergency response efforts in Member States by facilitating their access to space-based information through regional and global emergency mechanisms. These mechanisms include the International Charter "Space and Major Disasters", Sentinel Asia and Copernicus Emergency Management Service Mapping, through which the space community provides satellite-derived information and map products to support disaster response efforts.

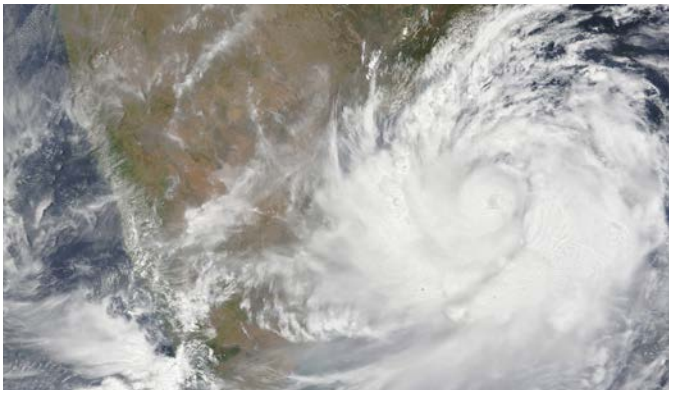
False colour image of the Indian state of Kerala after floodwater had inundated the area. Floodwater appears dark blue, while vegetation is bright green.
Photo credit: NASA

UN-SPIDER is also working to enable Member States to activate these mechanisms on their own and develop the capacity of their national institutions to utilize satellite images for emergency response, damage and loss assessment, and to improve rebuilding.

The work of UN-SPIDER is backed up by a global network of 23 regional support offices that provides a wide range of expertise and services to implement the UN-SPIDER mandate.

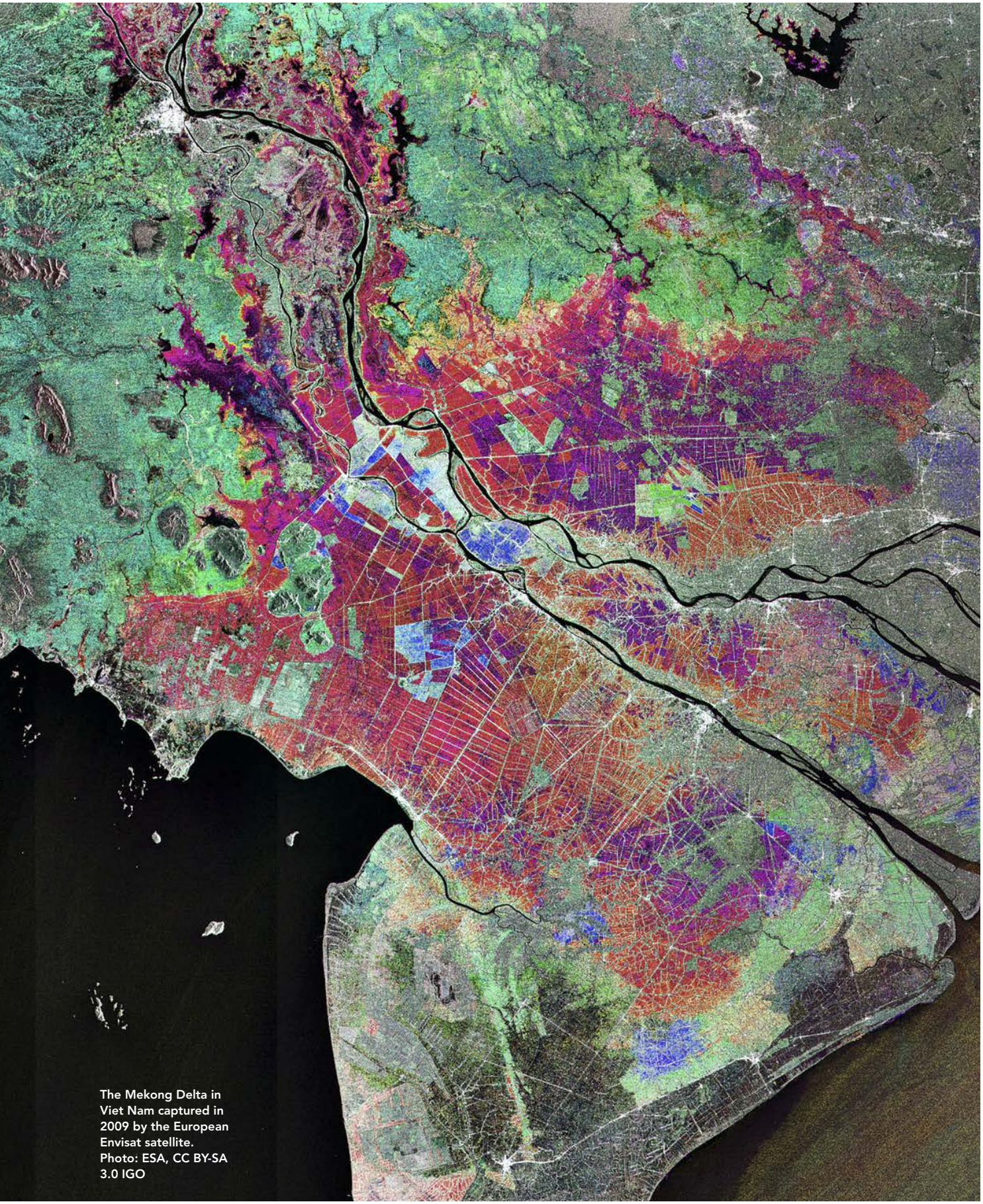
Regional support offices are hosted by national space agencies, research centres, universities and intergovernmental institutions. This network is growing constantly.

UN-SPIDER would not have been possible without the voluntary contributions (cash and in-kind) received from the following Governments since its establishment: Austria, China, Croatia, Czechia, Germany, Indonesia, Republic of Korea, Spain, Switzerland, and Turkey.



Satellite image of tropical storm Fani in the Indian Ocean in April 2019, captured by the NASA Terra satellite.
Photo credit: NASA

Signing of the memorandum of understanding between UNOOSA and the Government of China at the UN-SPIDER Beijing conference in 2017.
Photo credit: UNOOSA



The Mekong Delta in Viet Nam captured in 2009 by the European Envisat satellite. Photo: ESA, CC BY-SA 3.0 IGO

02. TEN YEARS OF UN-SPIDER IN BEIJING

This section highlights the role and achievements of the UN-SPIDER office in Beijing in helping Member States and regional and international organizations leverage space-based information for disaster risk management and emergency response. The Beijing office benefits from the financial and in-kind support provided by the Government of China.

Technical advisory support

Offered technical advisory missions and follow-up activities to 20 countries in Asia, the Pacific and Africa.

Countries covered

Asia: Afghanistan, Bangladesh, Bhutan, Cambodia, India, Indonesia, Lao People's Democratic Republic, Maldives, Mongolia, Myanmar, Nepal, Sri Lanka, Viet Nam (lead role)

The Pacific: Fiji, Samoa, Solomon Islands (lead role)

Africa: Ghana, Kenya, Mozambique, Sudan (supporting role)

National/regional level capacity-building efforts

Over 30 national/regional level capacity-building programmes were conducted on the use of space-based technologies in disaster management and emergency response. These programmes benefited over 800 participants.

