

CITY AT RISK? PHNOM PENH

Hazard, Vulnerability and Capacity Assessment

Authors:

Concept: Piotr Sasin, Tep Sokha

Text: Piotr Sasin

Maps: Bunthoeun Seng, Piotr Sasin

Urban HVCA team: Sreymom Hem, Chack Eem,

Bunthoeun Seng, Kihour Sok, Sovannary Chorn, Monyvann Nhean

Supervision: Tep Sokha, Leakhana Kol, Izabela Klimowicz

Graphic Design: Radek Mlodzianowski

email address: cambodia@peopleinneed.cz

Disclaimer

This publication has been produced with the assistance of the European Union. The contents of this publication are the sole responsibility of People in Need and can in no way be taken to reflect the views of the European Union.

**Acknowledgment:**

The authors of this report want to thank all the people and institutions who contributed to this assessment, especially: Phnom Penh Municipality for providing overall guidance, facilitation of the process and sharing of data; district, commune and village level authorities for their active participation in the HVCA exercise, contributions to the report and feedback; Sahmakum Teang Tnaut, our project partner for technical assistance and support.

About the project

Human Rights Based Spatial Planning in Cambodia as a tool for Promotion of Tenure Security for the Most Vulnerable and Marginalized Groups is a joint project of PIN and STT funded by the European Instrument for Democracy and Human Rights (EIDHR).

The project contributes to the development and consolidation of the rule of law and respect for human rights and fundamental freedoms in Cambodia through strengthening tenure security, the right to adequate housing and disaster risk reduction. The main elements of the project include:

- Development of inclusive spatial re-development plans to provide alternatives to the involuntary resettlement of urban poor dwellers in Phnom Penh, in line with existing Royal Government of Cambodia policies and regulations and Cambodia's international obligations.
- Mapping of natural and man-made hazards in Phnom Penh in order to propose a series of structural and non-structural mitigation measures which reduce impacts of disasters and build resilience of urban poor communities.
- Collaboration with academic institutions to support formation of new generations of spatial planners in Cambodia.

People in Need (PIN) is a Czech non-governmental organization providing relief and development assistance while working to defend human rights and democratic freedoms in over 20 countries. With a global turnover of \$25 million USD and over 800 employees worldwide, PIN's food security, WASH, health, education, emergency response and other programs have assisted millions of people. In Cambodia, PIN has operated since 2008 in rural and urban areas, specifically in 3 sectors: market development for improved livelihoods and environment, maternal and child health with a focus on nutrition and disaster preparedness and response.



Sahmakum Teang Tnaut (STT) is a Cambodian Urban NGO based in Phnom Penh. Its mission is to provide pro-poor technical assistance for adequate housing and infrastructure and to inform dialogue and raise awareness about urban issues. STT works closely with urban poor communities impacted by development-related land alienation and forced evictions as well as those who are under threat of evictions. It works to achieve its mission through two main programs: the Technical and Advocacy Programs. The Technical Program consists of three main projects including, Community Mapping, Alternative Housing and Urban Planning, and Research Projects. The Advocacy Program consists of four main projects including Youth, Community, ICT and Media Projects.



CITY AT RISK? PHNOM PENH

Hazard, Vulnerability and Capacity Assessment

Acronyms:**CCA:** Climate Change Adaptation**CDP:** Commune Development Plan**CIP:** Commune Investment Plan**DRR:** Disaster Risk Reduction**EIA:** Environmental Impact Assessment**NCDM:** National Committee for Disaster Management**P/HVCA:** Participatory Hazard Vulnerability and Capacity Assessment**PIN:** People in Need**PPM:** Phnom Penh Municipality**SCDM:** Sangkat Committee for Disaster Management**WASH:** Water, Sanitation and Hygiene**Glossary of terms:****Capacity:** The combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals.**Disaster:** A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.**Disaster Risk Reduction:** The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events**Hazard:** A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage**Resilience:** The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.**Risk:** The combination of the probability of an event and its negative consequences**Vulnerability:** The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.**Coping mechanism:** The ability of people, organizations and systems, using available skills and resources, to face and manage adverse conditions, emergencies or disasters

Source: UNISDR



TABLE OF CONTENTS

INTRODUCTION.....6

METHODOLOGY.....8

HAZARDS.....11

VULNERABILITY.....14

CAPACITY.....16

RISK.....18

FEEDBACK.....27

INTRODUCTION

Cambodia is the 9th most disaster prone country in the world according to the World Risk Index (2014)^I.

This has been confirmed by another recent study by Standard & Poor ranking agency which ranked Cambodia in 2014 as the most vulnerable country to climate change related shocks^{II}.

While Cambodia remains a predominantly rural society (78%), the cities are growing at a fast pace. Cambodia's growing economy is concentrated within metropolitan areas which attract the rural poor with new life opportunities. According to World Bank data, every year more than 41 000 people migrate to Phnom Penh looking for better income and educational opportunities^{III}. These people tend to live in the city's outskirts in often marginalized areas prone to all kinds of hazards: floods, fires, landslides, biohazards, droughts, storms, etc. Vulnerability of these settlements is often defined by their physical location (e.g. riversides) as well as high housing densities, lack of community infrastructure (paths, roads, sewage system, safe electricity connections, city lights, etc.), services and absence of regulatory frameworks (building codes, environmental impact assessments, zoning) and their enforcement. A fairly new phenomenon observed by PIN Urban DRR officers is of unregulated land development induced flooding, which is caused by backfilling of plots of land, new road constructions, etc.

This study is a first Phnom Penh city wide attempt (at commune level) to define and map main disaster hazards, indicate the most vulnerable areas and groups as well as their coping mechanisms and capacities. Through engaging commune officials, village chiefs and community members; field observations and literature review, we tried to collect as much accurate data as possible. However, an important limitation of this exercise is that it is based on perceptions of risks mainly of the local duty bearers. While these views are very valuable, empirical research using remote sensing analysis and community level studies would definitely help verify certain statements and indications as these may be politically driven in some cases. For example some commune authorities claimed there are no hazards or vulnerable groups in their communes, despite the fact the secondary data demonstrates otherwise.



Main Findings:

- The results of this assessment clearly indicate flooding as the main disaster hazard causing the biggest losses and damages (score 378). It is followed by fires and biohazards (garbage, sewage and industrial pollution).
- An interesting result is the high score of traffic accidents- 211. Although traffic accidents do not meet the disaster definition criteria, it indicates how severe its consequences are to individual households.
- The study confirms a trend observed in other research that outer districts are more disaster prone than central ones. They also demonstrate less capacity and confidence in disaster management and risk reduction as compared to centrally located communes.
- The commune authorities are often under resourced with regards to disaster management and risk reduction. They frequently have very good ideas on how to reduce disaster risks but lack necessary resources, both financial and technical to implement them.
- None of the assessed communes have land use plans. Climate Change Adaptation and Disaster Risk Reduction is rarely integrated into local planning processes.

Main Recommendations:

- Disaster Risk Reduction and Climate Change Adaptation shall be mainstreamed throughout the local planning process to ensure that any development investments are environmentally and socially feasible and reduce, rather than exacerbate, disaster risks.
- Structural and non-structural DRR measures shall be prioritized in the outer districts and urban poor settlements to protect vulnerable populations.
- The most active communes should be prioritized for DRR/ CCA specific projects to generate good practices and promote local ownership.
- Commune authorities should be capacitated to conduct village level HVCAs and other types of risks assessments in the most disaster prone settlements identified through this report or other studies.

96
COMMUNES

947
PEOPLE PARTICIPATED IN THE
HAZARDS, VULNERABILITY,
CAPACITY ASSESSMENT
SESSIONS

3
HVCA workshop at
commune level

Meeting with the commune authorities, village chiefs and community representatives to conduct hazard, vulnerability and capacity assessment (including digital mapping using Google Earth as a base map to identify the most vulnerable areas).

6
Feedback

Once completed, the reports and maps were once again consulted with local authorities. The meeting was also an opportunity for collection of the feedback regarding the HVCA process.

People in Need has been using Participatory Hazard, Vulnerability and Capacity Assessment tools since 2013 in the rural areas of Cambodia (e.g. Koh Kong, Pursat) at village and commune levels. This participatory method has been extremely useful to the communities and local authorities in identification of main hazards and vulnerabilities, as well as for assessing their own capacity to deal with disaster risks. In 2014, PIN decided to test these tools in the urban setting. It quickly became evident that urban HVCA needs to be extensively adapted to fit into the urban context. One of the major issues was time available to conduct this quite time consuming exercise which normally would take around 3 days. After several consultations, PIN DRR team came up with a new format which focused on the most important tools and used secondary data sources to fill the information gaps. Please see the HVCA form in Annex A to see the structure of the report^{IV}.



Secondary data review

The Urban DRR officers together with commune representatives reviewed secondary data available at the commune level.



DRR workshop

To gain access and schedule the meetings with local authorities, the concept of the HVCA was presented to the Phnom Penh Municipality. H.E governor Pa Socheatavong endorsed this initiative and organized a workshop for all commune and district authorities. During the workshop, the concept of the HVCA was presented to the participants and they received basic orientation regarding the process and the purpose of the exercise.



