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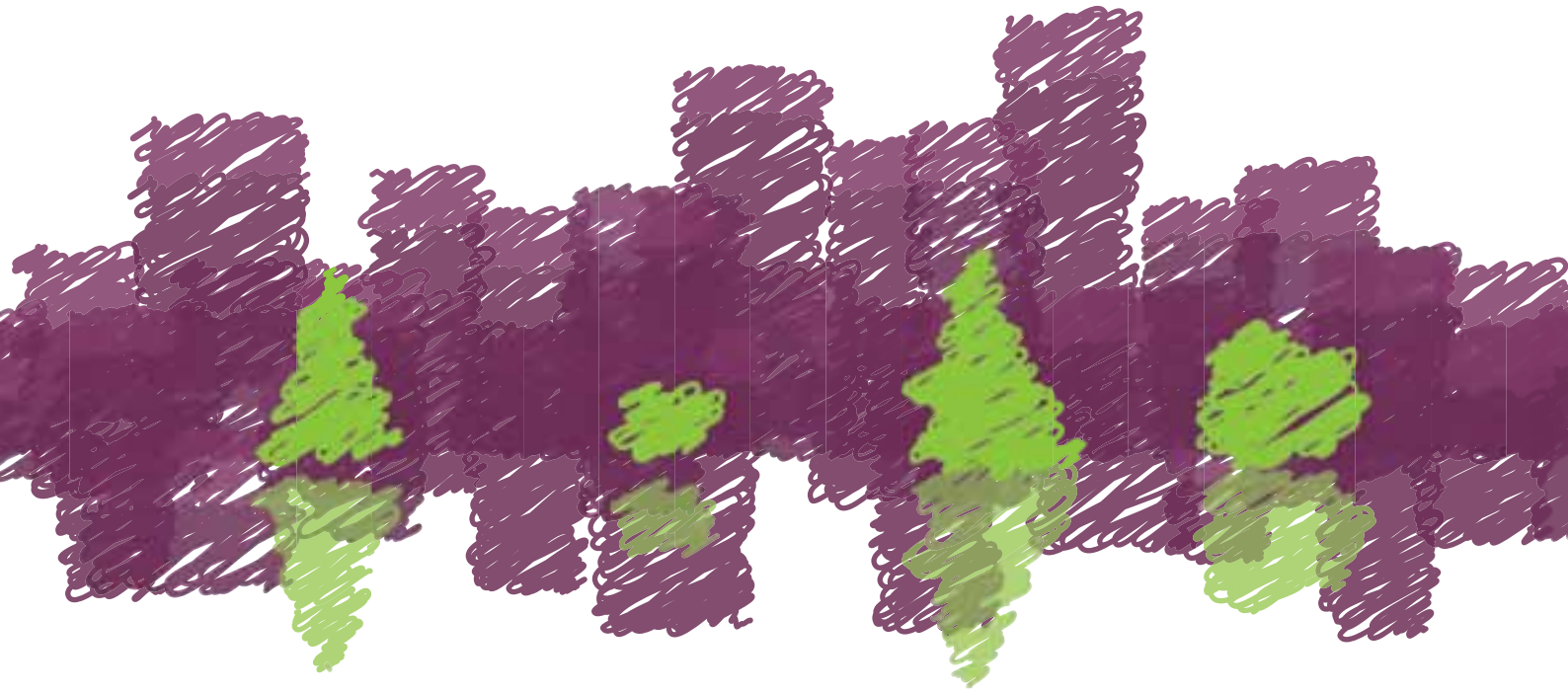
BUILDING URBAN RESILIENCE THROUGH DISASTER RISK REDUCTION IN ASIA AND PACIFIC

Priorities, good practices and lessons learnt



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EXECUTIVE SUMMARY

Rapid urbanization and development goes along with increasing disaster risks. Governments in Asia and the Pacific face continued challenges towards sustainable development at the same time reducing the risks from future disasters. In 2010, governments in Asia and the Pacific together with other countries in the world have adopted the Hyogo Framework for Action 2010-2015 (HFA). The HFA served as a guide for the countries towards building resilient nations by disaster risk reduction (DRR). It has brought about significant shift from mere response strategies to DRR. HFA expired in 2015 and is continued through the recent adoption the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework for DRR), which aims to achieve substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

The need to integrate efforts towards sustainable development goals, climate change adaptation ad disaster risk management has been recognized. And to do this, the term resilience is important. Resilience is the "ability of a system, community, or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of hazards promptly and efficiently by preserving and restoring essential basic structures". And building or reinforcing resilience implies the development of unified tools supporting greater coherence and coordination among different approaches. Addressing disaster risks in the context of resilience encourages urban planners to look at the many impacts of disasters and build long term capacity of communities to both adapt and cope with uncertain risks. The goal is for communities to prepare for an earthquake as much as they prepare for a drought or flooding.

DRR and resilience is part and parcel of sustainable development in the environmental, economic, social and political spheres. The gains in reducing disaster risk include strengthened trust in and legitimacy of local political structures and opportunities for decentralized competencies and optimization of resources; conformity to international standards and practices; lives and property saved in disaster or emergency situations, with a dramatic reduction in fatalities and serious injuries; active citizen participation and a platform for local development; protected community assets and cultural heritage, with less diversion of city resources to disaster response and recovery; assurance for investors in anticipation of fewer disaster losses, leading to increased private investment in homes, buildings and other properties that comply with safety standards; increased capital investment in infrastructure, including retrofitting, renovation and renewal; increased tax base, business opportunities, economic growth and employment as safer, better-governed cities attract more investment.

Selected DRR practices in Asia and Pacific region under economic, social, political and environmental spheres are presented in this report. Building from key issues under these 4 spheres as identified and discussed by the participants of the "Expert Group Meeting on Sustainable Urban Development in Asia and the Pacific: Towards a New Urban Agenda" which was held in Bangkok in December 2015, case studies that can address specific key issues are presented. Although issues can be interrelated with those under other spheres, case studies are discussed here under the major issue being addressed. Practices included range from knowledge enhancement and raising public awareness on hazards and risks, capacity building, community-based resilience building, active participation of most vulnerable groups, use of technologies in governance and land management, etc.

Upon looking at these practices, one can conclude that the following are main considerations to be focused on to further resilience building in Asia and Pacific:

- Strong policy support and political commitment are needed for DRR actions to be sustainable. At the community level, the presence of local law can develop an attitude of disaster preparedness and can keep community actions going on.

- Financing DRR actions is necessary for sustainability. Provision of financial mechanism in DRR policies and plans usually ensure support for such programs and activities.

- It is also important that DRR activities are made part of mandated routine operations such as the provision of building regulations, land-use planning and development control. In this way, cities can strengthen its own institutional capacities and implement practical DRR actions by themselves.

- Multi-stakeholder engagement (government, private sector, civil society, and academia all from national to local level) is necessary for effective management and holistic implementation of development activities in cities, while ensuring social, economic, infrastructure and environmental resilience are built. The community most vulnerable to risks in cities must be completely involved in DRR activities from identifying risks, their vulnerabilities and capacities to planning, implementation and monitoring and evaluation. Their active involvement can produce more comprehensive outputs. With this, creation of local working groups that focus on DRR actions ensures continuity of the focus on DRR.

- For more effective DRR planning and implementation, the use of ICT and other forms of technology is valuable.

- Capacity building, awareness creation, effective information dissemination and advocacy are effective tools in reducing the vulnerability to disaster impacts and strengthening DRR process at local level.

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ABBREVIATIONS

ACCCRN	Asian Cities Climate Change Resilience Network
ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
APUF	Asia Pacific Urban Forum
BDCC	Barangay Disaster Coordinating Council
BRT	Bus Rapid Transit
CBDRM	Community Based Disaster Risk Management
CCC	Chittagong City Corporation
CDCC	City Disaster Coordinating Council
CDF	Core Development Funds
CDP	Center for Disaster Preparedness
CNG	Compressed Natural Gas
CODI	Community Organizations Development Institute
DECS	Department of Education, Culture and Sports
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
DOC	Danang Department of Construction
DRR	Disaster Risk Reduction
EGM	Expert Group Meeting on Sustainable Urban Development
GEAG	Gorakhpur Environmental Action Group
GHG	Green house gas
GIS	Geo Information System
GLTN	Global Land Tool Network
HFA	Hyogo Framework for Action 2010-2015
ICLEI	International Council for Local Environmental Initiatives
ICT	Information and Communication Technologies
ISET	Institute for Social and Environmental Transition-International
LGU	Local Government Unit
LMFR	Lower Magat Forest Reserve
LMFMO	Lower Magat Forest Management Office
LRT	Light Rail Transit
LWU	Laos Women Union
MRT	Metro Rail Transit
NULICO	National Union of Low Income Community Organizations
PAGASA	Philippine Atmospheric Geophysical and Astronomical Services Administration
PPTA	Project Preparation Technical Assistance

PRCIC	Poverty Reduction and Community Improvement Committee
PROMISE	Program for Hydro-Meteorological Disaster Mitigation in Secondary Cities in Asia
RECLAIM	Asian Program for Regional Capacity Enhancement for Landslide Impact Mitigation
SHOUHARDO	Strengthening Household Ability to Respond Development Opportunities
TWG	Technical Working Group
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
VAI	Village Area Improvement
VUDAA	Vientiane Urban Development and Administration Authority
VUISP	Village Area Improvements Project

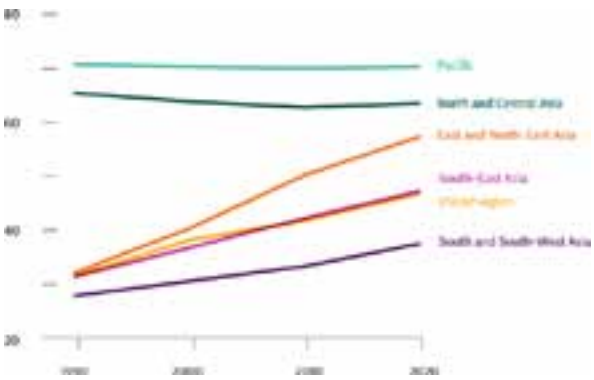
INTRODUCTION

BACKGROUND

The urban population is continuously increasing. The global urban population is expected to grow approximately 1.84% per year between 2015 and 2020, 1.63% per year between 2020 and 2025, and 1.44% per year between 2025 and 2030[1]. It is forecasted that from more than half of the global population living in towns and cities, this will increase to two-thirds by the year 2050. Asia will likely have exponential urban population growth rate in the coming years. In 2030, population in urban areas in Asia will be doubled. Urbanization rates in Asia and the Pacific vary widely by sub-region. The Pacific has more than 70% of its population living in urban areas, in South and South-West Asia only 34% of the population lives in urban areas. Overall it is expected that the urbanization rate in the whole region will reach 50% in 2026 (Figure 1).

Only 40% of the Asian-Pacific population which lives in cities contributes 80% of the region's gross domestic product (GDP)[2]. Although urbanization enhances productivity, increases gross domestic product per head and has turned into a major source of economic strength, most urban dwellers in the region were not equally benefitted. The region remains host to over half of the world's slum population. With an estimated 850 million urban dwellers in slums and slum-like conditions, over 500 million are in Asia-Pacific cities. Worsening expected impacts to urban areas is the fact that Asia-Pacific region is by far the most disaster-prone region in the world accounting for approximately 85% of all people reported affected by disasters in

FIGURE 1 Trends in urbanization in Asia Pacific sub-regions in millions[3]



the last decade[4]. This exacerbates future negative impacts to quality of life, economic development and environment[5].

The rapid urbanization and development on progress goes along with continued rise in disaster risks. Factors contributing to increasing disaster risks to society and environment include unsustainable development practices, ecosystem degradation, poverty as well as climate variability and extremes. Even more, huge impacts to low and middle countries are loss of economic assets and jobs from disasters. For instance, the 2011 Great East Japan earthquake and tsunami caused a 1% shrink, according to the estimated Japanese growth forecast in 2011[6]. In the Asia Pacific region, this would mean a 0.1 to 0.21% impact on growth to China, Malaysia, India, Singapore, and Philippines, including a 0.2 to 0.5% impact on export growth in these countries due to disruption in inputs from Japan. The floods in Thailand in 2011 not

1 UNESCAP 2013. Urbanization trends in Asia and Pacific. Available online at http://www.unescapsdd.org/files/documents/SPPS-Factsheet-urbanization-v5.pdf

2 UNHABITAT & UNDP (2012). Asia-Pacific Issue Brief Series on Urbanization and Climate Change, 1. Available online at *http://www.undp.org/content/dam/rbap/docs/Research%20%26%20Publications/poverty/RBAP-PR-2013-Urbanization-Climate-Change-Issue-Brief-01.pdf*

3 UNHABITAT & UNDP (2012). Asia-Pacific Issue Brief Series on Urbanization and Climate Change, 1. Available online at *http://www.undp.org/content/dam/rbap/docs/Research%20%26%20Publications/poverty/RBAP-PR-2013-Urbanization-Climate-Change-Issue-Brief-01.pdf*

4 UNISDR (2011). HFA Progress is Asia Pacific: Regional synthesis report 2009-2011 *http://www.unisdr.org/files/21158_hfaprogressinasiapacific20092011.pdf*

5 UN HABITAT (2012). Urban patterns for green economy: working with nature. Available online at *http://unhabitat.org/books/urban-patterns-for-a-green-economy-working-with-nature/*

6 UNISDR 2012. Towards a post 2015 framework. Available online at *http://www.unisdr.org/we/inform/publications/25129*

only cost US$40 billion, they also led to an estimated 2.5% drop in global industrial production[7].

Governments in Asia and the Pacific have taken significant efforts towards dealing with problems and issues of increasing disaster risks that impede development goals. The adoption of the Hyogo Framework for Action 2010-2015 (HFA)[8] by countries in the region, with all other member states of the United Nations (UN) General Assembly, has brought about significant shift from mere disaster response strategies to DRR. An effort at the global level including the Asia and Pacific region, HFA was envisaged as a guide for efforts on DRR. Since its adoption, the three strategic goals and five priority areas contained within the HFA have since become a common point of reference for nations to systematically track progress in DRR efforts that they have undertaken. Before the end of HFA in 2015, assessments on progress in building resilience of nations have been done that outlined the need for a framework that will continue to guide actions. The Sendai Framework for DRR 2015-2030 (Sendai Framework for DRR), was adopted by representatives from 187 countries on March 2015. The new framework aims to achieve substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries. While some progress in building resilience and reducing losses and damages has been achieved, a substantial reduction of disaster risk requires perseverance and persistence, with a more explicit focus on people and their health and livelihoods, and regular follow-up.

On the other hand, the development goals of Asia and Pacific have been aligned with the overarching global framework, the Millennium Development Goals 2000-2015 (MDGs). The 2 major DRR frameworks and the sustainable development framework are briefly detailed in the following subsections.

7 UNISDR (2010). The Hyogo Framework for Action 2010-2015: Building the Resilience of Nations and Communities to Disasters. Accessed online at http://www.unisdr.org/files/1037_hyogoframeworkforactionenglish.pdf

8 UNISDR (2010). The Hyogo Framework for Action 2010-2015: Building the Resilience of Nations and Communities to Disasters. Accessed online at http://www.unisdr.org/files/1037_hyogoframeworkforactionenglish.pdf

HYOGO FRAMEWORK FOR ACTION 2005–2015

The HFA has been a key agreement to increase understanding, knowledge and developing approaches and priorities for reducing disaster risk and building resilience. It has been instrumental in embarking on a path of change that is now irreversible. Global, regional and national efforts for DRR and reinforcing resilience are increasing. International momentum for DRR is currently at play whether in discussions and planning around climate change adaptation, sustainable development, the MDGs or more broadly public and private investment strategies.

The HFA has proved effective in galvanizing and bringing together the many stakeholders in DRR including national and local governments, parliamentary forums, inter-government organizations, non-government organizations, community-based organizations and practitioners, the private sector, academic and technical institutions, the media and international organizations. It has also proven important in supporting regional cooperation and agreements on DRR. It has assisted governments to introduce national DRR legislation; to set up early earning warning systems; and, strengthened disaster preparedness and response. It has helped to link DRR to managing climate-related risks and climate change adaptation. Parties to the UN Framework Convention on Climate Change have also identified the HFA as a pillar of their efforts to adapt to climate change.

For countries to reduce their vulnerabilities and risk, a much bolder approach is required. The approach needs to incorporate development mechanisms (such as national public investment planning systems, social protection, and national and local infrastructure investments) to reduce risks and strengthen resilience. There are various practical links between disaster risk management, climate change adaptation and sustainable development. These links have not been fully internalized in the ways in which national government institutions, international development agencies and the United Nations system itself approaches disaster risk management. It is essential to continue to harmonize, integrate and embed DRR within poverty eradication and sustainable development policies and programs. Reducing disaster risk and re-enforcing resilience is increasingly seen as part of a new development

paradigm where well-being and equity are core values and human and natural assets central to planning and decision-making. The concept of building or reinforcing resilience implies the development of unified tools supporting greater coherence and coordination among different approaches. A disaster risk management approach leading to an outcome of strengthened resilience would lead to less duplication of efforts, optimized use of available resources; an increased potential for collaborative alliances and joint actions among disciplines; and the ability to provide better guidance for policy makers and practitioners in program design, implementation and evaluation. Exposure to future disasters has the greatest potential to be reduced if disaster risk management approach is incorporated in land use, urban and spatial planning, and in post-disaster reconstruction planning. There is a growing recognition about government's responsibility for effective DRR policy planning and implementation conducted through a transparent and multi-stakeholder approach.

The need to integrate sustainable development, DRR and climate change in planning, financing and implementation at the global, regional, national and local levels, is outlined in the Asia Pacific input document[9] towards a post 2015 Framework for DRR.

Sendai Framework for Disaster Risk Reduction 2015–2030

The realization of the outcome to be achieved in the Sendai Framework for DRR requires the strong commitment and involvement of political leadership in every country at all levels in the implementation and follow up of this framework and in the creation of the necessary conducive and enabling environment. In order to attain the expected outcome these goals must be pursued: prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience. The pursuance of this goal requires the enhancement of the implementation capacity and capability of developing countries including the mobilization of support through international cooperation for the provision of means of implementation in accordance with their national priorities. Global progress will be assessed according to the seven global targets. National targets and indicators will contribute to the achievement of the outcome and goal of this framework. The seven global targets are:

- Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015.
- Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020 -2030 compared to 2005-2015.
- Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
- Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
- Substantially increase the number of countries with national and local DRR strategies by 2020.
- Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.

Adoption and implementation of national and local DRR strategies and plans should be across different time scales with targets, indicators and time frames, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience. States have until 2020 to complete this as per the Sendai Framework. States can start by assessing how their existing strategies and plans align with the Sendai Framework and defining their national targets. This first part can be done immediately.

9 UNISDR 2014. Risk sensitive development as the cornerstone of resilience and sustainability. Asia-Pacific Input Document for the Post-2015 Framework for Disaster Risk Reduction 6th AMCDRR meeting document. (HFA2). Available online at *http://www.unisdr.org/files/38055_hfa2inputfinal.pdf*

SUSTAINABLE URBAN DEVELOPMENT IN ASIA AND THE PACIFIC

The adoption of the Millennium Development Goals (2000-2015)[10] at the global level that include the Asia Pacific region which range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education served as blueprint of galvanized unprecedented efforts to meet the needs of the world's poorest. With the expiration of the MDGs in 2015, the Sustainable Development Goals (SDGs) are now under development and consideration to replace the MDGs. Poverty eradication, changing unsustainable and promoting sustainable patterns of consumption and production and protecting and managing the natural resource base of economic and social development are the overarching objectives of and essential requirements for sustainable development. Drawing from the experience of two decades of development practice and from the inputs gathered through an open and inclusive process is a post 2015 Development agenda underway. A road map to achieve dignity in the next 15 years is proposed in a synthesis report from the UN General Assembly Secretary[11] released in 2014. A proposed universal and transformative agenda for sustainable development, underpinned by rights, and with people and the planet at the center, an integrated set of six essential elements is provided to help frame and reinforce the sustainable development agenda and ensure that the ambition and vision expressed by Member States communicates and is delivered at the country level. These are (a) dignity: to end poverty and fight inequality; (b) people: to ensure healthy lives, knowledge and the inclusion of women and children; (c) prosperity: to grow a strong, inclusive and transformative economy; (d) planet: to protect our ecosystems for all societies and our children; (e) justice: to promote safe and peaceful societies and strong institutions; and (f) partnership: to catalyze global solidarity for sustainable development.

10 UN. Millenium development goals and beyond 2015. Available online at *http://www.un.org/millenniumgoals/bkgd.shtml*

11 The road to dignity by 2030: ending poverty, transforming all lives and protecting the planet. Synthesis report of the Secretary-General on the post-2015 sustainable development agenda. Accessed online at *http://www.un.org/ga/search/view_doc.asp?symbol=A/69/700&Lang=E*

The Asia Pacific Urban Forum (APUF) is a regional platform that aims to provide a regional platform for urban actors to discuss emerging and critical urban development issues from the perspectives of different stakeholders; share experiences on good practices and approaches; and explore cooperation opportunities and links to regional and global processes and development objectives. It is a multi-stakeholder forum organized by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) every 4-5 years. Five APUF have been organized in the past. This year, 6th APUF will be held with the theme "Sustainable Urban Development in Asia-Pacific: Towards a New Urban Agenda". Specific objectives of the Forum are to discuss persistent and emerging issues related to sustainable urban development in Asia-Pacific, and in particular priority areas that should be addressed in the Post-2015 Development Agenda; and to provide recommendations to the High-level Regional Preparatory Meeting for Habitat III for Asia-Pacific to be held in Indonesia in terms of priority issues for the region to be considered in the "New Urban Agenda" to be adopted at Habitat III.

In preparation to the 6th APUF to be held in 2015 and regional stakeholder consultations for the Third United Nations Conference on Housing and Sustainable Urban Development "Habitat III" which will be held in 2016, the Expert Group Meeting on "Sustainable Urban Development in Asia and the Pacific: Towards a New Urban Agenda", was held on 2-3 December 2014 in Bangkok, Thailand. Organized by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), around 50 participants from the Asia-Pacific region comprising representatives from civil society, academia, international organizations and the private sector gathered for this two-day meeting. Through critical evaluation of progress made with the Habitat Agenda to date, and a forward-looking perspective on the Post-2015 Development Agenda, debate focused around pressing emerging and persistent issues experienced by cities throughout the region, and how new or existing good practices and approaches could influence the nascent New Urban Agenda. The meeting identified and discussed emerging issues related to sustainable urban development in Asia and the Pacific, reflecting key inputs from stakeholders working in the urban sector; and identified and discussed priority issues for the region in relation to the Post 2015 Development Agenda and Habitat III. The meeting also substantively engaged key regional partners in the

organization of APUF-6, as a multi-stakeholder forum, specifically through an inclusive preparatory process.

Building from results of the Meeting discussions on key issues in sustainable urban development, the next Chapter presents case studies (good practices and approaches) identified that can help address the issues. There is a significant amount of information on what good practice is in disaster risk management and what works. There is guidance in some areas including risk assessments with a view to eventually arriving at a common definition of disaster and risk; integration of climate change adaptation and disaster risk management; working at national and local levels; and, vulnerability of communities to the impact of hazards. There has been a strong call to develop and provide more guidance, principles and tools on how good practice is achieved. One approach in achieving sustainable development is to build the resilience of urban areas through DRR. Learning from the good practices in DRR implemented in Asian countries can be replicated in order to achieve sustainable urban development.

FIGURE 2 Relationship of Drivers of DRR and Resilience, and Sustainable Urban Development

DRIVERS OF DISASTER RISK REDUCTION AND RESILIENCE IN ASIA

2

Resilience is the "ability of a system, community, or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of hazards promptly and efficiently by preserving and restoring essential basic structures"[12]. A resilient community is one that can absorb disturbances, change, reorganize and still retain the same basic structures and provide the same services. DRR on the other hand, is the "concept and practice of reducing disaster risks through systematic efforts to analyze and reduce the causal factors of disasters"[13]. Examples of DRR include reducing exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, and improving preparedness and early warning for adverse events. DRR includes disciplines like disaster management, disaster mitigation and disaster preparedness, but DRR is also part of sustainable development. In order for development activities to be sustainable they must also reduce disaster risks.

Addressing disaster risks in the context of resilience encourages urban planners to look at the many impacts of disasters and build long term capacity of communities to both adapt and cope with uncertain risks[14]. The goal is for communities to prepare for an earthquake as much as they prepare for a drought or flooding. By breaking urban resilience down into four components, infrastructural, institutional, economic and social, underlying issues can be addressed and capacity can be deepene[15] .

- Infrastructural resilience refers to a reduction in the vulnerability of built structures, such as buildings and transportation systems. It also refers to sheltering capacity, health care facilities, the vulnerability of buildings to hazards, critical infrastructure, and the availability of roads for evacuations and post-disaster supply lines. Infrastructural resilience also refers to a community's capacity for response and recovery.
- Institutional resilience refers to the systems, governmental and non-governmental that administers a community.
- Economic resilience refers to a communities' economic diversity in such areas as employment, number of businesses, and their ability to function after a disaster.
- Social resilience refers to the demographic profile of a community by sex, age, ethnicity, disability, socio-economic status, and other groupings and the profile of its social capital. Although difficult to quantify, social capital refers to a sense of community, the ability of groups of citizens to adapt and sense of attachment to a place.

DRR and resilience is part and parcel of sustainable development in the environmental, economic, social and political spheres[16]. The gains in reducing disaster risk include strengthened trust in and legitimacy of local political structures and opportunities for decentralized competencies and optimization of resources; conformity to international standards and practices; lives and property saved in disaster or emergency situations, with a dramatic reduction in fatalities and serious injuries; active citizen participation and a platform for local development; protected community assets and cultural heritage, with less diversion of city resources to disaster response and recovery; assurance for investors in anticipation of fewer disaster losses, leading to increased private investment in homes, buildings and other properties that comply with safety standards; increased capital investment in infrastructure, including retrofitting, renovation and renewal; increased tax base, business opportunities, economic growth and

12 UNISDR (2011). Resilience definition. Available online at *http://www.unisdr.org/we/inform/terminology*

13 UNISDR (2010). What is disaster risk reduction. Accessed online at *http://www.unisdr.org/who-we-are/what-is-drr*

14 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

15 World Bank (2013). Building urban resilience: principle, tools and practice. Accessed on 25 April 2015 at *http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2013/03/08/000356161_20130308155433/Rendered/PDF/758450PUB0EPI0001300PUBDAT UNESCAPE02028013.pdf*

16 ICLEI (2010). How to make cities more resilient: a handbook for local government leaders. Accessed on 25 April 2015 at *http://www.unisdr.org/files/26462_handbookfinalonlineversion.pdf*

employment as safer, better-governed cities attract more investment[17].

