

# Safer Cities 5

Case studies on mitigating disasters in Asia and the Pacific

## Community-Based Disaster Risk Reduction in Central Sri Lanka *Mitigating landslide and rock-fall damage in urban Nawalapitiya*

In 1965, Maginona and her family were uprooted from the busy commercial center of Nawalapitiya and forced to move to hilly Soysakelle on the outskirts as a temporary shelter from flood. More than thirty years later, she continues to stay in the small matchbox house set in a row of wooden shacks high on that landslide prone hill. Here she has brought up three children. At 64, with her blind husband's pension, Maginona just about manages to make ends meet. She fears the possibility of a landslide but the thought of relocating is daunting. "Every time it rains I fear the slope will give way and these houses will end up on the neighbors' below."

Soysakelle was one community selected to pilot the community-based disaster mitigation efforts in Nawalapitiya. Today, Maginona's humble abode is protected by a community-built drain, which carries storm water down the slope to the river.

### Mapping danger zones

*Landslide risks are assessed and incorporated as part of policy planning and actions*



### Sri Lanka witnesses rise in landslide disasters

With the opening up of its economy in the mid-1980s, Sri Lanka saw rapid development and growth, especially in the hilly regions. It was also during this period that the country witnessed an escalation



Maginona benefits from landslide mitigation efforts in Soysakelle

#### Abstract

*This case study looks at two community-based disaster mitigation initiatives in Nawalapitiya, in Kandy district, central Sri Lanka. It demonstrates a novel experience as state, non-government organizations, local authorities and community groups collaborated to reduce disaster vulnerability of the affected communities. In Soysakelle, this partnership worked well and a storm-water drain was constructed, leading to further joint community efforts. In Gonnennawa, the same approach did not work so well. Here, the steep sloping terrain made it difficult for people's participation in the community-proposed fire belt and afforestation initiatives. Conflict arose on issues of land ownership and different perceptions of whose responsibility it was to mitigate disasters.*

*These community-based mitigation efforts made use of landslide-risk maps, the technical knowledge of disasters and the public awareness generated by earlier projects implemented by the Center for Housing, Planning and Building (CHPB), Intermediate Technology Development Group (ITDG), National Building Research Organization (NBRO) and Urban Development Authority (UDA), with support from the Nawalapitiya Urban Council (NUC).*

#### The inside story

- 📁 Mapping danger zones, page 1
- 📁 Organizations collaborate, page 3
- 📁 Living with landslides, page 6
- 📁 Future challenges, page 7

in landslides. For example, in 1986, following unprecedented rain, more than 51 lives were lost, 10,000 families were rendered homeless and many development projects came to a grinding halt.

Before the country could recover from the aftermath, landslides struck several parts of the island again with greater fury in 1989. Over 300 people were killed and more than 15,000 families became homeless. A United Nations Development Program (UNDP)

assessment team placed the direct losses at USD35.5 million. Even in 1993, 1994, 1998, 1999 and 2002, landslides were responsible for heavy losses and continues to do so.

**Government focus on disaster mitigation since 1990**

August 1990 was a turning point in government policy on natural-disaster mitigation in Sri Lanka. The government established the Landslide Hazard Mapping Project as a tripartite

collaboration with assistance from the UNDP and the United Nations Center for Human Rights. This project, implemented by the National Building Research Organization (NBRO), has been extended to year 2007 to map all landslide prone districts in Sri Lanka.

**NBRO hazard-mapping project shows high risk**

According to the NBRO, more than 20 per cent of the country's total land area is highly prone to landslides. The nature of the steeply rising mountainous zone, soil type, weather, as well as urbanization and human activity, have all contributed to the increasing threat of landslides.

The NBRO has listed 62 highly populated/urban locations as being vulnerable to landslides. National highways are often damaged, cutting off communication and transport. The main east-west highway, known as the A4, was damaged by major landslides at least thrice in the last five years.

