

# HOW CAN A SECONDARY COASTAL CITY IN CAMBODIA BE BETTER PREPARED FOR CLIMATE CHANGE AND NATURAL DISASTER RISKS?

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## **How can a Secondary Coastal City in Cambodia be Better Prepared for Climate Change and Natural Disaster Risks?**

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### **Abstract**

Building cities that can withstand and bounce back from natural disasters and impacts of climate change is a challenge for a developing country like Cambodia where resources, knowledge and capacity are limited. This policy brief discusses the readiness of Khemarak Phumin city in Koh Kong province and provides policy recommendations to better cope with impacts of climate change and natural disasters. Our assessment finds that the city might not be ready should a big hazard such as a storm or flood strikes. This vulnerability is caused by an absence of an early warning system, a responsible specialized agency at the city level, an evacuation route and safe areas for an emergency, and a reserve emergency fund. It is thus important that the city invests in these critical mechanisms.

### **Introduction**

Urban climate resilience refers to the capacity of cities to function so that inhabitants— particularly the poor and vulnerable— survive and thrive no matter what stresses or shocks they encounter ([Asian Development Bank, 2014](#)). This capacity also embraces climate change adaptation, mitigation actions, and disaster risk reduction while recognizing complexities of rapidly growing urban areas and uncertainties associated with climate change. Cities in Cambodia face long-term challenges in ensuring the well-being of their inhabitants. These challenges are partly a result of direct and indirect impacts of climate change, and are often compounded by pre-existing vulnerabilities such as overwhelming urbanization and environmental degradation.

Cambodia is the least urbanized country in Southeast Asia, with only 21 percent of urban population ([United Nations, 2014](#)). However, it is the third fastest growth country, with an annual growth rate of 2.6 percent ([World Bank, 2018](#)). Much of the urbanization is taking place in the capital city of Phnom Penh, which grew from 110 to 160 km<sup>2</sup> between 2000 and 2010 ([Phnom](#)

[Penh Municipality, 2005](#)). Its population grew from 900,000 to 1.5 million in the last 15 years and is expected to double by 2030. Secondary cities or provincial cities have also experienced rapid urbanization. It is estimated that 36 percent of the Cambodian population will live in urban areas by 2050 ([United Nations, 2014](#)).

The growth of urban areas, especially unplanned ones, has led to overwhelming use of services, facilities and space, and put pressures on environmental, social and economic resources ([Theobald, 2011](#)). Specifically, urbanization has increased the consumption of land, water and energy, and the production of waste and pollution. Other effects have included changes in land use and land cover patterns, which have adversely impacted natural and socio-economic resources.

Further, Cambodia is prone to both natural and human-made disasters such as flood, drought, lightening, storms, fire, riverbank collapses, and pest epidemic ([NCDM, 2013](#)). Flood, drought, storms and lightening are prevalent and seasonal while riverbank collapses, pest outbreak and fire are less frequent. For example, a major flood in 2011 affected 1.7 million people (about 13 percent of the population) and killed 250 people. Climate change has increased the frequency, intensity and severity of these natural events, which have turned into far worse disasters. Besides being one of the most vulnerable countries to climate change in Southeast Asia, Cambodia has low adaptive capacity due to a lack of resources, skills, knowledge and infrastructure ([Yusuf and Francisco, 2009](#)). Consequently, it has suffered many adverse impacts.

To better deal with effects of climate change in urban areas, we need monitoring approaches and periodic assessments of land use planning and urban ecosystem management. This policy brief is based on an urban climate resilience assessment of Khemarak Phumin city, Koh Kong province, Cambodia ([Yin, 2017](#)).

## Methodology

We applied the UNISDR Local Government Self-Assessment Tool (LGSAT) ([UNISDR, 2014](#)) to assess the city's vulnerability to climatic hazards and capacity for disaster risk reduction. The 41-question tool comprised ten essentials: (1) Roles and responsibilities of key stakeholders; (2) Budget and incentives for low-income families, and private sector to invest in risk reduction; (3) Hazards and vulnerability Data; (4) Risk-reduction infrastructure maintenance and

investment; (5) School and health facility safety Assessment; (6) Risk-compliant building and land use planning regulation and enforcement; (7) Mainstreaming disaster risk reduction in schools and communities; (8) Ecosystems protection and climate change mitigation and adaptation; (9) Early warning systems and emergency management capacities; and (10) Community participation.

Thirty participants from eleven organizations were asked to assess the essentials on a five-point scale and provide corroborating explanations. The organizations were selected to participate in the assessment based on their expertise in and relevance to urban resilience in climate change and disaster risk reduction. They were eight provincial agencies, two NGOs and one private company. The findings of the assessment were verified with the participants and key stakeholders at a consultation workshop in the city.

