



ASEAN
AUSTRALIA
SMART CITIES
TRUST FUND
Asian Development Bank



Australian Government
Department of Foreign Affairs and Trade

ADB

RAMBOLL

NATURE-BASED SOLUTIONS TRAINING PROGRAM

25 AUGUST – 15 SEPTEMBER 2022

PROGRAM REPORT



ASEAN
AUSTRALIA
SMART CITIES
TRUST FUND
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Department of Foreign Affairs and Trade



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Prepared by	Oana-Daniela Cristea; Stine Dybkjær
Checked by	Alvaro Fonseca, Hillarie Cania; Ida Linde Hansen, Kristine Lucero
Approved by	Jens Christian Riise

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PROGRAM OVERVIEW

PROGRAM OVERVIEW

AASCTF is supporting capacity building programs to enable ASEAN cities to develop holistic smart city plans that prioritize livability and resiliency.

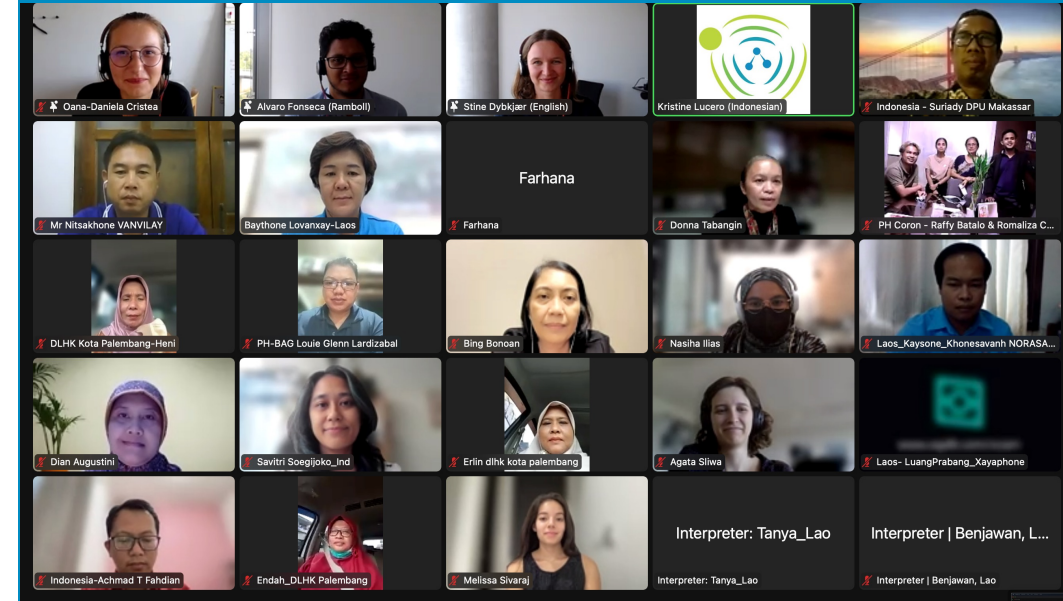
The NbS Program aimed at developing capacity to conceptualize Nature-based Solutions (NbS) tailored to the spatial and socio-economic city context.

This program was designed to introduce participants to an approach for conceptualizing NbS through

- reflecting upon their knowledge and understanding of the city
- understanding the city context and characteristics
- developing a city tailored NbS typology through application of an NbS typology toolbox
- creating a NbS vision for their cities.

Participants from 9 different cities were divided in 7 groups. Direct communication to participants was facilitated by National Focal Points, WhatsApp groups were established for internal communication between participants, and all workshops and meetings were interpreted in Laotian and Bahasa.

Participants were actively involved and encouraged to share their input, present their findings, and present their understanding of NbS. Online tools, such as Miro, Mentimeter, Kobo and WhatsApp were used to facilitate interaction, collaboration, and knowledge-sharing.



PROJECT TEAM



Alvaro Fonseca
NbS Specialist



Stine Dybkjær
Climate Adaptation Specialist



Oana-Daniela Cristea
Landscape Architect & Sustainable
Design Engineer



Agata Sliwa
Sustainable Design
Engineer



Kristine Lucero
Communication Expert,
AASCTF



Cassandra Hale
Communication Expert,
AASCTF



Ida Linde Hansen
Project Coordinator,
AASCTF



Mrs. Baythone Iovanxay
National Focal Point,
Lao PDR



Mrs. Savitri Soegijoko
National Focal Point,
Indonesia



Mrs. Bing Bonoan
National Focal Point,
Philippines



Ir Jackson I. Pereira
National Focal Point,
Malaysia



Noor Khamisah Abd Aziz
National Focal Point,
Malaysia

PROGRAM SCOPE

The NbS Program was designed to develop an understanding of the impact of flooding and climate change in cities, to provide tools for assessment of city context based on which NbS can be applied, and to introduce NbS, their functions, benefits and applicability to achieve urban resiliency.

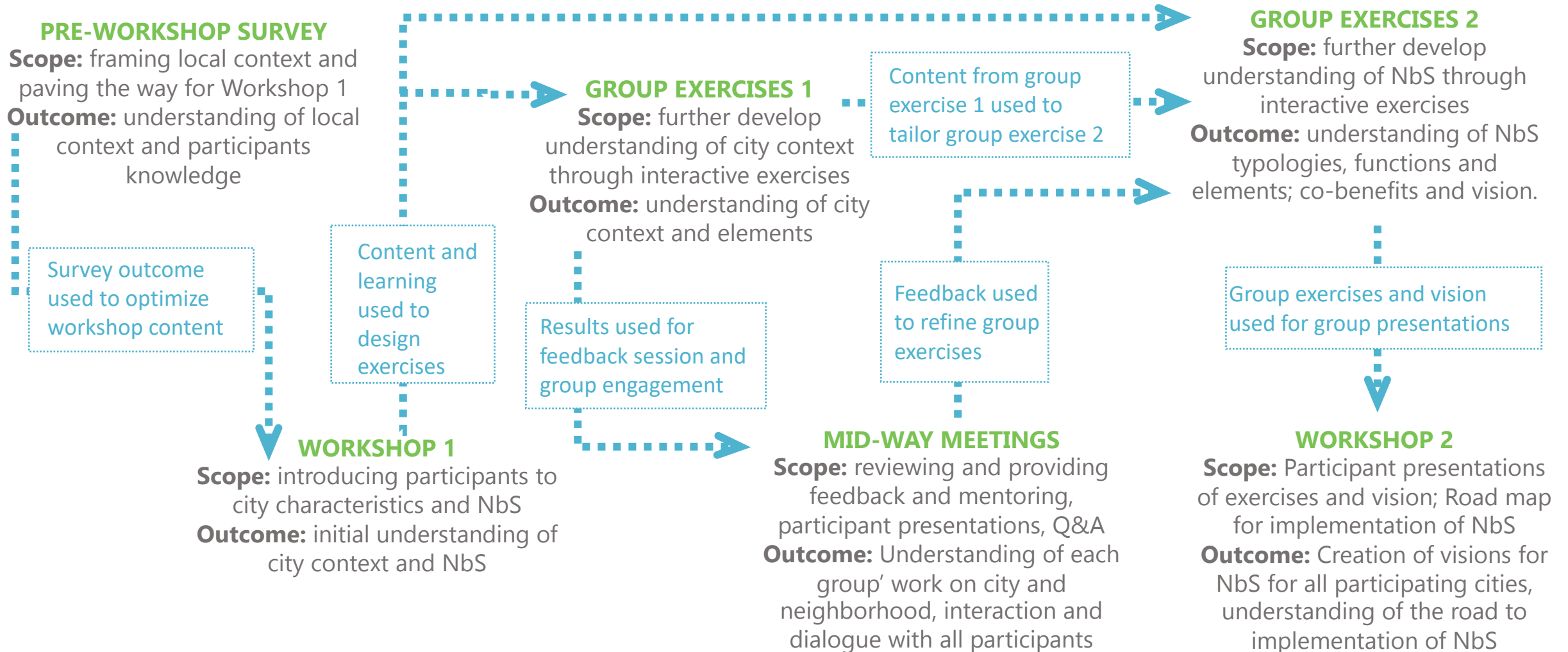
Finally, the program aimed at enabling participants to create a conceptual vision for NbS in their cities.

The program was designed to gradually introduce an innovative approach to conceptualize NbS through the following format:

- **Pre-survey** – understanding local knowledge and framing Workshop 1 content
- **Workshop 1** – creating understanding of local contexts and NbS
- **Group exercises 1** – analyzing local context
- **Mid-way meetings** – group specific feedback and presentation of first group exercises
- **Group exercises 2** – application of NbS toolbox and vision
- **Workshop 2** – group presentations on the overall learnings and vision followed by presentation of next steps
- **Post-survey** – participants to provide their feedback and assess their knowledge of NbS after the completion of the program

PROGRAM ROADMAP

All activities and exercises were designed to interlink and gradually build an understanding of application of NbS in a city context.



PARTICIPANTS

Participants in the NbS Program were selected through the AASCTF Capacity Building Application. The selection criteria included relevant work, experience or knowledge within urban planning and local city planning.

31 participants out of 39 candidates were selected from Lao PDR, The Philippines, Malaysia and Indonesia were selected to take part in the program.

It was found that 19 participants out of the 31 were female, and the remaining 12 were male.

All 6 participants from Lao PDR were male, and all 5 participants from Malaysia were female. Furthermore, out of the 11 participants from the Philippines 7 of them were female and 4 were male. From the 9 Indonesian participants 7 of them were female and 2 of them were male.

A pre-survey was shared with all selected candidates to prepare the participants for the program through topic-related questions and assess the pre-program knowledge level within NbS and Climate Adaptation. Based on the participants' experience, language and geographic similarities between the cities 7 groups were formed.

31 participants, 4 countries, 9 cities

PARTICIPANTS

Group 1 - The Philippines - Baguio

Position	Entity
Statistician	City Planning & development office, Baguio
LDRRMO II	CDRRMO Baguio
CSR/ Community Outreach Committee Chairperson	PICE Baguio Chapter
City Planner and Development Coordinator	LGU Baguio

Group 2 – Malaysia - Penang

Position	Entity
Associate	Think City Sdn. Bhd.
Associate - Climate and Environmental Resilience	Think City Sdn. Bhd.
Senior Associate	Think City Sdn. Bhd.
Manager	Think City Sdn. Bhd.
Associate - Climate and Environmental Resilience	Think City Sdn. Bhd.

Group 3 – Indonesia - Makassar & Semarang

Position	Entity
Community Engagement Specialist	ADB
Technical expert	Academia/University
Construction Services Supervisor	Makassar City Public Works Service

Group 4 - Lao PDR - Kaysone

Position	Entity
Director of personal and inspection office	Personal and inspection office
Acting head of Academic affair	Savannakhet University
Head of Department	Savannakhet University

PARTICIPANTS

Group 5 – Lao PDR - Luang Prabang

Position	Entity
Government official	Urban Service Office
Lead of Technical and Environmental Management Unit	Urban Service Office
Vice Dean	Savannakhet University
Government official	Urban Service Office

Group 7 - Indonesia - Palembang

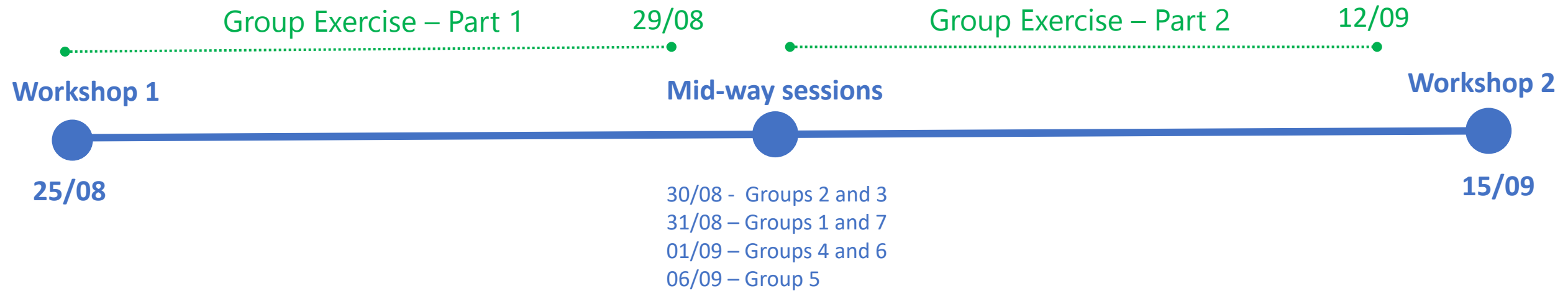
Position	Entity
Head of International Affairs	Foreign Cooperation Office
Head of International Affairs	Foreign Cooperation Office

Group 6 - The Philippines - El Nido & Coron

Position	Entity
Project Development Officer I	Public sector
MPDC	

TIMELINE

The program was facilitated in the span of 3 weeks in August-September 2022, during which 2 workshops with all participants and individual group mid-way meetings were held. Group exercises were assigned and completed in-between workshops and mid-way meetings.



PROGRAM HIGHLIGHTS

Workshops

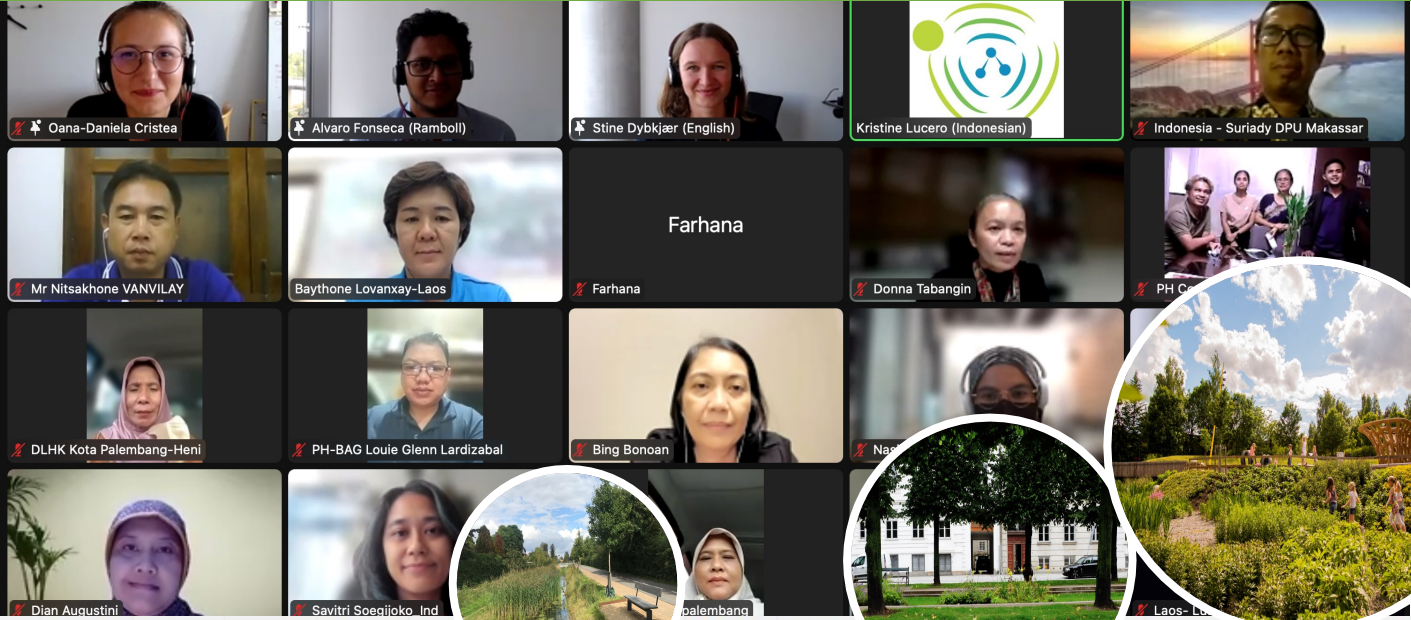


Interactive exercises

Group work

Midway meetings

Mentoring



Online collaboration using Miro

Application of NbS approach

Peer-to-peer learning

NbS vision for your city

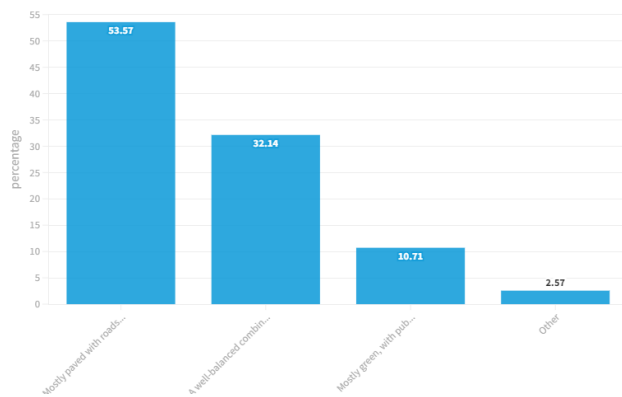
PRE-WORKSHOP SURVEY

SCOPE

The pre-workshop survey was designed to (1) assess participant’s knowledge of city characteristic, flood risk, vulnerability, risk, challenges and opportunities and NbS; and (2) to create the premise for understanding the NbS development approach by requiring participants to analyze their cities through a series of questions and image documentation (e.g. Google Street View screenshots). Snips from the survey results are shown below.

How would you best describe the public space in your city:

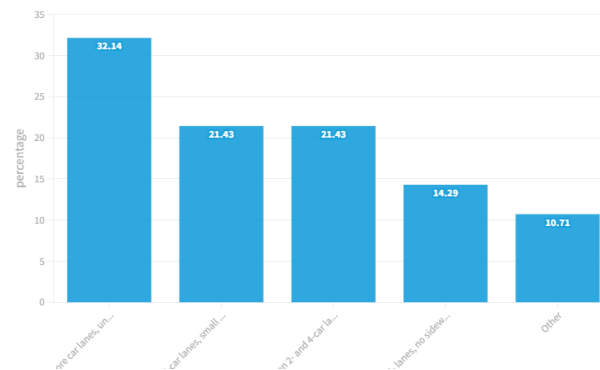
28 out of 28 respondents answered this question. (0 were without data).



Value	Frequencies	Percentage
Mostly paved with roads, parking spaces, crowded and with a few green spaces	15	53.57
A well-balanced combination of paved and green areas, as well as water bodies	9	32.14
Mostly green, with public parks and bodies of water, and few paved areas	3	10.71
Other	1	3.57

Which of the following statements best describe MAJOR ROADS in your city:

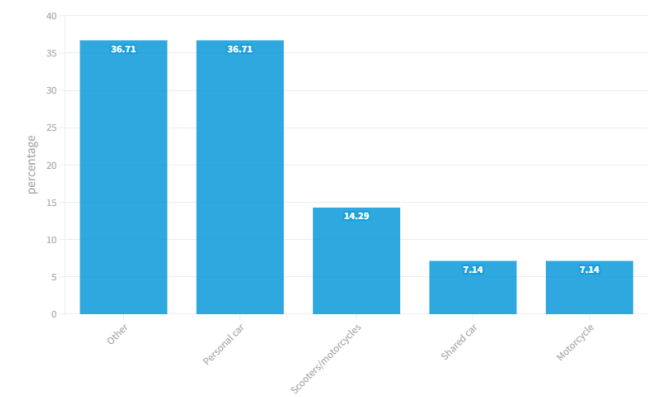
28 out of 28 respondents answered this question. (0 were without data).