Annual international conferences

The office has organized nine annual UN-SPIDER conferences in Beijing – the United Nations International Conference on Space-based Technologies for Disaster Risk Reduction – benefiting over 1,000 participants from all over the world in consolidating their actions in the use of Earth observation and other space-based technologies at all stages of disaster management.

International capacity-building efforts

Eight one-week-long training programmes were conducted in conjunction with the annual international conferences in Beijing. The Regional Centre for Space Science and Technology Education for Asia and the Pacific (RCSSTEAP) based at Beihang University, China hosted the training programmes, which benefited over 225 international participants from all continents.

Emergency response

The office has supported over 25 major disasters by providing disaster management agencies with access to Earth observation images for rapid response mapping.

The office conducts special efforts to enable countries to use international and regional emergency response mechanisms on their own so that they proactively access space-based information and use it effectively during emergencies.

Outreach at regional and international level

The office has organized over 30 international, regional and national workshops for creating awareness among the disaster management community and offering support for the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030.

Engagement with international agencies

The office has participated in over 60 international events to increase the outreach of UN-SPIDER activities to engage with Member States and international agencies.

The UN-SPIDER Beijing office provides contributions to:

- Asian Ministerial Conference on Disaster Risk Reduction and ISDR Asia Platform meetings organized by the United Nations Office for Disaster Risk Reduction (UNDRR)
- Committee on Disaster Risk Reduction of the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP)
- Intergovernmental Consultative Committee on the Regional Space Applications Programme for Sustainable Development
- Asia-Pacific Regional Space Agency Forum

In addition, the office regularly conducts programmes in partnership with the following institutions:

- Asia-Pacific Space Cooperation Organization (APSCO)
- Association of Southeast Asian Nations (ASEAN) Research and Training Center for Space Technology and Applications supported by the Geo-informatics and Space Technology Agency of Thailand (GISTDA)
- ASEAN Coordinating Centre for Humanitarian Assistance (AHA Centre)
- South Asian Association for Regional Cooperation (SAARC) Disaster Management Centre (Interim Unit)
- Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) (UN-affiliated), Dehradun, India
- Regional Centre for Space Science and Technology Education in Asia and the Pacific (RCSSTEAP) (UN-affiliated), Beijing

Ministry of Emergency Management of China – Host of the UN-SPIDER Beijing office

The inauguration of the UN-SPIDER Beijing office in 2010 was an important achievement in the history of cooperation between UNOOSA and the Government of China. The Beijing office has been instrumental in helping UN-SPIDER establish effective relations with member countries and international and regional organizations in Asia and beyond to work together on its mission to leverage space technology and data for disaster risk reduction.

UNOOSA has successfully implemented the nearly 18 million RMB operating funds it received in three funding cycles (2009– 2012, 2013–2016 and 2017–2020) to provide technical support and raise awareness in the Asia-Pacific region and beyond.

In addition the Government of China provided two Chinese staff for the UN-SPIDER Beijing office, thereby enhancing its capacity to carry out its work. The National Disaster Reduction Centre of China (NDRCC) of the Ministry of Emergency Management of China offered comprehensive technical support. In particular, the NDRCC helped UN-SPIDER on critical aspects such as providing Chinese experts and preparing emergency mapping services.

Moreover, the annual UN-SPIDER conference, held in Beijing since 2011, has become a reference in the areas of space technology and disaster management in the Asia-Pacific region. It has played a positive role in enhancing national and regional capabilities in space-based technology applications for disaster risk reduction and promoted the implementation of the Sendai Framework for Disaster Reduction 2015–2030 in Asia.

2010

Technical advisory mission to Maldives.
Photo credit: UNOOSA

2011

Technical advisory mission to Maldives.
Photo credit: UNOOSA

2012

Training programme in Sri Lanka in 2012
Photo credit: UNOOSA

2013

Technical advisory mission to Ghana.
Photo credit: UNOOSA

2014

Technical advisory mission to Bhutan.
Photo credit: UNOOSA

2015

Training programme in Bangladesh in 2015.
Photo credit: UNOOSA

2016

ASEAN workshop in Indonesia in 2016.
Photo credit: UNOOSA

2017

Beijing international training course.
Photo credit: UNOOSA

2018

UN-SPIDER International Conference in Beijing in 2018.
Photo credit: UNOOSA

Typhoon Wutip captured by the NASA Terra satellite in 2013. *Photo credit: NASA*

03. TECHNICAL ADVISORY SUPPORT IN ASIA AT NATIONAL LEVEL

The goal of UN-SPIDER technical advisory support is to ensure that countries recognize the value of space-based information to prevent and mitigate disasters and use it effectively when needed. UN-SPIDER offers such support through technical advisory missions and capacity-building programmes, as well as by supporting emergency response. This section presents success stories from the UN-SPIDER technical advisory missions and support in Bangladesh, Lao People's Democratic Republic, Myanmar, Nepal, Sri Lanka and Viet Nam.

Bangladesh

Lead organization

Ministry of Disaster Management and Relief

Supporting organizations

Bangladesh Space Research and Remote Sensing Organization and the United Nations Development Programme (UNDP) country office in Bangladesh

Technical advisory mission follow-up to Bangladesh in 2015.
Photo credit: UNOOSA

Since the UN-SPIDER technical advisory mission led by Shirish Ravan in 2011, our Department of Disaster Management has received multiple benefits from the training courses, workshops and conferences organized by UN-SPIDER in Bangladesh and abroad. We are better equipped to use space-based information especially for multi-hazard risk and vulnerability assessment, emergency response mapping, and damage and loss assessment for flood hazards, the most frequent disaster that occurs in Bangladesh. We are pleased to engage with UN-SPIDER in the coming years to further strengthen our capacities.

Abu Syed Mohammad Hashim, (Additional Secretary), Director General, Department of Disaster Management, Government of Bangladesh.

Activities

2011: Technical advisory mission

2013: National training programme on "Space Technology for Flood Hazard Mapping, Flood Forecast and Rapid Mapping in Bangladesh"

2015: Training programme on the use of "Earth Observation Technologies for Disaster Damage and Loss Assessment".

Facilitated participation of officials from Bangladesh at international and regional workshops, training programmes and specific regional initiatives in South Asia

Impact

- The support of UN-SPIDER has helped the Department of Disaster Management and other organizations to enhance their capacity on topics such as damage and loss assessment, and flood hazard and emergency response mapping.
- The Department developed a standard operating procedure on the "Use of space technology in disaster risk reduction and climate change adaptation in Bangladesh" based on the recommendations of the technical advisory mission. The purpose of the standard operating procedure is to act as a guide to develop space-based technology applications for disaster management in Bangladesh.

Technical advisory mission follow-up to Bangladesh in 2013.
Photo credit: UNOOSA

Lao People's Democratic Republic

Lead organization

Ministry of Science and Technology

The technical advisory mission and consequent follow-up activities have generated enormous awareness in the Lao People's Democratic Republic about incorporating space-based information to support the provisions of the Sendai Framework. An informal group, the National Geospatial Information Utilization and Management (LaoNGUM), created during the UN-SPIDER mission, is the first voluntary association of its kind that aims at coordinating specific activities related to remote sensing and geographic information systems in the country. LaoNGUM was active during the floods caused by the Xe-Pian Xe-Namnoy hydropower dam collapse in 2018. In its disaster reduction endeavours, the Lao government has been supported and assisted extensively by the international community and especially by UN-SPIDER, which we highly appreciate. The Lao People's Democratic Republic stands ready to deepen cooperation with all parties. We look forward to enhancing cooperation with UN-SPIDER.

