Assessing City Resilience

Using the UNISDR Local Government Self-Assessment Tool in Koh Kong, Cambodia

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Introduction

Global urbanization is growing rapidly. The UN Population Division (2015) reported that in 1950 there was only 30 per cent of the world's population resided in urban areas. The percentage went up to 54 per cent in 2014 (UN, 2014). Global urbanization is expected to grow and will reverse the global rural-urban population distribution by 2050. The urban population will rise from 3.9 billion in 2014 to 6.3 billion in 2050.

Urban growth can be explained by a number of factors. Pacione (2009) said that the urbanization growth is influenced by two main factors "rural push" and "urban pull". The rural push refers to hardship, economic stagnation and poverty in rural areas that make people migrate from rural to urban area in order to find better opportunities. Urban pull refers to attractiveness of urban areas that attract people to live and work in urban areas.

Cambodia has recently experienced rapid and unplanned urbanization of spatial urban expansion of 4.3 per cent. For example, the size of Phnom Penh, the capital of Cambodia grew from 110 to 160 square kilometers between 2000 and 2010. The expansion of the capital has added eight more districts, encroaching nearby provinces such as Kandal and Kampong Speu. The expansion appears to go south and west since these directions have more vacant spaces. The capital population grew from 900,000 to 1.5 million during the 15-year period and expected to double its population by 2030.

The growth of urban areas, especially an unplanned one has led to competitive uses of services, facilities and space and put pressure on environment, social and economic resources. Theobald (2011) reported that the urbanization expansion is one of potential threats to sustainable development where urban planning should be taken because it implies an increase the consumption of land, water, energy, and other resources as well as of pollutants and waste. The extent of urbanization and its growth have driven the change in land use and land cover pattern. The land use and land cover pattern may have adverse impacts on natural resource and socio-economic.

Monitoring approaches and frequent assessment are important for an effective land use planning and making informed decisions for urban landscape planning and urban ecosystem management. This urban climate resilience assessment was conducted in Khemarak Phumin City, Koh Kong province, Cambodia. The assessment aims to empower local government officers through self-assessment and inform their decision making process. A research team from the Faculty of Development Studies, the Royal University of Phnom Penh and University of Toronto conducted the assessment with financial support from the Urban Climate Resilience in Southeast Asia Project.

Koh Kong is located in the southwest of Cambodia. It is one the biggest provinces in Cambodia with total land size of 11,160 square kilometer. The population of the province is 207,474 with density of 18.6 people per square kilometer. It has rich natural resources with undeveloped long coastline and largest rainforest in Southeast Asia. The geographical characteristics of the province are coastline, Cardamom Mountain and large rainforest. The province is accessible mainly in the coastal area and the interior part remains largely inaccessible. Its main tourist

attractions include abundant wildlife, waterfalls, mangrove forest, local and indigenous cultures and casinos on the border to Thailand.

Figure 1. Map of Koh Kong Province, Cambodia

Assessment Tool: UNISDR Local Government Assessment Tool (LGSAT)

Survey was the main method for this assessment. The assessment applied the UNISDR Local Government Assessment Tool (LGSAT). The LGSAT is powerful tool to help cities reflect on and assess their own capacity for disaster risk reduction. The tool created a space for dialogue and assessment around key capacities. LGSAT also enables cities to understand their vulnerability and start making changes to address them.

Thirty people from eleven agencies were involved in the assessment. The organizations were mostly public agencies including the Provincial Hall, municipality, Provincial Disaster Management Committee, Departments of Environment, Education, Health, Planning, Water Resources and Department of Industry. Two NGO and one private company were also involved in the survey. Most participants were males despite our efforts to recruit female respondents.

The participants were selected to participate in the survey based on their expertise and organization's relevancy to the assessment topics – urban resilience in climate change and disaster risk reduction. Appointments were made via telephone before assessment was conducted. Each survey lasted about one hour and half.