Value	Frequencies	Percentage
2- or more car lanes, undefined sidewalks, sporadic parking	9	32.14
4- to 6-car lanes, small sidewalks next to commercial street, little to no green spaces, defined parking spaces.	6	21.43
Between 2- and 4-car lanes, separated by green strips, defined, large sidewalks, defined parking.	6	21.43
2- to 4- lanes, no sidewalks, no greenspaces, sporadic parking.	4	14.29
Other	3	10.71

The main mean of transportation in your city is:

28 out of 28 respondents answered this question. (0 were without data).



Value	Frequencies	Percentage
Other	10	35.71
Personal car	10	35.71
Scooters/motorcycles	4	14.29
Shared car	2	7.14
Motorcycles	2	7.14

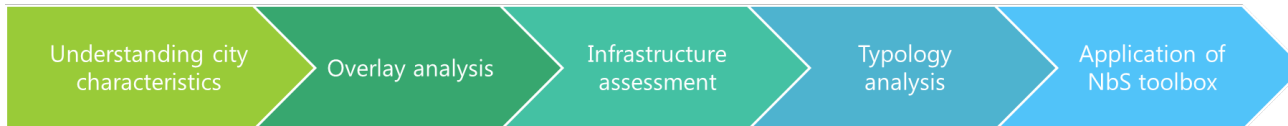
RESULTS

The pre-workshop survey provided the project team an overview of the participants' pre-program level of knowledge and successfully framed an understanding of existing city contexts, paving the way for workshop 1. Participants were familiarized with the program vocabulary, which prepared them for the content of workshop 1. The survey concluded that most of the participants' knowledge and experience within NbS and climate adaptation was limited prior to the start of the training program.

WORKSHOP 1 SUMMARY

OVERVIEW

The main objective of Workshop 1 was to introduce participants to the approach for developing NbS.



To achieve the main objective, the project team has first introduced participants to the different aspects of flooding in cities and a general understanding of NbS and their benefits.

The approach for implementing NbS was introduced by demonstrating and explaining each step. The presentation was followed by an interactive exercise where participants were asked to apply steps from the approach using Mentimeter. The exercise aimed at consolidating the content presented during the Workshop and introducing participants to the Group Exercises.

During Workshop 1, participants were introduced to the Project Team, their working group, and the communication and work channels that were used through the program.

The screenshot displays a Zoom meeting interface. The main window shows a presentation slide with a Mentimeter poll. The poll question is "Which of the following elements can you identify in the image?". Below the question is a bar chart with 13 categories and their respective counts: 11, 11, 2, 13, 10, 10, 5, 13, 11, 13, 7, 4, 6, 1. The presentation slide is in Lao and English, titled "ການຮຽນແບບ Replicability". It lists four bullet points in Lao and includes a map of Laos with various NbS icons. The video call windows on the right show three participants: Oana-Daniela Cristea, Alvaro Fonseca (Ramboll), and Stine Dybkjaer (English).

Go to www.menti.com and use the code 3312 5157

Which of the following elements can you identify in the image?

Element	Count
1. Green roofs	11
2. Permeable pavements	2
3. Rainwater harvesting	13
4. Urban forests	10
5. Green walls	10
6. Blue-green infrastructure	5
7. Urban agriculture	13
8. Green corridors	11
9. Urban parks	13
10. Green roofs	7
11. Permeable pavements	4
12. Rainwater harvesting	6
13. Urban forests	1

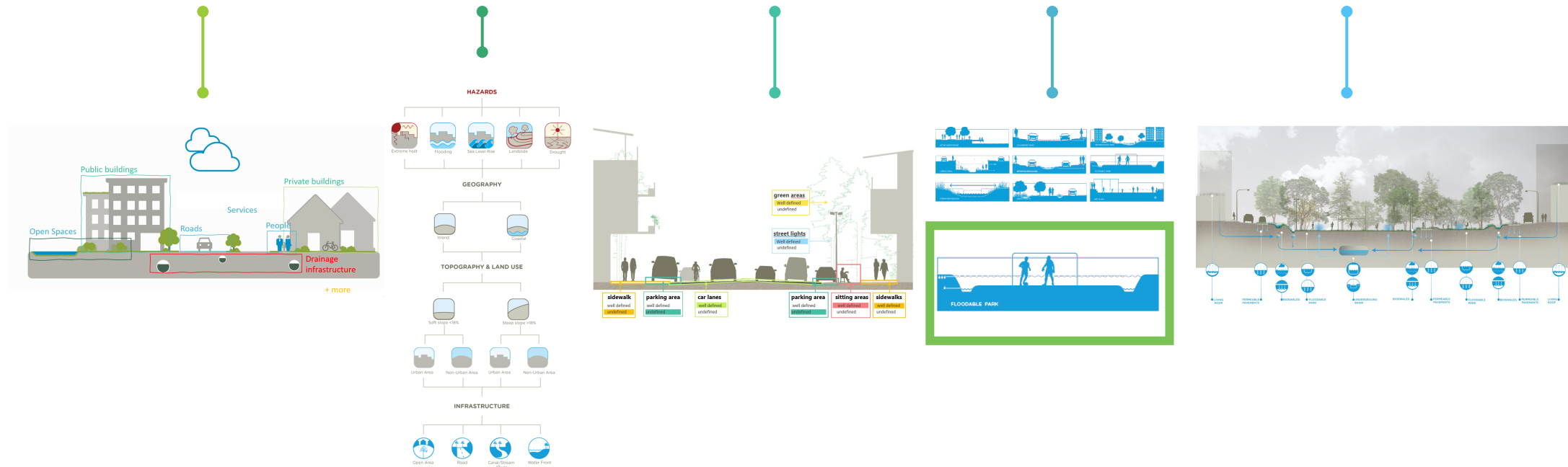
Press to show image

RAMBOLL

- ໂດຍທົ່ວໄປແລ້ວ, ພື້ນທີ່ສາທາລະນະ ມີພື້ນຖານໂຄງລ່າງທີ່ຄ້າຍຄືກັນຢູ່ທຸກ ນະຄອນ.
- ໂດຍການກຳນົດລັກສະນະທີ່ຄ້າຍຄືກັນຂອງພື້ນ ທີ່ສາທາລະນະ, ແນວຄວາມຄິດຂອງການ ກຳນົດປະເພດ ແມ່ນສາມາດພັດທະນາໄດ້.
- ການວິເຄາະແບບຊ່ອນຊັບ ຊ່ວຍໃຫ້ສາມາດ ລະບຸພື້ນທີ່ (ຟຼີເຊັດ) ທີ່ອາດໃຊ້ການຈຳແນກ ປະເພດ.
- ການກຳນົດພື້ນທີ່ ທີ່ອະນຸຍາດໃຫ້ມີການການ ແກ້ໄຂບັນຫາຢູ່ທຸກບ່ອນໃນທົ່ວເມັອງ.

Scope of Workshop 1

Developing an understanding of city characteristics, flood risk, challenges and opportunities and how to address these through application of NbS.



Agenda of Workshop 1

3-hour workshop, Thursday August 25, 2022

Agenda:

- | | | |
|--------------|--------------------------------------|----------------|
| 1 | Welcome and Program Introduction | 20 min. |
| 2 | Flooding in cities | 20 min. |
| 3 | Nature-based Solutions | 20 min. |
| BREAK | | 10 min. |
| 4 | Approach for developing NbS | 20 min. |
| 5 | NbS typology toolbox | 15 min. |
| 6 | Demonstration case: Rio de Janeiro | 30 min. |
| BREAK | | 10 min. |
| 7 | Program Timeline and Group exercises | 10 min. |
| 8 | Q&A | 20 min. |
| 9 | Closing remarks | 05 min. |

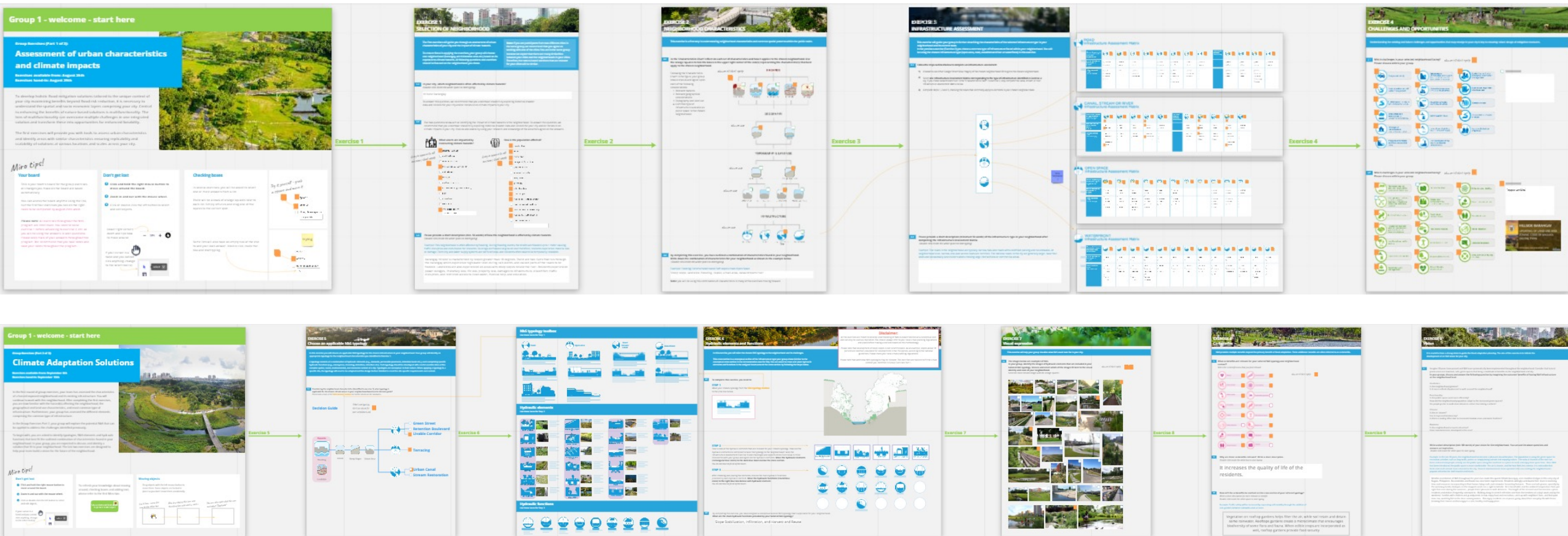


GROUP EXERCISES

Overview

Group exercises were designed to cement learnings from Workshop 1. Based on the approach for developing NbS, a series of 9 interlinked exercises, released in two rounds, were completed by the groups. The exercises were provided via Miro.com, an online whiteboard platform with great flexibility that fosters interactive collaboration and enables brainstorming and creativity.

For detailed description of the exercises see Appendix A.

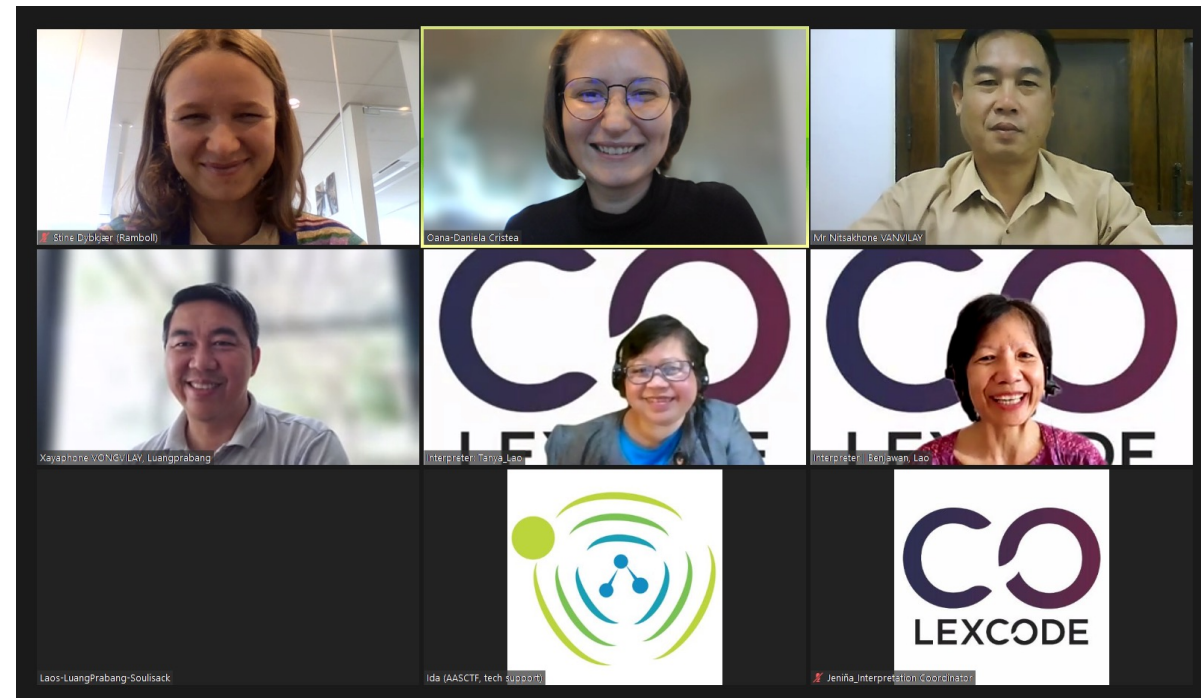
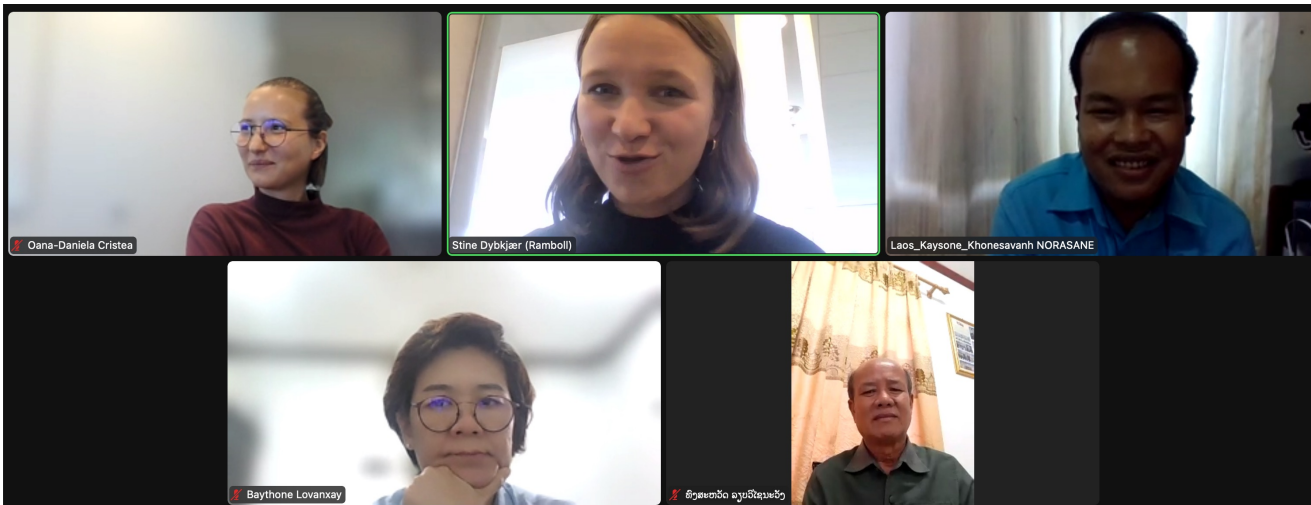
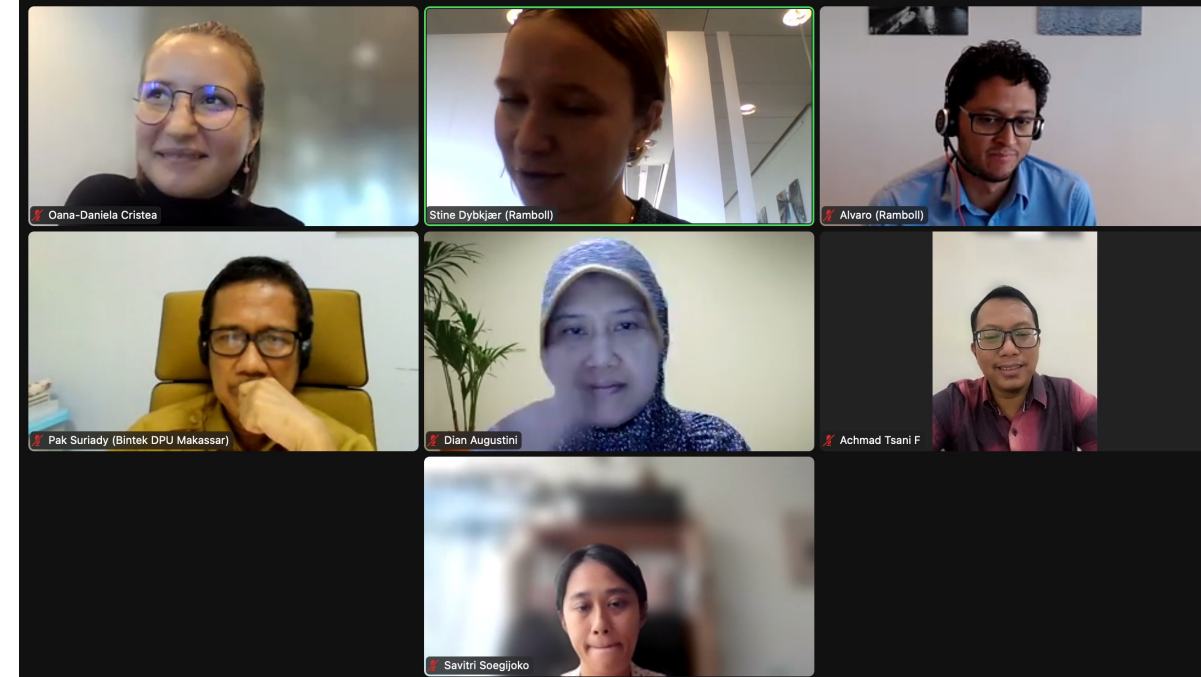


MID-WAY MEETINGS

Overview

Following Group Exercises 1, an individual mid-way meeting was held with each group. The mid-way meetings enabled dialogue with all participants in an informal setting and allowed for direct mentoring and guidance of group members. The groups presented their work on the exercises, sharing their screens showing their group Miro boards. Through the meetings, it was ensured that the groups understood the exercises and successfully identified urban characteristics at neighborhood level.

The Project Team facilitated an open, informal conversation where all participants were included and encouraged to share their thoughts, feedback, questions and concerns.