Dr. Sanya Praseuth, Member of Parliament and Vice President of the Economic, Technology and Environment Committee of the National Assembly of the Lao People's Democratic Republic

Activities

2015: Technical advisory mission

2016: Technical workshop with disaster management stakeholders, high-level advocacy meeting, training programme and formation of the LaoNGUM voluntary association

2019: Training programme on "Earth Observation-based Mechanisms and Tools for Assessing Flood Risk and Rapid Response During Floods

Facilitated participation of officials from the Lao People's Democratic Republic at international and regional workshops, training programmes and specific regional initiatives in South-East Asia

Impact

- The technical workshop and the high-level advocacy meetings generated awareness at decision-making level about the use of space-based information in implementing "Priority 1: Understanding disaster risks" and "Priority 4: Enhancing disaster preparedness for effective response and to 'Build Back Better' in recovery, rehabilitation and reconstruction" of the Sendai Framework for Disaster Risk Reduction 2015–2030.
- The idea of forming LaoNGUM was informally agreed on by all participants at the 2016 UN-SPIDER training session. It is the first voluntary association of its kind that aims at coordinating specific activities related to remote sensing and geographic information systems in the country.
- LaoNGUM was active during the floods caused by a dam collapse in 2018. Maps provided through the International Charter "Space and Major Disasters" were channelled to the end users.

Technical advisory mission to the Lao People's Democratic Republic in 2015.
Photo credit: UNOOSA

Technical advisory mission follow-up to the Lao People's Democratic Republic in 2016.
Photo credit: UNOOSA

Myanmar

Lead organization

Ministry of Social Welfare, Relief and Resettlement

Supporting organizations

UN-HABITAT, United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), UNDP

Myanmar received a technical advisory mission from UN-SPIDER in 2012 and the recommendations from the resulting report have been very helpful in enhancing capacity in the use of disaster risk reduction technology. This led us to establish a technical unit dedicated to remote sensing and geographic information systems at the Emergency Operation Centre. Myanmar has also benefited from learning opportunities on the use of space technology for disaster risk reduction through UN-SPIDER support. As a result of this cooperation, two officials were sent to pursue postgraduate diplomas in remote sensing and geographic information systems at the United Nations-affiliated Regional Centre for Space Science and Technology for Asia and the Pacific (CSSTEAP) based at the campus of the Indian Institute of Remote Sensing in the current academic year. We have also become an authorized user of the International Charter "Space and Major Disasters" and are able to practise the use of space technology in addressing disasters and emergencies.

U Soe Aung, Deputy Minister, Ministry of Social Welfare, Relief and Resettlement, Republic of the Union of Myanmar

Technical advisory mission follow-up to Myanmar in 2016.
Photo credit: UNOOSA

Activities

2012: Technical advisory mission

2012: Training programme on "Geo-informatics for Disaster Risk Management in Myanmar"

2016: High-level advocacy meeting and training programme on the "Use of Space Technology in Landslide Hazard, Risk and Damage Assessment"

March 2017: Training programme on "Post Disaster (Earthquake) Rapid Damage Assessment"

March 2019: High-level advocacy meeting at ministerial level, training programmes on "Use of Space Technology in Post Disaster Rapid Damage Assessment"

Facilitated participation of officials from Myanmar at international and regional workshops, training programmes and specific regional initiatives in South-East Asia

Impact

- The Ministry of Social Welfare, Relief and Resettlement established an emergency operations centre that hosts a section dedicated to the use of Earth observation data as well as a satellite imagery and research section. An official trained through UN-SPIDER programmes is leading the activities related to the use of satellite images and mapping. UN-SPIDER is continuing its engagement with the ministry in updating its "Action Plan for Disaster Risk Reduction".
- The UN-SPIDER Beijing office, together with UN-HABITAT and UNDP, is working with the Disaster Management Training Centre, based in Myanmar, to develop remote sensing-based training courses.
- In 2017, the Relief and Response Department became an authorized user of the International Charter "Space and Major Disasters" and will be able to activate the Charter on its own.
- In 2019, the Ministry of Social Welfare, Relief and Resettlement nominated two officials to attend a postgraduate course in remote sensing and geographic information systems at the United Nations-affiliated Centre for Space Science and Technology Education in Asia and the Pacific based in India.

Nepal

Lead organization

Ministry of Home Affairs and National Emergency Operation Centre

Supporting organizations

International Centre for Integrated Mountain Development (ICIMOD), Office of the United Nations Resident Coordinator and Nepal GIS Society

The UN-SPIDER technical advisory mission offered timely interventions to the Ministry of Home Affairs of Nepal and helped us incorporate the use of space-based and geospatial information in the National Disaster Risk Reduction and Management Strategy of Nepal.

Ms. Indu Ghimire, Division Head/Joint Secretary, Disaster and Conflict Management Division, Ministry of Home Affairs, Nepal

Technical advisory mission follow-up to Nepal in 2018.
Photo credit: UNOOSA

Technical advisory mission follow-up to Nepal in 2018.
Photo credit: UNOOSA

Activities

2017: Technical advisory mission

2018: Coordination meetings between the Government and United Nations agencies; training programme on space technology for multi-hazard risk assessment; a high-level advocacy meeting and a meeting on the national spatial data infrastructure

Facilitated participation of officials from Nepal at international and regional workshops, training programmes and specific regional initiatives in South Asia

Impact

- As a result of the 2017 technical advisory mission, the Ministry of Home Affairs included references to remote sensing, geographic information systems and Earth observation-based tools into their 2018 disaster risk reduction policy.
- Following the UN-SPIDER technical advisory mission, the Ministry also requested that stakeholders develop a unified and inclusive approach to preparing hazard maps with the support of Earth observation.
- As a further result of the 2017 UN-SPIDER mission, the country's surveying department approached the United Nations Resident Coordinator's Office in Nepal to request the support of UN-SPIDER in implementing a national spatial data infrastructure. The process of implementing this infrastructure was discussed during the UN-SPIDER mission in 2017.

Sri Lanka

Lead organization

Ministry of Public Administration, Disaster Management and Livestock Development

Supporting organizations

International Water Management Institute (IWMI) and the UNDP country office in Sri Lanka

UN-SPIDER has been offering its consistent support to Sri Lanka since 2011. These interventions led the Disaster Management Centre of Sri Lanka to play a role as the main stakeholder in the national spatial data infrastructure established under the Information and Communication Technology Agency. In 2017, with support from UN-SPIDER, the Disaster Management Centre became an authorized user of the International Charter "Space and Major Disasters" and is better prepared for handling emergencies.

