

Mekong Thought Leadership and Think Tanks Network Program (MTT)

Flagship studies are one of the critical activities of the MTT Program aiming to enhance evidence-based understanding of the Water-Energy-Climate (WEC) nexus, including through the lens of gender and social equity. The work motivates the application of this knowledge to practical, robust, and equitable policy solutions to persistent and emerging issues and challenges.

1. Solutions and Opportunities in managing water Storage to reduce transboundary water-related disaster risks and to address multiple water demands

SOS

Countries: Thailand, Lao PDR

Sectors: Water, Energy, Climate

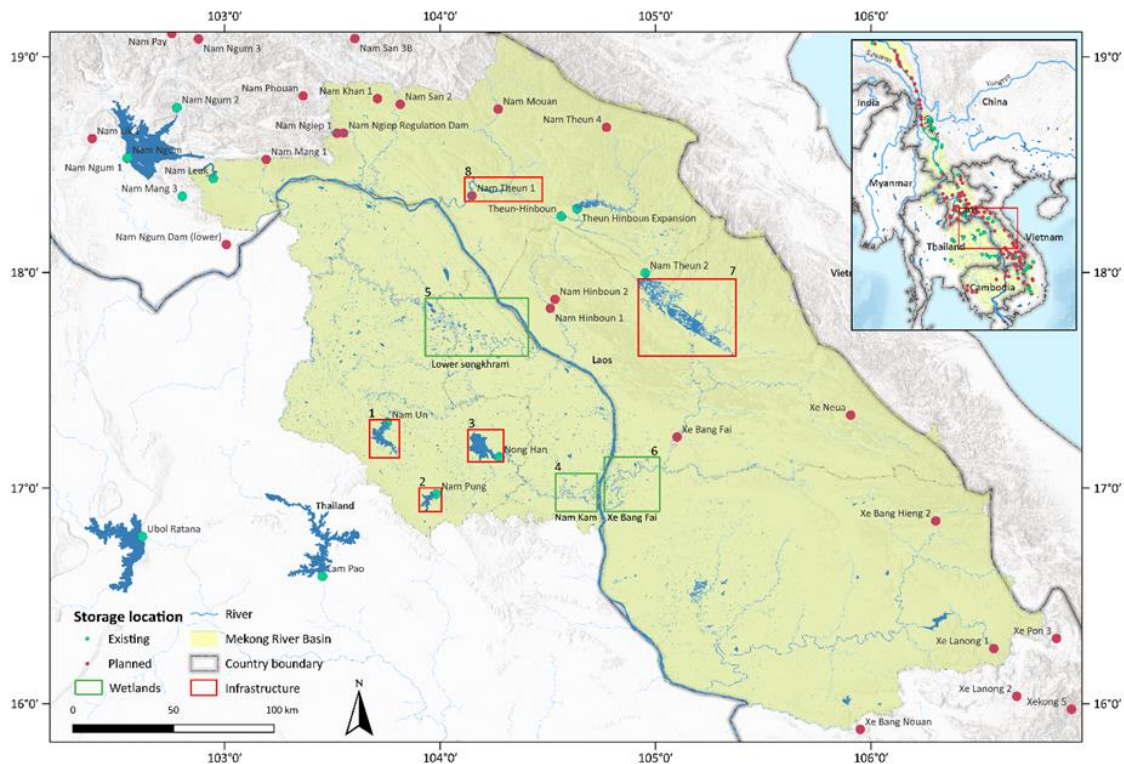
Consortium: SEI, TEI, Maha Sarakham University, NUOL, Lao Women's Union

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This project aims to develop inclusive and sustainable water storage solutions that optimize disaster risk reduction and diversify benefits for water, energy, and food security for vulnerable communities while promoting transboundary cooperation and governance. Water storage is crucial for socio-economic development and ecosystem sustainability in the Mekong Region. Over the past two decades, infrastructure water storage, particularly hydropower reservoirs, has significantly increased. However, these reservoirs primarily focus on energy production due to power purchase

agreements, raising concerns about coordination and equitable benefit sharing. Conversely, water storage in wetlands and floodplains has drastically decreased, leading to a loss of ecosystem services and increased risks for local, vulnerable, and marginalized groups who depend on these natural systems.