Field visits

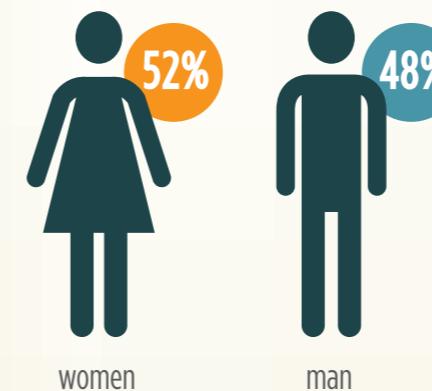
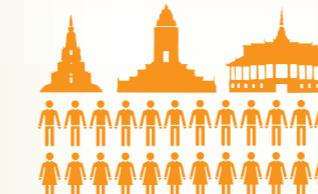
Although it was impossible to do a transect walk through the whole commune, the participants of the HVCA visited several locations in the commune which are particularly hazard prone.



Generation of reports

Urban DRR officers entered the information into the commune HVCA report and produced commune HVCA maps.

1 501 725 *
TOTAL POPULATION IN PHNOM PENH



Urban Growth 2014



Phnom Penh
economic growth
in Cambodia

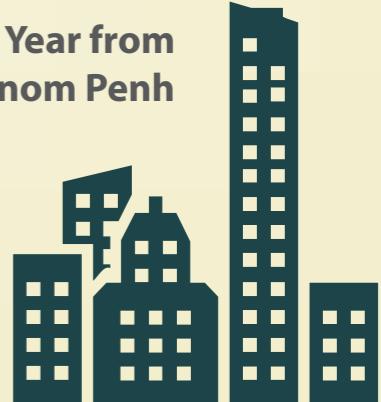
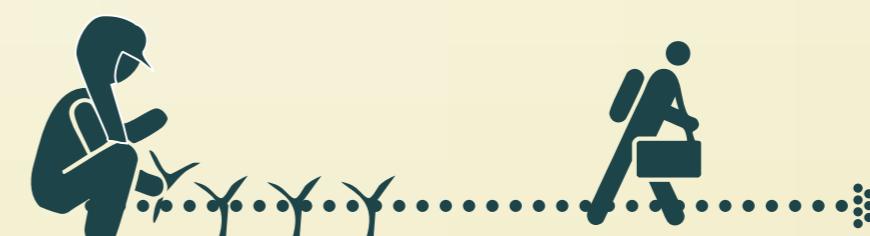
area 67 800 ha



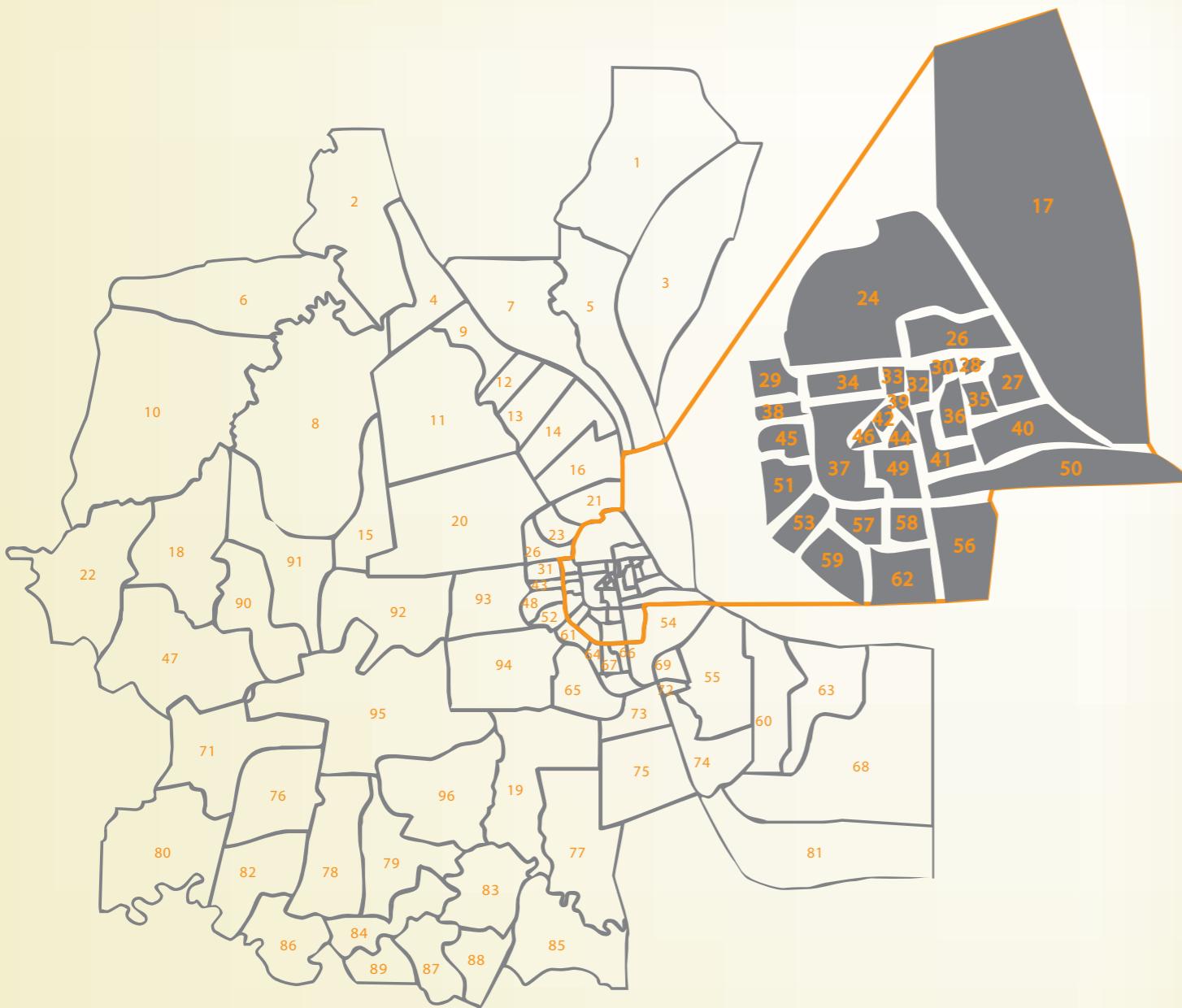
96 sangkats



Approx 41 000 People (mainly young) Move Every Year from
Rural Areas to Phnom Penh



SANGKATS IN PNOM PENH



- 1. Bak Khaeng
- 2. Samraong
- 3. Kaoh Dach
- 4. Preaek Pnov
- 5. Preaek Lieb
- 6. Ponhea Pon
- 7. Preaek Ta Sek
- 8. Kouk Roka
- 9. Svay Pak
- 10. Ponsang
- 11. Khmuonh
- 12. Chrang Chamreh I
- 13. Chrang Chamreh II
- 14. Kiloumaetr Lekh Prammuoy
- 15. Krang Thnong
- 16. Ruessei Kaev
- 17. Chrouy Changva
- 18. Snao
- 19. Dangkao
- 20. Phnom Penh Thmei

- 21. Tuol Sangkae
- 22. Ovlaok
- 23. Boeng Kak I
- 24. Srah Chak
- 25. Boeng Kak II
- 26. Voat Phnum
- 27. Phsar Kandal I
- 28. Phsar Chas
- 29. Phsar Depou I
- 30. Phsar Thmei I
- 31. Tuek L'ak I
- 32. Phsar Thmei II
- 33. Monourom
- 34. Mittakpheap
- 35. Phsar Kandal II
- 36. Phsar Thmei III
- 37. Veal Vong
- 38. Phsar Depou II
- 39. Ou Ruessei IV
- 40. Chey Chumneah

- 41. Boeng Reang
- 42. Ou Ruessei III
- 43. Tuek L'ak II
- 44. Ou Ruessei I
- 45. Phsar Depou III
- 46. Ou Ruessei II
- 47. Kamboul
- 48. Tuek L'ak III
- 49. Boeng Prolit
- 50. Chakto Mukh
- 51. Phsar Daeum Kor
- 52. Boeng Salang
- 53. Tuol Svay Prey II
- 54. Tonle Basak
- 55. Nirouth
- 56. Boeng Keng Kang I
- 57. Oulampik
- 58. Boeng Keng Kang II
- 59. Tuol Svay Prey I
- 60. Veal Sbov
- 61. Tumnob Tuek
- 62. Boeng Keng Kang III
- 63. Preaek Aeng
- 64. Tuol Tumpung II
- 65. Boeng Tumpun
- 66. Boeng Trabaek
- 67. Tuol Tumpung I
- 68. Kbal Kaoh
- 69. Chbar Ampov II
- 70. Phsar Daeum Thkov
- 71. Kantaok
- 72. Chbar Ampov I
- 73. Chak Angrae Leu
- 74. Preaek Pra
- 75. Chak Angrae Kraom
- 76. Phleung Chheh Roteh
- 77. Cheung Aek
- 78. Pong Tuek
- 79. Prey Veaeng
- 80. Boeng Thum
- 81. Preak Thmei
- 82. Prateah Lang
- 83. Spean Thma
- 84. Sak Sampov
- 85. Preaek Kampis
- 86. Krang Pongro
- 87. Tien
- 88. Roluos
- 89. Kong Noy
- 90. Trapeang Krasang
- 91. Samraong Kraom
- 92. Kakab
- 93. Tuek Thla
- 94. Stueng Mean Chey
- 95. Chaom Chau
- 96. Prey Sa