**Projects demonstrate disaster mitigation**

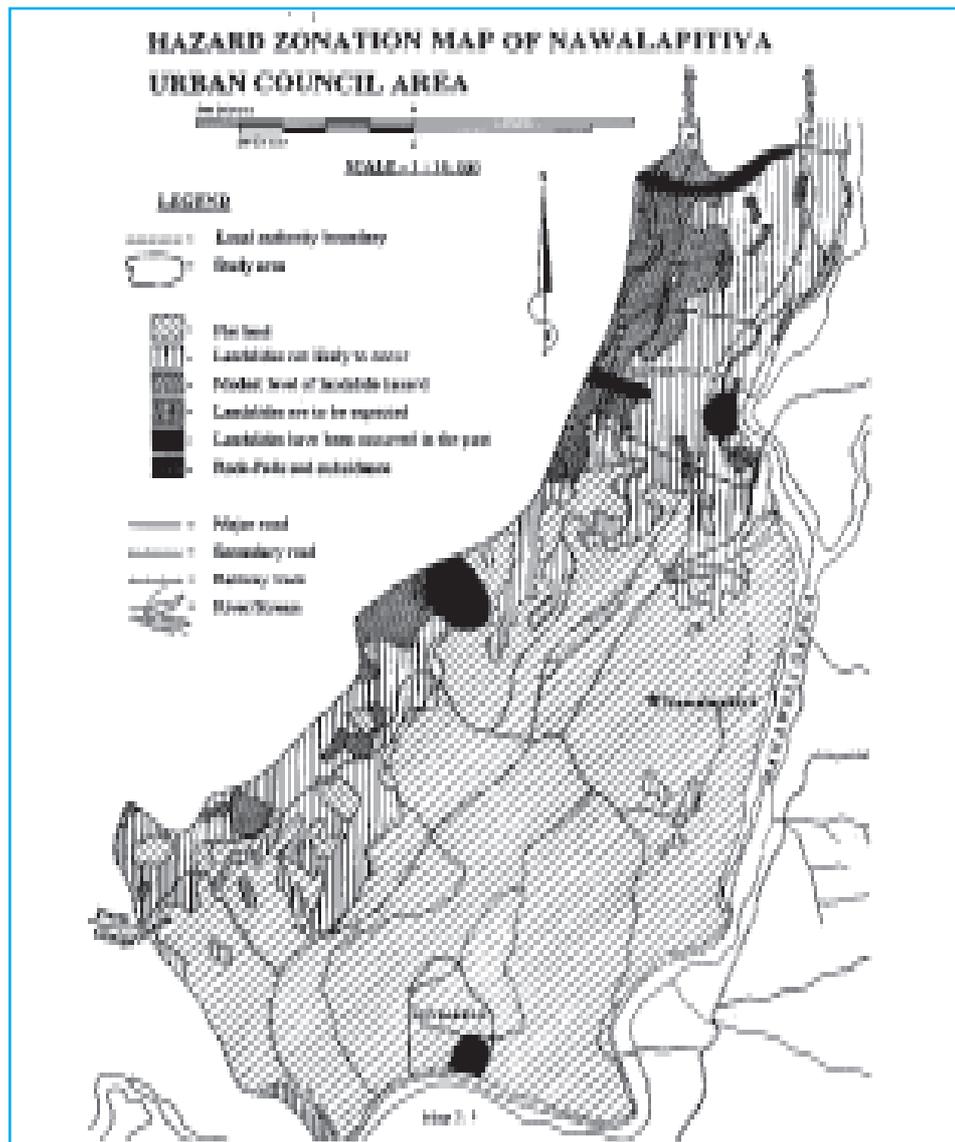
For any active intervention of disaster preparedness and mitigation, the hazard zoning maps could identify areas and magnitude of the risk. To integrate this effort with the regional and urban planning process, the Sri Lanka Urban Multi-Hazard Disaster Mitigation Project (SLUMDMP) was commissioned as part of the Asian Disaster Preparedness Center's (ADPC's) Asian Urban Disaster Mitigation Program (AUDMP). Under this project, the main aim was to integrate disaster mitigation into development policy and planning. To aid this process, construction guidelines and codes of practice for human settlement planning in hilly areas, as well as raising awareness among politicians, planners and masons were carried out in a number of cities, including Nawalapitiya.