The following sections briefly present the identified priority issues and suggested solutions under the umbrella of sustainable urban development areas including economic development, governance, social development and environment. Although ways of addressing key issues under each of these four areas are inter-related, case studies are presented according to the major issue being addressed.

ECONOMIC DEVELOPMENT

The region's cities have undergone profound economic transformation but this has come at a cost. Not all have benefitted and the environmental outcomes are increasingly serious. Cities must develop economically to meet needs, but quality of growth should be a priority. Some identified ways of how economic development is achieved include:

- formation/establishment of new institutional frameworks or structures;
- implementing infrastructure projects that underscore compact urban growth;
- establishment of new financing methods as well as increasing local authorities' access to financing DRR projects;
- enhancement of knowledge and capacity building of human resources;
- enhancement of technology skills according to purpose/context; and
- scaling of good practices on urban efficiency and economic success to fit other parts of the region.

In order for cities to be harnessed as economic drivers of modern economies, and for their role to be properly recognized, new types of institutions are needed to bridge the gap between policy-making, financing and urban development. Current, orthodox institutions, structures and methods are unable to respond to urban challenges in timely and appropriate ways. New institutional frameworks or structures which bridge the gaps between silos (such as transport planning and urban planning) as well as between the national and local scale would be of particular interest when thinking about how institutional innovation could take place.

Infrastructure is a fundamental factor in underpinning future economic growth for cities and their regions. However, infrastructure types must also be considered i n terms of holistic benefits. Focusing on materials that do not "lock in" embodied energy (i.e. using alternative construction materials and design) as well as focusing on projects that underscore compact urban growth are more desirable than mega-projects that facilitate car usage, for example. Urban compaction aims to increase built area and residential population densities; to intensify urban economic, social and cultural activities, and to manipulate urban size, form and structure and settlement systems in search of the environmental, social and global sustainability benefits, which can be derived from concentration of urban functions[18]. Benefits of a compact city are as follows:

- Greater efficiency in the use of land and so a positive impact on a city's spatial and ecological footprint, which also means reduction in reliance on cars, lower impacts of urban growth on rural and agricultural lands, and lower non-renewable resource consumption per household

17 ICLEI (2010). How to make cities more resilient: a handbook for local government leaders. Accessed on 25 April 2015 at *http://www.unisdr.org/files/26462_handbookfinalonlineversion.pdf*

18 UN Habitat (2012). Urban Patterns for a Green Economy: Leveraging Density. Accessed online at *http://unhabitat.org/wp-content/uploads/2014/06/Leveraging-Density-Urban-Patterns-for-a-Green-Economy.pdf*

- Higher population and economic thresholds, which also means increased accessibility to services and amenities as higher economic thresholds are achieved within any given area, viable and effective public transport provision based on sustainable population thresholds to support the service
- Harnessing of agglomeration advantages (for example, shops benefiting from the customers generated by each other)
- Reduction of time and cost spent travelling due to shortened distances to destinations
- Increased social inclusiveness and reduction in social segregation through designing quality mixed-use areas.

The city is now a crucial investment vehicle. Urban areas not only bring together many potential consumers, but the economic multipliers of operating in these contexts are now well known. A challenge is ensuring that the investment outcomes are equitable, and sustainable. The needs and the scale of financing needs in Asia and the Pacific require new financing methods. But, in order to build low-carbon futures financing needed to include sustainability as a key goal. Also, increasing local authorities' access to financing can overcome finance gaps at the local level.

Many cities are suffering from human resource and skill gaps, particularly in green urban planning, and also regarding the uses of new technologies. Cities in Asia-Pacific have the potential to "leap frog" more orthodox practices or policies that have been used elsewhere in the past. The key issue here lies on how knowledge is used and shared, and technologies applied to fit the purpose and scale. In addition, the case studies of Hong Kong and Singapore are often cited as examples that pair both urban efficiency and economic success in the region. However, there is a need to bridge the disconnection between an urban agenda and workable and adapted practices in order to bring sustainability to Asia-Pacific's cities.

Below are cases studies on urban compact development, knowledge enhancement, capacity building and technology skills development practices in some countries in Asia.

INFRASTRUCTURE PROJECT THAT UNDERLINE URBAN COMPACT GROWTH

Compact, connected, and accessible cities must become the norm for more sustainable cities. The city of Nanjing, capital of Jiangsu Province, China is noted for a successful program of redevelopment of its inner city areas[19]. The inner city development scheme combines cultural conservation with tourism and entertainment. To provide economic vitality to the inner city, the Nanjing authorities have converted areas formerly occupied by rundown structures into commercial, service, and entertainment centers. The Overall City Plan for Nanjing (1991–2010) features not only the redevelopment of the inner city area encompassed by its ancient walls, but clustered settlements or urban nodes formed along the banks of the Yangtze River. To control urban sprawl, Nanjing has concentrated high-density development in specific zones. The most important of these development schemes is located in Hexi, southwest of the city, where an ambitious development program designed to transfer the central business district from inside the city walls has been pursued. Industrial and technological development has also been concentrated in suburban areas, such as the high-tech enclave located near the international airport. With technical assistance from the American Planning Association, the Nanjing city authorities have adopted a redevelopment scheme that includes a landscaped park, highrise condominiums, affordable housing units, local community service centers, and provision of water and sanitation. Instead of proposing wholesale destruction of traditional houses, the redevelopment plan for Menxi use a slum upgrading approach where the physical structures that can be saved are retained. Courtyard walls are cleaned and improved, adequate water supply and sanitation facilities provided, and people organized and directly involved in the improvement of their community. The upgrading scheme may involve the resettlement of about a quarter of the original residents. Resettlement to apartments in the suburbs is done on a voluntary basis, with families that agree to be relocated compensated with cash awards as well as provided with apartments that have more than twice the floor space occupied in Menxi. Suburban

19 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

apartments also have private kitchens, toilets, and baths instead of shared facilities as in the old neighborhood. Details on this case study is presented in Section 3.1.

CAPACITY BUILDING OF HUMAN RESOURCES, ENHANCING KNOWLEDGE, SKILLS AND TECHNOLOGY USE ACCORDING TO THE PURPOSE OR CONTEXT

Cities in Asia have embarked on effective ways in adopting methodologies, tools and enhancing capacities and planning towards DRR. Case studies such as the "risk assessment for landslide and mitigation capacity building[20] conducted in 3 Asian cities" and the "community-centered disaster resilience building in Jamalpur Bangladesh[21]" showcase some of the good practices.

TThe risk assessment for landslide and disaster mitigation capacity building was implemented through the Asian Program for Regional Capacity Enhancement for Landslide Impact Mitigation (RECLAIM). The Program was implemented by the Asian Disaster Preparedness Center (ADPC) through the auspices of the Government of Norway. RECLAIM highlighted the need for gradual change in attitude towards proactive approaches of preventive measures to reduce losses concerning landslide events. It provided a platform for discussion and sharing experiences in landslide risk reduction between decision-makers, planners, professionals and residents. The program implemented demonstration projects in three countries the Philippines, Sri Lanka and Thailand. The demonstration projects' major components are land use planning, environmental management and forecasting. From this is certain focus of the project implemented in each of the countries. The Philippines focused on strengthening community capacity and enhancing local commitment. Sri Lanka developed a landslide early warning system through a school-based network of rainfall monitoring stations. Lastly, Thailand relied more on instrumentation and technical risk assessment as the basis for structural mitigation measures. Aside from the demonstration projects, regional training courses on landslide mitigation were conducted in Thailand and the Philippines, to bring together the RECLAIM institutional partners in 7 Asian countries to share the problems encountered and approaches they adopted as mitigation and preparedness measures. The detailed case study is given in Section 3.2.

On the other hand, resilience building in Jamalpur was conducted through the implementation of two succeeding projects, the "Strengthening Household Ability to Respond Development Opportunities (SHOUHARDO)" and the "Program for Hydro-Meteorological Disaster Mitigation in Secondary Cities in Asia (PROMISE)". A major objective of the SHOUHARDO program was to build the capacity of targeted communities and institutions to prepare for, mitigate and respond to disasters. The objective of PROMISE was to identify the most vulnerable communities in Jamalpur and subsequently reduce their vulnerability through community driven DRR strategies. Jamalpur Pouroshava was a site for a project on reducing food insecurity in the poor urban settlements. Later on, its urban poor communities would tackle the challenge of forming resilience to flood disasters. Through the implementation of the projects, the community learned and practiced participatory process of DRR from community organizing, risk assessments through development planning. During the implementation of SHOUHARDO, interventions at the city and community levels were initiated by building self-sustaining institutions on disaster management. The city facilitated a multi-hazard vulnerability assessment, a floods contingency plan, and integrated a DRR budget into the annual development plan of the city. Continued during the implementation of the PROMISE, activities included community-based mitigation activities, capacity development and mainstreaming DRR into city development planning. The action plan now serves as a guide for the city council on making decisions regarding allocating funds and prioritizing DRR activities. Small-scale mitigation and DRR actions were undertaken such as building evacuation access roads and water supply facilities. This case study is detailed in Section 3.3.

20 ADPC (2009). Using Risk Assessments to Reduce Landslide Risk. Safer cities, 26. Available online at *http://www.adpc.net/igo/contents/Publications/publications-Details.asp?pid=225#sthash.B4yn23NS.dpuf*

21 ADPC (2010). Building a Community-Centered Disaster-Resilient City. Safer Cities, 28. Available online at *http://www.adpc.net/igo/contents/Publications/publications-Details.asp?pid=227&t=PEER%20Key%20Activities%20for%20the%20Period:%20December%202010%20-%20November%202011#sthash.qaq5q6J5.dpuf*

GOVERNANCE

Governance is essential to the development of sustainable cities. It is recognized that there is an urgent need to move beyond past and current policy fragmentation towards holistic and sustainable frameworks. In recent decades the number of actors with a role in governing cities has multiplied. Rather than seeing this as creating confusion and unpredictability, such diversity needed to be better harnessed.

In order to improve governance towards resilience, the following has been identified:

- Understanding for whom governments govern;
- Use of territorial approaches;
- Use of tools for efficient land management;
- Use of ICT and e-governance tools; and
- Application of innovative ways of governance.

The myriad of urban governance challenges within the Asia-Pacific region include the difficulty of enabling the poorest to participate or fully contribute to decisions or policy implementation. Understanding for whom governments govern is considered important. Sustainable cities were also in the interest of private enterprise, because societal and economic gains were intrinsically linked.

Additionally, disciplinary or functional divisions between city departments, professions and administrations ("silos") are posing real barriers to efficient and effective governance. Many argue that governance methods that take territorial approaches to urban challenges should be used. In this approach, the problem should define the territorial scope and engagement of stakeholders, rather than the other way around.

Underlying almost all governance challenges are inefficient systems of land management, which result in affordability problems for the middle class and the poor, and often leave the most vulnerable populations without secure tenure arrangements. The challenge of data availability is also crucial as land recording is still haphazard. The Global Land Tool Network (GLTN) has done much work on new tenure arrangements for cities, and land use planning will be important to the new urban agenda and regional discussions.

Information and Communication Technologies (ICT) and e-Governance, were also noted as important tools for changing the way that decision-making and urban planning takes place. Current planning was seen as failing by making pre-determined choices for people, rather than providing the basis for ideas and exchange.

Traditional or customary governance models are "hybrid" systems that combine customary or non-formal practices with formal systems. They could be of interest for parts of the Asia-Pacific region. Innovative forms of governance such as these could be learned from.

Case studies on using territorial approaches and ICT and innovative ways of governance as well as the use of technology for land management are highlighted in the following.

USE OF TERRITORIAL APPROACHES

The practice in Sleman, Indonesia shows how rapid urbanization is managed, particularly on dealing with its urban problems by involving other local government as key stakeholders in combating various inter-district urban problems on transportation, waste, drainage, and water supply.[22] Sleman is a local government in Indonesia that exemplify good practices in governance, economic development, and financial management that leads to local level capacity and sustainability. Strengthening of local governments is seen by the Indonesian government as a crucial aspect in addressing challenges brought about by

22 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

growing urbanization. Sleman has embedded in its financial system a manifestation of public accountability and transparency, internal performance evaluation, and analytical, managerial controlling instrument, and regional planning instrument. The district has undertaken extensive mapping of social, environmental, and economic resources through the auspices of Swiss Government. The project established a geographic information system, linked to cadastral maps prepared for the region. The district has used the maps to analyze complex information and undertake detailed planning, monitoring, and evaluation of environmental impacts resulting from development. The detailed case study is given in Section 3.4.

USE OF TOOLS FOR EFFICIENT LAND MANAGEMENT

In India, GIS based map is used for urban slum management[23]. This was done to address the issue of the lack of up-to-date, comprehensive and detailed information needed for planning. Risk assessment for urban upgrading should identify slum population and their locations and assess sector-specific risks such as housing and tenure, basic services, critical infrastructure, transportation, social and economic vulnerabilities, community readiness, institutional capacity, and access to data and finances as well as city-wide risks for integration with comprehensive urban planning goals. Both the complexity and cost of risk assessment must be considered in undertaking an urban upgrade. Shelter Associates, that has been working to promote inclusive urban planning since early 2000, collaborated with Baandhani in Pune, Sangli and Khuldabad to introduce slum surveys and Geographical Information Systems (GIS) as tools for integrating low-income settlements into urban planning and development. The work with Baandhani comprises studies of poor people in urban settings, a study existing situations carried out by the poor themselves. The Sangli Sanitation Project is one example of how our research and development work influences outcomes in the field. Another is the Thane Poverty-Mapping and Redevelopment Project, which shows how research can be used to increase outreach to communities and create a comprehensive list of policies for stakeholders to choose from. Governments, NGO-CBOs, and communities can then consider the options jointly and weigh possible outcomes. Working with slum residents, Shelter Associates compelled the local government to legitimize migrants and initiate city planning to improve slum settlements by widening roads, installing flood protection, and building new infrastructure. The Pune slum census covered over 100,000 households in over 200 pockets throughout the city. The residents gained skills in data collection, a better understanding of their collective community problems, and opportunities to negotiate with the local government in the planning process. In Sangli-Miraj-Kupwad, slum mapping by the community initiated a comprehensive approach with the local administration and its elected members to improve all slum pockets. May slums have been mapped and improvement plans produced cost-effectively. Detailed case study can be found in Section 3.5.

USE OF ICT AND E-GOVERNANCE TOOLS

The "Urban Development Simulation Model is used in Danang Vietnam as a tool for Disaster Mitigation Planning[24]. Known to have perennial flood events, Vietnam in 2011, through Da Nang Department of Construction (DOC) and the Institute for Social and Environmental Transition-International implemented a project on urban flood modeling. The project, funded by the Rockefeller Foundations through its Asian Cities Climate Change Resilience Network (ACCCRN) program, developed a database on Da Nang's socioeconomic development to assist in the management of urban development, climate change and sea level rise; developing hydrologic-hydraulic model, and simulate urban flood maps under different urban development, climate change and sea level rise scenarios; contribute to steering city urban plans towards sustainable development in the context of exacerbating climate change and sea level rise; build awareness among organizations and local people about the potential impacts of climate change and sea level rise on urban development; and build the capacity of staff in relevant agencies, in the application of hydrologic-hydraulic modeling. The simulation model result was used to adjust Da Nang's Development Plan. Some of the notable changes include widening and maintaining/

23 World Bank (2013). Building urban resilience: principle, tools and practice. Accessed on 25 April 2015 at *http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2013/03/08/000356161_20130308155433/Rendered/PDF/758450PUB0EPI0001300PUBDAT UNESCAPE02028013.pdf*

24 Tran, P., Tran, D. (2014). Building climate resilience from results of Hydrology and Urban development simulation model project. Da Nang, Vietnam: Institute for Social and Environmental Transition-Vietnam and Da Nang Department of Construction. Available online at *http://i-s-e-t.org/resources/working-papers/results-hydrology-danang.html*

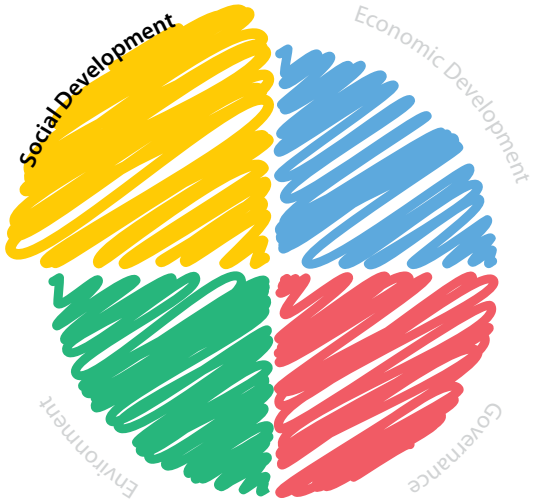
improving floodways mostly in low-lying rural areas, and adjusting land use planning in riverine areas to adapt and minimize risks from future urban flooding. Results from the hydrologic-hydraulic model provided an important basis for the establishment, evaluation and approval of urban spatial plans and urban infrastructure plans. This includes plans for transportation, water supply, rainwater drainage, waste-water drainage, green areas, and lighting system. This case study is detailed in Section 3.6.

INNOVATIVE WAYS OF GOVERNANCE

Some cities in Asia have put efforts towards shifting from formal systems to more innovative ways in order to push forward on sustainable development at the same time building resilience in the City. The dynamic and innovative leadership of a past City Mayor in Chittagong Bangladesh, Mayor Mohiuddin Chowdhury is an example of a leader who initiated development works in the City[25]. He led the Chittagong City Corporation (CCC), the urban local government unit responsible for overall governance. Chittagong has also experienced urbanization and development issues such as a steady growth in its slum settlements as a result of the increasing economic activities in the city and emigration from rural areas. The Mayor's management style is a pro-people approach, which takes up socially beneficial projects. He made efforts to ensure that projects were financially self-sustaining. CCC through has regularly mandated programs on civic infrastructure development, garbage disposal, maintenance of parks and playgrounds, but has extended its services to such other areas as education, health, environmental protection, preservation of hill areas, disaster management, establishing a compressed natural gas (CNG) plant, supplying water to poor communities, power plant installation, a pharmaceutical factory, garbage recycling plant, and shopping complexes. City corporations normally are not expected to run institutions of higher education, such as colleges or universities, nor operate higher-level medical facilities or medical schools. However, Mayor Mohiuddin Chowdhury has led CCC to shoulder such responsibilities. More details on initiatives of CCC through the leadership of Mohiuddin Chowdhury is presented in Section 3.7.

25 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

SOCIAL DEVELOPMENT



Cities in the region are becoming more socially complex over time. The emergence of the world's largest middleclass represents a significant opportunity for new social relations but also a great challenge in meeting expectations. The region must also manage growing inequalities and close gaps. Rising prosperity throughout the region has not translated into the social gains expected, and economic growth has not brought about secure employment, especially for youth. Future aging will present significant new challenges. Some ways of addressing these issues include:

- understanding of the role of urban informal sector;
- building equity in the city;
- building the capacity of most vulnerable groups;
- more involvement of the private sector in DRR; and
- building greater coordination and effective partnerships across government, civil society and the private sector.

There is a continued significance of the urban informal sector for the region's urban areas. The informal sector should no longer be seen as a manifestation of unplanned urban growth, or as a "market failure" but a policy opportunity. Very few cases of officially sanctioned informal commerce or housing have been able to take hold in the region. There is an urgent need

to re-look at the informal sector and its role in future urban development in the region.

There was evidence of greater inequality in the region's cities. While poverty reduction/eradication should stay as a priority for policymakers, inequality was of great concern and more needed to be done to address growing gaps.

Women and youth more often than not had the more vulnerable livelihoods. In many cities women increasingly had to balance both wage-earning and domestic roles. Youth continued to lack decent access to education or training, and typically were unable to accumulate assets. Migrants were also identified as a growing and vulnerable group in many cities. Intergenerational poverty is evident across the region's cities.

The private sector is also increasingly providing services traditionally provided by the state but that greater coordination and partnership needed to be forged across government, civil society and the private sector to ensure service delivery and with regards to nascent social protection systems.

Although the MDG target "reducing the number of slum dwellers by 100 million" had been achieved, the actual number of slum dwellers has increased overall, with the largest numbers observed in the Asia-Pacific region. This increase had yet to be fully comprehended by governments. Future urban development goals must be more ambitious and address structural transformation rather than set overly simplified numerical targets.

Specific cases are presented under building the capacity of most vulnerable groups such as women and greater coordination and effective partnerships across government, civil society and the private sector.

BUILDING THE CAPACITY OF THE MOST VULNERABLE GROUPS

The involvement of women in the Vientiane Urban Region Village[26] improvements is an example of how women can actively participate to development projects in the role of monitoring and community facilitation. The village area improvement implementation in Vientianne sought to address this through a demand-led, village-by-village approach to tertiary-level infrastructure improvement. Environmental improvements, particularly drainage improvements, were the most pressing demands of the urban poor. The urban area covered by the project included 100 villages with about 162,000 residents within the original boundary of the Vientiane Urban Development and Administration Authority (VUDAA). The Lao Women's Union (LWU) and the village LWU representatives actively participated in village meetings. Two LWU appointees were assigned full-time to the project one of which is the Vice President of LWU. Initial task of LWU was to explain to villagers how to participate. They ran a series of workshops on community participation as well as providing a conduit for day-to-day liaison between residents and the project. This enabled the villagers to voice their opinions and be heard by VUDAA and the project team, thereby overcoming a general community reluctance to confront government authorities. It also helped the project team engineers to effectively communicate with residents, which led to the engineers' adoption of a more flexible approach to infrastructure design. LWU was also closely involved in setting up VAI committees in each village and in ensuring that women and the poor were appropriately represented on these committees. Close cooperation between LWU and the VAI team was also an important element in dealing with resettlement and other minor impacts. Participatory village-level urban infrastructure provision on this scale through this project implementation was a learning process for all concerned, and its success is testament to the effective collaboration between the engineering and social development professionals, community advisors, and village representatives. The project's accomplishments are reflected in the fact that it has been mentioned in the National Assembly as an example of good participatory planning, which is one of the Government's areas of focus in its move toward decentralized planning. Its popular success is also borne out by demand. Many villages currently not in the scheme have approached the projects national project director with requests to be included. Detailed case study is presented in Section 3.8.

26 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

BUILDING GREATER COORDINATION AND EFFECTIVE PARTNERSHIPS ACROSS GOVERNMENT, CIVIL SOCIETY AND THE PRIVATE SECTOR FOR RESILIENCE BUILDING

Similar to the experiences of urban poor housing management around the world, policy makers found it difficult to cope with the increasing housing needs of the poor with the conventional strategies with supply driven development concept. As a common practice in dealing with the problem of increasing number of slums in Asian cities, the government builds public housing and private sectors for sell in the market and both sectors are not able to sell them to the poor, who could not afford due to limited finances and support. The poor in general do not like the isolated individual housing in the high rise flat because they have lost the most important component of life which is "community". As a result, the poor cannot repay and cannot have enough income to pay for their daily transportation and high living expenses since the new houses are far away from their original occupation site, so they sold their houses, then return to the original encroached site or invaded new areas. The circle has gone on and on forever if there is no paradigm shift taking place to break this cycle. Most conventional low-income housing strategies focus on the physical aspects or mainly on construction of housing and treat housing as an individual need, to be provided to each family individually. The individual approach may work for better-off people, but not for the poor, whose position at the bottom of the economic ladder leaves them especially vulnerable when they're alone. But while the poor may be weak in financial terms, they are particularly richer in social terms since they have to help each other for their survival.

The Asia-Pacific region is rich in terms of many successful examples of participatory development models that have brought about social change: the Orangi pilot project in Pakistan and CODI in Thailand (detailed here) are examples of initiatives that have brought improved life quality to urban poor groups, positively changed state-society relations, and provided new models. Planned slum upgrading is also being implemented in Nanjing, China (as mentioned in Case Study 3.1), and Cases in Cambodia (mentioned in Case Study 3.10) and India, are evidences that a paradigm shift in dealing with slums is becoming popular. This examples however needs to be highlighted, and learned from, and especially those which forged new and effective partnerships.

This case of slum upgrading project in Thailand, named Baan Mankong which means "secure housing" had the goal to have "cities without slums" within five years, across Thailand. Launched by the Thai government in 2003 and implemented through the Community Organizations Development Institute (CODI), the program centers on providing infrastructure subsidies and housing loans to low-income communities to support upgrading in situ wherever possible and, if not, to develop new homes close by. Programs are designed and managed by urban poor networks working in partnership with local actors. The key features that make the program successful include the flexible financing schemes with the savings groups, the collective effort of the communities in all aspects, and the presence of horizontal and technical support. During its tenth year of implementation in 2013, the Baan Mankong program upgrading projects has been implemented in 1,637 communities are either finished or underway in 286 towns and cities, in 71 of the country's 77 provinces, providing legal entity, secure housing to 93,100 households. A significant outcome of the program was the creation of a network of low-income communities, called NULICO (National Union of Low Income Community Organizations), which puts into practice the program's ideals of knowledge sharing between communities. Another significant outcome was the creation of the core development funds (CDFs) which help sustain the financial needs of upgrading projects. The program reconceives how to achieve large-scale impacts by supporting local community-driven processes in each urban center which, when added together, achieve city and national scale. Detailed case study is given in Section 3.9.

Pnohm Penh, in its improved urban management approach[27] has been also dealing with slum issues in a participatory manner. Adoption of the decentralization policy has been channeled through the (SEILA) program, where local development plans are prepared by local communities and authorities at the district, commune, and neighborhood levels. Such a bottom-up approach to planning better represents

27 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

local needs; therefore, the municipal and national governments are better able to respond. To improve city management further, the municipal government has also established other operational mechanisms, such as the Municipal Development Committee to oversee city development more transparently. In addition, the city Poverty Reduction and Community Improvement Committee (PRCIC) has been set up to work closely and effectively with urban poor. Under the PRCIC is a more decentralized body, the Urban Poverty Reduction Unit, set up for implementing municipal government programs and projects relevant to the urban poor, such as land sharing and slum upgrading. At the district level, a Community Development Management Committee was set up to coordinate all work related to local communities with the district and municipal governments in an efficient manner. This committee is composed of members from the district authority, line development agencies, and representatives of the local community themselves. At the commune level, a communications office coordinates issues related to the public with the local authority. So far, the office has provided support in organizing about 600 poor communities, consisting of more than 46,000 underprivileged families living in the city of Phnom Penh. It also has mobilized poor inhabitants to save money for their communities' development. Through this grassroots initiative, communications between office staff of the municipal government and poor communities have improved, transforming the relationship from one characterized by suspicion and hostility to one of no violence but negotiation. The success of many slum and squatter settlement projects has been attributed to the transformation in trust and increased participation by local communities. Detailed case study is presented in Section 3.10.