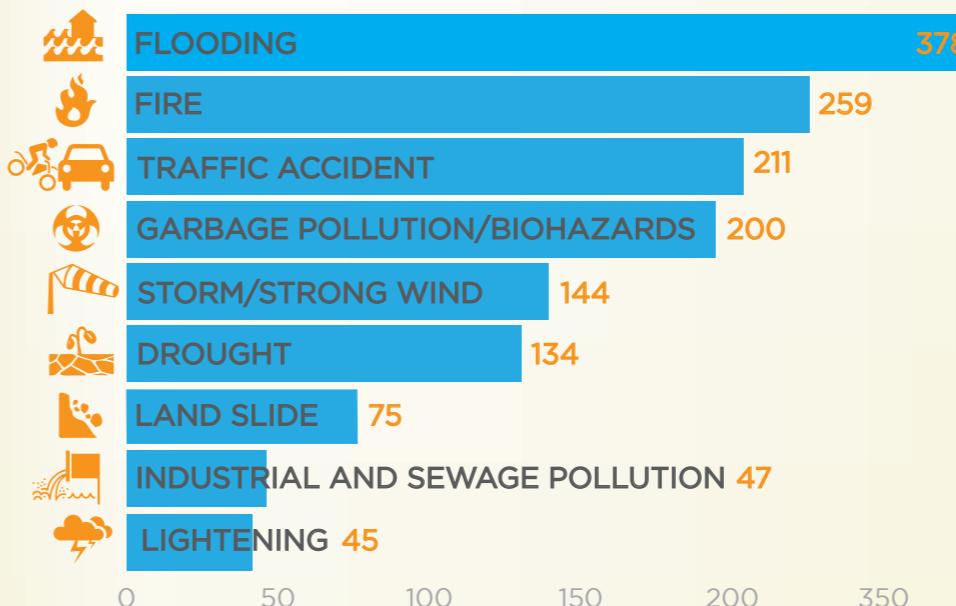
Flooding, both slow (river) and rapid (rain flash flooding) onset, is the biggest single hazard in Phnom Penh. There are also several man-made hazards highlighted by HVCA participants such as fires, garbage, industrial and sewage pollution.

It was decided not to include traffic accidents in the overall risk score. However, the results of this study clearly demonstrate that traffic accidents are seen as a very severe type of hazard.

According to the Human Rights groups active in Phnom Penh there are approximately 26 communities under threat of eviction in Phnom Penh. During HVCA this was identified as a serious hazard only in Toul Sangke commune. This may be underreported due to sensitivity of this subject.

The hazard assessment matrix was used as the main tool in the beginning of the process to identify main hazards and discuss their probability and impact. These initial indications were further assessed using the summary of major disasters tool, HVC mapping

HAZARD ASSESSMENT SCORE



FLOODS IN PHNOM PENH

2001 2006 2011 2013



and HVC summary table where all aspects (hazard, vulnerability, capacity) of assessing the risk were considered (please see page 18 for details). In some cases, the hazards which were identified as severe or critical at the stage of Hazard Assessment Matrix development were categorized differently by the end of the exercise. It was therefore the HVC summary table which is used for final risk assessment.

Likelihood:

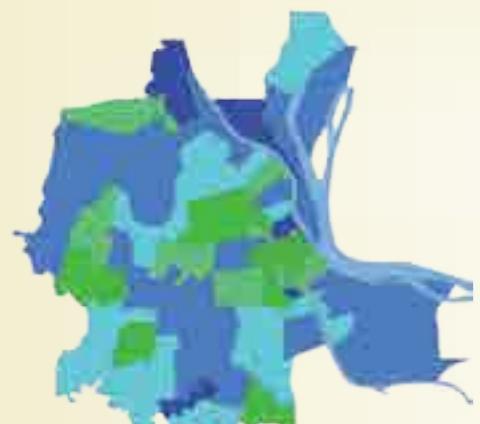
- 1 = Very unlikely (estimated 0-20% chance of the event happening)
- 2 = Unlikely (21-40%),
- 3 = Moderately likely (41-60%),
- 4 = Likely (61-80%),
- 5 = Very likely (81-100%)

I	6	7	8	8	10	5. Critical
M	5	6	7	8	8	4. Severe
P	4	5	6	7	8	3. Moderate
A	3	4	5	6	7	2. Minor
C	2	3	4	5	6	1. Negligible

L I K E L I H O O D
1. Very unlikely
2. Unlikely
3. Moderately likely
4. Likely
5. Very likely

- 1 = Negligible (0-5% families affected),
- 2 = Minor (5-10% families affected),
- 3 = Moderate (10-20% families affected),
- 4 = Severe (20-30% families affected),
- 5 = Critical (over 30% families affected)

FLOOD HAZARD



negligible (0)
minor (1-4)
moderate (5-6)
severe (7-8)
critical (9-10)

Sak Sampov (10)

Srah Chak (10)

Samraong (9)

Preak Ta Sek (9)

Phsar Daeum Thkov (9)



AUGUST
NOVEMBER

SEASONALITY



2569
HOUSES
AFFECTED/
DESTROYED



83
INJURED



39
VILLAGES
AFFECTED



92 226m
of roads
INFRASTRUCTURE



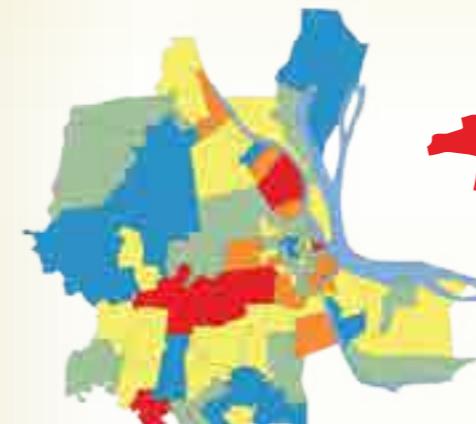
3
HEALTH CENTRES
(REQUIRING SERIOUS REPAIRS)



45
DAMAGED SCHOOLS
(REQUIRING SERIOUS REPAIRS)

36 453
AFFECTED HOUSEHOLDS

FIRE HAZARD



negligible (0-1)
minor (2)
moderate (3-4)
severe (5-6)
critical (7-10)

Stueng Mean Chey (10)

Chaom Chau (7)

Krang Pongro (7)

Kiloumaetr Lekh Prammuoy (7)

Ruessei Kaev (7)

Chey Chumneah (7)



5912
HOUSES
AFFECTED/
DESTROYED



17
INJURY



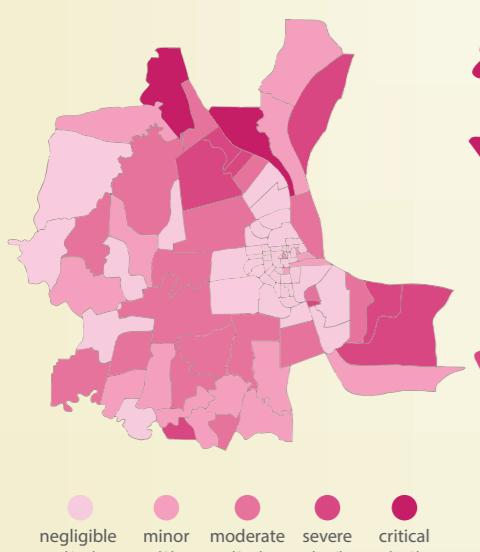
54
FATALITIES



268
VILLAGES
AFFECTED

6902
AFFECTED HOUSEHOLDS

STORM HAZARD



negligible (0-1)
minor (2)
moderate (3-4)
severe (5-6)
critical (7-8)

Samraong (8)

Preak Ta Sek (7)

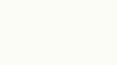
Chbar Ampov I (6)

Kong Noy (6)

Kaoh Dach (5)



1612
HOUSES
AFFECTED/
DESTROYED



55
INJURY



11
FATALITIES



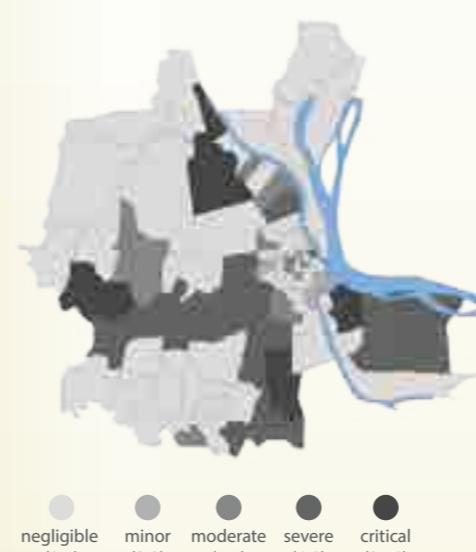
7
DAMAGED SCHOOLS
(REQUIRING SERIOUS REPAIRS)

1 890
AFFECTED HOUSEHOLDS



139
VILLAGES
AFFECTED

GARBAGE HAZARD



negligible (0-1)
minor (2-3)
moderate (4-5)
severe (6-8)
critical (9-10)

Preak Pnov (10)

Khmuonh (10)

Kamboul (10)

Cheung Aek (10)

Nirouth (10)



31 121
AFFECTED HOUSEHOLDS



161
VILLAGES
AFFECTED

LAND SLIDE HAZARD



negligible (0)
minor (1-3)
moderate (4-5)
severe (6-7)
critical (8-10)

Nirouth (10)

Bak Khaeng (9)

Kaoh Dach (6)

Preak Lieb (7)



83
INJURY



6
FATALITIES



1
DAMAGED SCHOOLS
(REQUIRING SERIOUS REPAIRS)

1 006
AFFECTED HOUSEHOLDS



247
HOUSES
AFFECTED/
DESTROYED



32
VILLAGES
AFFECTED

DROUGHT HAZARD



negligible (0)
minor (1-3)
moderate (4-6)
severe (7-8)
critical (9-10)

Kouk Roka (10)

Spean Thma (10)

Ovlaok (9)

Snao (9)



22 658
PEOPLE AFFECTED



173
VILLAGES
AFFECTED

VULNERABILITY

88 000



REASON OF MIGRATION



URBAN POOR

The disaster hazards tend to concentrate in the outer districts of Phnom Penh. These parts of the city are less developed and have fewer protection and response mechanisms than the central districts. A high malnutrition rate among children (35%) and pregnant, lactating women (16%) is further exacerbating the vulnerability of the urban poor as they are more prone to getting ill, hence staying out of school and work^v.