WORKSHOP 2 SUMMARY

Overview

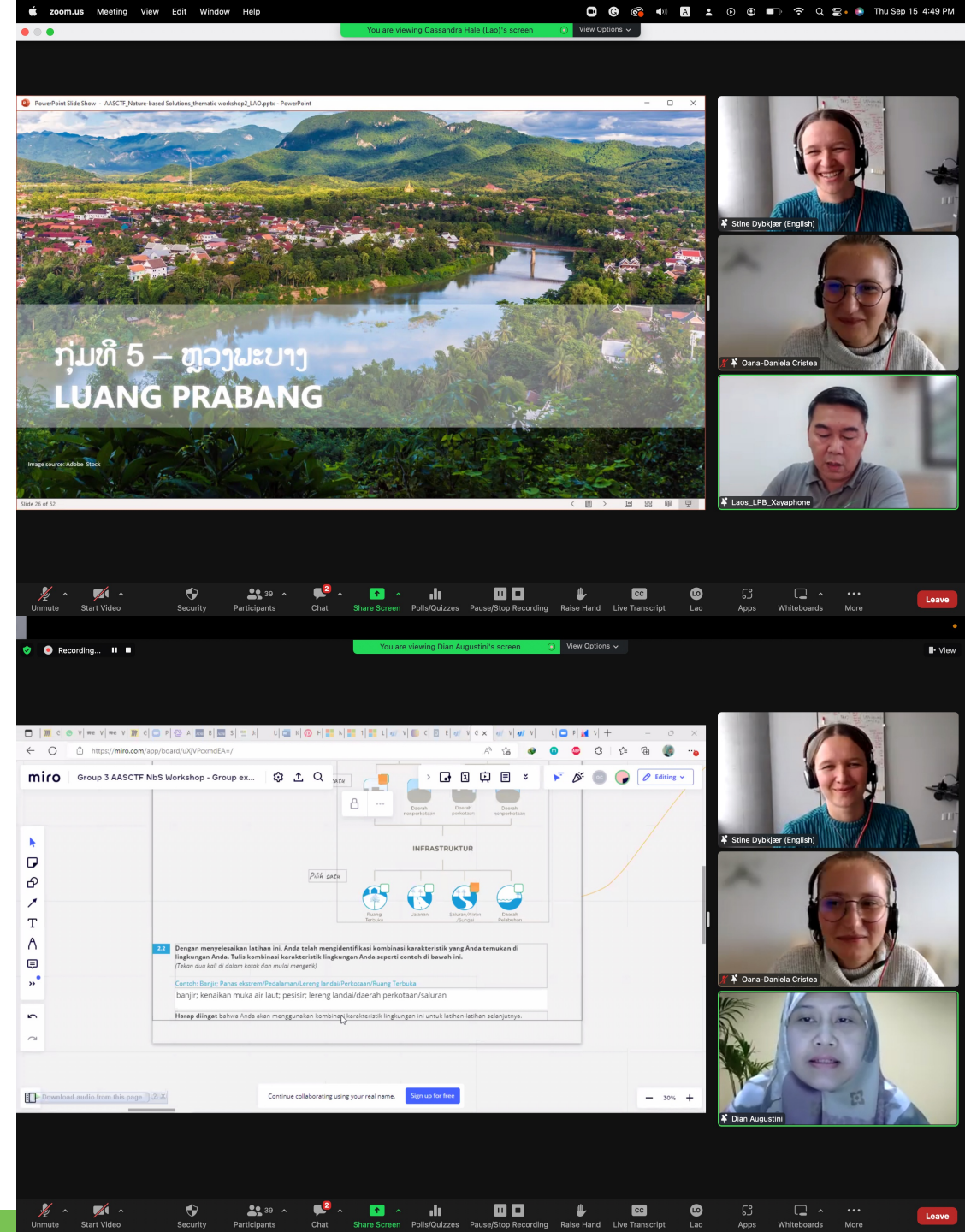
The focus of Workshop 2 was group presentations. A representative from each group presented their group progress throughout the program and the developed NbS vision for their city.

Prior to the workshop, the project team had prepared a vision board for each group translating the NbS vision prepared through the group exercises into a visual illustration that can be used by participants to communicate their learnings to peers, city officials and stakeholders.

Participants were introduced to a roadmap for implementation of NbS.

Finally, a Q&A and feedback session was facilitated, and the project team shared key take-aways from the program.

For viewing full size vision boards, see Appendix B.



Agenda of Workshop 2

3-hour workshop, Thursday September 15, 2022

Agenda:

- | | |
|---|----------------|
| 1 Welcome and Program Introduction | 15 min. |
| 2 Group Presentations (Group 1-3) | 45 min. |
| BREAK | 10 min. |
| 3 Group Presentations (Group 4-7) | 60 min. |
| BREAK | 10 min. |
| 4 Road map for NbS implementation | 15 min. |
| 5 Q&A and Feedback | 15 min. |
| 6 Closing remarks | 10 min. |



Image: Ramboll

EVALUATION SURVEY

Feedback

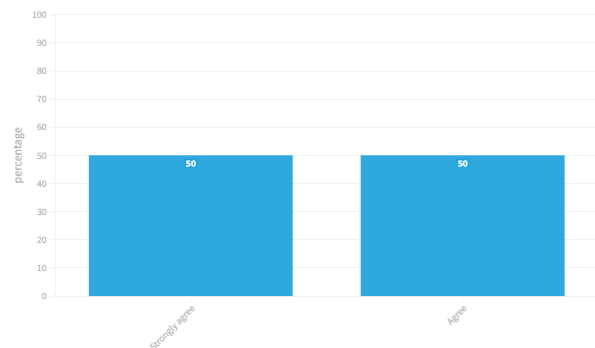
A post-program evaluation survey was circulated to participants to gain feedback on the following:

- Overall program satisfaction
- Use of interactive online tools
- Program content
- Group exercises
- Participant involvement
- Acquired knowledge

The degree of program satisfaction was high among participants. Participants have responded positively to all survey questions and stated that their knowledge has improved, the program was interactive, and they enjoyed using online tools during the Group Exercises. Suggestions for improvement of the program included use of break-out rooms to facilitate discussions between participants. *See detailed survey under Appendix C.*

The information and materials presented during the program were relevant to me.

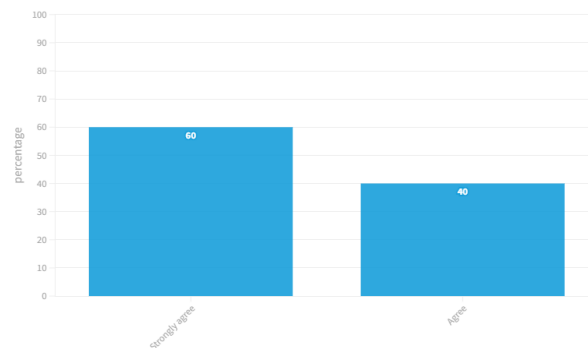
10 out of 10 respondents answered this question. (0 were without data).



Value	Frequencies	Percentage
Strongly agree	5	50
Agree	5	50

After taking part in the program, my understanding of benefits of NbS has improved.

10 out of 10 respondents answered this question. (0 were without data).



Value	Frequencies	Percentage
Strongly agree	6	60
Agree	4	40

Is there anything you particularly enjoyed in the NbS program?

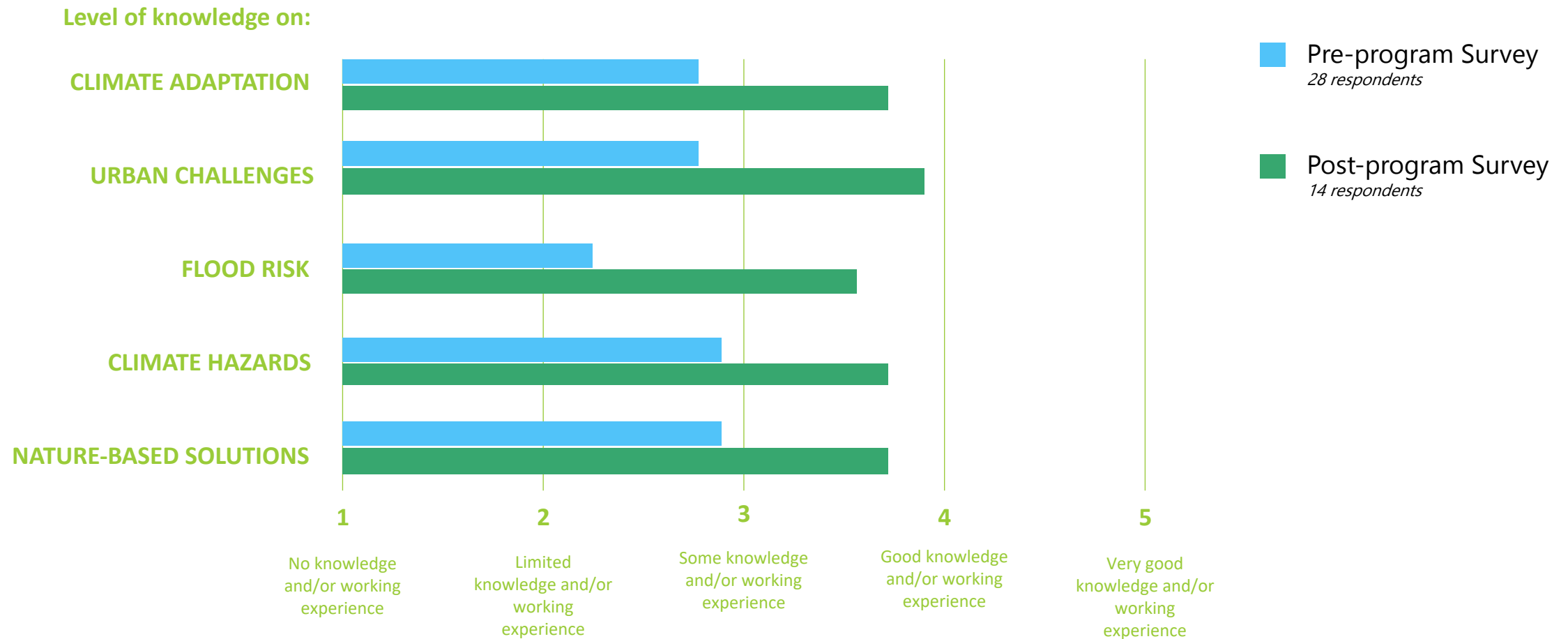
10 out of 10 respondents answered this question. (0 were without data).

Value	Frequencies	Percentage
Using Miro	1	10
Miro	1	10
The group exercise using the Miro	1	10
ຫຼັກສູດການແກ້ໄຂບັນຫາໂດຍແນວທາງທຳມະຊາດ NbS ແມ່ນມີຄວາມສຳຄັນຕໍ່ກັບການແກ້ໄຂບັນຫາໃນຕົວເມືອງໂດຍສະເພາະເຂດທີ່ມີພື້ນທີ່ດິນຊຸ່ມນ້ຳ, ເຂດຊຸ່ມຊື່ນ ໂດຍສະເພາະແມ່ນຢູ່ໃນນະຄອນຫຼວງເມະບາງ	1	10
ຢາກໃຫ້ມີກິດຈະກຳຫຼາຍກວ່າເກົ່າ(ດຽງກັບກນ)	1	10
How to solve flooding	1	10
Participate in development	1	10
This presentation is very interesting and easy to understand	1	10
this workshop is very joyful to meet the others from different country	1	10

KNOWLEDGE ASSESSMENT

Knowledge Assessment

To assess the learning progress during the NbS Program, the participants were asked self-assessment questions related to their knowledge within topics covered by the program in the pre- and post-workshop survey. A comparison of the results shows an increase in knowledge in all topics covered by the NbS program.



LESSONS LEARNED & KEY TAKE-AWAYS

National Focal Points feedback

The overall feedback provided by The National Focal Points (NFPs) was positive. The NFPs appreciated:

- They found the program to be well structured and the content relevant
- The use of Miro for interactive engagement and being trained in using the platform beforehand
- Providing participants with Vision Boards

The level of coordination was appreciated; however, they expressed their interest in being informed and involved in a timely manner for the following reasons:

- To get familiar with the concept
- To be able to plan their workloads in advance
- To provide local knowledge

The NFPs suggested:

- Having meetings with the assigned interpreter for each workshop to assure familiarity with the program content
- A list of technical terms should be provided in advance
- More guidance should be provided by the project team to the participants in smaller group meetings
- Being involved in shaping and/or reviewing the content to be able to provide timely local input
- Access to survey platform (Kobo) to be able to proactively follow-up with participants
- Longer period program with more in-depth trainings and closer participants engagement

The NFPs found the content of the program to be relevant across many of the cities in the countries they represent and suggested to repeat the program with other cities.

Lessons Learned & Key Take-aways

Program content and organization

The overall process of preparation and facilitation of the program has been a positive experience. Timely preparation of content, timeline and team engagement with National Focal Points and AASCTF coordination team has proven effective throughout the program.

Mid-way meetings have been noted as a key activity in the program for the following reasons:

1. Close engagement between participants and project team
2. In-depth feedback in an informal setting to encourage participants to communicate findings
3. Encourage active involvement
4. Technical input for each specific case

Sharing the overall program timeline with the NFPs and the coordination team (including the comms teams) at the beginning of the course preparation period was also important, as it allowed the team to identify specific timelines (such as document translation processes) that might be problematic down the line. This also made advance planning for certain milestones easier.

Following the Evaluation Survey, the team has noticed that a second round of mid-way meetings following Group Exercises 2 would have been valuable for cementing NbS and vision content.

Lessons Learned & Key Take-aways (cont'd)

Participation and interactivity

The visual design of the workshops and group exercises has been very well received by participants, who stated the content was easy to follow and engaging. The interactive platform (Miro) was a good choice for hosting group exercises and most participants were enthusiastic about using it. The use of Mentimeter during the main workshops also provided another avenue for the team to virtually interact with participants and seek their views/ideas.

To these points, the team acknowledges the shortcomings of hosting a highly interactive and engaging program through online platforms. More peer-to-peer engagement should have been facilitated to encourage active involvement within the groups.

Lessons Learned & Key Take-aways (cont'd)

Meeting/technical support requirements

A member of the comms team providing technical support in the hosting the workshops/meetings via Zoom allowed the course management team to focus on the delivery of the workshop/meeting content. In the case of workshops without interpretation, one member of the comms team providing support was sufficient, while in cases where there are more than 2 language pairs required, another member of the comms team was needed to assist.

The two NBS workshops also needed to present the main slide deck in more than one language. This was done by assigning multiple members of the course management and comms team to take charge of sharing the translated versions of the slide deck. The team also needed to actively coordinate the advancement of slides via the use of an audible cue from the active speaker (i.e. saying "next slide"), and/or assigned team members joining the workshop using another Zoom account to monitor when the active speaker is moving the slides.

The slide deck being available in multiple languages was also announced during the housekeeping announcements at the start of the workshop, and again at certain points during the workshop to ensure that participants were aware that this option was available. Due to the technical restrictions of Zoom's platform, participants needed to select which slide deck they wanted to see every time the presenters stopped and resumed their screen share, as the participants would see the slide of the presenters who shared their screen first (i.e. there is currently no way for participants to select a certain presenter's screen share by default).

Lessons Learned & Key Take-aways (cont'd)

Translation and interpretation requirements

Considering the flexibility in adjusting content to participants' knowledge and findings, translation processes have been done under a time crunch, but had been completed using alternative arrangements (such as having the NFPs do the translation when Lexcode cannot accommodate the translation in the timeframe required). It is important for future programs to ensure that enough time for translation is allocated, as the administrative side of this component takes anywhere between 2-3 days to be completed, with the turnaround time (TAT) for the translation itself taking a minimum of 5 working days for documents that are 2,750 words and above. The final TAT depends on several factors, including the number of documents that need to be translated, the number of words for each document, the technical complexity of the topic, and the workload of the translation company at a given time.

In the interest of maintaining the quality of interpretation during the workshops, materials should ideally be provided to interpreters at least 3 days in advance to give them enough time to study the slide presentations and other relevant workshop/course materials. The benefit of providing in advance a glossary of technical terms in maintaining the quality and consistency of the interpretation was also observed.

The team also noticed the value of making the program and course content available in the local language for non-English participants.

Appendix A – Group exercises

Exercise 1 – Selection of Neighborhood

The first exercise required participants to choose a flood prone neighborhood in their city and reflect upon the physical and social impacts of reoccurring hazards affecting the area.

The participants had to tick the boxes corresponding to the affected assets and social issues caused by unmitigated climate hazards. Based on their initial assessment, participants wrote a short description on how the neighborhood is affected.

The aim of this exercise was to create a general common understanding of the neighborhood among group members before jumping into more detailed analysis.

**EXERCISE 1
SELECTION OF NEIGHBORHOOD**

The first exercises will guide you through an assessment of urban characteristics of your city and the impact of climate hazards.

To ensure focus in applying the exercises, your group will choose one neighborhood (barangay, administrative area etc.) based on its exposure to climate hazards. All following questions and exercises should be focused on the neighborhood you chose.

Note: If you are participants from two different cities in the same group, we recommend that you agree on working with one of the cities. You are in the same group because we expect that there are many similarities between your cities and the neighborhoods in your cities. Therefore, the nature-based solutions that are relevant for your cities will be similar.

1.1 In your city, which neighborhood is often affected by climate hazards?
(Double click inside the white space to start typing)

Hillside Barangay

To answer this question, we recommend that you undertake research by exploring historical disaster data and records for your city and/or literature on climate impacts in your city.

1.2 The two questions below aim at identifying the impact of climate hazards in the neighborhood. To answer this question, we recommend that you undertake research by exploring historical disaster data and records for your city and/or literature on climate impacts in your city. Discuss and assess by using your research and knowledge of the area then agree on the answers.

What assets are impacted by reoccurring climate hazards?

drag a square to all answers that apply

- residential buildings
- public buildings
- commercial buildings
- facilities (schools, hospitals, etc.)
- national roads
- city roads
- neighborhood roads
- utilities (water supply, electricity, etc.)
- parks
- telecommunications
- cultural sites
- other, please specify:

How is the population affected?

drag a square to all answers that apply

- monetary loss
- life loss
- property loss
- damage to critical infrastructure
- employment loss
- increased criminality
- safety threats
- discomfort
- health disruption
- gender equality
- restricted access to clean water
- restricted access to food supply
- restricted access to medical help
- restricted access to education
- other, please specify:

1.3 Please provide a short description (min. 50 words) of how the neighborhood is affected by climate hazards.
(Double click inside the white space to start typing)

Example: This neighborhood is often affected by flooding. During flooding events, the streets are flooded up to 1 meter causing traffic disruption and disturbance for residents. Buildings are flooded at ground level therefore, residents experience material loss or damage. Electricity and water supply systems are not functional, and residents often have to be temporarily relocated.

Barangay Hillside is characterized by slopes greater than 18 degrees. There are two rivers that run through the barangay which experience high water level during rain events, and caused parts of the roads to be flooded. Landslides are also experienced on areas with steep slopes beside the river. Residents experienced power outages, monetary loss, life loss, property loss, damages to infrastructure, discomfort, traffic disruption, and restricted access to clean water, medical help, and education.

Exercise 2 –Neighborhood Characteristics

Exercise 2 was designed to help participants create an overlay analysis of the chosen neighborhood.

By ticking the boxes participants have unraveled relevant characteristics of the neighborhood and created an overlay that was further used throughout the group exercises.

Participants have chosen the types of hazards affecting the neighborhood, relevant geographical considerations, typology and land use considerations and the most affected type of urban infrastructure.

The aim of this exercise was to create a qualitative assessment of the neighborhood characteristics and frame high-level elements of the public space needed as a base when applying NbS.

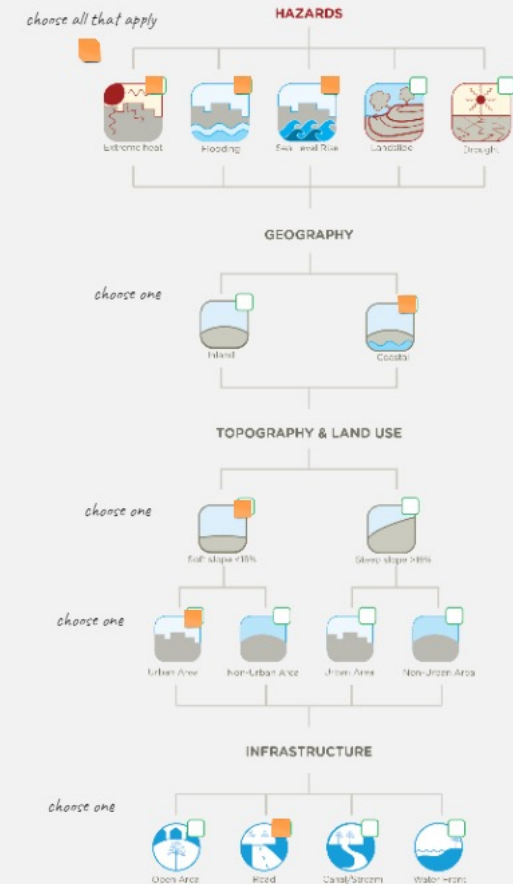
EXERCISE 2 NEIGHBORHOOD CHARACTERISTICS

This exercise is a first step in understanding neighborhood characteristics and common spatial patterns within the public realm.

