

# Safer Cities 13

Case studies on mitigating disasters in Asia and the Pacific

## What is the Appropriate Mitigation Mix? Structural and non-structural mitigation in Hat Yai, Thailand



The major flood of November 2000 was a wake-up call for residents and policy makers in Hat Yai and throughout Thailand. No one imagined the extent of the damage that could be caused by flooding. "I am used to the annual floods in Hat Yai. Around this time every year, I would listen to the weather forecast every morning. But I had always been able to head out to work like business-as-usual," said Mr. Manut Hemman, a community leader and businessman in Hat Yai City Municipality. He certainly did not expect to see floodwaters wreaking havoc and damaging his recently imported supply of construction materials in the Year 2000 flood.

At that time, no one thought that flooding could completely paralyze this bustling commercial center for five days and cause economic losses exceeding US\$ 220 million. This disaster event prompted many people to take actions to mitigate and prepare for future flood risks. But how do we know what actions to take, and whether or not the actions will be effective. A pilot project in Hat Yai provides some insights.

### Introduction

Thais have been living with flood for centuries. Flood in urban and rural areas during the rainy season is common and is considered as part of life in Thailand. However, accelerated and uncontrolled growth of densely populated built-up areas has put more people, properties and infrastructure at risk to flood and other hazards.

With increasing frequency, Thailand is facing situations, in which scarce resources that were earmarked for development projects have to be diverted for relief and recovery following disasters, thus impeding the process of sustainable development.

The devastating flood of 21 to 24 November 2000 in Hat Yai was an urban disaster. Heavy rainfall, flash flood from the eastern mountain ranges and river overflow into a city with limited drainage capacity claimed 30 lives, affected almost 80,000 people and severely damaged properties, infrastructure, public utilities, critical facilities, and commercial and industrial establishments. Water rose up to 3.5 meters high and 75 per cent of the city was partially submerged for several days. Severe rains hit all communications and power lines and sent the city into darkness. People suffered from snake and scorpion bites, drowning, dehydration, dengue fever and other diseases as water levels remained high and stagnant. Losses exceeded US\$ 220 million.

The devastating flood of November 2000 brought to public attention the need for actions to minimize future social and economic losses in Hat Yai and Thailand. But what could be done? What is needed? What is the process for selecting and prioritizing the actions to take? Who should be involved? How can one assess the effectiveness of the actions?



### Abstract

The devastating flood of 2000 brought to public attention the need for appropriate actions to minimize future social and economic losses in Hat Yai and Thailand. This case study shows how partners of the Thailand Urban Disaster Mitigation Project (TUDMP) have worked together to plan and implement mitigation measures for Hat Yai. In this pilot initiative, TUDMP's broader goal is to demonstrate to Thailand and other countries in Asia, a methodology for mitigation planning and implementation that promotes safer communities and sustainable development. The experience in Hat Yai highlighted four concurrent steps that are key to effective disaster mitigation.

### The inside story

- 📁 Step 1: Assess risks
- 📁 Step 2: Plan with communities
- 📁 Step 3: Raise awareness
- 📁 Step 4: Build capacity

There is no shortage of possibilities for reducing disaster risks. Traditionally scientists and engineers have sought to “control” disasters. To control flood, for example, construction of embankments or flood walls are popular to protect the land area behind them. But it has been widely documented that this is not sufficient.

Disaster risk management in Thailand focused primarily on emergency response, recovery and structural mitigation measures. However, the occurrence of a series of disasters over the last decade has indicated that the efforts undertaken so far are not adequate.

Increasingly, a complement of structural and non-structural mitigation measures to building institutions’ and communities’ capacities to cope with disaster risks are used in many countries. Effective decision on the appropriate mix of mitigation measures will depend on the area’s development objectives, an assessment of risk and the resources available.

This case study shows how partners of the Thailand Urban Disaster Mitigation Project (TUDMP) have worked together to plan and implement mitigation measures for Hat Yai.

## City Profile: Hat Yai

Hat Yai city is situated on a low-lying plain in Songkhla Province. It is the center for commercial trading, the rubber industry and tourism in southern Thailand, and the gateway to Malaysia and Singapore. Hat Yai is separated to two sides by the north-south railway lines to Malaysia and Singapore. Two main rivers flow pass Hat Yai city: (1) Klong Toey flows through the central business district; and (2) Klong Wa originates in the mountains southeast of the city and passes the southern boundary of the city before joining Klong U-Tapao. The overflow of these rivers is often the cause of annual flooding in Hat Yai.