ENVIRONMENT

In relation to environmental challenges, there is also the increasing need to develop the resilience of cities in Asia and the Pacific. More also needed to be done to develop low-carbon urban models. Cities are both the source of, as well as the principle victims of climate change. Urban growth patterns were also cited as inefficient and resource-intensive. It is imperative that cities develop in a more resource efficient manner such as the ones below with selected Case studies highlighted.

SHIFTING CONSUMPTION PATTERNS TO FIT AVAILABLE RESOURCES AND DEVELOPMENT OF ALTERNATIVE TECHNOLOGIES, MATERIALS OR ENERGY SOURCES

The overall trend is that of burgeoning emerging middle classes in the Asia Pacific region which will re-shape consumption and production patterns, resulting in an enormous strain on natural resources. Two ways of addressing future city and resource growth include shifting consumption patterns to fit with the availability of resources and the development of alternative technologies, materials or energy sources. Both required a strong public policy framework, support of the private sector and of communities.

The water management approach[28] in Singapore is one that demonstrates the importance of strong policy support of putting into reality their target of water sustainability. Water sustainability and security is vital for Singapore as there is no groundwater and the land area is not sufficient for collecting and storing water to meet its requirements. The government has invested considerably in research and technology for water conservation, and in implementing the first stage of a deep tunnel sewerage system to redirect wastewater flows towards water reclamation plants. The current water supply in the country is drawn from four sources, one of it is the NEWater which refers to the collection, treatment and purification of used water using advanced technologies, rendering it even purer than World Health Organization standards and perfectly safe to drink. NEWater meets 30% of the nation's needs. Singapore currently has one of largest desalination plants in Asia, using reverse-osmosis to transform seawater into drinkable water. In efforts to reduce the amount of water used and wasted, lessen the country's dependence on imported water and prevent water wastage through leaks, a series of projects has been launched to clean up the Singapore River, increase the number of reservoirs, fix leaks in the water distribution system and encourage the public to reduce their water usage. Detailed case can be found in Section 3.11.

On the other hand, the use of integrated public transport system, modes of transportation that use clean fuels and promotion of non-motorized mode of transport is an example of dealing with environmental development issues. The threat of climate change related disaster to human settlement is well known to Kaohsiung City, which has been severely affected by torrential rains and floods. Hence, the city urgently needs to strengthen its policies and infrastructure to reduce greenhouse gas (GHG) emissions and increase its resiliency. Kaohsiung is on the fast-track toward becoming an eco-mobile city through the integration of a variety of public transport systems, In addition to the deployment of public transport infrastructure, convincing residents to opt for public transit over private transit is a pivotal challenge to eco-mobility[29]. The City of Kaohsiung's transportation planners are addressing the challenge of reducing private vehicle dependency through people-oriented, low carbon transport alternatives to improve the environment and quality of life. In recent years, the City has integrated a mix of viable transportation alternatives with the aim of building a sustainable and eco-mobile city. The City is realizing its ambitious goals through the provision of Bus Rapid Transit (BRT), Metro Rail Transit (MRT), Light Rail Transit (LRT) and a public bike system, and has thus far achieved encouraging results. This case is detailed in Section 3.12.

PARTICIPATORY APPROACH IN DEALING WITH ENVIRONMENTAL CHALLENGES

Involving grass root communities in dealing with present and future environmental challenges is important. In the battle against climate change, strong partnerships will be essential. The case of promoting peri-urban agriculture[30] in flood prone areas of Gorakhpur India is an example of allowing people at risk to act on reducing the risk they face from disasters. Gorakhpur, a secondary city located at the confluence of the Rapti and Rohin rivers in eastern Uttar Pradesh, India, is one of the fastest-growing cities in the mid-Gangetic plains. Its proximity to the Himalayas makes it vulnerable to floods, which impacts the livelihoods of poor and marginalized communities. The peri-urban areas of Gorakhpur are particularly prone to recurring floods and waterlogging for two to three months every year. As a result, small and marginal farmers suffer from crop losses. Climate change is likely to increase the intensity of similar rainfall events by 10 to 20% in the future. The Gorakhpur Environmental Action Group, an NGO that seeks to mitigate the risks associated with flooding by maintaining the existing open spaces uses a strategy of strengthening livelihoods based on peri-urban agriculture. In these flood-prone areas, peri-urban agriculture is a means to keep areas that

28 UN HABITAT (2012). Accessed at *http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Urban_patterns_for_a_GE%20-%20optimizing_infrastructure_UN_Habitat.pdf*

29 ICLEI (2014). Kaohsiung, Chinese Taipei Steering towards an eco-mobile city with integrated public transport. Case Study 168. Accessed on 30 April 2015 at *http://www.iclei.org/fileadmin/PUBLICATIONS/Case_Studies/ICLEI_cs_168_Kaohsiung_2014.pdf*

30 Mani, N., Singh, A., Wajih, S. (2014). Promoting peri-urban agriculture in flood-prone areas in Gorakhpur, India. In Grow the city innovations in agriculture. Urban agriculture magazine, 28, pp 72-76. Available online at *http://www.ruaf.org/sites/default/files/UAM28.pdf*

are vulnerable to flooding free from construction and to maintain their natural functions (such as enhancing water storage and infiltration, and in this way reducing run off). This reduces the vulnerability of the urban poor and enhances their capacity to cope with the impacts of floods. It also helps to enhance the sources of food and income available to peri-urban agricultural communities. Since women members of the family do most of the agricultural activities, nutritional security is an important outcome. In addition, peri-urban agriculture diversifies food sources, thereby reducing energy footprints, as well as creating income opportunities. Preservation of local biodiversity and recycling of urban waste are other potential gains that peri-urban agriculture offers. Detailed case study is presented in Section 3.13.

Another case is the cooperation between local authority and communities in Dagupan City, Philippines in reducing flood disaster risk[31]. Flooding in Dagupan is now a common problem due to rivers having high sediment load and do not drain easily into the sea. The situation is aggravated by the onset of high tide that can go as high as 2.2 meter above the average sea level. Tidal back flow has created secondary rivers in addition to the City that has grown to a major urban center for the region. The flooding hazard of Dagupan City is well-understood by the local authority. The perception of the problem was that it was serious in prior already combination disaster response, and recovery activities, scope and effect. Dagupan City government had grouped the types of risk they face into four: health and sanitation, life and property; peace and order and environmental degradation. The CDCC decided to form a Technical Working Group (TWG) focusing on disaster mitigation and risk reduction. The membership of the TWG was drawn from the existing members of the CDCC. The TWG created tasks related to DRR and disaster mitigation: planning, documentation, training (design, planning and implementation), water quality monitoring, barangay-level waste management, flood canal maintenance, and tree pruning. In addition, the barangays in Dagupan were grouped into three "teams", and some members of the TWG were the Team Facilitators. In this role, they had to lead their team towards managing their disaster risk at the community level. The TWG conducted an assessment of each barangay's capacity to respond to a disaster, collected data on the number of evacuation centers, their location, and the facilities available per center, and conducted an assessment of each barangay's vulnerability to flooding. With the creation of the TWG, the city was able to continually address disaster risk and mitigation. The plans and activities were implemented through its members' own roles as officials of the City Government. Detailed case study is presented in Section 3.14.

Another case worth highlighting in this section is the example of "Strengthening Resilience of Urban Communities and Schools in Dhaka, Bangladesh", detailed in Section 3.15. As a city vulnerable to natural disasters, almost 30% of Dhaka's population lives in water-side informal settlements prone to flooding and water logging. Poor waste management in these settlements exacerbates the health risks associated with flooding and water-logging resulting to high occurrence of waterborne diseases and respiratory problems, with consequential interruptions to education and economic livelihoods. Results and recommendations of the DRR and Resilience Assessment conducted by World Vision in Kamalapur and Dhaka East urban slums was the basis for the design of the Urban Bangladesh DRR Project. Currently being implemented, the objectives of the project are to reduce the risk of flooding, water logging and related water borne diseases and infections in urban settlements and schools in Dhaka and to support local governments and communities to adapt, mitigate, prepare for and respond to disasters. Under the first objective, World Vision Dhaka is implementing community-based DRR activities in water-side urban slums. World Vision is working with the local government, the community and schools towards attaining the project objectives. Community WASH and garbage management committees are formed, which regularly meets and developed plans for implementation of appropriate activities. Training sessions on WASH and hygiene promotion are also organized at household level and in pilot schools. Public awareness regarding WASH and health are also being raised by distribution of information education and communication (IEC) materials. School-based garbage management systems are also established, with campaigns and training sessions provided to school authorities and students. Pipeline and drainage infrastructure in schools are improved. Capacity building activities on early warning, preparedness and disaster response organized for local government stakeholders.

31 ADPC (2007). Cooperation between Local Authority and Communities: Reducing Flood Disaster Risk in Dagupan City, Philippines. Safer Cities 16. Available online at *http://www.adpc.net/igo/category/ID215/doc/2013-n63UI8-ADPC-Safer_Cities_16.pdf*

CASE STUDIES

3

This chapter presents more details of case studies presented in the previous section.

3.1 NANJING: REVITALIZING THE INNER CITY[32]

INTRODUCTION

Economic growth and urbanization in China brought environmental costs and risks to people. For instance, due to dependence on coal energy, cities suffer from environmental pollution. Water supply also becomes scarce and suffers from poor sanitation. In the country's pursuit to sustainable development, good practices in urban regional developments have been used to learn from. One example is that of the redevelopment program of the inner city areas in Nanjing City, Jiangsu Province.

Nanjing City was founded in 495 BC and became the Provincial capital in 229 AD. The 19 miles long and 39 feet high city walls was preserved. The tombs of the Ming Dynasty are declared as a World Heritage Site. The City has also the Sun Yat-Sen Mausoleum, Art World of Red Mansions, the Presidential Palace during the Republican Period, and a known Confucius temple. The cultural heritage is preserved at the same time the City aspires to become an international metropolis like Shanghai and Hangzhou. The population in the City continuously increases from more than 8 Million according to the 2010 census to a projected population of about 10 Million in 2050. With a territory of 6,516 square kilometer, approximately 91% of the people live in the urban area while 9% in rural areas.

32 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

IMPLEMENTATION

With jurisdiction over 12 districts including Xuanwu, Baixia, Qinhuai, Jianye, Gulou, Xiaguan, Pukou, Luhe, Qixia, Yuhuatai, Jiangning, and Jiangpu; and two counties including Lishui and Gauchun, People's Government of Nanjing City is under the political authority of the Communist Party. The Secretary of the Nanjing Communist Party Committee is the de facto governor of the city. Then a Mayor who is appointed, is the head of the government executive branch. Nanjing authorities with the people, in order to make sure environment is conserved, economic growth continues, social equity enhanced and poverty reduction is pursued, implemented projects and programs to revitalize inner city areas. Examples of their programs include redeveloping inner city areas, the use of a regional approach to achieve metropolitan development, and pursuing housing reforms and poverty reduction schemes.

In Nanjing Master Plan, redevelopment of the inner city is a focus. Specific types of development are established in well-defined zones within the downtown areas. Type of developments for instance includes information centers, administrative centers, shopping centers, cultural institutions, and areas for production and sale of scientific and technological products. 13 protected zones are indicated in the plan to preserve historical and cultural heritage. Within these zones are located ancient and traditional houses, the Zhongshan Scenic Area and the Stone City Scenic Area, major museums on ancient and modern history and a number of buildings holding historical relics. The inner city development scheme is a combination of cultural conservation with tourism and entertainment. For instance Fuzimiao area focused on the ancient temple of Confucius was developed into shopping, eating, and entertainment area. While Xiaotaoyuan used to be occupied by squatters near the city walls, was turned into a park. High-end housing is constructed and income generated is used to cover maintenance costs of the park. Areas used to be occupied by rundown structures are turned into commercial, service, and entertainment centers. Now with more than 70 enterprises, the 1912 development scheme behind the Presidential Palace of the Republican

era is now used as the entertainment hub for Nanjing. The area is linked to city's public transport system and had provision of vehicle parking.

In the urban development, some people living in inner cities were taken importance of and were relocated to suburban housing projects. Provided were various type of housing such as high-end luxury condominiums and densely inhabited neighborhoods where water facilities, toilets, and kitchens are shared by families. Slum upgrading programs are also implemented for informal and uncontrolled settlements. Mini-parks and open spaces were created for residents. One way night markets are organized, community development programs are implemented in inner city areas to allow and let people participate in social campaigns such as neighborhood beautification and vaccination. Suburban settlements are also given access to the city through a system of arterial expressways (spokes) and to each other by a system of circumferential roads (rings). A 17-kilometer north-south line and east-west rail-based metro system was constructed and implemented since 2005. Industrial and technological development has also been concentrated in suburban areas, such as the high-tech enclave located near the international airport. Nanjing metropolitan region has been planned holistically. Areas between the nodes are also preserved as green spaces and agricultural production sites. The suburban regions of Nanjing produce vegetables, fruits, freshwater fish, and other food items for the city. The current city master plan continues to stress urban agriculture as a major thrust in the total development scheme.

RESULTS/IMPACTS TO THE COMMUNITY

Redevelopment of inner cities allowed for a case, densely occupied zones with people living in extremely crowded housing areas, and at risk from lack of resources to be relocated to have better quality of life. Nanjing city authorities, with technical assistance from the American Planning Association, adopted a redevelopment scheme with elements of landscaped park, high rise condominiums, affordable housing units, local community service centers, and provision of water and sanitation. Instead of massive destruction of traditional houses, the redevelopment plan for Menxi uses a slum upgrading approach. Courtyard walls are cleaned and improved, adequate water supply and sanitation facilities provided, and people organized and directly involved in the improvement of their community. Some other benefits from this interventions include (a) provision of economic opportunities in the inner city, (b) ensuring affordable housing in inner city areas, (c) creating entertainment and commercial enclaves, (d) enhancing cultural conservation by combining it with tourism and entertainment, and (e) fostering environmental sustainability by the provision of parks and open spaces.

LESSONS LEARNED

Towards achieving sustainability, the following policy interventions can be drawn from the case of Nanjing City:

- Adopting a regional approach to planning gives positive impacts to sustainable development. Aside from developing the inner city area, the regional plan include suburban nodes and areas of high density that are more or less self-contained in terms of sources of employment, residences, service centers, shopping, and entertainment.
- It is important to connect urban nodes to the city and to each other through a comprehensive transport system. Improving mobility of people and goods through the development of hierarchical transport system is important intervention. This is also a good way of connecting transport and land-use planning.
- Preservation of agricultural land and conservation of open spaces is a key intervention. Urban agriculture is becoming an important way of establishing food supply near the city and also of using the city waste as input to food production.
- Adopting intergovernmental political and administrative mechanisms makes metropolitan and regional governance more efficient and effective. Unified metropolitan governance is used to coordinate the delivery of urban services, with special concentration of key urban functions that are region-wide, such as water and sewerage, transport, and solid waste disposal. Financial mechanisms are also important, illustrating how a regional approach can improve the financial viability for the government, improve sharing of tax revenues, and bring about more equity among local governments in a metropolitan area. This also helps in management and coordination of preparation for disasters that are potentially faced by the urban population.

3.2 RISK ASSESSMENT AND BUILDING MITIGATION FOR LANDSLIDE[33]

INTRODUCTION

Risk assessments and capacity building for landslide mitigation was conducted in three Asian countries including Philippines, Sri Lanka and Thailand. Under RECLAIM, the main objective of the project was to promote proactive approaches to landslide risk mitigation for reduction of loss of lives in future landslide events. The project implementation was led by the Asian Disaster Preparedness Center under the auspices of the Government of Norway.

In the Philippines, the project which focused on strengthening community capacity and enhancing local commitment was implemented in Baguio. A major City outside the Metropolitan Manila, Baguio City is located 1,500 meters above sea-level and is built on uneven terrain with subsurface of mostly stiff clayey silts and light clays underlain by limestone that contributes to the area being prone to natural landslide hazards. Both migrants and tourists are attracted in the City leading to rapid urbanization that creates pressure on land, pushing the inhabitants to settle within hazard-prone areas. Landslide risk is increasing due to excavation related to residential construction that magnifies the water absorption and thus the slope instability, as well as continued deforestation from development activities. The City is also dissected by young and vigorous eroding river systems that have produced large elevation differences has undergone intense tectonic activity that have caused development of many slope failures representing potential landslide risk occurrence. A technical survey conducted also showed that land movement patterns are related to the poor drainage system.

In Sri Lanka, the project focused on the development of a landslide early warning system through a school-based network of rainfall monitoring stations. The implementation was done in Kaluthara district, one of the most densely populated province of Sri Lanka, and located at the southwest part of the country where there is high risk from landslides triggered by heavy rainfall. The rainfall monitoring system in Sri Lanka is used mainly for agricultural purposes, and the locations of rain gauge stations do not correspond to the areas with landslide risks. On the other hand, a landslide and flood risk assessment was conducted in Patong City, Phuket, Thailand. Patong City is located on the west coast of Phuket island. Despite having limited plain area for development, it has been facing pressures for further development beyond the urban area. Due to urban expansion and its correlated man-made modifications on the local natural drainage patterns, wetlands have been disappearing. Recurring flooding events are due to reduced loading capacity of culverts and bridges that now control water flows. These and changing landforms and destruction of land cover has been leading to increased landslide risk in the area.

IMPLEMENTATION

The Landslide Mitigation Demonstration Project was led by Baguio City officials with ADPC, University of the Philippines (UP), and the Norwegian Geotechnical Institute (NGI) at the top of the project implementation. The stakeholders involved compiled their knowledge and skills to foster a comprehensive landslide risk mitigation process. The Project focused in 5 sub-districts in Baguio City to increase the feasibility of assessing and monitoring landslide risk, and include more stakeholders and beneficiaries into the project. The five selected barangays are all adjacent to each, with San Luis located at the center. The pilot area was at the boundary of Barangay San Luis and the Baguio Pines Garden Subdivision. During the project implementation, capacity building activities were conducted. Community awareness regarding landslide disaster was also done involving the people themselves. Round table discussions were organized, putting together officials of the municipal government, management of the subdivision, and residents of selected sub-district areas to promote cooperation between the local government and the barangay residents.

33 ADPC (2009). Using Risk Assessments to Reduce Landslide Risk, Safer Cities 26. Available at *http://www.adpc.net/igo/category/ID225/doc/2013-y17Gx3-ADPC-Safer_Cities_26.pdf*

In Sri Lanka, a school-based landslide early warning system was established in Kaluthara district Sri Lanka. The project was implemented in coordination with the National Building Research Organization (NBRO) that was at that time doing a project on installing rain gauge stations as part of a landslide early warning system. The method employed in this project built on existing resources in order to limit issues of lack of resources while producing huge impact in the community. Schools in Kaluthara were made the center where rain gauges were installed for monitoring rainfall data. Ten schools were selected through criteria including level of hazard according to the already available landslide hazard zonation map, the availability of facilities such as computers and technical knowledge within the school, the number of students, and the school category. A disaster management cell was also established in each school to structure the rainfall data collection, and enable an efficient transfer of knowledge on landslide risk management. Workshops were organized to raise awareness and train the cell members on how to use a landslide probability chart. The chart was used to establish the linkage between the amount of rain and the probability for a landslide to occur in a certain area. The chart was divided into five categories according to the level of landslide risk a rainfall event can trigger, based upon previous local observations. Rain gauges were distributed to the schools, and the Meteorological Department has helped in the installation and training of students and teachers on rain data collection.

Landslide and flood risk assessment studies conducted in Patong, Thailand was led by Norwegian Geotechnical Institute (NGI) with team members from the Department of Mineral Resources (DMR), the Geotechnical Engineering Research and Development Center of Kasetsart University (GERD), and ADPC. A comprehensive mapping process was done throughout the project to understand and assess the overall components of landslide risk in Patong City. The landslide risk mapping focused in 2 villages: Kalim and Na Nai village. Kalim with a population of 889 inhabitants is situated on the lower and toe slope on the northern hillside, with very active land development. Landslide events have increased, leading to recent and more frequent flooding and debris flow. Na Nai village with a population of 2,656 people has the shape of a long strip. The city has to cope with high tourist arrivals that lead to rapid and mostly unplanned land development and related transit under the tourism economic sector, and that increased the erosion process of its slopes. A series of mapping activities were undertaken to map out the topography, hydrology, and land-use patterns in the area. The flood mapping identified areas likely to be flooded. To better understand how water circulates in the area, hydrologic models were developed based upon 10-, 50- and 100-year return periods, extreme precipitation patterns and run-off patterns on 12 predefined sub-basins in the area. The hydrologic modeling, the river hydraulic modeling and the flood mapping enable the building of scenarios and to forecast potential impacts. The different areas at risk and the impacts a flood event can trigger in the different zones according to its intensity and its return period can then be known. The models are continuously updated and reviewed according to further experience through work with the model and field observations. Landslide risk mapping combined the analysis of the results of the landslide hazard mapping and the vulnerability factors in Patong. Demographic data and building use and ownership information were extracted from the Patong taxation map. Landslide risk mapping of Patong highlighted the number of people exposed to possible landslide events, as well as the potential loss of properties in case of a specific natural hazard occur.

RESULTS/IMPACTS TO THE COMMUNITY

After the demonstration project on flood risk mitigation in Baguio City, several activities have been developed that resulted to an increase in community awareness on the hazard, risk and prevention. A five-step methodology on landslide risk mapping was established that was followed in doing the participatory risk mapping. The method included the identification of community boundaries; definition and establishment of landmarks and roads; delineation of high-risk areas and development of reports to authorities for action; determination of low-risk areas; and identification of safe areas for evacuation. Community participation was enhanced as it was a requirement for the project implementation.

The landslide risk management project in Kaluthara Sri Lanka resulted to benefits between the NBRO and the community. Through the landslide Early Warning System implementation, NBRO can continue to monitor and forecast possible landslide occurrence. For the community, involvement of schools in the process of landslide risk management enhanced knowledge and capacity of the disaster management cells. The demonstration project can guide how to establish

permanent rain gauge stations through non-technical organizations such as schools and expand to other areas.

The land management model that was developed in Patong in Phuket Thailand is used to predict landslide hazard. Land management has made over the past decades great improvements concerning cost-effective techniques to prevent landslides. Through the overall mapping activities, the areas within the city, with specific flooding exposure and landslide risk, are identified Gabions, cages filled with to stabilize the slope from erosion. Channel construction to improve the water circulation within the area and reduce the erosion process in Patong City and assessed. Understanding the scope of the potential impacts over years within a city is crucial to mitigate the landslide risk. Scenarios are then built and appropriate measures can be advocated towards decision-makers and community for them to undertake the right steps to prevent disastrous impacts on the population and the urban infrastructures. The recommendations were made according to the conclusions that the risk mapping provided. These were delivered to the decision-makers at the city-level and at the relevant disaster risk mitigation agencies. Several steps were proposed to impede further slope failure and reduce landslide risk. These include the following:

- Housing should be constructed outside of a failure zone, and away from a cut slope, according to the land authority. Furthermore, the soil excavation and filling should be endorsed by civil engineer.
- The denser the land cover in the slopes, the more the surface is protected from erosion and water infiltration. Plastic sheeting can also be used but it can only temporarily prevent surface infiltration. A clay cover can be used as permanent protection.
- Vegetation and gabion, cages of rocks, can reduce erosion by water, and should improve slope drainage, thus strengthening slope stability. In addition, synthetic fabrics such as geo-textile can be used to reinforce the soil.
- Comprehensive surface drainage in the slope prevents erosion and surface failure to be deepened by use water ditch.
- Engineering structures, including Mechanically Stabilized Earth (MSE) walls, can be used to reduce earth movement in certain areas. Retaining walls, soil nails for soil slope protection, and rock bolts/ anchors for rock slope protection are some of the means for the slope to become more resistant to slipping. Relocation of the community is usually complex; it is recommended to have the community assess and continuously observe terrain stability and, update the landslide risk mapping accordingly using the community observations. The main objective was to mitigate landslide risk in the project site, therefore land management activities were undertaken by the community to stabilize the soil.

A capacity building workshop for Patong municipal officials, and other officials in Phuket provincial government, villagers and land developers was conducted. The technical inputs were used to provide a solid and relevant basis to present and explain landslide mechanism to the local people in charge of disaster management, emergency relief, and recovery process. The technical studies were a great support for convincing them on the effective steps needed for landslide risk mitigation. City authorities were advised to avoid creating new barriers and keep all existing waterways open; grey water treatment and disposal should be part of river planning to avoid contamination of flood water and the possible health-related problems; and strengthen the flood monitoring program to provide precipitation and associated flooding data for effective flood management.

LESSONS LEARNED

The following are the lessons learned from these three case studies:

- Scientific knowledge and practices need to be understood and used proactively by local communities. Their capacities to mitigate landslide risk are thus strengthened, ensuring sustainable risk reduction activities while the sense of ownership is created.
- Land use planning, as an important landslide push factor in case of unplanned land development, needs to consider landslide hazard in the decision making process, in consultation with civil engineering and local communities.
- Monitoring and analysis of natural parameters such as rainfall patterns and water absorption, land movements and slope evolution is critical to landslide risk mitigation.
- Traditional knowledge can validate evidence of past landslide events, and helps to further understand the landslide perception among the local communities.

Traditional technologies are also useful in designing landslide Early Warning System.

- Community-level capacity building, awareness creation, effective information dissemination and advocacy are effective tools in reducing the vulnerability to landslide impacts and strengthening disaster risk management process at local level. Community level disaster risk management institutions are thus essential to be incorporated in the decision making process.

REPLICABILITY/SUSTAINABILITY

Landslide disasters happen frequently in Asia. These three different case studies demonstrate how to reduce the impact in landslide hazard prone areas which can be done in other parts of the region. The mapping process is the first step for landslide risk analysis, to establish zones in terms of degree of risk, and locate the landslide hotspots within the area. Monitoring the land movements and the rainfall patterns is then crucial; in each study area, scientific agencies have focused on the local communities' participation and using their traditional practices as part of their involvement in the landslide risk mitigation process. Incorporating indigenous alternative measures is crucial for monitoring and mitigating landslides while it promotes sustainability and increase the possibility of replication by other communities because the recipients can claim ownership over their own DRR. The landslide risk mapping also allows communities to own and manage the risk mitigation steps from the beginning. The governance system is one of the substantial foundations for fostering an efficient policy framework for the different stakeholders to adopt and implement together a coherent strategy of landslide risk adaptation. In all cities, local authorities have started to engage themselves, following up and implementing policies to build a comprehensive landslide risk mitigation framework, to reduce the exposure and the related vulnerabilities of the population. School-based landslide monitoring project helps ensuring the durability and the expansion of landslide risk reduction among other stakeholders and also other geographical areas by involving students considered as catalysts of change. The active engagement of the population, local officials, and technical experts tend to strengthen the knowledge dissemination channels on landslide risk mitigation and encourage further awareness raising among all the different stakeholders on the landslide risk situation. Subsequently the disaster risk adaptation mechanisms can then be expanded quicker and more easily to other type of risks.