The survey was conducted in a questionnaire form which researchers directly asked respondents to express their opinions and perceived perceptions on specific issues and topics. Respondents were asked to give score from one (low) to five (high) on specific statements. Score of one means achievements are minor and there are few signs of planning or forward action to improve the situation. Two is below average. It means that achievements have been made but are incomplete and while improvements are planned, the commitment and capacities

are limited. Three is average which indicates that there is some institutional commitment and capacities to achieving DRR, but progress is not comprehensive or substantial. Four is medium-high. It indicates substantial achievement has been attained, but with some recognized deficiencies in commitment, financial resources or operational capacities. Five is the highest score. Comprehensive achievement has been attained, with commitment and capacities to sustain efforts at all levels.

The questionnaire focused on ten key topics or essentials with forty one questions. The ten essentials include:

1. Put in place organization and coordination to clarify everyone's roles and responsibilities
2. Assign a budget and provide incentives for homeowners, low-income families, and private sector to invest in risk reduction
3. Update data on hazards and vulnerabilities; prepare and share risk assessments
4. Invest in and maintain risk-reduction infrastructure, such as storm drainage
5. Assess the safety of all schools and health facilities and upgrade these as necessary
6. Enforce risk-compliant building regulations and land use planning, identify safe land for low-come citizens
7. Ensure education programs and training on disaster risk reduction are in place in schools and communities
8. Protect ecosystems and natural buffers to mitigate hazards and adapt to climate change
9. Install early warning systems and emergency management capacities
10. Ensure that the needs and participation of the affected populations are at the center of reconstruction.

Validation Workshop

After our research team drafted the report, we organized one day validation workshop with key stakeholders and especially people whom we interviewed during our survey field visits. The workshop provided an opportunity to our stakeholders to verify our findings. We received good feedback and comments to improve our report. One of them was the request to translate the report into Khmer language. Participants approved most scoring results in the report.

Scope and Limitations

The study was conducted with several limitations and constraints. The study was not objectively conducted to assess the level of urban resiliency to climate change. The assessment was based on opinions and perceived perceptions of the respondents. This is a rapid assessment due to time and budget constraints.

Assessment Results:

Key Results:

Among the ten indicators or essentials, law enforcement received the highest mean score of 4.86, almost reaching the top score of 5. Respondents claimed that their city did a good job on law

enforcement related to enforcing risk-compliant building regulations and land use planning, identifying safe land for low-income citizens. The city did considerably well in areas of organization and coordination, risk assessment, infrastructure, education, protecting ecosystem, meeting victim's needs, safety & health and early warning. However, the city had low mean score on budget and early warning to disaster response.

Table 1: Urban Resilience Index in Koh Kong

Essentials	Mean Score
Law Enforcement	4.85
Organization &Coordination	3.89
Risk Assessment	3.82
Infrastructure	3.66
Education	3.56
Protecting Ecosystem	3.52
Victim's needs	3.36
Safety & Health	3.23
Early Warning	3.1
Budget	2.97

Ten Key Essentials for Making Cities Resilient
1. Law Enforcement:

Law enforcement is a key for urban resilience. The assessment found that law enforcement received the highest mean scores of 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 also strict. For example, participants reported that the new approved Disaster Management Law and building and construction codes provided practitioners good direction and guidelines to inform their day-to-day operation. The table below indicates their agreement on risk-compliant regulations and land use planning.

Table 2: Law Enforcement on risk-compliant building regulations and land use planning, identify safe land for low-income citizens

Questions	Average Score (1 -5)
How well enforced are risk-sensitive land use regulation, building codes, and health and safety codes across all development zones and building types?	3.36
How strong are existing regulations (e.g land use plans, building codes, etc.) to support disaster risk reduction in your local authority?	3.09
Total Average Score	**4.85**

2. Put in place organization and coordination to clarify everyone's roles and responsibilities

Strong organization and coordination among stakeholders are important in time of crisis. The table below shows how 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 in Koh Kong, which is chaired and led by the provincial governor and relevant departments as members. The governor can call for meetings to respond to any disaster that might occur in the province. At the city level, there is a municipality 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 response to community and victims and technical support to the provincial and municipal committee for disaster management.