However, it is often at the community level where the impact of disasters is felt and it is also where the risks can be reduced by the communities themselves. Increasingly, it is believed that when the capacities of a

**Defining landslide** 

**Landslide** is caused by soil or rock being displaced along a slope.

Loose boulders dislodged from the bedrock of steep hills cause **rock fall**. These rocks come crashing down causing damage to property and injury to human life.



community are recognized, the solution comes from within the community itself, making them stronger and self-reliant. The solutions are realistic and the community feels responsible and involved in the disaster mitigation process. This leads to more effective and sustainable mitigation that is integrated as part of the development process.

Highlighted earlier are the basic principles of Community-Based Disaster Mitigation (CBDM) that are increasingly being recognized by non-government organizations (NGOs), government agencies and the donor community as one of the important approaches to reducing disaster risks. Under a South Asia program entitled “Livelihood Options for Disaster Risk

Reduction,” funded by the United Kingdom’s Department for International Development and implemented by the Intermediate Technology Development Group (ITDG) in Sri Lanka, the CBDM approach was piloted in Nawalapitiya in collaboration with the Center for Housing Planning and Building (CHPB), NBRO, Nawalapitiya Urban Council (NUC) and local NGOs.



## Organizations collaborate in mitigating disasters

Examples from vulnerable communities in Nawalapitiya

**N**walapitiya is located in Kandy district at the start of Sri Lanka’s central mountain massif, with the country’s longest river, Mahaweli, carving out a natural boundary for the town’s urban limits. The 2.6 square-kilometer town nestles between steep mountain slopes and the river, with altitude ranging between 560 to 830 meters above sea level. Located in a wet, mountainous zone, it receives an annual rainfall of about 4,000 to 5,000 mm. Nawalapitiya is a multi-ethnic town representing a great deal of racial and religious diversity. The people here use both Sri Lanka’s official languages - Sinhala and Tamil.



During the British colonial days, Nawalapitiya was used as a railway base for the surrounding tea plantations. A major part of the rail infrastructure, including elaborate houses and stores, now lay in a state of disrepair and neglect.

The area has long been known for landslides and rock fall. Several recent

landslides sites can be identified. Some older sites have been utilized for houses, public areas and in one particular instance, for a school building.

Nawalapitiya’s problems with natural hazards do not end with landslides. Floods are common too, as the town’s archaic drainage system, built by the British over a century ago, cannot cope with the heavy rainfall. During the dry spell there is the added threat of forest fire (always man-made) in the high, grassy slopes above the town.

The high population density in Nawalapitiya exacerbates these problems. A survey in 1998 showed a population density of 66 persons per hectare (pph), poised to increase up

to 70pph by 2005. Proximity to schools, utilities, transport and work places has placed a high value on property even in high or moderate landslide risk areas. Affected populations have resigned themselves to living with the possibility of disaster rather than be uprooted from the conveniences offered by the location.

### Communities plan mitigation initiatives together

Through technical and social research conducted by ITDG and NBRO that made use of the 1:10,000 NUC hazard maps, and the awareness-raising and training activities implemented under the SLUMDMP, two of the eight pilot wards in Nawalapitiya were selected for the CBDM initiatives - Soysakelle and Gondennawa (Dolosbage Road). Soysakelle had witnessed a recent landslide and Gondennawa had to bear the threat of frequent bush fires and rock fall.

Before the community-based demonstration project initiated by the ITDG got underway, household members of both localities gathered to

### Safer Cities

*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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review research findings and help design mitigation measures. Through community participation, several distinct projects were identified. Two CBOs (Community-Based Organizations) were formed to carry out the mitigation measures that were proposed. A field officer from ITDG coordinated the activities of the CBOs.