3.3 DISASTER RESILIENCE IN JAMALPUR, BANGLADESH[34]

INTRODUCTION[34]

This case study documents the participatory process and the growing contribution of DRR to local development planning. Jamalpur Pouroshava was a site for a project on reducing food insecurity in the poor urban settlements. Later on, its urban poor communities would tackle the challenge of forming resilience to flood disasters. Jamalpur lies within the floodplains of Brahmaputra and Jamuna River rivers and is therefore prone to floods, soil and riverbank erosion, and water logging during heavy monsoon season. It is also exposed to cyclones. Floods occur due to torrential rainfall, inundation by the Brahmaputra and Jamuna rivers, an inadequate embankment, a malfunctioning drainage system, and settlement on the flood-prone char lands[35]. Char lands were made as residential areas for poor people who can't afford buying land in the city. There are 2 char lands in Jamalpur- Nawbhanga and Compopur. Char Nawbhanga is a primarily agricultural land, and its settlement is highly vulnerable to floods. It is located in Ward 1 and is one of the areas identified as most vulnerable to floods.

34 ADPC (2010). Building a Community-Centered Disaster-Resilient City: Jamalpur, Bangladesh. Safer Cities, 28. Available online at http://www.adpc.net/igo/category/ID227/doc/2013-u05Ctg-ADPC-Safer_Cities_28.pdf

35 Char lands are formed as a river gradually erodes the lands and changes its path to make a complete diversion from the original track, leaving only a trace of the original river in the form of a stream or creek. The land left between the old and new traces is called "char land" or "char island". It is quite fertile, and is usually reserved for agricultural purposes.

IMPLEMENTATION

In 2005, a project named Strengthening Household Ability to Respond Development Opportunities (SHOUHARDO) was implemented by CARE-Bangladesh with financial assistance from USAID. Major objective of the SHOUHARDO program was to build the capacity of targeted communities and institutions to prepare for, mitigate and respond to disasters. With the project implementation, interventions at the city and community levels were initiated by building self-sustaining institutions on disaster management such as the Pouroshava Disaster Management Committee (PDMC) at the city level, volunteers and disaster committees at the community level. The city facilitated a multi-hazard vulnerability assessment, a floods contingency plan, and integrated a DRR budget into the annual development plan of the city. SHOUHARDO transformed to the Program for Hydro-Meteorological Disaster Mitigation in Secondary Cities in Asia (PROMISE), a project implemented in Jamalpur from November 2009 to September 2010.

The objective of PROMISE was to identify the most vulnerable communities in Jamalpur and subsequently reduce their vulnerability through community driven DRR strategies. The implementation pillars included the Mayor, the Pouroshava Disaster Management Committee (PDMC), Water Development Board (WDB), District Disaster Management Committee (DDMC), District Relief and Rehabilitation Organization, Ahsania Mission, CARE Bangladesh and the community, with technical guidance, resources and inputs from ADPC. Activities included participatory planning, community-based mitigation activities, capacity development and mainstreaming DRR into city development planning. Building from assessments on the most vulnerable areas conducted during SHOUHARDO implementation, wards for project implementation were identified. Ward 1 in char Nowbhanga lies between old Brahmaputra and new Brahmaputra. Wards 10 and 12 are located on the right bank of Jhinai river. However, action planning and the integration of DRR into city development plans covered all 12 wards.

The participatory approach for risk management, one of the best tools for disaster mitigation and preparedness in a disaster-prone community is used. Following the guidance from the Bangladesh National Action Plan on CBDRM, ward members helped cluster different communities for preliminary identification of risks in terms of geographic locations and vulnerability. Communities in Jamalpur assessed elements at risk, identified community resources, determined the most vulnerable areas exposed to hazards and gauged their vulnerability. Support from ward members in structuring community workshops has aided in the successful completion of these activities. Baseline information was applied to assess the community's vulnerability in terms of living standards, livelihoods and income in order to gain a comprehensive profile of loss and vulnerability within the community with regards to floods. This approach was utilized to better understand the community's socio-economic conditions, risk perceptions, knowledge of disasters and preparedness measures. It aided in identifying problems and losses. The data and information from the SHOUHARDO project were used at the start of the implementation of PROMISE. When developing hazard maps, women's participation was particularly encouraged despite their literacy rate typically being below that of men. Three separate workshops on community based risk mapping and action planning was conducted 2010 covering all 12 wards. Community members, ward members, representatives from WDB, Ahsania mission, Care Bangladesh and other relevant stakeholders participated. Workshop participants identified high-, medium- and low-risk areas, available critical facilities, their locations and the degree of vulnerability. Police stations, hospitals, mosques, schools (for evacuation centers), roads and bridges were among the identified critical facilities, identified the resources available to the community that can be used in disaster risk management.

RESULTS/IMPACTS TO THE COMMUNITY

Through the participatory approach, the Jamalpur stakeholders worked together to meet the joint objectives, actions and planning on DRR. The result was a systematic assessment of the vulnerability of critical lifelines to floods. The risk maps formulated for each ward indicated the hazards, potential measures, local level mediation and strategies necessary to overcome DRR issues within short-, medium- and long-term planning periods. The primary hazard identified was flooding. Water logging, river erosion and inadequate drainage facilities were the other problems identified, all of which are directly and indirectly connected with floods and torrential rains. The hazard analysis was focused on determining where risk consideration areas were and how they should be prioritized. Historical

information and community experience were used to identify potentially high-impact areas.

Understanding people's previous experiences with hazards is a useful tool in developing coping strategies. Community members held meetings to explore mitigation opportunities that could potentially lower vulnerability and reduce disaster impacts. They identified and evaluated their existing capacity in terms of available resources, knowledge, skills and strengths. Government and non-governmental organizations were considered in terms of the areas where they may assist poor communities in disaster mitigation and ensure that measures taken are easily maintained. During the action planning workshop, participants generated an innovative mix of old and new suggestions. The workshop helped to determine what people do and need with regards to disaster preparedness, mitigation, response, recovery and rehabilitation in order to reduce the damaging effects of the hazard, protect themselves and secure livelihoods and community services. Inputs from ward-level workshops were compiled in action plans and then validated by TWG, ward representatives and community members at the city consultation workshop held in September 2010. Several recommendations developed from workshop discussions about how to include a DRR section within the municipality development plan. Recommendations included the activation of the PDMC in line with DRR activities, the allocation of a DRR fund under the annual budget, and fund-raising for DRR.

The action plan now serves as a guide for the city council on making decisions regarding allocating funds and prioritizing DRR activities. During the development of the community action plan, the people of wards 1, 10 and 12 proposed large-, medium- and small scale mitigation activities. Under PROMISE a small grant was made available to the most needy communities for small-scale mitigation items, and funded the evacuation access roads and water supply facilities for the three wards. The large-scale, high-impact items were forwarded by TWG to the district or the central government via the TWG members from LGED, PWD and WDB. Thus, two dirt access roads were constructed for two settlements. One access road connected the main Rashidpur Road to Madrasha Road, and the second connected the main Rashidpur Road to Tangorpara Road. Later, the Pouroshava will have to strengthen the access roads structurally to ensure that they will be resilient against high-impact flooding should it occur.

Another problem faced by people in Jamalpur was shortage of lack potable drinking water. Due to bodies of water surrounding the whole of Bangladesh including Jamalpur, the ground water table is very high and water is not able to percolate naturally for filtration which is necessary in reaching an acceptable level for drinking purposes. Through the implementation of activities under PROMISE, small-scale mitigation priorities were agreed upon by all and implemented by both the municipality and community. Five deep wells were drilled and supported with concrete platforms for washing and bathing purposes, all with proper wastewater drainage outlets. With this, about 20 – 30 people benefit from each tube well. Accountability and leadership roles was also seen and appropriated to the Mayor, ward councilors and community leaders. Hence, good governance practices were utilized. CBDRM is a systematic approach used to influence governance functions.

It was acknowledged by authorities is Jamalpur that incorporating DRR into development activities, policy-making and project planning and implementation is important. Hence, a 5-year development plan incorporating DRR strategies was produced for Jamalpur. The physical development plan of the city determines the relationships between and growth of the building control, housing, land use development, public utility needs, infrastructure, water, drainage, power, communication and agricultural sectors.

Flood forecasting warning involving the communities was also established in Jamalpur. Organizations such as the Flood Forecasting Warning Center (FFWC) operate to produce daily monsoon bulletins, river situation reports, river level forecasts for 24, 48 and 72 hours and other consistently updated information. Emergency Operations Center (EOC) was established with basic tools such as life-jackets, ropes, helmets and first aid kits. The elected members of the EOC were educated and trained. Excellent results were achieved by identifying members of the PDMC, defining their roles and holding them accountable so as to not forget their responsibilities. The early warning system was established under the existing institutional mechanism for flood control, drainage and irrigation with WDB having key role guided by National Water Policy and National Water Management Plan. The national level flood forecasting warning system produces forecasts by recording daily rainfall data, while FFWC produces inundation maps.

LESSONS LEARNED

The following has been learned from building resilience in Jamalpur implementation:

- Urban poor people, such as those in Jamalpur, are strong in social ties and can therefore be trained and mobilized to act together in reducing the risk they face. This case study exemplified that the people can develop participatory action plans and risk maps to be used as basis for planning and implementation purposes in building the communities resilience.
- DRR actions or any development activity will be sustainable once the political commitment is in place. In an environment where those in leadership positions have a high turnover, sustainability lies in the hands of a leader who is dedicated and capable of maintaining the support of others. Such proven political leadership was seen in Jamalpur, ensuring the continued growth of Jamalpur towards building into a safer city in the future.
- If a city wishes to engage the local stakeholders in DRR activities, it should consider tapping local agencies such as the WDB for collaboration on major flood protection mitigation. Any city can strengthen its own institutional capacities and implement practical DRR actions by themselves. The key is to include DRR into mandated ro**u**tine operations such as the provision of basic services, land-use planning and development control.

REPLICABILITY/SUSTAINABILITY

Urban cities in developing countries in Asia and Pacific faces common problems on increasing urban poor settlements that are usually located in high risk areas. Efforts in building communities resilience as shown in this case study can be replicated in any city. Educating, training and mobilizing the urban poor communities in working together tow rds reducing their risks from disasters, take strong political and technical support.

3.4 LOCAL LEVEL CAPACITY AND SUSTAINABILITY BUILT FROM STRONG AND GOOD LEADERSHIP[36]

INTRODUCTION[36]

After the crisis in the late 1990s, Indonesia has taken efforts towards a more sustainable development. This was done by democratization, decentralization and to some extent, privatization. Democratization including the implementation of good local governance and decentralization can be seen as one of the prerequisites for successful urbani²ation. This is demonstrated in this case in Sleman Regency, Yogyakarta. With an area of about 575 km2, Sleman has a total population of 850,000 people in 2003. As a result of the rapid expansion of Yogyakarta urban region, some parts of the local government area have become urbanized. The agriculture sector still contributes approximately 19% to the districts total economy. Sleman not only houses one of the largest and finest universities in Indonesia, the Gajah Mada University, but also is the home of no less than 35 other large and small universities. It has become an education cluster that has enabled it to develop a degree of competitiveness and specialization in knowledge and learning. The university campuses and their activities naturally attract economic development through multiplier effects, private dormitories or rented rooms for students, restaurants, photocopy service centers, bookstores, and various other retail outlets and facilities. The educational level of Sleman residents can be assumed to be relatively high that certainly pose another challenge for the regency government, as the citizens tend to be more rationally critical. This has provided an impetus for various good governance measures to be introduced. Sleman is acknowledged as having one of the most progressive local governments

36 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

in Indonesia. It has achieved a number of awards in recognition of its focus on achieving excellence in good governance, economic development, and financial management. Several urban development good practices were adopted by the local government that has significantly contributed to sustainability.

IMPLEMENTATION

The Sleman district has adopted good practice administrative procedures under its bupati (mayor) from 2000. During that time the Government, assisted by the USAID's performance-based budgeting training program, has adopted asset- and accrual-based accounting and valued the entire region's public assets. The asset appraisal process took some time to complete because the location of many utility services was not known, the result of poor plan record keeping. In 2003, it took the initiative to prepare and present publicly an annual financial report. An independent professional audit of this report was conducted to ensure that it complied with national accountancy standards. The audited financial report is considered a very important instrument in the operation of corporate governance. The report meets a number of objectives as follows:

- a manifestation of public accountability and transparency – of how far the Regent and the local government have carried out their respective authorities;
- an internal performance evaluation – to determine how well the government institutions of Sleman have implemented policies based on the regency's political documents and regulations issued by the higher governments;
- an analytical instrument- enabling other parties outside the local government to participate in local economics and investment considerations;
- a managerial controlling instrument – to determine the level of achievement of the central management in implementing the local political decisions and operational policies; and
- a regional planning instrument – that considers all aspects of strengths, weaknesses, threats, and opportunities.

These five aspects are contained in Sleman's financial report that comprises the regency's balance sheet report on the regency's revenues and expenditures, report on the regency's cash flow, and other related explanations. Sleman became the first district in the country to report the summary of its annual budget and its implementation publicly through local newspapers. Although the same practices have been implemented by some other district governments, many other local governments are still content to report only to the local councils. Council finances are reported by journalists in newspapers, but the balance sheets are not reported. Sleman and a few other districts are pioneering transparency, which is demanded by a local population that is increasingly better informed and educated about matters of local government. Such a climate not only elicits a positive reception from the population but has also been seen as improving the environment for private investment

In dealing with urban problems such as transportation, waste, drainage, and water supply, which are also shared with two other districts such as the city of Yogyakarta and the Regency of Bantul, Sleman has taken a leadership role in developing stronger and more institutionalized cooperation with the two districts to cope with inter-district urban problems. The three districts have established a joint secretariat, Kartamantul (from the names Yogyakarta, Sleman, and Bantul), which has successfully dealt with the problems of solid waste collection and processing, wastewater management, public transportation management, and many other issues. While it was somewhat dormant in the years prior to decentralization, this entirely local initiative now provides the local governments with greater opportunity to deal with their own problems. More recently, it has obtained external support from development partners, in particular the GTZ Urban Quality program. The above activities show that Sleman approaches sustainable local development through two main strategies: externally though leadership in cooperation with adjacent districts to solve common problems, and internally by implementing principles of good governance, such as transparency, participation, efficiency, and effectiveness.

The district has undertaken extensive mapping of social, environmental, and economic resources under a project known as AAA. This project has involved assistance from the Swiss Government to establish a geographic information system, linked to cadastral maps prepared for the region. The district has used the maps to analyze complex information and undertake detailed planning, monitoring, and evaluation of environmental impacts resulting from development. It has also shared information and has collaborated

on projects with other districts in the province. Sleman has also invested in building infrastructure and facilities, such as the Kebonagung-Kaliprogo bridge, roads, a sports and recreation center with road access, regional government office building, modeling school, Tambakboyo dam for water conservation and recreation, and Gamping market, and relocating the informal sector (Pedagang Kaki Lima/PKL) center. These investments have been important in developing a clean and efficient physical environment.

Additionally, Sleman has been able to build unique strategic infrastructure to give it a competitive advantage over other regions in Indonesia in tourism, education, and specialized food industries. The large number of education establishments in the municipality has led to an informal industry cluster that the district is seeking to develop by encouraging international universities to establish campuses in the district. There is a growing synergy emerging between businesses, leading to an increased interest in development, innovation, and new small business activities. The extension of these networks into wider regional and global networks is considered important to the long-term development of the economy. The district has invested extensively in the education of staff and government agencies, which have developed a high level of competency and expertise in addressing a wide range of development problems. The district has also focused on developing international linkages to identify opportunities for leveraging resources and cost-sharing arrangements. It has developed a high level of community consultation, which commands trust and respect from the community.

LESSONS LEARNED

The case study presented here provides the following lessons:

- By transferring authority and necessary resources to the city/local governments, decentralization has provided opportunities for city/ local governments to pay much more thorough attention to problems faced at the local level than could any central government.
- This case demonstrates that intergovernmental cooperation can work to benefit all parties involved and shows that implementation of good governance principles can have positive outcomes for local governments.
- Local leadership has been an imperative factor to success. However, to sustain good practice in the longer term, there should be a more concerted effort to reduce dependency on particular local leaders and to tran form personalized leadership into a more systemic or institutional course of actions.

3.5 USE OF GIS FOR URBAN SLUM MANAGEMENT IN INDIA[37]

INTRODUCTION37

One of the main obstacles of effective urban planning in India is the lack of up-to-date, comprehensive and detailed information. Municipalities fail to include informal settlements in city-wide planning and urban development. Major projects tend to skirt around these areas, which are often seen as chaotic masses rather than understood as neighborhoods in their own right. When these settlements are not ignored altogether, planning approaches rarely treat them as integral parts of the city.

IMPLEMENTATION

Shelter Associates has been working to promote inclusive urban planning since early 2000. We have collaborated with Baandhani in Pune, Sangli and Khuldabad to introduce slum surveys and Geographical Information Systems (GIS) as tools for integrating low-income settlements into urban planning and development. Research is directly applied to field projects, and used to help inform local government policies. Connecting research with needs-based interventions leads to better solutions and the possibility of large-scale projects.

37 World Bank (2013). Building urban resilience: principle, tools and practice. Accessed on 25 April 2015 at *http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2013/03/08/000356161_20130308155433/Rendered/PDF/758450PUB0EPI0001300PUBDAT UNESCAPE02028013.pdf*

FIGURE 3 Slum mapping done in India with community participation[38]

An important part of the work with Baandhani comprises studies of poor people in urban settings. This is not academic research, but the study of existing situations carried out by the poor themselves, and is in keeping with our joint philosophy of validating the existence of the poor living in cities. Baandhani is recording daily life through photo-stories and documents in Marathi, the native language of Maharashtra. Our own research and documentation ranges from film documentaries, photographs and one-page flyers, to in-depth analysis and documentation of settlements, including physical land use and socio-economic factors. Extensive primary research and accessible reporting heightens awareness about slum areas and their residents, and this, in turn, improves levels of participation and the sustainability of projects. All our study material directly feeds into our work, and the information is also made available to stakeholders for planning projects and impacting policy.

The Sangli Sanitation Project is another example of how our research and development work influences outcomes in the field. Another is the Thane Poverty-Mapping and Redevelopment Project, which shows how research can be used to increase outreach to communities and create a comprehensive list of policies for stakeholders to choose from. Governments, NGO-CBOs, and communities can then consider the options jointly and weigh possible outcomes

Although significant progress has been made, urban risk assessments still do not adequately address the vulnerabilities and capacities of people. Risk assessment for urban upgrading should identify slum population and their locations and assess sector-specific risks such as housing and tenure, basic services, critical infrastructure, transportation, social and economic vulnerabilities, community readiness, institutional capacity, and access to data an finances as well as city-wide risks for integration with comprehensive urban planning goals Both the complexity and cost of risk assessment must be considered in undertaking an urban upgrade.38

Many local governments have no mechanisms for systematically monitoring formal urban growth, let alone informal, which makes it difficult to assess risks for informal settlements. The UN-HABITAT Urban Indicators Program in 2005 reported that 80-120 cities had no monitoring systems to track changes in the spatial spread of the city. For targeted risk reduction measures in urban upgrading, disaggregated information on neighborhood poverty indicators is needed. An initiative led by GUO, CIESIN and ITC identified methods using very high resolution (VHR) remote sensing with census data that take into account exposure to natural

38 World Bank (2013). Building urban resilience: principle, tools and practice. Accessed on 25 April 2015 at *http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2013/03/08/000356161_20130308155433/Rendered/PDF/758450PUB0EPI0001300PUBDAT UNESCAPE02028013.pdf*

hazards and open space; access to social amenities, site conditions (location within the urban area, slope, natural vegetation, hazards) and the slum formation.

The NGO Shelter Associates is working with slum communities to use satellite imagery and filed surveys together to negotiate for slum improvement. VHR images from Google Earth are used to digitize slum boundaries and attach information on households, dwellings, and site characteristics from field surveys collected by slum residents. Settlements are mapped by professional agencies using plane table methods that show plot boundaries. Spatial and socio-economic data are entered into a GIS database and accessed by the community to prepare upgrading plans.

RESULTS/IMPACTS TO THE COMMUNITY

In Pune, satellite images were used to provide evidence that individual slums were not growing but that to prevent formation of ne slums in-migration needed to be planned for. Working with slum residents, Shelter Associates compelled the local government to legitimize migrants and initiate city planning to improve slum settlements by widening roads, installing flood protection, and building new infrastructure. The Pune slum census covered over 100,000 households in over 200 pockets throughout the city.

The residents gained skills in data collection, a better understanding of their collective community problems, and opportunities to negotiate with the local government in the planning process. In Sangli-Miraj-Kupwad, slum mapping by the community initiated a comprehensive approach with the local administration and its elected members to improve all slum pockets. May slums have been mapped and improvement plans produced cost-effectively.

LESSONS LEARNED

This example showcase how the people living in slum areas can be m bilized to gather data and information to enable them to analyze the risk they face.

3.6 A TOOL FOR URBAN DISASTER MITIGATION PLANNING IN DA NANG, VIET NAM[39]

INTRODUCTION39

Viet Nam is known to have perennial flood events. In 2011, the Rockefeller Foundations funded the Project named "Da Nang Hydrology and Urban Development Simulation Model" through its ACCCRN program. The project was implemented by the Da Nang Department of Construction (DOC) and the Institute for Social and Environmental Transition-International (ISET). The project is aimed at developing a database on Da Nang's socioeconomic development to assist in the management of urban development, climate change and sea level rise; developing hydrologic-hydraulic model, and simulate urban flood maps under different urban development, climate change and sea level rise scenarios; contribute to steering city urban plans towards sustainable development in the context of exacerbating climate change and sea level rise; build awareness among organizations and local people about the potential impacts of climate change and sea level rise on urban development; and build the capacity of staff in relevant agencies, in the application of hydrologic-hydraulic modeling.

IMPLEMENTATION

The project implemented in 2011-2013, have developed key products consisting of the model database, and the hydrologic-hydraulic model. The model database was simulated based on existing maps such as the historical, present and future Digital Elevation Maps (DEMs) of the city. The current maps were overlaid with elevation plans and drainage maps in June 2011 and draft modifications of the Development Plan. For the

39 Tran, P., Tran, D. (2014). Building climate resilience from results of Hydrology and Urban development simulation model project. Da Nang, Vietnam: Institute for Social and Environmental Transition-Vietnam and Da Nang Department of Construction. Available online at *http://i-s-e-t.org/resources/working-papers/results-hydrology-danang.html*

hydrologic-hydraulic model, using the city's historic flood data (2007, 2009, 2010), historical DEMs, and MIKE NAM and MIKE FLOOD models, a set of hydrologic-hydraulic parameters were developed. This provided the basis for developing flood maps for Da Nang city. Validated with real data, the flood maps from historic floods showed that flood levels at Cam Le station and flood-warning levels are almost consistent. Hence, the set of parameters identified was used as a basis for developing flood maps during different flood frequency events and different climate change and sea level rise scenarios.

Results of flood simulation based on climate change scenarios for 2030 and 2050, and of sea level rise in 2030, 2050 and 2100 based on the 2007 flood shows that flows of Yen, Cam Le, and Qua Giang rivers will rise steadily, consistent to historical trends; and water levels at Cam Le will also increase accordingly. Further, findings indicated that climate change will lead to a 0.105 cm increase in water levels at Cam Le in 2030 and 0.62 cm if the entire southern area of Da Nang is fully developed as planned in the modifications to Da Nang's Development Plan (infilling and raising to 4-6.5 m elevation in areas along Cam Le, Yen, and Qua Giang rivers). Specifically, water level at Cam Le monitoring station will be 3.98 meters if the southern area is not urbanized, and 4.6 meters if it is fully urbanized. From these results, modifications to Da Nang's Development Plan together with its structural components were reviewed in order to prevent future increase in flood levels and severe urban flooding in the future. Figure 4 below shows an example of proposed adjustment to the City's Development Plan based on findings from the model simulation. Specific changes are indicated in the Southern floodplain portion of the City. Modifications to Danang's development plan based on results of the hydrologic-hydraulic model include widening of the floodway along rivers and in low-lying areas, and developing clusters of high-rise buildings to minimize flood barriers. Low-lying areas with low population densities and low-rise houses should also be designed to facilitate flood drainage. DOC worked with Da Nang Urban Planning Institute to adjust the Development Plan, accordingly. The modified Development Plan was approved by the Prime Minister on December 04, 2013 under decision no. 2357/QĐ-TTg.

RESULTS/IMPACTS TO THE COMMUNITY

The results from the simulation models were used in modifying Da Nang's Development Plan. Some of the notable changes include widening and maintaining/improving floodways mostly in low-lying rural areas, and adjusting land use planning in riverine areas to adapt and minimize risks from future urban flooding. Moreover, results from the hydrologic-hydraulic model provided an important basis for the establishment, evaluation and approval of urban spatial plans and urban infrastructure plans. This includes plans for transportation, water supply, rainwater drainage, waste-water drainage, green areas, and lighting system. Based from modeling results, further actions for the government to take as part of DRR for flood risk were identified. The implementation of zoning plan, and construction of the technical infrastructure component of the plan with elevation and water drainage were suggested. The following are specific tasks suggested:

- Conduct of surveys and analysis identifying areas affected/not affected by floods. And from these, land use plans should be adjusted with special attention given to low-lying areas along Yen river, Tuy Loan river, Qua Giang river, Cam Le river and Cu De river;
- Investigation of further expansion of the southern floodway area, considering structural solutions such as embankment and buffer zones to function as natural riverine reserves; and urban green belts to reduce water level and speed of flood flow;
- Provision of provide recommendations for elevation levels in new development areas, appropriate drainage solutions and embankments;
- Investigation of expansion of the urban lake system to reduce pressure on the drainage system and minimize urban flooding;
- Investigation of structural solutions for existing settlements in low-lying floodplain areas, such as flood shelters, pumping stations for flood control, and flood protection dykes;
- Investment in a natural disaster warning center for the region;
- Communication and awareness raising among local communities of how to build resilience to floods;
- Development of house designs suitable for existing settlements in floodplain areas, provide training and encourage people to use designs appropriate to their location;

FIGURE 4 Proposed residential development areas in Southern floodplain[40]

- Research, develop, and implement strategies on green building development; and
- Pilot models of green building and green urban areas.40

LESSONS LEARNED

The following are the lessons that can be drawn from this example:

- This case study shows that the use of technology can be a great help to the government as a tool towards DRR and development planning.
- Development of the flood models helped identify the appropriate measures of mitigating future floods. Planning according to existing disaster risks is important to address the right issue and be able to develop appropriate solutions.
- Training the City urban planners with tools such as the one presented here is key towards an efficient and effective planning and development.
- It is also important that Development Plan devised from findings according to the model is presented to policy makers/relevant authorities so that its implementation is supported and sustainability ensured.