### Readiness of Khemarak Phumin City to Address Climate Change Challenges

#### Khemarak Phumin: A Growing, Vibrant City

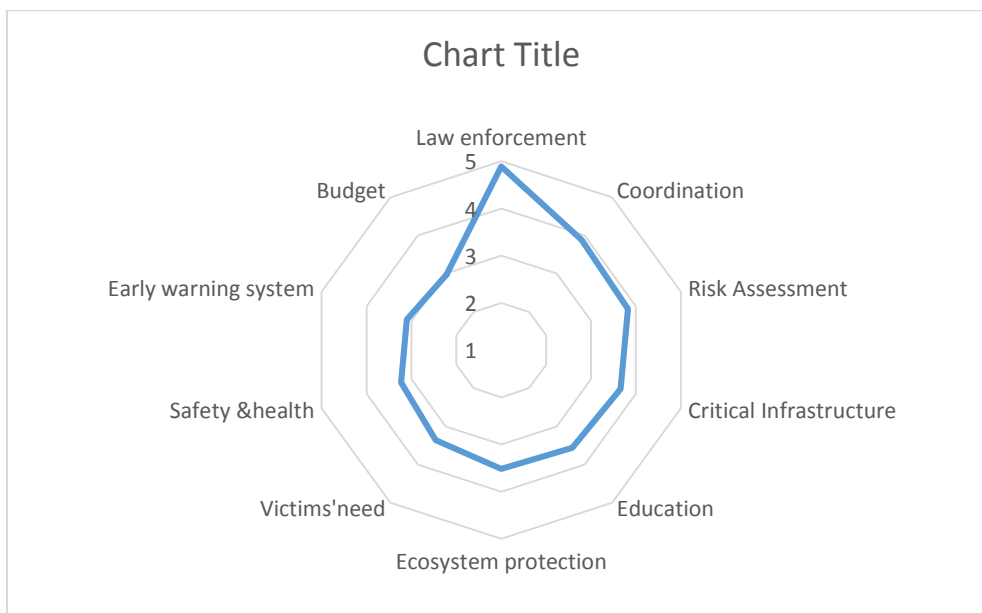
Albeit being the municipality, Khemarak Phumin is a small and remote town with a population of 23,337 (11.25 percent of the provincial populace) in 2008 (NIS, 2009). It is located just below the southern end of Cardamom Mountains, about 10 km from the Thai border, and run through by Kah Bpow River down to the Gulf of Thailand. It is the city of a province that is endowed with a sparse population density (18.6 people per km<sup>2</sup>) and rich natural resources including undeveloped long coastlines and the largest rainforest in Southeast Asia. The province's main tourist attractions encompass abundant wildlife, waterfalls, mangrove forests, local and indigenous cultures, and casinos on the border to Thailand. However, the province is accessible mainly in the coastal area while the interior part remains largely inaccessible.

Economically, Khemarak Phumin is a booming town as a result of the province's increasing integration, particularly in cross-border trade as part of the regional Southern Economic Corridors. Economic activities have been boosted by a functioning Special Economic Zone on the border. According to the 2011 Economic Census, Koh Kong province accounts for 1.0 percent of the national business establishments and 0.8 percent of the total business employment (NIS, 2013). Its annual sales and expenses both amount to 0.7 percent of the national figures. Wholesale and retail trade makes 60.5 percent of economic activities, followed by accommodation and food services

(20.1 percent), other services (6.6 percent), and manufacturing (4.8 percent). But, agriculture is an economic mainstay, employing 63.65 percent of the labor force, while manufacturing employs only 6.82 percent (Sau, 2012).

Koh Kong province is highly vulnerable to climate change due to its geographic and economic conditions (Sa, 2017). City-wide, Khemarak Phumin has encountered some major climatic hazards such as flood, storms and drought (Ngin et al., 2015). While it has some mechanisms (notably in the realms of law enforcement, organization and coordination, and risk assessment) to handle these disasters, it has been constrained by a lack of resources and know-how, particularly to assist vulnerable communities (see Figure 1). Below are the key results of the assessment.

**Figure 1: Urban Resilience Indexes of Khemarak Phumin City (1-5)**



### Enforcing Regulations and Laws

Law enforcement is key to urban resilience, which received the highest score (4.85). Most participants claimed that their municipality did a good job in enforcing existing laws and regulations on risk building codes, land use planning, and identification of safe land for low-income citizens. Participants felt that the existing risk compliant regulations were sufficient and the enforcement was strict. For example, participants reported that the newly-approved Disaster Management Law and Building and Construction Codes provided practitioners with good

directions and guidelines to inform their day-to-day operations. Law enforcement has been executed widely. It was pointed that individuals who have built their houses in the protected coastal zone and on riverbanks have been punished.