The project seeks to assess the impact of national and regional policies on water storage management, synthesize best practices, and identify key factors influencing benefit sharing among stakeholders, particularly vulnerable and marginalized groups, using a Gender Equality and Social Inclusion (GEDSI) lens. By co-developing solutions and investment opportunities, the project aims to enhance the capacity of water storage management for multi-water demands and transboundary



Study area of SOS MTT Flagship Study

flood and drought risk reduction. It also intends to co-develop pathways that ensure equitable benefit sharing and build the capacity of communities, operators, and policymakers on effective water storage management and GEDSI principles. The research seeks to influence policy processes and offers innovative approaches by integrating grey (human-made) and green (natural) storage systems. This approach aims to transition storage systems from single-purpose to multipurpose use, thereby enhancing storage potential in the Mekong Region. The project will also develop methodologies to quantify wetland storage and build on existing studies and frameworks.

The research addresses key questions on best practices in water storage systems for multi-benefit and transboundary flood and drought risk reduction, factors influencing equitable benefit sharing, practical solutions and investment opportunities for water storage systems in Thailand and Lao PDR, and capacity strengthening of communities and policymakers. The project employs a co-

design and co-production of knowledge approach, involving stakeholders in data collection, analysis, and capacity-building activities. Solutions will be identified and prioritized through stakeholder meetings and policy dialogues and evaluated using advanced remote sensing models and hydrological simulations. The findings will be disseminated through stakeholder networks and published in peer-reviewed journals.

The SOS project aims to foster sustainable water storage management in the Mekong Region by focusing on equitable benefit sharing and enhancing stakeholders' capacity. The inclusive knowledge co-production process ensures the research builds upon existing information and accelerates progress, providing nuanced and impactful outcomes. Ultimately, the project seeks to develop adaptive water storage solutions that counter climate-induced disaster risks and manage multiple water demands, benefiting vulnerable and marginalized communities and contributing to regional and national decision-making processes.

2. Urban Heat Resilience: Bridging Science, Policy and Sustainable Design

Urban Heat Resilience

Countries: Thailand, Vietnam

Sectors: Energy, Climate

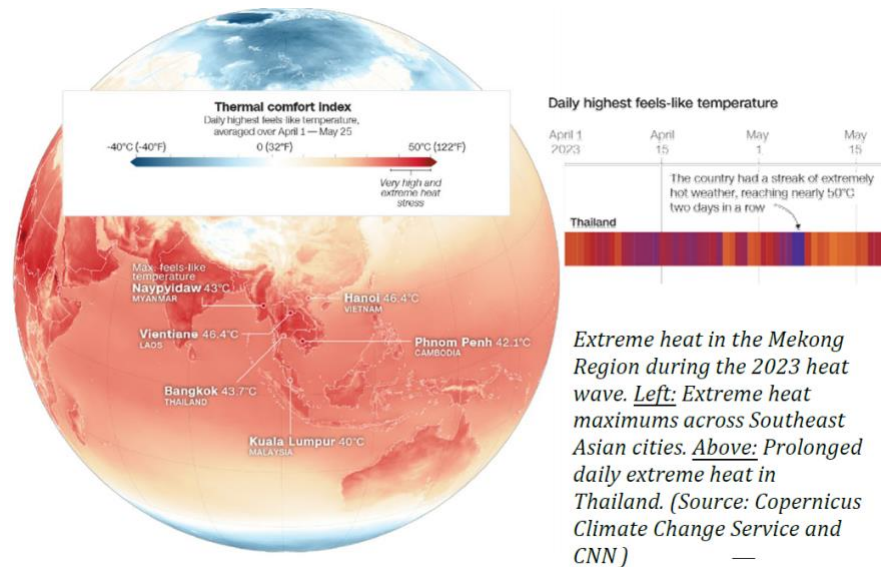
Consortium: Asian Disaster Preparedness Center (ADPC), Thailand Environment Institute (TEI), B-Kode, Alluvium Group

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Urban Heat Resilience Flagship Study addresses the impact of urban heat on vulnerable communities in Southeast Asia, particularly in Thailand and Vietnam, which experienced an unprecedented heat wave in 2023. The urban heat island (UHI) effect exacerbates rising temperatures in cities, disproportionately affecting the urban poor who live in low-quality, overcrowded housing with limited access to cooling. The project aims to develop urban policies, plans, and infrastructure that address urban heat impacts, promote nature-based solutions, and ensure gender, disability, and social inclusion (GEDSI).