Respondents reported that there was a strong partnership between public, private and communities to reduce risks. One respondent from the municipality said that he was pleased with strong cooperation and support from NGO to work on disaster risk and climate change adaptation in his city. The respondents also claimed that the local authorities were supportive to vulnerable local communities, particularly women, elders and children to actively participate in risk reduction decision making in their communities. For example, the local authorities with technical and financial supports from the People in Need (PIN) and Save the Children organizations facilitated a number of communities in the province to develop disaster risk management plans. However, these vulnerable group of people have had limited influence in risk reduction planning at the provincial level. Regarding to the capacities for disaster risk reduction, respondents reported that their organizations received above average scores. This indicated that they were well equipped with knowledge and experience in dealing with disaster risk reduction and climate change adaptation.

Table 3: Organizations and Coordination to Clarify Everyone's Roles and Responsibilities

Questions	Mean Score: (1 – 5)
To what extent do partnerships exist between communities, private sector and local authorities to reduce risk?	4.45
How much does the local government support vulnerable local communities (particularly women, elderly, infirmed, children) to actively participate in risk reduction decision making, policy making, planning and implementation processes?	4.18
How well are local organizations (including local government) equipped with capacities (knowledge, experience, official mandate) for disaster risk reduction and climate change adaptation?	3.55
To what extent does the local government participate in national DRR planning?	3.36
Total Average Score	3.89

3. Update data on hazards and vulnerability, prepare and share risk assessments.

The table below shows what respondents thought how information was updated and shared. Regular risk and vulnerability assessment and sharing its findings to relevant stakeholder are ones of ten indicators for sustainable urban climate resilience. There are standardized risk assessment forms developed by the National Committee for Disaster Management (NCDM). These forms are used by the Province Committee for Disaster Management to assess and report any disasters in Koh Kong province.

However, risk related information was not frequently updated and shared among relevant stakeholders. The information was shared during workshops, meetings and local TV and radio programs. For example, information about weather, rain, flood and storm was widely shared and broadcasted via local TV and radio programs in the province.

Table 4: Risk and Vulnerability Related Information Updates and Sharing

Questions	Average Score (1-5)
How well are local government risk assessments linked to, and support of, risk assessments from neighboring local authorities and state or provincial government risk management plans?	**4.18**
How regularly does the local government communicate to the community information on local hazards trends and risk reduction measures (e.g. using a Risk Communications Plan), including early warnings of likely hazard impact?	**3.73**
To what extent are these risk assessments regularly updated; e.g. annually or on a bi annual basis?	**3.55**
Total average score	**3.82**

4. Infrastructure

Investing and maintaining risk reducing infrastructure is another key indicator for successful urban climate resiliency. The respondents gave above average score on this area. This indicates that the respondents were satisfied with risk reducing infrastructure development and maintenance. Participants reported that the city invested in a lot of critical public facilities and infrastructures such as health centers, hospitals, schools, roads, and sewage and drainage systems. However, measures and efforts were made to protect these critical public facilities and infrastructure from damage during the disaster are limited. From our observation, there were maintenance issue to repair and restore public sewage system.

Table 5: Risk Reducing Infrastructure Investment and Maintenance

Questions	Average Score (1-5)
How well are disaster risk assessments incorporated into all relevant local development planning on a consistent basis?	**3.91**
How far do land use policies and planning regulations for housing and development infrastructure take current and projected disaster risk (including	**3.82**

climate related risks) into account?	
- Housing	**3.91**
- Communication	**3.91**
- Transportation	**3.82**
- Energy	**3.64**
How adequate are the measures being taken to protect critical public facilities and infrastructures from damage during disasters?	**3.64**
How adequately are critical public facilities and infrastructure located in high-risk areas assessed for all hazard risks and safety?	**3.27**
Total Average Score	**3.66**

5. Risk Reduction Awareness and Education

Efforts have been made to educate and train relevant stakeholders on disaster risk reduction and climate change. Target schools and communities in critical and flood bronzed areas were educated about flood and storm preparedness. First aid trainings were conducted in a number of local schools. However, these efforts to education people about the disaster and climate change were done based on fund availability and support from external donors and NGOs. Disaster and climate change were not integrated in school curriculum.