However, law enforcement has been constrained by limited resources and legal knowledge. Enforcement officers need more tools and equipment to do their tasks. For example, they need a boat to patrol the coastal zone to tackle mangrove clearance and illegal fishing. Low education might impede enforcement officers to properly comprehend and implement complex rules and regulations.

#### Defining Roles and Responsibilities

Strong organization and coordination among stakeholders is important in times of a crisis. This essential also received a strong score (3.89). Local organizations and stakeholders were coordinated to work together to plan for disaster risk management. At the provincial level, there is a Provincial Committee for Disaster Management, which is chaired by the provincial governor and has relevant departments as members. The governor can call for meetings to respond to any imminent or occurring disaster. At the city level, there is a Municipal Committee for Disaster Management, which is chaired by the city major. In addition, there is Cambodian Red Cross at both levels. The Cambodian Red Cross provides emergency responses to affected communities and technical support to the Provincial and Municipal Committees for Disaster Management. There is also a partnership with civil society actors to reduce disaster risks. For example, local authorities work with INGOs People in Need and Save Children to engage communities in developing their disaster risk management plans.

Notwithstanding, organizing and coordinating is mostly on an ad-hoc basis and for spontaneous emergency events. To effectively plan, coordinate and tackle disasters, more institutionalized and scheduled organization and coordination among the stakeholders is needed. This requires leadership precisely tasked with urban climate resilience and minded with timely and accurate information and data about hazards and vulnerabilities.

#### Updating Data on Hazards and Vulnerabilities

Regular risk and vulnerability assessments and sharing relevant findings to stakeholders are conducive for sustainable urban climate resilience. The city obtained a high score (3.82) in this

area. The Provincial Committee for Disaster Management uses standardized risk assessment forms developed by the National Committee for Disaster Management to assess and report disasters in the province.

However, risk-related information (about the weather, rain, flood and storms) was not frequently and timely updated and shared among stakeholders. Such information was normally shared at workshops and meetings and via local TV and radio programs.

#### Investing in and Maintaining Critical Infrastructure

Investing in and maintaining risk reducing infrastructure is another key indicator for urban climate resilience, which the city received a score of 3.66. Participants reported that the city has invested in a lot of critical public facilities and infrastructure such as health centers, hospitals, schools, roads, and sewage and drainage systems. However, measures and efforts to protect these facilities and infrastructure from damage during disasters are limited. For instance, repair and maintenance issues in the public sewage system were observed.

#### Raising Risk Reduction Awareness and Education

The city has done well to raise risk reduction awareness and education, receiving a score of 3.56. Efforts have been made to educate and train stakeholders about disaster risk reduction and climate change. For example, schools and communities in flood-prone areas were educated about flood and storm preparedness. First aid training was conducted in a number of local schools. However, these initiatives were done based on fund availability and technical support from external donors such as NGOs. Further, some efforts are not embedded in the existing systems. For instance, disaster preparedness and climate change is not integrated in school curriculum.

#### Protecting Ecosystems and Natural Buffers to Mitigate Hazards and Adapt to Climate Change

Ecosystems such as mangrove forests, coral reefs, watershed areas, wetland areas and rainforests play an important role in mitigating hazards and adapting to climate change. These ecosystems also provide services to needy communities and resources for provincial development. The city has made efforts to protect the ecosystems and enhance sustainable use and management of their services (scoring 3.52). For example, local authorities have strictly banned encroachment upon and land filling in the coastal areas. Mangrove trees have been planted and protected. Water resources, especially in the reservoir area for water supply to the city, have been well protected.

Despite these efforts, the city is facing water scarcity, especially during dry season. The current water reservoir is insufficient, forcing residents to use water from their wells or buy water from private trucks. The city has been looking for another water reservoir, which requires a substantial investment.

#### Ensuring the Needs of Victims are Central to Reconstruction

Rescuing and supporting victims affected by natural disasters is integral for urban climate resilience, which the city did not score well (only 3.36). Respondents claimed that local authorities, the Cambodian Red Cross and development partners were present in times of a crisis. When there was a storm or flood affecting local communities, local authorities provided necessary support to address their immediate needs and help them overcome adverse effects.

However, the support and assistance was short-term. There is a lack of long-term assistance or a Contingency Plan that outlines a development strategy for post-disaster recovery and reconstruction. Disaster risk reduction measures were not well integrated into post-disaster recovery and reconstruction activities due to the local government's resource constraint.