2.1 In the 'Characteristics Chart' reflect on each set of characteristics and how it applies to the chosen neighborhood. Use the orange squares to tick the boxes in the upper right corner of the icon(s) representing the characteristic(s) that best apply to the chosen neighborhood.

Following the 'Characteristics Chart' in the figure, your group should discuss and agree upon each of the following considerations:

1. Relevant hazards
2. Relevant geographical considerations
3. Topography and land use
4. Common type of infrastructure available as public space in the chosen neighborhood



2.2 By completing this exercise, you have outlined a combination of characteristics found in your neighborhood. Write down the combination of characteristics for your neighborhood as shown in the example below. (Double click inside the white space to start typing)

Example: Flooding; Extreme heat/Inland/ Soft slope/Urban/ Open Space

Extreme heat, flooding, sea rise level; coastal; soft slope; urban area; road

Note: you will be using this combination of characteristics in many of the exercises moving forward.

Exercise 3 – Infrastructure assessment

Exercise 3 focused on detailing the elements of the type of infrastructure chosen in the previous exercise.

By ticking the boxes, participants have identified elements that make up the type of infrastructure in their cities, whilst assessing their status and functionality.

The aim of this exercise was to cement the participants' understanding of the public space.

EXERCISE 3 INFRASTRUCTURE ASSESSMENT

This exercise will guide your group in further describing the characteristics of the selected infrastructure type in your neighborhood and its current state.

In the previous exercise (Exercise 2) you chose a common type of infrastructure found within your neighborhood. You will be using the chosen infrastructure type (open area, road, canal/stream/river or waterfront) in this exercise.

3.1 Follow the steps outlined below to complete an infrastructure assessment:

- 1) Choose to use either Google Street View imagery of the chosen neighborhood OR to go to the chosen neighborhood.
- 2) Select one Infrastructure Assessment Matrix corresponding to the type of infrastructure identified in Exercise 2. e.g. if you chose canal/stream/river in the "Characteristics Chart" in exercise 2, only complete the canal, stream or river Infrastructure Assessment Matrix below.
- 3) Complete steps 1, 2 and 3, checking the boxes that commonly apply to elements in your chosen neighbourhood.

3.2 Please provide a short description (minimum 50 words) of the infrastructure type in your neighborhood after completing the Infrastructure Assessment Matrix.
(Double click inside the white space to start typing)

Example: The roads in the neighbourhood are typically narrow, two-lane roads with undefined parking and no sidewalks. At neighbourhood level, narrow, one-lane access roads are common. The national roads in the city are generally larger, have four lanes and occasionally lane dividers when crossing large intersections or commercial areas.

The roads in the neighbourhood are typically two-lane, two-way with relatively well-defined sidewalks though its width is not always consistent. At neighbourhood level, access roads and street parking are less well defined. Generally, the city main roads in comparison are larger with six lanes for two-way access with small green strips as dividers.

ROAD Infrastructure Assessment Matrix

Step 1	Which of these elements are commonly found in roads in the neighbourhood?	<input checked="" type="checkbox"/> sidewalks	<input checked="" type="checkbox"/> road lanes	<input type="checkbox"/> swales	<input checked="" type="checkbox"/> streetlights	<input type="checkbox"/> sitting areas	<input type="checkbox"/> green strips	<input type="checkbox"/> drainage system	<input type="checkbox"/> Domes or arched	The roads are commonly surrounded by:	<input checked="" type="checkbox"/> buildings	<input type="checkbox"/> fences	<input type="checkbox"/> green areas	<input type="checkbox"/> Domes or arched
Step 2	Which of the following best describe the element? Select one	<input checked="" type="checkbox"/> well defined <input type="checkbox"/> undefined	<input checked="" type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> planned <input type="checkbox"/> improvised	<input type="checkbox"/> well defined <input checked="" type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input checked="" type="checkbox"/> planned <input type="checkbox"/> informal	<input checked="" type="checkbox"/> planned <input type="checkbox"/> informal	<input type="checkbox"/> planned <input type="checkbox"/> informal	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	
Step 3	How is the element used? Select all that apply	<input checked="" type="checkbox"/> transit <input type="checkbox"/> shared space <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Domes or arched	<input checked="" type="checkbox"/> transit <input type="checkbox"/> water storage <input type="checkbox"/> water cleansing <input type="checkbox"/> water conveyance <input type="checkbox"/> Aesthetic	<input type="checkbox"/> water storage <input type="checkbox"/> water cleansing <input type="checkbox"/> water conveyance <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input checked="" type="checkbox"/> safety <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> shared space <input type="checkbox"/> recreational <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input type="checkbox"/> water storage <input type="checkbox"/> water conveyance <input type="checkbox"/> water cleansing <input type="checkbox"/> Recreational	<input type="checkbox"/> water storage <input type="checkbox"/> water conveyance <input type="checkbox"/> water cleansing <input type="checkbox"/> Aesthetic	<input type="checkbox"/> transit <input type="checkbox"/> Add text	<input checked="" type="checkbox"/> residential <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input checked="" type="checkbox"/> residential <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input checked="" type="checkbox"/> provide shade <input type="checkbox"/> recreational <input type="checkbox"/> noise reduction <input type="checkbox"/> ecological <input type="checkbox"/> Add text	<input type="checkbox"/> transit <input type="checkbox"/> Add text	

CANAL, STREAM OR RIVER Infrastructure Assessment Matrix

Step 1	Which of these elements are commonly found in roads in the neighbourhood?	<input checked="" type="checkbox"/> sidewalks	<input checked="" type="checkbox"/> road lanes	<input type="checkbox"/> swales	<input checked="" type="checkbox"/> streetlights	<input type="checkbox"/> sitting areas	<input type="checkbox"/> green strips	<input type="checkbox"/> drainage system	<input type="checkbox"/> Domes or arched	The roads are commonly surrounded by:	<input checked="" type="checkbox"/> buildings	<input type="checkbox"/> fences	<input type="checkbox"/> green areas	<input type="checkbox"/> Domes or arched
Step 2	Which of the following best describe the element? Select one	<input checked="" type="checkbox"/> well defined <input type="checkbox"/> undefined	<input checked="" type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> planned <input type="checkbox"/> improvised	<input type="checkbox"/> well defined <input checked="" type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input checked="" type="checkbox"/> planned <input type="checkbox"/> informal	<input checked="" type="checkbox"/> planned <input type="checkbox"/> informal	<input type="checkbox"/> planned <input type="checkbox"/> informal	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	
Step 3	How is the element used? Select all that apply	<input checked="" type="checkbox"/> transit <input type="checkbox"/> shared space <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Domes or arched	<input checked="" type="checkbox"/> transit <input type="checkbox"/> water storage <input type="checkbox"/> water cleansing <input type="checkbox"/> water conveyance <input type="checkbox"/> Aesthetic	<input type="checkbox"/> water storage <input type="checkbox"/> water cleansing <input type="checkbox"/> water conveyance <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input checked="" type="checkbox"/> safety <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> shared space <input type="checkbox"/> recreational <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input type="checkbox"/> water storage <input type="checkbox"/> water conveyance <input type="checkbox"/> water cleansing <input type="checkbox"/> Recreational	<input type="checkbox"/> water storage <input type="checkbox"/> water conveyance <input type="checkbox"/> water cleansing <input type="checkbox"/> Aesthetic	<input type="checkbox"/> transit <input type="checkbox"/> Add text	<input checked="" type="checkbox"/> residential <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input checked="" type="checkbox"/> residential <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input checked="" type="checkbox"/> provide shade <input type="checkbox"/> recreational <input type="checkbox"/> noise reduction <input type="checkbox"/> ecological <input type="checkbox"/> Add text	<input type="checkbox"/> transit <input type="checkbox"/> Add text	

OPEN SPACE Infrastructure Assessment Matrix

Step 1	Which of these elements are commonly found in roads in the neighbourhood?	<input checked="" type="checkbox"/> sidewalks	<input checked="" type="checkbox"/> road lanes	<input type="checkbox"/> swales	<input checked="" type="checkbox"/> streetlights	<input type="checkbox"/> sitting areas	<input type="checkbox"/> green strips	<input type="checkbox"/> drainage system	<input type="checkbox"/> Domes or arched	The roads are commonly surrounded by:	<input checked="" type="checkbox"/> buildings	<input type="checkbox"/> fences	<input type="checkbox"/> green areas	<input type="checkbox"/> Domes or arched
Step 2	Which of the following best describe the element? Select one	<input checked="" type="checkbox"/> well defined <input type="checkbox"/> undefined	<input checked="" type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> planned <input type="checkbox"/> improvised	<input type="checkbox"/> well defined <input checked="" type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input checked="" type="checkbox"/> planned <input type="checkbox"/> informal	<input checked="" type="checkbox"/> planned <input type="checkbox"/> informal	<input type="checkbox"/> planned <input type="checkbox"/> informal	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	
Step 3	How is the element used? Select all that apply	<input checked="" type="checkbox"/> transit <input type="checkbox"/> shared space <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Domes or arched	<input checked="" type="checkbox"/> transit <input type="checkbox"/> water storage <input type="checkbox"/> water cleansing <input type="checkbox"/> water conveyance <input type="checkbox"/> Aesthetic	<input type="checkbox"/> water storage <input type="checkbox"/> water cleansing <input type="checkbox"/> water conveyance <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input checked="" type="checkbox"/> safety <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> shared space <input type="checkbox"/> recreational <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input type="checkbox"/> water storage <input type="checkbox"/> water conveyance <input type="checkbox"/> water cleansing <input type="checkbox"/> Recreational	<input type="checkbox"/> water storage <input type="checkbox"/> water conveyance <input type="checkbox"/> water cleansing <input type="checkbox"/> Aesthetic	<input type="checkbox"/> transit <input type="checkbox"/> Add text	<input checked="" type="checkbox"/> residential <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input checked="" type="checkbox"/> residential <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input checked="" type="checkbox"/> provide shade <input type="checkbox"/> recreational <input type="checkbox"/> noise reduction <input type="checkbox"/> ecological <input type="checkbox"/> Add text	<input type="checkbox"/> transit <input type="checkbox"/> Add text	

WATERFRONT Infrastructure Assessment Matrix

Step 1	Which of these elements are commonly found in roads in the neighbourhood?	<input checked="" type="checkbox"/> sidewalks	<input checked="" type="checkbox"/> road lanes	<input type="checkbox"/> swales	<input checked="" type="checkbox"/> streetlights	<input type="checkbox"/> sitting areas	<input type="checkbox"/> green strips	<input type="checkbox"/> drainage system	<input type="checkbox"/> Domes or arched	The roads are commonly surrounded by:	<input checked="" type="checkbox"/> buildings	<input type="checkbox"/> fences	<input type="checkbox"/> green areas	<input type="checkbox"/> Domes or arched
Step 2	Which of the following best describe the element? Select one	<input checked="" type="checkbox"/> well defined <input type="checkbox"/> undefined	<input checked="" type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> planned <input type="checkbox"/> improvised	<input type="checkbox"/> well defined <input checked="" type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input checked="" type="checkbox"/> planned <input type="checkbox"/> informal	<input checked="" type="checkbox"/> planned <input type="checkbox"/> informal	<input type="checkbox"/> planned <input type="checkbox"/> informal	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	
Step 3	How is the element used? Select all that apply	<input checked="" type="checkbox"/> transit <input type="checkbox"/> shared space <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Domes or arched	<input checked="" type="checkbox"/> transit <input type="checkbox"/> water storage <input type="checkbox"/> water cleansing <input type="checkbox"/> water conveyance <input type="checkbox"/> Aesthetic	<input type="checkbox"/> water storage <input type="checkbox"/> water cleansing <input type="checkbox"/> water conveyance <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input checked="" type="checkbox"/> safety <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> shared space <input type="checkbox"/> recreational <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input type="checkbox"/> water storage <input type="checkbox"/> water conveyance <input type="checkbox"/> water cleansing <input type="checkbox"/> Recreational	<input type="checkbox"/> water storage <input type="checkbox"/> water conveyance <input type="checkbox"/> water cleansing <input type="checkbox"/> Aesthetic	<input type="checkbox"/> transit <input type="checkbox"/> Add text	<input checked="" type="checkbox"/> residential <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input checked="" type="checkbox"/> residential <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input checked="" type="checkbox"/> provide shade <input type="checkbox"/> recreational <input type="checkbox"/> noise reduction <input type="checkbox"/> ecological <input type="checkbox"/> Add text	<input type="checkbox"/> transit <input type="checkbox"/> Add text	

ROAD Infrastructure Assessment Matrix

Step 1	Which of these elements are commonly found in roads in the neighbourhood?	<input checked="" type="checkbox"/> sidewalks	<input checked="" type="checkbox"/> road lanes	<input type="checkbox"/> swales	<input checked="" type="checkbox"/> streetlights	<input type="checkbox"/> sitting areas	<input type="checkbox"/> green strips	<input type="checkbox"/> drainage system	<input type="checkbox"/> Domes or arched	The roads are commonly surrounded by:	<input checked="" type="checkbox"/> buildings	<input type="checkbox"/> fences	<input type="checkbox"/> green areas	<input type="checkbox"/> Domes or arched
Step 2	Which of the following best describe the element? Select one	<input checked="" type="checkbox"/> well defined <input type="checkbox"/> undefined	<input checked="" type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> planned <input type="checkbox"/> improvised	<input type="checkbox"/> well defined <input checked="" type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	<input checked="" type="checkbox"/> planned <input type="checkbox"/> informal	<input checked="" type="checkbox"/> planned <input type="checkbox"/> informal	<input type="checkbox"/> planned <input type="checkbox"/> informal	<input type="checkbox"/> well defined <input type="checkbox"/> undefined	
Step 3	How is the element used? Select all that apply	<input checked="" type="checkbox"/> transit <input type="checkbox"/> shared space <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Domes or arched	<input checked="" type="checkbox"/> transit <input type="checkbox"/> water storage <input type="checkbox"/> water cleansing <input type="checkbox"/> water conveyance <input type="checkbox"/> Aesthetic	<input type="checkbox"/> water storage <input type="checkbox"/> water cleansing <input type="checkbox"/> water conveyance <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input checked="" type="checkbox"/> safety <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> shared space <input type="checkbox"/> recreational <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input type="checkbox"/> water storage <input type="checkbox"/> water conveyance <input type="checkbox"/> water cleansing <input type="checkbox"/> Recreational	<input type="checkbox"/> water storage <input type="checkbox"/> water conveyance <input type="checkbox"/> water cleansing <input type="checkbox"/> Aesthetic	<input type="checkbox"/> transit <input type="checkbox"/> Add text	<input checked="" type="checkbox"/> residential <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input checked="" type="checkbox"/> residential <input type="checkbox"/> commercial <input type="checkbox"/> tourism <input type="checkbox"/> Aesthetic	<input type="checkbox"/> aesthetic <input checked="" type="checkbox"/> provide shade <input type="checkbox"/> recreational <input type="checkbox"/> noise reduction <input type="checkbox"/> ecological <input type="checkbox"/> Add text	<input type="checkbox"/> transit <input type="checkbox"/> Add text	

Exercise 4 – Challenges and Opportunities

Exercise 4 presented participants with a list of challenges and a list of opportunities. Based on their previous work with exercises 1,2 and 3, participants have assessed the challenges that the neighborhood is facing.

Next, participants have chosen relevant opportunities that could arise from addressing the challenges.

The aim of this exercise was to frame the overall understanding of the neighborhood and to transition to the second round of Group Exercises- focused on applying NbS solution.

EXERCISE 4 CHALLENGES AND OPPORTUNITIES

Understanding the existing and future challenges and opportunities that may emerge in your city is key to ensuring robust design of mitigation measures.

4.1 Which challenges is your selected neighborhood facing? *choose all that apply*

Please discuss within your group.

<input type="checkbox"/>	Congestion in city	<input type="checkbox"/>	Settlements in uninhabitable areas (water-way easements, hazard prone, RTW, waterleak)	<input checked="" type="checkbox"/>	Limited space for low-impact stormwater management	<input type="checkbox"/>	other, please specify:
<input checked="" type="checkbox"/>	Lack of surface run-off water management	<input checked="" type="checkbox"/>	High rainfall occurrence in the city (flood hazard)	<input type="checkbox"/>	Lack of drainage infrastructure data	<div style="border: 1px solid #ccc; height: 100px; width: 100%;"></div>	
<input checked="" type="checkbox"/>	Limited space for expansion of drainage canals	<input type="checkbox"/>	Recurring landslides caused by flooding	<input checked="" type="checkbox"/>	Climate change		
<input type="checkbox"/>	Accelerated soil erosion due to occurrence of typhoons	<input type="checkbox"/>	Water quality issues	<input checked="" type="checkbox"/>	Accumulation of waste in rivers		
<input checked="" type="checkbox"/>	Damage of infrastructure due to heavy rainfall	<input type="checkbox"/>	Limited and depleting source of water supply	<input type="checkbox"/>	Uncontrolled urban migration		
<input type="checkbox"/>	Presence of landslides and flood susceptible areas	<input checked="" type="checkbox"/>	Low awareness of the public on disaster preparedness				

4.2 Which challenges is your selected neighborhood facing? *choose all that apply*

Please discuss within your group.

<input checked="" type="checkbox"/>	Rainwater may be stored or recycled for domestic/outdoor use	<input type="checkbox"/>	Increase tourism	<input checked="" type="checkbox"/>	Enhance local identity	<input type="checkbox"/>	other, please specify:
<input type="checkbox"/>	Linkages with academic, research institute, business, professionals (resources, assistance, studios)	<input type="checkbox"/>	Create new destinations for residents and visitors	<input type="checkbox"/>	Local food production	<div style="border: 1px solid #ccc; height: 100px; width: 100%;"></div>	
<input checked="" type="checkbox"/>	Resilient infrastructure	<input checked="" type="checkbox"/>	Comfortable micro-climate	<input checked="" type="checkbox"/>	Social inclusion		
<input checked="" type="checkbox"/>	Adoption of new/best practices and technologies from local and international places	<input type="checkbox"/>	Improved air quality	<input checked="" type="checkbox"/>	Noise reduction		
<input checked="" type="checkbox"/>	Multifunctional public spaces	<input checked="" type="checkbox"/>	Recreational spaces	<input type="checkbox"/>	Educational spaces		
<input checked="" type="checkbox"/>	Improved water quality	<input type="checkbox"/>	Increased biodiversity	<input checked="" type="checkbox"/>	Enhancement of feeling of safety		
<input type="checkbox"/>	Sustainable soil management	<input checked="" type="checkbox"/>	Physical health improvement				

Exercise 5 – Choose an applicable NbS typology

Exercise 5 presented participants with the overlay analysis concluded in exercise 2 by each group and corresponding general typologies for each type of infrastructure.

Participants have chosen one typology to further develop in exercise 6.

The aim of this exercise was to create a transition between neighborhood analysis and NbS conceptualization.

EXERCISE 5
Choose an applicable NbS typology

In this exercise you will choose an applicable NbS typology for the chosen infrastructure in your neighborhood. Your group will identify an appropriate typology for the neighborhood characteristics you identified in Exercise 1.