## Disaster Management Cycle

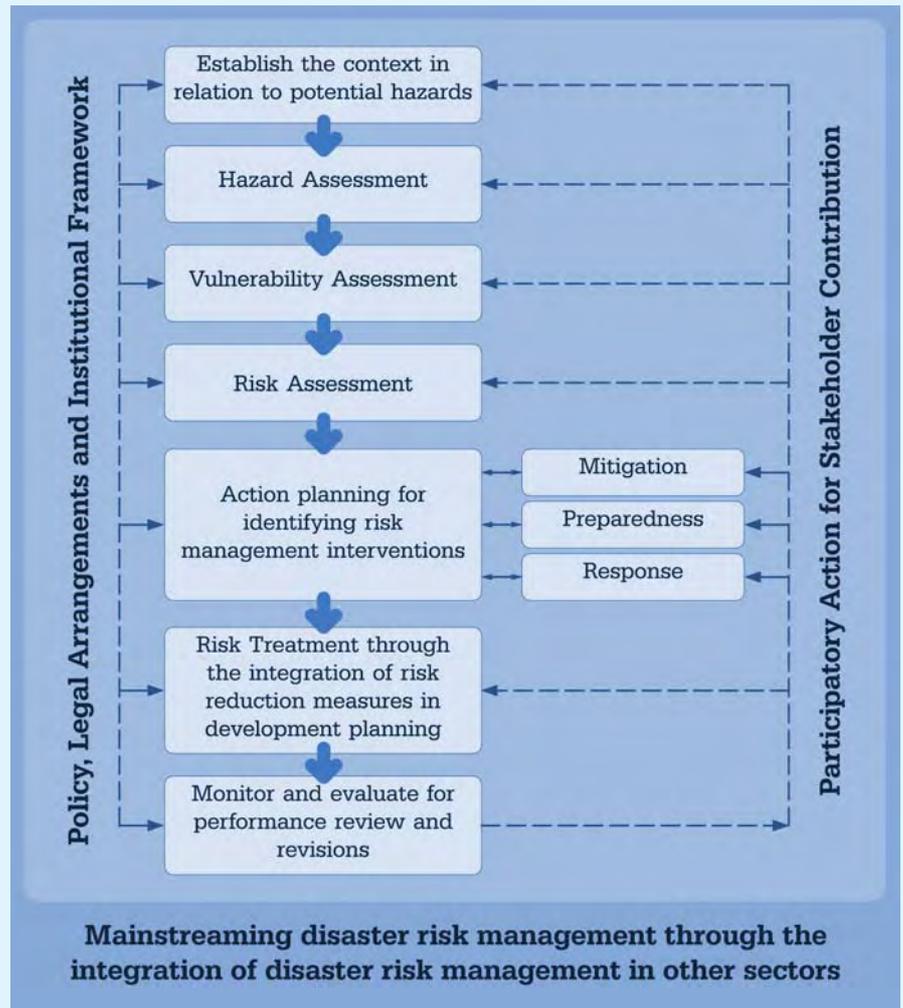


Effective disaster risk reduction needs to include the complete cycle of activities that occurs before, during and after disasters. The important phases in a disaster management cycle - response, recovery, mitigation and preparedness - flow in a continuous cycle and form an integral part of the development process.

**Structural Mitigation Measures:** any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure

**Non-Structural Mitigation Measures:** policies, awareness, knowledge development, public commitment and methods and operating practices, including participatory mechanisms and provision of information, which can reduce risk and related impacts.

*\*Definitions extracted from the United Nations International Strategy for Disaster Reduction <http://www.unisdr.org/eng/library/lib-terminology-eng%20home.htm>*





## The Planning Process

After the Year 2000 flood, the National Economic and Social Development Board (NESDB) was tasked to formulate a flood mitigation action plan for Hat Yai. The Government of Thailand allocated almost USD120 million for this process. The plan was submitted and approved by the Cabinet in April 2001.

A series of meetings involving national government departments responsible for forestry, highways, irrigation, land development, local administration, meteorology, public works, town and country planning, and all provincial- and district-level government departments were called upon to develop the flood mitigation action plan. Kasetsart University and ADPC were also involved in this planning process. A Hat Yai Flood Mitigation Committee was established with five sub-committees to plan and implement proposed measures.