REPLICABILITY/SUSTAINABILITY

This example can be easily replicated in other Cities in Asia and Pacific. The City Urban planners can be trained with the modeling tool to assess future risk scenarios according to the hazards the City i facing. Then, appropriate development solutions can be recommended and implemented.

40 Tran, P., Tran, D. (2014). Building climate resilience from results of Hydrology and Urban development simulation model project. Da Nang, Vietnam: Institute for Social and Environmental Transition-Vietnam and Da Nang Department of Construction. Available online at *http://i-s-e-t.org/resources/working-papers/results-hydrology-danang.html*

3.7 DYNAMIC AND INNOVATIVE LEADERSHIP[41]

INTRODUCTION[41]

Chittagong, the second largest city in Bangladesh has a population of 6.5 million in 2010, with the Metropolitan Area having a population of 4,009,423. Chittagong has experienced a rapid reduction in urban poverty. In 2005, the poverty rate was estimated at 27.8%. In 2010, the rate dropped to 11.8%, as compared to the national average of 31.5%. However, like other major urban centers in South Asia, Chittagong has also experienced a steady growth in its slum settlements as a result of the increasing economic activities in the city and emigration from rural areas. A study conducted in 2005 stated that there were 1,814 slums within the city corporation area, inhabited by about 1.8 million slum dwellers, the second highest in the country after the capital Dhaka42. The slum dwellers often face eviction by the local authorities, charging them with illegal abode on government lands.

Chittagong is the principal seaport of the country and the second most important industrial center, with more than 40% of the country's heavy industries located there. Chittagong also accommodates 20% of the export-oriented garment industries. Chittagong is an old port city but its history of development as a planned city began only in the 1960s with the establishment of the Chittagong Development Authority. Chittagong City Corporation (CCC) is the urban local government unit responsible for overall governance. Its municipal governance, however, dates back to 1863. Constrained by the limitations set by the City Corporation Ordinance or the Pourashava Ordinance, city corporations and pourashavas in Bangladesh normally do not enjoy any significant power or authority to mobilize resources on their own nor to undertake major development programs of commercial interest. They generally depend on the central Government to bring such programs to their cities. However, they can propose such programs or projects to the Government. However, Chittagong, under the dynamic and innovative leadership of its Mayor in 2005, ABM Mohiuddin Chowdhury, broke through the system and initiated sustainable social, economic, and environmental projects.

IMPLEMENTATION

During the Mayor's term, his management style is a pro-people approach, which takes up socially beneficial projects. He also tries to make his projects financially self-sustaining. CCC has regularly mandated programs on civic infrastructure development, garbage disposal, maintenance of parks and playgrounds, etc., but has extended its services to such other areas as education, health, environmental protection, preservation of hill areas, disaster management, establishing a compressed natural gas (CNG) plant, supplying water to poor communities, power plant installation, a pharmaceutical factory, garbage recycling plant, and shopping complexes. City corporations normally are not expected to run institutions of higher education, such as colleges or universities, nor operate higher-level medical facilities or medical schools. However, Mayor Mohiuddin Chowdhury has led CCC to shoulder such responsibilities which, according to him are merely responses to the needs of the citizens that at the same time help the city corporation strengthen its financial position. Examples of some such initiatives in Chittagong follows.

Garbage Disposal and Activities of Shebok. The CCC has produced an example of efficient garbage disposal and city cleaning activities through the input of its manual workers (around 1,800 staff and officials) named Shebok which means friends who help keep the city clean and who have been operating since 1994. Chittagong City is well known as the clean and green city of the country, a model for other cities. Chittagong won the honorable Prime Minister's award, first prize, as the Clean and Green City in 2002–2003.

Environmental Protection and Improvement. A tree-planting program has been undertaken throughout the city for the last decade to beautify and protect the quality of its urban environment. The road islands, footpaths, medians, parks/gardens, and others, are decorated with different types of trees, plants,

41 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

42 Wikipedia (2010). Chittagong, Bangladesh. Available online at *http://en.wikipedia.org/wiki/Chittagong*

shrubs, and bushes. Many persons are employed for the maintenance of this planting activity. CCC took adequate measures to mitigate air pollution caused by a range of vehicles in the city through the establishment of a CNG plant. This is the biggest CNG plant of its kind so far in the country. In Dhaka City, private sector enterprises had set up CNG plants on lands leased from the government.

Educational Institutions. In the words of the CCC mayor, we know that education is the backbone of a nation, but we have around 50% of our population who are still illiterate. So, we have undertaken programs to encourage all people to send their children to primary schools. The Education Department of CCC operates 6 kindergarten schools, 2 primary schools, 41 secondary schools, 8 girls colleges, 5 computer institutes/colleges, 1 health technology institute, 1 midwifery institute, and a university named Premier University. Many young people leave these institutions every year with adequate academic knowledge and professional skills to serve the country.

Health Service. To reduce the high maternal and child mortality and morbidity rates, CCC established six maternity hospitals and 60 health-care centers in different parts of the city. The aim is to ensure accessibility for underprivileged and deprived people to cheap health-care services, especially for female garment workers living in the city who have limited access to good urban services. CCC also started six health centers in the evening shift for this group of people to provide health services with nominal fees. Besides these, the Health Department of CCC operates a TB Clinic, Expanded Program on Immunization, leprosy program, HIV/AIDS program, school health program, adolescent health education, disaster management program, orphanage, and other services. CCC is planning to establish a referral hospital, medical college, HIV/AIDS screening hospital, cancer hospital, and a home for the aged in the city.

Disaster Management. Under the Köppen climate classification, Chittagong has a tropical monsoon climate (Am). Chittagong faced the deadliest cyclone of 1991 which killed 138,000 people and left as many as 10 million homeless. Cyclones, storm surges, floods, and earthquakes are the major natural hazards in the Chittagong region. CCC is trying to develop necessary awareness programs as well as infrastructure to cope with such events. The city is under threat from earthquakes. In response, the CCC has held motivational programs on various occasions to generate awareness among the public and to develop adequate preparedness regarding earthquake disaster risk mitigation.

City Pharmaceuticals Factory. Chittagong City Corporation recently inaugurated the establishment of a pharmaceutical factory to support its hospitals and health-care centers by providing cheap, good quality medicines and supplies. The factory is under- taking regular production of some essential medicines and should be able to generate income for the CCC.

Water for the Poor. Supplying drinking water for the people of Chittagong is the responsibility of the Chittagong Water and Sewerage Authority (C-WASA). C-WASA is unable to provide water to all, especially the poor in low-income areas and slums. CCC has taken the initiative of supplying water to such areas in mobile tankers at fixed water points. The water tankers distribute water at over 130 points in the 41 wards of the city. This has helped the poor immensely.

IMPACTS TO THE COMMUNITY

An example of extensive infrastructure-development work and a generally efficient local administration in Chittagong was seen during the reign of Mohiuddin Chowdhury. During his sixteen years and six months' tenure, the quality of education and health sector has improved in terms of service and cost reduction for lower-income and middle class city dwellers. Secondary schools for girls were built in almost every local ward and new post- secondary (two- and four-year education) colleges were built throughout the city enabling more people to access to education. Funding for projects was raised from income generating projects to sustain development projects. By not increasing holding tax, yet running public services without any public debt, the burden for people not paying more tax was not intensified. Many unique and innovative services, ranging from a transportation and preservation service for the deceased, to the recycling of waste to produce organic fertilizer which were good management of environmental issues.

LESSONS LEARNED

The innovative ventures of the mayor of Chittagong have shown that drive and dynamism often help overcome limitations. Municipal services are meant for the people. If people need and demand such services, and if the city can come forward with positive responses, the people will welcome such initiatives. The mayor of Chittagong has earned enough credibility to muster such responses even if he belongs to the opposition. All CCC projects are designed not only to serve the people but also to be financially viable. Many projects are also complementary and are run as socially-oriented commercial ventures.

3.8 INVOLVING WOMEN IN DRR PROJECT IN VIENTIANNE[43]

INTRODUCTION

Vientiane is the dominant and capital city of the Lao PDR. Although the city is located on the western boundary of the country, the shape of the Lao PDR is such that the capital is situated at a point that is geographically quite central. The area immediately west, north, and east of the city functions as a region based on the capital, which is a much smaller area than the official central region. This region is characterized by mostly flat, intensively farmed land, many small urban settlements and, compared to the rest of the country, a relatively extensive road network. The region described above equates approximately to the combination of the administrative areas of Vientiane Prefecture and Vientiane Province, plus the westernmost district of Borikhamxay Province. This represents an area with a population of about 1.1 million. The average annual population growth in Vientiane Prefecture in 1995-2005 was 2.79%. Economic Base of the Region 3 Vientiane is essentially a market town servicing an extensive agricultural hinterland, and is the conduit through which a considerable quantity of imported Goods finds their way to customers in the city and the surrounding area. Much of the industrial production centered on Vientiane is for national domestic consumption, such as pharmaceuticals, beer and soft drinks, steel fabrication works, and a range of construction material companies. Garment manufacture is the only significant export earner in the city. The service industry constitutes a major proportion of the city's economy.

The industrial survey undertaken as part of the ADB's Village Area Improvements Project (VUISP) project in 2000 highlighted four major concerns for formal sector businesses: (a) the lack of skilled labor, (b) poor state of local infrastructure (e.g., roads, drains), (c) ambiguous government rules and regulations, and (d) lack of finance. Since 2000, infrastructure has largely been addressed through ADB, JICA, and other development partner projects, and finances are improving through significant foreign investment, notably by entrepreneurs from the PRC, Thailand, and Malaysia. The Government continues to issue many new laws and regulations, so improvement in consistency in government regulations is ongoing. The shortage of skilled labor remains a problem.

IMPLEMENTATION

Village Area Improvements Project (VUISP) was designed in 2000 under an ADB Project Preparation Technical Assistance (PPTA) that identified a range of urban improvements with the main focus on roads, drainage, and solid waste collection. These were mostly secondary network elements designed to complement the primary infrastructure built under a previous loan project. It also included capacity-building project components in the areas of urban management and road safety. PPTA was the basis of an ADB loan for just over $30 million approved in 2001. AFD separately funded the capacity-building element. After completing the primary drainage infrastructure under the previous project, flooding continued to occur in Vientiane away from the main drain- age network. Stagnant, often polluted, water continued to lie in open roadside channels due to an incomplete primary network and mostly unimproved secondary and tertiary networks. In response to this, strategic areas for the project undertaken in 2000 were identified as five low-lying locations where flooding was most frequent and extensive. In line with the recommendations in PPTA,

43 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

the road and drainage improvements were divided into two components which are the City-wide projects and village area improvement (VAI) projects. It is the latter component that is the subject of this case study.

Prior to 2000, the benefits of physical interventions in Vientiane were compromised by the absence of parallel interventions at the tertiary or village level to complement citywide infrastructure and service improvements. This absence of adequate tertiary-level infrastructure and services to support the primary and secondary networks was highlighted in public responses recorded under the PPA carried out as part of VUISP. The village area improvement component sought to address this through a demand-led, village-by-village approach to tertiary-level infrastructure improvement. PPA indicated that environmental improvements, particularly drainage improvements, were the most pressing demands of the urban poor. The urban area covered by the project included 100 villages with about 162,000 residents within the original boundary of the Vientiane Urban Development and Administration Authority (VUDAA). Its jurisdiction has since been expanded to 189 villages. With insufficient funds to cover all 100 villages, using a selection process to prioritize the villages was necessary.

Criteria used included current environmental and public health conditions, the quality and coverage of existing infrastructure, incidence and severity of flooding experienced, quality of access and availability of reasonable access throughout the year, proximity to the trunk infrastructure from which they can be served, and socioeconomic conditions. The last of these incorporated an assessment of the prevalence of the urban poor based on the results of the PPA, which was the first comprehensive study of poverty in an urban area in the Lao PDR. The result of the selection process was a long list of villages ranked in order of priority. The first 50 were initially included in the project. Ultimately, four of these villages chose not to participate because they were due to benefit directly from improvements under the citywide projects. These were replaced by four other villages from the long list. The main stages and key activities in the consultation, design, and contract processes are shown in Table 1.

The VAI program was undertaken in phases. The first phase involved only six villages and all were completed by January 2005, while the second phase involved 20 villages. The third phase includes 24 villages, including the four late additions to make up the target of 50 villages. In developing the village proposals into contract packages, the engineering team aimed at a contract value per village of about $75,000. Under the VAI agreements, the villages contribute 10% of the cost of the contracts, the project loan covers 62%, and the Government meets the remaining 28%. In the initial concept, the villages' 10% was intended to be in cash or labor. However all contributions have been made in cash. During the final phase of villages, the project team aims to explore ways to use village labor, with nine villages having specifically expressed interest in this.

An important part of the project operation is the involvement of the Lao Women's Union (LWU) in the role of monitoring and community facilitation. As well as the active participation of village LWU representatives in village meetings, two LWU appointees were assigned full-time to the project. A reflection of the importance given to this role by LWU is the fact that one of the people assigned to the project was the then vice-president of LWU. One of the initial tasks of LWU was to explain to villagers how to participate. There has been only one previous attempt at community participation in urban improvements in Vientiane, by the United Nations Development Programme (UNDP) in the Sihom area, which was on a small and localized scale. LWU ran a series of workshops on community participation as well as providing a conduit for day-to-day liaison between residents and the project.

RESULTS/IMPACTS TO THE COMMUNITY

The active involvement of LWU provided a room for communication between village residents and the project team. This was important for dialogue in both directions. It enabled the villagers to voice their opinions and be heard by VUDAA and the project team, thereby overcoming a general community reluctance to confront government authorities. It also helped the engineers on the project team to communicate more effectively with residents. This also resulted in the engineers adopting a more flexible approach to infrastructure design. LWU was also closely involved in setting up VAI committees in each village and in ensuring that women and the poor were appropriately represented on these committees. Close cooperation between LWU and the VAI team was also an important element in dealing with resettlement and other minor impacts. Initial village meetings followed a standard format. This included a general introduction to the aims

TABLE 1 Stages of the VAI process

Stage	Key activities
Coordination with village head	• Meet the village head for organizing orientation meeting in the village • Set up village committee • Assist village committee in developing outline proposals
Outline village proposals	• Village submits outline village proposals
Village project, commitment and selection	• Engineers visit the site together with village committee • Reconnaissance/walkout survey for developing scope fo work for surveys • Present preliminary designs and cost estimates to village committee and villages • Villagers and village committee review options and select the preferred options of the village within the budget • Draft village agreement on village contributions • Village agreement signing ceremony
Detailed design	• Develop contract packages • Develop payment schedule • Prepare bidding documents and technical specifications • Present final designs and cost estimates to village committee • Village committee confirms that designs meet their requirements
Bidding process and contract award	• Bid opening and evaluation • Negotiation with reasonable lowest-price bidder • Contract signing ceremony between contractor, VUDAA and village committee
Construction supervision	• Notice to commencement of contract works • Mobilization • Construction supervision in coordination with Village committee • Issuance of completion certificate

of the project, followed by discussion and agreement on priorities. To ascertain priorities, the meetings were divided into three groups: women, men, and the village committee. The results of each group were then compared and combined.

The project has, therefore, been a learning process for all concerned, and its success is testament to the effective collaboration between the engineering and social development professionals, community advisors, and village representatives. The project's accomplishments are reflected in the fact that it has been mentioned in the National Assembly as an example of good participatory planning, which is one of the Government's areas of focus in its move toward decentralized planning. Its popular success is also borne out by demand. Many villages currently not in the scheme have approached the projects national project director with requests to be included.

LESSONS LEARNED

Many lessons learned during the VAI process should be used to inform the design of future projects. Many lessons were taken on board and adjustments made as the project moved from one phase to the next, while other lessons required going beyond those adjustments and were able to be made while the project was ongoing. Some key lessons and observations are described below:

- One very noticeable result of the scheme is the level of interest shown by residents in the work of the contractors. This ownership has led to many reports by villagers to their committees about the quality of completed works. Some of these instances led to contractors being required to remedy defects. At the same time, it was necessary to explain to the local residents that the standards of road and drain construction were not the same as those for main roads in the city.

- Some shortcomings of the VAI scheme could have been avoided if the VAI component was a separate project rather than an add-on to the much larger citywide component. The way the project was set up allowed insufficient time for the professional team to explore alternative design and construction options in the villages.
- The funding structure of the project may have contributed to the contractors payment problems referred to above. Under the loan agreement with ADB, the Government was required to contribute 28% of the project cost in cash. The high demand on the Government's cash resources led to delays in payments of their contributions to contractors fees. An outcome of these payment problems was that better contractors chose not to bid for contracts and the quality of work suffered.
- The learning process during the VAI project was ad hoc. According to the VAI team, community development consultant members of the team felt they would have benefited from more structured training, including study tours to see how the process was undertaken elsewhere. Despite this, the knowledge and skills that have been developed represent a significant resource. Unfortunately, there are doubts about how well this resource will be utilized in the future.
- VUDAA and the Government should make sure that these skills are disseminated and applied elsewhere.

3.9 THAILAND "BAAN MANGKONG" PROGRAMME: NATIONAL PARTICIPATORY SLUM UPGRADING PROJECT[44] [45] [46] [47]

INTRODUCTION

Urbanization in Thailand intensified after launching the National Economic and Social Development Plan in 1961, which pushed forward this predominant agricultural and rice first farmer country into industrialized one. According to a survey conducted in 2008, 6,300 urban poor communities with 1.6 millions low income families and over 720,000 families need permanent housing. Of these, 30% insecured housing families are in Bangkok, the capital city. Similar to the experiences of urban poor housing management around the world, policy makers found it difficult to cope with the increasing housing needs of the poor with the conventional strategies with supply driven development concept. As a common practice in dealing with the problem of increasing number of slums in Asian cities, the government builds public housing and private sectors for sell in the market and both sectors are not able to sell them to the poor, who could not afford due to limited finances and support. The poor in general do not like the isolated individual housing in the high rise flat because they have lost the most important component of life which is "community". As a

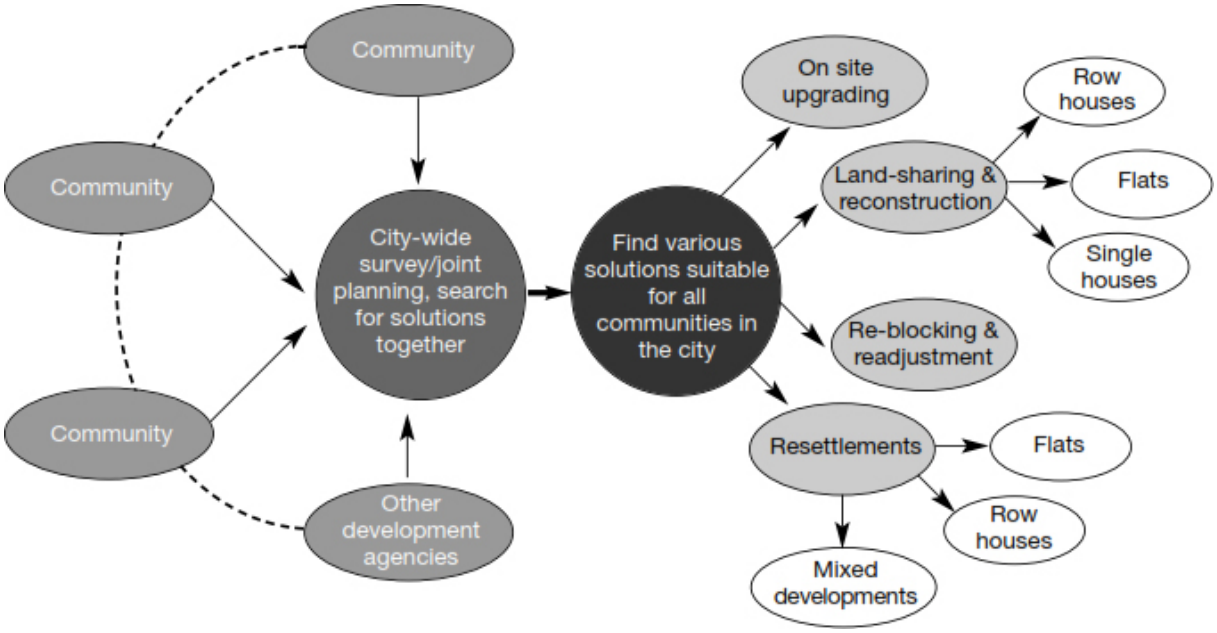
44 Boonyabancha, S. (2005). Baan Mankong: going to scale with "slum" and squatter upgrading in Thailand. Environment & Urbanization 17(1). Available online at *http://eau.sagepub.com/content/17/1/21.full.pdf*

45 Archer, D (2010). Empowering the urban poor through community-based slum upgrading: the case of Bangkok, Thailand. Empowering the urban poor. Proceedings of the 46th ISOCARP Congress.

46 Archer, D. (2012). Baan Mankong participatory slum upgrading in Bangkok, Thailand: Community perceptions of outcomes and security of tenure. Habitat International, 36, 178-184.

47 CODI (2013). Baan Mankong: Thailand's City wide, Community Driven Slum Upgrading and Community Housing Development at National Scale. Available online at *http://www.polsci.chula.ac.th/pitch/urbansea12/bmk.pdf*

FIGURE 5 Linkages for local housing development partnership by city-wide networks with communities and local authorities[48]



result, the poor cannot repay and cannot have enough income to pay for their daily transportation and high living expenses since the new houses are far away from their original occupation site, so they sold their houses, then return to the original encroached site or invaded new areas. The circle has gone on and on forever if there is no paradigm shift taking place to break this cycle. Most conventional low-income housing strategies focus on the physical aspects or mainly on construction of housing and treat housing as an individual need, to be provided to each family individually. The individual approach may work for better-off people, but not for the poor, whose position at the bottom of the economic ladder leaves them especially vulnerable when they're alone. But while the poor may be weak in financial terms, they are particularly richer in social terms since they have to help each other for their survival. So the new approach is to let poor people themselves to work together and bring their huge energy and their social force to the task of delivering secure, a fordable housing to everyone.

This case describes the national participatory slum upgrading project,48entitled Baan Mankong ("secure housing") program launched by the Thai government in 2003 and implemented through the Community Organizations Development Institute (CODI). This program was introduced in 2003, with the target to have "cities without slums" within five years, across Thailand. The program centers on providing infrastructure subsidies and housing loans to low-income communities to support upgrading in situ wherever possible and, if not, to develop new homes close by. Support is provided not only to community organizations formed by the urban poor for projects but also to their networks, to allow them to work with city authorities and other local actors and with national agencies on city-wide upgrading programs. It seeks to "go to scale" by supporting thousands of community-driven initiatives within citywide programs designed and managed by urban poor networks working in partnership with local actors. This case a program in Thailand that reconceives how to achieve large-

48 CODI (2013). Baan Mankong: Thailand's City wide, Community Driven Slum Upgrading and Community Housing Development at National Scale. Available online at *http://www.polsci.chula.ac.th/pitch/urbansea12/bmk.pdf*

scale impacts by supporting local community-driven processes in each urban center which, when added together, achieve city and national scale. The Baan Mankong program fosters cooperation between low-income communities, government authorities (from municipalities to public land owners), architects, planners and NGOs.

Key features of Baan Mankong approach from conventional approaches are:

- Urban poor community organizations and their networks are the key actors, and they control the funding and the management. They (rather than contractors) also undertake most of the building, which makes funding go much further and brings in their own contributions.
- It is "demand-driven by communities" rather than supply-driven, as it supports communities who are ready to implement improvement projects and allows a great variety of responses, tailored to each community's needs, priorities and possibilities (for instance, communities choose how to use the infrastructure subsidy).
- The program does not specify physical outputs, but provides flexible finance to allow community organizations and local partnerships to plan, implement and manage directly. Government agencies are no longer the planners, implementers and construction managers delivering to beneficiaries.
- It promotes more than physical upgrading. As communities design and manage their own physical improvements, this helps stimulate deeper but less tangible changes in social structures, managerial systems and confidence among poor communities. It also changes their relationships with local government and other key actors.
- It helps trigger acceptance of low-income communities as legitimate parts of the city and as partners in the city's larger development process. It works to develop urban poor communities as an integrated part of the city. People plan their upgrading within the city's development framework, so their local housing development plan is integrated within city planning and city development strategies.
- Secure tenure is negotiated in each instance, but locally – and this could be through a variety of means such as cooperative land purchase, long-term lease contracts, land swaps or user rights. But in all cases, the emphasis is on communal (rather than individual) tenure.
- Its focus is city-wide development with a commitment to reaching all l**o**w-income communities within a three- to four-year period, drawing on local resources.

IMPLEMENTATION

Baan Mankong was set up to support processes designed and managed by low-income households and their community organizations and networks. These communities and networks work with local governments, professionals, universities and NGOs in their city to survey all poor communities, and then plan an upgrading program to improve conditions for all these within three to four years. Once the plans have been finalized, CODI channels the infrastructure subsidies and housing loans directly to the communities. These upgrading programs build on the community-managed programs that CODI and its predecessor (UCDO) have supported since 1992, and on people's capacity to manage their own needs collectively. They also build on what slum communities have already developed, recognizing the large investments that communities have already made in their homes. Upgrading existing settlements is supported whenever possible; if relocation is necessary, a site is sought close by to minimize the economic and social costs to households. Baan Mankong has set a target of improving housing, living and tenure security for 300,000 households in 2,000 poor communities in 200 Thai cities within five years. This represents at least half the urban poor communities in Thailand.

Figure 5 illustrates the process through which a city-wide upgrading/housing development program is developed, bringing all actors together.