A typology consists of a combination of hydraulic elements (e.g., bioswale, permeable pavement, detention basin etc.), each comprising specific hydraulic functions (e.g., conveyance, cleansing, detention, retention etc.). Each typology should be developed with careful consideration of the complex spatial, social, environmental, and economic context of a city. Typologies are conceptual in their nature. When applying a typology to a specific site, the typology will need to be adapted and the design further detailed to meet the site-specific requirements and context.

5.1 Considering the neighborhood characteristics (identified in exercise 1), what typology is applicable for the chosen infrastructure in your neighborhood based on the decision guide? Please take a look at the [NbS typology toolbox](#) for further details on the typologies.

Decision Guide

Select one typology that you chose for your neighbourhood

The decision guide is a flowchart. On the left, under the heading 'Hazards', there are three categories: 'Flooding' (with a water icon), 'Extreme Heat' (with a sun icon), and 'Sea Level Rise' (with a water level icon). These lead to three infrastructure types: 'Coastal', 'Soft Slope', and 'Urban Area'. From 'Coastal', the flow goes to 'Green Street', 'Retention Boulevard', and 'Livable Corridor'. From 'Soft Slope', it goes to 'Floodable Park' and 'Wet Plaza'. From 'Urban Area', it goes to 'Urban Canal', 'Stream Restoration', 'Living Shoreline', and 'Active Waterfront'. Each typology is represented by a circular icon and a list of sub-typologies with checkboxes.

- Green Street
- Retention Boulevard
- Livable Corridor
- Floodable Park
- Wet Plaza
- Urban Canal
- Stream Restoration
- Living Shoreline
- Active Waterfront

Exercise 6 – Hydraulic elements and functions

Exercise 6 presented participants with a conceptual cross-section developed specifically for each group, a list of generic typologies, elements and hydraulic functions.

Participants identified relevant elements and placed them under the cross-section in order to tailor the chosen typology to the assessed type of infrastructure.

The aim of this exercise was to introduce participants to conceptual typology development.

Nbs typology toolbox
Use these icons for Step 1

Hydraulic elements
Use these icons for Step 2

Hydraulic functions
Use these icons for Step 3

The toolbox includes four typology categories: Road, Open area, River/Stream/Canal, and Waterfront. Each category shows a conceptual cross-section and a list of associated hydraulic elements and functions. The hydraulic elements panel lists 16 elements such as Planted Biowall, Rainwater Harvesting, Rain Gardens, Stormwater Storage, Permeable Pavements, Green Walls, Planted Overhead Pipe, Linear Vegetation, Stormwater with Outflow, Cleansing Structures, Green Walls, Planted Area, Wetlands, and Blue Infrastructure. The hydraulic functions panel lists 10 functions: Infiltration, Detention, Collection, Retention, Denotation, Conveyance, Storage, and Edge Protection.

EXERCISE 6 Hydraulic elements and functions

Disclaimer:
All the exercises are meant to develop understanding of Nature-based Solution at a conceptual level and can only be used as inspiration. You should always refer to your local urban planning regulations and plans before making a decision based on this methodology.
Please note that development of steep slopes is not recommended. As an example, slopes above 18 percent are deemed unsuitable for development in the Philippines, according to the national guidelines. Please check your local urban planning regulations.
Please note that additional NBS typologies may be relevant. The exercises are tailored to fit the urban context you identified in Group Exercises Part 1.

In this exercise, you will tailor the chosen NBS typology to the neighborhood and its challenges.
This cross section is a conceptual outline of the infrastructure type your group chose (similar to the conceptual cross section in the demonstration case for Rio). You are asked to move and place hydraulic elements and functions in the assigned boxes around the cross section by following the steps below.

4.1 To complete this exercise, you need to:

STEP 1
Move your chosen typology from the **Nbs typology toolbox** to the pink box below.

STEP 2
Take a look at the hydraulic elements that are relevant for your chosen typology. How can the hydraulic elements be combined to tailor the typology to the neighborhood? Keep the Infrastructure Assessment (Exercise 3) and challenges and opportunities (Exercise 4) in mind. Discuss this with your group and agree on the hydraulic elements. **Move the hydraulic elements (rectangular blue icons) to the dark blue boxes below the cross section.** You do not have to fill all of the boxes.

STEP 3
After choosing and placing the elements, discuss the main hydraulic functions provided by each hydraulic element. **Move the hydraulic functions (round blue icons) to the light blue box below each hydraulic element.** You do not have to fill all of the boxes.

4.2 By completing this exercise, you have designed a conceptual tailored NBS typology that is applicable for your neighborhood. **What are the main hydraulic functions provided by your tailored NBS typology?**

The main hydraulic functions provided by the selected NBS namely bioswale, permeable pavements and overflow pipes are infiltration, cleansing, retention, detention and conveyance.

Exercise 7 – Visual expression

Exercise 7 presented participants with images of implemented NbS projects.

By ticking the boxes, participants have chosen relevant visual expressions of solutions that can be applied to the conceptual typology they developed in the previous exercise.

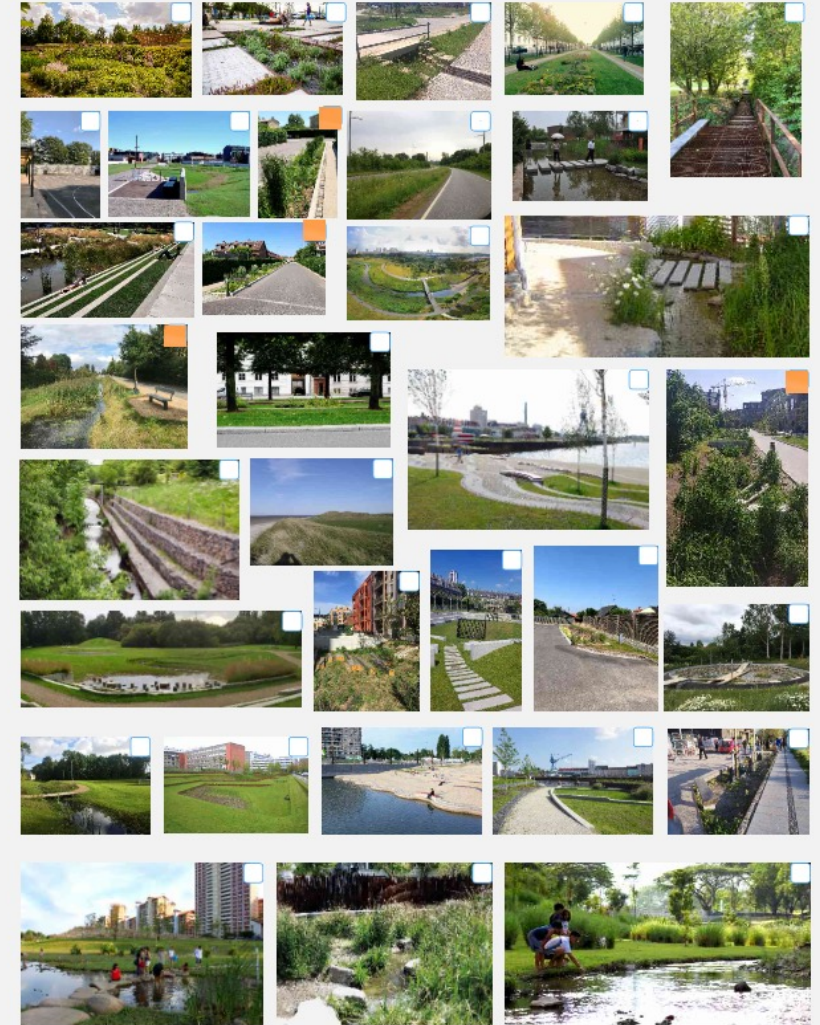
The aim of this exercise was to present participants with applied NbS solutions and inspire them to start moving from conceptualizing typologies to creating a vision for the chosen neighborhood.

EXERCISE 7 Visual expression

This exercise will help your group visualize what NbS could look like in your city.

7.1 The images below are examples of NbS.
In your group, identify the images of hydraulic elements that are included in your tailored NbS typology. Discuss and select which of the images fit best to the visual identity and scale of your neighborhood.
Select the most relevant images with the orange squares.

choose all that apply



Exercise 8 – Co-benefits

Exercise 8 provided participants with a list of co-benefits that can emerge from applying NbS.

Participants were asked to reflect upon the NbS typology designed in exercise 6 and identify co-benefits they find relevant for this solution.

The aim of this exercise was to emphasize the added value of NbS that goes beyond flood mitigation.



EXERCISE 8 Co-benefits

NbS provides multiple benefits beyond the primary benefit of flood adaptation. These additional benefits are often referred to as co-benefits.

8.1 What co-benefits are relevant for your tailored NbS typology and neighborhood context?
Select the co-benefit icons that you find relevant

choose all that apply

8.2 Why are these co-benefits relevant? Write a short description.
Double click inside the white box to start typing

It increases the quality of life of the residents.

8.3 How will the co-benefits be realized on the cross-section of your tailored typology?
Write a short description for each relevant co-benefit.
Double click inside the white space to start typing

Example: Traffic safety will be increased by separating soft mobility through the addition of rain gardens between sidewalks and car lanes

Vegetation on rooftop gardens helps filter the air, while soil retain and detain some rainwater. Rooftops gardens create a microclimate that encourages biodiversity of some flora and fauna. When edible crops are incorporated as well, rooftop gardens provide food security

Exercise 9 – Vision

Exercise 8 required participants to create a vision for their neighborhood. A list of question has been provided to guide the development of the vision.

Participants had written a short text describing the neighborhood in 30 years under the premises that NbS has been systematically applied.

The aim of this exercise was to enable participants to envision the potential transformation and benefits that NbS can provide.

It is crucial to have a strong vision to guide the flood adaptation planning. The aim of this exercise is to initiate the development of an NbS vision for your city.

9.1 Imagine 30 years have passed and NbS have systematically been implemented throughout the neighborhood. Consider that hazard prone areas are now lush, safe, green spaces that bring a multitude of benefits to the neighborhood and city. **In your groups, discuss and answer the following question by imagining the outcome/ benefits of having NbS infrastructure at the neighborhood level.**

Aesthetics:

Is the neighborhood greener?
Is it more esthetically pleasant to walk around the neighborhood?

Functionality:

Is the public space used more efficiently?
How did the neighborhood population adapt to the increased green spaces?
Do people prefer to walk short distances rather than taking a vehicle?

Climate:

Is the air cleaner?
Has it improved biodiversity?
Is there a cooling effect due to increased shadow areas and water features?

Business:

Is the neighborhood a tourist attraction?
Have new businesses developed in the area?

Write a short description [min 100 words] of your vision for the neighborhood. You can use the above questions and answers as inspiration.

Double click inside the white space to start typing

Example: In the last 30 years, the neighborhood has become a pleasant, beautiful place. The population is using the green space for recreation activities such as long walks, picnics or simply being outside and enjoying nature. The natural channel of the river has been restored and people actively use the public space along the riverfront as a place to meet and enjoy their spare time. Since NbS has been introduced, the public space is more comfortable. The air is cleaner, and the heat feels less intense. It is noticeable that birds and small animals have returned to the city. Several new businesses have opened in the area making the neighborhood a popular attraction for both tourists and locals.

In the last 30 years, the surrounding area of Solok Van Praagh has become more liveable. For example, a reduction in flooding events has led to decreases in damage to infrastructure and residential properties, as well as less disruption to business operations. Additionally, the increase in green spaces has encouraged more urban biodiversity in the area, such as birds, insects and pollinators. The walkways have heavier foot traffic as they are safer and the microclimate is cooler. Residents are less dependent on private vehicles to travel to nearby areas. These outcomes have transformed the area into a self-contained neighborhood, thereby increasing its land value.

Appendix B – Vision Boards

Baguio's VISION for Nature-based Solutions

Creating attractive and safe public spaces
 Enabling social cohesion
 Multifunctional places
 Generating new activities
 Liveable city
 Nature and culture
 Enhanced local identity



Connecting water and people

CLEAN WATER



CONVEYANCE



HARVEST & REUSE



EVAPOTRANSPIRATION



INFILTRATION



Creating attractive and safe public spaces

Enhanced local biodiversity



Enhanced local identity

Visual expressions



"...the ambient temperature feels just right that even during the summers, people find it pleasant to walk distances."

"There are lush greens, specially by the waterway banks and biotopes on the stepped canals are a sight to behold."

"...families with children and grandparents in tow, enjoy food and recreation, catch up with neighbors' lives, and find quiet time, too, watching fish in the clear running waters."

"...their homes and barangay are a safe, healthy and happy place."

Coron and El Nido's VISION for Nature-based Solutions

El Nido and Coron are lush green cities that have grown to be resilient and sustainable.

...these vivid cities are a popular touristic attraction.

The city is well connected with the coastal area
Nature is flourishing and water has become an asset

... people enjoy walking down the streets in the cool shadow.

- Co-benefits**
- Enhanced local biodiversity
 - Creating attractive and safe public spaces
 - Enabling social cohesion
 - Green infrastructure
 - Multifunctional places
 - Happy people
 - Impressed tourists
 - Liveable city
 - Nature and culture
 - Enhanced local identity

Enhanced local identity



EROSION CONTROL

DETENTION

HARVEST & REUSE



INCREASED BIODIVERSITY

Creating attractive and safe public spaces



SAFETY



MICRO-CLIMATE



RECREATIONAL VALUE



WATER QUALITY

COASTAL PROTECTION

There are new touristic trails throughout the city and beaches, all connected by beautiful, green streets and paths.

The beautiful coastline in El Nido and Coron is now complimented by the many green public space.

Spaces to relax, enjoy and be



BRANDING TOURISM



LOCAL ECONOMY



SOCIAL INCLUSION



BEAUTIFICATION



LOCAL IDENTITY

Enhanced connectivity

Generating new activities



PHYSICAL HEALTH

Connecting water and people



Kaysone's VISION for Nature-based Solutions

ຜົນປະໂຫຍດຮ່ວມກັນ

- ເພີ່ມຄວາມຮູ້ກັບອັດຕະໂນມັດ
- ສາມາດປະຕິບັດໜ້າທີ່ຮ່ວມກັນ
- ສະໜອງບໍລິການອາດອຸດສາຫະກຳທີ່ສະບາຍ
- ເພີ່ມເອກະລາດຂອງທ້ອງຖິ່ນ
- ສາມາດຮັບຮ່ວມທາງວັດຖຸດິບ
- ສາມາດສ້າງບັນດາບັນຍັດ
- ຫຼຸດຜ່ອນລຽງ
- ການສະໜອງບໍລິການໃຫ້ທ້ອງຖິ່ນ
- ເພີ່ມການທ່ອງທ່ຽວ
- ເພີ່ມໂຕ້ຮ່ວມ
- ສາມາດສ້າງບັນຍັດ



ການເຊື່ອມຕໍ່ກັບນ້ຳ ກັບຄືນ
ການສ້າງສະຖານທີ່ສາທາລະນະທິດີງດູດ ແລະ ປອດໄພ
ຊີວະນາໆພັນກັບຄືນສູ່ເມືອງ
ສ້າງກິດຈະກຳໃຫມ່

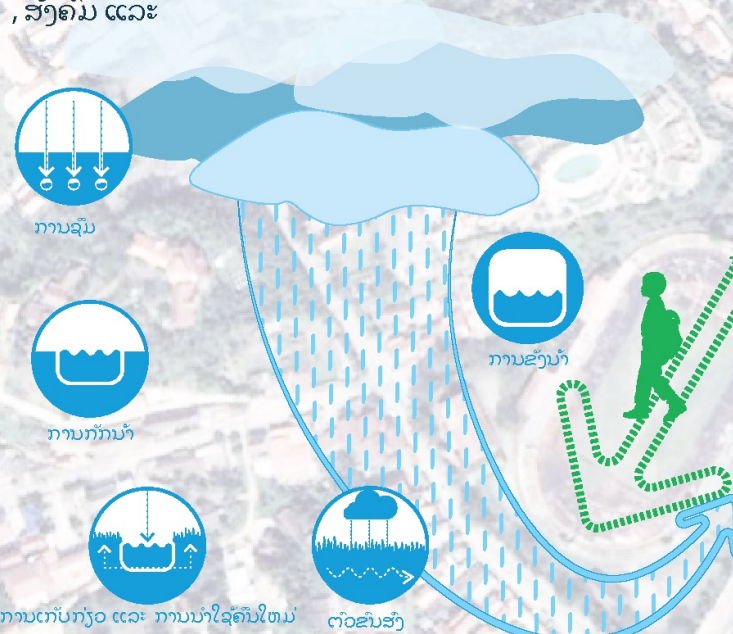
ການແກ້ບາງຄຸກ ແລະ ການນຳໃຊ້ຄືນໃຫມ່

ການສ້າງສະຖານທີ່ສາທາລະນະທິດີງດູດ ແລະ ປອດໄພ



Luang Prabang's VISION for Nature-based Solutions

ການແກ້ໄຂບັນຫາດ້ວຍວິທີການທາງທຳມະຊາດເຮັດໃຫ້ຊຸມຊົນ ແລະ ຕົວເມືອງໄດ້ມີການປ່ຽນແປງທີ່ດີຂຶ້ນ ເພີ່ມຂັດຄວາມຫນ້າຢູ່ໃນຕົວເມືອງ ຫລາຍຂຶ້ນ ມີສຸຂະພາບຈົດທີ່ເຂັ້ມແຂງ ມີຊີວິດຊີວາ ແລະ ສ້າງໃຫ້ຄຸນນະພາບຊີວິດໃນຊຸມຊົນດີຂຶ້ນຫລາຍດ້ານກວ່າແຕ່ກ່ອນເຊັ່ນ ສ້າງສົງເວດລ້ອມທີ່ດີ, ພູມອາກາດສົດຊື່ນປອດມົນລະພິດ, ຊຸມຊົນມີຄວາມສວຍງາມຫນ້າຢູ່ ແລະ ມີພື້ນທີ່ກິດຈະກຳຮ່ວມກັນຫລາຍຂຶ້ນໃນການອອກກຳລັງກາຍຕອນເຊົ້າແລະແລງ, ມີພື້ນທີ່ຮົ່ມເຫຼົ້າໄວ້ພັກຜ່ອນແລະ ແລກປ່ຽນເຊື້ອກັນແລະກັນ, ຫລຸດຜ່ອນໄພທຳມະຊາດຄຸກຄາມໂດຍສະເພາະໄພນຳຖວມລະດູຝົນ, ພ້ອມກັນນັ້ນກໍເຮັດໃຫ້ຫລຸດຜ່ອນມົນລະພິດໃນຕົວເມືອງ ເຮັດໃຫ້ຊຸມຊົນຫນ້າຢູ່ ມີວິຖີການດຳລົງຊີວິດທີ່ສະດວກປອດໄພ ແລະ ມີຄວາມສຸກ. ການແກ້ໄຂບັນຫາດ້ວຍວິທີການທາງທຳມະຊາດໄດ້ເຮັດບົດບາດຫນ້າທີ່ສຳຄັນໃນການພັດທະນາຕົວເມືອງ ທີ່ຍືນຍົງ ດ້ວຍຂະບວນການທາງທຳມະຊາດກໍໃຫ້ເກີດປະໂຫຍດດ້ານສັງເວດລ້ອມ, ສັງຄົມ ແລະ



ການອະທິບາຍຮູບພາບ



ຜົນປະໂຫຍດຮ່ວມ

- ເພີ່ມຄວາມຮູ້ສຶກປອດໄພ
- ເພີ່ມທາງການລົງທຶນ
- ຫຼຸດຜ່ອນລຽງ
- ຄວາມຫຼາກຫຼາຍທາງຊີວະນິເບດ
- ການອະນຸລັກສິ່ງໃນທ້ອງຖິ່ນ
- ການພັດທະນາທາງສັງຄົມ
- ເພີ່ມການທ່ອງທ່ຽວ
- ເພີ່ມທິພົນຜ່ອນ
- ສະເພາະອາກາດອຸ່ນແລະການລົງທຶນ
- ເພີ່ມເອກະລັກຂອງທ້ອງຖິ່ນ
- ຄຸນນະພາບອາກາດທີ່ປັບປຸງຂຶ້ນ

Palembang's VISION for Nature-based Solutions

"...area taman dan trotoar jalan menjadi lebih teduh sehingga pejalan kaki dan pengguna transportasi publik menjadi lebih nyaman."