W. A. Dharmasiri, Director General, Disaster Management Centre, Sri Lanka

Technical advisory mission follow-up to Sri Lanka in 2014.
Photo credit: UNOOSA

Technical advisory mission follow-up to Sri Lanka in 2014.
Photo credit: UNOOSA

Activities

2011: Technical advisory mission

2012: Training on "Space Technology for Improving Hazard Mapping in Sri Lanka"

2014, 2017 and 2018: Series of programmes that included workshops at decision-making level and training programmes in collaboration with the Disaster Management Centre and IWMI

2018: Sri Lanka provided a detailed assessment of its achievements in making use of space-based information in disaster management as a result of the support provided by UN-SPIDER

Facilitated participation of officials from Sri Lanka at international and regional workshops, training programmes and specific regional initiatives in South Asia

Impact

- Key recommendations of the technical advisory mission were useful in preparing disaster management policies and subsequent plans of actions initiated by the Disaster Management Centre.
- Based on the recommendations of UN-SPIDER, the Disaster Management Centre in Sri Lanka prepared a proposal for a national spatial database infrastructure, which was endorsed by the cabinet. Together with the Survey of Sri Lanka, the Disaster Management Centre is implementing the national spatial database infrastructure.
- In 2017, with support from UN-SPIDER, the Disaster Management Centre became an authorized user of the International Charter "Space and Major Disasters".
- In 2019, the Disaster Management Centre and UN-SPIDER started a new project aimed at developing a spatial data repository for reporting on the targets of the Sendai Framework.

Viet Nam

Lead organizations

Viet Nam National Disaster Management Authority (VNDMA) and its associated Disaster Management Preparedness and Technology Centre (DMPTC)

I thank UN-SPIDER for its consistent support since 2012. The awareness generated by the UN-SPIDER programme led us to establish a geospatial division at our Viet Nam Disaster Management Policy and Technology Center (DMPTC), which is run by staff partly trained through the UN-SPIDER programme. The Center also signed a bilateral memorandum of understanding with other national institutions and the Japan Aerospace Exploration Agency (JAXA) to access satellite images during emergencies.

Bui Quang Huy, Deputy Director of Disaster Management Policy and Technology Center, Viet Nam

Technical advisory mission follow-up to Viet Nam in 2018.
Photo credit: UNOOSA

Technical advisory mission to Viet Nam in 2013.
Photo credit: UNOOSA

Activities

2012: Technical advisory mission

2014: Workshop and simulation exercise on "Geospatially Enabling Community Collaboration"

2015 and 2016: Study tour of officials from VNDMA to the Mississippi Emergency Management Agency as a part of a UN-SPIDER capacity-building activity in collaboration with Delta State University, a regional support office of UN-SPIDER

2016 and 2018: Training programmes and development of the standard operating procedures for the utilization of space-based and geospatial information for disaster management and emergency response

Facilitated participation of officials from Viet Nam at international and regional workshops, training programmes and specific regional initiatives in South-East Asia

Impact

- DMPTC established a geospatial division with the help of staff partly trained through UN-SPIDER.
- DMPTC signed a bilateral memorandum of understanding with the Space Technology Institute and the Japan Aerospace Exploration Agency (JAXA) for sharing satellite images during emergencies.
- UN-SPIDER has worked with DMPTC to mitigate several disaster events by activating the International Charter "Space and Major Disasters" and the Copernicus Emergency Management Service - Mapping for emergency response mapping.

04. TECHNICAL ADVISORY SUPPORT AT REGIONAL LEVEL

The UN-SPIDER Beijing office has developed partnerships with regional entities to conduct training and workshops and prepare guidelines and standard operating procedures for leveraging space technologies for disaster management. This section highlights specific initiatives in this framework in South Asia and South-East Asia.

Sentinel-2 image of the Indonesian port city of Semarang.
Photo credit: contains modified Copernicus Sentinel data (2018), processed by ESA, CC BY-SA 3.0 IGO

SAARC workshop and training.
Photo credit: UNOOSA

REGION: SOUTH ASIA

Regional training and workshop in India for countries in South Asia

Efforts

UNOOSA and the Disaster Management Centre of the South Asia Association of Regional Cooperation – Interim Unit (SAARC DMC), with support from the International Water Management Institute (IWMI) and the Centre for Space Science and Technology Education in Asia and the Pacific, conducted a regional workshop and training session on the "Utilization of space-based and geospatial information for achieving the targets of the Sendai Framework for Disaster Risk Reduction" to enhance cooperation and share best practices among disaster management agencies and experts in SAARC member countries in December 2018.

Outcome

The officials participating in this initiative have become aware of advances in Earth observation and geospatial technologies for disaster risk reduction and emergency response, especially for implementing the Sendai Framework for Disaster Risk Reduction 2015–2030. They also learned about how to develop capabilities to use international mechanisms such as the International Charter "Space and Major Disasters," Sentinel Asia and the Copernicus Emergency Management Service. The participants were also informed about capacity-building opportunities in the region for the utilization of space-based and geospatial information in disaster management.

Way forward

Further efforts are underway to prepare procedural guidelines and standard operating procedures at regional level in building capability in emergency response mapping and the utilization of space-based and geospatial information in support of the Sendai Framework.

UN-SPIDER will continue to collaborate with SAARC DMC to conduct regional level outreach and capacity-building based on the needs of the disaster management agencies in South Asia.

Partners/contributors

SAARC DMC, IWMI, CSSTEAP, NDRCC

REGION: SOUTH-EAST ASIA

Sharing space-based information: procedural guidelines for disaster emergency response in ASEAN countries

Efforts

With support from the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) and the ASEAN Coordinating Centre for Humanitarian Assistance (AHA Centre), UNOOSA conducted four regional workshops on "Geo-referenced Disaster Risk Management Information Systems" involving ASEAN countries to understand the needs of disaster management agencies in terms of using space-based information effectively during emergency response.

1st workshop: 15–16 April, Yogyakarta, Indonesia

2nd workshop: 4–5 June 2015, Hangzhou, China

3rd workshop/expert meeting: December 2015, Sriracha, Thailand

4th workshop: April 2016, Bogor, Indonesia

Outcome

The workshop series led to a joint publication entitled "Sharing Space-based Information: Procedural Guidelines for Disaster Emergency Response in ASEAN Countries".

The publication provides guidelines for utilizing space-based information effectively during emergency response. The publication is available online.

Way forward

Further efforts include preparing standard operating procedures at the national level to build the capability of emergency response mapping. UNOOSA is working with the national disaster management agencies of Viet Nam and Myanmar to draw up such standard operating procedures.

UNOOSA plans to conduct simulation exercises based on these guidelines for the disaster management agencies in South-East Asia.

Partners/contributors

ESCAP, AHA Centre, United Nations Institute for Training and Research (UNITAR), Indonesian National Institute of Aeronautics and Space (LAPAN), Geo-Informatics and Space Technology Development Agency (GISTDA), NDRCC

4th ASEAN workshop entitled "Simulation exercise on the procedural guidelines for sharing space-based information during emergency response", 19-21 April 2016, Bogor, Indonesia.
Photo: UNOOSA

05. ANNUAL CONFERENCE AND TRAINING PROGRAMME

This chapter introduces an annual flagship event of the office, the United Nations International Conference on Space-based Technologies for Disaster Risk Reduction.

A flooded landscape in Cambodia between the Mekong River (right) and Tonlé Sap river (left), captured by Japan's ALOS satellite, 5 December 2009.
Photo credit: JAXA/ESA

The United Nations International Conference on Space-based Technologies for Disaster Risk Reduction has been an annual event of the UN-SPIDER Beijing office since its establishment in 2011.