60%
access in outer districts

35%
children malnutrition

10 000
20 000
street kids

12%
of urban poor do not have access to sanitation at all

57%
of urban poor settlements in outer districts do not have safe human waste disposal system



MAIN OCCUPATION OF URBAN POOR

20%
tuk tuk/moto dop driver

26%
small trade

34%
garments workers

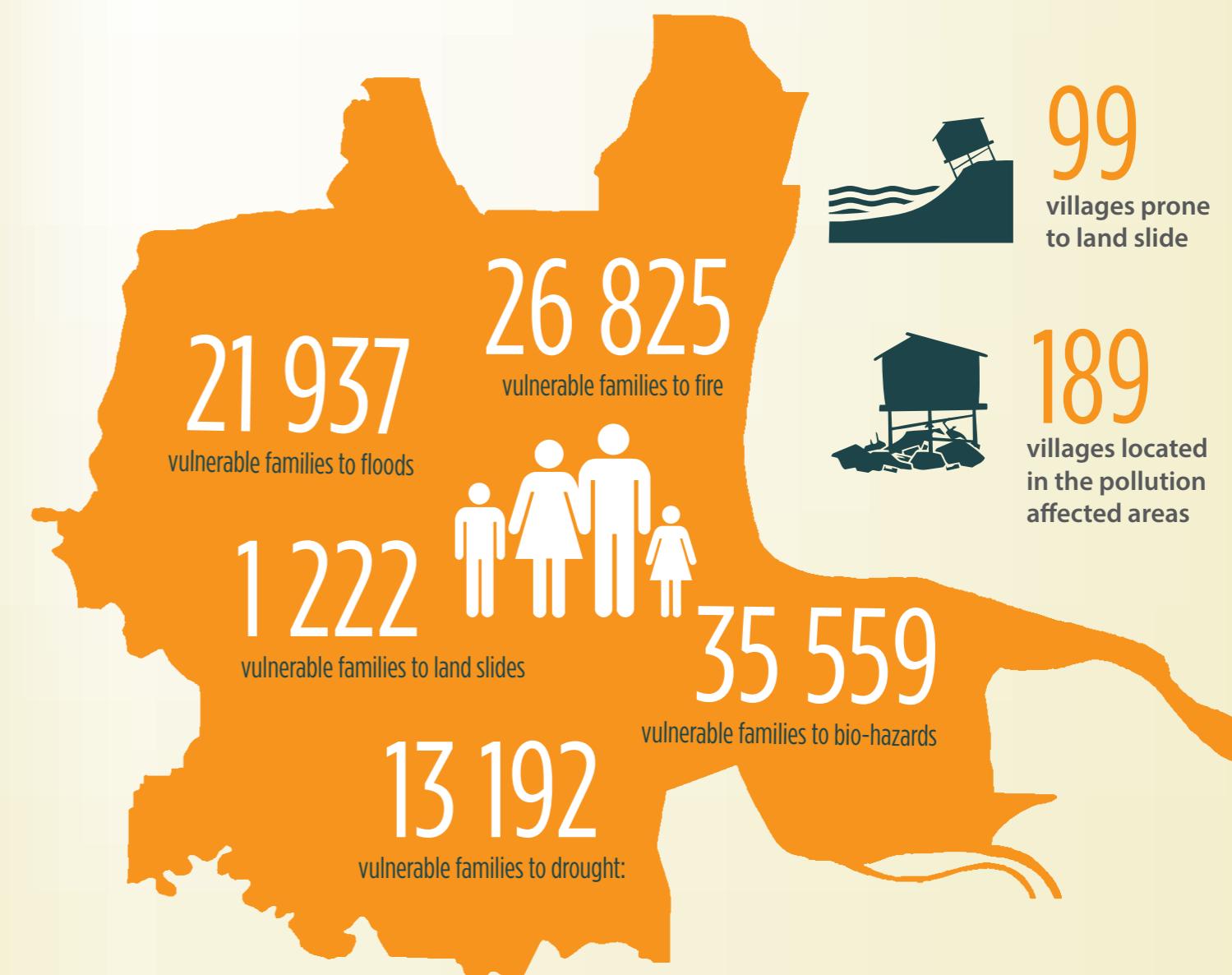
26%
construction workers

7%
Waste pickers

25%
Public sector

SETTLEMENT LOCATION VULNERABILITY

A significant factor increasing vulnerability is physical location of the settlements, access to water and sanitation and quality/ durability of the housing. Many urban poor settlements in Phnom Penh are located in the disaster prone areas such as riverbanks, lakes, garbage disposal sites, etc. They characterize with limited access routes resulting in poor environmental sanitation and higher risks of fire.



302
villages located in flooding prone area

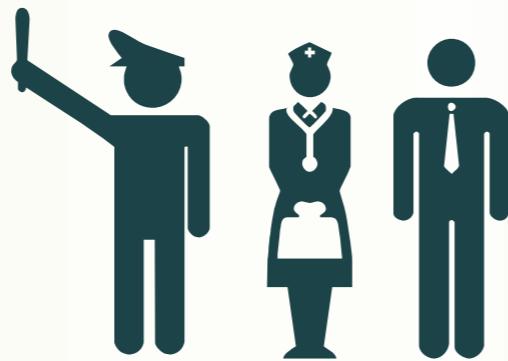
155
villages prone to drought

CAPACITY

The internal capacity of the Phnom Penh communes as well as their interest in the exercise varied depending on the severity of hazards and overall vulnerability. The assessment team received much more attention and inputs from the communes where disaster hazards are more severe and urgent action is required to address them.

The majority of communes had established Sangkat Disaster Management Committees consisting of local authorities and other public stakeholders (police, health centre, etc.).

While commune authorities in most of the cases were able to identify main roles and responsibilities, the longer term, systematic planning of DRR related actions was largely absent. For example, none of the communes have Land Use Plans, DRR/ CCA plans or regulatory frameworks which would prevent maladaptation measures from occurring. Please see PIN's Urbanizing Disaster Risk report for more details as well as to learn more about Community Based Disaster Risk Reduction in urban areas.



DISASTER MANAGEMENT IN PHNOM PENH

NCDM (National Committee for Disaster Management)

- Prevention, mitigation and planning: Draft DRR laws, regulations, formulate guidelines and determine and coordinate overall national DRR strategies; allocate DRR resources,
- Response: Coordinate relevant agencies to respond to disaster at the national level



C/PCDM (Capital/Provincial Committee for Disaster Management)

- Prevention, mitigation and planning: Implement NCDM laws and guidelines; collect data and devise DRR strategy at the municipal level (EPRP); allocate resources for DRR,
- Response: Coordinate relevant agencies to respond to disaster at the municipal level



KCDM (Khan Committee for Disaster Management)

- Prevention, mitigation and planning: Implement relevant laws and guidelines; collect data and devise DRR strategy at Khan level (EPRP); allocate resources for DRR,
- Response: Work with relevant agencies to respond to disaster at district level



SCDM (Sangkat Committee for Disaster Management)

- Prevention, mitigation and planning: Implement relevant laws and guidelines; collect DRR data; implement resources for DRR,
- Response: Work with relevant agencies to respond to disaster at the district at commune level



ROLES AND RESPONSIBILITIES

SANGKAT AUTHORITIES



Data collection and needs assessments



Resources mobilisation from higher level authorities incl: funds to support the most affected families and repair infrastructure



Coordination of disaster response at the Sangkat level



Identification of safe sites for temporary relocation for flood affected people



Mainstreaming DRR mitigation measures into Commune Investment Plans



Public awareness campaigns to eliminate risky behaviours and promote preparedness