Manfaat bersama
Menciptakan ruang publik yang menarik dan aman



Ekspresi visual

"...Tidak terjadi kemacetan lalu lintas pada saat turun hujan karena tidak terjadi genangan banjir di jalan."

"...lingkungan menjadi lebih hijau dan nyaman dimana masyarakat dari berbagai tingkat sosial berkumpul untuk berolahraga dan berekreasi."

Lebih banyak alam bagi masyarakat lokal
Air bersih di seluruh bagian
Nyaman hanya dengan jalan di jalanan

Infrastruktur hijau/ramah lingkungan
Kotak layak huni
Alam dan budaya



Penang's VISION for Nature-based Solutions

CLEAN WATER

Visual expressions

Co-benefits

CONVEYANCE

HARVEST & REUSE

INFILTRATION

FILTRATION

RETENTION

WATER REUSE

Enhanced local biodiversity

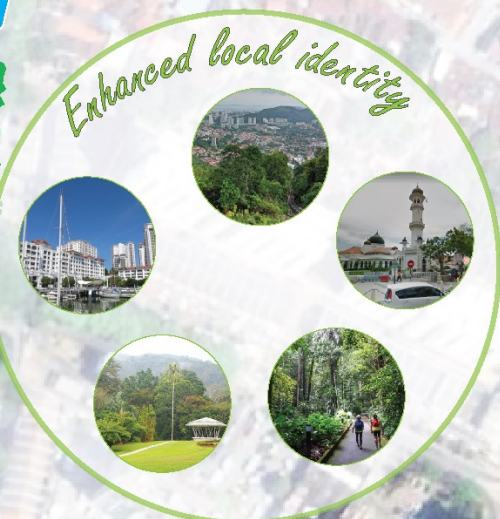
Connecting water and people

Enhanced local identity

“reduction in flooding events has led to decreases in damage to infrastructure and residential properties, as well as less disruption to business operations”

“the increase in green spaces has encouraged more urban biodiversity in the area”

Residents prefer to walk as the areas has become are safer and the microclimate is cooler



Semarang & Makassar's VISION for Nature-based Solutions

Ekspresi visual



Memperbanyak flora lokal
Menyambungkan air dan manusia
Menciptakan ruang publik yang menarik dan aman



Biodiversitas



Ruang Edukasi



Iklim mikro yang nyaman



Ruang rekreasi



Kualitas air yang lebih baik

Manfaat bersama



PERLINDUNGAN PESISIR

KUALITAS AIR YANG LEBIH BAIK

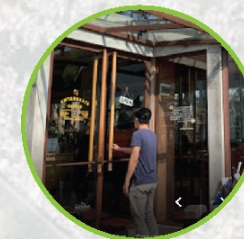
AIR BERSIH
KUALITAS AIR

PENGELOLAAN AIR

“Di kota Semarang, untuk estetika kawasan yang telah dikelola menggunakan NbS (Banjir Kanal Timur), tentunya akan semakin hijau dan memberikan kenyamanan bagi warga untuk tinggal, masyarakat akan Lebih senang tinggal di Tempat yang sejuk dan tidak banjir.

“...dengan NbS fungsi Ruang publik tersebut dapat menjadi tempat edukasi maupun tempat rekreasi, masyarakat juga semakin banyak yang menggunakan untuk tempat berolahraga dan berinteraksi dengan sesama, untuk menuju lokasi ruang terbuka hasil NbS memang masih banyak yang menggunakan kendaraan bermotor tetapi ketika sampai pada lokasi, mereka berlari dan berjalan di area yang dipersiapkan untuk jogging/jogging track.”

Meningkatkan identitas lokal

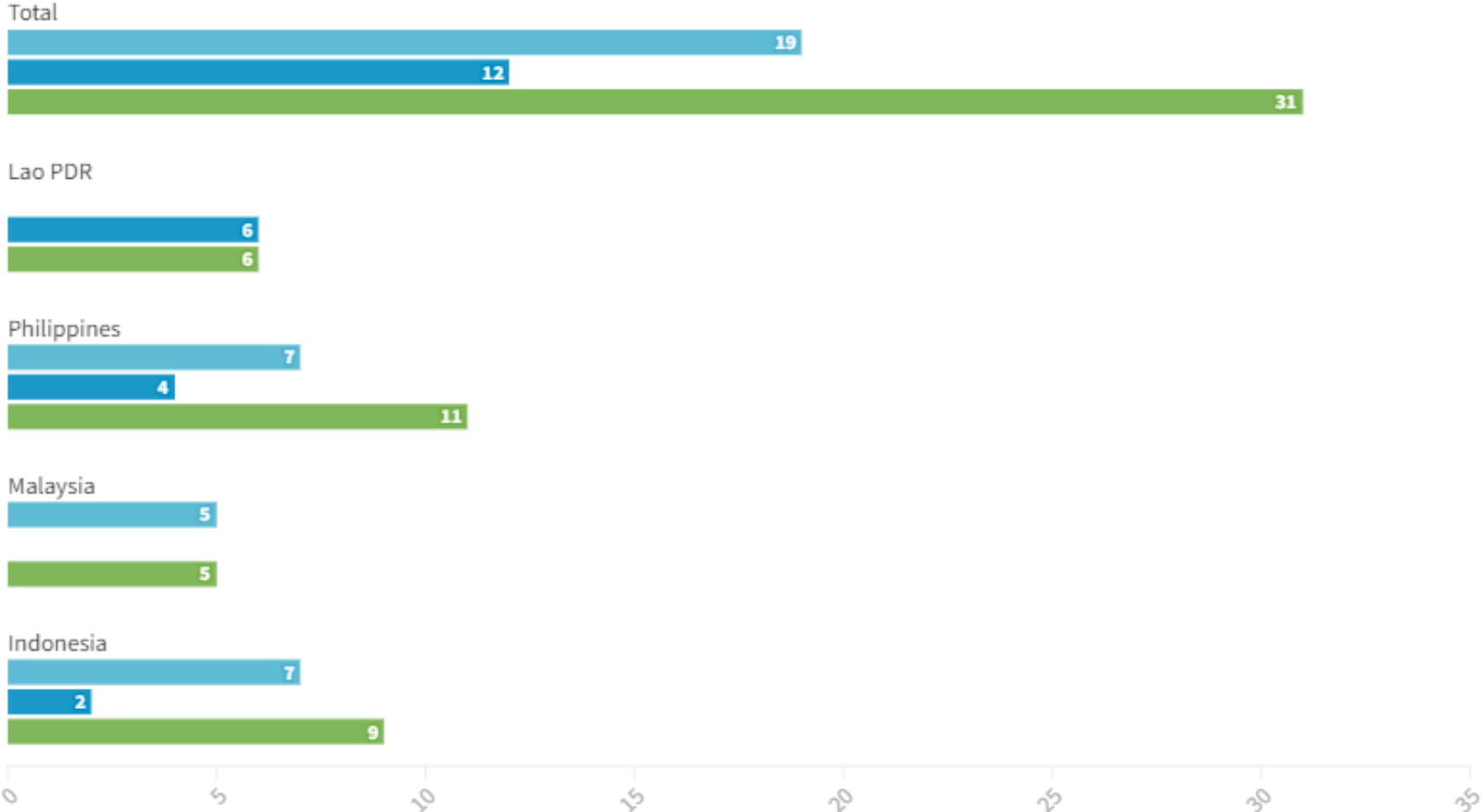


Appendix C – PRE-PROGRAM SURVEY

Genders across countries

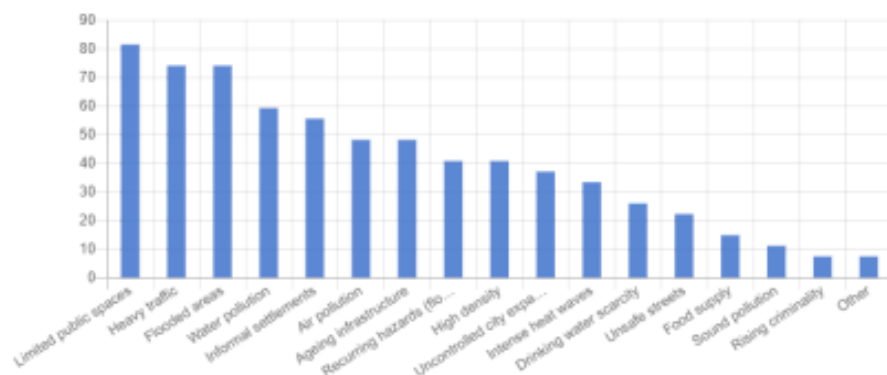
An overview of the 31 participants' gender across countries.

female male Total



Which of the following CHALLENGES is your city facing (you can choose more than one):

TYPE: "SELECT_MULTIPLE". 27 out of 27 respondents answered this question. (0 were without data.)



If other, please describe in your own words.

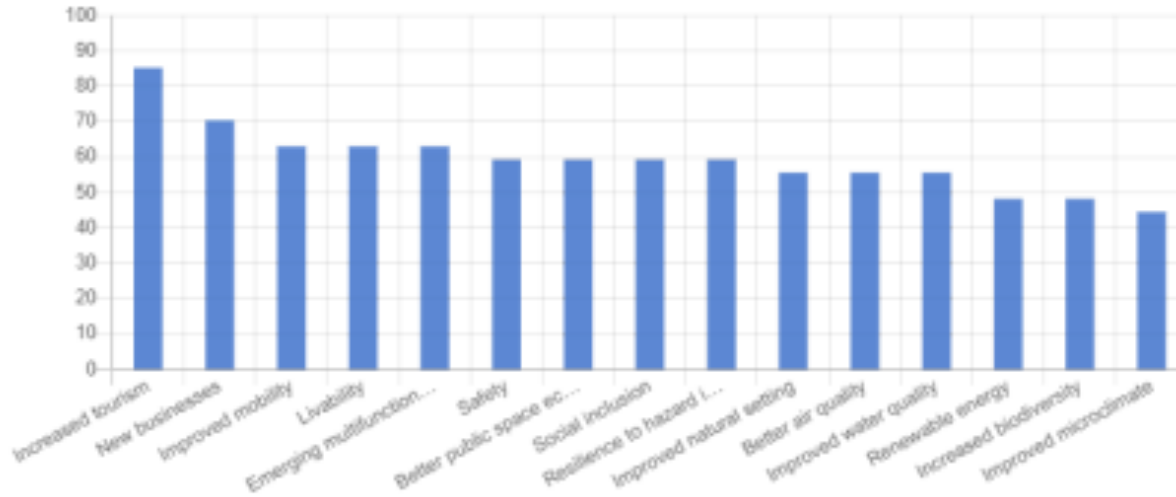
TYPE: "TEXT". 2 out of 27 respondents answered this question. (25 were without data.)

Value	Frequency	Percentage
limited supply of water during dry / hot season	1	3.7
'lack' of land to build infra like storm water detention facilities, sewage/septage treatment plants, parking areas and other needed facilities.	1	3.7

Value	Frequency	Percentage
Limited public spaces	22	81.48
Heavy traffic	20	74.07
Flooded areas	20	74.07
Water pollution	16	59.26
Informal settlements	15	55.56
Air pollution	13	48.15
Ageing infrastructure	13	48.15
Recurring hazards (floods, landslides)	11	40.74
High density	11	40.74
Uncontrolled city expansion	10	37.04
Intense heat waves	9	33.33
Drinking water scarcity	7	25.93
Unsafe streets	6	22.22
Food supply	4	14.81
Sound pollution	3	11.11
Rising criminality	2	7.41
Other	2	7.41

Please mark the OPPORTUNITIES you believe apply to your city (you can choose more than one):

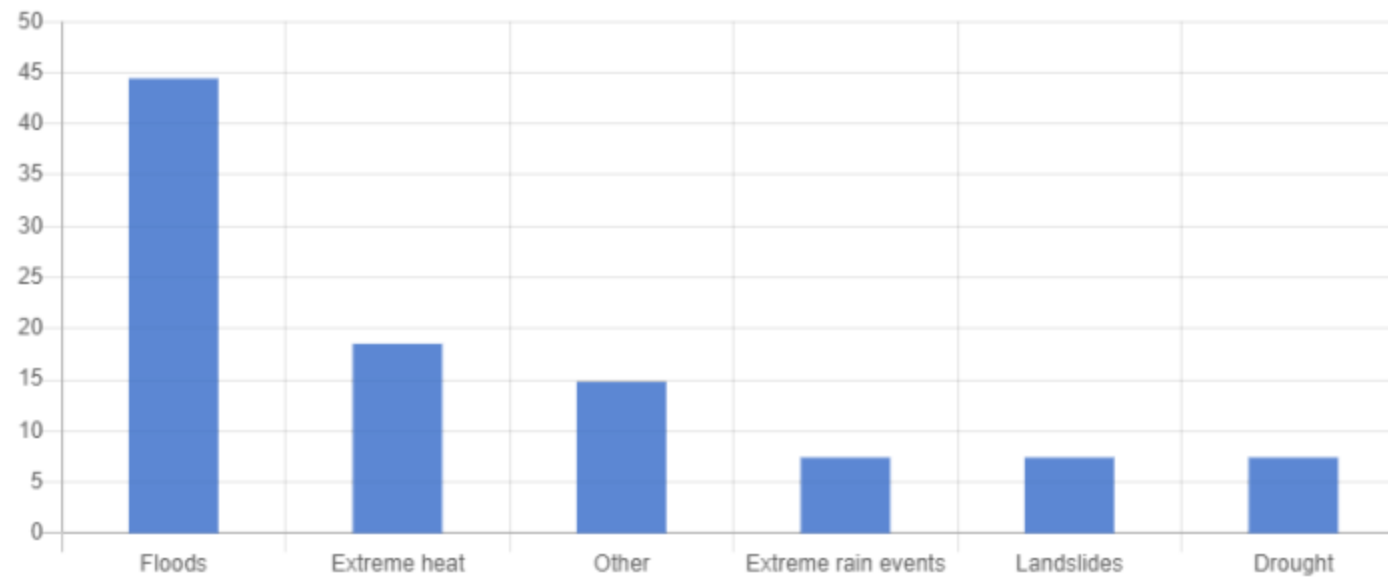
TYPE: "SELECT_MULTIPLE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Increased tourism	23	85.19
New businesses	19	70.37
Improved mobility	17	62.96
Livability	17	62.96
Emerging multifunctional spaces	17	62.96
Safety	16	59.26
Better public space ecology	16	59.26
Social inclusion	16	59.26
Resilience to hazard induced disasters	16	59.26
Improved natural setting	15	55.56
Better air quality	15	55.56
Improved water quality	15	55.56
Renewable energy	13	48.15
Increased biodiversity	13	48.15
Improved microclimate	12	44.44

Which of the following HAZARDS is affecting your city:

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Floods	12	44.44
Extreme heat	5	18.52
Other	4	14.81
Extreme rain events	2	7.41
Landslides	2	7.41
Drought	2	7.41

If other, please describe in your own words.

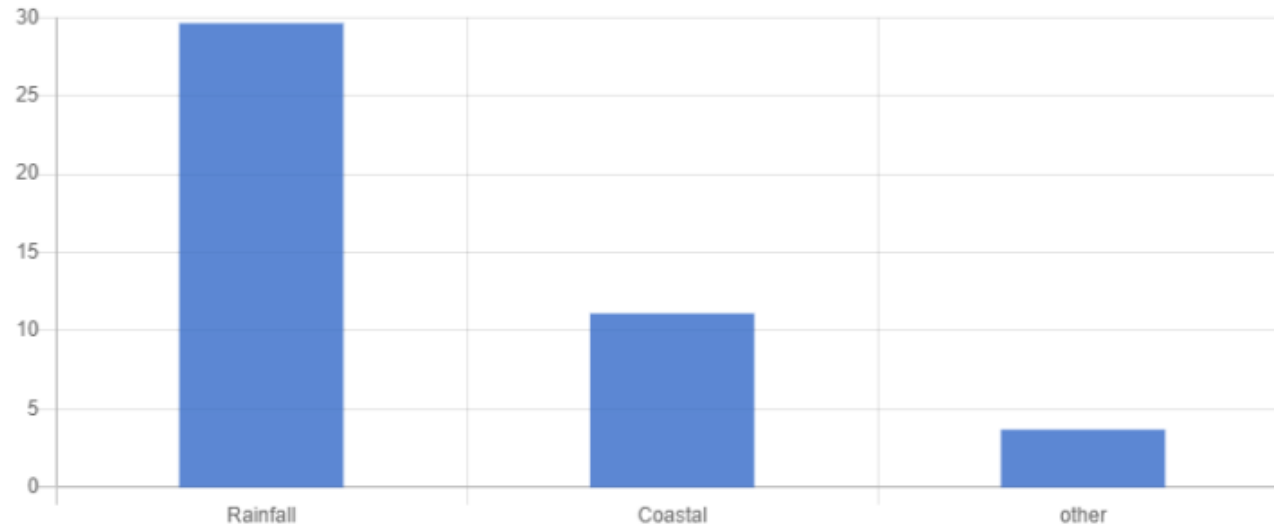
TYPE: "TEXT". 18 out of 27 respondents answered this question. (9 were without data.)

Value	Frequency	Percentage
landslide	1	3.7
The main city of George Town, Penang also experiencing flash flood.	1	3.7
Besides floods, there are instances of extreme heats and numerous landslides.	1	3.7
<i>Months 3 to 7 each year are hotter than usual due to the scorching sun rather than rain</i>	1	3.7
floods, landslides	1	3.7
<i>From April to June, the weather is very hot, affecting work and living, due to the increase in electricity and water bills.</i>	1	3.7
<i>Flooding occurs when it rains heavily and the water does not drain through the pipes. There is rarely cleaning along the manhole</i>	1	3.7
<i>Due to the lack of sanitation in the urban drainage system, the drains on the side of the road are blocked at some points</i>	1	3.7
<i>During the rainy season, if there is a lot of rain, there will be flooding in some places along the road inside Luo Prabang city</i>	1	3.7

Due to heavy rains, the city becomes vulnerable to landslides and floods too; the City is also prone to earthquake hazard	1	3.7
Sepeda motor, mobil pribadi, bus/kendaraan umum	1	3.7
Landslides with flooding brought about by heavy rainfall	1	3.7
motor	1	3.7
-	1	3.7
<i>Public transportation</i>	1	3.7
/	1	3.7
Extreme rain events, landslides, earthquakes	1	3.7
<i>Private vehicles (motorcycles and cars), online motorcycle taxis, public transportation (BRT Trans Musi and City Transportation)</i>	1	3.7

Please specify further the key driver(s) of the flood in your city:

TYPE: "SELECT_ONE". 12 out of 27 respondents answered this question. (15 were without data.)



Value	Frequency	Percentage
Rainfall	8	29.63
Coastal	3	11.11
other	1	3.7

If other, please describe in your own words.

TYPE: "TEXT". 2 out of 27 respondents answered this question. (25 were without data.)