2011–2017

Co-organized with the Ministry of Civil Affairs of China

2018 onwards

Co-organized with the Ministry of Emergency Management of China

Collaborators: Ministry of Foreign Affairs of China, China National Space Administration and the Asia-Pacific Space Cooperation Organization.

UN-SPIDER Beijing conference in 2011 *Photo credit: UNOOSA*

Themes of the annual conferences

2011 Best practices for risk reduction and rapid response mapping

2012 Risk assessment in the context of global climate change

2013 Disaster risk identification, assessment and monitoring

2014 Multi-hazard disaster risk assessment

2015 Consolidating role in the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030

2016 Understanding disaster risks

2017 Building resilience through integrated applications

2018 Enhancing disaster preparedness for effective emergency response

2019 A policy perspective

UN-SPIDER Beijing conference in 2017. *Photo credit: UNOOSA*

UN-SPIDER international training programme in 2017. *Photo credit: UNOOSA*

UN-SPIDER Beijing conference in 2017. *Photo credit: UNOOSA*

Annual international training programme

About 25–30 conference participants are offered a five-day training programme at the Regional Centre for Space Science and Technology Education for Asia and the Pacific hosted at Beihang University, Beijing.

Over 250 international participants from all continents have benefited from this training programme.

Through these annual conferences and training programmes, UN-SPIDER has established itself as a unique facilitator between space and disaster management professionals from Asia and beyond.

06. PARTNERS

REGIONAL SUPPORT OFFICES

The regional support offices (RSOs) are regional or national centres of expertise that are set up within an existing entity by a Member State or group of Member States. These offices have played a pivotal role in the success of UN-SPIDER. This section introduces RSOs that are contributing to the multiple activities organized by the UN-SPIDER office in Beijing.

International Water Management Institute

The International Water Management Institute (IWMI) is a non-profit research for development organization, head-quartered in Colombo, and with offices throughout Asia and Africa. IWMI is a member of the Consultative Group for International Agricultural Research (CGIAR) system of international agricultural research centres, which is a global research partnership for a food-secure future dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources.

IWMI has a comprehensive services portfolio based on technical excellence, which focuses on:

- Improving resilience to climate shocks, providing flood and drought analysis for planning and responses, and analysis of big data in real time
- Providing insights into water and land management from field to basin scales
- Assessing performance and identifying solutions for agricultural water management (large- and small-scale)
- Incorporating ecosystem approaches into agricultural systems
- Analysing biophysical and socioeconomic processes

IWMI provides expertise to developing countries to assist governments, development partners and communities in addressing critical challenges including water availability and variability, climate change, water use in irrigated and rain-fed agriculture, resource recovery and reuse, water and society, and water futures.

The Water Risks and Disasters Research Group of IWMI focuses on mitigating the impacts of water risks and climate-related disasters and providing cost-effective products and measures for disaster prevention, preparedness, mitigation and adaptation using space-based information. In collaboration with diverse partners, it promotes the use of Earth observation data including disruptive technologies to generate and disseminate new knowledge, products and services that respond to the needs of national disaster management agencies to guide an improved decision-making process.

IWMI pursues solutions through partnerships with space agencies, international and regional organizations – including UNOOSA – disaster management agencies, agricultural ministries in Asia and Africa, and the private sector.

Key research products:

- Climate hazard mapping and risk assessment
- Monitoring, forecasting and early warning of floods and drought
- Risk transfer through index-based flood insurance mechanisms
- Crop advisory services for the insurance industry
- Rapid emergency response mapping for relief measures

Contributions to the UN-SPIDER Beijing office

- IWMI contributed to the UN-SPIDER technical advisory mission in Lao People's Democratic Republic and Sri Lanka
- Supported disaster risk reduction policy dialogue with stakeholders in Bangladesh, Lao People's Democratic Republic and Sri Lanka
- Specialized training courses on hazard mapping and risk assessment of floods and drought in Bangladesh, China, India and Lao People's Democratic Republic
- Training programme with the Geo-Informatics and Space Technology Development Agency (GISTDA) on regional drought monitoring mechanism
- Contributing to preparing procedural guidelines on space-based information for disaster emergency response and monitoring of the Sendai Framework for Disaster Risk Reduction 2015–2030
- Participated in the UN-SPIDER Beijing conference and provided training in collaboration with the Asia-Pacific Space Cooperation Organization (APSCO) and Beihang University, China
- Supporting a new initiative in partnership with the SAARC Disaster Management Centre (Interim Unit) on capacity-building in South Asia on the use of Earth observation data for the implementation of the Sendai Framework

IWMI staff during a SAARC Disaster Management Center training session in 2018.
Photo credit: IWMI

IWMI staff during a UN-SPIDER training course in Lao People's Democratic Republic.
Photo credit: IWMI

Center for Interdisciplinary Geospatial Information Technologies at Delta State University

The Center for Interdisciplinary Geospatial Information Technologies at Delta State University provides graduate and undergraduate studies across the full spectrum of geospatial technologies: geographic information systems, remote sensing, positioning and survey, cartography and visualization, programming and data management, and analytic techniques. It works with partners cooperatively to apply this suite of knowledge and gain a deeper understanding of how to solve problems related to disaster, conflict, climate change, resource allocation and policy. Students are at the core of the Center's programmes. While most of its courses are available on campus, they are also accessible online with no non-residency fee. The Center engages in cooperative education whereby students are paid to work alongside faculty mentors to create real products, solve real problems and apprentice in a manner that leads to solid career opportunities. International students are always welcome to join the team.

Several of the faculty have extensive experience as emergency responders and disaster managers. The Center understands that geospatial technologies must fit into the overall command and control structure used for crisis management and are able to integrate our broad geospatial skills in a way that results in meaningful contributions. The Center has provided geospatial support for 67 major disasters since 2005. It is available for production mapping and image processing, on-site support for search and rescue actions, the creation of web and mobile device apps and similar response activities. They also specialize in the use of geospatial technologies for disaster risk reduction planning, the construction of national spatial data infrastructures and capacity-building in educational and governmental domains.

Staff from the Center for Interdisciplinary Geospatial Information Technologies visit the China National Remote Sensing Center.
Photo credit: Center for Interdisciplinary Geospatial Information Technologies

Contributions to the UN-SPIDER Beijing office

- Follow-up mission to Mozambique
- Three missions to Viet Nam
- A mission to Lao People's Democratic Republic
- A mission to Nepal
- Planned missions to Ethiopia, India and Mongolia (2019)
- Sponsorship of an education summit on the Use of Space-Based Technologies in Support of Disaster and Crisis in Arid Regions (December 2019)
- Presentations and session moderation at five UN-SPIDER Beijing meetings

Asian Disaster Preparedness Center

The Asian Disaster Preparedness Center (ADPC) is an intergovernmental organization that works to find practical solutions for people and institutions in Asia and the Pacific to enhance their ability to cope with disasters. Using its expertise and scientific knowledge base in the field of disaster and climate risk management, ADPC works with countries to address the root causes of disasters. Since 1986, ADPC has expanded its scope and diversified its operations for an approach that offers long-term and sustainable solutions to reduce the impact of disasters and climate change.