Community organizing



Small scale infrastructure upgrading



Awareness raising

HEALTH CENTRE



Medical care for disaster affected people

POLICE



Search and rescue



Ensure security



Provide emergency assistance to affected people

SCHOOL



Support public forums at Sangkat level



Promote safe behaviours among students

CAPACITY GAPS



Limited budget



Absence of urban planning

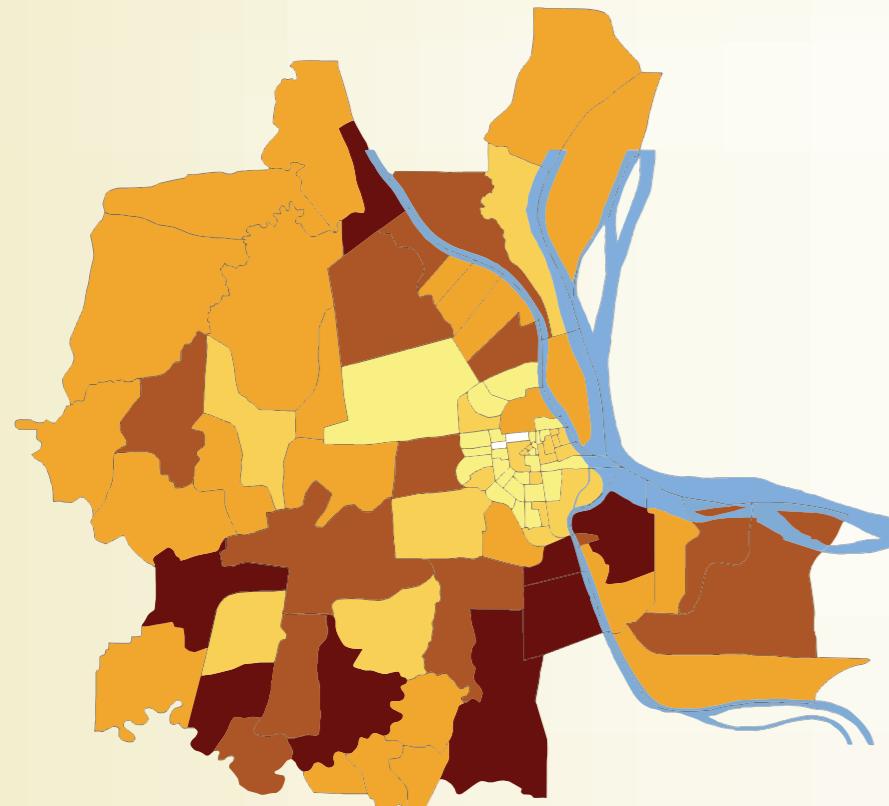


Limited understanding of DRR

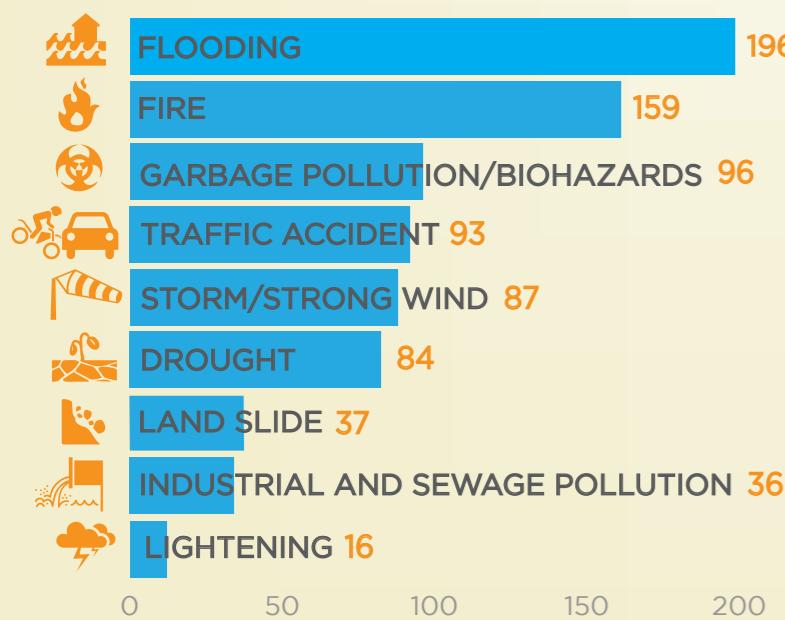
JICA. Since 1999, the city of Phnom Penh receives significant assistance in reducing flood risks from Japanese Government Development Agency- JICA. The Project for Flood Protection and Drainage Improvement in Phnom Penh (PFPDIPP) has been implemented in three phases. Phases I and II (2002- 2007, 2008- 2012) cost 59 mln USD and phase III brings additional 46 mln USD for further improvements of drainage. The project is implemented only in the inner (central) districts of Phnom Penh and its objective is to direct the rain water to the Mekong and underground reservoirs. The project is implemented in four areas in the city namely: 60,789 meters around Tuol Sleng; 19,058 meters around Ou Russey; 162,871 meters in Boeung Keng Kang and 126,727 meters around Tuol Tumpong. Its main objectives are to:

- Improve the drainage system in the areas mentioned above.
- Reconstruct the big chamber as the underground reservoir under the Park at the corner of Street 240
- Provide equipment such as Water Jet Machines and Sludge Suckers
- Train the technical staff of Phnom Penh Department of Public Works and Transport for operation and maintenance of the procured equipment.

OVERALL RISK SCORE



STORM SCORE:

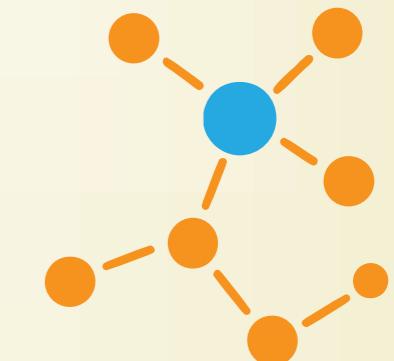


- Chak Angrae Kraom (20)
- Chbar Ampov II (17)
- Chak Angrae Leu (17)
- Cheung Aek (17)
- Preak Kampi (17)
- Seak Sampov (17)
- Nirouth (16)

EXAMPLE OF HVC SUMMARY TABLE

Hazard	When most likely to occur (month)	name of vulnerable communities	Vulnerabilities-no of vulnerable families	Vulnerable schools located in the hazard zone	Vulnerable HCs located in the hazard zone	Vulnerable water supply/ sewage/ Electric lines located in the hazard zone	Capacities and Coping Mechanisms	Rank (based on potential impact/ damage (score 1-5, where 1 is negligible and 5 critical
Flood	Oct-Nov	• Khva • Baku	• 200 families	• Prek Chrey Primary School	• No	• Around 125 m of road is vulnerable to flood	<ul style="list-style-type: none"> - Villages, commune, and Communities together spread the information and build dam - The village chief spread the information and move the villagers to the safe area 	3
Garbage Pollution	May to December	• Baku • Ta Lei	• 1134 families	• Preak Chrey Primary School • Toul Am Pil High School	• No	• No	<ul style="list-style-type: none"> - Commune had sent the requests to District and Municipality in order to find the solution of the problem 	4

One of the major limitations of this report is that it presents data at the commune level, while we know that within one commune, some villages may be more hazard prone than others. A table below presents how this problem has been addressed during the HVCA process^{VII}. Ranking of the villages per hazard matrix helped commune authorities to identify areas at most risk^{VIII}.

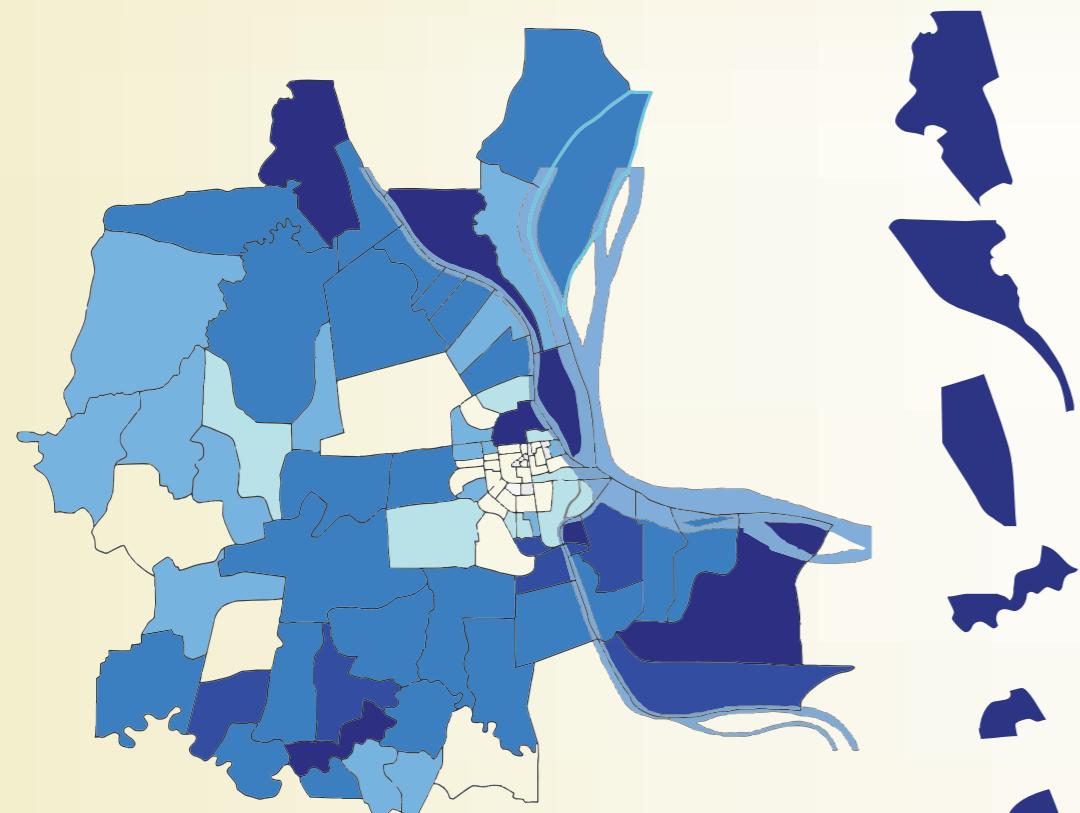


EXAMPLE OF HAZARD RANKING PER VILLAGE TABLE

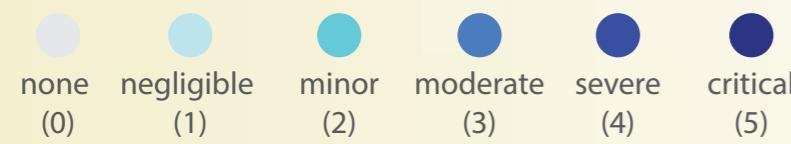
Hazard: Garbage Pollution	Baku	Ta Lei	Sambor	Khva	Mol	Thmei
Severity of Hazard	5	5	1	2	1	2
Frequency of Hazard	5	5	1	2	1	2
Human Loss potential	3	3	1	1	1	1
Economic Loss potential	4	3	1	2	1	1
Response Capacity	-1	-2	-4	-3	-4	-3
Summary	16	14	0	4	0	3