Value	Frequency	Percentage
flooding	1	3.7
the city experiences flooding in some parts ; the city is characterized as susceptible to landslides	1	3.7

Please provide a short description of how the selected hazard/s affect the city's infrastructure/assets.

TYPE: "TEXT". 23 out of 27 respondents answered this question. (4 were without data.)

Value	Frequency	Percentage
Our city is a mountainous area, thereby all structures are exposed to landslides	1	3.7
The extreme heat affect the building operation system whereby air-conditioning is installed to create a comfortable ambience. For flash flood, most of the resident/ business owner experiencing loss in the term of personal asset (ie: material for business).	1	3.7
In November 2017, a major flooding resulted in significant financial losses in several industries namely manufacturing, agriculture and fisheries due to business disruption, damages to equipments and assets as well as inundation over agricultural land.	1	3.7
<i>Living in poverty due to the use of water and electricity, but the price of water and electricity is higher and affects the property infrastructure in the city.</i>	1	3.7
flooding usually happens along roads and open spaces in residential areas and landslides are within residential areas as well as along highways	1	3.7
<i>The property infrastructure is exhausted due to the use of electricity, water, water and heat, making life difficult</i>	1	3.7
In November 2017 Penang was hit by its worst recorded floods, with 7 lives lost and half of urban areas submerged. A total of 159 areas reported being affected by floods, 68 of had never previously flooded. 16 Losses to manufacturing were estimated at RM200 million and RM300 million (~USD 48 to 72 million). 17 It also impacted 2,626 farmers and 3,464 hectares of agricultural land, with a total economic loss estimated of approximately RM5.7 million (~USD 1.37 million) . In the fisheries sector, the estimated losses were of approximately RM57.5 million (~USD 13.8 million).	1	3.7

<i>Flooding of transport routes</i>	1	3.7
<i>When it rains for several hours in a row, it causes flooding in some places due to the failure of drainage ditches</i>	1	3.7
the City's infra and assets are impacted by these identified hazards, particularly homes, schools, government buidlings, etc	1	3.7
Landslides often affect roads as means of connection to other barangays, it also affects critical infrastructures that when affected causes a delay in services for public consumption.	1	3.7
<i>Coastal flooding is a hazard to urban infrastructure because it damages roads, buildings, clean water facilities and community access</i>	1	3.7
infrastructure/assets are affected in terms of accessibility and immediate response	1	3.7
<i>rob and flood inundation because the drainage has not been repaired</i>	1	3.7
It affects the plantations and the potable water level in our municipality.	1	3.7
Floods have affected roads, communication, buildings, and amenities and causes a lot of maintenance work post-flood events	1	3.7
It affects the supply of potable, drinking water municipal wide	1	3.7
<i>The type of hazard faced is flooding which can cause roads to be asphalted can be damaged</i>	1	3.7
Floods expose infrastructure to more risks of structural damage, wearing out, and aging quickly, thus increasing maintenance and replacement costs.	1	3.7

Extreme rain events: either traffic is a standstill or no public utilities plying their routes; residents unable to go out; some infra inundated to a certain level, landslides; earthquakes: damage to school buildings; earth movement/landslides	1	3.7
Banjir di Kota Palembang umumnya terjadi jika curah hujan besar bersamaan dengan kondisi sungai pasang. Infrastruktur kota yang terdampak oleh banjir adalah Jalan	1	3.7
Drought affects the water supply in our municipality affects water supply	1	3.7

Please name a few areas in your city (if you are familiar with any) where flooding has occurred in recent years.

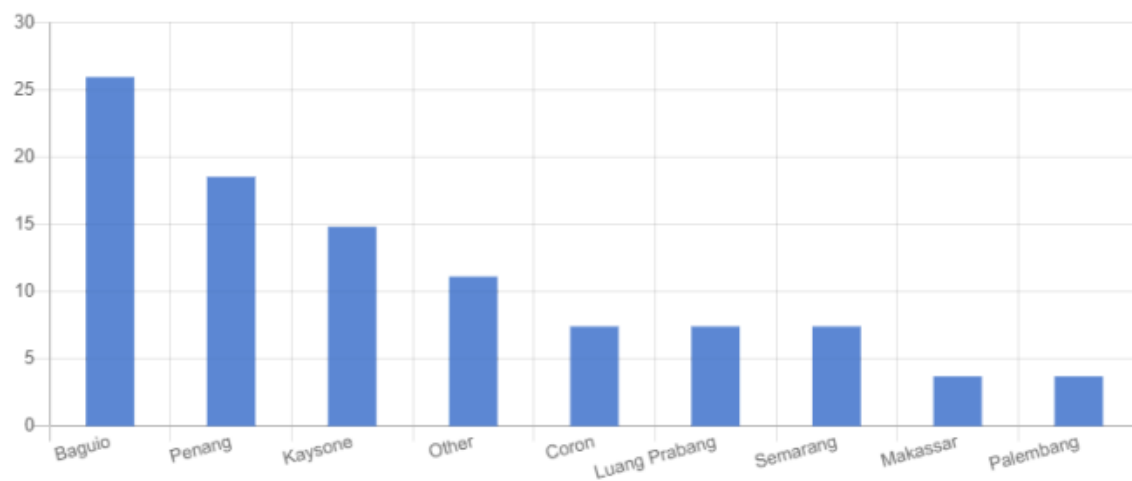
TYPE: "TEXT". 23 out of 27 respondents answered this question. (4 were without data.)

Value	Frequency	Percentage
bancuang baba	2	7.41
Lagoon area, Guisad and Irisan	1	3.7
Jalan P. Ramlee, Lebuh Carnarvon, Lebuh Victoria dan Pengkalan Weld	1	3.7
<i>The riverside area of Pak will not be flooded due to the large amount of water during the 8th to 10th months of the last two years</i>	1	3.7
City Camp	1	3.7
<i>Phon Diang village in the city of Kaisonpom temple, Savannakhet province, Som village area, in the city of Kaisonpom temple, has been a flood area for the past three years.</i>	1	3.7
Penang Island (2017)	1	3.7
<i>Na Kue Village, Na Sen Village and Rattana Lansai North Village</i>	1	3.7
<i>Urban areas along the province's municipalities, water does not flow from the pipes yet causing flooding in a short time, about 1-5 hours</i>	1	3.7
<i>The border road of Huaxiang Village, Vishun Village and area The edge of Huai Khong</i>	1	3.7
<i>Because the drainage of rainwater does not lead to flooding, the rise of natural rivers such as Nam Nok, Kanan River and natural water drainage such as Nam Dong, Huai Hop, Huai Maw... and so on.</i>	1	3.7

City Camp Lagoon	1	3.7
City Camp Lagoon, Barangay Lower Rock Quarry	1	3.7
Semarang, Kudus, Pati	1	3.7
City Camp Lagoon located at Barangay Lower Rock Quarry, Baguio City	1	3.7
tanjung mas	1	3.7
Brgy. Poblacion 5 or Bancuang Baba	1	3.7
Jalan P. Ramlee, Jalan Terengganu, Weld Quay, etc	1	3.7
Floody roads from higher poblacion like from Poblacion 4 going down to poblacion 3,2, & 1 due to lack of sufficient drainage system & at bgy. 5 (Bancuang Baba) due to the reclamation activities	1	3.7
Daerah biringkanaya	1	3.7
Jalan Kebun Lama; Jalan Masjid Negeri; Parit Lumba Kuda; Jalan Langkawi; Jalan P. Ramlee	1	3.7
<i>Almost all sub-districts in Palembang City have flood inundation areas either as a result of poor runoff water management or located in areas lower than the tide level.</i>	1	3.7

Please specify the city you are representing:

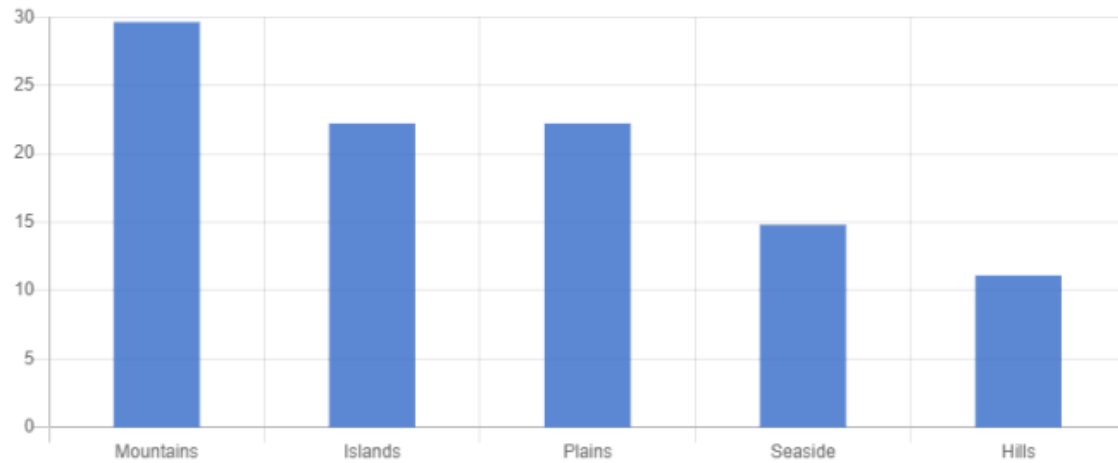
TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Baguio	7	25.93
Penang	5	18.52
Kaysone	4	14.81
Other	3	11.11
Coron	2	7.41
Luang Prabang	2	7.41
Semarang	2	7.41
Makassar	1	3.7
Palembang	1	3.7

The predominant landscape of your city is:

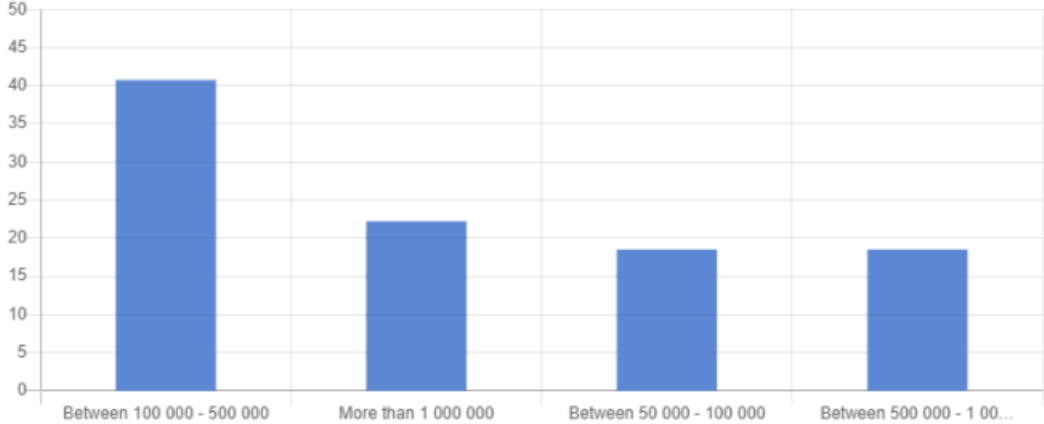
TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Mountains	8	29.63
Islands	6	22.22
Plains	6	22.22
Seaside	4	14.81
Hills	3	11.11

The approximate population of your city is:

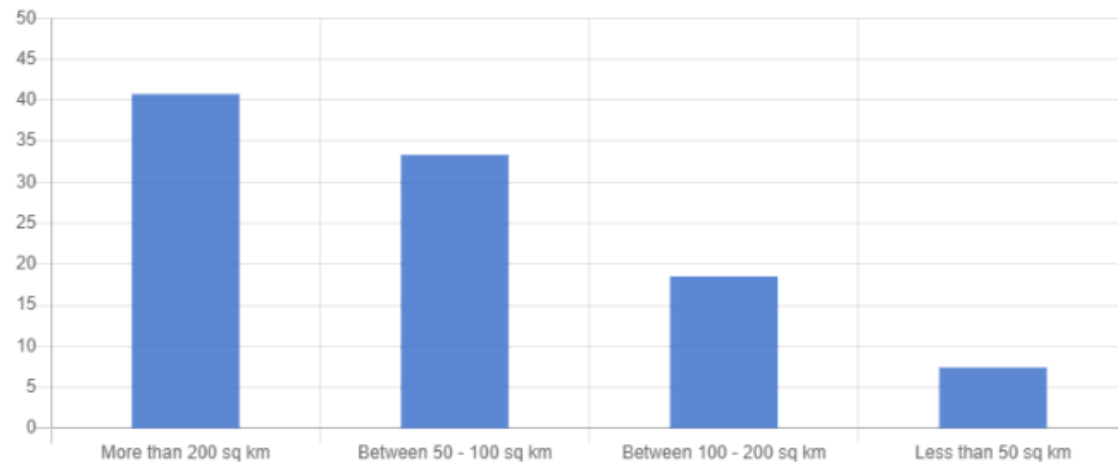
TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Between 100 000 - 500 000	11	40.74
More than 1 000 000	6	22.22
Between 50 000 - 100 000	5	18.52
Between 500 000 - 1 000 000	5	18.52

The approximate area (km²) of your city is:

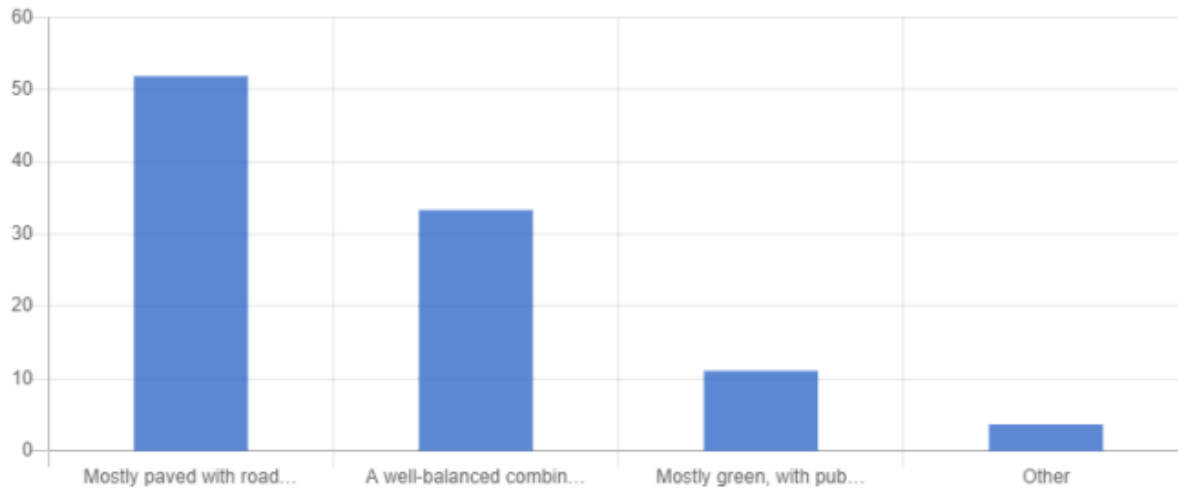
TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
More than 200 sq km	11	40.74
Between 50 - 100 sq km	9	33.33
Between 100 - 200 sq km	5	18.52
Less than 50 sq km	2	7.41

How would you best describe the public space in your city:

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Mostly paved with roads, parking spaces, crowded and with a few green spaces	14	51.85
A well-balanced combination of paved and green areas, as well as water bodies	9	33.33
Mostly green, with public parks and bodies of water, and few paved areas	3	11.11
Other	1	3.7

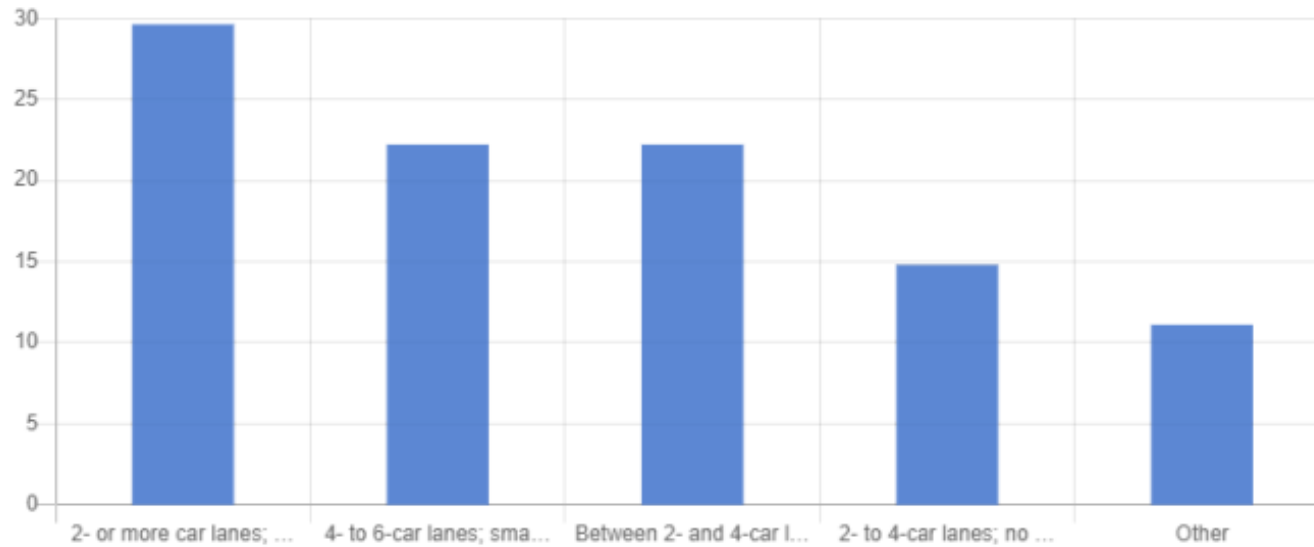
If other, please describe in your own words.

TYPE: "TEXT". 1 out of 27 respondents answered this question. (26 were without data.)

Value	Frequency	Percentage
Mostly paved with roads that also serve as parking spaces at certain hours, crowded, not enough green spaces, polluted waterways	1	3.7

Which of the following statements best describe MAJOR ROADS in your city:

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
2- or more car lanes; undefined sidewalks; sporadic parking.	8	29.63
4- to 6-car lanes; small sidewalks next to commercial streets; little to no green spaces; defined parking spaces.	6	22.22
Between 2- and 4-car lanes; separated by green strips; defined, large sidewalks; defined parking.	6	22.22
2- to 4-car lanes; no sidewalks; no greenspaces; sporadic parking.	4	14.81
Other	3	11.11

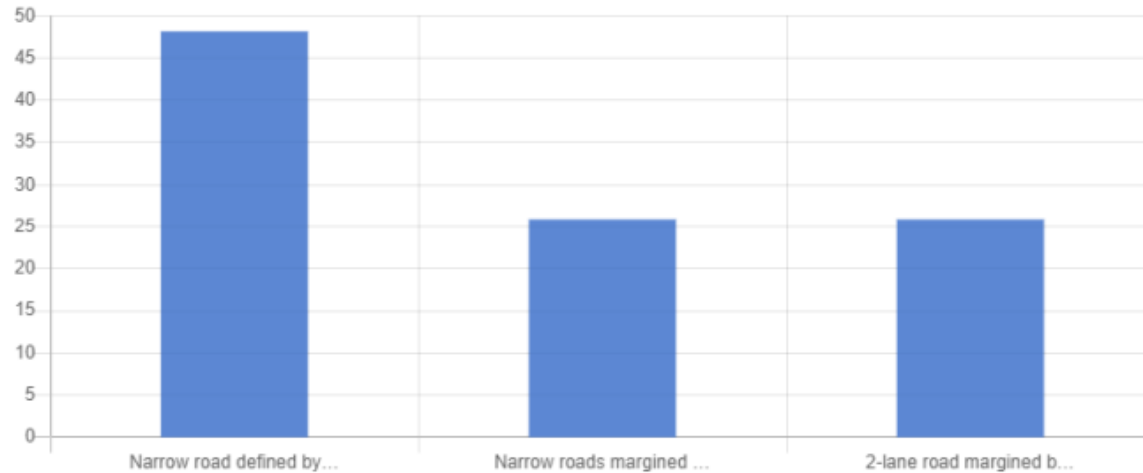
If other, please describe in your own words.