ADPC has a dedicated team of more than 100 professionals, including experts on institutional and legal assessment, risk assessment, hydro-meteorology, geology, geographic information systems and remote sensing, agriculture, water resource management, environment, capacity-building and gender. ADPC has the following thematic departments:

- Risk governance
- Preparedness for response and resilient recovery
- Climate resilience
- Urban resilience
- Health risk management
- Geospatial information
- ADPC Academy

ADPC is recognized as one of the resource centres applying geospatial information for practical applications in support of governments in Asia to understand disaster and climate risk. ADPC has conducted disaster risk assessments across Asia and the Pacific resulting in the integration of risk information into development planning.

ADPC hosts the SERVIR-Mekong hub supporting Cambodia, Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam. SERVIR-Mekong is a partnership between the United States Agency for International Development (USAID) and the National Aeronautics and Space Administration (NASA), focusing on bringing space-based technologies to climate and disaster management decision makers. ADPC works in partnership with leading regional organizations such as the Mekong River Commission Secretariat and national agencies such as the Viet Nam Academy for Water Resources and the Department of Disaster Management of Myanmar to help decision makers use Earth observation information to manage climate and disaster risk.

ADPC co-hosts a regional course on "GIS for Disaster Risk Management" held annually since 2007 with the University of Twente's Faculty of Geo-information Science and Earth Observation, the UNITAR Operational Satellite Applications Programme and the Asian Institute of Technology to build understanding of geographic information systems by relevant stakeholders.

Contributions to the UN-SPIDER Beijing office

- Technical advisory mission follow-up and training on "Applications of Geospatial Information on Statistic Data for Sustainable Development", Lao People's Democratic Republic, 2019
- Technical advisory mission follow-up and high-level meeting, Sri Lanka, 2018
- Technical advisory mission follow-up, Lao People's Democratic Republic, 2016
- Technical advisory mission follow-up, Myanmar, 2016
- Regular participation at the annual UN-SPIDER conferences in Beijing
- Acted as a value adder in the activation of the International Charter "Space and Major Disasters" by UN-SPIDER for the Lao People's Democratic Republic dam break flood in 2018

Youth learning about geospatial information through games at the Cambodia Science and Engineering Festival 2019. *Photo credit: ADPC*

Asian Disaster Reduction Center

The Asian Disaster Reduction Center (ADRC) and UNOOSA signed a cooperation agreement on the establishment of the ADRC UN-SPIDER regional support office on the occasion of the fifty-second session of the Committee on the Peaceful Uses of Outer Space (COPUOS) on 4 June 2009.

ADRC has geographic information systems software licences for the analysis of satellite data sets. ADRC has conducted several workshops on capacity-building in this field. For instance, ADRC held capacity-building workshops related to Sentinel Asia activity in Myanmar, Thailand and Viet Nam in 2018. Participants from disaster management organizations and space agencies were invited to this workshop and highlighted interest in data sharing in those countries.

ADRC uses space-based information for emergency response operations among disaster management organizations and space agencies. For instance, ADRC has the function to escalate activations of Sentinel Asia to the International Charter "Space and Major Disasters". The rollout to the Charter began in February 2010. In 2017, eight disaster events were escalated to the Charter. Excluding escalations via other institutions, two disaster events were escalated through Sentinel Asia. There was one response to an earthquake in the Philippines and one response to a flood in Viet Nam.

Contributions to the UN-SPIDER Beijing office

- Participation in the annual UN-SPIDER conference in Beijing
- Information sharing and strengthening networks at the above conference
- Supporting emergency response through the Sentinel Asia emergency mapping mechanism

ADRC workshop in Myanmar.
Photo credit: ADRC

ADRC participates in the UN-SPIDER Beijing conference in 2018.
Photo credit: ADRC

International Centre for Integrated Mountain Development

The International Centre for Integrated Mountain Development (ICIMOD) has been working extensively in the Hindu Kush Himalaya region (HKH) on disaster risk reduction-related activities for bridging science, technology and innovations, and increasing resilience. Its activities are focused on improving the understanding of disaster risks through field-based research, sensitization, strengthening capacity and the use of remote sensing and geospatial technologies. It has been working at regional, national and community levels on flood early warning systems, drought monitoring and early warning, and rapid response mapping. Through its Mountain Environment Regional Information System, ICIMOD is promoting space applications and geospatial technologies on key regional priorities as well as active regional cooperation to support informed decision-making. It hosts SERVIR-HKH, a regional hub of the global SERVIR programme supported by USAID and NASA. ICIMOD has well-equipped facilities for remote sensing image processing, geographic information systems analysis and mapping. It has a strong team of geospatial professionals with extensive experience in disaster risk reduction.

The approach of ICIMOD has been to work closely with national organizations mandated with the generation of early warnings. The focus has been on strengthening institutional and individual capacities. Several web-based applications related to disasters are being developed in collaboration with NASA Applied Science projects. An operational medium-range 15-day stream flow prediction based on downscaled global forecasts by the European Centre for Medium-Range Weather Forecasts has been developed using advanced modelling, mapping and visualization tools to make results intuitive and accessible for decision support. Similarly, a high impact weather assessment tool has been developed to facilitate the assessment of high-impact convective weather events over the Hindu Kush Himalaya region. The tool has been extended by integrating stream flow prediction to support early warning of floods due to extreme weather events with 48-hour forecasting. In the event of disasters, ICIMOD has collaborated with space agencies and supported national agencies through image analysis and mapping for rapid response.

Contributions to the UN-SPIDER Beijing office

- Participated in a "High Level Advocacy Workshop for Decision Makers on the Use of Earth Observation in Disaster Risk Reduction" in Myanmar in March 2019
- Contributed to a course on the application of the Google Earth Engine for flood inundation mapping during a national training on "Earth Observation for Multi-Hazard Risk Assessment and Emergency Response" from 11 to 15 March 2019 in Myanmar
- Supported the organization of a UN-SPIDER technical advisory mission to Nepal from 31 July to 4 August 2017, and participated in a follow-up training course in December 2018
- Through UN-SPIDER coordination, ICIMOD acquired high-resolution satellite data from AIRBUS to support Afghanistan in assessing damages resulting from the Panjshir flood in July 2018

UN-SPIDER technical advisory mission to Nepal in 2017.
Photo credit: ICIMOD

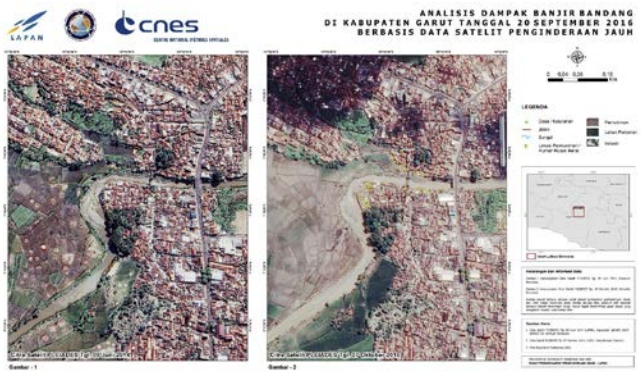
Indonesian National Institute of Aeronautics and Space

The activities of the Indonesian National Institute of Aeronautics and Space (LAPAN) include research and development, training, supervision and the provision of information to government institutions. It has hardware and software for image processing activities, high-performance computing as well as fieldwork equipment such as field spectrometers, drones and the like. LAPAN programmes mostly relate to research and development activities, particularly how to extract information from remote sensing data. LAPAN is currently developing a national Earth observation system from satellite data. This system will monitor natural resources and the environment as well as disaster mitigation, where all information will be extracted from remote sensing data. Later, the information will be sent to government institutions and some of it will also be displayed on web services for the public.