While the commune HVC report is a good basis to start with, a more thorough assessment shall be undertaken to understand the nature of these risks and plan protective measures accordingly at the village level. Many of them (e.g. biohazards) exceed the capacity and competencies of the commune authorities and the planning process shall be completed at the District and Municipal levels.

FLOOD RISK



FLOOD SCORE:



Samraong (5)

Preaek Ta Sek (5)

Chrouy Changva (5)

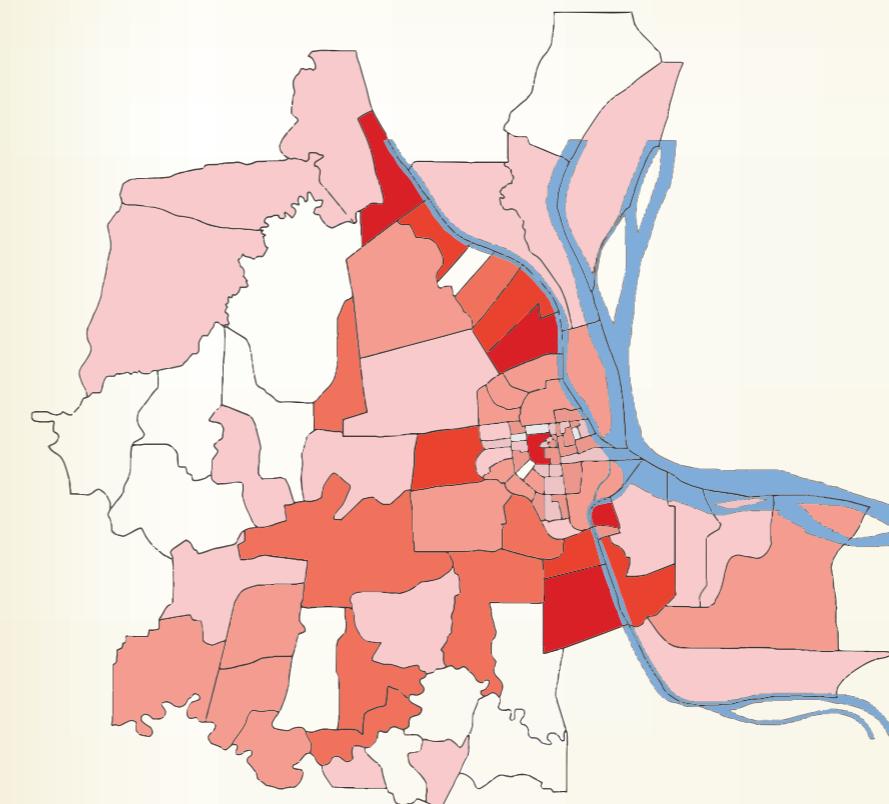
Sak Sampov (5)

Srah Chak (5)

Chbar Ampov II (5)

Kbal Kaoh (5)

FIRE RISK



FIRE SCORE:



Preak Pnov (5)

Russei Kaev (5)

Chak Angrae Kraom (5)

Veal Vong (5)

Chbar Ampov II (5)

Due to its geographical location, Phnom Penh city is very prone to flooding. Despite many efforts to mitigate its effects (e.g. JICA funded flood protection project) the city continues to face problems in response to floods.

Two types of flooding were identified during the HVC process: floods caused by extensive rains, and river flooding. An interesting phenomenon observed by the urban DRR team has been land development induced flooding (see PIN's Urbanizing Disaster Risk report for more details) in the areas which were not affected by floods in the past to the same degree. Findings of this report only confirm that further efforts should be undertaken by the Phnom Penh Municipality to reduce the risks of flooding in a strategic and holistic manner.

RECOMMENDATIONS:



NON-STRUCTURAL MITIGATION MEASURES
(EWS, ZONING, AWARENESS SESSIONS, ETC.)



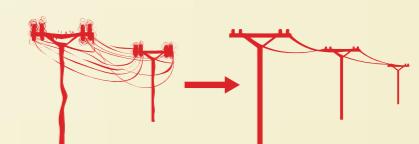
STRUCTURAL MITIGATION
MEASURES (EIA, LEVIES, ETC.)

The fire hazards tend to have critical impacts on the affected population resulting in significant or complete damage of families' assets. The HVC mapping exercise does not demonstrate any spatial trend in distribution of this risk across the city. One of the main problems identified during HVCA is slow response of the fire brigades as well as accessibility issues (many urban poor communities are characterized by very narrow streets). Other risk factors include poor quality of electrical grid construction and electrical connections, lack of fire extinguishers at household levels and limited awareness of the population to fire prevention.

RECOMMENDATIONS:



AWARENESS SESSIONS



UPGRADE OF ELECTRICAL CONNECTIONS INFRASTRUCTURE

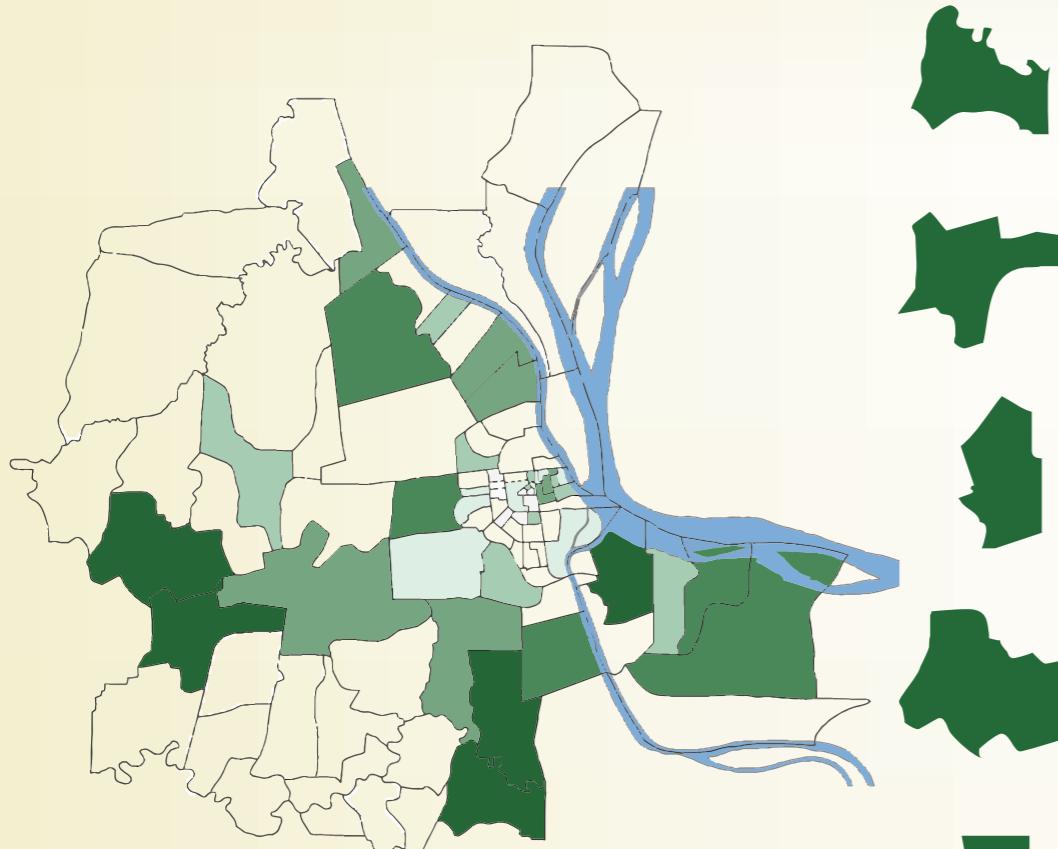


IMPROVE ACCESSIBILITY WHERE NECESSARY

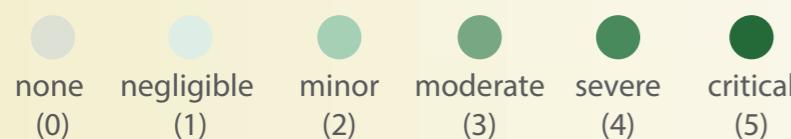


BUILD CAPACITY OF FIRE BRIGADES UNITS

GARBAGE POLLUTION RISK



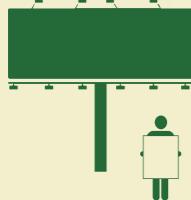
GARBAGE SCORE:



Garbage pollution is a chronic problem across many areas of Phnom Penh. Although it does not constitute immediate risk to life or assets, it creates conditions for spread of disease. Rubbish also clogs the sewage and drainage systems causing flooding. In many assessed areas of Phnom Penh, garbage pollution has been identified as the main issue. There are multiple reasons causing poor environmental sanitation, namely inefficiency of CINTRI company in garbage collection and utilization, poor environmental sanitation awareness of the population, accessibility of garbage trucks to some parts of the city where the roads are poorly constructed and too narrow, and affordability of the waste collection system.