Table 6: Disaster and Climate Change Awareness and Education

Questions	Average Score (1-5)
How regularly does the local government conduct awareness-building or education programs on DRR and disaster preparedness for local communities?	
- Program include cultural diversity issues	**4**
- Programs are sensitive to gender perspectives	**4**
To what extent does the local government provide training in risk reduction for local officials and community leaders?	**3.82**
How aware are citizens of evacuation plans or drills for evacuation when necessary?	**3.55**
To what extent does local schools and colleges include courses, education or training in disaster risk reduction (including climate-related risks) as part of the educational curriculum?	**2.45**
Total Average Score	**3.56**

6. Protecting ecosystems and natural buffers to mitigate hazards, adapt to climate change.

Ecosystems such as mangrove forest, coral reef, watershed areas, wetland areas and rainforest play an important role in mitigating hazards and adapt to climate change. Protecting these ecosystems is even important so that they continue to mitigate and provide services to needy communities as well as provincial development. Efforts have been made to protect the ecosystem and enhance sustainable use and management of ecosystem services. For example, the local authorities has strictly banned encroachment and land filling in the coastal areas. Mangrove trees were planted and protected. Water resources, especially in the reservoir area was well protected. The water reservoir provides supplies water to the city.

Despite the conversational efforts, the city is facing water scarcity especially during dry season. The current water reservoir has limited water that it could provide sufficient water in the city. City residents use water from their wells and water from water trucks to substitute the scarcity. The city has been looking for another water reservoir. Big investment is required to build another one.

Table 7: Ecosystem and Natural Buffer Protection

Questions	Average Score (1-5)
How well integrated are the DRR policies, strategies and implementation plans of local government into existing environmental development and natural resource management plans?	3.73
To what degree does the local government support the restoration, protection and sustainable management of ecosystems services?	
- Coastal zones	3.55
- Wetlands	3.73
- Water resources	3.64
- River basins	3.64
- Fisheries	3.36
To what degree do civil society organizations and citizens participate in the restoration, protection and sustainable management of ecosystems services?	3.36
To what degree does the private sector participate in the implementation of environmental and ecosystems management plans in your local authority?	3.18
Total Average Score	3.52

7. Ensuring the needs of victims are central of construction

Rescuing and supporting victims and people who are affected by disasters such as storms and floods are important indicators for urban climate resilience. Respondents claimed that local authorities through Cambodian Red Cross and other development partners were always present in time of crisis. When there was storm or flood affecting local communities, the local authorities

always came and provided necessary support to the affected communities address their hardships and start their new lives.

However, their supports and assistances are for short-term. There is a lack of long-term assistance or Contingency Plan that outline development strategy for post-disaster recovery and reconstruction. Disaster risk reduction measures were not well integrated into post-disaster recovery and reconstruction activities. This is due to the limited resources that the local government has.

Table 8: Comprehensive and Inclusive Disaster Risk Reduction Plan

Questions	Average Score (1-5)
To what degree does the Contingency Plan (or similar plan) include an outline strategy for post-disaster recovery and reconstruction, including needs assessments and livelihoods rehabilitation?	3.73
How well disaster risk reduction measures are integrated into post-disaster recovery and rehabilitation activities (i.e. build back better, livelihoods rehabilitation)?	3.55
How much access does the local government have to resources and expertise to assist victims of psycho-social (psychological, emotional) impacts of disasters?	2.82
Total Average Score	3.36

8. Assessing the safety of all schools and health facilities and upgrade these as necessary

Schools and health facilities are crucial for disaster risk management. These public facilities have been mostly used for public goods. Maintaining and upgrading these public facilities are even important. They can be used for temporary shelter in time of crisis. Respondents reported that their schools and health facilities were in good shape.

However, some respondents admitted that there was no special attention from the local authorities to upgrade these critical public facilities for hazard preparedness. One respondent reported that public school in community was built with poor quality and with little hazard preparedness knowledge. For example, the school did not have public water, electricity and toilet.