LAPAN has experience in providing disaster information during or after a disaster has happened. It has a quick-response team that is responsible for providing disaster information, especially from remote sensing data. This quick-response team will search all satellite data available that covers the disaster area and rapidly provide information related to it. On the other hand, LAPAN is also involved in early warning systems, especially for forest fire monitoring, by providing hotspot information in forest areas. The organization is very active with regard to Sentinel Asia and the International Charter "Space and Major Disasters" in the South-East Asia region. Since 2010, LAPAN has acted as a data analysis node of Sentinel Asia.

Contributions to the UN-SPIDER Beijing office

- Development of procedural guidelines on emergency response in countries that are members of the Association of Southeast Asian Nations (ASEAN) together with the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP), the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre), ASEAN Sub-Committee on Space Technology and Applications (SCOSA) and other ASEAN member states
- Attendance at UN-SPIDER Beijing office conferences and trainings
- Development of a booklet on lessons learned about the forest fires in Indonesia for the UN-SPIDER Knowledge Portal
- Support for activations of the International Charter "Space and Major Disasters" for six major disasters in Indonesia and Viet Nam
- LAPAN contributed to the International Charter as project manager as well as value-added providers



Map created by LAPAN for the activation of the International "Charter Space and Major Disasters" for flash floods in Garut, West Java.
Photo credit: LAPAN

The team at LAPAN.
Photo credit: LAPAN

Iranian Space Agency

The UN-SPIDER regional support office in Iran is hosted by the Iranian Space Agency (ISA). The regional support office was established in 2009 under a cooperation agreement between ISA and UNOOSA. ISA, as a governmental entity, is the national focal point responsible for all peaceful space activities in Iran in the domain of space science, space technology, space applications and space education. In 2017, the regional support office's initiative to establish an Earth monitoring centre won a national award and was selected as one of the five successful projects at national level. Among the focuses of the office are developing and operating integrated monitoring systems for fire detection, drought monitoring and dust storm monitoring using satellite imagery.

The mission of the office is to provide products according to requests from national and regional users. Some of its activities are as follows:

- Fire detection using MODIS imagery on a daily basis
- Dust storm monitoring using MODIS imagery on a daily basis
- Drought monitoring using MODIS imagery
- Making flood situation maps for the National Disaster Management Organization (NDMO) in 2017 and 2019
- Making earthquake situation and plate deformation maps after several earthquakes for NDMO

Contributions to the UN-SPIDER Beijing office

- Participated in the UN-SPIDER technical advisory mission to Sri Lanka
- Conducted technical workshops at national and international level
- Conducted annual training courses with the cooperation of the Asia-Pacific Space Cooperation Organization (APSCO)
- Published a booklet entitled "Lessons Learnt from Drought in Iran"
- The UN-SPIDER Beijing office has repeatedly provided the regional support office with satellite imagery during disasters in its region

Damage map produced by ISA as part of an activation of the International Charter "Space and Major Disasters" in 2017.
Photo credit: ISA

Inundation map of flash flooding produced by ISA as part of an activation of the International Charter "Space and Major Disasters" in 2019.
Photo credit: ISA

Pakistan Space and Upper Atmosphere Research Commission

The Space Application Center for Response in Emergency and Disasters (SACRED) of the Pakistan Space and Upper Atmosphere Research Commission (SUPARCO) was established in 2013 to provide space-based technical support to the national disaster management authority (NDMA), provincial disaster management authorities (PDMAs) and other national organizations during natural disasters using satellite remote sensing technologies, geographic information systems and other data. The centre is equipped with state-of-the-art facilities including the required software and hardware for space-based information processing and dissemination. Moreover, SUPARCO has been host to the UN-SPIDER regional support office in Pakistan since 2010. Major functions of SACRED are:

- Provision of space-based information to NDMA and PDMAs in the event of disasters (floods, droughts, earthquakes and landslides) for mitigation, preparedness, response and recovery
- Activation of the International Charter "Space and Major Disasters" in the event of major disasters
- Technical support to NDMA and PDMAs in conducting multi-hazard vulnerability and risk assessment studies
- Capacity-building of NDMA and PDMAs in the field of space-based disaster management
- Technical support to NDMA for the realization of the National Disaster Management Plan 2015–2030, the Sendai Framework for Disaster Risk Reduction 2015–2030, the Paris Agreement and the 2030 Agenda for Sustainable Development
- Provision of space-based information/support to countries in the region in the event of the natural disasters

In the event of the natural disasters, SACRED acquires satellite imagery from different sources and prepares maps for rescue and relief operations, flood inundation forecasting and monitoring based on upstream data, suitable camp site selection, monitoring of critical infrastructures and rapid damage assessment (infrastructure and crops).

Contributions to the UN-SPIDER Beijing office

- Creation of a booklet on "Effective use of Space-based Information to Monitor Disasters and its Impacts: Lessons Learnt from Floods in Pakistan"
- Development of a recommended practice on "Flood Mapping and Damage Assessment Using Sentinel-2 Data"
- Development of a recommended practice on "Flood Hazard Assessment using 2D flood model"
- Development of a recommended practice on "Drought Hazard Assessment and Monitoring using Google Earth Engine"
- Contributions to the UN-SPIDER technical advisory mission to Sri Lanka
- Contributions to the UN-SPIDER technical advisory mission to Bangladesh
- Contributions to the UN-SPIDER Beijing Conference since 2011
- Regular participation in training courses organized by UN-SPIDER Beijing office since 2011

A training facility at SUPARCO.
Photo credit: SUPARCO

REGIONAL CENTRES

The Asia-Pacific Space Cooperation Organization (APSCO) and the United Nations-affiliated Regional Centres for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) based in India and China are making great contributions to the UN-SPIDER programme. This section introduces these key regional partners and highlights their contribution to the activities of the UN-SPIDER office in Beijing.

Asia-Pacific Space Cooperation Organization

The Asia-Pacific Space Cooperation Organization (APSCO) was officially inaugurated in 2008 with full international legal status, and has its headquarters in Beijing. As an intergovernmental non-profit organization and permanent observer to the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), APSCO provides a cooperative mechanism for developing countries in the Asia-Pacific Region to be able to peacefully exploit space technology for promoting sustainable social and economic development. APSCO focuses on capacity-building for its member states in the research and development of space technology and its application in narrowing the gap in the progress of space infrastructure. APSCO adheres to the principles of mutual benefits and complementariness, equal consultations and development to improve the capability of APSCO member states. It is guided by the APSCO Development Vision2030, endorsed at the tenth Anniversary High-Level Forum, and is committed to in-depth international exchanges and cooperation in outer space and to promoting the development of the space industry. APSCO aims to archive these objectives through sharing resources and common achievements by joint efforts, and through the acquisition and sharing of space technology benefits for the further development of international cooperation.