RECOMMENDATIONS:

BIG PUBLIC ENVIRONMENTAL SANITATION AWARENESS CAMPAIGN



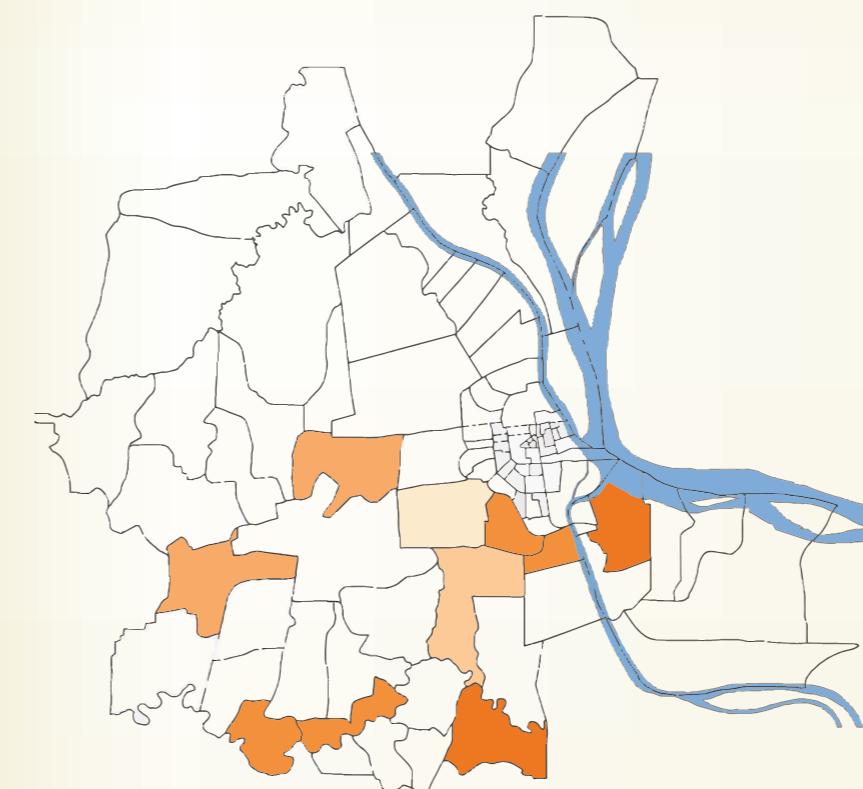
IMPROVING GARBAGE COLLECTION SYSTEM WITH ENGAGEMENT OF WASTE PICKERS AND URBAN POOR COMMUNITIES WHERE THE PROBLEM IS THE BIGGEST



ENFORCEMENT MEASURES - INTRODUCING FINES FOR POLLUTING THE ENVIRONMENT



SEWAGE AND INDUSTRIAL POLLUTION RISK



SEWAGE AND INDUSTRIAL POLLUTION SCORE:



Several areas facing the problems of industrial and raw sewage pollution have been identified through HVCA. Unfortunately there are very few measures which can be undertaken by commune authorities and this needs to be addressed at the district and municipal levels.

RECOMMENDATIONS:



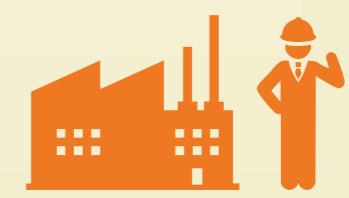
SEWAGE TREATMENT PLANT



EXPANSION OF SANITATION PROGRAMS TO URBAN POOR SETTLEMENTS

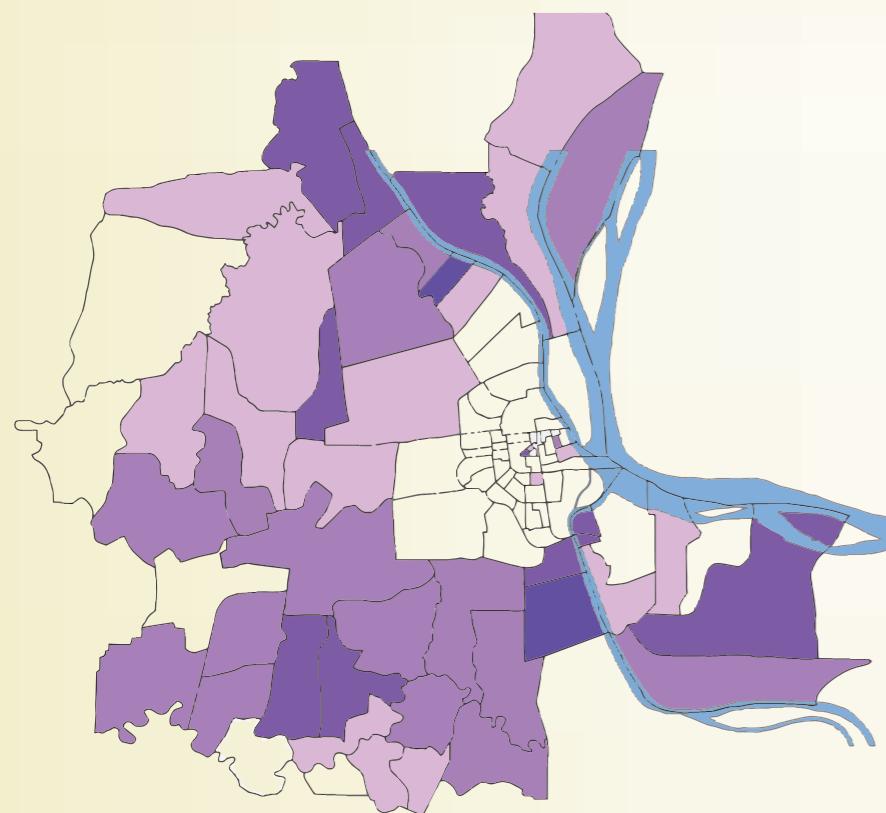


SEPARATION OF SEWAGE WATER FROM PEOPLE ACCESSED AREAS

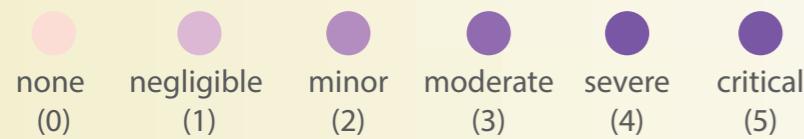


ENFORCEMENT OF ENVIRONMENTAL PROTECTION MEASURES AND STRICTER CONTROLS ON INDUSTRIES

STORM RISK



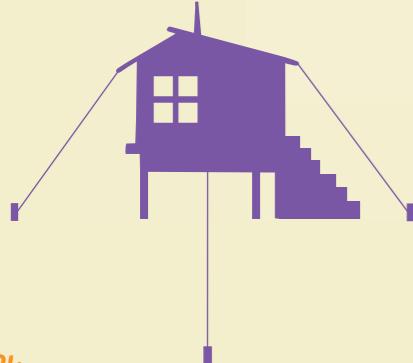
STORM SCORE:



Only few locations identified strong winds and storms as a significant hazard. This could also be because its strong correlation with rain floods and lightning which were both identified as separate hazards. The main causes of storm/ strong wind related risks is poor construction of dwellings and community infrastructure (e.g. electrical pillars), which may lead to critical consequences (collapse, fire).

