
USAID
FROM THE AMERICAN PEOPLE
NASA
adpc
SERVIR MEKONG
SERVIR-MEKONG
IMPRESSIONS
Connecting Space to Village in Southeast Asia

SERVIR-MEKONG

IMPRESSIONS

Connecting Space to Village in Southeast Asia

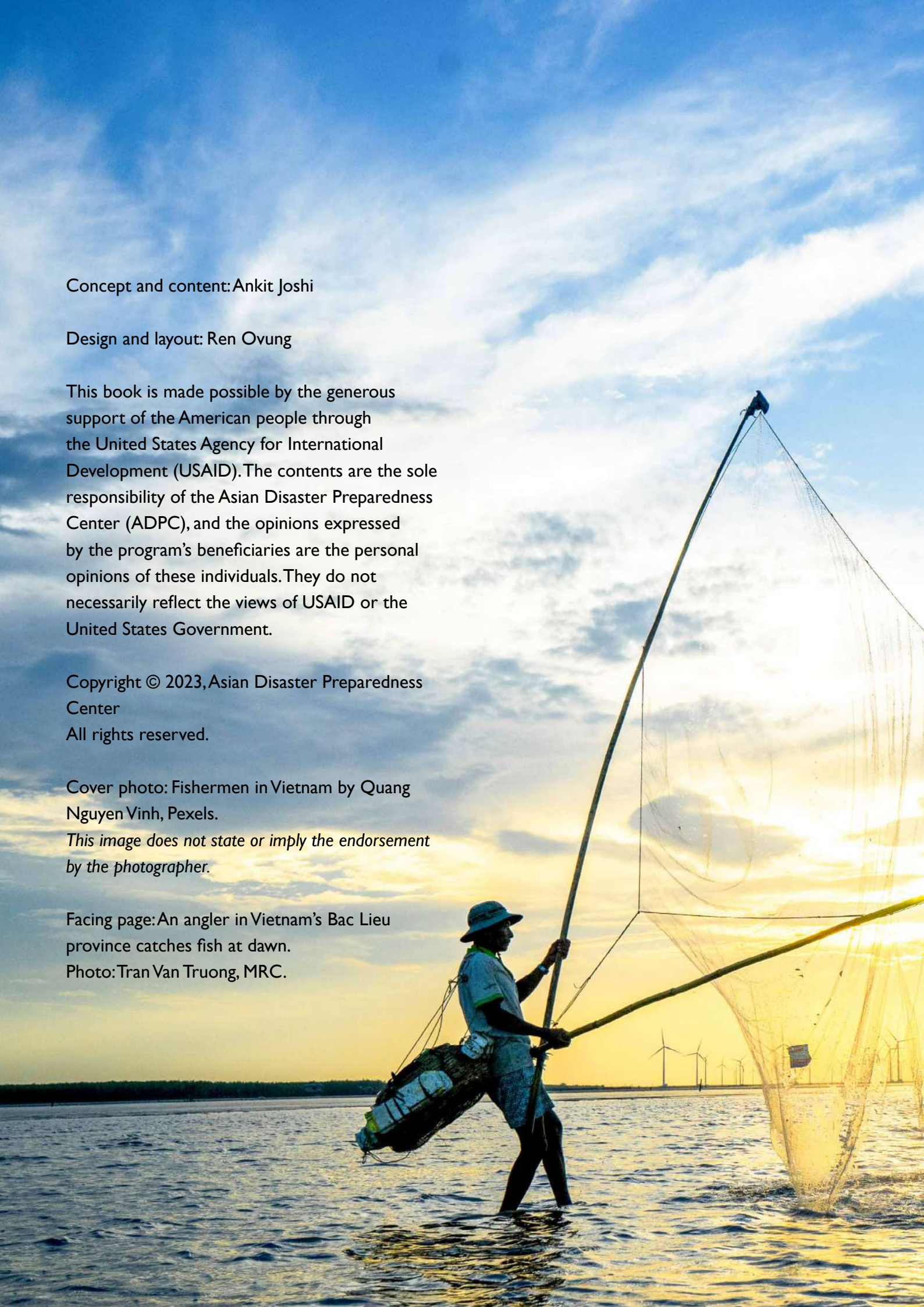
Concept and content: Ankit Joshi

Design and layout: Ren Ovung

This book is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the sole responsibility of the Asian Disaster Preparedness Center (ADPC), and the opinions expressed by the program's beneficiaries are the personal opinions of these individuals. They do not necessarily reflect the views of USAID or the United States Government.

Cover photo: Fishermen in Vietnam by Quang Nguyen Vinh, Pexels.
This image does not state or imply the endorsement by the photographer.

Facing page: An angler in Vietnam's Bac Lieu province catches fish at dawn.
Photo: Tran Van Truong, MRC.



A woman farmer in Luang Prabang, Lao PDR. The city's center is located on a peninsula at the confluence of the Nam Khan and Mekong Rivers. Photo: Richard Nyberg, USAID/RDMA.

CONTENTS

01
ORIGINS AND HISTORY Page 13

02
THEMATIC AREAS OF IMPACT Page 57

03
PUSHING BOUNDARIES Page 99

04
LINE OF SIGHT Page 123

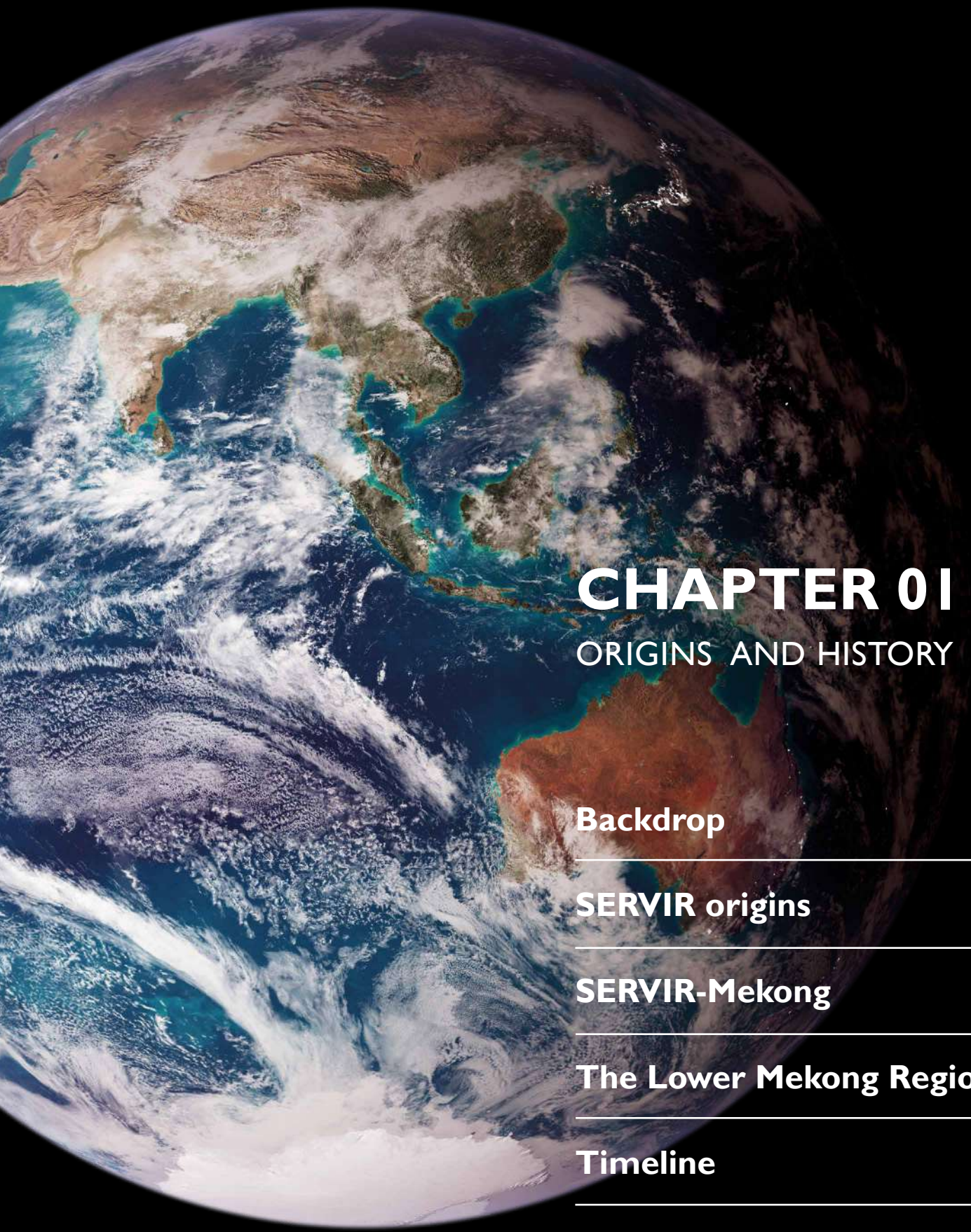
CHAPTER 01

ORIGINS AND HISTORY

"SERVIR WANTED TO TAKE ADVANTAGE OF NASA'S CONSTELLATION OF SATELLITES TO ADDRESS MANY GLOBAL DEVELOPMENT CHALLENGES AND ISSUES. WE USE THAT UNIQUE VANTAGE POINT OF SPACE TO UNDERSTAND BETTER AND PROTECT OUR HOME PLANET."

Dan Irwin
Global Program Manager of SERVIR

Twin Blue Marbles: A picture of the Earth from space. A work of magnificence by NASA scientists and graphic artists achieved by blending science and art and drawing on data from multiple satellite missions.
Photo: NASA images by Reto Stöckli, based on data from NASA and NOAA.



CHAPTER 01

ORIGINS AND HISTORY

Backdrop

SERVIR origins

SERVIR-Mekong

The Lower Mekong Region

Timeline

Impressions

BACKDROP

FOREWORD

SINCE ITS LAUNCH IN 2014, SERVIR-MEKONG HAS TRAINED MORE THAN 1,500 PEOPLE, MOBILIZED MORE THAN $500,000, DEVELOPED 21 DECISION SUPPORT TOOLS, AND SUPPORTED THE ADOPTION OF 4 POLICIES.

The Lower Mekong Region is home to over 245 million people living in Burma, Cambodia, Lao PDR, Thailand, and Vietnam. It is also home to one of the richest areas of biodiversity in the world, with more than 20,000 plant species and 850 fish species discovered to date. The region produces over 50 million tons of paddy rice each year, contributing to a quarter of the world's rice exports.

The region is under stress from various environmental factors exacerbated by climate change. The region-wide drought in 2019 affected over 1.8 million hectares of cropland, resulting in damage and loss of $400 million. On average, annual flooding affects over 3 million people, resulting in damage and loss of $90 million. In extreme years, such as 2011, this figure reached $370 million.

As climate-related disasters become more frequent and intense, decision-makers are looking to the scientific community to help monitor, map, and manage these disasters. Through a unique partnership between the U.S. Agency for International Development (USAID), the U.S. National Aeronautics and Space Administration (NASA), and the Asian Disaster Preparedness Center (ADPC), SERVIR-Mekong streamlines access to data and tools that strengthen the ability of Lower Mekong countries to build locally-developed and sustainable solutions to address the climate crisis.

LEFT
Trees in the Stung Treng province in northeast Cambodia, where the Mekong River bisects the province. Many rural people in the Mekong basin depend on the Mekong River's diverse and abundant resources. **Photo: Sokratana Hou, MRC.**

LEFT
Vietnam's Phong Dien floating market, located on the Can Tho and the Hau Rivers, bustles with activity at the break of dawn as it opens for trading.
Photo: Hieu Minh Vu, MRC.

SERVIR-Mekong uses satellites from NASA and other agencies to support regional institutions, governments, and citizens to address climate-related challenges such as disaster preparedness and response, water resource, and land management. Together with stakeholders, SERVIR-Mekong co-develops regional geospatial tools and services ranging from drought monitoring, flood forecasting, and crop yield management to improve natural resources management, environmental conservation, and protection. SERVIR-Mekong is part of a network of SERVIR hubs operating across the developing world.

Since its launch in 2014, SERVIR-Mekong has trained more than 1,500 people, mobilized more than $500,000, developed 21 decision support tools, and supported the adoption of 4 policies to ensure that millions of Lower Mekong region residents are better prepared to deal with the impacts of climate change.

"Impressions" chronicles SERVIR-Mekong's journey from its launch until the present day. The book documents the program's achievements and learnings as SERVIR-Mekong looks to the future—using satellite data and geospatial information to connect 'space to village' across Southeast Asia.

Hans Guttman
Executive Director
Asian Disaster Preparedness Center (ADPC)

Dr. Steven G. Olive
Mission Director
U.S. Agency for International Development (USAID), Regional Development Mission for Asia

Dan Irwin
Global Program Manager of SERVIR
National Aeronautics and Space Administration (NASA)

SERVIR GLOBAL

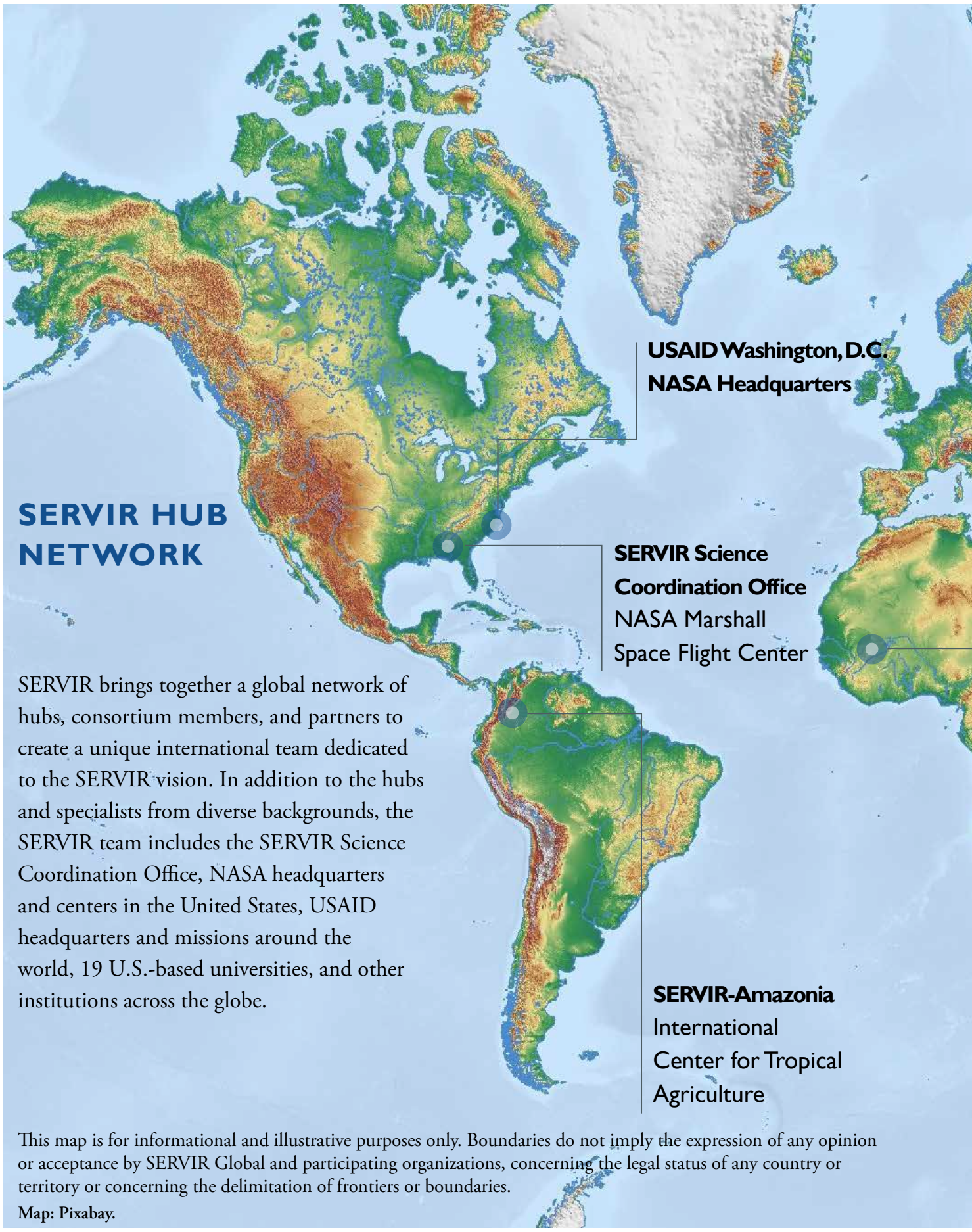
SERVIR Global Team at SERVIR Annual Global Exchange in Siem Reap, Cambodia, in February 2020.
Photo: SERVIR Global.

CONNECTING SPACE TO VILLAGE

WITH ACTIVITIES IN MORE THAN 54 COUNTRIES AND COUNTING, SERVIR GLOBAL HAS CO-DEVELOPED OVER 30 SERVICES, COLLABORATED WITH OVER 800 PARTNERS AND 200 USER GROUPS, AND TRAINED MORE THAN 14,500 INDIVIDUALS TO ACHIEVE SUSTAINABLE DEVELOPMENT RESULTS.

SERVIR Global—a partnership between USAID, NASA, and leading technical organizations worldwide—has grown into a global network of regional hubs. This expansive network across South America, West Africa, Eastern, and Southern Africa, the Hindu Kush Himalaya, and the Lower Mekong Region has enabled accessible and lasting capacity to apply geospatial technology, data, and solutions to improve livelihoods and foster self-reliance.

Through SERVIR, NASA's Earth Science Division's Applied Sciences Program advances the use of space-based observations and geospatial technologies. SERVIR's Applied Science Team supports SERVIR by working with its regional hubs to develop science applications for international development.



SERVIR HUB NETWORK

SERVIR brings together a global network of hubs, consortium members, and partners to create a unique international team dedicated to the SERVIR vision. In addition to the hubs and specialists from diverse backgrounds, the SERVIR team includes the SERVIR Science Coordination Office, NASA headquarters and centers in the United States, USAID headquarters and missions around the world, 19 U.S.-based universities, and other institutions across the globe.

This map is for informational and illustrative purposes only. Boundaries do not imply the expression of any opinion or acceptance by SERVIR Global and participating organizations, concerning the legal status of any country or territory or concerning the delimitation of frontiers or boundaries.

Map: Pixabay.


SERVIR-Hindu Kush Himalaya
International Centre for Integrated Mountain Development
SERVIR-Eastern & Southern Africa
Regional Centre for Mapping of Resources for Development
SERVIR-West Africa
International Crops Research Institute for the Semi-Arid Tropics
SERVIR-Mekong
Asian Disaster Preparedness Center

ACTIONS TO CONFRONT THE CLIMATE CRISIS

"USAID'S NEW CLIMATE STRATEGY WILL GUIDE OUR EFFORTS TO TACKLE THE EXISTENTIAL THREAT OF CLIMATE CHANGE OVER THIS DECADE IN A TRULY TRANSFORMATIONAL WAY. IT WILL REQUIRE USAID TO SEE ITSELF NOT JUST AS A DEVELOPMENT AGENCY, BUT AS A CLIMATE AGENCY, WITH EACH SECTOR AND MISSION FIGHTING TO PROTECT OUR PLANET."

Samantha Power
USAID Administrator

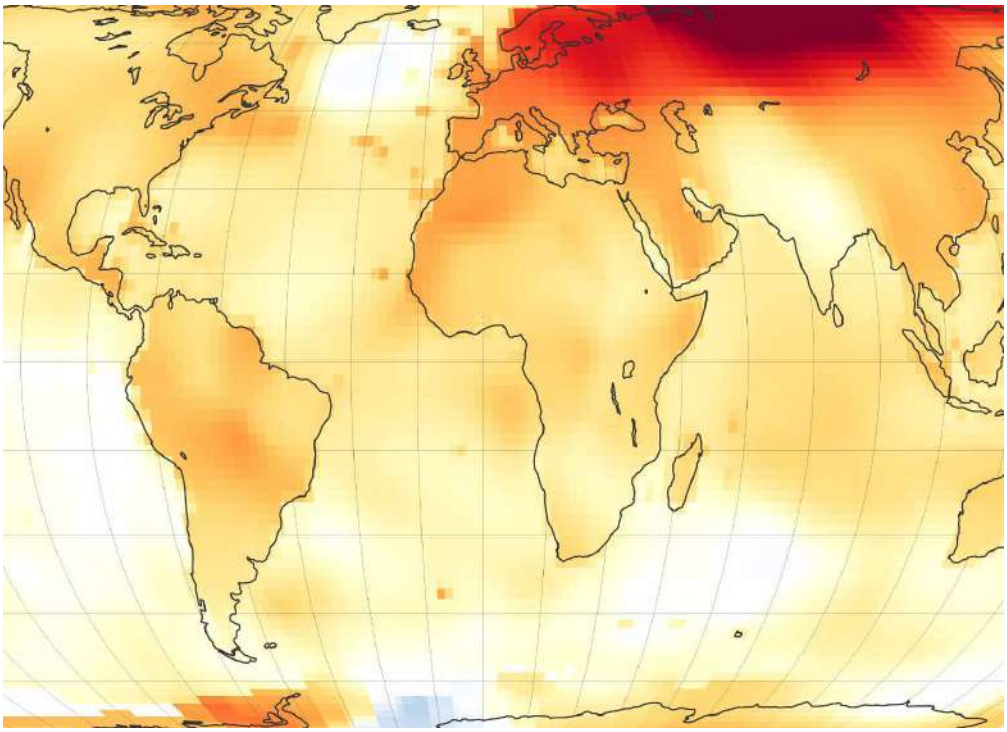
USAID assists in a disaster response drill in Thua Thien Hue Province, Vietnam. USAID supports disaster risk reduction in Asia to increase the resilience of local communities against disasters.
Photo: Richard Nyberg, USAID/RDMA.