To mobilize the community, a core group was formed between the community and the project partners - ITDG, NBRO and NUC. The awareness and capacity building that was achieved through the SLUMDMP project created a conducive background for CBDM in Nawalapitiya. Several brainstorming sessions were organized and three meetings were held at Nawalapitiya and Colombo with community mobilization experts from ITDG to formulate action plans for community activities. The proposed structural interventions for mitigation were designed by the NBRO in consultation with the communities. The NUC provided logistical and political support toward encouraging communities to help themselves.

#### CBDM training conducted for project partners

Meanwhile in Colombo, the ITDG together with the CHPB conducted two local training workshops for Community-Based Disaster Management (CBDM) in Sinhala and Tamil. CBO leaders and project partners from Nawalapitiya attended these training sessions for a clearer idea of the concept and practise of CBDM. The aim was to take the CBDM concepts to the community through the implementing organizations - CBOs and government partners.



Soysakelle community participates in the drain building exercise

#### Soysakelle demonstrates that it is possible

Despite a recent landslide and the possibility of recurrence, people of Soysakelle, like Maginona, ignored the suggestion of relocating due to the area's proximity to the town center and their reluctance to leave inherited land.

However, following several community meetings, a practical solution to the problem was identified. The lack of a proper drain in the congested hillside caused problems during the monsoons, including minor landslips, cracks in houses, collapsing walls and lack of sanitation. Therefore, it was decided to construct and maintain a storm-water drain.

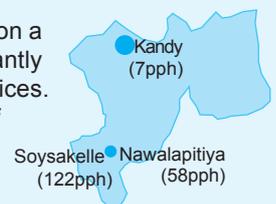
A CBO was formed in Soysakelle in July 2002. Project funds were channeled through the Soysakelle Prajamula Sanvidanaya (Soysakelle CBO) to construct a storm-water drain. With the NBRO's engineering expertise, a system of drains was designed to take rainwater from the populated upper slopes down to the river. At present, 865 feet of the drain has been completed, and the final link to the river is under construction.

**"We meet every month on full moon day, a public holiday," said Pichchai Gani Nauer, the CBO's treasurer. "Each member cleans and removes sediment from the drain outside their homes."**

"This community had many problems before the CBO was formed," said the supervising field officer. "There was much animosity between neighbors, and few were on agreeable terms with one another." But the CBO managed to rope in community members toward a

#### About Soysakelle, Ward No. 7, NUC

Soysakelle is located on the periphery of the town center on a slope that leads to the Mahaweli river. Resided predominantly by low-income families, it has poor infrastructure and services. The ward comprising 124 households is a melting pot of communities, legal and illegal settlers, long-time residents and new migrants with a population density of 122pph. NUC's average density is 58pph and Kandy district's average is 7pph.



The Soysakelle community largely depends on paid labor from the town center to make ends meet. High rate of unemployment and large family size (average 5.3) has exacerbated the socio-economic conditions of the populace.

A landslide occurred here in August 1994 covering one acre of land. The main cause - river erosion and heavy rains. Two homes, 26 meters of road and storm drains were damaged. Inhabitants of the damaged houses had noticed cracks appear a week before the landslide and moved out in advance, thus no lives were lost. To fill the landslide gully, NUC had used solid waste generated within the city. This led to other problems like pollution of the river and health hazards to Soysakelle residents.

common good. Fighting among households, Soysakelle residents themselves will tell you, has lessened noticeably since construction of the drain started. “We meet every month on full moon day, a public holiday,” said Pichchai Gani Naufer, the CBO’s treasurer. “Each member cleans and removes sediment from the drain outside their homes.”

The benefit of the drain is now obvious and most residents take the task of maintenance seriously. The drain has improved their lives and sanitation. Especially in the case of Kusuma Perera, 40, whose home used to get flooded with water from the community toilets during a storm. Following the construction of the drain, several homes too have been upgraded and improved.