RECOMMENDATIONS:

PROMOTION OF WIND PROOF HOUSING TECHNIQUES



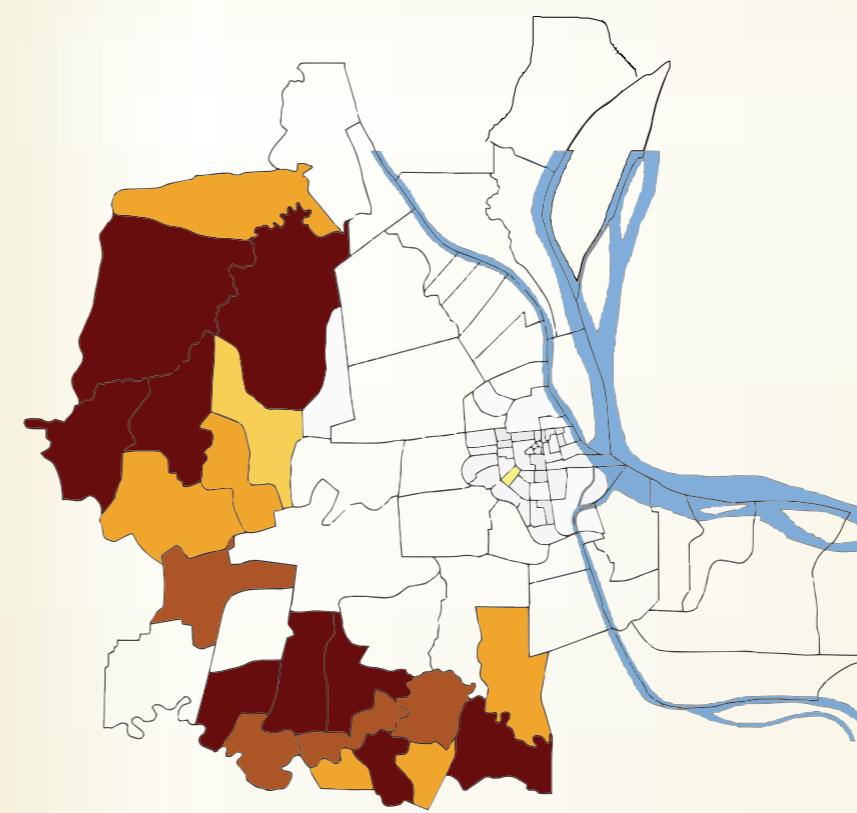
AWARENESS RAISING AMONG POPULATION IN REGARDS TO STORM/STRONG WIND MITIGATION AND PREPAREDNESS MEASURES.



ENFORCEMENT OF BUILDING CODES



DROUGHT RISK



DROUGHT SCORE:



In Cambodia, agricultural drought is considered an extremely dangerous hazard especially in the rural areas as it devastates peoples' crops and incomes. The drought hazard has been observed in the outskirts of Phnom Penh in the peri-urban areas where local livelihoods are reliant on agricultural production. The main factors causing drought are erratic rains and limited irrigation infrastructure which is not sufficient to support peri-urban farmers.

RECOMMENDATIONS:

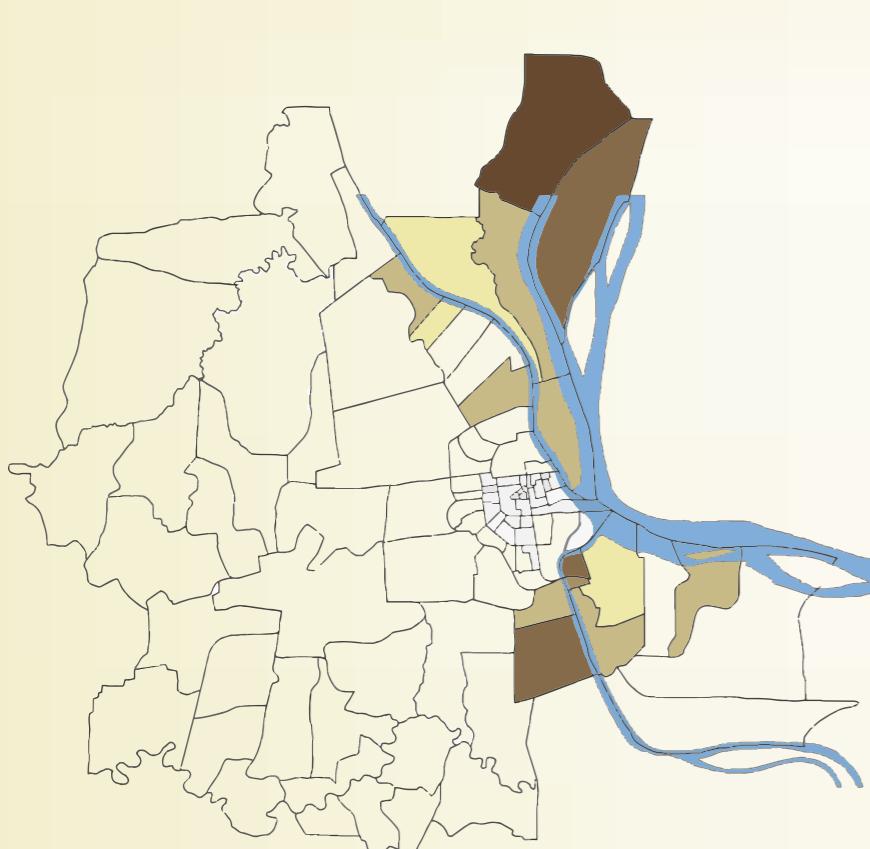


IMPROVING WATER MANAGEMENT AND SOIL CONSERVATION AT LOCAL LEVEL (E.G. THROUGH WATER USERS GROUPS)



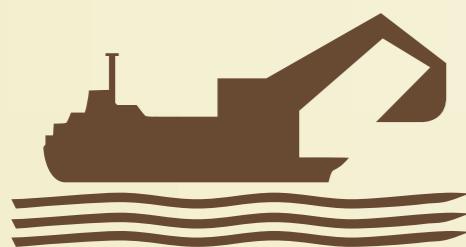
IMPROVING ACCESS TO IRRIGATION NETWORKS

LAND SLIDE RISK



Landslide hazards were identified mainly along the Phnom Penh river banks. The main causes of the landslides include dense, unsafe construction along the embankments and continuous sand dredging from the river bed causing soil erosion on the embankments.

RECOMMENDATIONS:



**STOP SAND DREDGING ACTIVITIES
ON THE RIVERS**



**SUPPORT ONSITE RE-DEVELOPMENT OF
THE COMMUNITIES LIVING ON THE RIVERBANKS**

Bak Khaeng (5)

Kaoh Dach (4)

Chak Angrae (4)

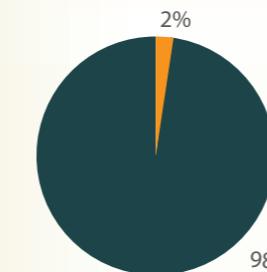
Chbar Ampov II (4)

Chbar Ampov I (3)

FEEDBACK

Do you think urban PHVCA developed under this project is useful for your Commune?

- Yes
- No
- I don't know

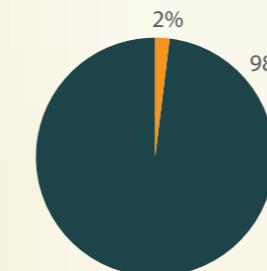


What is the most valuable part of the PHVCA process (multiple answers)?



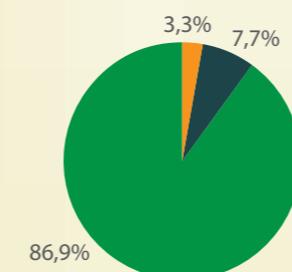
Are you going to use the information from the report?

- Yes, if yes
- No



Would you like to learn more about PHVCA and DRR to conduct PHVCA at the community level?

- Definitely yes - it is essential for good spatial planning
- Yes, this is useful process important for the planning process
- I would consider it if I have time - some elements of PHVCA are interesting



I UNU-EHS, World Risk Report 2014, available at <http://i.unu.edu/media/ehs.unu.edu/news/4070/11895.pdf>
[Sept. 2015]

II S&P, 2014. Climate Change is a Global Mega-Trend for Sovereign Risk. Standard and Poor. Accessed from
<http://www.acclimatise.uk.com/login/uploaded/resources/climate-change-is-a-global-mega-trend-for-sovereign-risk-15-may-14-.pdf> [May 2015]

III This figure is based on the official 1 501 725 population figure (PPM) and estimated urban growth by the World Bank- 2.74% per annum. The actual figure is probably much higher than 41 000 as Phnom Penh is probably attracting more migrants. However, in the course of writing of this report, the authors have not identified a good source for Phnom Penh's specific urban growth figure.

IV The Urban HVCA forms were adapted from standard PHVCA forms developed by the Concern Worldwide, ActionAid, DanChurchAid and People in Need consortium implementing "Building Disaster Resilient Communities in Cambodia" 2012-2014 funded by ECHO

V People in Need &UNICEF, Phnom Penh Multiple Indicator Assessment of the urban Poor(p. 35-36)

VI PPWSA Annual Report 2014, p.5

VII World Bank Institute, Establishing Basic Parameters: Risk Assessment, 2014

VIII This data is available to the interested parties through commune authorities, Phnom Penh Municipality or PIN country office

Data sources:

- All maps were produced using shape files provided by the Phnom Penh Municipality (district and commune boundaries, waterways) and OpenStreetMap (streets) are formatted in WGS 1984.
- Disaster losses and damages data was provided by commune representatives based on commune records.
- Data for Phnom Penh factsheet is based on inputs from Phnom Penh Municipality and commune offices (demographic information, administrative division). Data related to migration is sourced from CRUMP 2012 report and World Bank statistics. Phnom Penh's share in Cambodia's economic growth is based on the 2011 Cambodia Economic Census.
- Socio-economic vulnerability data comes from the following sources: Phnom Penh Municipality (number of urban poor and urban poor settlements), UNICEF (number of street children), PPWSA 2014 annual report (water supply), STT Phnom Penh Survey 2014 (sanitation), PIN/UNICEF Phnom Penh Multiple Indicator Assessment of the Urban Poor (income, livelihoods, sanitation, malnutrition rate).



People In Need (PIN)
33(4th floor), St. 71, S/K Tonle Bassac,
Khan Chamkar Morn,
Phnom Penh, Cambodia