LEFT
Residents in the Cambodian province of Pursat gather to receive food assistance funded by USAID on October 28, 2020.
Photo: Cesar Lopez Balan, WFP, USAID/Cambodia.

Climate change poses a fundamental threat to human and natural systems around the world. It is causing sea level rise, more frequent and severe weather events, and ecosystem collapse. In early November 2021, the U.S. government announced the President's Emergency Plan for Adaptation and Resilience (PREPARE) to drive equitable and inclusive climate resilience and help countries and communities around the world adapt to and manage the impacts of climate change. By 2030, PREPARE will support more than 500 million people through locally led programs that strengthen adaptation to climate change.


75XL-067.P2

CLIMATE ACTION PLAN



Visualization of Earth's global average surface temperature in 2020. According to an analysis by NASA, 2020 tied with 2016 as the warmest year on record. NASA collects massive amounts of environmental data to understand climate change better and how to slow it.
Image: NASA Earth Observatory image by Joshua Stevens, based on NASA Goddard Institute for Space Studies data.

LEFT
Coastal cities such as Hue in central Vietnam are highly vulnerable to climate change, being exposed to regular typhoons and flooding. Many cities in the Mekong Region are expanding in ways that increase climate vulnerability.
Photo: USAID/RDMA.

As part of the President's Emergency Plan for Adaptation and Resilience, NASA, USAID, and 21 other U.S. Government agencies have developed climate action plans. NASA's Climate Action Plan (CAP) provides its vision for adapting to climate change effects on its mission, facilities, infrastructure, natural lands, and other assets, now and in the future. The CAP builds on the Agency's efforts, beginning in 2005 when 'regional climate variability' was identified in NASA's risk management framework as a threat to operations and missions. This CAP identifies opportunities to incorporate further consideration of climate risk into management functions and other processes to prioritize those risks and apply resources. The CAP addresses co-benefits related to climate change mitigation.

USAID'S SIX HIGH-LEVEL TARGETS

MITIGATION

Reduce, avoid, or sequester six billion metric tons of carbon dioxide equivalent.

NATURAL & MANAGED ECOSYSTEMS

Support the conservation, restoration, or management of 100 million hectares.

ADAPTATION

Improved climate resilience of 500 million people.

FINANCE

$150 Billion in public and private finance for climate.

COUNTRY SUPPORT

Climate change mitigation and adaptation commitments in at least 80 countries.

CRITICAL POPULATIONS

Meaningful participation and active leadership in climate action in 40 countries.

STRENGTHENING CLIMATE CHANGE MITIGATION AND ADAPTATION

A local girl in Luang Prabang province, Lao PDR. USAID plays a vital role in mitigating climate change and addressing its impacts by partnering with more than 45 countries to build resilience against the impacts of climate change.
Photo: Richard Nyberg, USAID/RDMA.

USAID's new Climate Strategy 2022-2030 confronts the climate crisis with a focus on six ambitious high-level targets—climate change mitigation and adaptation measures—that will reduce global greenhouse gas emissions, help partner countries build resilience to climate change, and improve agency operations. Five core principles are integrated across all activities and actions: Locally Led Development, Equity and Inclusion, Private-Sector Engagement, Nature-Based Solutions, and Evidence, Technology, and Innovation.

SERVIR's global network will play a vital role in supporting initiatives to strengthen U.S. leadership in tackling the climate crisis and galvanize worldwide action and commitments. SERVIR's proven expertise in leveraging geospatial data and technology to develop innovative and up-to-date solutions to pressing development challenges will support the implementation of both agency climate strategies.

LEFT
USAID's six high-level targets will involve all corners of USAID to play a part.

LOCALLY-DEVELOPED SOLUTIONS TO ADDRESS THE CLIMATE CRISIS

The official launch of SERVIR-Mekong at the Asian Disaster Preparedness Center office in Bangkok, Thailand. Beth Paige, Director of USAID Regional Development Mission for Asia, and Maj Charles Bolden, NASA Administrator, presided over the launch event. Dr. Bhichit Rattakul represented ADPC's Board of Trustees.
Photos: USAID/RDMA.

In 2014, USAID and NASA launched SERVIR–Mekong to create solutions using cutting-edge technologies for climate change adaptation, mitigation, and humanitarian response in the Lower Mekong Region. One of five regional SERVIR hubs across the globe, SERVIR-Mekong works through regional institutions to streamline access to data that strengthens the ability of Lower Mekong countries to build locally-developed and locally-led solutions to the climate crisis.

Guided by the USAID Regional Development Mission for Asia's (RDMA) Regional Development Cooperation Strategy (RDCS) 2020-2025, founded upon the U.S. vision for a free and open Indo-Pacific, SERVIR-Mekong supports the U.S. Government's priorities of enhancing economic prosperity and ensuring peace and security in the region.

LEFT
People living along the Mekong River in Cambodia's Kampong Cham depend on the waterway for their livelihoods.
Photo: Phearith Phan, MRC.


SERVIR MEKONG
Burma (Myanmar)
Vietnam
Thailand
Lao PDR
Cambodia

HELPING DECISION-MAKERS RESPOND TO A CHANGING CLIMATE

A woman in the Mekong Delta makes her way home. **Photo: Richard Nyberg, USAID/RDMA.**

LEFT
SERVIR-Mekong works in partnership with leading regional organizations to help the five countries in the Lower Mekong Region manage climate risks.

The Asia-Pacific region is more vulnerable to climate change than other parts of the world, and most areas of the region lack sufficient observational weather records. SERVIR-Mekong engages with leading regional organizations, governments, and citizens of five countries in the Lower Mekong Region to co-develop tools and services to ensure that the 245 million residents of the Lower Mekong Region are better prepared to understand, plan for, and respond to the impacts of climate variability and change.


USAID
USAID
USAID

PARTNERING FOR SUSTAINABLE SOLUTIONS

Participants at a regional technical training on Synthetic Aperture Radar. **Photo: ADPC.**

LEFT
SERVIR-Mekong, the NASA Applied Science Team from the Oregon State University and USAID staff at Cambodia's Prey Lang Extended Landscape meeting with end users (local communities and forest rangers) of the Forest Alert Tool.
Photo: Ankit Joshi, ADPC.

SERVIR-Mekong is implemented by the Asian Disaster Preparedness Center (ADPC) in the Lower Mekong Region in partnership with USAID and NASA. With inputs from its consortium partners—Deltares, Spatial Informatics Group, and Stockholm Environment Institute—SERVIR-Mekong assists in delivering unparalleled capabilities and services to integrate satellite data and imagery into tools and models that are accessible to those who need it most.

Deltares provided flood modeling and mapping expertise, Spatial Informatics Group supported the development of geospatial data analytics and artificial intelligence, and the Stockholm Environment Institute assisted with the water resources management and gender equality component.

The United States Agency for International Development (USAID)

USAID is the world's premier international development agency and a catalytic actor driving development results. USAID's work advances U.S. national security and economic prosperity, demonstrates American generosity, and promotes a path to recipient self-reliance and resilience.

The National Aeronautics and Space Administration (NASA)

NASA is America's civil space program and the global leader in space exploration. NASA studies Earth, including its climate, our Sun, our solar system, and beyond—to advance, develop and fund space technologies that will enable future exploration and benefit life on Earth.

Asian Disaster Preparedness Center (ADPC)

ADPC is an autonomous international organization that works to build the resilience of people and institutions to disasters and climate change impacts in Asia and the Pacific region. Established in 1986, it provides comprehensive technical services across social and physical sciences to support sustainable risk reduction and climate resilience solutions.

Deltares

Deltares is an independent institute for applied research in water and subsurface, working on four mission areas: future deltas, sustainable deltas, safe deltas, and resilient infrastructure. It works on smart solutions, innovations, and applications for people, the environment, and society worldwide.

Spatial Informatics Group (SIG)

SIG is an environmental think-tank founded in 1998. It specializes in the characterization and assessment of wildland and urban landscapes. It combines spatial analytics with ecological, social, and economic sciences to understand the effects of management and policy choices on ecosystems' short and long-term stability.

Stockholm Environment Institute (SEI)

SEI is an international non-profit research and policy organization that tackles timely environmental and development challenges through connecting science and decision-making to develop solutions for a sustainable future for all. SEI's work spans climate, water, air, land-use issues, governance, the economy, gender, and health.


PEARL

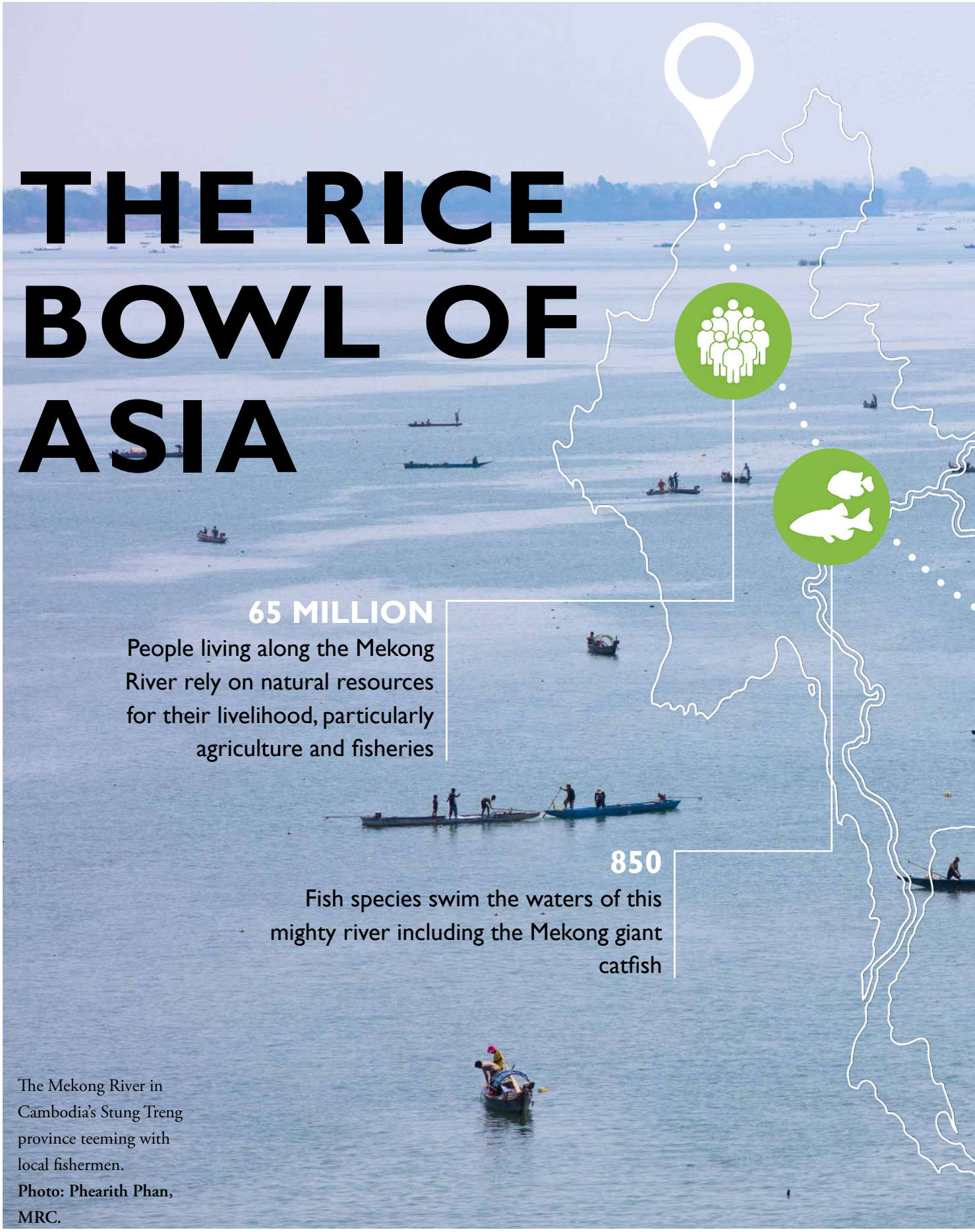
EFFECTIVE RESPONSES FOR ADAPTATION AND MITIGATION

Bustling street scene in downtown Ho Chi Minh City, Vietnam.
Photo: Anne and David.
(This image does not state or imply the endorsement by the photographers).

LEFT
A vegetable vendor in Bogyoke Aung San Market, also known as Scott Market in downtown Yangon, Burma.
Photos: Werner Bayer.
(This image does not state or imply the endorsement by the photographer).

Home to 245 million people, the Lower Mekong Region is particularly vulnerable to physical climate risks. The impacts of climate change, such as shifts in temperature and intensity of rainfall, floods, and droughts, are being felt across the Lower Mekong Region affecting the livelihoods of local communities that rely on natural resources. There is an increasing need to adapt and mitigate the adverse effects of climate change to prevent the worsening of existing risks and vulnerabilities. The need to accurately determine and forecast conditions has become even more pronounced to help understand and see the bigger picture of weather phenomena and unlock solutions for improved resilience.

THE RICE BOWL OF ASIA



65 MILLION

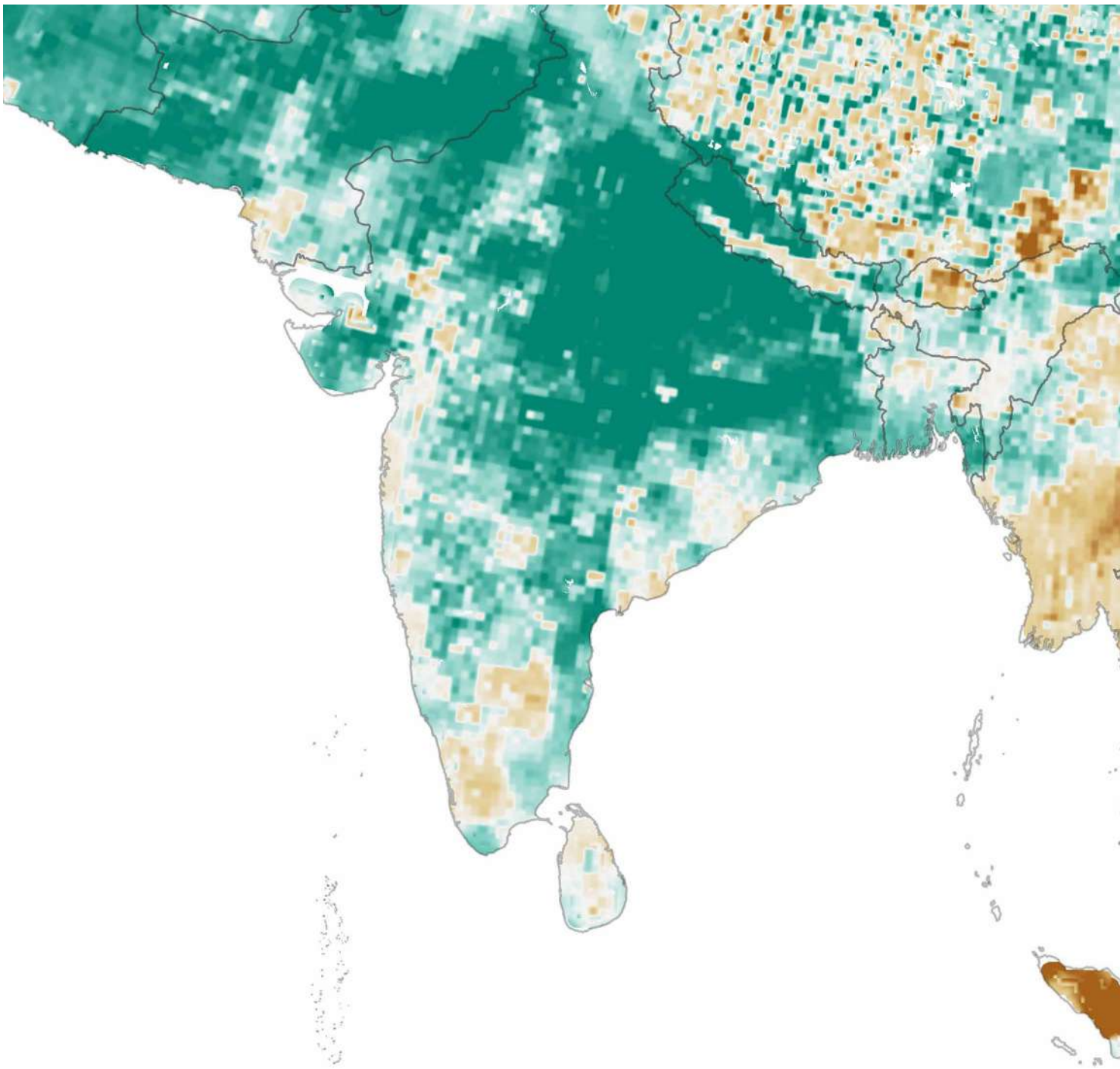
People living along the Mekong River rely on natural resources for their livelihood, particularly agriculture and fisheries

850

Fish species swim the waters of this mighty river including the Mekong giant catfish

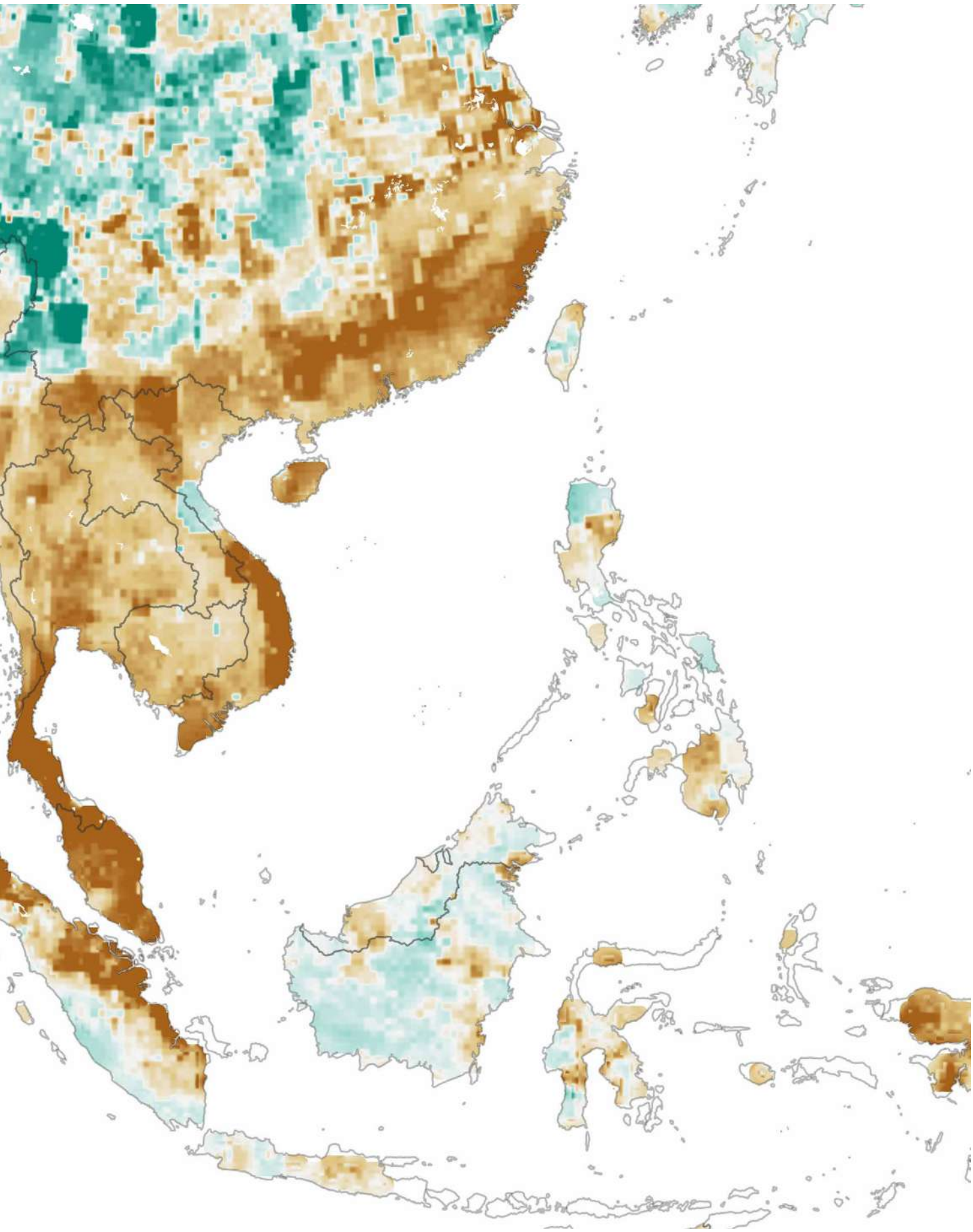
The Mekong River in Cambodia's Stung Treng province teeming with local fishermen.
Photo: Phearith Phan, MRC.


50+ MILLION
Tonnes of paddy rice are produced each year in the Lower Mekong Basin
20,000
Plant species grow in the delta
25 PERCENT
Or a quarter of the world's rice exports come from this region
5,000 KM
The Mekong River flows through six countries: China, Burma, Thailand, Lao PDR, Cambodia, and Vietnam



Map displaying soil moisture anomalies in the Lower Mekong Basin. The drought conditions were caused by a shorter-than-normal monsoon season and below-average annual rainfall in 2019. The SERVIR-Mekong team developed several drought-related products to generate drought and crop yield forecasts in the Mekong area and help provide accurate information for farmers trying to plan their water usage.

Image: NASA Earth Observatory image by Lauren Dauphin using soil moisture data from NASA-USDA and the SMAP Science Team.