“A lessons learned from the Hat Yai flood crisis is that a disaster is never caused by any one factor,” emphasized Mr. Kreng Suwanwongse, Mayor of Hat Yai (1999-2002) in the aftermath, “the success of overcoming this crisis depends on the effective



and reforestation.

*“A lessons learned from the Hat Yai flood crisis is that a disaster is never caused by any one factor,” emphasized Mr. Kreng Suwanwongse, Mayor of Hat Yai*

cooperation of all departments concerned.”

The focus of the plan was on large-scale structural mitigation measures that could better manage large volume of floodwater into Hat Yai and the vicinity. They include construction of an integrated network of bypass channels, drainage systems, flood walls, water pump stations and water retention ponds. Proposed non-structural mitigation measures, also focused at the macro-level, included development of an early warning system, land-use readjustments

It was in this context that ADPC developed the TUDMP - to complement and build on the activities implemented under this flood mitigation action plan. In this pilot initiative, TUDMP’s broader goal is to demonstrate to Thailand and other countries in Asia, a methodology for mitigation planning and implementation that promotes safer communities and sustainable development. The experience in Hat Yai highlighted four steps that are key to effective disaster mitigation:

### Hat Yai Flood Prevention and Mitigation Management Committee

Chief: Deputy Prime Minister

Secretary: Water Resources Department

Project Information and Education Sub-committee

Land Procurement Sub-committee

Project Evaluation Sub-committee

Construction Co-operative Sub-committee

Land Use Planning Re-adjustment for Flood Control Sub-committee

Occupation Supporting for New Channel Land Owner Sub-committee

Chief: Provincial Governor

Chief: Provincial Governor

Chief: Provincial Governor

Chief: Director of Royal Irrigation Dept.

Chief: Director of Public Works & Town-country Planning

Chief: Director of Community Development Department

Secretary: Songkhla Information Office

Secretary: Songkhla Land Office

Secretary: Songkhla Provincial Office

Secretary: Water Resources Development Office

Secretary: Bureau of Town-country Planning

Secretary: Songkhla Community Development Office

**Step 1: Assess the risk.** Prior to planning, it is important to assess the risk. Comprehensive risk assessment is conducted to better understand the existing and potential disaster risks. Based on the risk assessment, mitigation measures can be identified and prioritized.

**Step 2: Plan with communities.** While the development of a plan at its minimum may involve a small number of disaster managers or other specialists, ideally mitigation or disaster risk reduction planning is a priority-setting and partnership-building exercise to coordinate the efforts of multiple agencies and levels of government and society. ADPC provided a community-based approach to disaster mitigation that is participatory in design and address the community's vulnerabilities and capacities.

**Step 3: Raise awareness.** To ensure political commitment for the planning and implementation of mitigation measures, it is essential for all stakeholders to first be aware of the importance of disaster mitigation.

**Step 4: Build capacity.** It is necessary to go beyond raising awareness by generating knowledge and developing skills which can translate this awareness into concrete practices.

There are no clear cut lines as to when one step begins and the other ends. These are inter-related steps that take place simultaneously.

## Disaster Management Cycle



### Examples of non-structural mitigation measures

- Building codes enforcement
- Environmental management
- Financial measures: insurance, loans, tax, micro-finance schemes, compensation
- Forecasting, monitoring & early warning systems
- Knowledge management: education, awareness, capacity building
- Land use planning and zoning
- Legislation and policy development
- Natural resources protection: water, coast, forest

### Examples of structural mitigation measures

- For flood*
- By-pass channel
  - Dam
  - Drainage System
  - Flood wall
  - Reservoir
  - Retention pond
  - Road elevation
  - Storm drain
  - Water pump

## Four Steps for Effective Disaster Mitigation



### Step 1: Assess the risk

The Regional Disaster Management Study Center established at the Faculty of Natural Resources, Prince of Songkla University in November 2002 was where data for the flood risk assessment of Hat Yai was collected, analyzed and presented as risk maps using Geographic Information Systems and Remote Sensing technologies. The risk assessment showed the degree of which population, lifeline facilities, infrastructure and housing in different parts of Hat Yai are at risk to flood as well as fire.



Flood by itself is not necessarily a problem. Flooding becomes a problem when it affects human development. It is therefore important to know what is specifically affected by the flood.