The design of a city-wide upgrading program, and the city network necessary to implement it, involves certain key steps that are as follows:

- Identifying the stakeholders and explaining the program;
- Organizing network meetings, which may include visits from people in other cities;
- Organizing meetings in each urban poor community, involving municipal staff if possible;

- Establishing a joint committee to oversee implementation. This includes urban poor community and network leaders and the municipality; also local academics and NGOs. This committee helps to build new relationships of cooperation to integrate urban poor housing into each city's overall development and to create a mechanism for resolving future housing problems;
- Conducting a city meeting where the joint committee meets with representatives from all urban poor communities to inform them about the upgrading program and the preparation process;
- Organizing a survey covering all communities to collect information on all households, housing security, land ownership, infrastructure problems, community organizations, savings activities and existing development initiatives. Doing the survey also provides opportunities for people to meet, learn about each other's problems and establish links;
- From the survey, developing a community upgrading plan which covers the whole city;
- While the above is going on, supporting community collective savings, as these not only mobilize local resources but also strengthen local groups and build collective management skills;
- Selecting pilot projects on the basis of need, communities' willingness to try them out and the learning possibilities they provide for those undertaking them, and for the rest of the city,
- Preparing development plans for pilots, starting construction and using implementation sites as learning centers for other communities and actors;
- Extending improvement processes to all other communities, including those living outside communities, e.g. the homeless and itinerant workers;
- Integrating upgrading initiatives into city-wide development. This includes coordinating with public and private landowners to provide secure tenure or alternative land for resettlement, integrating community-constructed infrastructure into larger utility grids, and incorporating upgrading with other city development processes;
- Building community networks around common land ownership, shared construction, cooperative enterprises, community welfare and collective maintenance of canals; and creating economic space for the poor (for instance, new markets), or economic opport**u**nities wherever possible within the upgrading process

TYPES OF UPGRADING PROJECT AND FUNDING SCHEMES

Upgrading projects of different types include reblocking, reconstruction, relocation, on site upgrading and land sharing. Each of these types of project are described below:

a. On site re-blocking. Reblocking is a more systematic way of improving the infrastructure and physical conditions in existing communities by making some adjustments to the layout of houses and roads to install sewers, drains, walkways and roads, and to replan the plot site. It is the physical adjustment with more systematic planning in ways which ensure the continuity of the community. Communities can then develop their housing gradually, at their own pace or reconstruct some of them where there is a need to shift. When communities opt for reblocking, some houses usually have to be moved and partially or entirely reconstructed. Some lanes may also have to be re-aligned to enable drainage lines, water supply systems or sewers to be constructed. Reblocking is often undertaken in cases where communities have negotiated to buy or obtain long-term leases for the land they already occupy. In both cases, the process of reblocking is an important step in the progress towards land tenure security and improved housing.
b. On site reconstruction. In this upgrading strategy, existing communities are totally demolished and rebuilt on the same land either under a long-term lease or after the people have negotiated to purchase the land. The new security of land tenure on the already-occupied land often provides community people the needs and with a very strong incentive to invest in their housing, through rebuilding or new construction. Although the reconstruction option involves making considerable physical changes within the community and requires some adaptations to a new environment, the strategy allows people to continue living in the same place and to remain close to their places of work and vital support systems with totally new environment.
c. Relocation. The greatest advantage of the relocation strategy is that it usually comes with housing security in new environment which community can design and build without too much existing conditions. They can also get their land use rights, outright ownership or some kind of long-term land lease. Relocation sites can be nearby or sometimes

FIGURE 6 Example of upgrading project that shows situation before and after upgrading[49]

be far from existing communities, job opportunities, support structures and schools. In these cases, community members who want to keep their old jobs or attend the same schools must bear the burden of additional traveling time and expense and must adapt themselves to a new environment. But in many towns and cities around the country, resourceful communities are finding bits of land to buy or rent cheaply for their housing that are not far away at all. In all cases of relocation – whether it is nearby or not-so-nearby relocation - communities face the cost of reconstructing their houses at the new site, and in some cases the additional burden of land purchase payments. But tenure security tends to be a big incentive to invest in housing and environmental development at the new community.

d. On site upgrading. Slum upgrading is a way of improving the physical environment and basic services in existing communities, while preserving their location, character and social structures. Usually upgrading means that the houses, lanes, roads and open spaces are improved without changing or with little adjustment in the layout or plot sizes. Besides improving the physical conditions and quality of life in these poor communities, the physical improvements can act as a springboard for other kinds of development such as income generation, welfare and comm nity enterprises. Figure 6 shows an example of how a slum area look like before and after upgrading.49

e. Land sharing. Land-sharing is a housing and settlement improvement strategy which allows both the land-owner and the community people to share the land and the benefit. The former slum land, after the agreement, always had to be divided into two portions. The community is given, sold or leased one portion (usually the less commercially attractive part of the site) for reconstructing their housing, and the rest of the land is returned to the land-owner to sell or to develop. There's no rule about how the land is divided: the amount of land the people get and how much goes back to the owner is settled by negotiations. At the core of a land sharing process is the ability to translate conflicting needs and conflicting demands into a compromise which takes a concrete "win-win" form, and which is acceptable to all parties involved. The people may end up with less area than they had before but with better conditions and to build their secure housing, and the land-owner may get back less-than-all of his land, but the trade-off is that the poor will no longer be squatters but the legal owners or tenants of their land. And the landlord finally gets to develop the land.

There are two main source of fund in Baan Mankong program, the subsidy/grants and loans. Subsidy grants amounts to about 80,000 Baht per household (about 2,500 US$) allocated to infrastructure, housing, capacity building and management cost at community, city and national level. Loans for either land or housing are from the CODI revolving fund. On site upgrading subsidies amounts to 25,000 baht (US$715) per family. 35,000 baht ($1,000) is provided per family for communities rebuilding their settlement. For families building houses

49 CODI (2013). Baan Mankong: Thailand's City wide, Community Driven Slum Upgrading and Community Housing Development at National Scale. Available online at *http://www.polsci.chula.ac.th/pitch/urbansea12/bmk.pdf*

on the land they now occupy or for communities relocating to different land and rebuilding there, standard subsidy is 35,000 baht ($1,000). But in special cases where the cost of filling land or infrastructure is very high, the subsidy per family can go up to 45,000 Baht (US$1,285). Subsidies for landscaping of newly upgraded settlement (20,000 Baht or $600 per community), to liven up the visual character of the new community (200,000 Baht or $6,000 per community), to construct temporary houses in case of fire or eviction (18,000 Baht or $500 per community), or to construct a Community center (150,000 Baht or $5,000 per community). To support for local coordination and administrative expenses, a grant equal to 5% of the total infrastructure subsidy is made available under the upgrading program to whatever organization the community (or the community network) selects to assist and support their local upgrading process. This could be an NGO, another community network, a local university, a group of architects, or a local government agency. Moreover, capacity building, learning and national coordination expenses is provided for all the various activities that go with such a large national upgrading process, including exchange visits between cities, seminars at various scales, meetings, training, support universities and NGOs to work with communities, coordination costs, on-the-job training activities, support for the community network's involvement in the upgrading process and CODI expenses.

In case of relocating families, housing/land soft loans are made available from CODI to families to purchase existing or new land and to improve or construct their houses. Interest rate from the loan to the cooperatives is 4%. The community cooperatives usually add about 2-3% margin from CODI rate so the end members pay at around 6-7%. This margin allows the cooperative expenses as well as for other community development needs such as late repayment or default. The ceiling for land and housing loans put together is 300,000 Baht ($9,000) per family, however, average loan size is about 200,000 Baht (6,400 US$). All loans are made collectively to the community cooperative, not to individual families. With both housing and land loans, the community cooperatives must have saved up to 10% of the amount they borrow from CODI.

RESULTS/IMPACTS TO THE COMMUNITY

During its tenth year of implementation in 2013, the Baan Mankong program upgrading projects has been implemented in 1,637 communities are either finished or underway in 286 towns and cities, in 71 of the country's 77 provinces, providing legal entity, secure housing to 93,100 households. This participatory slum upgrading process has spurned communities on to take community development into their own hands. A significant outcome of the process was the creation of a network of low-income communities, called NULICO (National Union of Low Income Community Organizations), which puts into practice the program's ideals of knowledge sharing between communities. The two core aims of NULICO are: to solve the problems of community organizations of the poor in cities; and to collectively push forward policy changes with the state. The NULICO emphasizes that community residents need to be at the core of Baan Mankong upgrading. NULICO links the urban poor, which gives them access to more resources and hence power, as well as sharing of experiences, and with this they can achieve change. The network members have created an identity for themselves around their ability and willingness to upgrade, calling themselves the chao chumchon baan mankong prachar samakee: the united citizens of Baan Mankong. This has been possible largely due to the dedication of a number of community members and representatives, who now see volunteering for the cause as an almost full-time job, and CODI also plays an important role in assisting these community-led initiatives, with technical as well as financial assistance. Another significant outcome was the creation of the CDFs. When CODI couldn't financially cope with the scale of the upgrading movement, CDFs were introduced as an alternative, and though there are only two so far, these can facilitate the continuation of the upgrading momentum, and continue to keep community residents actively involved in the development of their city.

LESSONS LEARNED

The following describes the important lessons learned through the Ban Mankong Implementation.

- "Slums" are not an aberration, but a normal part of existing city structures. The Baan Mankong program helps city authorities and all other city groups to see the problem of slums as part of the system, something which can be improved. By

creating space for poor communities, municipalities, professionals and NGOs to work together on the housing problems in their cities, Baan Mankong has been bringing about an important change in how the issue of low-income housing is dealt with: no longer as an ad-hoc welfare process or a civic embarrassment to be swept under the carpet, but as an important structural issue which relates to the whole city and which can be resolved. The upgrading program is helping to create local partnerships which can integrate poor community housing needs into the larger city's development and resolve future housing problems as a matter of course.

- When collective resources of poor and their collective management capacities are put together with a flexible external finance, it gives people a new power to change things. To join the Baan Mankong program, communities have to have fairly well-established savings groups. These savings groups act as a crucial stabilizing force when the upgrading project begins, so that the flexible finance can link with people's collective financial base and to the money management skills they have already developed through their internal community savings and credit activities.
- Doing things collectively also creates an important balancing and proactive mechanism between community members and various outside forces: collective land, collective finance, collective management and collective welfare. Another important requirement to join the upgrading program is that communities have to find ways to do things together, and that everyone in the community (even the poorest) has to be included in the process, as a way of creating and strengthening their organizations. This collectivity is tool to pull people together and create a new interactive strength within their group. Working together as a group is never easy, but it gives the poor, who usually have not much power, the strength and confidence to do all kinds of things they could never hope to do individually.
- The program also open up big spaces for communities to work and to support each other, assessing projects, providing advice by communities in the networks and among networks in the country. As more and more upgrading projects get underway, and as community people go for project visits, exchanges, workshops and new projects inaugurations, the Baan Mankong Program has made the whole country into one big university of housing and land options for the poor, offering learning opportunities for all levels. If people see their peers doing something, they realize they can do it themselves. This kind of sharing of experience and learning from the real action are the most powerful inspiration and helps build confidence.
- In a program which has to do with physical change, their ability to make alternative drawings and models helps communities to visualize new possibilities, and their professional presentations are essential ingredients in the success of the upgrading program. The Baan Mankong program also supports the involvement of a growing number of community architects, planners, architecture faculties and design students from many universities around the country to assist communities as they develop their settlement layout plans and housing designs. These professionals and students play an important role in the upgrading process.
- When considering housing solutions for the urban poor, security of tenure is a vital consideration – not only with regard permission to stay on site, but to allow the poor to gain acceptance as legal members of the city, with access to resources and services this entails, and social recognition. Rather than the evictions of old which banish the poor to the city outskirts, Baan Mankong aids the integration of slum-dwellers into society at large by giving them decision power through "horizontal power delivery", creating horizontal linkages between peer groups in the city and allowing the urban poor to form one big community.

REPLICABILITY/SUSTAINABILITY

Whilst CODI eventually received fresh funds in 2009 from the government and sold some outstanding community loans to the Government Housing Bank, the precarious situation of the Baan Mankong project at that instant made community networks realize their need for financial independence. As a result, two local networks of communities decided to take steps to form their own City Development Funds (CDFs): the Bang Khen district community network in Bangkok, and the Chum Pae town community network, in North Eastern Thailand. The Bang Khen district community network, of which Bang Bua community is part, was already very strong due to its history of working together on environmental problems and then on

Baan Mankong. As part of the upgrading process, the community residents, along with local municipal officials and a nearby university, undertook a district-wide survey of the housing situation in Bang Khen, including the number of households, how many faced housing problems, and land tenure data. When some communities were hampered in the Baan Mankong process by CODI's funding shortage, the idea of linking together all of the communities' savings groups into one district-wide fund, the CDF, arose, to be supported by contributions from the district. Though the savings are not pooled, and each savings group maintains its independence, the collective savings of the network amount to 1.45 million baht, and each community savings group makes a contribution to the fund. This CDF will allow communities in Bang Khen to obtain loans from the fund for communal projects, at an interest rate of 4% per annum, of which 1% will go towards management costs, 1% will go towards the community's welfare fund, and 2% will go back into the CDF.

While the CDF in Bang Khen is currently being used mostly to encourage housing improvement projects, it can also provide income-generating loans and fund educational and welfare projects. In this way, community development will extend beyond solely housing issues. The aim is to encourage other cities to set up their own CDFs as Bang Khen district and Chum Pae town have done, so that communities can continue to improve their living environment and increase their control over the process. For a CDF to be possible, the community network need not only be strong between communities, but with local authorities, as their collaboration is needed to provide technical support, approve building plans and other official matters, though they may also extend contributions to the fund. The CDF is also open to external sources of funding, such as the Asian Coalition for Community Action program, run by the Asian Coalition for Housing Rights, which funds small and large community upgrading projects. Thus, having a CDF opens up possibilities for communities, by ending their dependence on government funding, and sustaining the participatory process encouraged by Baan Mankong, allowing for more far-reaching community development.

3.10 GOVERNANCE WITH COMMUNITY PARTICIPATION IN PHNOM PENH, CAMBODIA[50]

INTRODUCTION

Phnom Penh, the capital, has a population of about 1.5 million people in 2012. About 569 squatter and slum communities are established in Phnom Penh, many of which are in poor living environments. The average population density for the whole area of Phnom Penh is 2,986 people/km. Historically, Phnom Penh emerged from a village to a city over a 100- year period. Population explosions occurred in three stages: 1900–1940, 1950–1970, and post-1990s. Since the 1990s, Phnom Penh has witnessed its third phase of growth, reconstructing itself and building beyond the parameters set in the 1970s. Infill is occurring in the city center. Higher-quality housing is replacing the old structures; however, height restrictions limit the size of new developments and, therefore, only marginally alter the city center density. What remains of open space in the city center is being built on. Underutilized space such as school playgrounds or inefficient housing configurations have been transformed into apartment blocks with predominately retail unit**s at the bottom.** Since the mid-1990s, the city has moved toward an industrial market.

IMPLEMENTATION

Good governance. The principles of good governance overarch the districts, communes, neighborhoods, and villages comprising the larger agglomeration of Phnom Penh, enabling it to function and grow. The existing territory of 375 km is divided into 76 communes, with 637 neighborhoods and villages requiring coordination and management. The municipality of Phnom Penh has about 15,000 employees and must

50 ADB (2006). Urbanization and Sustainability in Asia: Case studies of good practice. Accessed on 25 April 2015 at *http://adb.org/sites/default/files/pub/2006/urbanization-sustainability.pdf*

also coordinate its work with 28 government line ministries in its day-to-day operations. Armed only with good governance, the city has been able to respond to the enormous demand for public services with very limited resources. According to interviews conducted in 2005, the municipal government of Phnom Penh has a regimen of meeting every week to listen to and discuss general issues arising in all administrative districts and communes of the city. During the weekly meetings, the governors for each of the city's districts have the opportunity to raise issues of concern to the board of governors of the municipality for appropriate action and solutions. The meetings have also been used as a public open forum since not only are local authorities in Phnom Penh invited to the meeting but also all other relevant stakeholders according to the proposed agenda of the meetings. Despite the regular weekly meeting regimen, extraordinary meetings have been held for urgent cases, such as issues related to security and disaster responses. Development and strategic planning for the city has been conducted through public participation and the organization of workshops or forums. For example, in the case of squatter and slum settlements, solutions were sought throug**h a series of discussions *a***nd workshops before appropriate and acceptable solutions were finalized.

Improved Urban Management. Like many urban centers in Cambodia, Phnom Penh is implementing the Government's administrative reform policies of decentralization and deconcentration. However, the pace of implementation is slower than in the pilot-tested secondary cities of Battambang and Siem Reap. Adoption of the decentralization policy has been channeled through the SEILA program, where local development plans are prepared by local communities and authorities at the district, commune, and neighborhood levels. Such a bottom-up approach to planning better represents local needs; therefore, the municipal and national governments are better able to respond. To improve city management further, the municipal government has also established other operational mechanisms, such as the Municipal Development Committee to oversee city development more transparently. In addition, the city Poverty Reduction and Community Improvement Committee has been set up to work closely and effectively with urban poor. A more decentralized body, the Urban Poverty Reduction Unit, was set up under the committee above and is responsible for implementing municipal government programs and projects relevant to the urban poor, such as land sharing and slum upgrading. At the district level, a Community Development Management Committee was set up to coordinate all work related to local communities with the district and municipal governments in an efficient manner. This committee is composed of members from the district authority, line development agencies, and representatives of the local community themselves.

At the commune level, a communications office coordinates issues related to the public with the local authority. So far, the office has provided support in organizing about 600 poor communities, consisting of more than 46,000 underprivileged families living in the city of Phnom Penh. It also has mobilized poor inhabitants to save money for their communities' development. Through this grassroots initiative, communications between office staff of the municipal government and poor communities have improved, transforming the relationship from one characterized by suspicion and hostility to one of no violence but negotiation. The success of many slum and squatter settlement projects h**as been attributed to the transformation in trust and increas**ed participation by local communities.

Effective and Efficient Infrastructure and Service Provision. Since 1993, the city has been characterized predominantly by the renewal of urban facilities, reconstructing what was destroyed after almost 20 years of civil war. Rehabilitation of electricity, water supply, and sewage and drainage facilities has been financed by development partners, such as the World Bank and the Asian Development Bank (ADB). The privatization policy mentioned earlier as part of the municipal government's attempt to improve its management and service provision has contributed to the increased coverage in waste services across the city, especially to suburban areas. As a result, about 95% of the urban city area and 50% of the rural city area are covered by waste collection services. The success is even more pronounced for water supply service provision. For example, in 2005, it was reported that 80% of the city's population was connected to the water supply system, which provides residents with good quality water. As a result, the public municipal enterprise, Phnom Penh Water Supply Authority, was recognized as the best water supply company in Asia, and received the "Water PrizeWater For All" award by ADB in 2004. In addition to reconstruction, Phnom Penh allowed private **developers during the 1990s** to

expand the city beyond the boundaries established in the 1950s–1970s.

Financing and Cost Recovery. Phnom Penh is the first city in Cambodia to receive and implement the 50-50 shared cost policy of the Government. This formula has been very successful in motivating the public to share the responsibility for public service and infrastructure provision. A year from September 2004, the 50-50 formula was employed to improve about 17,040 meters of city road, with a total contribution from the community of about $420,500. Private and public partnership in development has been one of the sources of financing and cost recovery for most local development projects. A noticeable example is the city waste collection and disposal service, where a private company (CINTRI, Canada) was awarded the contract to manage the city waste service after negotiations over the price charged to the city population. The service management in the Phnom Penh International Airport has also been awarded to a private company (SCA France and Malaysia). The city has set up a microfinance scheme to help poor urban communities improve their living conditions through a community savings system. The microcredit scheme set up by the municipal government (Urban Poverty Development Fund) covers five important areas: housing, land, fish paste (food reserves), job creation, water supply, and urban agriculture. So far, more than $1.4 million of microcredit has benefited 12,000 families in 300 communities. The repayment rate for the scheme has been impressive at 100%. For the urban poor housing sector alone, **the municipality has disbursed more than** $600,000 as housing loans to more than 1,500 poor families.

Social and Environmental Sustainability. The master plan for the city development of Phnom Penh, contribute to ensuring the city's social and environmental sustainability through proper land-use planning. The city's green and open spaces are protected and preserved. The master plan identifies the establishment of four small satellite towns in order to cope with urban sprawl as the result of the city's economic growth. If the four small towns are built successfully, the core historical inner center of the city will be preserved. The small towns would also reduce the pressure on the city's remaining open spaces by distributing new development therein. The master plan also provides adequate public soc**ial facilities such as** schools, hospital, markets, and other services for future population growth.

Innovation and Change. One of the most noticeable innovations and changes is in the management of poor settlements. The municipality of Phnom Penh has moved away from the policy of forceful eviction and resettlement to upgrading and voluntarily resettlement, which has garnered international recognition. In 2003, the Prime Minister declared that the Government would no longer force squatter and slum settlers to move from their existing locations. Instead they will be reorganized and upgraded on existing sites. This concession excluded those settlements located in areas classified as public state land, such as public parks and road pavements. The newly introduced 50-50 method for financing infrastructure development projects in Phnom Penh has been hailed as a huge success for city authorities. The success of this approach is such that the people themselves now request to be included in the program and no longer need convincing by the municipal government to take part in the program as was the case during the introductory phase. The Cambodian population as a whole is untrusting of government authorities as a consequence of past horrific government regimes, especially the Khmer Rouge genocidal regime (1975–1979); therefore, it is notable that the local population is eager to engage with the Government.

3.11 SINGAPORE DOING MORE WITH LESS[51]

INTRODUCTION

The island-state of Singapore has undergone one of the fastest transitions from a developing economy to a leading first world economy in history. It has one of the highest per capita incomes in Asia and its population is steadily increasing to close on five million people. However, Singapore has finite land space, limited water

51 UNHABITAT (2012). Urban patterns for a green economy: optimizing infrastructure. Available online at *http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Urban_patterns_for_a_GE%20-%20optimizing_infrastructure_UN_Habitat.pdf*

resources and a growing population dependent on imported energy, food and water; and all of this in the face of climate change challenges. The country is dependent on global trade for access to the resources that it needs for economic growth, and the rising cost of resources such as oil, energy, raw materials and water will increasingly put pressure on Singapore's ability to maintain its economic growth. Currently, Singapore imports most of its food and water as well as the resources and raw materials needed for industry, including construction materials and oil. In addition, it is vulnerable to climate change impacts such as flooding, loss of coastal land and impacts on fresh water resources. The city has acknowledged the importance of securing access to resources, conserving energy and reducing water use; in other words, doing more with less to decouple the future growth of the city from increased resource use.

IMPLEMENTATION

In 2009, Singapore released the Sustainable Singapore Blueprint document, which outlined a plan that would allow for economic growth within the limitations posed by resource scarcity and rising resource prices. The strategy rests on four primary principles: improved resource efficiency, improved environmental quality, increased knowledge about sustainable development, and community ownership. Aggressive goals have been set in all four areas to be met by 2030, including improving energy efficiency by 35 per cent from 2005 levels, achieving a recycling rate of 70 per cent, improving accessibility for pedestrians and cyclists, and reducing domestic water consumption to 140 litres per person per day.

Aligning economic growth with environmental sustainability has meant the acceptance of certain operating principles that have come to be known as the "Singapore Way". These include recognizing the importance of integrating and aligning planning; taking a long-view of development although it entails short-term costs; and adopting a flexible approach, recognizing that there will be many changes in technology and the global environment in the coming decades. In 2008, an Inter-Ministerial Committee on Sustainable Development was set up to craft a strategy to ensure Singapore's sustainable development in light of domestic and international challenges. The result was the Sustainable Singapore Blueprint document that was jointly created by government, public and the private sector. It was an inclusive and participatory process that had input from media editors and academia Goals will be reviewed every five years and adapted to improvements in technology and international developments, and the government will monitor and inform the public of progress. SGD 1 billion (USD 0.8 billion) was set aside by government as a budget to rollout the initiative and since 2009 additional investments have been allocated, in particular for improving energy efficiency in buildings, improving public transportation and for testing solar technology and applications. Almost SGD 700 million (USD 558 million) of the initial funding was set aside for research and development and manpower training, with large allocations for implementing and incentivizing the Green Mark efficiency system for buildings and the installation of solar panels. Testing for the viability of electric vehicles was conducted in 2010 and part of the budget was set aside to build cycling networks. It is estimated that the investment of SGD 680 million (USD 542 million) to build capability in the energy and water technology sectors could contribute a value-add of SGD 3.4 billion (USD $2.7 billion) to these industries and generate employment of close to 20,000 people by 2015. One of Singapore's biggest success stories is its water resource management. Water sustainability and security is vital for Singapore as there is no groundwater and the land area is not sufficient for collecting and storing water to meet its requirements. Although it has historically low water consumption levels in comparison to other first world countries, when its two water agreements with Malaysia end in 2011 and 2061, the price that it pays for water could increase radically, making it difficult for government to ensure affordable and adequate supplies. The interim goal of the Sustainable Singapore Blueprint initiative is to reduce domestic water usage from 154 liters per person per day (2009 figures) to 147 liters by 2020, and 140 liters by 2030.

Over the past four decades, the government has invested considerably in research and technology for water conservation, and in implementing the first stage of a deep tunnel sewerage system to redirect wastewater flows towards water reclamation plants. The current water supply is drawn from four sources, known as the "Four National Taps": the local reservoir catchment, imported water, NEWater and desalinated water. NEWater refers to the collection, treatment and purification of used water using advanced technologies, rendering it even purer than World Health Organization standards and perfectly safe to drink. It is estimated

that at the end of 2011, once the fifth plant has been completed, NEWater will meet 30 per cent of the nation's needs.

RESULTS/IMPACTS TO COMMUNITY

Singapore currently has one of largest desalination plants in Asia, using reverse-osmosis to transform seawater into drinkable water. In 2010, this plant was supplying 136,000 cubic meters of fresh water per day, providing roughly 10 per cent of Singapore's water needs. In efforts to reduce the amount of water used and wasted, lessen the country's dependence on imported water and prevent water wastage through leaks, a series of projects has been launched to clean up the Singapore River, increase the number of reservoirs, fix leaks in the water distribution system and encourage the public to reduce their water usage. These water conservation programs include a 10 per cent Challenge and 10-Litre Challenge to citizens, schools and businesses to use water responsibly and to save it. A Watermark Award is given annually to individuals and organizations that have significantly contributed to the "water cause"; those who raise awareness around water issues in Singapore are recognized in the Friends of Water Program, and an Our Waters initiative encourages schools to adopt water bodies and look after them. In 2010, the number of leaks per 100 km in potable water pipelines had been reduced by 1.2 per cent, and the number of sewerage disruptions per 1,000km of sewer lines reduced by 6 per cent from 2007 levels. During the same period, the number of reservoirs increased from 14 to 17, sales of NEWater increased from 49.2 to 96.4 million cubic meters, and sales of industrial water (non-potable, reused water) decreased by five million cubic meters. Citizens of the country have benefited through cost savings of energy- and water-efficient appliances following the mandatory labeling campaigns, as well as through being able to enjoy the cleaner city; lifestyle events held at Reservoirs and waterways increased from 74 in 2007 to 288 in 2010 signifying the increased value and appreciation that Singapore's citizens place on its water.