MEKONG DELTA DROUGHT OF 2020

RISING TEMPERATURES AND CHANGES IN RAINFALL INTENSITY, RIVER FLOW, FLOODS, AND DROUGHTS ARE DESTROYING HOMES, INFRASTRUCTURE, CROPS, AND FISHERIES ACROSS THE LOWER MEKONG BASIN.

Signs of severe drought in a rice field in Ben Tre province in the Mekong Delta region of Vietnam. **Photo: Hanh Nguyen, USAID/Vietnam.**

LEFT
Farmers in the Mekong River Delta grow various rice varieties, but their production is endangered by sea-level rise and an associated increase in salinity level. **Photo: Montakan Tanchaisawat, USAID/RDMA.**

The Mekong Delta faces more extreme weather conditions in Vietnam, threatening rice production. Rice accounts for 82 percent of the total cultivated land area and is a staple food for 97 million people.

In early 2020, due to prolonged drought and an extensive salinity build-up in Vietnam's Mekong Delta region, five provinces in the country's rice bowl declared a state of emergency. According to the VnExpress, nearly 600,000 people could not access fresh water, 160,000 hectares of paddy were damaged, and farmers lost 800,000 tons of rice. The economic losses amounted to $237 million.

SERVIR-MEKONG'S JOURNEY CREATING CLIMATE-RESILIENT COMMUNITIES

2014

The official launch of SERVIR-Mekong.

Partnership network initiated with five universities from Lower Mekong countries to use space-based technologies.

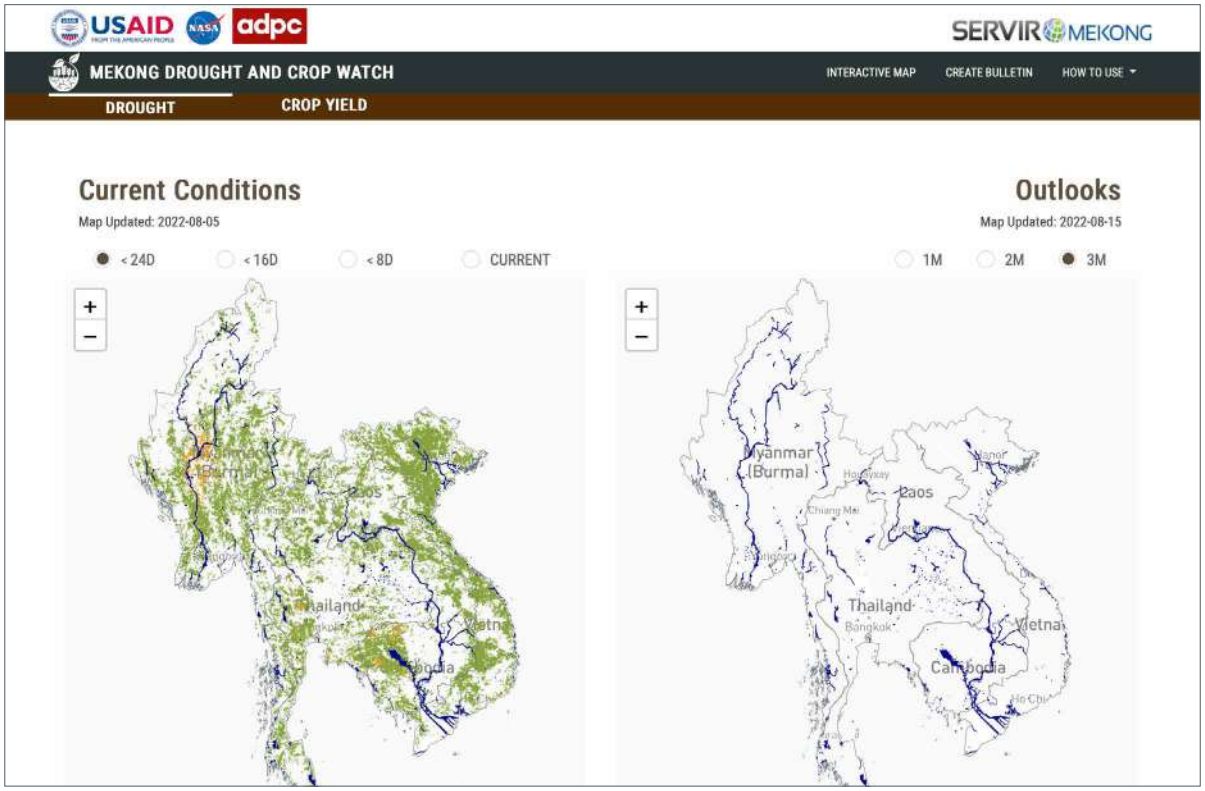
The SERVIR-Mekong Regional Consultation to identify geospatial data and service needs in the region.

2017

Launch of the Mekong Drought and Crop Watch Tool to assist Lower Mekong countries to prepare and respond to droughts.

Commencement of the SERVIR-Mekong Grants Program with grantees from Cambodia, Thailand, and Vietnam.

Launch of the Virtual Rain and Stream Gauge Data Service to provide near real-time rainfall and stream height data to the Mekong River Commission for improved flood forecasting.



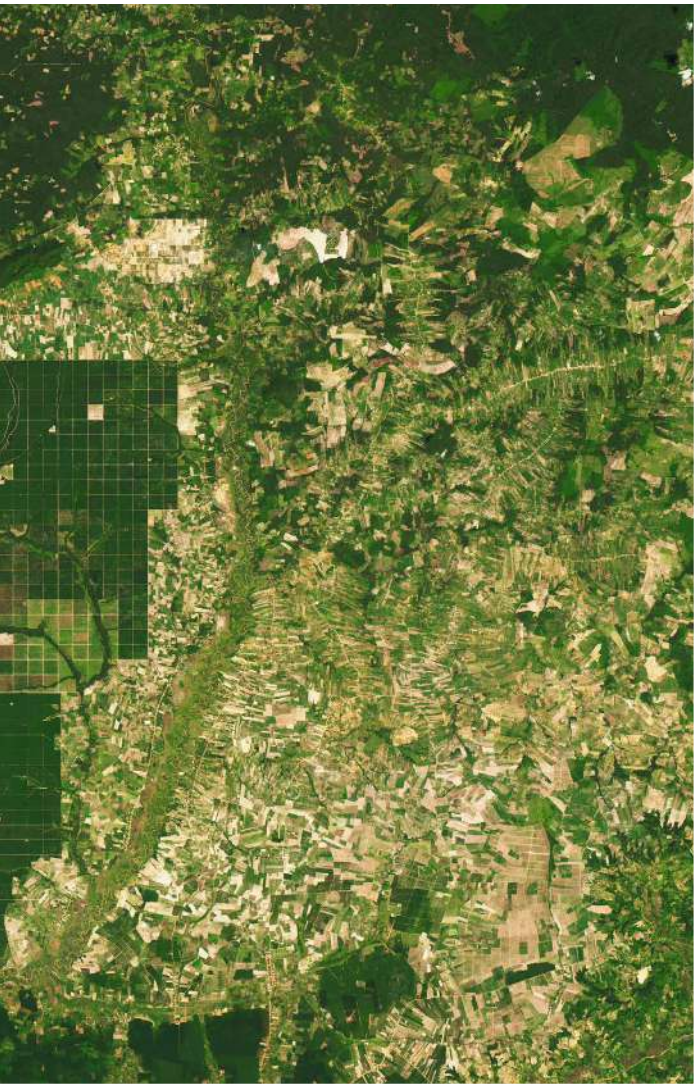
2016

Partnership with ADPC and UN-SPIDER to boost space-based technology in Asia-Pacific for disaster risk management and climate change adaptation.

2018

Co-development of drought monitoring and forecasting systems and services for Lao PDR, Cambodia, Vietnam, and Thailand initiated by SERVIR-Mekong and the Mekong River Commission.

Launch of the Regional Land Cover Monitoring System to produce custom, high-quality land cover information products.



2020

Launch of the Mekong Air Quality Explorer Tool to provide more accurate forecasting of air pollution for up to three days.

Launch of the Mekong River Commission's 2020-2025 Drought Management Strategy.

Collaboration with the World Food Programme to produce flood map products to strengthen humanitarian response in Cambodia.

2019

Integration of Synthetic Aperture Radar technology that enables the ability to see through cloud cover and mark flood extent from space.

2021

Development of the Biophysical Monitoring and Evaluation Dashboard to support monitoring and management of large-scale landscape management projects in Cambodia and beyond.

Launch of the Rainstorm Tracker Tool to monitor and alert governments about the severity of rainstorm events over the Lower Mekong Basin in near real-time.

2022

Collaboration with the U.S. President's Malaria Initiative and USAID Inform Asia, to provide satellite-based land cover data on over 7,200 municipalities in Thailand to help accelerate malaria elimination.

Partnership established with the Ministry of Natural Resources and Environment, Lao PDR, to expand the Mekong Air Quality Explorer Tool.

Launch of the Reservoir Assessment Tool to support water resources management in Lower Mekong countries.

Launch of the Mekong X-Ray Vulnerability Assessment Tool to analyze the potential impacts of flash floods and landslides in the Lower Mekong Basin.

Launch of the Hydrologic Remote Sensing Analysis for Floods (HYDRAFloods) Tool to provide flood location and extent information for effective flood preparedness and humanitarian response.

Launch of the HYDRO-MET BOX to provide easy access to water and climate-related data using satellites and ground measurements for improved management of transboundary resources.

Launch of the Landslide Hazard Assessment for Situational Awareness (LHASA) Tool to reduce landslide risks across Thailand.

IMPRESSIONS

BUILDING LOCALLY-LED SOLUTIONS

SERVIR-Mekong holding a training session with the Mekong River Commission Cambodia team.
Photo: ADPC.

LEFT
Snapshots from various training and capacity-building activities organized by SERVIR-Mekong and its partners to increase the capacity of researchers and practitioners in the region.
Photos: ADPC.

To address development challenges related to a changing climate, SERVIR-Mekong builds the capacity of regional partners to institutionalize tools, products, and services of use to governments, decision-makers, and key civil society groups.

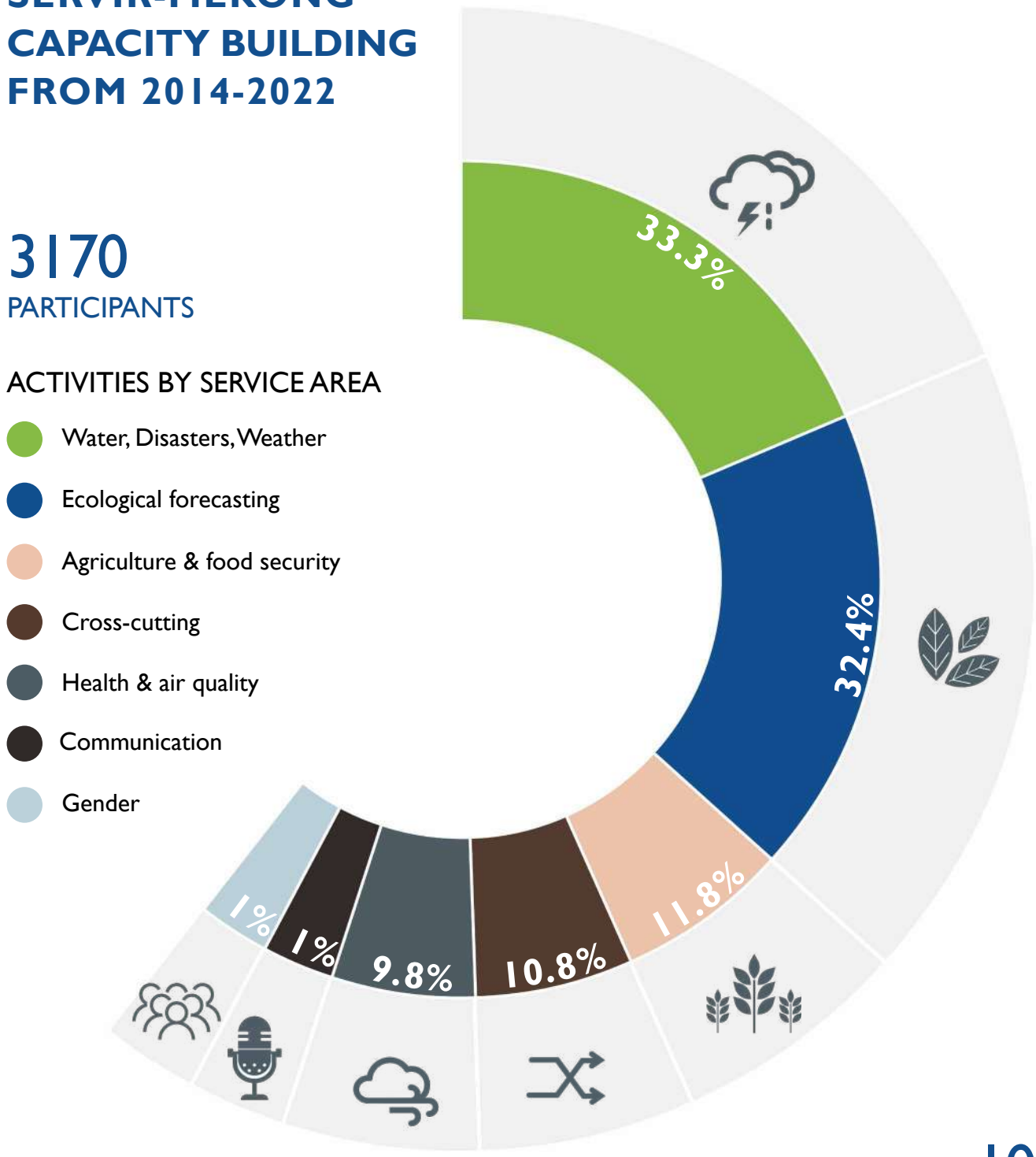
Since the program's launch, SERVIR-Mekong has conducted comprehensive, in-depth training to help strengthen and enable effective implementation and integration of geospatial information and solutions into decision-making, planning, and communication on transboundary issues. Over the years, SERVIR-Mekong has expanded its capacity-building activities to cover new areas and intensified its support to member countries and local communities.

Participants at a training for Regional Land Cover Monitoring System organized by SERVIR-Mekong. Photo: ADPC.

SERVIR-MEKONG CAPACITY BUILDING FROM 2014-2022

3170
PARTICIPANTS

ACTIVITIES BY SERVICE AREA



102
ACTIVITIES

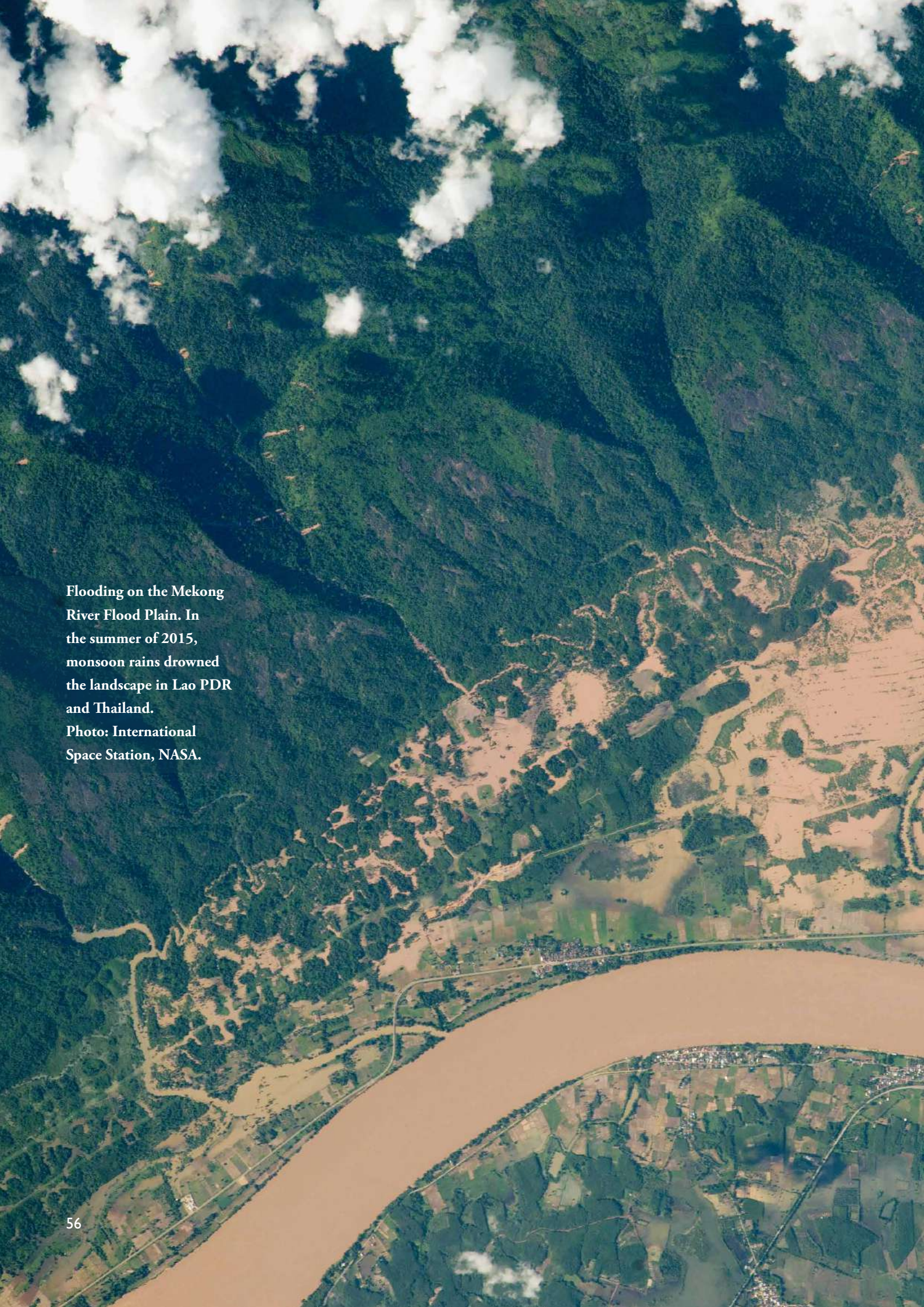
TYPE OF ACTIVITY

In-person training
Online training
Online capacity needs assessment
In-person workshop
Online workshop
Needs assessment workshop

CHAPTER 02

THEMATIC AREAS OF IMPACT

SERVIR-MEKONG ACTIVITIES SPAN SEVERAL THEMATIC SERVICE AREAS THAT EMPOWER DECISION-MAKERS TO ADDRESS CRITICAL ISSUES RELATED TO FOOD SECURITY, WATER RESOURCE MANAGEMENT, DISASTERS, LAND USE, AIR POLLUTION, AND CLIMATE CHANGE.



Flooding on the Mekong River Flood Plain. In the summer of 2015, monsoon rains drowned the landscape in Lao PDR and Thailand. Photo: International Space Station, NASA.

CHAPTER 02

THEMATIC AREAS OF IMPACT

Agriculture & food security

Land cover, land-use change, & ecosystems

Air quality

Water resources & hydro-climatic disasters

AGRICULTURE ANDFOOD SECURITY

LEFT
Terraced paddy fields of Lao Cai, Vietnam. Rice terraces are typical in hilly and mountainous areas of Southeast Asia and play an essential role in food production. Terraced paddy fields are ideal for sustainable agriculture with far-reaching benefits. They help control floods, soil erosion, and landslide prevention in mountainous areas.
Photo: Quang Nguyen Vinh, Pixabay.
(This image does not state or imply the endorsement by the photographer).

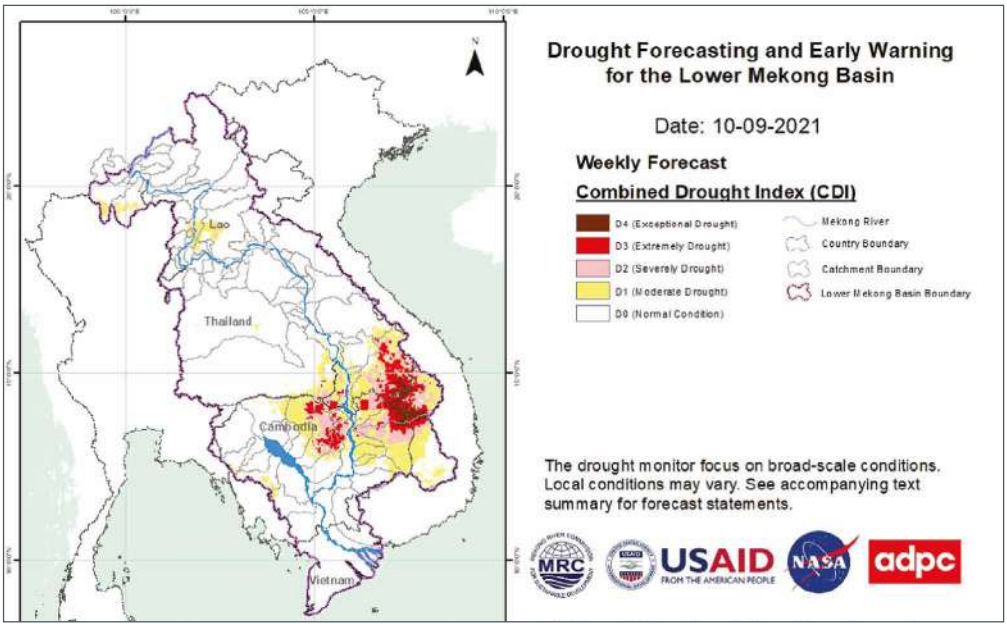
The Mekong region is Asia's rice bowl and produces over 50 million tonnes of paddy rice each year and contributes to a quarter of the world's rice exports. Changes in water cycles driven by climate change are impacting rice production. To provide communities across the Lower Mekong Region with improved drought monitoring and forecasting, SERVIR-Mekong focuses on generating seasonal crop yield forecasts and assessments of interannual (two or more years) to decadal (ten years) climate change on crop yields. SERVIR-Mekong has developed adaptive tools to monitor and mitigate the climate change impacts on agriculture to help sustain rural life and ensure food security.