Some assessments may focus on a specific hazard (e.g. flood) although a multi-hazard approach would be more effective since risks are often multi-hazard in nature. A flash flood often triggers landslides or it may disperse toxic materials; and earthquake may cause fire and tsunamis.

This risk assessment formed the basis for identifying and prioritizing mitigation activities.

The assessment revealed several communities extremely vulnerable to flood and fire. Highly vulnerable communities in Hat Yai City Municipality and Kuan Lang Municipality were selected as sites to pilot mitigation activities.

### Step 2: Plan with communities

One of the first tasks at the community-level was to conduct a risk assessment. The process of conducting a risk assessment involving community members provides an opportunity to collectively discuss

## Lessons Learned



### Why involve the community?

They can:

- provide local knowledge of the hazard and risk in the area
- design a project that meet their needs
- strengthen resident and business support for the project
- minimize misunderstandings
- help share the workload

the problems, needs and solutions. In Hat Yai, communities in each municipality adopted a different approach to the risk assessment process.

Selected communities in Hat Yai City Municipality reviewed the risk maps and evacuation plan developed by Hat Yai City Municipality, and provided recommendations which were fed back to the municipality. To ensure that all members of the communities in Hat Yai City Municipality know of and understand the risk maps and evacuation plans, ADPC co-produced a flood preparedness leaflet which was widely disseminated.

In Kuan Lang Municipality, community groups developed their own hazard and risk maps. These risk maps and report of the communities' recommendations were proposed to Kuan Lang Municipality.

It is important to have plans at different levels that complement each other. At the national level, framework and guidance in developing disaster risk reduction plans are critical. Development of disaster risk reduction plans should be based on a thorough participatory risk assessment and planning process. Disaster risk reduction plans should consider actions to take before,

*"...During the rainy season the person-in-charge must check the warning flag and report its status to the community leader." said Mr. Somchai Saman, a deputy head villager of Bang Fab community in Kuan Lang Municipality.*



*DDPM has recently issued a national policy to promote community-based approaches to disaster risk reduction.*

during and after a disaster and should be linked with the economic and social development at the national level.

ADPC developed strong network with local stakeholders in Hat Yai, and actively promoted dialogue and forged partnerships between government authorities, NGOs, communities and other organizations at different levels (national, provincial, local) and with different sectors (water, community development, security).

One of the needs identified in the risk assessment process was to operationalize the emergency management and response system in vulnerable areas by building institutional connections between government and community-level networks. This activity complements the early warning system being developed. The public must be aware of the different warning signals and have the capacity to act accordingly.

A series of workshops, training courses, and drills for evacuation and search and rescue were held bringing together community groups, Civil Defence volunteers, Mittraphab Samakkee Foundation representatives, Fire Rescue and Rescue Association, and government officials from the Department of Disaster Prevention and Mitigation (DDPM), Irrigation Department, Meteorological Department and Municipalities.

Forums, community meetings, committees, and discussion groups are good places to begin dialogue and encourage participation. These discussions can draw out opinions, build awareness, and increase engagement amongst different groups in society.

"I think our community is more united and organized now. We have regular meetings. We are assigned specific tasks. During the rainy season the person-in-charge must check the warning flag and report its status to the community leader." said Mr. Somchai Saman, a deputy head villager of Bang Fab community in Kuan Lang Municipality.

DDPM has recently issued a national policy to promote community-based approaches to disaster risk reduction. Budget has been allocated to support and provide platforms for communities to participate in the planning and implementation processes

## Who to involve in the planning process?



checklist

### Consider involving representatives from the following organizations in mitigation planning:

Planning  
Public works  
Infrastructure  
Critical facilities (hospitals, schools, power stations)  
Public safety (police, fire, health)  
Building, zoning, code enforcement  
Housing  
Finance

Engineering  
Urban development  
Representatives of communities (farmers, women's group)  
Private sector (businesses, industries, land developers, real estate agents, construction)  
Academic, training and research  
Media  
Donors

### Step 3: Raise awareness



National events are held worldwide on this day every year to raise public awareness on disaster risk reduction.

TUDMP partners planned a high-profile campaign to commemorate the International Day for Natural Disaster Reduction on 12 October 2004 in Hat Yai. The campaign “learning from today’s disasters for tomorrow’s hazards,” comprised of a series of events catered to different groups of people.