The people here can suggest more ways to stabilize the hillside against earth slips but cannot yet see themselves raising necessary funds to implement those schemes. The community, due to their low income and education levels, relies to a large extent on external agencies for solutions and funding.

**Gondennawa provides important lessons**

Two activities were identified for Gondennawa following a series of community meetings. During dry weather, man-made fires destroyed the grass cover on the slopes, increasing soil erosion and the risk of landslide. A fire belt was proposed to prevent the spread. The community also suggested increasing tree cover between home-steads and the upper slopes to provide a natural buffer against falling rocks.

Unfortunately, the steep sloping terrain made it difficult for the community to participate fully in the venture. Moreover, it was observed that the community’s higher social status and involvement in the service sector meant that many were generally not prepared to engage in activities that involved hard labor. Making a 10 to 15 feet wide fire belt along 1.5 kilometers of hill slope proved to be a good example. The work, therefore, had to be subcontracted to two laborers who specialized in working on that terrain.



This house in Soysakelle was renovated recently over the newly built drain

lessons learned 

- ↳ Participatory decision-making to provide effective and sustainable solutions.
- ↳ Convince through demonstrations.
- ↳ Coordinate by facilitating partnerships and activities.

issues to consider 

- ↳ Community’s willingness and capability (time, resources, skills) to participate.
- ↳ Participation does not mean contribution to labor only.
- ↳ Participation means contribution to goal, planning process and administration.

The tree-planting campaign, which sounded ideal and practical on all counts, also met some obstacles. Firstly, it was difficult to grow any type of trees on the barren rocky slopes. The project managers’ choice of food-producing trees were unsuited for the terrain and were constantly attacked by wild animals. Secondly, during the dry season, the community faced water scarcity and were not prepared to maintain the plants. Of the 3,000 saplings that were planted over a six-month period, only a few survived.

The land identified for tree planting was partly owned by businessmen living in Nawalapitiya. The community was not prepared to invest their efforts in planting trees on land that was not their own. This is a common issue seen in

community-based initiatives across South Asia. If the fire belt and tree planting were done on public property vested in the community, involvement and sense of ownership may have been greater. This issue will need to be tackled with location-specific solutions in consultation with all stakeholders.

It has been difficult to hand over the project to the 16-member Ekamuthu Prajamula Sanvidanaya (United CBO) of Godennawa, due to the above reasons. Despite the community’s higher level of education and employment (compared to Soysakelle), this CBO has found it difficult to maintain the interest of its members to meet regularly to facilitate work on the interventions.

**Gondennawa (Dolosbage Road) Ward No. 8 of NUC**

According to the landslide maps developed by the NBRO, Gondennawa is zoned as a high-risk area. Jayantha Perera, a lawyer, and housewife Ariyawathie Ambakumbura do not have much in common. However, living in the same neighborhood they share a common risk - the threat of rock fall on their houses and the possibility of landslide along the steep slope.

Both have their homes, albeit very different in size and structure, along Dolosbage Road. This community lives under the constant threat of landslide and rock fall. In 1994, several large boulders crashed on to the Nawalapitiya-Dolosbage road obstructing traffic. In Gondennawa, the community is more educated and have better job security (since most work for the Railway Department) compared with Soysakelle. The homes occupied by many railway workers are old quarters built for high-ranking railway officials, now condemned by the local authorities due to landslide and rock-fall risk. Cheaper rents here have prompted people to occupy these houses despite the danger.

## Environmental protection reduces disaster risks

Environmental protection was integrated as a vital part of the project to promote interest and awareness among the two communities and the rest of Nawalapitiya that good environmental management can lead

to sustainable development through a reduction in natural disasters. A campaign against man-made forest fires was carried out, with support from the NUC. Three large signboards were erected at Gondennawa, Dolosbage

Road in Sinhala and Tamil, warning the community of fire hazard. People living here claim that forest fire incidence has reduced drastically since the awareness campaigns were carried out.