DO NOT MOVE

IMPACTS

Enhancing drought resilience and crop yield security

THE MEKONG RIVER COMMISSION INTEGRATED THE MEKONG DROUGHT AND CROP WATCH TOOL INTO ITS DROUGHT MANAGEMENT STRATEGY (2020-2025).



Weekly drought forecast of the Mekong River Commission that employs the Mekong Drought and Crop Watch Tool to increase flood forecast accuracy.
Photo: MRC.

LEFT
Participants from the Mekong River Commission during a training-of-trainers session led by SERVIR-Mekong to monitor, analyze, and accurately forecast future droughts in the Mekong Delta.
Photo: ADPC.

SERVIR-Mekong developed the Mekong Drought and Crop Watch Tool, a decision support system that enables Lower Mekong countries to monitor and forecast droughts. The Mekong River Commission integrated the tool into its Drought Management Strategy (2020-2025), allowing SERVIR-Mekong to provide valuable data and satellite imagery to inform future management decisions. As a result, policymakers have better data and tools to develop and implement drought prevention and mitigation strategies. Farmers have advanced information to mitigate the impact of droughts on their crops.

IMPACTS

Enabling local communities to adapt

"THIS FORECASTING SERVICE HAS ENHANCED THE PROVINCE'S FORECASTING CAPABILITIES AND WILL SIGNIFICANTLY BENEFIT NINH THUAN IN CONTRIBUTING TO REDUCING DAMAGES CAUSED BY NATURAL DISASTERS."

Dang Thanh Binh
Deputy Director, Ninh Thuan Hydrometeorology Station

ADPC / SERVIR-Mekong at the 12th Regional Stakeholder Forum on enhancing the Mekong River Commission's flood and drought services. **Photo: MRC.**

LEFT
Vietnam's Mekong Delta, also known as the rice bowl of the region, faces critical threats from the impacts of climate change.
Photo: Jeff Schmaltz, MODIS Land Rapid Response Team, NASA GSFC.

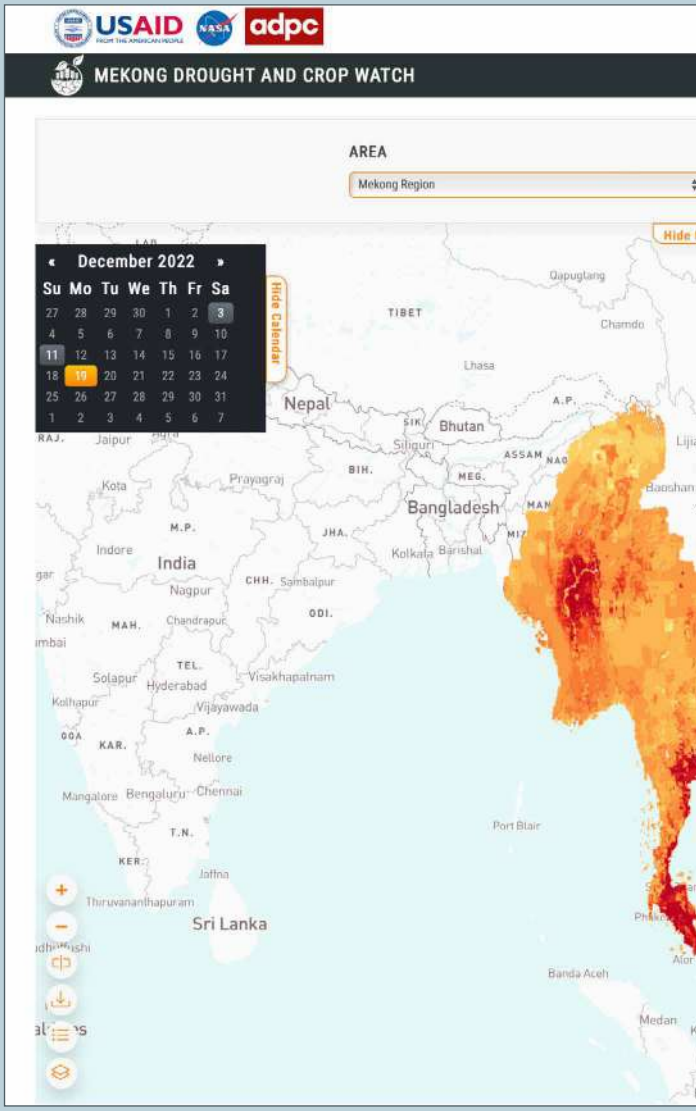
From 2014 to 2016, Ninh Thuan, a province in south-central Vietnam with a population of over 600,000, was one of the worst affected by drought and suffered a loss of crop and livestock production totaling 768 billion VND (approximately $33 million).

SERVIR-Mekong, together with the Mekong River Commission and Vietnam Academy for Water Resources, co-developed the Mekong Drought and Crop Watch Tool to provide historical rainfall data for advanced and accurate drought forecasting. The data generated from the tool supports the local meteorology station with accurate monthly drought bulletins that enable local farming communities to assess the severity of incoming droughts and ration water resources.

EARTH OBSERVATIONS & NASA PRODUCTS USED

Regional Hydro-Extreme Assessment System Model, Climate Hazards Group InfraRed Precipitation with Station data, NCEP Reanalysis Data, NMME Meteorological Forecast Data, AMSR-E/SMAP/SMOS Soil Moisture, MODIS Leaf Area Index Data, MODIS Evapotranspiration Data, and Harmonized World Soil Database

MEKONG DROUGHT & CROPWATCH



DEVELOPER(S)

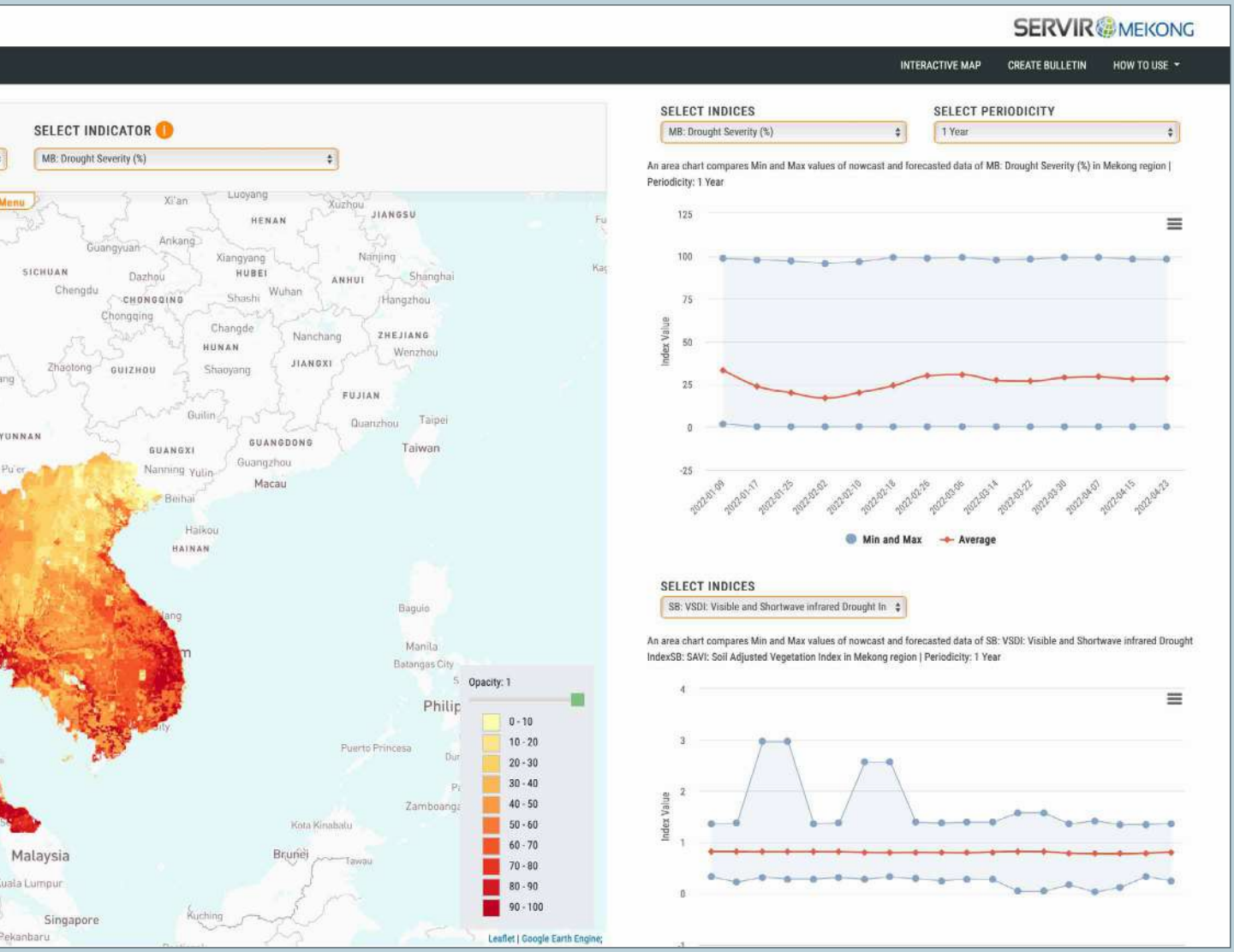
SERVIR-Mekong and NASA Jet Propulsion Laboratory

CONTRIBUTORS/PARTNERS

Vietnam Academy for Water Resources

GEOGRAPHIC REGION

Lower Mekong



USERS

Agriculture and Irrigation Departments of Lower Mekong countries, Meteorology and Hydrology Departments, Water Resources Department, National Mekong Committees, Farmers, Government agencies, and Private companies

VOICES

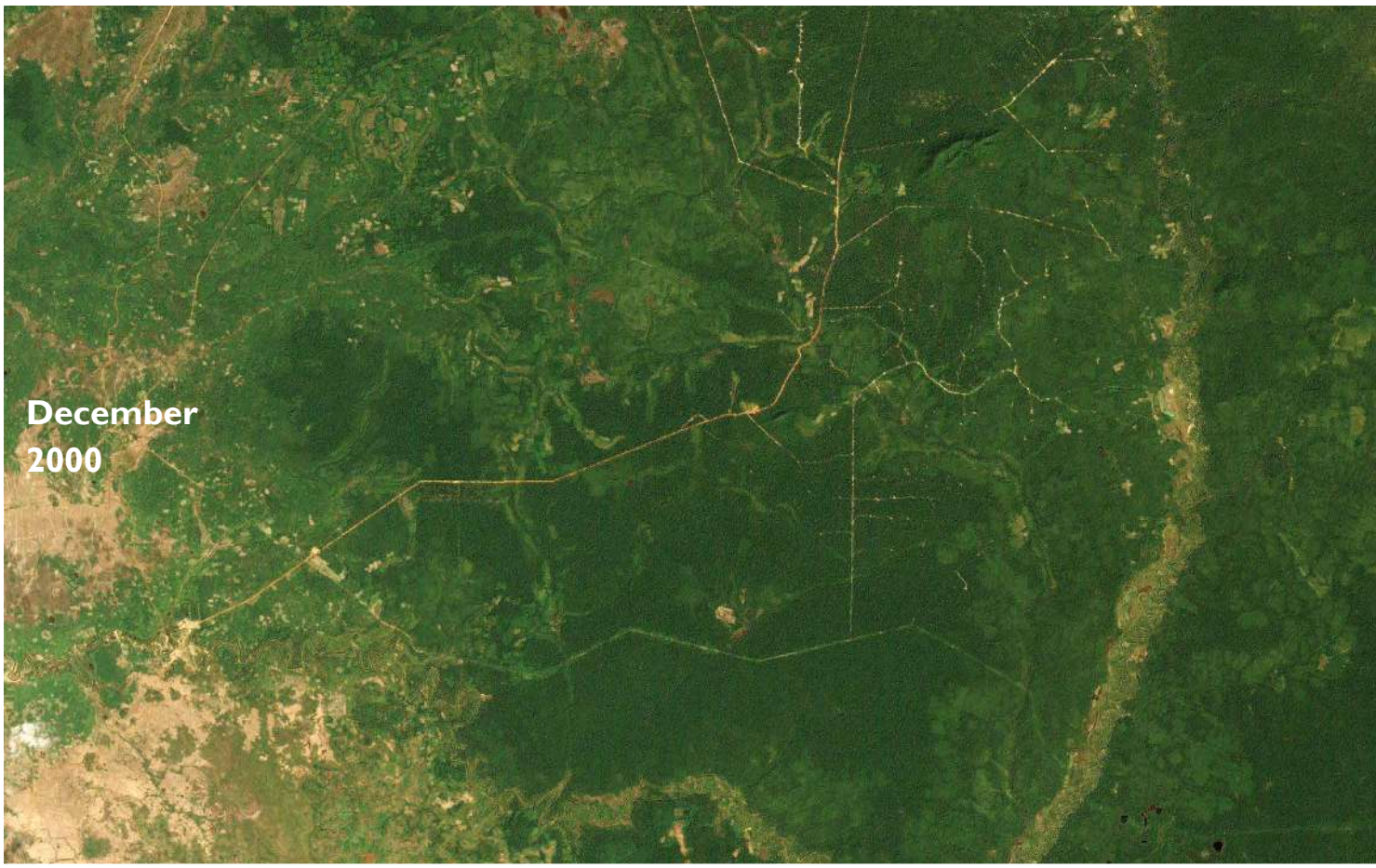
Empowering local farming communities to minimize drought impacts

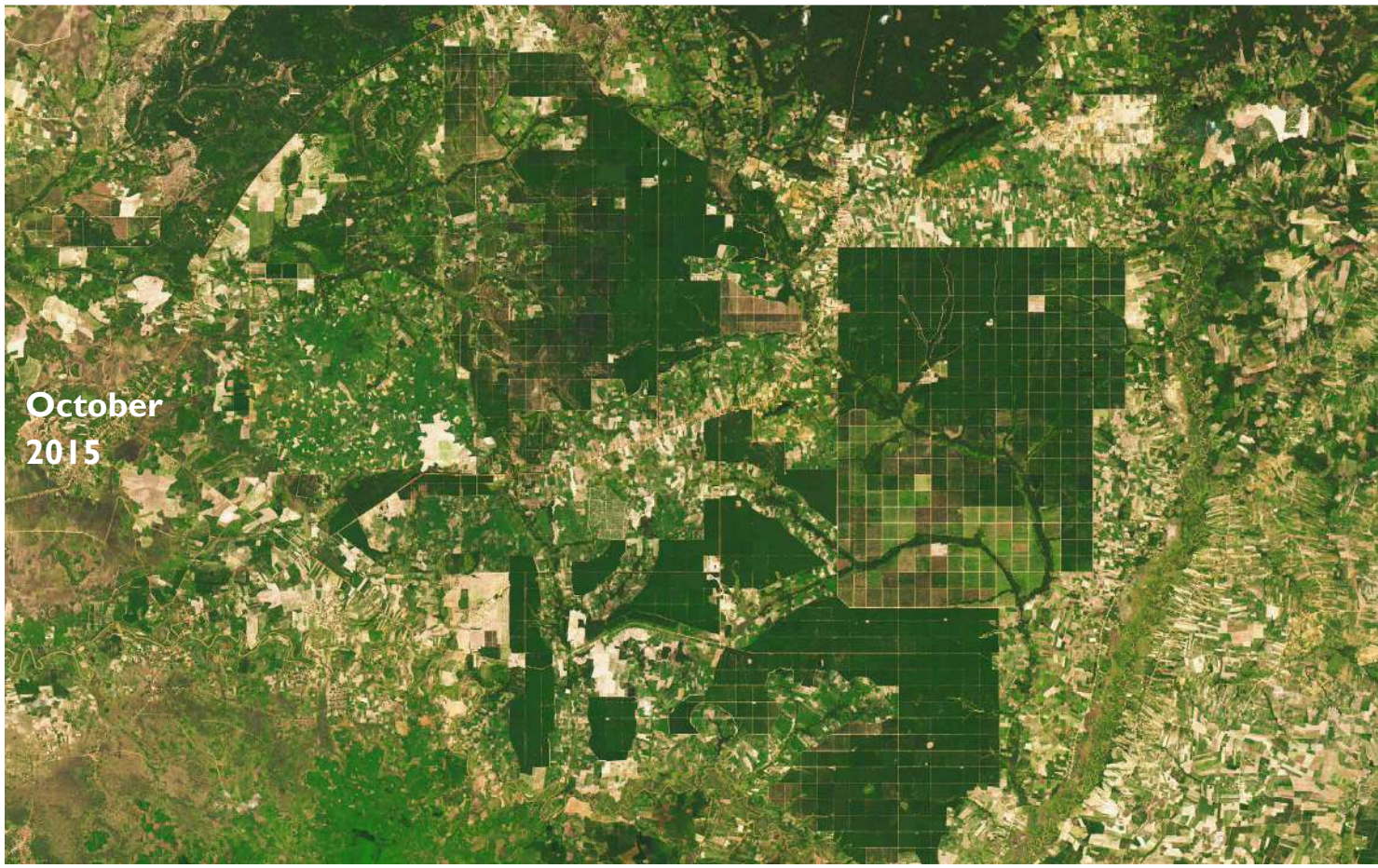
"THE KNOWLEDGE GAINED FROM THE WORKSHOP ABOUT DROUGHT WILL HELP LOCAL COMMUNITIES TO ADEQUATELY MODIFY THEIR CROP PLANTING TO ADAPT TO ADVERSE WEATHER CONDITIONS, PLAN FOR RAISING LIVESTOCK, AND REDUCE WATER CONSUMPTION."

Tran Thi Hue
Head of the Women's Union, Thuan Nam District

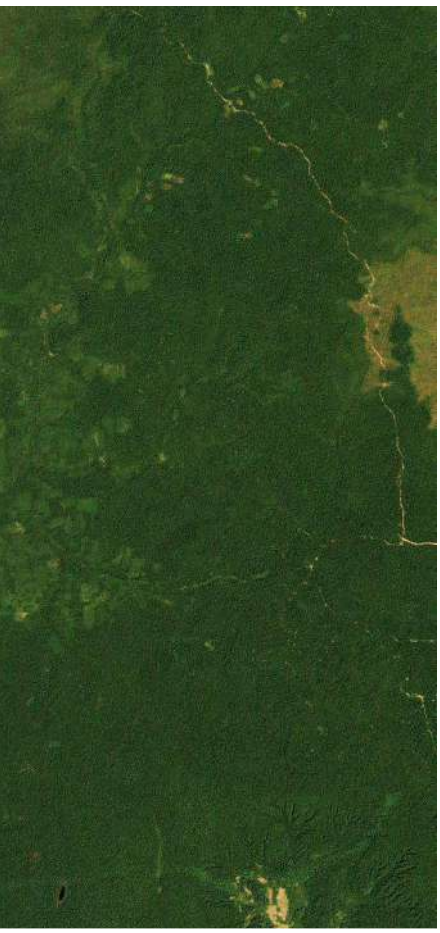
TOP AND LEFT
SERVIR-Mekong and NASA's Applied Sciences Team leading an in-person training on drought forecasting and crop yield estimation in Hanoi, Vietnam, to participants from the Vietnam Academy for Water Resources, the Institute of Water Resources Planning, and the Institute for Agricultural Environment.
Photos: ADPC.

When SERVIR-Mekong introduced the Mekong Drought and Crop Watch Tool to the Ninh Thuan province's Hydro Meteorology Station, Nguyen Sy Thoai, the director of the station, was initially hesitant about the usefulness of the data. However, after attending a training workshop and applying the tool to forecast weather systems, he became a strong advocate for SERVIR-Mekong and its drought monitoring and forecasting work to provide detailed information on location and crop yield forecasts for rice planting to improve harvests and crop resilience. SERVIR-Mekong's Drought and Crop Watch Tool has benefited approximately 60,000 households in Vietnam's Ninh Thuan province.


December
2000


October
2015

LAND COVER, LAND-USE CHANGE AND ECOSYSTEMS



LEFT
Cambodia has one of the fastest rates of forest loss in the world. The top image shows intact forests near the border of the Kampong Thom and Kampong Cham provinces. The image below, captured on October 30, 2015, reveals much of the forest has been replaced by a grid-like pattern of roads, fields, and large-scale rubber plantations.
Photos: NASA Earth Observatory images by Joshua Stevens, using Landsat data from the U.S. Geological Survey and Global Forest Watch.

Tropical forests are incredibly effective at storing carbon, and their restoration contributes to the mitigation needed to meet climate targets. The dwindling forest cover of the Greater Mekong is causing a significant loss of biodiversity and becoming increasingly fragmented. Urban expansion, agricultural conversion, land abandonment, deforestation, and logging are the primary drivers of land use change.

SERVIR-Mekong's land cover, land-use change, and ecosystems thematic service area focuses on assisting countries in forest monitoring and expanding capacity to use Earth observation satellites for sustainable land management.

IMPACTS

Detecting forest changes in Cambodia

THE FOREST ALERT TOOL PLAYS A VITAL ROLE IN COMPLEMENTING CAMBODIA'S MINISTRY OF ENVIRONMENT PROTECTED AREA MONITORING PLATFORM, ALLOWING FOREST OFFICIALS TO MAKE DATA-DRIVEN DECISIONS TO ADDRESS AND TACKLE THE CAUSES OF DEFORESTATION.