One of most important missions of APSCO is to promote the implementation of space-based technologies in monitoring natural disasters. The APSCO Secretariat has always focused on this issue, giving it great importance and actively supporting any related activities. In this regard, APSCO established data sharing and disaster monitoring programmes including a framework for research on the application of space technology for disaster monitoring in APSCO member states. This includes research on determining precursor ionospheric signatures of earthquakes by ground-based ionospheric soundings and the "APSCO Earthquake Research Project Phase II: Integrating Satellite and Ground Observations for Earthquake Signatures and Precursors". Furthermore, APSCO successfully implemented the Data Sharing Service Platform (DSSP) project and Phase II of the project will be based on cloud services to allow more member states to access remote sensing satellite data; provide more convenient and faster remote sensing data acquisition channels, emergency data application functions and more active and flexible result-sharing modes.

Contributions to the UN-SPIDER Beijing office

- APSCO has attended the United Nations international conferences in Beijing since 2011
- APSCO participated in the technical advisory mission to Bangladesh in 2011 and was part of the technical advisory mission team to Mongolia in 2014
- APSCO has been actively supporting UN-SPIDER activities, especially by jointly organizing training programmes back-to-back with the United Nations international conferences in Beijing since 2013
- APSCO is determined to continue to work together with UN-SPIDER to establish more effective mechanisms on the cooperative use of space technology for disaster management and improving the quality of life of people living in the region.

Centre for Space Science and Technology Education in Asia and the Pacific (United Nations-affiliated), Dehradun, India

The Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP), the first regional centre established by UNOOSA for promoting space science and technology and its applications, has been contributing significantly to the empowerment of scientists and engineers in Asia-Pacific countries in the frontier areas of space science and technology and its applications since its inception in 1995. Located in Dehradun, India, the Department of Space of India provides all the necessary support in terms of human resources, infrastructure and finance for the smooth functioning of CSSTEAP, and executes its programmes as the focal point of the Centre.

CSSTEAP offers nine-month-long postgraduate courses in "Remote Sensing and Geographic Information Systems", "Satellite Communications and Global Positioning Systems", "Satellite Meteorology and Global Climate", and "Space and Atmospheric Science and Global Navigation Satellite Systems". It also conducts short courses, on a regular basis, spanning two to four weeks, on specialized themes based on feedback from its alumni or demand from member countries.

The Indian Space Research Organisation (ISRO) Disaster Management Support (DMS) programme comprehensively addresses various aspects of natural disasters in the country, using space-based inputs. The synergistic use of the space and airborne systems, in conjunction with geospatial technologies produces value-added products/services during all spheres of disaster management – preparedness, early warning response, rehabilitation, recovery and mitigation. The programme also supports neighbours and other countries through the International Charter "Space and Major Disasters", Sentinel Asia and the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP).

Scientists who are actively involved in operational DMS activities share their practical experience, as faculty, with the participants. To strengthen the capacity to sustain natural disaster mitigation strategies in the Asia Pacific region, CSSTEAP conducts regular capacity-building programmes especially aimed at disaster risk reduction using space technology-based tools and applications.

For practical knowledge and experience, CSSTEAP has recently developed the educational dashboard "SWAMI'" (System for Weather and Apadaa Management Information) for course participants to provide country-specific geo-web information services that enable participants to work on their country-specific projects. This provides country-specific data and information services on base layers (road, rail, settlements, country, district, province, points of interest), socioeconomic (population, households); hydrological layers (basin, flow direction, flow accumulation, flood vulnerable areas); and hydro-meteorological forecast products (rainfall, temperature, humidity, cloud fraction and wind speed). This framework is being extended to other Asia-Pacific countries.

Contribution to the UN-SPIDER Beijing office

- CSSTEAP has organized four training programmes that took place at Nay Pyi Daw and Yangoon (Myanmar) in 2017 and 2019; at Ahmedabad (India) in 2018 and Beijing in 2017
- CSSTEAP participated in the UN-SPIDER technical advisory mission to Nepal in 2017

Post disaster (EQ) rapid damage assessment. *Photo credit: CSSTEAP*

Regional Centre for Space Science and Technology Education in Asia and the Pacific (China) (United Nations-affiliated)

The Regional Centre for Space Science and Technology Education in Asia and the Pacific (RCSSTEAP) was established in November 2014. The Centre is located on the main campus of Beihang University, Beijing.

As an education and training entity supported by the Committee on the Peaceful Uses of Outer Space (COPUOS), the Centre was established with the missions to promote the peaceful use of space technologies for the benefit of humanity and to sensitize countries within the region about space science and technology activities by educating and creating awareness through training, workshops, short courses and outreach.

The Centre offers degree and non-degree programmes in the field of space technology applications. The main education and training fields include remote sensing and geographic information systems, satellite communications, global navigation satellite system (GNSS), micro-satellite technology, and space law and policy.

The Centre focuses on personnel training in the fields of disaster management. So far, the Centre has trained 260 master students and 60 doctoral students in the field of space technology applications for developing countries. More than 30 short training programmes on space technology applications were held with an enrolment of over 1,500 participants.

Contributions to UN-SPIDER Beijing office

- Organizing short training programmes jointly
- Attending UN-SPIDER meetings
- Visiting the UN-SPIDER Beijing office

Graduation ceremony at RCSSTEAP. *Photo credit: RCSSTEAP*

ACRONYMS

ADPC	Asian Disaster Preparedness Center
ADRC	Asian Disaster Reduction Center
AHA Centre	ASEAN Coordinating Centre for Humanitarian Assistance
APSCO	Asia-Pacific Space Cooperation Organization
ASEAN	Association of Southeast Asian Nations
CGIAR	Consultative Group on International Agricultural Research
COPUOS	Committee on the Peaceful Uses of Outer Space
CSSTEAP	Centre for Space Science and Technology Education in Asia and the Pacific
DMC	Disaster Management Centre (Sri Lanka)
DMPTC	Disaster Management Policy and Technology Center (Viet Nam)
GIS	Geographic information systems
GISTDA	Geo-Informatics and Space Technology Development Agency (Thailand)
GNSS	Global Navigation Satellite System
ICIMOD	International Center For Integrated Mountain Development
ISA	Iranian Space Agency
IWMI	International Water Management Institute
LaoNGUM	Lao National Geospatial Information Utilization and Management
LAPAN	Indonesian National Institute of Aeronautics and Space
MODIS	Moderate Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration
NDMA	National Disaster Management Authority
NDRCC	National Disaster Reduction Centre of China
RCSSTEAP	Regional Centre for Space Science and Technology Education for Asia And the Pacific
RSO	Regional support office
SAARC	South Asian Association for Regional Cooperation
SAARC DMC	SAARC Disaster Management Centre
SUPARCO	Pakistan Space and Upper Atmosphere Research Commission
UN ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNDP	United Nations Development Programme
UNOOSA	United Nations Office for Outer Space Affairs
UN-SPIDER	United Nations Platform for Space-based Information for Disaster Management and Emergency Response

THE UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS (UNOOSA)
IS RESPONSIBLE FOR ADVANCING INTERNATIONAL COOPERATION IN THE PEACEFUL USES OF OUTER SPACE AND HELPS ALL COUNTRIES USE SPACE SCIENCE AND TECHNOLOGY TO ACHIEVE SUSTAINABLE DEVELOPMENT.

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