## Living with landslides

*Communities learn to help themselves through increased awareness and capacity*



### Educating engineers, architects and builders

To promote safer building construction in communities nationwide, workshops aimed at improving the construction industry's skills on disaster-area building practices were conducted by the SLUMDMP and the Livelihood Options project. They drew participants not only from Nawalapitiya but also from adjoining urban areas in Kandy. The modules for these workshops were

designed by the CHPB. An outline of the training module is given below.

The ITDG and NBRO conducted two workshops under the Livelihood Options project aimed at craftsmen and engineers. The workshops provided construction tips on stabilizing buildings in dangerous areas. At the town hall, the first workshop brought together 25 skilled craftsmen for a day's program

with a practical component, which involved the private sector. The craftsmen were given demonstrations of new technology like gabions, flood-proof walls and concrete retaining walls. The second workshop brought together engineers, architects and road construction officials (state and private) working in Kandy.

#### The training module for construction in disaster prone areas

- 1 Introductory session: explain course objectives, contents and structure.
- 2 Introduction to natural hazards and the importance of disaster mitigation.
- 3 Landslide mitigation: structural measures to reduce landslide risk.
- 4 Flood mitigation: how to build flood-proof buildings.
- 5 Construction considerations in areas prone to high winds/cyclone.
- 6 Protection of buildings and safety from lightning hazard.
- 7 Demonstration on application of new construction technologies.
  - a Introduction to gabion construction.
  - b Practical session on engineered construction (retaining walls, gabions, concrete retaining walls, flood-proof walls, lightning protectors and roof for high winds).

Course module developed by CHPB.

Resource persons from CHPB, NBRO, ITDG, Meteorological Department, and the private sector.



The skills training workshop gives practical demonstrations to craftsmen

### Harnessing private sector interest in mitigation

Several gabion-construction specialists and water-proofing experts from the private sector participated in the Nawalapitiya skills development workshops. "The most encouraging factor about the workshops was that we managed to get the private sector involved. The construction industry, suppliers and

retailers were happy to participate and promote their activities and products in these workshops," an NBRO official said.

In the future, project managers aim to leverage more private participation to carry out landslide protection, especially in Soysakelle. The river

has eroded the toe or base of the old landslide and is likely to cause another disaster. Concrete reinforcement is estimated to cost SLR2 million (USD20,610), which cannot be raised through the project or NUC funds, and the project partners are hoping for private sector cooperation to build the structure.



## Future challenges

### A ripple effect

The two projects described above, while being invaluable exercises in community-based approach to disasters, are but drops in the ocean. The hazard maps show clearly that vulnerability is spread all over the urban center and that the town has little resources to handle the impact of future disasters, in the face of expanding population and limited resources.

The Livelihood Options project has specific plans for future activity. A risk-based map is being prepared by the NBRO with settlement guidelines for the NUC. The guidelines will spell out

precautionary measures to mitigate hazard risks when constructing new buildings in the areas identified as vulnerable on the map. This will be presented to the NUC and handed over to the NUC for implementation. The project also hopes to raise funds for a gabion structure to protect the base of Soysakelle's old landslide. Plans and cost estimates for this activity are completed.

Meanwhile, the Urban Development Authority (UDA) is finalizing a comprehensive development plan using the hazard zonation maps under SLUMDMP, for Nawalapitiya's future

development. The NUC, under a new political leadership, is pressing for expansion of its urban limits for town development. The council is expected to pass legislation that would incorporate the hazard and risk maps in future planning activity and building approvals. It is worth mentioning that the NUC has been increasing its annual budget for disaster management from SLR50,000 (USD518) in 1999 to SLR200,000 (USD2,072) in 2002. The NUC is also expected to put into practise the action plans and guidelines that emerge from both the SLUMDMP and the Livelihood Options projects.



## Conclusion

The project has been an exercise in partnerships and an experience in building upon results and lessons of previous projects. This pilot demonstration project was the first time in Sri Lanka that textbook knowledge on landslide hazard mitigation was applied in a practical, community-based effort to reduce vulnerability and safeguard lives and livelihood. It was a new experience for all the parties involved.