LESSONS LEARNED

The following can be learned from the successful implementation of this case in Singapore:

- The very clear vision presented by the Singapore Government following extensive public and private sector participation, combined with strong commitment to action, have been vital for the success observed so far in this initiative.
- The focus on integrated planning at all levels and the inclusion of the public in education and awareness campaigns has also been extremely important.

SUSTAINABILITY/REPLICABILITY

Progress towards the goal of 140 liters per person per day in 2030 is ongoing as consumption has decreased from an average of 165 liters per person in 2003 to 157 liters in 2007, and 154 liters in 2010. The Singapore Government has said that the country can be self-sufficient in water by 2061 when the water agreements with Malaysia run out.

3.12 TOWARDS AN ECO-MOBILE CITY WITH INTEGRATED PUBLIC TRANSPORT: THE CASE OF KAOHSIUNG, TAIPEI[52]

INTRODUCTION

Located in Southern Taiwan, Kaohsiung City has a long history as a hub for heavy industry. The total amount of the city's carbon emissions is an enormous 23 tons per capita per year; two times higher than the average of the entire island of Taiwan. In 2010, Kaohsiung City and the surrounding county merged into one municipality, which substantially enlarged both the city's land area and population. Today, the administrative area of Kaohsiung City amounts to roughly 2,946 km, with a population of 2.77 million, which makes it the largest municipality in Taiwan. The

52 ICLEI (2014). Kaohsiung, Chinese Taipei Steering towards an eco-mobile city with integrated public transport. Case Study 168. Accessed on 30 April 2015 at *http://www.iclei.org/fileadmin/PUBLICATIONS/Case_Studies/ICLEI_cs_168_Kaohsiung_2014.pdf*

downtown urban area is roughly 153 km and is home to 1.5 million inhabitants. As is typical in many cities, residents in Kaohsiung primarily rely on motorized vehicles for daily transportation. Of the 8.8 million daily commuting trips in Kaohsiung, 86.5% occur via private cars and scooters. Private vehicle ownership in Kaohsiung is approximately 242 vehicles per thousand people for automobiles, and 814 for scooters. On the other hand, the public transportation utilization rate in Kaohsiung city stands at 17%; a relatively low share of total transportation. Consequently, providing eco-mobile transportation alternatives and reforming transportation habits is crucial to reducing emissions, as well as fo$_r$ enhancing the aesthetic value of Kaohsiung's streetscapes. According to Kaohsiung City's current CO2 emissions portfolio, the transport sector ranks third in total emissions (6.2%). The city, however, has the highest per capita emissions (22.3 tons/per capital/year) in the state.

IMPLEMENTATION

In order to achieve its goal of reducing emissions by 30% by 2020 (compared to 2005 levels), Kaohsiung intends to introduce the following initiatives:

- provision of an integrated and energy efficient public transportation mix
- improvement of public transportation usage rates
- creation of enhanced walking and cycling paths
- reduction of the CO2 emissions of current transportation and station facilities

In addition to these initiatives, Kaohsiung has implemented state-of-the-art reforming transportation habits of residents via sustainable alternatives.

Kaohsiung has encountered challenges transitioning out of unsustainable automobile dependency into sustainable eco-mobility. To counteract this, the City of Kaohsiung's transportation planners are addressing the challenge of reducing private vehicle dependency through people-oriented, low carbon transport alternatives to improve the environment and quality of life. The threat of climate change related disaster to human settlement is well known to Kaohsiung City, which has been severely affected by torrential rains and floods. Hence, the city urgently needs to strengthen its policies and infrastructure to reduce greenhouse gas (GHG) emissions and increase its resiliency.

Five transport systems for an integrated eco-mobile framework to provide residents and visitors with seamless public transport services, Kaohsiung orients its public transportation system according to its population density through the use of the five major public transport systems – Bus Rapid Transit (BRT), Light Rail Transit (LRT), Metro Rail Transit (MRT), shuttle buses and DRT (Demand Responsive Transit). The first three systems, BRT, MRT, LRT, together with a public bicycle sharing system, form Kaohsiung city's eco-mobile framework. In order to provide more energy-efficient service, the Kaohsiung City government undertook the development of two BRT systems in 2012 by making improvements to the existing bus infrastructure, vehicles, and scheduling. The city has optimized its bus route network, set up new routes for sight-seeing ferries, and made use of the tourism infrastructure within the river and harbor districts in order to offer better-quality bus and ferry services. The accessibility of transport opportunities has been enhanced through an increase in the quantity of shuttle-bus routes, which have doubled in number from 25 to 50. The bus-stop distribution of the downtown area has been structured so that no bus-stop is further than 5 minutes away, regardless of location. Moreover, buses depart every 10 minutes during peak traffic hours, and the new BRT's guarantee a maximum travel time of 30-minutes to any destination. The successful enhancement of infrastructure and technology constituted half of the Kaohsiung City eco-mobility strategy; however, finding creative ways to increase transportation usage amongst residents was equally as important. A key component of this included making transport as accessible as possible. Incentives including: special fares and free transfers, innovative "iPass" tickets, the "iBus" smartphone application, and the dissemination of time tables all combined to make public transport both attractive and accessible. The result of these efforts included a 7% increase in ridership in 2013.

Among the five major public transportation systems, the LRT and Express Buses are under development as pilot systems to serve the growing population. Phase I of the Circular Light Rail Line (also known as the Kaohsiung LRT or, Kaohsiung Tram) has been under construction since 2013, and is scheduled to open in mid2015. An estimated budget of NTD 16.5 billion (approximately USD 550 million) was allotted to complete the project. In addition, cycling is being promoted as a low carbon transportation method for commuting to work, as well as championing their considerable applications

FIGURE 7 MRT system connects with main transportation networks[52]

in regard to health and fitness, leisure and travel. Kaohsiung has been recognized as one of the best biking cities in Asia in 2012. However, only 5.4% of residents (mostly students) use it daily. In order to increase the appeal of bicycling as a viable alternative to short motorized trips, Kaohsiung City launched its public-use rental system in 2009, making it the first city in Taiwan to set up a self-service bike rental system. The rental service is managed through a public-private partnership between the City and the MRT Company. The City plans to increase the amount of bike lanes to 1,000 km in the near future, making it easier and safer for all bike users. In addition, the Kaohsiung City Public Bike launched the "Kaohsiung Public Bike Easy Go" smartphone application in February 2012, offering users a real-time overview of the conditions at every rental station location, along with social media and text services. By the end of 2013, 160 rental stations had been installed, extending the city's network from 6km to 13km and providing for 6,742 trips per day. By 2015, the total distance of bicycle routes is planned to exceed 740 km and serve over 10% of the population.

In 2008, the City developed the Kaohsiung Mass Rapid Transit (KMRT) system to ensure that both resident and tourists could travel from point-A to point-B without having to rely on private transportation.53The KMRT system is currently made up of 39 stations dispersed over two metro lines, covering a total distance of 42.7 km. In addition, the KMRT connects to numerous major transportation networks including: the BRT, railways, high speed rails, harbors for both cruise and cargo ships, and the international airport. Several of the 39 KMRT stations have received international recognition: the Formosa Boulevard Station and Central Park Station have been honored in both the "50 most beautiful subway stations in the world" and the "Top 15 most beautiful subway stations in the world". In February of 2013, the number of average daily passengers on the

53 ICLEI (2014). Kaohsiung, Chinese Taipei Steering towards an eco-mobile city with integrated public transport. Case Study 168. Accessed on 30 April 2015 at *http://www.iclei.org/fileadmin/PUBLICATIONS/Case_Studies/ICLEI_cs_168_Kaohsiung_2014.pdf*

KMRT system was approximately 190,690. Moreover, on New Year's Eve in 2012, the system transported 472,378 passengers. The goal is to increase resident use from a current 18.1 to 36% by 2018.

In operation since 2008, the KMRT is managed by Kaohsiung Rapid Transit Corporation (KRTC) under a Build-Operate-Transfer (BOT) agreement. The total operational and capital budget amounted to USD 6 billion, and was primarily funded by the Kaohsiung City Government. The BRT (USD 13.33 million), LRT (USD 0.41 billion) and Public Bike Rental System projects are now directly funded by the Transportation Bureau via Demonstration Projects. The City believes these investments will facilitate the transition to a new phase of urban mobility, which is fundamentally linked to quality of life, the low-carbon environment, and city livability.

RESULTS/IMPACTS TO THE COMMUNITY

Since construction began in 2000, the ITS infrastructure has expanded considerably. Consequently, popularity for public transportation alternatives has grown as well: the number of public transportation network users tripled between 2007 and 2012. Pursuing ambitious public transportation programs improves resident's lives and the environment. In 2007, 34.5 million passengers utilized the City's public transportation network. As a result of Kaohsiung's initiatives, total ridership tripled within five years. At the end of 2012, 101.7 million residents were integrating the public transportation network into their daily routine. The City of Kaohsiung has reformed the public transportation system to make it more user-friendly and efficient; however, shifting user preferences remains a challenge. In the future, public transport services such as the BRT, MRT, and LRT are likely to further reduce private vehicle dependency and associated congestion.

LESSONS LEARNED

- Because of the convenience that private vehicles and ample, inexpensive parking offer, residents do not have a strong incentive to alter their transportation habits. In order to combat this trend, the City needs to integrate transportation, housing, and land usage together, while also making its streets more attractive and safer for bicycling and walking. Through measures such as these, Kaohsiung City can continue to increase the appeal of public transportation for its residents.
- Providing alternative choices to residents is crucial; however, they must be coupled with affordable pricing schemes. Although the number of residents using the Kaohsiung public transportation systems has risen dramatically, the public transportation operators are still not confident that they will be able to balance revenues and expenditures. The KMRT system has incurred deficits of at least NTD2 billion (USD 67.7 million) every year since it began operations in 2008, and this is largely the result of low usage. As a result, the City must provide a lump-sum subsidy to the KMRT service provider to keep the service in operation. This creates a costly dilemma: potential funding for other eco-mobility projects is being regularly directed back into the KMRT.
- In Kaohsiung's case, transit initiatives follow a top-down project-oriented model. Given the importance of community involvement, as well as the apparent resistance to initiatives such as the KMRT, communication between the local government, service providers and residents could be enhanced.

SUSTAINABILITY/REPLICATION

Kaohsiung's experiences provide a tangible example of promoting a transition in residential transportation habits, from private-vehicle to public-system use, in a developing Asian city. In addition to the deployment of public transport infrastructure, convincing residents to opt for public transit over private transit is a pivotal challenge to eco-mobility. In recent years, the City of Kaohsiung has integrated a mix of viable transportation alternatives with the aim of building a sustainable and eco-mobile city. The City is realizing its ambitious goals through the provision of BRT, MRT, LRT and a public bike system, and has thus far achieved encouraging results. More comprehensive plans are needed, both financially and behaviorally, to guarantee the commitment that is necessary with ambitious projects. All sectors of the community play a critical role in shaping the development of livable cities, and Kaohsiung City's experiences reflect the inertia that can be met when attempting to adopt an alternative transportation model in an automobile-oriented city.

3.13 RESILIENCE PLANNING AND PROMOTING PERI-URBAN AGRICULTURE IN GORAKHPUR, INDIA[54] [55]

INTRODUCTION

Gorakhpur is one of the fastest-growing cities in the mid-Gangetic plains. The rapid urbanization taking place puts a strain on the natural resources which makes the existing agricultural lands converted to residential areas. This change in the use of agricultural land to non-agricultural ones adds to the risks brought about by climate change. Gorakphur being located near the Himalayas also make it vulnerable to floods that bring about negative impacts to the poor and marginalized communities and their source of livelihoods. Particularly, the peri-urban areas of Gorakhpur experience recurring floods and waterlogging that occur 2-3 months annually. It is forecasted that there will be about 10-20% increase in rainfall events in the future due to climate change. This will exacerbate flooding and its negative impacts to the communities.

Promoting micro resilience planning and peri-urban agriculture in Gorakhpur are projects implemented under the ACCCRN[56] program implemented in the City in 2008-2014. Supported by the Rockefeller Foundation[57], the program was implemented in three phases. PHASE I conducted in 2008-2009 focused on selection of cities for project implementation. Gorakhpur was one of the cities in Asia that were selected to develop and demonstrate effective processes and practices for addressing urban climate vulnerabilities using multi-stakeholder planning as well as implementing targeted intervention projects. The project was implemented with National partners including TARU Leading Edge and the Gorakhpur Environmental Action Group (GEAG)[58].

PHASE II was conducted in 2009-2010 focusing on engagement with the local partners to introduce climate change issues and to develop context specific climate resilience strategies. ISET was the lead organization for this initiative to provide technical assistance and guidance to the national partner agencies in each country. The Phase-II engagement in Gorakhpur was organized around shared learning dialogues (SLDs) that helped in identifying the constraints and opportunities in adapting to climate change, understanding the complex systems within the Gorakhpur city, and working with a diverse range of city actors to build urban resilience. The SLDs were informed by city specific information generated or compiled to support the ACCCRN engagement, including climate science and modeling results, vulnerability assessments, and sector studies. Through this process, GEAG and relevant city stakeholders increased their understanding of climate change and how it was impacting and affecting the city, particularly the vulnerable groups and areas, which are prone to the impacts of climate change. This understanding was tested and extended through the development and implementation of climate change adaptation pilot projects in Gorakhpur. Phase-II culminated with preparation of "City Resilience Strategy (CRS)". GEAG, along with ISET led the coordination and analysis, with the goal of fostering strong city ownership and integrating resilience planning processes into long-term city planning.

54 Mani, N., Singh, A., Wajih, S. (2014). Promoting peri-urban agriculture in flood-prone areas in Gorakhpur, India. In Grow the city innovations in agriculture. Urban agriculture magazine, 28, pp 72-76. Available online at *http://www.ruaf.org/sites/default/files/UAM28.pdf*

55 Mani et al (2014). Building micro resilience in Gorakhpur City: Process document. Published by GEAG. Available online at *http://www.geagindia.org/pdf/Process-documents-Mahewa.pdf*

56 The ACCCRN initiative aimed at generating replicable models and interventions for climate adaptation in medium-sized Asian cities. The initiative takes an action research approach that has catalyzed city level actors to assess key climate stresses and potential vulnerabilities and to propose measures to respond to them, rather than commissioning external experts or national agencies to prepare such plans independently.

57 The Rockefeller Foundation works at the intersection of climate change, urban systems and vulnerability to consider both direct and indirect impacts of climate change in urban areas.

58 GEAG is an NGO that seeks to mitigate the risks associated with flooding by maintaining the existing open spaces. A strategy being used to do this is that of strengthening livelihoods based on peri-urban agriculture. For more information about the NGO, visit *www.geagindia.org*

It was during the PHASE III in 2011-2014 that the 2 projects including promoting micro resilience planning and peri-urban agriculture in Gorakhpur were implemented. These projects are city-led climate change adaptation interventions generated from the city engagement process during the Phase II. These projects guided by the CRS developed during the Phase II were conducted as a response to some of the actions that Cities had identified in order to build urban resilience to climate change.

IMPLEMENTATION

The implementation of the 2 projects conducted during the Phase 3 of ACCRN program are presented in this section.

1. Ward Level Community Based Micro Resilience Planning

This project established micro planning mechanisms in the Mahewa Ward within the city of Gorakhpur that address multiple sectors including agriculture and livelihoods, solid waste and drainage management, water and sanitation, drainage, housing, health and education. The project advocates for the integration of climate resilience in the overall development planning process to the local government. Building on the vulnerability assessment, development of CRS developed during Phase 2 implementation, this pilot project, was a small scale household resilience intervention that include education, communication (especially for women and children), techniques for integrated farming, waste management, water, health, and sanitation, and enhanced access to services. On a neighborhood level, the program sought to build institutions and capacity for resilience planning, promote planning and the use of climate information, and launch demonstration projects, awareness campaigns, and health surveillance through a ward level resource center.

2. Promoting adaptive peri-urban agriculture

In the flood-prone areas of Gorakhpur, peri-urban agriculture is a means to keep areas that are vulnerable to flooding free from construction and to maintain their natural functions such as enhancing water storage and infiltration, and in this way reducing run off. This reduces the vulnerability of the urban poor and enhances their capacity to cope with the impacts of floods. It also helps to enhance the sources of food and income available to peri-urban agricultural communities. Since women members of the family do most of the agricultural activities, nutritional security is an important outcome. In addition, peri-urban agriculture diversifies food sources, thereby reducing energy footprints, as well as creating income opportunities. Preservation of local biodiversity and recycling of urban waste are other potential gains that peri-urban agriculture offers.

The project scope includes 8 villages, all prone to recurring floods and water logging, with livelihoods dependent on input intensive agriculture, or casual labor during the floods. The peri-urban area of Gorakhpur totals 7,000 hectares and most of this is demarcated by the Gorakhpur Development Authority (GDA) as green and open areas. Types of peri-urban farming methods include climate-resilient agriculture, use of integrated and diversified farming systems, altering the timing of cropping cycles, loft farming, raising low tunnel poly-houses, and use of climber crops and flood-resilient crop varieties. These are briefly described below.

Climate-resilient agriculture is a type of farming based on the principle of integrating household, livestock and agriculture, and seeks to enhance diversity and recycling in the farming systems. Low use of external bio-inputs, appropriate crop varieties, space and time management, seed banking, land shaping and portable nursery systems are practices that are being promoted and taken up by the farmers. The farmers have adopted a number of innovative farming practices that are adapted to the geographical conditions of the area and the problem of frequent flood events. These are described below.

Integrated and diversified farming systems helped farmers to increase the resilience of their farms because the chance of losses is reduced. Increasing diversity and complexity in agriculture means increasing the number and performance of functions. For example, if the function of fodder is performed by several elements, such as agricultural residues, fallen leaves and pruned branches of trees on the farm boundary, cattle residues and other such farm sources, the farmer's resilience will be greater than it would be by only relying on a single option such as cow dung. Similarly, increasing the number of crop varieties grown, the number of crops grown simultaneously, the number of crop cycles. During the year on the farm, and the number of crops

replaced over the years are other mechanisms of enhancing the diversity of a farm. Besides increasing the number of crops, increasing the number of subsystems on the farm to include, for example, a pond for aqua-culture, orchards/a kitchen garden, livestock, poultry, will add to the diversity of farm systems. The number of functions performed by a single farm element increases the complexity of a farm system. For example, if the livestock in the farm system is utilized for its dung (for compost), milk, ploughing and other purposes, it increases the complexity of that particular farm element. Similarly, the trees can be used for wood, fuel, shadow, multiple cropping and other such functions. In this way the utility of elements is increased. Recycling is adopted by the farmers in and between various farm sub-systems to fulfill several needs of the farm and reduces the need for external inputs. The more recycle flows there are, the better the health of the farm, as this reduces the input costs of the farm without having a negative effect on outputs.

Altering the timing of cropping cycles through pre- or postponement of planting is a successful strategy that the farmers have adopted. Sowing varieties that can withstand water inundation has also been helpful in saving the crops from the effects of flooding. Traditional varieties and those developed by research institutions were identified through participatory exercises and adopted by the farmers. Multitier cropping is another effective practice that the farmers have adopted, as the layers of crops are able to deal with various water levels during flooding in this area.

In waterlogged areas, loft farming is an innovative way of farming. Farmers fill old tyres or sacks with soil and manure and plant seeds of climber vegetable crops. Lofts or stilts are made from wooden sticks and these support the climber crops as they grow, thus saving the produce from spoiling in the waterlogged fields. On the other hand, raising crops in nurseries during summer for transplanting in winter used to be extremely difficult due to extensive waterlogging. Farmers have now been trained to prepare and use poly-houses for growing seedlings. First, the farmers prepared a raised seed bed (1 to 1.5 feet above the ground) in the field which was free from waterlogging. A 30 to 45 cm high mound with a sloppy drain was made around the seed bed to prevent rainwater from entering the seed bed and to allow excess water to drain away easily. This high raised bed was covered by a low tunnel poly-house supported with bamboo sticks. Vegetable seedlings of tomato, cauliflower, brinjal (eggplant), and chilli are to be prepared in these seed beds until they have become ready for early transplantation.

Farmers in the area grow vegetables that creep over the soil, such as sponge gourd and bottle gourd, but these crops do not survive due to excess water and humidity in the soil. Farmers have adopted an innovative practice of growing dhaincha (Sesbania aculeata) for green manure and also use it as a support for these creeping vegetables to climb up. In the waterlogged fields, farmers also use thermocol boxes and jute bags to raise climber crops such as bottle gourd and ridge gourd. The boxes or bags are filled with soil and manure and the vegetable seeds are sown in them. The climbers are supported by wooden sticks as they grow.

Flood-resilient crop varieties have been promoted among farmers. The Swarna Sub-1 variety of paddy and the PV-7 variety of lady's fing r have shown successful results. These crop varieties even grow in flood and waterlogged conditions.59

FIGURE 8 Example of Low tunnel polyhouse preparation[59]

In addition to the above farming techniques, weather stations have been installed and mobile SMS-based climate information advisory services have been set up, providing the farmers with advance weather information. Information on temperature, rainfall, wind and humidity is sent to farmers through SMS, which acts as an early-warning system and helps the famers in scheduling their irrigation, harvesting or other crop

59 GEAG (Gorakhpur Environmental Action Group), www.geagindia.org

activities. The adoption of Promoting Low External Input Sustainable Agriculture (LEISA) practices, such as local preparation of organic manure and pesticides, has significantly reduced the use of high-cost external inputs such as chemical pesticides and fertilizers, thereby increasing the net gains to small and marginal farming communities.

RESULTS/IMPACTS TO COMMUNITY

This initiative of building micro-resilience planning in Mahewa Ward has succeeded in terms of meeting the expectations of raising broader awareness among diverse audiences and generating initiatives that benefit the vulnerable sections of the society. The interventions done through formation of community institutions at the ward level and their convergence with the city level institutions helped in addressing the problems of poor and marginalized which people which are caused by climatic changes. The pilot initiative has impacts on all the three key aspects of urban resilience such as systems, agents and institutions. Some of the impacts from the project that have been seen are as follows:

- Collective understanding on Climate Change Resilience. The term "resilience" is a technical one and is difficult to understand for a common person. Hence, while dealing with this term in relation to issues, "resilience" term was rarely used. The idea of building resilience and its concepts were transferred to the community members successfully by developing this understanding through local examples. Therefore, the micro resilience planning, through its participatory methodologies of functioning was quite successful in developing a collective understanding on climate change resilience in the community.
- Provision of basic need services. With the empowerment of the community members in Mahewa and the active leadership of the local level institutions, provision of basic need services were ensured in the ward. Liaising with the Nagar Nigam and other government officials was done by the ward level committee members for efficient delivery of services in the ward. Mahewa, the ward which was never on the priority list of the Municipal Corporation, started getting all the attention when the residents started voicing their problems, taking initiatives and walking that extra mile to ensure that their rights and entitlements are respected and fulfilled. The workers from the Municipal Corporation has come to good terms with the Mahewa ward level committee members and attends to problems in the ward on the request of the committee members which was never the case before.
- Improved Governance. Though the government was functional in the ward since ages, there was hardly any governance and the ward had been suffering because of this limitation. People's participation and their initiatives to solve their problems involving the Corporator of the ward started ensuring good governance in the ward.
- Linkage between Climate Change and Development Mechanisms. The linkage between climate change and development mechanisms can be seen from two different angles in this case. Firstly, at the ward level, an understanding on the impacts of climate change has been developed among the community members. Second, at the city level the Mahanagar Paryavaran Manch has been advocating on the future impacts of climate change and the development mechanisms that will be required to minimize its impacts on the residents of the city. The Gorakhpur Municipal Corporation has prepared a drainage plan for the city which is under the approval process.
- Ownership and Empowerment. The community institutions and the entire community together have taken the ownership of the problems and situations and devised solutions accordingly which is very much in line with Elinor Ostrom's principles of institution building. Through their involvement in the whole process since the beginning, the community and institutions are empowered enough to take collective actions and approach to the higher authorities in the city for mobilization of resources, etc.
- Lobbying with Local Government for Scale up. Using these results of demonstration in Mahewa, the community and GEAG has successfully lobbied with the city government to expand and build on these efforts.
- Scaling up of Mahewa Experiences in other Wards of the City. Similar to the institutional framework at the Mahewa ward level, institutions were formed at the city level too. Six committees on the same issues as were identified in Mahewa ward were formed which comprised of citizens from the city, academicians, doctors, government functionaries, etc. City level thematic institutions were formed so that the internal experiences from Mahewa could

be disseminated into wider city level departments and organizations by means of exposure visits, create thematic platforms to share learning, and publication of experiences.
- The City Steering Committee acts as an active advisory body and advises on the ideas for solutions at the Mahewa level. The Steering Committee provide**s** feasible solutions and resources, whenever required, for solving the problems at the Mahewa level.

LESSONS LEARNED

The following are the lessons that can be learned from this example:

- Agriculture in peri-urban areas should be seen as an activity undertaken by the entire community, as only then will its impacts be felt and sustainability achieved.
- Government schemes should also be formulated in such a way that the encourage promotion of peri-urban agriculture at the community level, since the problems that farmers face are not individual but affect the whole community (for example, discharge of sewage water or solid waste, digging out of soil, private land colonizers).
- Conservation of peri-urban villages is essential largely because of their role in providing a low-cost supply of food to the urban market. However, peri-urban land use could also be developed not just for the services it provides to urban areas but also for agro-based industries, such as seed production, processing of dairy products and meat, tanneries, laundry services, carpentry, etc.

SUSTAINABILITY/REPLICABILITY

Some of the interventions piloted in Mahewa have already been used in other projects by GEAG and even by other people in the city. For example, the learning from Climate Resilient Agriculture has been used extensively in the peri-urban project where these techniques and methods have been disseminated and implemented. Similarly, the solid waste management system has been adopted by a prominent hotel in the city and the Gorakhpur Jail for converting their kitchen solid waste into manure. GEAG has been promoting peri-urban agriculture in Gorakhpur since 2012 on 200 hectares where a total of 18,000 people live, focusing on small and marginal (mostly women) farmers. The interventions of GEAG are aimed at reducing risks and vulnerabilities of the poor who are dependent on peri-urban agriculture and also of the city's population who are affected by flooding. The underlying strategy is to make peri-urban farming economically viable among the farmers and to demonstrate new techniques of climate-resilient farming.