Table 9: Health and Safety Plan

Questions	Average Score (1-5)
To what extent have local schools, hospitals and health facilities received special attention for 'all hazard' risk assessments in your local authority?	
- Schools	3.45
- Hospitals/health facilities	3.45
How safe are all main schools, hospitals and health facilities from disasters so that they have the ability to remain operational during emergencies	

- Schools	**3.55**
- Hospitals/health facilities	**3.55**
To what degree do local government or other levels of government have special programs in place to regularly assess schools, hospitals and health facilities for maintenance, compliance with building codes, general safety, weather-related risks etc.?	
- Schools	**2.91**
- Hospitals/ health facilities	**2.91**
How far are regular disaster preparedness drills undertaken in schools, hospital and health facilities?	
- Schools	**3**
- Hospitals/health facilities	**3**
Total Average Score	**3.23**

9. Install early warning systems and emergency management capacity

The assessment found the city had poor performance on early warning system and emergency installment. Participants reported there were no early warning system and emergency installment in place. No route sign for evacuation. No safe evacuation route and no emergency shelter have been identified.

Table 10: Early Warning System and Emergency Installment

Questions	Average Score (1-5)
To what degree do local institutions have access to financial reserves to support effective disaster response and early recovery?	**3.27**
Contingency plan or community disaster preparedness plan for all major hazards	**3.27**
How available are key resources for effective response, such as emergency supplies, emergency shelters, identified evacuation routes and contingency plans at all times?	
-Stockpiles of relief supplies	**3**
- Emergency shelters	**3.55**
- Safe evacuation routes identified	**3.09**
How regularly are training drills and rehearsals carried out with the participation of relevant government, non-governmental, local leaders and volunteers?	**3**
To what extent are early warning centres established, adequately staffed (or on-call personnel) and well resourced (power backups, equipment redundancy etc) at all times?	**2.91**

How much do warning systems allow for adequate community participation?	2.91
To what extent does the local government have an emergency operations centre (EOC) and/or an emergency communication system?	2.91
Total Average Score	3.1

10. Budget and Financing

The assessment found budgeting and financing essential received the lowest ranking. Participants reported that the city lacked budget and resources to provide necessary support to low income families and local community who were affected the disaster and climate change.

However, respondents reported that the provincial authorities had some limited supplies and material and resources to be used for emergency purpose. There is a budget line that is dedicated for emergency expense.

Table 11: Budget and Resources Allocation

Questions	Average Score (1-5)
To what degree does the local government conducted through disaster risk assessments for key vulnerable development sectors in your local authority?	4
To what extend does the local government have access to adequate financial resources to carry out risk reduction activities?	3.27
To what degree does the local government allocate sufficient financial resources to carry out DRR activities, including effective disaster response and recovery?	3.09
How well established are economic incentives for investing in disaster risk reduction for households and businesses (e.g. reduced insurance premiums for households, tax holidays for businesses)?	3.09
What is the scope of financial services (e.g. saving and credit schemes, macro and micro insurance) available to vulnerable and marginalized households for pre-disaster times?	2.91
To what extent do local business associations, such as chambers of commerce and similar, support efforts of small enterprises for business continuity during and after disasters?	2.36
To what extent are micro financing, cash aid, soft loans, loan guarantees, etc. available to affected households after disasters to restart livelihoods?	2.09
Total Average Score	2.97

Conclusion and Next Steps

This assessment reports urban climate resilience perceived by key stakeholders in Khemarak Phumin City, Koh Kong Province. The assessment focused on ten essentials related to disaster risk reduction. The assessment found that Koh Kong town had experienced some major hazards

such as flood, storm and drought. Despite the high exposure to these hazards, most respondents reported their province had high resiliency to the disasters and changing climate. The province experienced some disasters and could handle them. For example, the province enforced risk-compliant building regulation and land use planning. The province had functioning disaster management committee which was chaired by the provincial governor. The province made efforts to educate and raise disaster awareness to the public and target vulnerable groups of communities. However, the province had limited budget and resources to fund on major disaster mitigation projects and give incentive to low income and vulnerable families and communities.

We plan to disseminate this report to our key stakeholders to inform their decisions in planning and making Koh Kong town a more resilient to climate change and disasters. We will translate the report into Khmer language so that local officers can read. We also plan to write a policy brief out of this report for policy makers so that they can adopt policies that are more climate resilient.

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Field Work Activities