Mobilizing an urban community to take mitigation into their own hands presented project partners with a number of challenges. Although people showed great enthusiasm at the beginning of the project, when it came to physically implementing the activities that they themselves had recommended, the enthusiasm waned.

There were differences in the way the two communities perceived the projects and its results. The drain-building exercise in Soysakelle gave immediate results. One storm and people were convinced of the benefit, their lives improved and they took a

personal interest in its maintenance. But in Gondennawa, the community action required was on a steep, inaccessible hillside where benefits were neither immediate nor personal.

Attitude change has been slow throughout the project. Dependency on local government and state institutions to provide answers was common and the communities expected the NUC to take on a larger portion of project responsibility. It proved easier to implement common activity in the poorer sections of the town in Soysakelle. Those living in state-provided houses with regular employment at the Railway Department in Gondennawa saw little personal gain to get involved in community activity.

Continuity of interventions and much of the future depends overly on the interest and participation of the NUC. Under the previous political leadership, the NUC played a crucial role at the start of both projects by lending moral and logistical support. But a change of political leadership has altered the situation at present.

**The project has been an exercise in partnerships and an experience in building upon results and lessons of previous projects.**

The ITDG and NBRO hope that as a partner, the NUC would take an active interest in the long-term maintenance of the interventions together with the community. However, the council, pressed for resources, has shown little promise of that.

At this juncture, project partners may have to rethink the way forward. Changing urban attitudes and dependency on state interventions is a slow process that will require more than just these pilot demonstrations to achieve. More consultations with the community and other partners may pave the way for new means of managing the work already done with the communities as well as set a new direction for future activity.

### Why partner?



- ↳ Avoid duplications.
- ↳ Maximize resources (human, material and information).
- ↳ Build on previous and existing knowledge and projects.
- ↳ A project needs both structural and non-structural components.
- ↳ A project needs support of senior government officials and community members.



## Further References

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### Relevant Safer Cities case studies:

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 Safer Cities 2: Coping with Flood in Cambodian Communities, June 2002.  
 Safer Cities 3: Mitigating Flood Risk in Cambodian Communities, July 2002.  
 Safer Cities 6: Promotion of Disaster Mitigation in Sri Lanka, October 2003.

## About the Author

The Intermediate Technology Development Group (ITDG) is an international development agency that promotes appropriate technology options around the world. The ITDG was established by E.F. Schumacher, the famous economist and author of the widely read book *Small is Beautiful*. ITDG South Asia has been operating in Sri Lanka since 1989. ITDG South Asia currently works in the areas of energy, transport, manufacturing, agro-processing and disaster mitigation.

The regional program for Livelihood Options for Disaster Risk Reduction, funded by the United Kingdom's Department for International Development, was implemented in five South Asian countries - Bangladesh, India, Nepal, Pakistan and Sri Lanka - to showcase community-based approaches to disaster mitigation and livelihood security. In Sri Lanka, two pilot community-based initiatives were implemented by ITDG and NBRO. The project had two distinct components. A structural component that involved construction of drains, community mobilization and awareness creation.

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## SLUMDMP

*The Sri Lanka Urban Multi-Hazard Disaster Mitigation Project (SLUMDMP) was launched in September 1997 under the Asian Urban Disaster Mitigation Program (AUDMP) of the Asian Disaster Preparedness Center (ADPC). The objective is to reduce the vulnerability of Sri Lankan cities to landslides, flood and typhoons. Through activities in Ratnapura, Nawalapitiya, Kandy, Colombo and cities along the Kelani river, the SLUMDMP promoted awareness, built capacities and developed tools for incorporating risk management into urban development planning and implementation.*

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### Funding:

Office of Foreign Disaster Assistance (OFDA), U.S. Agency for International Development (USAID)



## 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 2003. 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.*

## ADPC

*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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