GEDSI considerations and stakeholder engagement are central to the project, ensuring that all activities are planned with input from GEDSI specialists. The research methodology includes mapping areas where marginalized and vulnerable communities reside in Bangkok, identifying urban heat "hotspots" through modeling and vulnerability assessments, and prioritizing these areas for intervention. Field visits to these hotspots will involve testing and validation of assessment results, focus group discussions with GEDSI groups to understand the impacts of urban heat on their health and livelihoods, and exploring potential solutions, particularly nature-based solutions, to mitigate these impacts. Policy stakeholders will be invited to these visits to understand the issues firsthand.

The project will produce a peer-reviewed journal article and communication and capacity-building products, such as policy briefs and fact sheets, to disseminate key findings. A website will host project deliverables and provide an overview of key issues and opportunities. An inclusive decision support framework will be developed to guide policies in urban heat management, focusing on vulnerable city dwellers in the Mekong Region. The research will also identify common factors contributing to urban heat in Mekong cities, the challenges and opportunities associated with implementing nature-based solutions, and policy pathways for improved urban heat resilience. Follow-up support for policy change will ensure ongoing engagement with policymakers to enact the project's recommendations.



Extreme heat in the Mekong Region during the 2023 heat wave. Left: Extreme heat maximums across Southeast Asian cities. Above: Prolonged daily extreme heat in Thailand. (Source: Copernicus Climate Change Service and CNN)

Rapid urbanization in the Mekong Region has led to significant population growth and inadequate infrastructural development, exacerbating the vulnerability of marginalized communities to urban heat. The research will demonstrate the nexus between water, energy, and climate by highlighting how climate change accelerates urban heat and the role of cooling systems and urban natural assets in mitigating this heat. By engaging closely with vulnerable groups, the project aims to understand their needs and promote adopting nature-based solutions. GEDSI considerations will be integrated across all phases and tasks, ensuring that the research supports equity, inclusiveness, and benefits for all, especially marginalized and vulnerable communities.

Results from the research will inform the Thai National Cooling Action Plan and support heat-sensitive housing development and green space conversion in Bangkok. Findings will be shared with regional counterparts, including in Vietnam, influencing city and provincial development plans. The comprehensive approach, combining scientific research with policy engagement and GEDSI strategies, aims to build urban heat resilience and improve the well-being of vulnerable communities in Southeast Asia.

3. Sustaining the shared groundwater resources of the Transboundary Cambodia- Vietnam Mekong River Delta aquifer under Climate Change impacts through strategic Gender equality, disability, and social inclusion (GEDSI) tools and suitable Nature-based Solutions (NbS)

SAGAA

Countries: Cambodia, Vietnam

Sectors: Water, Energy, Climate

Consortium: Asian Institute of Technology (AIT), Institute of Technology of Cambodia (ITC), Vietnam Women's Academy (VWA), Institute for Water Resources Engineering and Environment Technology (IWAT) Thuy Loi University, Ho Chi Minh City University of Technology (HCMUT)