Over 200 people participated in a parade around the city including government authorities, NGOs, students, residents, media groups, famous movie stars and ADPC staff, carrying banners and broadcasting disaster safety messages.

A press conference was organized followed by “certificate-awarding ceremony for 90 community leaders and volunteers who completed a training on flood preparedness planning, and prize-awarding ceremony to 26 students who won an art competition entitled, “flood preparedness,” for primary and secondary schools in Songkhla Province.

TUDMP adopted different approaches and used different media to raise public awareness.

The United Nations have designated the second Wednesday of October as the International Day for Natural Disaster Reduction.



**Face-to-face activities.** A series of workshops, training courses, drills and events were organized (see Step 4: Build capacity).

**Audio-visual.** Videos were produced on the activities of the TUDMP. A video “The Change of Paradigm - AUDMP Achievements” dubbed into Thai language was presented to communities to build a common understanding of disaster mitigation.

**Electronic media.** TUDMP information and project outputs are made globally accessible on the ADPC website.

### Step 4: Build capacity

TUDMP tailored workshops, courses and drills to build capacity for different groups of people at national, provincial and community levels, to reduce disaster risks in a concerted manner.

For policy makers, TUDMP organized a national workshop on “Thailand’s Disaster Mitigation Strategy” on 10 March 2003, to introduce the project to senior government officials and other stakeholder, and provide a forum for developing disaster management strategies for the country.

To strengthen the capacity of national-level DDPM staff, TUDMP organized two courses, namely “Natural Disaster Management” and “Community-Based Disaster Management (CBDM)” during June and July 2003.

Subsequently, DDPM became a member of ADPC’s National Partner Training Institute. As a member, DDPM have access to ADPC training materials. ADPC in collaboration with DDPM tailored and translated training materials for high- and mid-level government officials and community groups based on their needs.

TUDMP in collaboration with DDPM organized three type of training courses focused on:

- An International Perspective on Disaster Management for Executive Management for High-Level Officials of DDPM. A manual entitled “Total Disaster Risk Management,” was produced and continue to be used as a reference document in DDPM. This manual is available online on the ADPC website (Please see reference).
- Community Based Disaster Management for Mid-Level Officials at the provincial levels
- Training of Trainers on Flood Risk Management for Mid-Level Officials at the provincial levels

At the community level, the 12 Regional Centers of DDPM trained 36 batches of community leaders and voluntary groups in disaster management during 2004. The target for Year 2005 is 120



Demonstrations on emergency search and rescue, fire safety, road safety and first aid, and screening of a video entitled, “Living with Flood” produced by Vietnam Red Cross and dubbed in Thai proved popular among the public.

This event is a first-of-its-kind in Thailand and received wide media coverage. This was a successful collaborative event, involving Songkhla’s Disaster Prevention and Mitigation Regional Center, Hat Yai City Municipality, Mitrphab Samakkee Foundation, Red Cross Chapter, Hat Yai Hospital and ADPC.

These and other special commemorative events are important for raising awareness but they need to be supplemented with a strategy that builds public awareness on an ongoing basis, sustains public interest and motivates stakeholders to take appropriate actions. TUDMP’s strategy included:

**Distributor print.** Leaflets on flood and fire preparedness, and a handbook on community-based disaster risk reduction were printed and widely disseminated.



batches. The process practised by TUDMP and the series of pilot capacity building initiatives in Hat Yai provided useful lessons learned in tailoring activities to suit the needs of communities in other provinces.

In both Hat Yai City and Kuan Lang Municipalities, community training sessions and workshops on disaster management were identified as opportunities to inform communities about their emergency management and response plans, and generate their support in operationalizing the plans. At the start of the training, participants developed community-level emergency management and response plan that were in line with the municipal plans.