#### Assessing and Upgrading the Safety of Schools and Health Facilities

Schools and health facilities are crucial for disaster risk management since they are avenues for public goods. Maintaining and upgrading these facilities is critical as they can be used for temporary shelters in times of a crisis. The city performed relatively poor in this area (with a score of 3.23). Respondents reported that their schools and health facilities were in good shape. However, some respondents pinpointed that there was no attention from local authorities to upgrade these facilities for hazard preparedness. One respondent reported that a public school in his community was built with poor quality and little hazard preparedness. For example, the school did not have public water, electricity and a toilet.

#### Installing Early Warning Systems and Emergency Management Capacity

The city had poor performance in early warning systems and emergency management capacity (with a score of 3.10). Participants reported that there were no early warning systems, route signs for emergency evacuation, and emergency shelters in place. For daily weather forecast, the city relies heavily on Thai TV weather forecast. Since the province borders Thailand, many residents understand Thai language.



## Budgeting and Financing

The budgeting and financing essential received the lowest ranking (2.97). Participants reported that the city lacked budget and resources to provide necessary support to low-income families and local communities affected by natural disasters and climate change. The provincial authorities had limited supplies and resources for emergency purposes. There is a budget line for emergency expenses, but it is not publicly disclosed.

## Conclusion and Recommendations

This policy brief discusses Khemarak Phumin city's climate resilience in the context of disaster risk reduction as assessed and explained by the key stakeholders. The city has experienced some major hazards such as flood, storms and drought, which have adversely affected livelihoods of its residents. Despite these hazards, most respondents perceived the city had considerable resilience to natural disasters and changing climate. Its handling capacity lied in such critical mechanisms as enforced risk-compliance building regulations and land use planning, functioning disaster management committees, and civil society partnerships to enhance disaster preparedness among the public, particularly vulnerable communities. Despite these strengths, the city had key limitations that eroded its resilience. These included minimal budget and resources, a lack of knowledge about climate resilience among the stakeholders, non-existence of early warning systems, and an absence of an institutionalized entity in charge of climate resilience.

To address these challenges, the city should focus on three priorities. First, it should create a disaster trust fund to mobilize budget and in-kind resources from the public, private and development partners. This fund should be used for disaster responses, education and research. Second, it should invest in early warning systems to alert residents about imminent hazards. Finally, the Municipal Committee for Disaster Management should establish a Climate Resilience Office with technical staff and adequate resources dedicated to resilience bolstering and disaster management.

## References

Asian Development Bank. (2014). Urban Climate Change Resilience: A Synopsis. Manila: Asian Development Bank.

- National Institute of Statistics. (2009). National Demographic Census 2008. Phnom Penh: National Institute of Statistics.
- National Institute of Statistics. (2013). Economic Census of Cambodia 2011: Provincial Report 09, Koh Kong Province. Phnom Penh: National Institute of Statistics.
- National Committee for Disaster Management (2013). Analysis Report 1996 – 2013, Phnom Penh, Cambodia.
- Ngin, C., Heng, N., Thuon, T. and Kim, N. (2015). Report on Identification of Case Study Site: Khemarak Phoumin Town, Koh Kong Province, Cambodia. Toronto: Urban Climate Resilience in Southeast Asia Partnership Project.
- Phnom Penh Municipality. (2005). Phnom Penh City Master Plan 2005. Phnom Penh: Phnom Penh Municipality.
- Sa, K. (2017). Urban Climate Vulnerability in Cambodia: A Case Study in Koh Kong Province. *Economies*, 5(41): 1-19. Available at: doi: 10.3390/economies5040041.
- Sau, S. (2012). “A Study on Cross-Border Trade Facilitation and Regional Development along Economic Corridors in Cambodia” in Emerging Economic Corridors in the Mekong Region, edited by Masami Ishida, *BRC Research Report No.8*. Bangkok: Bangkok Research Center, IDE-JETRO.
- Theobald, D.M., 2011, “Quantifying urban and rural sprawl using the sprawl index”, Paper presented at the annual conference of the Association of the American Geographers in New York, March 2011.
- UNISDR. (2014). The Local Government Self-Assessment Tool (LGSAT). Available at: <http://www.unisdr.org/campaign/resilientcities/toolkit/howto>.
- United Nations. (2014). World Urbanization Prospects: The 2014 Revision Population Database. Available at: <https://esa.un.org/unpd/wup/>.

World Bank. (2018). Urban Population Growth. Available at:

<https://data.worldbank.org/indicator/SP.URB.GROW>.

Yin, S. (2017). *Assessing City Resilience: Using the UNISDR Local Government Self-Assessment Tool in Koh Kong, Cambodia*. Phnom Penh: Royal University of Phnom Penh.

Yusuf, A. A., & Francisco, H. (2009). *Climate Change Vulnerability Mapping for Southeast Asia: Economy and Environment Program for Southeast Asia (EEPSEA)*