A group of volunteer patrollers from communities dependent on the Prey Lang forest plays an active role in the area's protection. **Photo: USAID/Greening Prey Lang.**

LEFT
Illegal logging is evident throughout the Prey Lang Extended Landscape increasing local people's vulnerability to disasters, food insecurity, and other effects of climate change. **Photo: Michael Gebremedhin, USAID/Cambodia.**

Rapid deforestation threatens the Prey Lang Extended Landscape in Cambodia, which covers about 3.5 million hectares and is home to protected areas and indigenous communities. SERVIR-Mekong, in collaboration with NASA Applied Science Team from Oregon State University, partnered with USAID Greening Prey Lang to develop a Forest Alert Tool. The tool applies SERVIR-Mekong's Regional Land Cover Monitoring System technologies to detect forest changes and external disturbances such as forest fires in near real-time and can pierce through dense clouds using Synthetic Aperture Radar technology to provide analysts with high-resolution satellite imagery.

EARTH OBSERVATIONS & NASA PRODUCTS USED

Sentinel 1

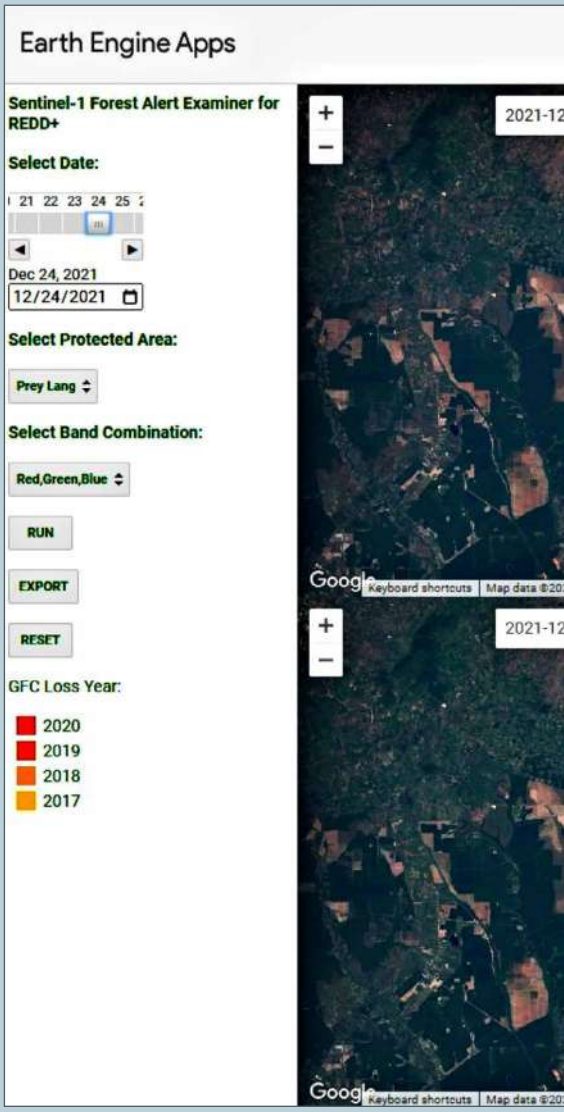
DEVELOPER(S)

SERVIR-Mekong and Oregon State University

CONTRIBUTORS/PARTNERS

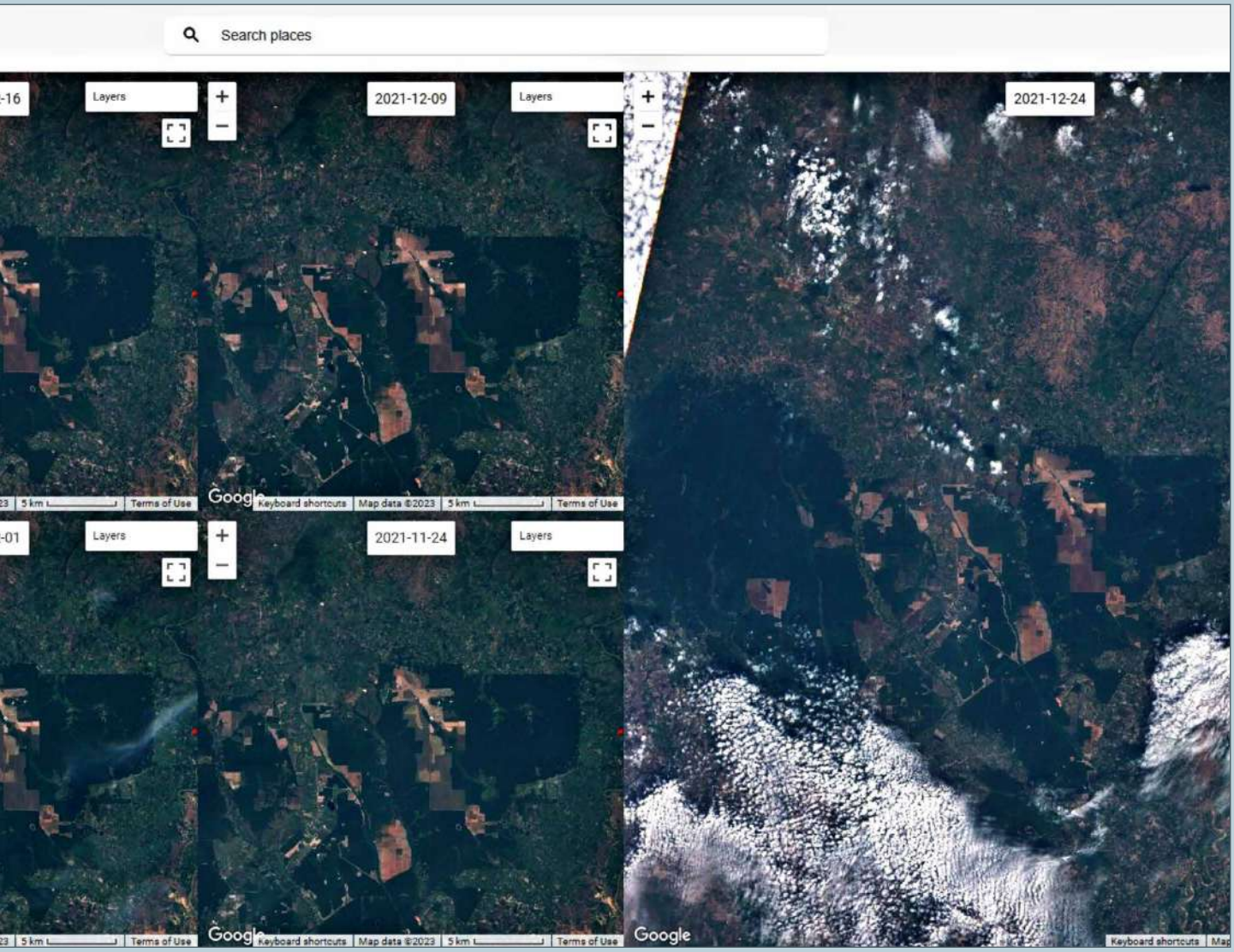
USAID Greening Prey Lang project, Cambodia Ministry of Environment departments: General Department of Administration for Nature Conservation and Protection, Department of Geospatial Information Service, and General Directorate of Environmental Knowledge and Information

CAMBODIA PROTECTED AREA ALERTS SYSTEM



GEOGRAPHIC REGION

Cambodia



USERS

USAID, Cambodia, Ministry of Environment, Cambodia, Provincial Department of Environment Protection Area Management Board, Cambodia, and NGOs: Conservation International, Wildlife Conservation Society, World Wildlife Fund, Fauna and Flora International, BirdLife International, Wild Earth Allies, Our Future Organization, Rising Phoenix Co., Ltd, and Maddox Jolie-Pitt Foundation


NASA

VOICES

Developing and strengthening knowledge using Synthetic Aperture Radar

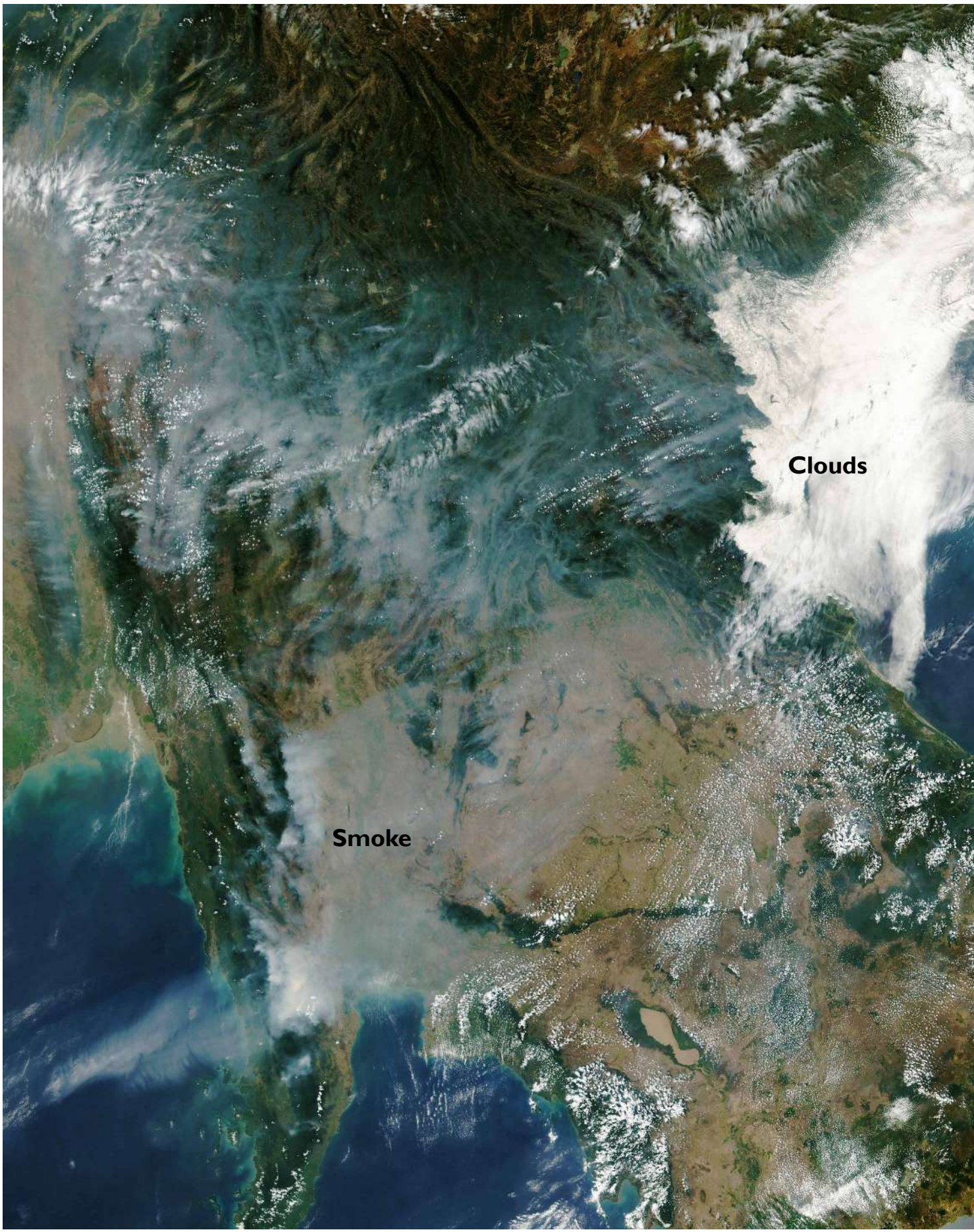
"I FOUND THIS WORKSHOP HELPFUL IN LEARNING NEW TECHNIQUES AND METHODOLOGIES FOR ESTIMATING FOREST STAND HEIGHT, AND I HOPE TO SHARE SOME OF THE KNOWLEDGE I LEARNED WITH MY COLLEAGUES."

Nguyen Thi Quynh Lam
Forest Inventory and Planning Institute, Vietnam

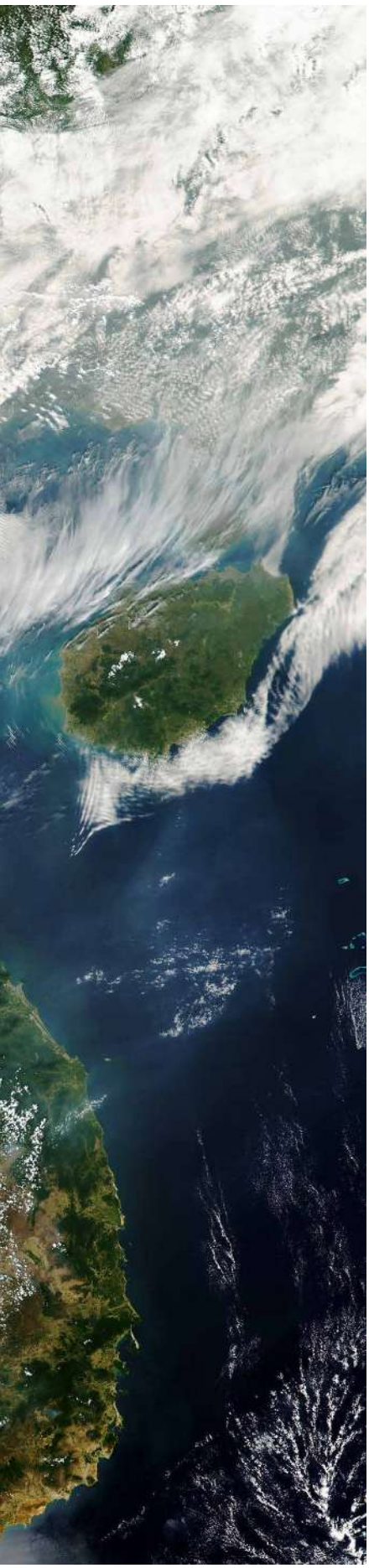
TOP AND LEFT
Participants at the technical training on Forest Stand Height estimation using Synthetic Aperture Radar data. Forest Stand Height estimation effectively works out the average canopy height, which is advantageous for determining forest age, characterizing plant and animal habitats, providing land use history, and contributing to estimates of above-ground biomass.
Photos: ADPC.

To increase the capacity of researchers and practitioners to monitor forests, SERVIR Global, SERVIR-Mekong, SilvaCarbon, and NASA's Science Coordination Office organized technical training in January 2020 to use Synthetic Aperture Radar technologies to improve forest monitoring and biomass estimation. Participants representing academic institutions and government agencies from Cambodia, Lao PDR, Nepal, Thailand, and Vietnam attended the training.

Synthetic Aperture Radar helps monitor forests and map land cover and land use changes over time by providing high-resolution remote sensing that can penetrate thick cloud cover over tropical rainforests. The training allowed participants like Dr. Chittana Phompila from the Faculty of Forest Sciences, National University of Laos, to incorporate the learning into their teaching.


Clouds
Smoke

AIR QUALITY



LEFT
Agricultural burning and forest fires during the burning season from January to March have contributed to high pollution levels, causing a deterioration in air quality in many parts of Southeast Asia. This natural-color satellite shows large numbers of small fires burning throughout the Indochina peninsula on March 19, 2016, with a thick cloud of smoke obscuring much of western Thailand and eastern Burma.
Photo: NASA image by Jeff Schmaltz, LANCE/ EOSDIS Rapid Response.

The Lower Mekong Region faces major challenges caused by human-induced burning of agricultural areas and forest fires. Poor air quality has been a seasonal problem in Thailand for over a decade. Over the past few years (especially during winter), Thailand has experienced some of the worst air pollution in the world.

The Mekong Air Quality Explorer Tool was launched to support Thailand's efforts to address air pollution challenges. The new state-of-the-art, publicly available web-based tool uses satellite and advanced computer models to provide more accurate air pollution forecasting up to three days out.

In 2022, the Lao PDR Ministry of Natural Resources and Environment partnered with SERVIR-Mekong to expand the tool to Lao PDR. The tool's demand and scalability advance efforts under the ASEAN Agreement on Transboundary Haze Pollution.


adpc
SERVIR MEKONG
USAID
FROM THE AMERICAN PEOPLE
GISTDA
STARTUP THAILAND
CHIANGMAI
STARTUP HUB

IMPACTS

Reducing agricultural burning and managing forest fires in Thailand

"THE MEKONG AIR QUALITY EXPLORER TOOL HAS THE POTENTIAL TO ADDRESS THE TRANSBOUNDARY CHALLENGES THAT AIR POLLUTION POSES TO THE REGION."

Dr. Steven G. Olive
Mission Director, USAID Regional Development Mission for Asia

The launch event of the Mekong Air Quality Explorer tool. High-level governmental officials from the Royal Thai Government Pollution Control Department and USAID Regional Development Mission for Asia attended the event. **Photo: ADPC.**

LEFT
A participant at the Smogathon Thailand 2020 in Chiang Mai, Thailand. The event enhanced public awareness and encouraged youth to use the Mekong Air Quality Explorer tool. **Photo: Wiraporn Srisuwanwattana, USAID/RDMA.**

In response to a request from the Royal Thai Government's Pollution Control Department, SERVIR-Mekong worked closely with the Thai space agency Geo-Informatics and Space Technology Development Agency to develop the Mekong Air Quality Explorer Tool. Air quality data from the tool provides provincial governments with accurate air pollution readings to regulate agricultural burning and forest fires. It enables authorities to design better response strategies and data-driven policies to tackle air pollution across Thailand. Since the Chiang Rai government started using SERVIR-Mekong's fire hotspot data in 2021, there has been an 88 percent reduction in fire hotspots in Chiang Rai province.

EARTH OBSERVATIONS & NASA PRODUCTS USED

AQUA and TERRA/ MODIS Aerosol Optical Depth, MODIS, and VIIRS true-color imagery, GEOS Air Quality Forecasts bias-corrected using machine learning algorithm, and Fire product from MODIS and VIIRS: fire radiative power, number of fire

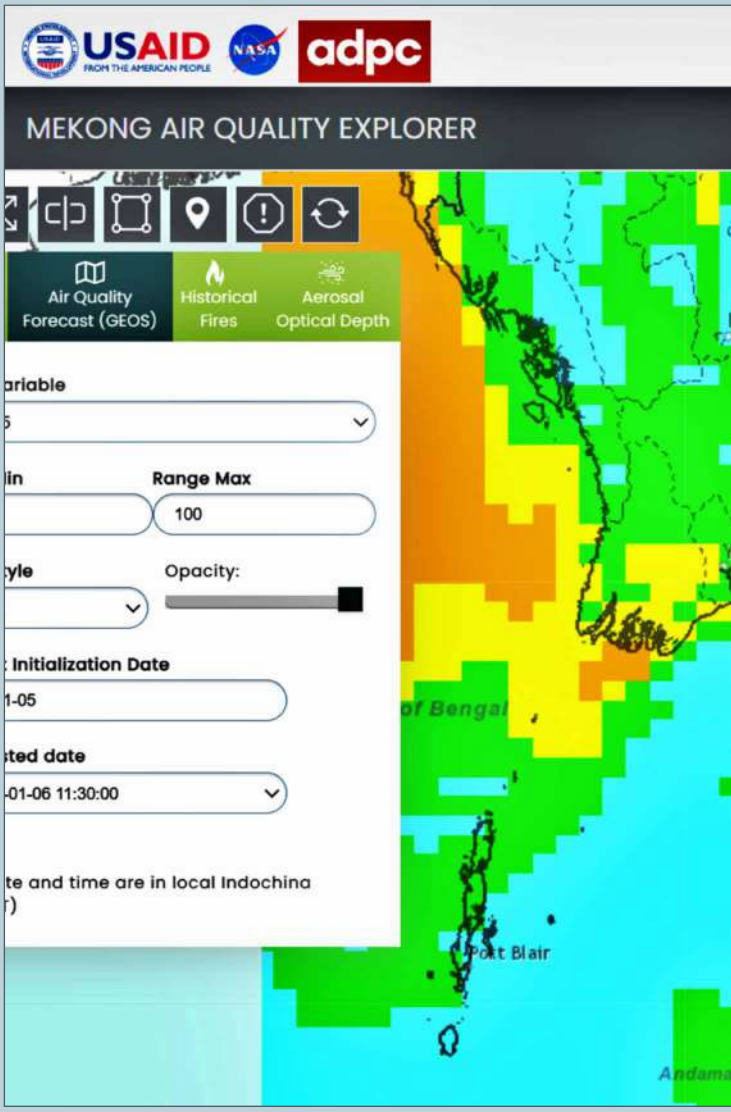
DEVELOPER(S)