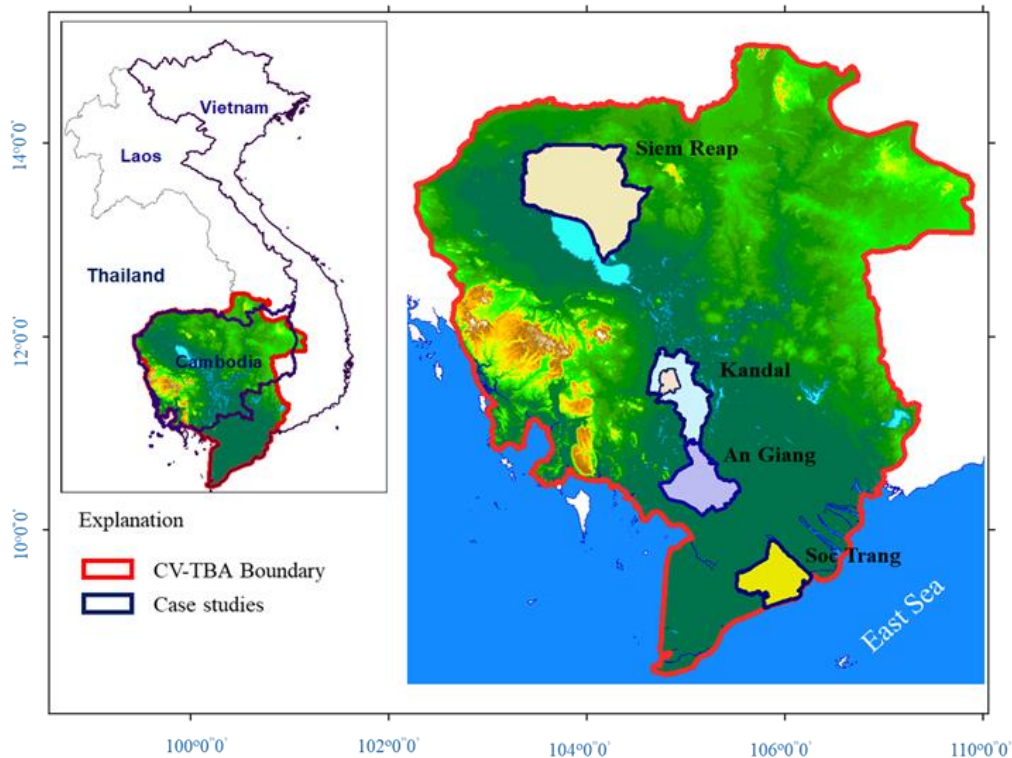
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Cambodia-Vietnam Mekong River Delta Aquifer (CV-TBA), a crucial transboundary aquifer shared by Cambodia and Vietnam, supports millions of livelihoods and is vital for socio-economic development. Project SAGAA aims to enhance community resilience to climate change by integrating energy, food, and water domains. By promoting optimal energy use for groundwater pumping and exploring renewable options, the project reduces costs and aligns with environmental conservation goals. SAGAA encourages adaptive agriculture and strategic water management, guiding communities to shift crop patterns for climate resilience. Sustainable groundwater management is crucial for buffering against climate-induced water scarcity and ensuring resilience to droughts and irregular rainfall.

Women and vulnerable groups are underrepresented in groundwater resource governance. Analytical work is needed to understand GEDSI issues, power dynamics, and barriers to participation in water resource management. SAGAA develops a GEDSI plan for sustainable groundwater management, addressing these issues and promoting inclusive, equitable, and effective transboundary groundwater planning and management. Through science-policy dialogues, the project engages local communities, governments, NGOs, and academia. GEDSI is promoted through gender-responsive and socially inclusive policies and programs, protecting the rights of marginalized groups and persons with disabilities. Indigenous knowledge is integrated to enhance NbS design and policy relevance.

The project assesses energy requirements for groundwater extraction, promotes energy-efficient practices, explores renewable energy options, and considers climate projections and adaptation measures in groundwater management. Collaborative training events are planned in Cambodia, Vietnam, and Thailand. Early career researchers will receive hands-on training, and a Massive Open Online Course (MOOC) will be hosted to disseminate knowledge. The project integrates a GEDSI lens throughout its cycle, promoting active participation of women, people with disabilities, and socially marginalized groups. SAGAA upholds the right to safe and accessible drinking water,

working to ensure equitable access for all. The project will explore human rights-based approaches by referring to national and international laws and treaties.



Study area of SAGAA Project

The policy impacts of Project SAGAA are multifaceted, targeting various governance levels. At the grassroots level, it empowers local authorities to craft effective water resource management plans, mitigating overexploitation and contamination of the CV-TBA. At the subnational and national levels, the knowledge generated will influence the revision and enhancement of groundwater management policies and regulations in Vietnam and Cambodia. Specifically, the project aims to inform water supply planning for the Mekong Delta to 2030 and beyond, aligning with Vietnam's National Strategy on Climate Change and Cambodia's National Water Resources Policy. Identifying groundwater recharge areas will enable swift action to establish safeguarded zones and propose NbS to fortify groundwater resources and preserve groundwater-dependent ecosystems. The lessons and solutions from this project can also be scaled up to other transboundary aquifers within the Mekong Region, contributing to broader regional resilience efforts.