*“Previously, we were all busy with our own lives, but the training on CBDM and emergency response made us realized the importance of having a well-informed and well-prepared community for overcoming any crisis situations,” said Mr. Roon Tebenmood, Bang Fab Community Leader, Kuan Lang Municipality.*



Based on the community-level emergency management and response plans developed by the pilot communities, a series of training sessions and drills were conducted for the communities. They included:

- A flood evacuation drill
- Field training on rescue boat driving, first aid and rescue
- Fire safety

*“Previously, we were all busy with our own lives, but the training on CBDM and emergency response made us realized the importance of having a well-informed and well-prepared community for overcoming any crisis situations,” said Mr. Roon Tebenmood, Bang Fab Community Leader, Kuan Lang Municipality.*

## Lessons Learned



Focus on:

- Linking disaster mitigation with development goals
- adopting a multi-hazard approach to assessment, planning and implementation
- ensuring the participation of representatives from different sectors and levels
- committing funds for mitigation planning and implementation
- developing clear roles and responsibilities for different stakeholders in disaster risk reduction
- providing policy support for community-based disaster risk management
- establishing networks and sustainable mechanisms for revising plans, raising awareness and building capacities as staff and community needs changes

## Future Challenges



The gradual shift from a top-down relief and response approach to a more inter-sectoral risk management approach has begun to influence the way disaster risk reduction programs are now being planned and implemented. Many high-level policymakers from the government sector and international agencies are recognizing the importance of the participation of local government, NGOs, CBOs and communities in development.

However, despite regulations, trainings and pilot projects, people will continue to be vulnerable unless they are committed to and take the responsibility for reducing disaster risk. For mitigation to become a part of people’s—“culture” requires time and integrated efforts from different organizations.

The planning process involves continuous implementation, monitoring, review and revision of the plan to reflect the changing situation and needs of the area(s). Monitoring and evaluation a fundamental learning process to understand the full extent of positive and negative outcomes and impacts of an initiative.

It is important to establish sustainable systems for risk assessment, planning, awareness raising and capacity building and repeat activities, messages and training courses. This is because people will forget. Politicians and leaders change. Community needs also change.



## Further References

Thailand Urban Disaster Mitigation Project Website  
<http://www.adpc.net/audmp/tudmp/en/default.html>

Flood Vulnerability Reduction Training Modules  
Capacity Building in Asia Using Information Technology  
Applications  
[http://www.adpc.net/casita/Course\\_Modules\\_Flood.html](http://www.adpc.net/casita/Course_Modules_Flood.html)

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## TUDMP

The Thailand Urban Disaster Mitigation Project (TUDMP) is a two-year pilot project that started in October 2002. It aims to develop a sustainable operational strategy at city level to reduce disaster risks. TUDMP achieve its objectives by strengthening cooperation among government, non-government and community-based organizations in planning and implementing disaster mitigation; promoting awareness; building capacity; and demonstrating the effectiveness of community-based flood mitigation in the most vulnerable communities.

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*Safer Cities is a series of case studies that illustrate how people, communities, cities, governments and businesses have been able to make cities safer before disasters strike. The series presents strategies and approaches to urban disaster mitigation derived from analyses of real-life experiences, good practices and lessons learned in Asia and the Pacific. This user-friendly resource is designed to provide decision-makers, planners, city and community leaders and trainers with an array of proven ideas, tools, policy options and strategies for urban disaster mitigation. The key principles emphasized throughout Safer Cities are broad-based participation, partnerships, sustainability and replication of success stories.*

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## AUDMP

*The Asian Urban Disaster Mitigation Program (AUDMP) is the first and largest regional program implemented by ADPC. The AUDMP started in 1995 with core funding from USAID's Office of Foreign Disaster Assistance (OFDA) until 2005. The program was developed with the recognition of increased disaster vulnerability of urban populations, infrastructure, critical facilities and shelter in Asian cities. In an environment where good governance and decentralization are high in most countries' political agenda, AUDMP aims to demonstrate the importance of and strategic approaches to urban disaster mitigation as part of the urban development planning process in targeted cities of Asia.*



*AUDMP supports this demonstration by building the capacity of local authorities, national governments, NGOs, businesses and others responsible for establishing public and private sector mechanisms for urban disaster mitigation as part of city management. AUDMP also facilitates knowledge sharing and dialogue between key stakeholders to promote replication of AUDMP approaches to other cities and countries worldwide. Currently, the AUDMP approaches have been introduced and sustained by national partner institutions in targeted cities of Bangladesh, Cambodia, India, Indonesia, Lao PDR, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.*

*The Asian Disaster Preparedness Center (ADPC) is a regional resource center dedicated to safer communities and sustainable development through disaster risk reduction in Asia and the Pacific. Established in 1986 in Bangkok, Thailand, ADPC is recognized as an important focal point for promoting disaster awareness and developing capabilities to foster institutionalized disaster management and mitigation policies.*

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