SERVIR-Mekong, Universities Space Research Association, and NASA

CONTRIBUTORS/PARTNERS

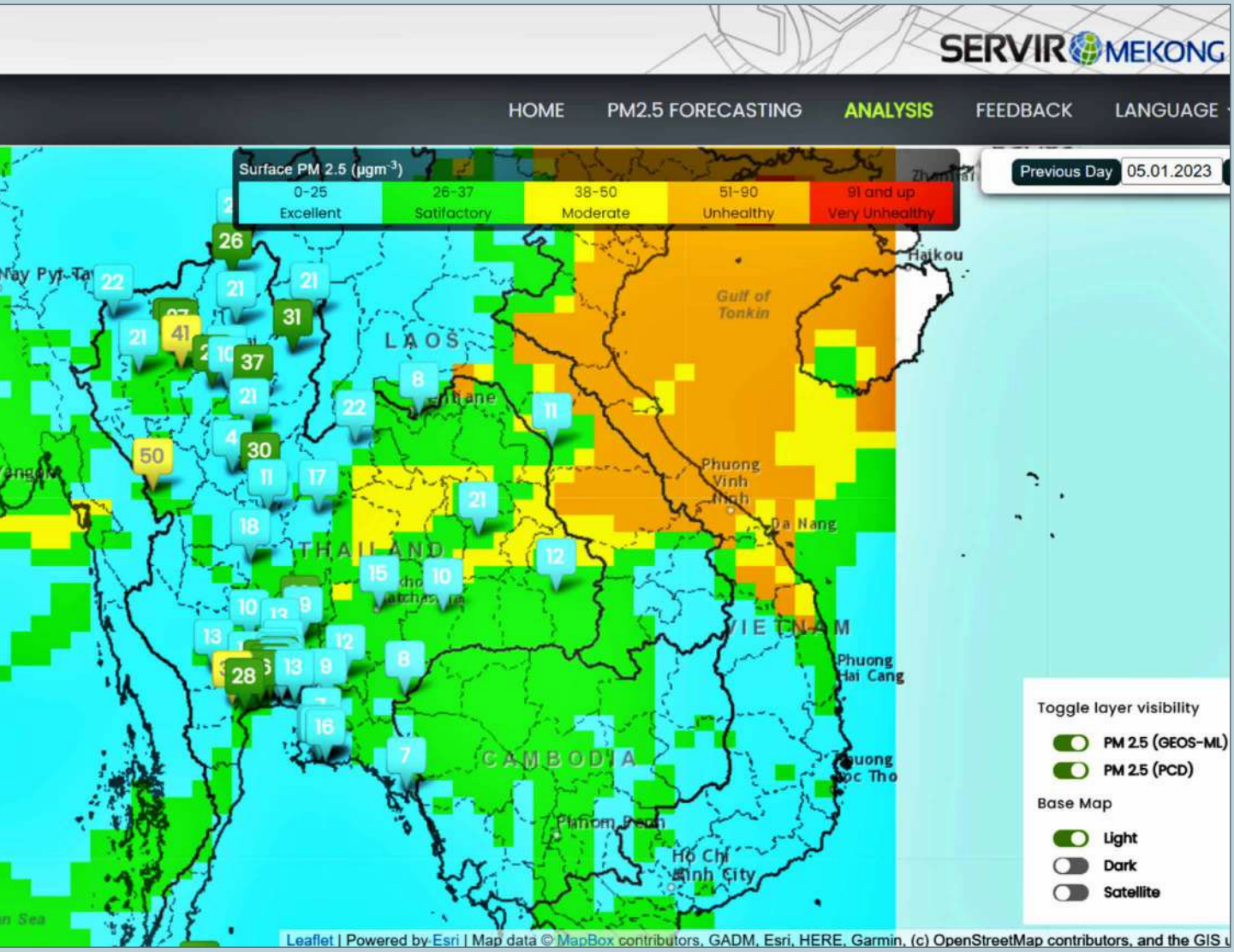
Thailand Pollution Control Department, and Thailand's Geo-Informatics and Space Technology Development Agency

MEKONG AIR QUALITY EXPLORER



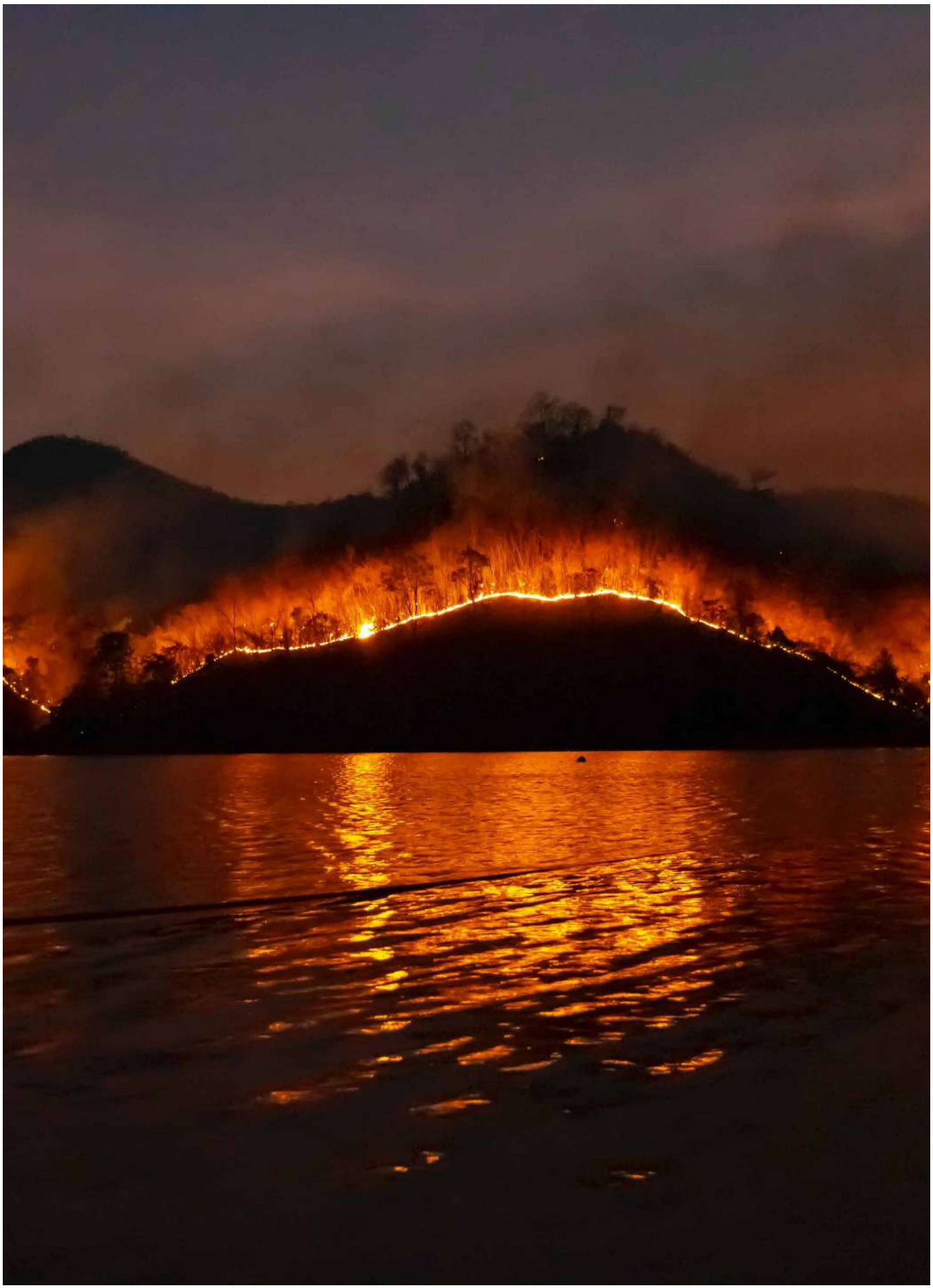
GEOGRAPHIC REGION

Lower Mekong



USERS

Pollution Control Department, Geo-Informatics & Space Technology Development Agency, Rajamangala University of Technology Lanna, PAM Air, UNESCAP, and Thai Northern Provincial Center for Solving Haze Problem and Forest Fire Control



VOICES

Identifying forest fires in Chiang Rai

"PREVIOUSLY, IT WAS TIME-CONSUMING FOR THE FOREST FIRE DEPARTMENT TO LOCATE THE EXACT LOCATION OF FIRES. NEAR REAL-TIME DATA FROM THE SERVIR-MEKONG AIR QUALITY EXPLORER TOOL IS INSTRUMENTAL IN PINPOINTING FIRE HOTSPOTS."

Dr. Nion Sirimongkonlertkul
Rajamangala University of Technology

Dr. Nion (left) with Governor Prachon Pratsakul of Chiang Rai Province (right) during the launch of the Smoke Watch App. **Photo: Fulfill Social Enterprise Limited Partnership.**

LEFT
Burning of agricultural land in Chiang Rai province, Thailand. **Photo: Sippakorn Yamkasikorn, Pexels.** *(This image does not state or imply the endorsement by the photographer).*

Dr. Nion Sirimongkonlertkul from the Rajamangala University of Technology and the Chiang Rai provincial government collaborated with SERVIR-Mekong to use data from SERVIR-Mekong's Air Quality Explorer tool to develop a Smoke Watch mobile application. In 2021, as a result of this partnership, data from the tool provided the exact locations of fires to facilitate timely interventions by first responders. The Government of Thailand awarded the Smoke Watch mobile application the National Innovation Award 2021.

In February 2022, SERVIR-Mekong received a letter of appreciation from the Chief of Disaster Prevention and Mitigation, Chiang Rai provincial government, for its support toward forest fire management in the province and expressed support for increasing regional cooperation in air quality monitoring and control.

WATER RESOURCES AND HYDRO-CLIMATIC DISASTERS

LEFT
Seasonal flooding in the Lower Mekong Basin is considered a common phenomenon. However, unusually high floods cause severe effects destroying rice harvests, livelihoods, and infrastructure. In October 2011, the Chao Phraya river overflowed onto nearby floodplains submerging fields, roads, and buildings.
Photo: NASA Earth Observatory image created by Jesse Allen and Robert Simmon, using EO-1 ALI data provided courtesy of the NASA EO-1 team and the United States Geological Survey.

Flooding events are projected to be highest in low-lying and crowded coastal cities in many South and Southeast Asian countries. Lower Mekong countries are subject to seasonal floods, adversely affecting thousands of communities living within 15 kilometers of the Mekong River.

SERVIR-Mekong harnesses space technology and open data with state-of-the-art geospatial technologies. It works closely with the Mekong River Commission to develop new satellite-based rainfall data and tools to increase flood forecasts' accuracy and effectiveness. The Mekong River Commission's Mekong Flood Forecasting System integrated SERVIR-Mekong satellite-based precipitation data, improving accuracy and increasing lead time from 6 to 15 days.


LỚP 3B
LỚP 3A

IMPACTS

Improving flood forecasting and early warning in the Lower Mekong

"SERVIR-MEKONG PROVIDES ACCURATE REGIONAL RAINFALL DATA TO HELP THE MEKONG RIVER COMMISSION SECRETARIAT IMPROVE OUR FLOOD AND DROUGHT EARLY WARNING SYSTEM WITH THE MOST UP-TO-DATE DATA AND FLOOD FORECASTING PRODUCT."

Dr. Winai Wangpimool
Director, Technical Support Division
Mekong River Commission Secretariat

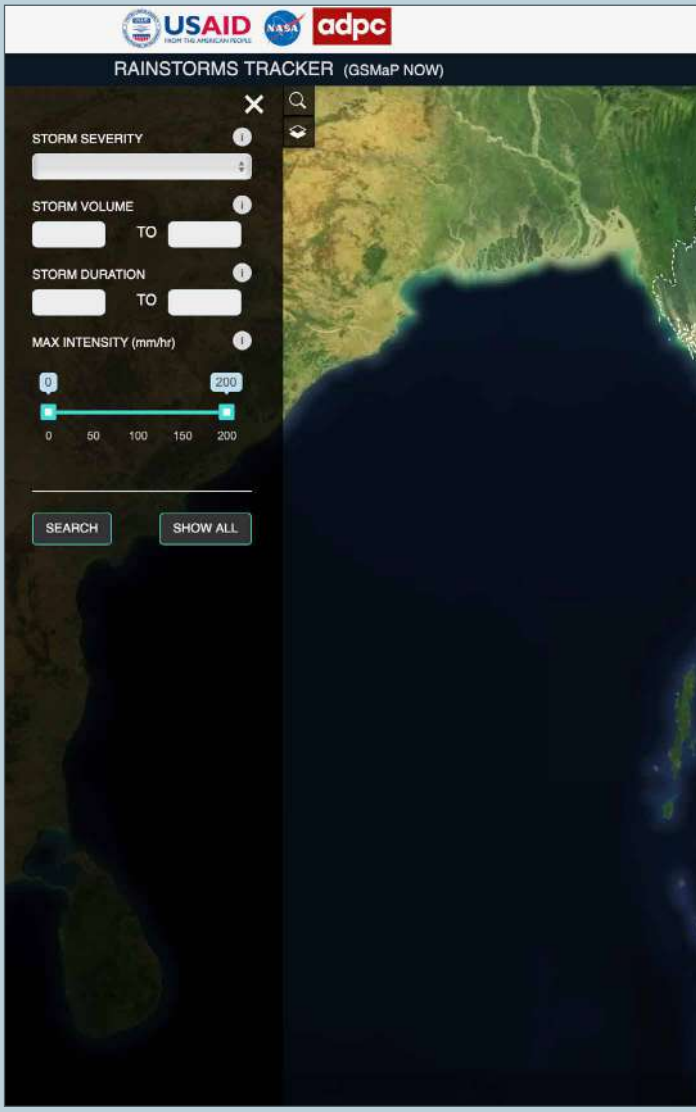
Communities along the banks of the Chao Phraya river in Thailand's Ayutthaya province were severely affected during the 2011 megaflood. **Photo: Dr. Peeranan Towashiraporn, ADPC.**

LEFT
A flooded school in central Vietnam. On October 6, 2020, the central region of Vietnam experienced prolonged, heavy rains that caused severe and widespread flooding and landslides in eight provinces in the country. **Photo: Christine Gandomi and Tuong Do, USAID/Vietnam.**

According to the Mekong River Commission 2018 State of the Basin Report, average annual economic losses from seasonal flooding amount to $71 million in the Mekong Delta in Vietnam and approximately $88 million in Thailand. The region's demand for effective flood forecasts is ever more critical with current climatic trends.

SERVIR-Mekong enhanced the Mekong River Commission's regional flood forecasting system by integrating new-generation satellite-based rainfall data and products. The efficacy of SERVIR-Mekong's flood forecasting tools helped increase flood forecasts' lead-time from six to fifteen days, encouraging the Mekong River Commission to implement them into their Flood and Drought Early Warning System. As a result, longer-term and accurate flood forecasting will significantly improve and help strengthen the resilience of communities in Lower Mekong.

RAINSTORM TRACKER



EARTH OBSERVATIONS & NASA PRODUCTS USED

IMERG: Integrated Multi-satellitE Retrievals for GPM | NASA, and GSMaP_NRT JAXA Global Rainfall Watch

DEVELOPER(S)

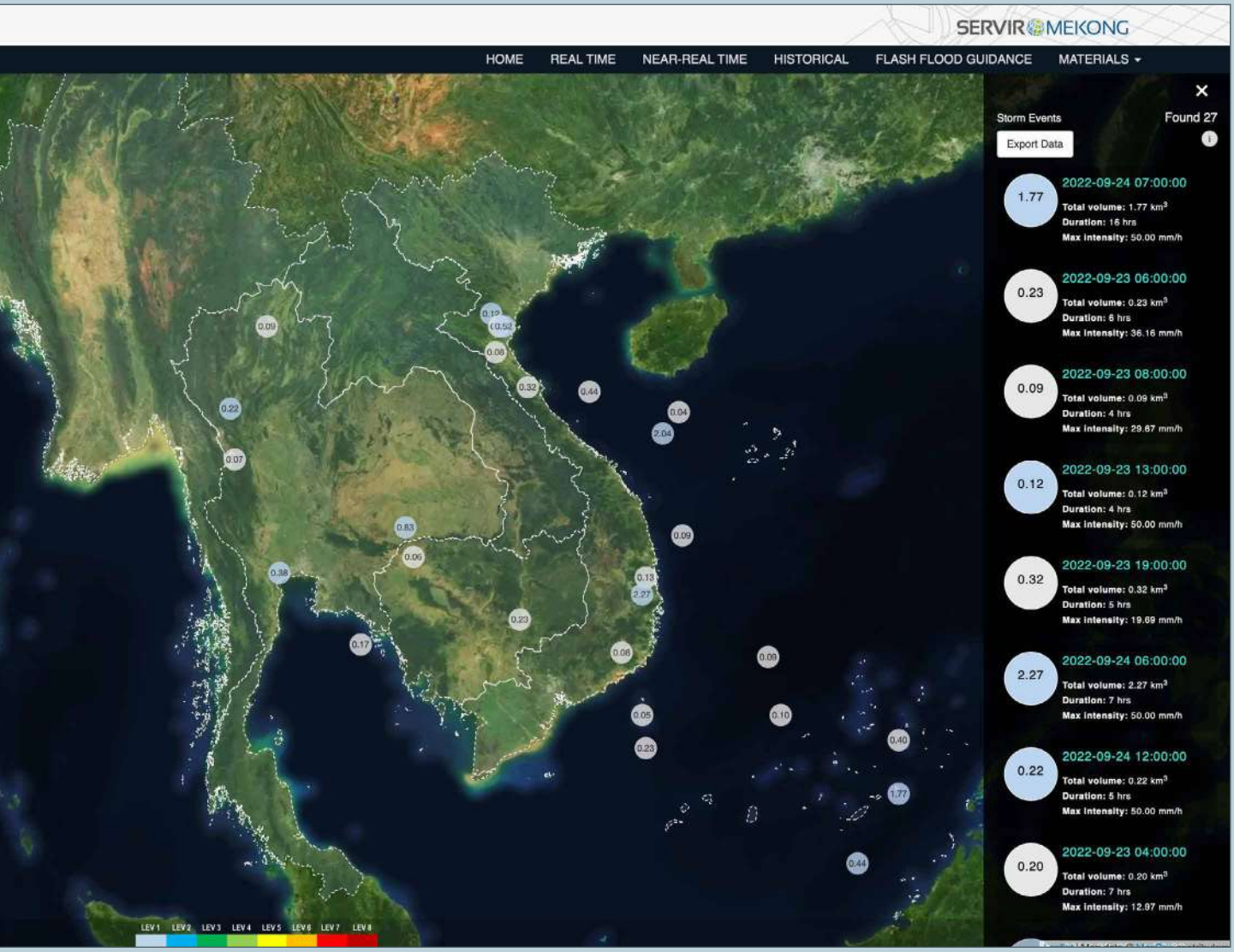
SERVIR-Mekong

CONTRIBUTORS/PARTNERS

IHE Delft Institute for Water Education, Netherlands, Technical University of Delft, Netherlands, and Mekong River Commission

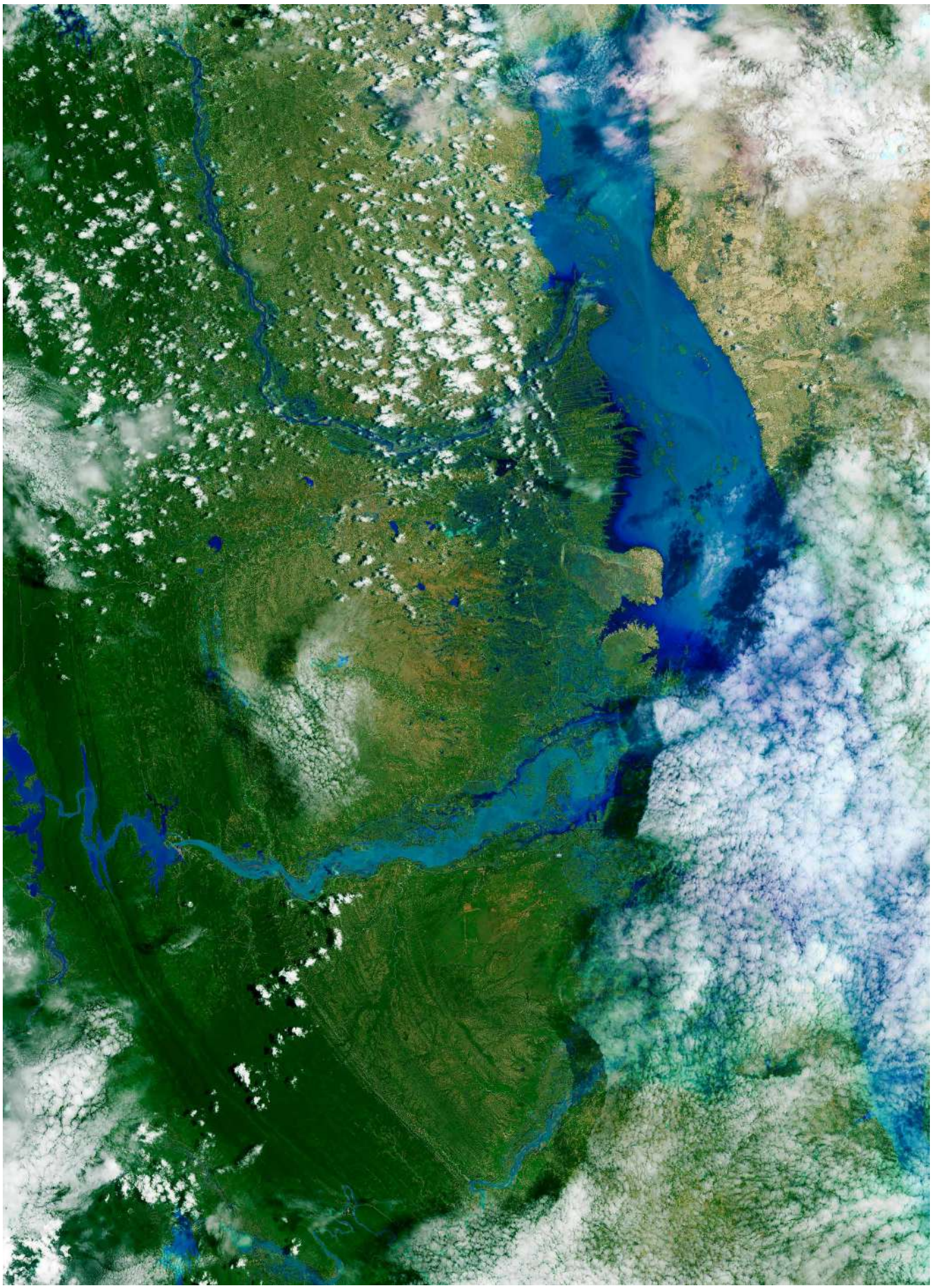
GEOGRAPHIC REGION

Lower Mekong



USERS

Mekong River Commission and member states, and disaster preparedness and response organizations



IMPACTS

Dancing rivers of Burma

"THE WORKSHOP BENEFITED THE DIRECTORATE OF WATER RESOURCES AND IMPROVEMENT OF RIVER SYSTEMS AND OTHER ORGANIZATIONS, ESPECIALLY LOCALS LIVING ALONG BURMA'S BIG RIVERS."