4. Resettlement, Transformation, and Eco-Adaptation Typology for Cities (and Communities) amidst rising seas in the Lower Mekong

ReTrEAT-Cities

Countries: Cambodia, Thailand, Vietnam

Sectors: Energy, Climate

Consortium: Asian Institute of Technology (AIT), Bureau of National and Regional Planning Department of Public Works Thailand, Center of Rural Development University of Social Sciences and Humanities Vietnam National University, Royal University of Phnom Penh (RUPP), Faculty of Social Administration Thammasat University

Contact: Dr. Malay Pramanik (malay@ait.asia)

Southeast Asia's major cities, including Bangkok and Ho Chi Minh City, face the imminent threat of inundation by 2100 due to sea level rise (SLR) intensified by climate change and unplanned urban development. Protecting these 50 million residents is paramount, but the vulnerability is exacerbated by rapid subsidence. Managed retreat emerges as a proactive strategy to address large-scale climate-induced displacements, but it has often produced problematic social consequences and relied on top-down planning models. Our project, ReTrEAT-Cities (Resettlement, Transformation, Eco-Adaptation Typology for Cities), empowers vulnerable coastal communities with 'participatory energy-neutral coastal retreat planning,' focusing on ReTrEAT (Resettlement, Transformation, Eco-Adaptation Typology). This approach integrates energy-efficient infrastructure, housing, and transportation service design for job creation and local economic growth, providing a holistic model for water-energy security and climate adaptation. Gender equality and inclusive community-centric approaches are priorities, serving as models for regional initiatives and policy development for lower Mekong countries.

The project methodology involves a series of systematically designed work packages (WP) based on project deliverables. Each country's partners will engage in every deliverable, prioritizing their respective countries' needs through participatory budgeting with inclusive, scenario-based, equitable bottom-up approaches involving local communities, individuals, and grassroots organizations in the decision-making process. The project begins with conducting baseline and projected SLR scenarios using satellite altimetry and tide gauge records, excluding land subsidence data from LiDAR. Future scenarios are projected using downscaling and bias correction based on the shared socio-economic pathways (SSP 5&2, 4.5, 8.5) of the IPCC Sixth Assessment. Exposure analysis under SLR scenarios will identify high-risk zones and exposure to critical infrastructure and vulnerable communities using high-resolution satellite images, digital elevation models (DEM), and deep learning to assess risk levels.



RetrEAT Cities approach for empowering vulnerable coastal communities to craft and implement novel participatory energy-neutral coastal retreat planning

Participatory energy-neutral coastal retreat planning is an innovative approach to creating sustainable, environmentally friendly, and socially inclusive solutions for communities and infrastructure facing the challenges of climate-induced sea-level rise. The project integrates energy-efficient technologies and renewable energy sources into infrastructure and resettlement strategies, minimizing the ecological footprint of the retreat. This involves designing energy-efficient buildings and infrastructure in new coastal communities, promoting renewable energy sources, and training locals in installation for job creation and local economic growth. Additionally, energy-efficient transportation is integrated into retreat planning, offering a holistic model for water-energy security and climate adaptation in Eco-Adaptation. The project prioritizes gender equality, involving women in decision-making and addressing their unique needs, promoting inclusive community-centric approaches that serve as a model for regional initiatives, and informing policies on the water-energy-climate (WEC) nexus.

The policy impacts of ReTrEAT-Cities are multifaceted, targeting various governance levels. At the local level, it empowers coastal communities to craft effective retreat plans, mitigating the social and economic disruptions of forced displacements. The project informs local governments about integrating sea-level rise scenarios into city development, backed by evidence of the economic benefits of resilient coastal communities. This knowledge drives resource allocation and policy reforms prioritizing climate adaptation. Nationally, the project contributes to policy processes addressing sea-level rise and climate adaptation, guiding the development of sustainable urban development policies that discourage high-risk coastal ventures. Regionally, ReTrEAT-Cities fosters collaborative discussions on climate adaptation and resilience, advocating for proactive, community-centered, and evidence-based coastal resilience strategies across all governance levels. The project aims to influence policy reforms that promote sustainable urban development and empower local communities through knowledge co-production, integrating climate adaptation and resilience into existing policies, ultimately contributing to the enduring sustainability of coastal communities in the Lower Mekong Countries.