Looking to the future, the experiences generated from this initiative will be used to develop and implement a policy framework in which the marginalized are empowered and peri-urban agriculture and farmers receive due recognition. Apart from promoting LEISA techniques and other farm practices as ways of adapting to flood situations, the focus will also be on organizing communities so that they can compete in markets. Through advocacy initiatives with city authorities, efforts will be made to implement regulatory frameworks that preserve peri-urban agricultural space and discourage change in land-use patterns. Lastly, experiences will be disseminated and shared in other areas with potential for peri-urban agriculture.

3.14 LOCAL AUTHORITY AND COMMUNITIES WORKING TOGETHER FOR FLOOD RISK REDUCTION: CASE OF DAGUPAN CITY, PHILIPPINES[60]

INTRODUCTION

Dagupan City in Pangasinan province Philippines is a typical growing Asian city where economic development is a priority while dealing with increasing

60 ADPC (2007). Cooperation between Local Authority and Communities: Reducing Flood Disaster Risk in Dagupan City, Philippines. Safer Cities 16. Available online at *http://www.adpc.net/igo/category/ID215/doc/2013-n63UI8-ADPC-Safer_Cities_16.pdf*

population. The city's population are now used to disasters such as the devastating earthquake that happened in 1990 and the present recurring flooding that are affecting hazard that heavily affected most of the city in many ways. The worst-case scenario of flooding is a combination of heavy rainfall in the region, release of dam water, and high tide. Other factors that contribute to flooding in the city are: (1) poor drainage system; (2) the continuing increase in built up area; and (3) conversion of fishponds and other "catch basins" into residential and commercial lots and subdivisions. Key stakeholders in the city started to work together towards dealing with flooding.

Regular mitigation activities included declogging of drainage systems, the reconstruction and repair of drainage systems, dredging of rivers and tributaries, raising the height of roads and bridges, conducting vulnerability assessments of houses and other infrastructure in hazard areas, and budget planning and allocation for disaster mitigation and preparedness. The identified emergency preparedness activities included the reactivation of City Disaster Coordinating Council (CDCC) and Barangay Disaster Coordinating Councils (BDCCs) of the city's 31 barangays, the training of target personnel for emergency response activities, conducting an inventory and purchase of needed emergency equipment, stockpiling of relief (food, medicines etc.), planning the deployment of emergency personnel and equipment, and conducting a public information campaign. The disaster response activities identified included search and rescue operations, evacuation, relief, emergency medical treatment, and security and other police action. The identified post-disaster recovery activities included damage assessment, clearing operations, rebuilding or repairing, and psychological rehabilitation. However, the city authority and the city's residents had been concentrating on responding to the flooding (evacuation, search and rescue operations, emergency medical treatment, providing security) and on being prepared for emergencies (stockpiling and maintaining emergency equipment) with little mitigation (drainage system maintenance and river dredging). It would seem that there is extensive flood mitigation work that needs to be done.

What was clear at the outset was the city government already had recognized the importance of addressing the issue of flooding and was active in the different phases of disaster management. When they expressed a willingness to try reducing disaster risk by addressing issues of vulnerability, they were selected to become the Philippines' demonstration city for the Program for Hydro Meteorological Disaster Mitigation in Secondary Cities in Asia (PROMISE). The objective of PROMISE was to increase the adoption by the private and public sectors of mechanisms for community preparedness and mitigation. The program promotes the adoption of specific disaster mitigation measures at the city and community level. It also tried to increase the participation by needed stakeholders from community to national levels. PROMISE Philippines was implemented through the Center for Disaster Preparedness (CDP), a non-governmental organization devoted to promoting Community Based Disaster Risk Management (CBDRM) in the Philippines. CDP employed different means to show and tell that CBDRM works through the partnership of the community, support organizations and the different levels of government. The PROMISE-Philippines project focused the CDCC upon the idea of disaster mitigation through risk reduction. They recognized that it is a continuing set of activities, and that they need to be active even when there are no emergencies.

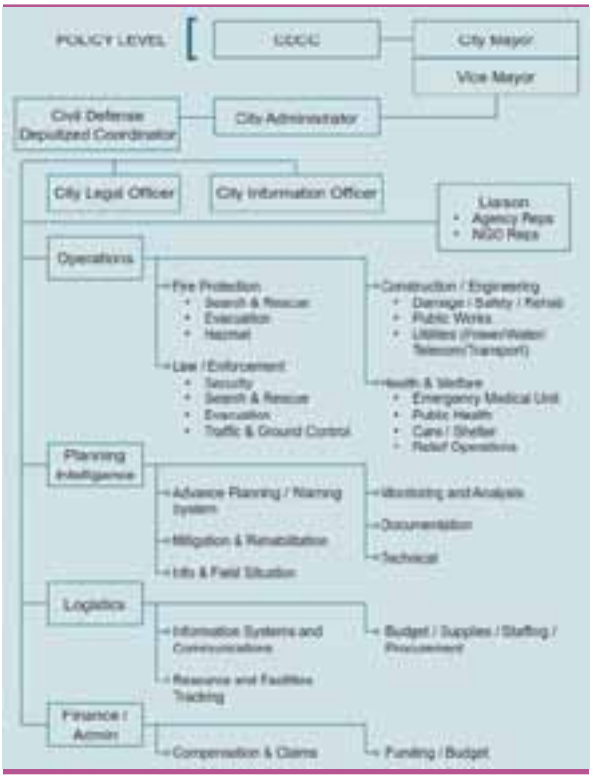
IMPLEMENTATION

As a first step, the CDCC decided to form a Technical Working Group (TWG) that focused on disaster mitigation and risk reduction. The membership of the TWG was drawn from the existing members of the CDCC. The TWG created tasks related to DRR and disaster mitigation: planning, documentation, training (design, planning and implementation), water quality monitoring, barangay-level waste management, flood canal maintenance, and tree pruning. In addition, the barangays in Dagupan were grouped into three "teams", and some members of the TWG were the Team Facilitators that led their team towards managing their disaster risk at the community level.

Second, the TWG conducted an assessment of each barangay's capacity to respond to a disaster. They collected data on the number of evacuation centers, their location, and the facilities available per center. They also conducted an assessment of each barangay's vulnerability to flooding. With the creation of the TWG, the city was able to continually address disaster risk and mitigation. The plans and activities it formulated were implemented through its members' own roles as officials of the City Government that include monitoring

their evacuation centers' readiness for disasters, taking survey in each barangay for information on vulnerability to floods, conduct ng capacity building in DRR, and (4) coordinating its DRR activities with other interested parties. 61

FIGURE 9 CDCC Organizational Chart[61]



One of the key developments was the continuous capacity building with each undertaking of the TWG. Within a few months, the TWG had several study trips and training workshops that include a study visit to the PAGASA Flood Control Office to brief the TWG on how the Flood Control Office monitors the flood situation within the Agno River Basin, to get a briefing on the PAGASA system for communicating the information to affected cities and municipalities, to get full support for the initiatives from Dagupan City Early Warning and Evacuation Workshop. The Workshop was held to brief Department Heads and Staff of the CDCC, including the TWG, on city level planning for early warning and evacuation, to develop the outline of the early warning and evacuation plan, and assign the creation of the components to the different offices of the city government, to review and clarify the CDCC's functions and structure, and the roles and responsibilities of the members of CDCC for finalization of Early Warning and Evacuation Plan, for the CDCC to discuss, agree upon, and finalize the Early Warning and Evacuation Plan, to develop the first draft of the Early Warning and Evacuation Plan and to plan for a public consultation with the eight pilot communities on the draft

The TWG knew that the city cannot act alone and hope to reduce disaster risk significantly, so they actively invited the participation of other government agencies and civic society from within the disaster coordination network. The key stakeholders whose participation was sought by the TWG are the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA)62, the Philippine Institute of Volcanology and Seismology (PHIVOLCS)63, the Department of Education, Culture and Sports (DECS)64, and Bantay Dagupan65. The PAGASA regional Flood Control Office was tapped to provide resource persons for activities related to setting up the Flood Early Warning System. Their technical inputs were especially helpful when the TWG was conceptualizing the system, and again during the training workshops on the system that the city conducted at the barangay level. PHIVOLCS participated in the TWG's capacity building workshops; it sent representatives to present on topics that included the PHIVOLCS early warning

61 ADPC (2007). Cooperation between Local Authority and Communities: Reducing Flood Disaster Risk in Dagupan City, Philippines. Safer Cities 16. Available online at *http://www.adpc.net/igo/category/ID215/doc/2013-n63UI8-ADPC-Safer_Cities_16.pdf*

62 PAGASA has the task to watch over environmental conditions, prepare daily weather forecasts, typhoon watches, and flood outlooks.

63 PHIVOLCS issues advisories on earthquakes, volcanic activity and tsunamis; it identifies appropriate evacuation sites and organizes disaster control groups and reaction teams.

64 DECS provides assistance in public education and campaigns regarding disaster preparedness, prevention and mitigation; makes school buildings available as evacuation centers; and trains education staff in disaster preparedness.

65 Bantay Dagupan is an association of about 17 Dagupan-based NGOs, service groups, special groups, businesses who may be tapped as volunteers to help during various emergencies. Originally created to assist the police force in the overall maintenance of peace and order in Dagupan, its responsibilities were expanded in 2006 by executive order 309-2006 to provide assistance to the CDCC during emergency response and special events.

system and public awareness program. PHIVOLCS also provided technical inputs during planning workshops on early warning systems and on risk mapping. The Region 1 Office of DECS was asked to allow schools in Dagupan City and Pangasinan province to participate in the activities for Dagupan's Disaster Preparedness Week, including the simultaneous earthquake drill. Bantay Dagupan eventually signed a Memorandum of Understanding with the city government to formalize their cooperation during emergencies and special events.

The communities of the eight pilot barangays were involved in their disaster risk management from the very beginning. They also undertook several activities to build community awareness of the risks around them, to create ownership over solutions that they can implement by themselves, and to promote the spirit of cooperation between them, the city government, and civic organizations. Barangay level disaster risk management workshops was held for residents of each pilot barangay and officials from the city government. Workshops on DRR planning, early warning and evacuation were also held in each Barangay.

The TWG worked with the legislators and the City Council and developed Resolution No. 5469-2006 setting July 16 of every year as the Dagupan City Disaster Preparedness Day. This is a significant development because the resolution has made disaster safety day part of the city's culture. The creation of the local law also means that the observance of disaster preparedness must be continued by succeeding city officials. In all of the activities, the TWG was active in coordinating and hosting. The City Government forged ties with various civic organizations for the citywide campaign for disaster preparedness. The list included the expanded task force Bantay Dagupan, the Dagupan Bangus Jaycees, the Dagupan City chapter of the Philippine National Red Cross, all the media outfits in the City, and privately owned schools within Dagupan City.

At the start of the PROMISE Philippines project, Dagupan City developed its own communications plan for the project, called "Capturing the Hearts and Minds of All." Its objectives were to increase the level of understanding of natural disasters among the people of Dagupan (in particular), and the people in the whole country (in general); create awareness among the target public on the need to plan and adopt disaster preparedness and risk management; mobilize people to save lives and to protect the community through disaster risk management. The team behind the implementation of the plan was the City Information Officer, the City Tourism Officer, the City Agriculturist, and the City Administrator Rafael Baraan. The team would mobilize the city's other departments, schools, civic organizations, and other government agencies to help implement various activities under the plan. With this plan to guide the City, they were able to maximize all activities under the project as media-worthy events.

RESULT/IMPACTS TO THE COMMUNITY

A key element to success was the orientation of the city towards raising public awareness of concepts of risk and risk reduction. Through the implementation of their plan, the city learned that the media are supportive of disaster preparedness program because they usually cover the frequent typhoons and flash floods visiting the city. Future plans include the development of informative and creative disaster preparedness campaign materials including radio "plugs" (concise messages sent over the radio, designed to effectively transfer information and understanding to the target audience), audio visual presentations, flyers, posters and calendars.

The success of the project relies on the involvement of every individual, thus the City's communication campaign targets the general public. Highlighting the fact that Dagupan is the only City in the country chosen as a PROMISE city even brought pride to the people and rallied them to support the project. The plan therefore tried to embed disaster risk awareness at the grassroots level by targeting the communities and the children, and it showed simultaneously how active the city officials were on a critical issue as disaster mitigation.

LESSONS LEARNED

The following are the lessons that can be drawn from this case:

- Creating a TWG within the CDCC ensures continuity of the focus on disaster management, and involves the key stakeholders who are concerned with lowering the need for disaster response. Continuous capacity building, risk monitoring, and close

cooperation with key stakeholders are possible through this approach.

- For disaster management to be effective key players that have to be involved are found from national to village level, from government offices to the private sector and civil society.
- The community must be completely involved in disaster management. Their participation can translate to a more comprehensive monitoring of hazards with more data collection points that can be inputted into the city's monitoring system. The community can also monitor their own vulnerabilities and capacities. Developing a local law to create an attitude of disaster preparedness can keep the community on its toes.
- Having a risk communications plan to increase the transparency of disaster management activities helped create a stronger feeling of community and ownership over DRR activities.

SUSTAINABILITY/REPLICABILITY

This initiative can be replicated in any City in Asia. The formation of TWG that focuses on addressing disaster risk issues that consist of urban planners, private sector and community members at the City and local levels

can be done. The TWG then can implement programs and activities according to existing plans, if there is while developing plans if nothing exists.

3.15 STRENGTHENING RESILIENCE OF URBAN COMMUNITIES AND SCHOOLS IN DHAKA, BANGLADESH

INTRODUCTION

Exacerbated by high population density and rapid urbanization, Bangladesh is highly vulnerable to natural disasters such as cyclones, floods, tidal surges and drought. Bangladesh is also one of the most densely populated countries in the world with an average of 1,033 residents per square kilometer. Sustained population growth and migration from rural to urban areas has led to the formation of informal urban settlements, with pollution, poor waste management, contamination of water sources and high levels of poverty. The residents of these informal settlements are highly vulnerable to disasters due to the existing physical, social and economic vulnerabilities inherent in their environment. Almost 30% of Dhaka's population lives in water-side informal settlements prone to flooding and water logging. Poor waste management in these settlements worsens the health risks associated with flooding and water-logging. Due to this, high prevalence of waterborne diseases and respiratory problems, with consequential interruptions to education and economic livelihoods exists. Increasing exposure to natural and human-induced hazards in informal settlements in Dhaka heightens the need for positive developments in urban Climate Change Adaptation (CCA) and DRR.

IMPLEMENTATION

In 2012, WV conducted a DRR and Resilience Assessment in two of the most densely populated informal settlements in Dhaka, namely Kamalapur and Dhaka East . This assessment was part of WV's broader Community Resilience Program, partially funded by the Department of Foreign Affairs and Trade (DFAT) under the inaugural Humanitarian Partnership Agreement (HPA) DRR grant. The assessment was conducted using WV's innovative Urban DRR and Resilience Assessment Methodology . Multi-level research was undertaken through the integration of primary and secondary data collection methods. Local-level field research was conducted, including group discussions, household interviews and first-hand observations of life in the slums. Institutional-level research was collated from government, NGO and academic sources through key-informant interviews and group discussions. This allowed for the triangulation of information between sources. The assessment focused on examining the range of environmental, economic, social and institutional shocks that may impact on urban community members. It also analyzed the capacity of government, private sector, Non-Government Organizations (NGOs), Community-Based Organizations and community members to mitigate, prepare for, and respond to, and recover from such shocks. Key assessment findings indicated that DRR initiatives in these urban settlements should focus on addressing gaps in water,

FIGURE 10 Ward-based risk and evacuation assessment, mapping and validation session with concerned population in Dhaka

sanitation and hygiene (WASH) management, solid waste disposal, health promotion, risk awareness, and community preparedness for disasters, as well as institutional strengthening of government agencies and facilitating increased collaboration with other community stakeholders, including the private sector. Results and recommendations of the above assessment was the basis for the design of the Urban Bangladesh DRR Project.

The project being implemented from September 2014 to end of this year in Dhaka East and Kamalapur Urban Slums, targeted number of individuals to benefit directly and indirectly are 14,820 and 152,415, respectively. The project objectives are to reduce the risk of flooding, water logging and related water borne diseases and infections in urban settlements and schools in Dhaka, thereby mitigating threats to health and livelihoods; and to support local governments and communities in Dhaka to adapt, mitigate, prepare for and respond to disasters. Under the first objective, World Vision Dhaka is implementing community-based DRR activities in water-side urban slums in close collaboration with local government authorities. Community WASH and garbage management committees are established, meeting regularly and with a plan, leading the roll-out of such activities. Training sessions on WASH and hygiene promotion are conducted at household level and in pilot schools. Public awareness regarding WASH and health are also being raised by distribution of information education and communication (IEC) materials. School-based garbage management systems are also established, with campaigns and training sessions provided to school authorities and students. For mitigation of water drainage systems, pipeline and drainage infrastructure in schools are improved. Under the second objective, capacity building activities are also organized for local government stakeholders. Training sessions on early warning, preparedness and disaster response are being conducted for Ward officials, CBDMC, CBOS and volunteer groups. Disaster risk maps and management plans were developed, including Early Warning and Communication (EWC) system which was tested by conducting a simulation exercise. Emergency equipments including megaphones, first aid boxes, fire extinguisher and hammers were provided to selected members of the communities.

RESULTS/IMPACTS TO THE COMMUNITY

The activities under this project are helping build resilience of communities through raising their knowledge on how to prepare for and be involved as agents of change in their community. Impacts in communities are evident. For instance, all the community of Moynarbag ,Badda is now neat and clean and enjoying a healthy environment. Moynarbag Unnayon parishad ensures a disease-free community through effective garbage management. 11-member committee formed in 2015, analyzed the social problems including garbage management, drug addiction, sewerage problem, drainage problem and water supply. Focusing on garbage management issue, they spearheaded training the community on garbage management and established the garbage management system. In another case, Mr. Younis Ali, a resident of Post-Gulshan, Dhaka, after participating in WV's activities under this program, gained much knowledge about disasters, how to prepare hazard and risk maps, DRR plan and educational campaign. Being a Secretary of a local community based organization named Purbo Badda, they formed a CBDMC in their organization. They developed a DRM plan for their CBDMC and organized regular meeting, area assessment, yard session, campaign for creating local awareness. Now he is helping different CBDMC and community to make their DRM plan and R&R map, which will help community to reduce their risk. Now he has prepared a plan to help increase knowledge of the students on DRR and plans to use the student's brigade to raise awareness of more people and their families.

To date, under the DRR resilience project, 28 community WASH and garbage management committees are established and 164 training sessions were conducted at the household level; 34 training sessions on WASH conducted in pilot schools; 3,926 community members and schools received information education and communication (IEC) on WASH and health promotion; pipeline for drainage and water infrastructures were improved in 2 schools, 8 communities and 4 school-based garbage management systems are established to improve waste management thereby reducing the risk of flooding inherent in waterside urban settlements; 6 training sessions on garbage management were conducted for community members and school authorities and students; and 2 community-based campaign on hygiene garbage management for schools were implemented. Under the second objective, 8 training sessions on early warning, preparedness and response were conducted with 201 participants including Ward officials and representatives from CBDMC, CBOS and volunteer groups; 40 meetings between CBDMC members and Ward and Zonal officials supported; 13 community disaster risk maps and management plans developed, including Early Warning and Communication (EWC) system, co-facilitated with CBDMC and local government; NB: plans will be piloted in the communities through simulation exercise to test preparedness as well as early warning and communication systems, 1,810 community members receive materials to IEC materials on the EWC system, Fire, Water Logging and Waste Management related issues, 100 participants take in a simulation exercise to test emergency preparedness and EWC system, 192 items of emergency equipment are provided to 48 Community members.

LESSONS LEARNED

The following challenges have been experienced during program implementation:

- Needs based assessment of vulnerabilities and existing risks in urban areas allow identification of projects that can be implemented along with the government and the people at risk. This allows more effective approach to project development and implementation while helping the government and the community people benefit from project implementation.
- Establishing relationship with local government officials help them understand the project objectives and the importance of them being involved in the project in consultation with WV and community members. This would ensure 'buy in' at the highest level of local government. Change in local government officials –there were significant changes in local government leadership following the elections.
- Working hand in hand with the local government and people most vulnerable in the implementation of disaster risk reduction activities provides win-win strategy towards addressing the needs of all parties involved. While World Vision achieves their mission of implementing such project, the local government capacities on DRR is built while assisting them in doing their responsibilities towards the people in their jurisdiction and the community members learning and knowing how to reduce the risks they face.
- During project implementation, adopting a flexible approach to scheduling training sessions (usually in the evening after the standard working day) help gain more involvement of key people, especially participants working in the informal sector with uncertainty as to if/when they will have to work.

CONCLUSIONS AND RECOMMENDATIONS

4

Practices in Asia and Pacific region in building urban resilience though DRR programs/activities range from activities and programs on knowledge enhancement and raising public awareness on hazards and risks, capacity building targeted at governments and other stakeholders, community-based resilience building and active participation of most vulnerable groups, as well as the use of technologies in governance and land management. Tackling key issues identified by the EGM on sustainable development, the cases presented show some good practices in addressing key issues identified under the 4 spheres of development including governance, economic, social and environment. The following are conclusions that can be drawn based on the lessons learned from the cases presented.

ECONOMIC DEVELOPMENT

Compact urban growth provides greater efficiency in the use of land and higher economic thresholds as people can access more to basic services, reduced time and cost in travelling and increased social inclusiveness. Capacity building, awareness creation, effective information dissemination and advocacy are effective tools in reducing the vulnerability to disaster impacts and strengthening disaster risk management process at the local level. The urban poor people, are strong in social ties and can therefore be trained and mobilized to act together in reducing the risk they face. DRR actions or any development activity will be sustainable once the political commitment is in place. If a city wishes to engage the local stakeholders in DRR activities, it should consider tapping local agencies for collaboration disaster risk reduction and mitigation. Any city can strengthen its own institutional capacities and implement practical DRR actions by themselves. The key is to include DRR into mandated routine operations such as the provision of basic services, land-use planning and development control.

GOVERNANCE

Governance is important in managing and implementing development processes while reducing risks of urban population. City governments, despite existence of formal systems that can sometimes limit DRR activities and programs, can be flexible and creative in order to be effective agents of development and resilience building. Management that focuses on the needs of people such as in areas of civic infrastructure developments, education, health, is an approach that can often be effective in uplifting the quality of life of the people, limiting the risk they face while development processes continued. On another hand, decentralization is an approach that provides opportunities for government to pay much more thorough attention to problems faced at the local level than could any central government can do. Intergovernmental cooperation can work to benefit all parties involved and shows that implementation of good governance principles can have positive outcomes for local governments. However, the impact of decentralization depends on factors such as capacity of local actors, the culture of accountability and law enforcement; the presence of social institutions and political power structures; and, the ability and willingness to carry out changes. Inconsistencies in the legal provision and institutional framework of decentralization, and financing, often pose more problems. These should also be taken into account.

The use of technology provides great help to the government as a tool towards DRR, development planning and identifying appropriate measures of reducing risks in future disasters. Building the capacity of City urban planners with such tools is helpful towards an efficient and effective planning and development. Results and outputs from such technologies can also be used to build awareness among organizations and the people regarding risks they face from hazards and those resulting from urban development activities.

SOCIAL DEVELOPMENT

Social complexities of cities are increasing over time. In order to cope with social development issues, first, identification of pressing needs according to the inputs of the population at risk is an important factor towards developing appropriate DRR programs and activities. The bottom-up approach to development planning better represents local needs, hence allowing municipal and national governments are better able to support. Also, involving the most vulnerable groups to plan, building their capacity as well as involving them to act cooperatively with different stakeholders and the government can produce life changing results. When collective resources of people at high risk and their collective management capacities are put together with a flexible external finance, it gives them encouragement to push forward towards resilience. Formation of working groups for operations on specific areas at various levels such as DRR, poverty reduction, and infrastructure development help improve urban management. Establishing trust to city government leaders and increased participation of people helps cities achieve development targets at the same time building the social resilience.

ENVIRONMENT

Environmental challenges also go with economic and population growth in Cities. To be able to deal with pressing environmental issues and put to reality targets of environmental sustainability, strong policy support is needed. Government investments in research and technology, and financial provision for implementation, as well as getting support from the citizens are crucial in attaining targets. Further, integrated planning at all levels and the inclusion of the public in education and awareness campaigns is important in any DRR activities and programs. Involving grass root communities in dealing with present and future environmental challenges is also important. Strong partnerships are helpful for tackling complex environmental problems such as climate change and natural or man-made induce hazards. Creating a TWG that focus on DRR implementation ensures continuity of the focus on disaster management, and involves the key stakeholders who are concerned with DRR. Continuous capacity building, risk monitoring, and close cooperation with key stakeholders are also important for DRR to be effective. Key players that have to be involved are found from national to village level. The community must be completely involved in disaster management. Their participation can translate to a more comprehensive monitoring of hazards with more data collection points that can be inputted into the city's monitoring system. The community can also monitor their own vulnerabilities and capacities. Developing a local law to create an attitude of disaster preparedness can keep the community on its toes. Having a risk communications plan to increase the transparency of DRR activities helped create a stronger feeling of community and ownership over DRR activities.

Based on the lessons learned highlighted in each sphere of sustainable development as summarized above, the following are specific recommendations for building resilience in cities through DRR efforts.

- Strong policy support and political commitment are needed for DRR actions to be sustainable. At the community level, the presence of local law can develop an attitude of disaster preparedness and can keep community actions going on.
- Financing DRR actions is necessary for sustainability. Provision of financial mechanism in DRR policies and plans usually ensure support for such programs and activities.
- It is also important that DRR activities are made part of mandated routine operations such as the provision of building regulations, land-use planning and development control. In this way, cities can strengthen its own institutional capacities and implement practical DRR actions by themselves.
- Multi-stakeholder engagement (government, private sector, civil society, and academia all from national to local level) is necessary for effective management and holistic implementation of development activities in cities, while ensuring social, economic, infrastructure and environmental resilience are built. The community most vulnerable to risks in cities must be completely involved in DRR activities from identifying risks, their vulnerabilities and capacities to planning, implementation and monitoring and evaluation. Their active involvement can produce more comprehensive outputs. With this, creation of local working groups that focus on DRR actions ensures continuity of the focus on DRR.
- For more effective DRR planning and implementation, the use of ICT and other forms of technology is valuable.
- Capacity building, awareness creation, effective information dissemination and advocacy are effective too**ls in r**educing the vulnerability to disaster impacts a**nd s**trengthening DRR proces**s at** local level.

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