Aung Myo Khaing
Director of Planning and Research Division,
Directorate of Water Resources and Improvement of River Systems

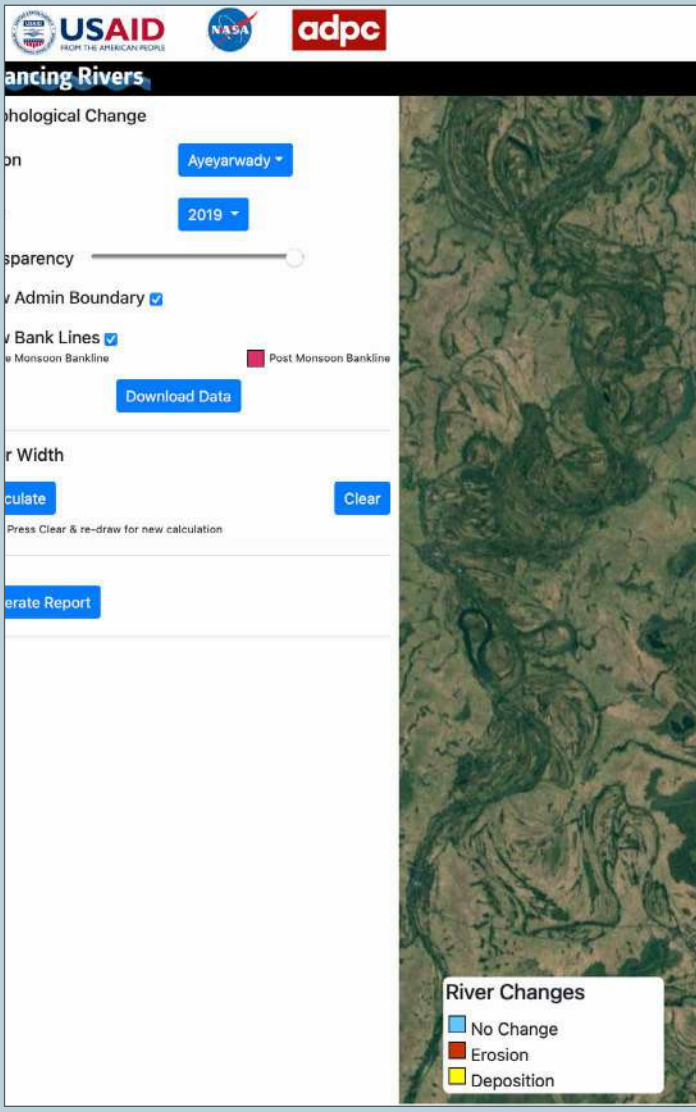
Training of junior engineers to utilize the Dancing Rivers system to monitor changes in the Ayeyarwady River. **Photo: SEI.**

LEFT
A swollen Ayeyarwady River. Heavy monsoonal flooding in Burma in May 2015 damaged crops, displaced thousands of residents and submerged about 5,000 square kilometers (2,000 square miles) of rice fields. **Photo: NASA Earth Observatory image by Joshua Stevens, using Landsat data from the U.S. Geological Survey.**

Each year, increased water levels of the Ayeyarwady (Irrawaddy) river due to heavy monsoonal rainfall cause considerable erosion. Collecting information along 2000 kilometers of the river after every monsoon season is both time and resource-consuming. Burma's Directorate of Water Resources and Improvement of River Systems requested SERVIR-Mekong to support their monitoring process with a large-scale remote sensing-based assessment; to efficiently provide a holistic overview and respond to erosion risk.

SERVIR-Mekong developed the Dancing Rivers—a river morphological monitoring system. Dancing Rivers uses freely available Landsat satellite data to build an annual river morphology change map, generating detailed change maps of erosion and deposition locations along the river before initiating the detailed survey for riverbank protection.

DANCING RIVERS



EARTH OBSERVATIONS & NASA PRODUCTS USED

Landsat 5, 7, 8 data, Sentinel -1, and Google Earth Engine

DEVELOPER(S)

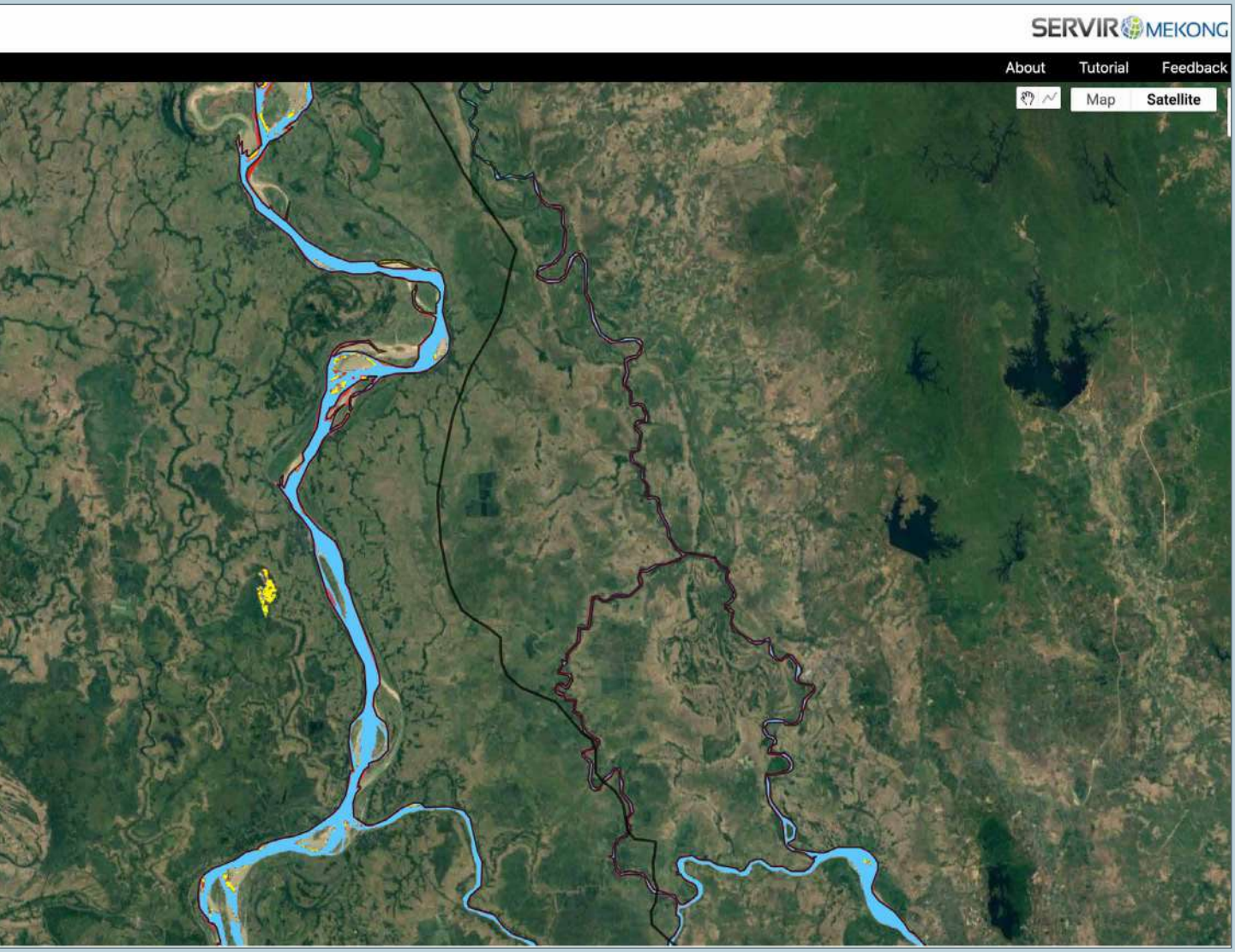
SERVIR-Mekong

CONTRIBUTORS/PARTNERS

N/A

GEOGRAPHIC REGION

Lower Mekong



USERS

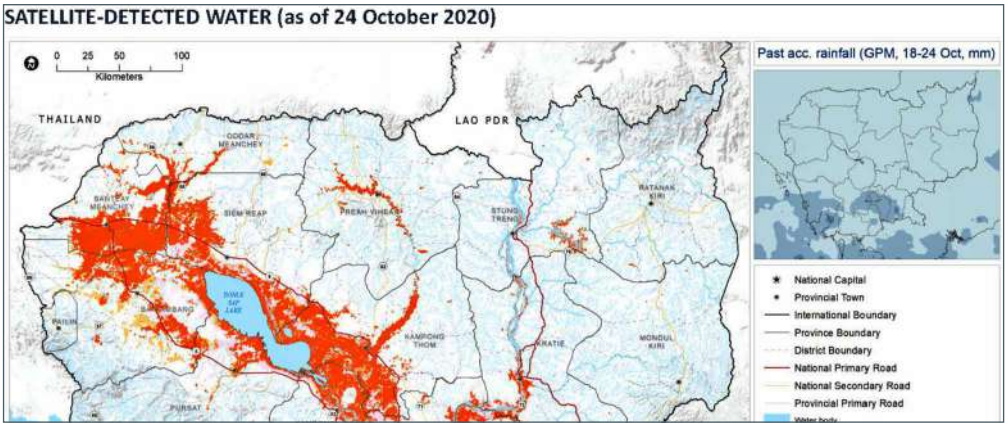
Directorate of Water Resources and Improvement of River Systems, Burma, and water resource management agencies in the Lower Mekong

VOICES

Using near real-time data to support and strengthen flood response in Cambodia

"WHEN THE LARGE-SCALE FLOODS HIT CAMBODIA, FLOOD EXTENT MAPS PROVIDED BY SERVIR-MEKONG ENABLED HUMANITARIAN PARTNERS AND LOCAL GOVERNMENTS TO UNDERSTAND THE GEOGRAPHICAL EXTENT OF THE FLOODS AND PROVIDE EMERGENCY ASSISTANCE WHERE IT WAS MOST NEEDED."

Kurt Burja
Programme Policy Officer, World Food Programme



TOP
Daily satellite-detected water map produced by SERVIR-Mekong with additional data from the WFP Headquarters Geospatial Support Unit. **Image: WFP.**

LEFT
A resident in the Cambodian province of Pursat wades through flood water with her child. **Photo: Cesar Lopez Balan, WFP, USAID/Cambodia.**

In October 2020, Cambodia experienced extreme flooding that affected more than 790,000 people. To strengthen disaster response, the World Food Programme (WFP), using earth observation and near real-time data from SERVIR-Mekong, helped the Government of Cambodia and its humanitarian partners respond to the emergency.

According to Kurt Burja of WFP Cambodia, SERVIR-Mekong's Hydrologic Remote Sensing Analysis for Floods (HYDRAFloods) provided daily flood extent data to WFP to integrate into their comprehensive disaster risk management platform: Platform for Real-Time Impact and Situation Monitoring. This enabled WFP to produce timely and accurate flood map products and situation reports to immediately guide humanitarian partners and local governments to affected communities.

CHAPTER 03

PUSHING BOUNDARIES

SERVIR-MEKONG IS CONSTANTLY EVOLVING ITS TOOLS AND SERVICES TO RESPOND TO REGIONAL DEMANDS.

A natural-color view of Bang Kachao in the heart of Bangkok, Thailand's most populous city. Bang Kachao, also known as "green lung," is an artificial body of land and a lush protected area that has escaped the dense development seen elsewhere in Bangkok. Photo: NASA Earth Observatory image by Jesse Allen, using Landsat data from the U.S. Geological Survey.

CHAPTER 03

PUSHING BOUNDARIES

Improving development outcomes across the Lower Mekong

Enduring regional partnerships

Agents of change

International recognition

IMPROVING DEVELOPMENT OUTCOMES ACROSS THE LOWER MEKONG

TOP
Training for officials of the Mekong River Commission, the National Mekong Committee, and national line ministries on utilization of the Reservoir Assessment Tool.
Photo: ADPC.

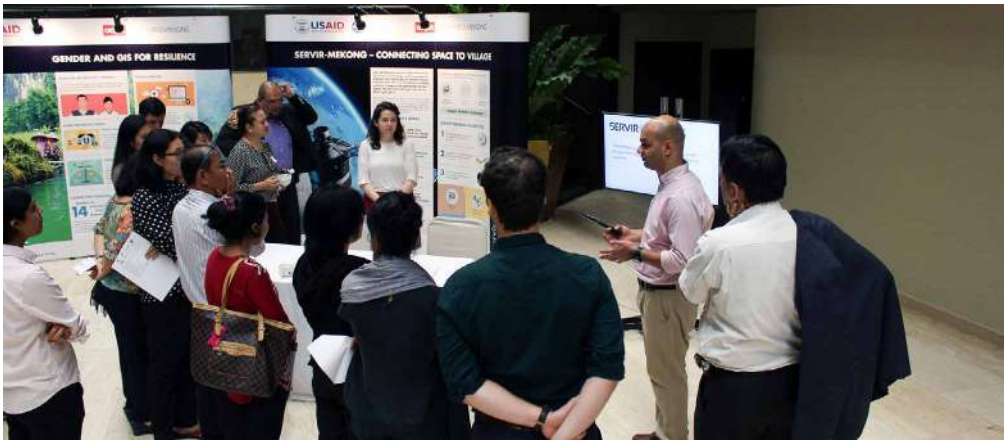
LEFT
Young monks crossing a bamboo bridge over the Nam Khan River (a major tributary of the river Mekong) in Luang Prabang of Lao PDR.
Photo: Khomkrish Innanchai, MRC.

SERVIR-Mekong is constantly evolving its tools and services to respond to regional demands—exploring how space applications and geospatial technologies can support improved social, environmental, and economic outcomes. SERVIR-Mekong's innovative tools and services are breaking new ground to help decision-makers accurately and more efficiently respond to environmental challenges across the region.

PLACING PEOPLE ON THE MAP

"GENDER AND GEOGRAPHIC INFORMATION SYSTEM COMMUNITIES NEED TO CONSIDER HAVING GENDER ASPECTS AS PART OF PROJECT FRAMEWORKS FROM THE BEGINNING TO DISCOVER AT-RISK AREAS WHERE SUPPORT IS MOST NEEDED."

Dr. Pham Viet Hoa
Vice Director, Ho Chi Minh City Institute of Resources Geography,
Vietnam Academy of Science and Technology

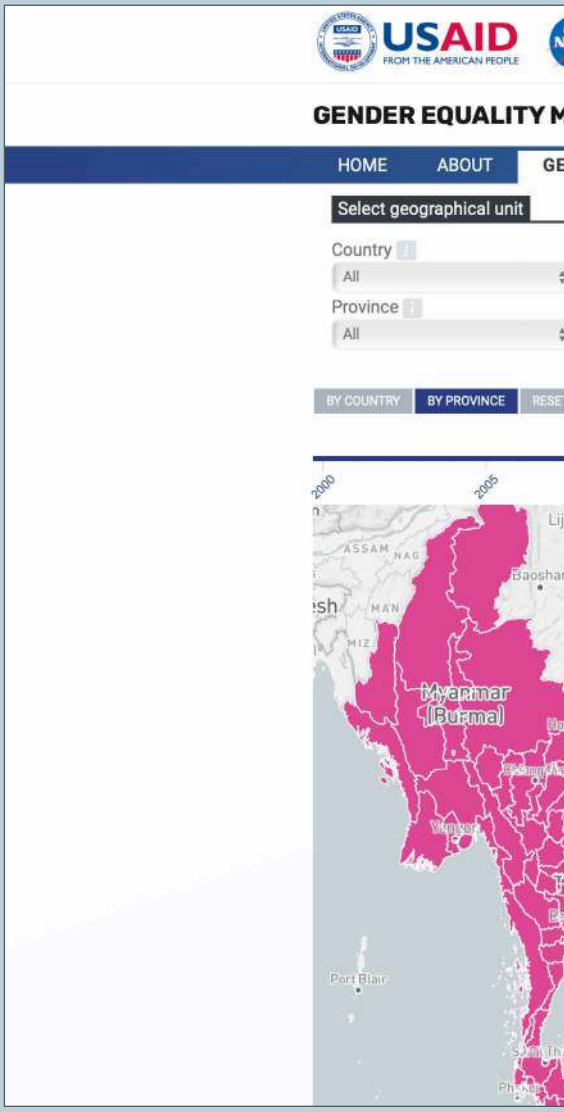


TOP AND LEFT
Participants during a knowledge exchange for sustainable development in Asia hosted by ADPC to promote better linkages between disaster risk reduction and gender initiatives.
Photos: ADPC.

At SERVIR-Mekong, gender integration in geospatial services remains a high priority. Addressing issues of gender inequality ensures inclusivity that enables both women and men from different backgrounds to thrive. Placing "people on the map" allows for extensive analysis of gender-differentiated impacts and implications of environmental change on the population.

SERVIR-Mekong's Gender Equality Monitoring platform was developed to create a public repository for officially published sex-disaggregated data, including the Gender Inequality Index—to help visualize gender inequality at the sub-national level in education, health, employment, and household decision-making.

GENDER EQUALITY MONITORING



EARTH OBSERVATIONS & NASA PRODUCTS USED

N/A

DEVELOPER(S)

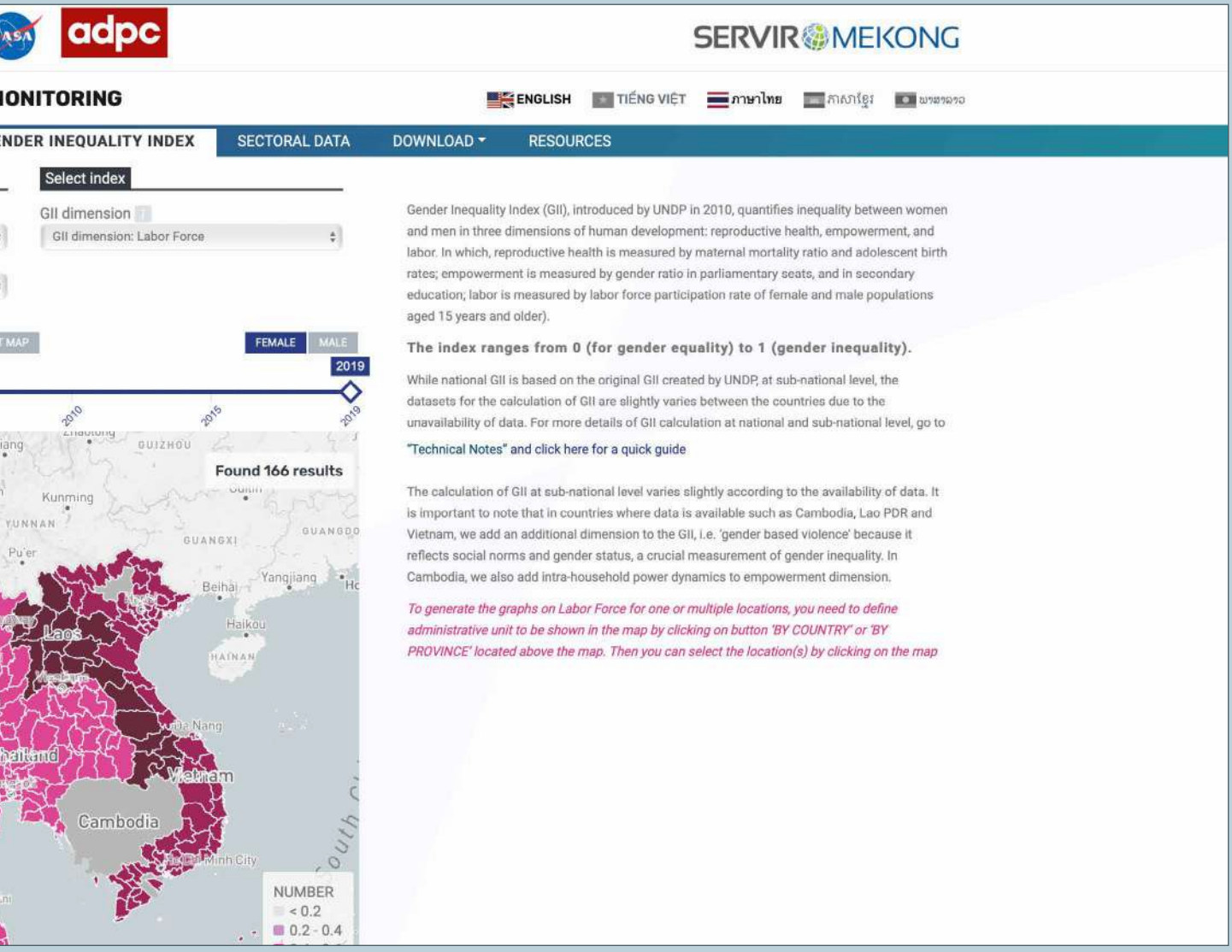
SERVIR-Mekong

CONTRIBUTORS/PARTNERS

N/A

GEOGRAPHIC REGION

Cambodia and Vietnam



USERS

Women/gender organizations, gender advocates, USAID projects, policymakers, researchers, and development practitioners


USAID

ELIMINATING MALARIA IN THAILAND

"FOR THE FIRST TIME IN THAILAND, WE ARE USING ENVIRONMENTAL DATA FOR STRATIFICATION AS PART OF OUR MALARIA ELIMINATION STRATEGY."

Dr. Prayuth Sudathip
Deputy Director, Division of Vector Borne Diseases
Ministry of Public Health, Thailand

TOP AND LEFT
World Malaria Day Event 2015, Chanthaburi, Thailand. USAID promotes efforts to combat the spread of malaria in Southeast Asia.
Photos: Richard Nyberg, USAID/RDMA.

Malaria elimination is urgent due to the emergence and spread of the multi-drug-resistant Plasmodium falciparum malaria parasite, placing 16.7 million people at risk in Thailand. Enhancing surveillance capabilities to monitor malaria hotspots in near real-time and a better understanding of the impact of environmental factors in spreading the vector-borne disease is critical to eliminating malaria.

SERVIR-Mekong has collaborated with USAID Inform Asia by sharing satellite-based land cover data on 7,200 communes (local administrative units) from its Regional Land Cover Monitoring System. Enhanced surveillance of malaria cases supports the Government of Thailand in achieving its target of eradicating malaria by 2024.

EARTH OBSERVATIONS & NASA PRODUCTS USED

Landsat 7 and 8 imagery, Moderate Resolution Imaging Spectroradiometer imagery, Derived biophysical indices, WorldView and other high-resolution satellite imagery, and Google Earth Engine

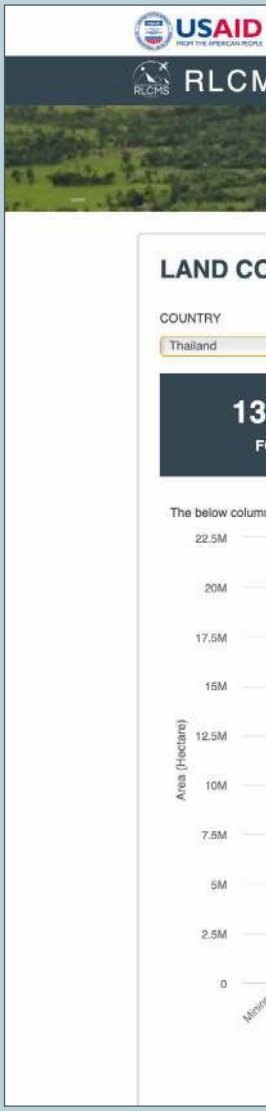
DEVELOPER(S)

SERVIR-Mekong

CONTRIBUTORS/PARTNERS

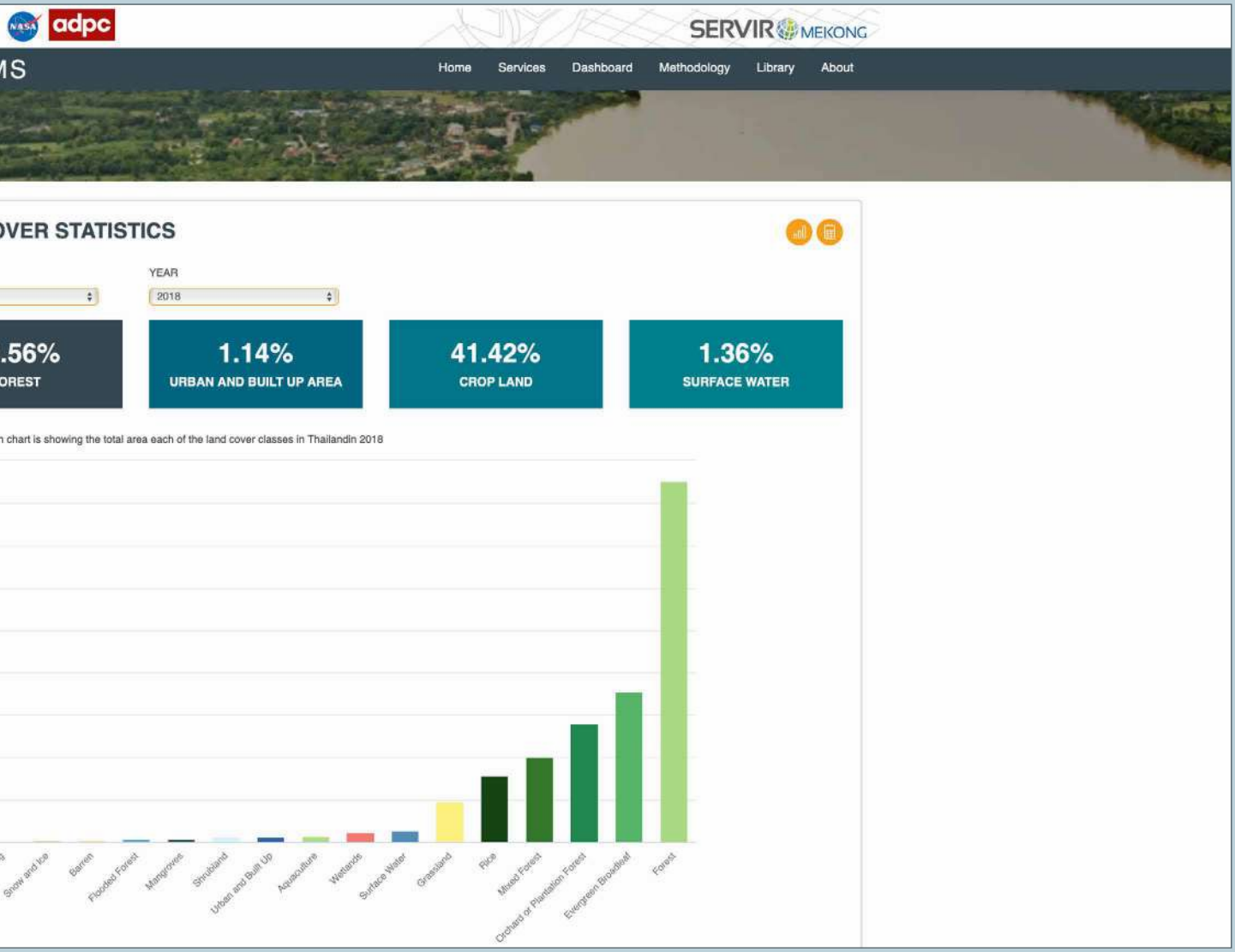
US Forest Service - Geospatial Technology and Applications Center, University of San Francisco, NASA Applied Sciences Program, Google, University of Maryland, General Department of Administration for Nature Conservation and Protection, Cambodia, Forest Inventory and Planning Division, Lao PDR, Forest Department of Burma, and Vietnam: Forest Inventory and Planning Institute, National Institute for Agriculture Planning and Projection, National Remote Sensing Department

REGIONAL LAND COVER MONITORING SYSTEM



GEOGRAPHIC REGION

Lower Mekong

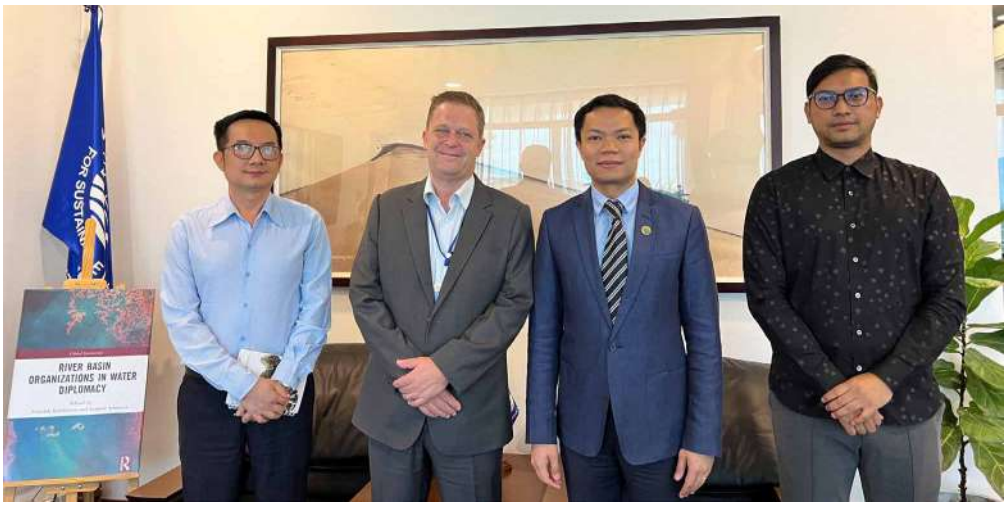


USERS

Forestry/agricultural ministries/ departments in the Mekong region, NGOs, and agencies responsible for greenhouse gas emissions reporting

BUILDING THE RESILIENCE OF MEMBER COUNTRIES AGAINST CLIMATE RISKS

THE MEKONG RIVER COMMISSION IS THE ONLY INTER-GOVERNMENTAL ORGANIZATION THAT WORKS DIRECTLY WITH THE GOVERNMENTS OF CAMBODIA, LAO PDR, THAILAND, AND VIETNAM TO JOINTLY MANAGE THE SHARED WATER RESOURCES AND THE SUSTAINABLE DEVELOPMENT OF THE MEKONG RIVER.



Dr. Anoulak Kittikhoun, Chief Executive Officer of the Mekong River Commission Secretariat (second from right), with Hans Guttman, the Executive Director of the Asian Disaster Preparedness Center (second from left), during a meeting to discuss ongoing cooperation on flood and drought forecasting. **Photo: MRC.**

LEFT
A fisherwoman in Nha Trang, Vietnam, also called the country's seafood capital. However, climate change and global warming adversely affect the teeming marine life, especially underwater ecosystems such as coral reefs. **Photo: Montakan Tanchaisawat, USAID/RDMA.**

SERVIR-Mekong partnered with the Mekong River Commission Secretariat to improve the ability of the five Lower Mekong countries to use publicly available satellite data to monitor and forecast drought and floods and manage climate risks. SERVIR-Mekong's tools and services give policymakers access to better data to implement and adapt to the adverse impacts of climate change.

MEASURE

In 2021, SERVIR-Mekong's Rainstorm Tracker Tool integrated historical and real-time rainfall data into the Mekong River Commission flash flood guidance system to help improve the reliability of its flash flood warnings.

OUTCOME

Decision-makers can take preventive measures to reduce loss of life and property and increase the resilience of communities to climate change across the region.

Images from the 2017 Mekong River Commission photo contest. The contest celebrates the Mekong river's diversity and raises awareness of the importance of transboundary water cooperation among the lower Mekong countries. **Photos: MRC.**

MEASURE

SERVIR-Mekong, in partnership with NASA Applied Science Team from University of Washington and the University of Houston, co-developed the Reservoir Assessment Tool-Mekong and applied it to 13 dams that the Mekong River Commission Secretariat and member countries formally endorsed.

OUTCOME

The tool will strengthen the Mekong River Commission's long-term flood and drought management efforts in the region by supporting Lower Mekong countries to manage their reservoirs more effectively and increase their resilience to climate change.

MEASURE

SERVIR-Mekong supports the Mekong River Commission's Drought Management Strategy 2020-2025.

OUTCOME

This will help advance Cambodia, Lao PDR, Thailand, and Vietnam's drought preparedness and manage droughts effectively by adopting the Regional Drought and Crop Yield Information System products into the Mekong River Commission's drought portal.


WE
adpc
SERVIR MEKONG
servir.adpc.net

EDUCATING AND INSPIRING YOUTH

"PARTICIPATORY LEARNING IS IMPORTANT FOR YOUNG PEOPLE TO HELP DRIVE THE LEARNING PROCESS."

H.E. Dr. Hang Chuon Naron
Minister of Education Youth and Sport Cambodia

TOP AND LEFT
In March 2017, over 25,000 students participated in Cambodia's Science & Engineering Festival Exposition and Workshop. As part of the United States Government pavilion, ADPC and SERVIR-Mekong held a booth exhibition to engage students with geospatial information systems.
Photos: ADPC.

The Asia-Pacific region is home to nearly 60 percent of young people globally, with approximately 700 million youth aged 15 to 24 years. Young people are the most prominent climate change advocates, disseminating information to their peers and families, and serving as agents of change that help scale climate action.

SERVIR-Mekong has strategically engaged with youth to connect, spark ideas, and inspire young people in the applications of space and geospatial technologies—including participating in events that challenge them to develop solutions using satellite data to address climate-related issues.


SMOGATHON
THAILAND 2020
USAID
Spotlight Award
Special price
Civic Engagement
U.S. Consulate General
Chiang Mai, Thailand


SMOGATHON
THAILAND 2020
A HACKATHON TO HELP
SOLVE AIR POLLUTION
USAID


SERVIR

EDUCATING AND INSPIRING YOUTH

"THIS EVENT HAS IGNITED MY ENDURING PASSION FOR WORKING IN THE ENVIRONMENTAL FIELD. I WANT TO WORK HANDS-ON IN COMMUNITY-BASED ADVOCACY TO TACKLE ENVIRONMENTAL ISSUES SUCH AS AIR POLLUTION."

Jureerut Somboon
Participant at Smogathon

TOP AND LEFT
Participants in Smogathon Thailand 2020. The event brought together young professionals, students, and technical experts from various fields to address air pollution challenges using satellite-based air quality monitoring and forecasting tools.
Photos: USAID/RDMA.

Smogathon Thailand 2020 was an event organized by the United States Agency for International Development, the U.S. National Aeronautics and Space Administration, and the Asian Disaster Preparedness Center, in collaboration with the U.S. Department of State's Young Southeast Asian Leaders Initiative, and the Royal Thai Government's Pollution Control Department.

Smogathon Thailand 2020 provided a forum for the youth to find creative solutions using satellite data to address smog in Northern Thailand and beyond. The winning team developed an idea to create a board game to educate elementary school children about the root causes of air pollution and preventive measures students can take.

A GROWING REGIONAL PRESENCE

SERVIR-Mekong's contribution to climate resilience in the Lower Mekong Region has earned international recognition —and serves as an impetus to scale these geospatial tools and services within other Association of Southeast Asian Nations (ASEAN) countries.

The White House

To help address development challenges related to a changing climate, the United States will invest in the SERVIR initiative in support of the U.S.-ASEAN Strategic Partnership. In 2021 and 2022, two White House fact sheets relating to space cooperation and enhancing regional climate adaptation articulated this.

The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)

In the UNESCAP report, Geospatial Practices for Sustainable Development in Asia and the Pacific 2020: A Compendium, UNESCAP recognized SERVIR-Mekong's drought management decision support services to monitor and forecast droughts in real-time in Lower Mekong countries.

The World Meteorological Organization (WMO)

In its 2020 State of Climate Services Report, WMO acknowledged the collaborative effort between SERVIR-Mekong and the World Food Programme to strengthen disaster response during the October 2020 floods in Cambodia.

The Economist Intelligence Unit (EIU)

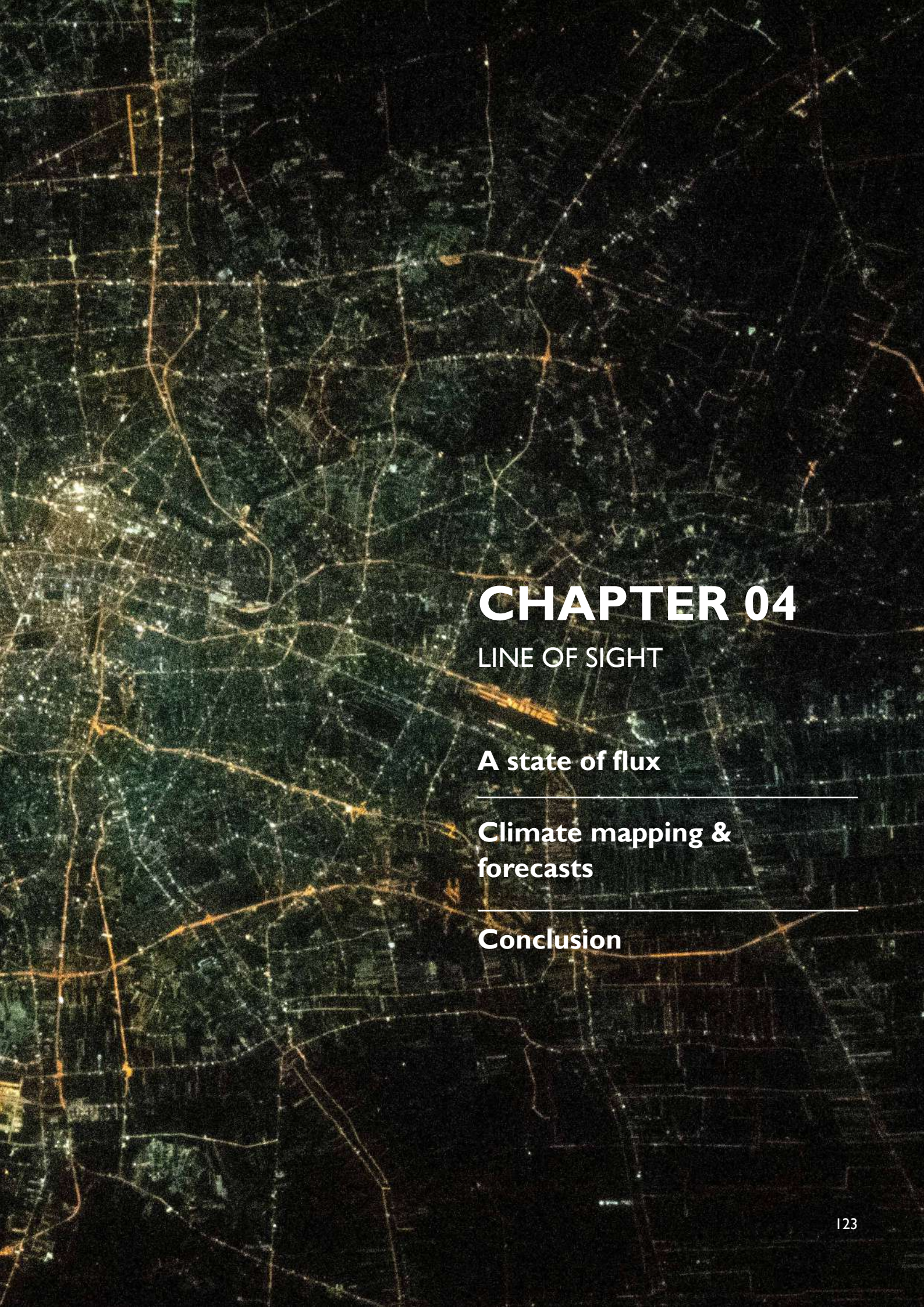
SERVIR-Mekong was acknowledged in the EIU report Water security threats demand new collaborations: Lessons from the Mekong River Basin, for its contributions and services in helping Lower Mekong countries use satellite imagery for land-use planning, infrastructure development, and disaster risk management.

CHAPTER 04

LINE OF SIGHT

SERVIR-MEKONG ENHANCES SUSTAINABLE DEVELOPMENT, SCALING AND REPLICATING EXISTING TOOLS WHILE LAUNCHING NEW APPLICATIONS TO CONNECT 'SPACE TO VILLAGE.'

The city lights of Bangkok, the capital of Thailand, are pictured from the International Space Station as it orbited 262 miles above the Southeast Asian nation. Photo: NASA.



CHAPTER 04

LINE OF SIGHT

A state of flux

Climate mapping & forecasts

Conclusion

A STATE OF FLUX

Evolution of geospatial technologies into the future

LEFT
The Spatial Monitoring and Reporting Tool (SMART) is a one-stop device that combines a ranger-based data collection tool with a camera, notebook, and Global Positioning System. Forest rangers in Cambodia's Prey Lang Extended Landscape use SMART Mobile for patrol planning, navigation, land clearance, poacher tracking, and tree loss mapping.
Photo: Ankit Joshi, ADPC.

The human race is at a point in history where with the help of technology, the whole is almost always greater than the sum of its parts. Today, the integration of new satellite technologies, better and higher resolution sensors, and more powerful processing chips have changed how we view the world.

Big data, artificial intelligence, and machine learning help integrate the tools to form a cohesive picture allowing data and information to be shared and analyzed seamlessly for decision making. Cloud computing—the technology used by Google Earth Engine, Microsoft Planetary Computer, and Amazon Web Services—enables users to process and analyze large amounts of data despite a slow internet connection, a hindrance in some parts of Asia.

CLIMATE MAPPING AND FORECASTS

How can geospatial technologies help countries respond to climate change?

LEFT
Lao Chai village near Sapa in Vietnam.
Photo: Brian Jeffery Beggerly, licensed under CC BY 2.0.
(This image does not state or imply the endorsement by the photographer).

The use of geospatial technologies has grown exponentially over recent years. These technologies will continue to provide innovative ways of collecting, analyzing, and applying data to inform decision-making. Geospatial technologies help address the adverse effects of climate change, such as reducing human losses from climatic disasters, by informing decisions, policies, and actions.

Geospatial technology applications offer decision-makers solid insights to help manage critical natural resources such as water, build resilient energy systems, and model disease outbreaks, such as COVID-19.

CONCLUSION

One cannot manage what one does not measure

LEFT
A young boy from the mountainous province of Lào Cai in northwest Vietnam.
Photo: Xuan Duong, Pixabay.
(This image does not state or imply the endorsement by the photographer).

Climate change impacts all areas of life on Earth: social, economic, and environmental. While geospatial technologies enable informed decision-making, they have a long way to go before being institutionalized within government agencies, the private sector, and civil society organizations. Ongoing advocacy on the utility of geospatial applications needs to be strengthened, communicating to a broader audience their existing capabilities, resounding success, and potential future applications across the region.

AT SERVIR-MEKONG, AS WE ENVISION THE FUTURE, WE STRIVE TO FIND INNOVATIVE WAYS TO CONNECT 'SPACE TO VILLAGE' TO IMPROVE ENVIRONMENTAL, ECONOMIC, HUMAN AND CLIMATE RESILIENCE ACROSS SOUTHEAST ASIA.

ASIAN DISASTER PREPAREDNESS CENTER
Tel:+66 2 298 0681-92
Email: adpc@adpc.net
Website: www.adpc.net