TYPE: "TEXT". 3 out of 27 respondents answered this question. (24 were without data.)

Value	Frequency	Percentage
<i>The road runs 2 lanes, there is a road on both sides, there is a green area (planting ornamental trees), there is a designated area for parking.</i>	1	3.7
The National Highway is the major road in our municipality, it has 2 lanes in the town proper and continues with 4-lanes outside the town proper. In the town proper, it has limited sidewalk and no sufficient parking area while outside the town proper, it has sufficient sidewalk and parking spaces.	1	3.7
2- or more car lanes, some with and without sidewalks; sidewalks not continuous and have obstacles (posts); sporadic parking, decreasing greenspaces,	1	3.7

Which of the following statements best describes (small) NEIGHBOURHOOD ROADS in your city:

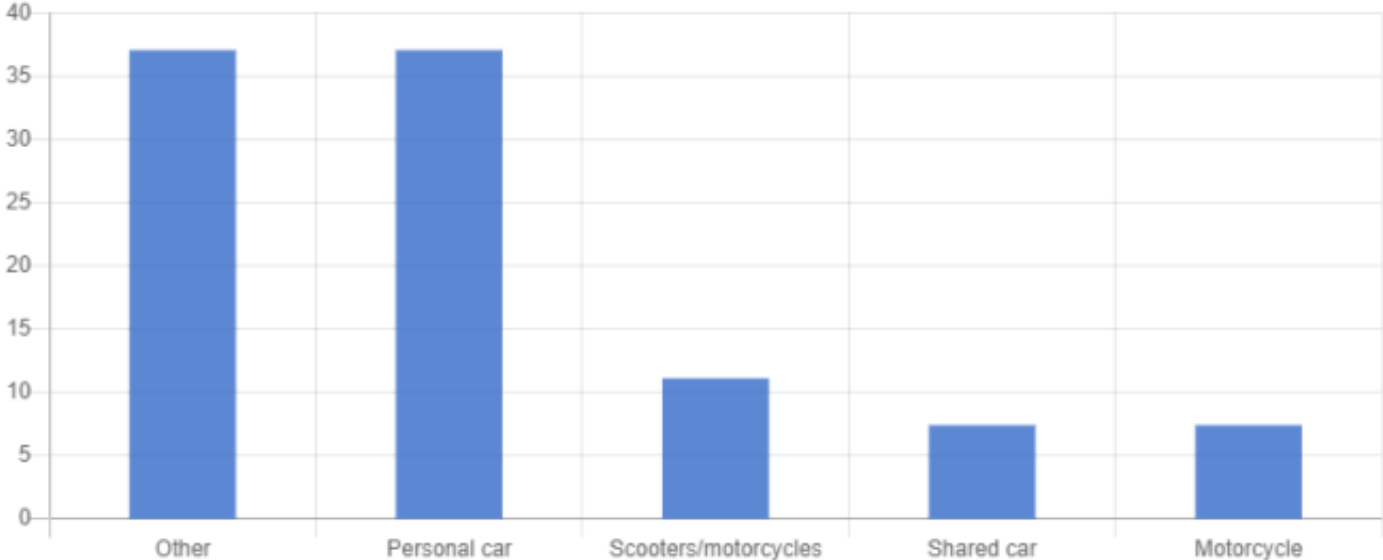
TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Narrow road defined by property lines (fences or buildings) with no clear division between car lanes and sidewalks; undefined parking; pedestrians often have to make room for cars.	13	48.15
Narrow roads margined by small sidewalks; sporadic parking on car lanes; little to no green spaces.	7	25.93
2-lane road margined by sidewalks; defined parking spaces; defined sidewalks.	7	25.93

The main mean of transportation in your city is:

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Other	10	37.04
Personal car	10	37.04
Scooters/motorcycles	3	11.11
Shared car	2	7.41
Motorcycle	2	7.41

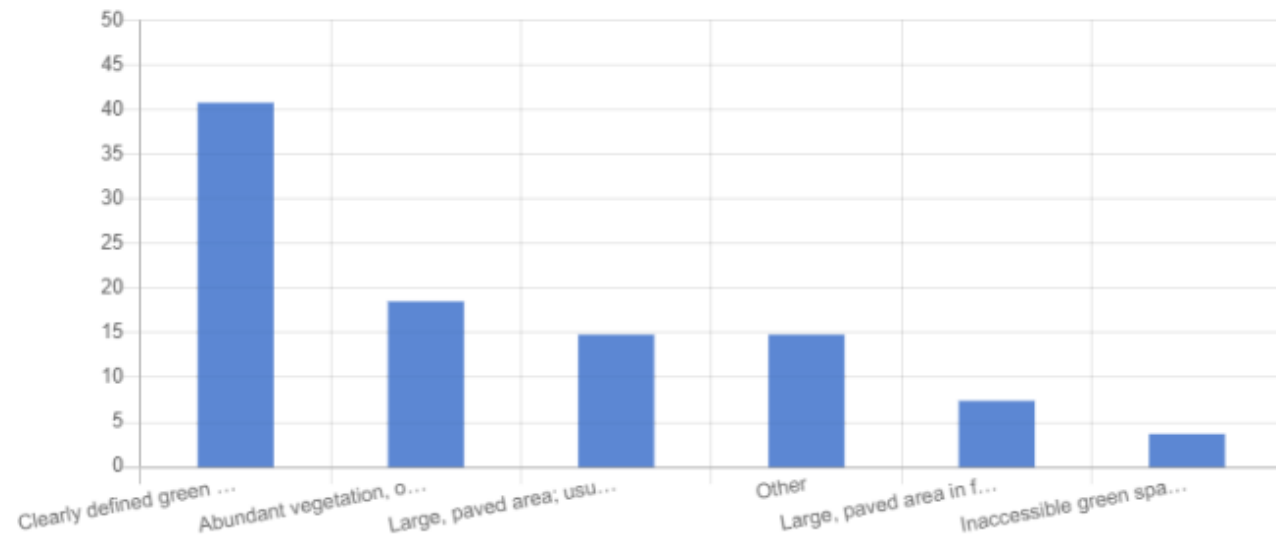
If other, please describe in your own words.

TYPE: "TEXT". 10 out of 27 respondents answered this question. (17 were without data.)

Value	Frequency	Percentage
tricycle	2	7.41
Jitney	1	3.7
personal cars, taxis, jeepneys	1	3.7
Public Utility Vehicles- Jeepney or Taxi cab	1	3.7
Public Utility Vehicles such as Jeepneys and Taxi	1	3.7
Public Utility Vehicle (Jeepney and taxi)	1	3.7
Tricycle & motorcycle	1	3.7
Public transportation	1	3.7
Jeepney	1	3.7

Which of the following statements best describes major PARKS/OPEN AREAS in your city:

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Clearly defined green spaces and paths; large floral arrangements following geometric patterns; usually located around institutions/ touristic attractions/ temples/ churches.	11	40.74
Abundant vegetation, organic paths, and limited amenities.	5	18.52
Large, paved area; usually located in the city center; limited sitting areas; little to no vegetation.	4	14.81
Other	4	14.81
Large, paved area in front of institutional buildings.	2	7.41
Inaccessible green spaces, usually surrounded by roads (ex: roundabouts).	1	3.7

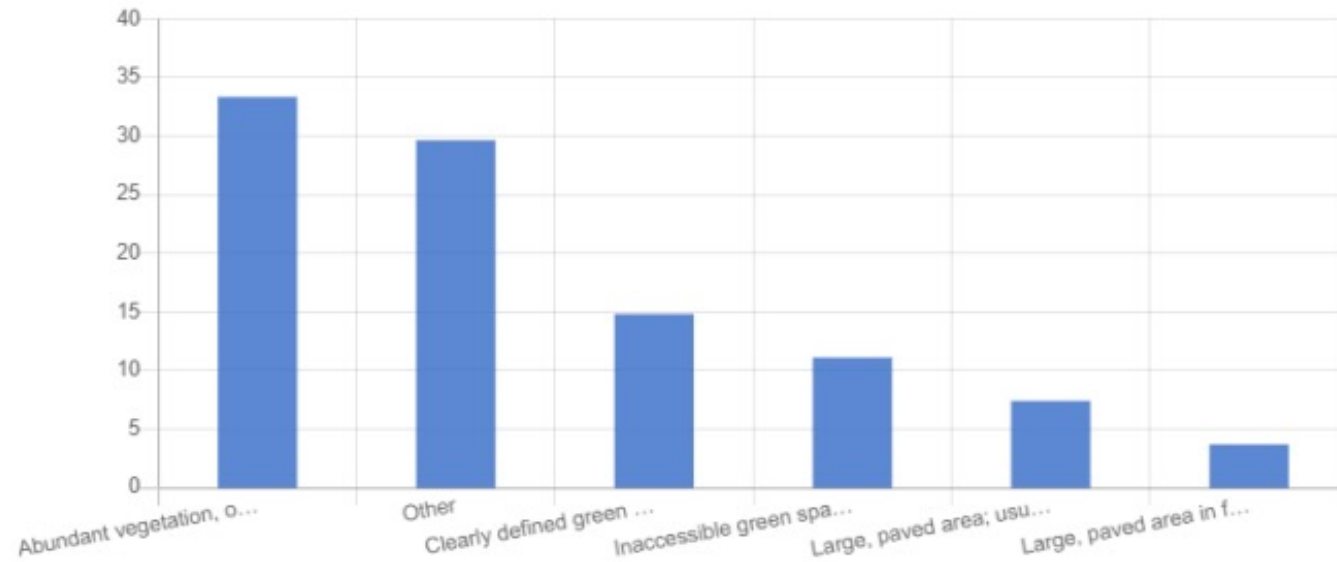
If other, please describe in your own words.

TYPE: "TEXT". 4 out of 27 respondents answered this question. (23 were without data.)

Value	Frequency	Percentage
Medium-sized parks, mostly within residential neighbourhood with a few pocket parks in the city centre	1	3.7
central park at CBD, accessible parks in other parts of the city, limited parking	1	3.7
<i>The park is clearly allocated</i>	1	3.7
not so large areas, mostly paved, one located in the city center, others scattered off the city center, limited sitting areas, with some ornamental and flowering vegetation with a few trees, with buildings across.	1	3.7

Which of the following statements best describes NEIGHBORHOOD OPEN AREAS/ PARKS in your city:

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Abundant vegetation, organic paths, and limited amenities.	9	33.33
Other	8	29.63
Clearly defined green spaces and paths; large floral arrangements following geometric patterns; usually located around institutions/ touristic attractions/ temples/ churches.	4	14.81
Inaccessible green spaces, usually surrounded by roads (ex: roundabouts).	3	11.11
Large, paved area; usually located in the city center; limited sitting areas; little to no vegetation.	2	7.41
Large, paved area in front of institutional buildings.	1	3.7

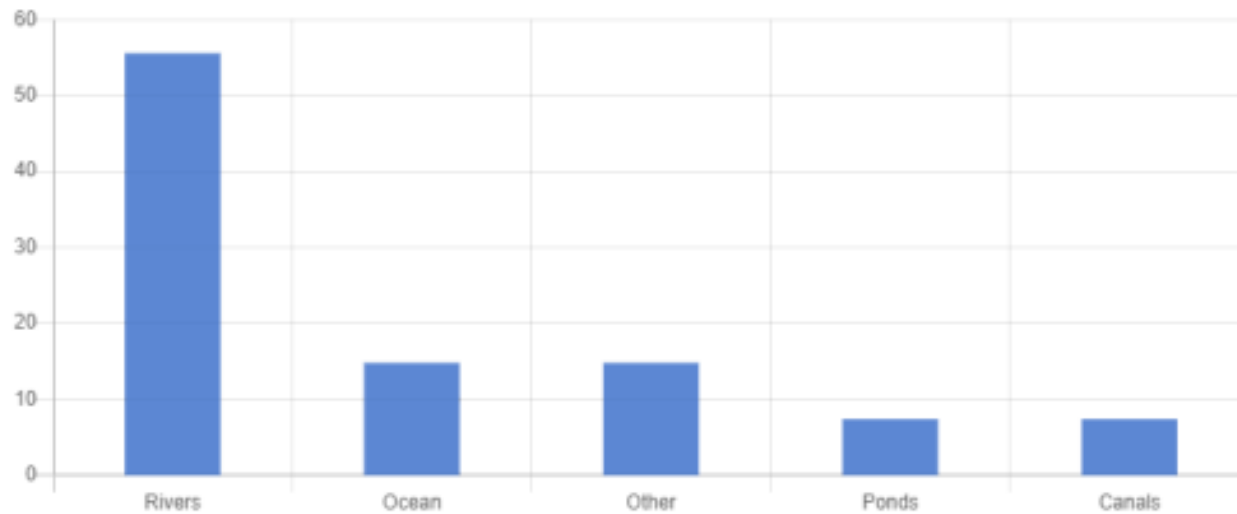
If other, please describe in your own words.

TYPE: "TEXT". 8 out of 27 respondents answered this question. (19 were without data.)

Value	Frequency	Percentage
In neighborhood or community areas, there are limited or minimal green areas except for those outskirts communities.	1	3.7
Small to medium-sized with some play equipments and seating and a few large trees.	1	3.7
limited neighborhood parks in the city, limited parking	1	3.7
<i>The park is clearly allocated</i>	1	3.7
<i>Based on the urban area of Prabang capital, is there any green space (garden) within the city?</i>	1	3.7
<i>A park that still needs to be touched so that it can become an elderly-friendly, disability-friendly and child-friendly place</i>	1	3.7
not so large areas, some paved, limited sitting areas, with some ornamental and flowering vegetation with a few trees	1	3.7
<i>Limited public facilities or unused private land</i>	1	3.7

Which of the following WATER BODIES are present in your city:

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Rivers	15	55.56
Ocean	4	14.81
Other	4	14.81
Ponds	2	7.41
Canals	2	7.41

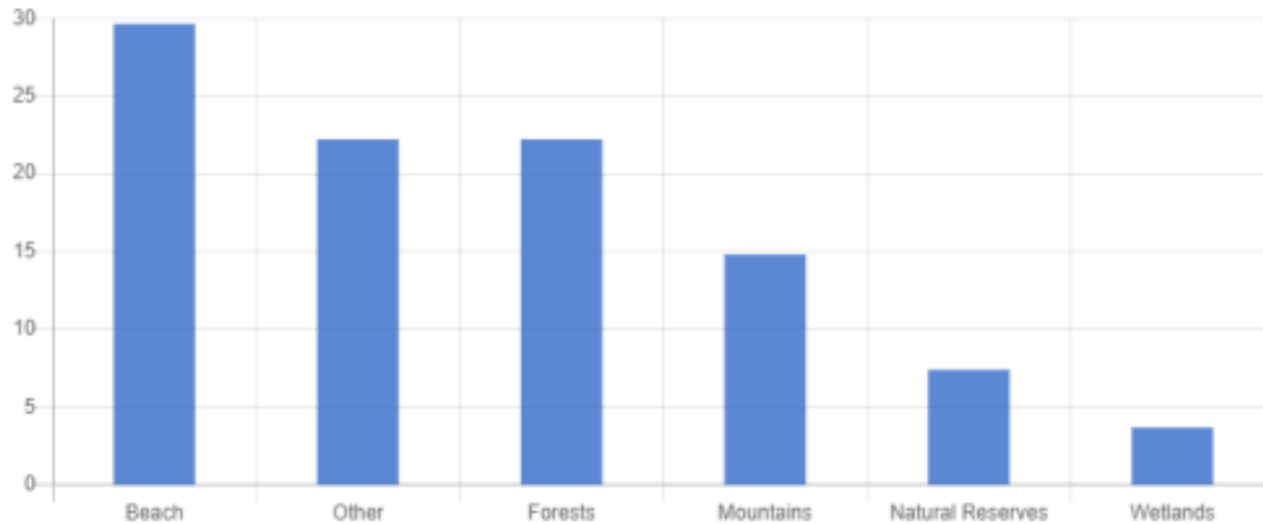
If other, please describe in your own words.

TYPE: "TEXT". 4 out of 27 respondents answered this question. (23 were without data.)

Value	Frequency	Percentage
seas	2	7.41
rivers, canals, creeks	1	3.7
sea	1	3.7

Which of the following NATURAL AREAS are present in/around your city:

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Beach	8	29.63
Other	6	22.22
Forests	6	22.22
Mountains	4	14.81
Natural Reserves	2	7.41
Wetlands	1	3.7

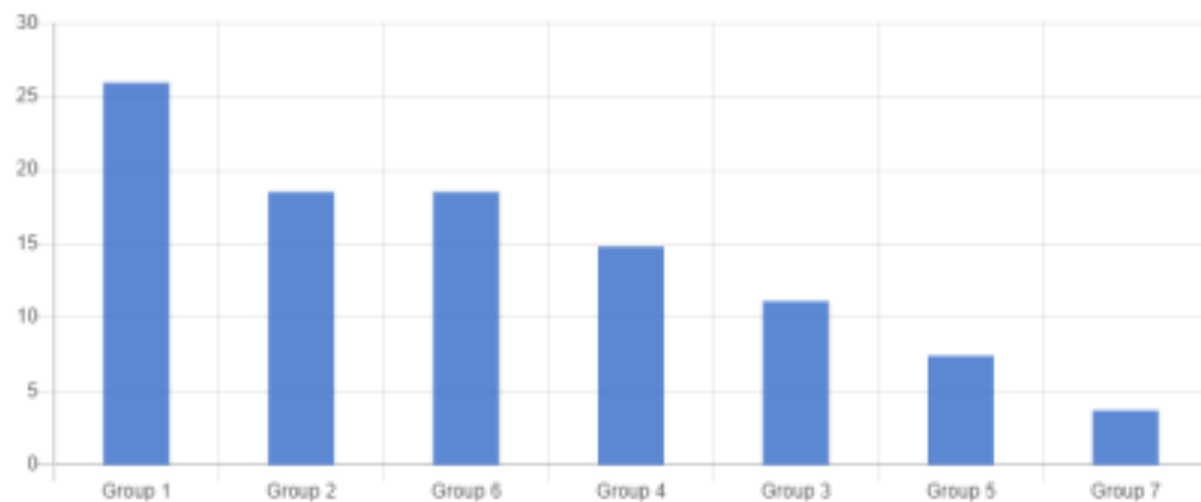
If other, please describe in your own words.

TYPE: "TEXT". 6 out of 27 respondents answered this question. (21 were without data.)

Value	Frequency	Percentage
watersheds	2	7.41
forest, watershed, mountains	1	3.7
<i>Provincial Forest Reserve: Dong Natat Forest Reserve</i>	1	3.7
beach, forests, mangroves, mountain, etc	1	3.7
beach, forest, mangroves, mountains, natural reserves	1	3.7

Which group have you been assigned to?

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Group 1	7	25.93
Group 2	5	18.52
Group 6	5	18.52
Group 4	4	14.81
Group 3	3	11.11
Group 5	2	7.41
Group 7	1	3.7

Please either briefly describe below your understanding of Nature-based Solutions, or provide any specific references that demonstrate your previous work related to the above:

TYPE: "TEXT". 20 out of 27 respondents answered this question. (7 were without data.)

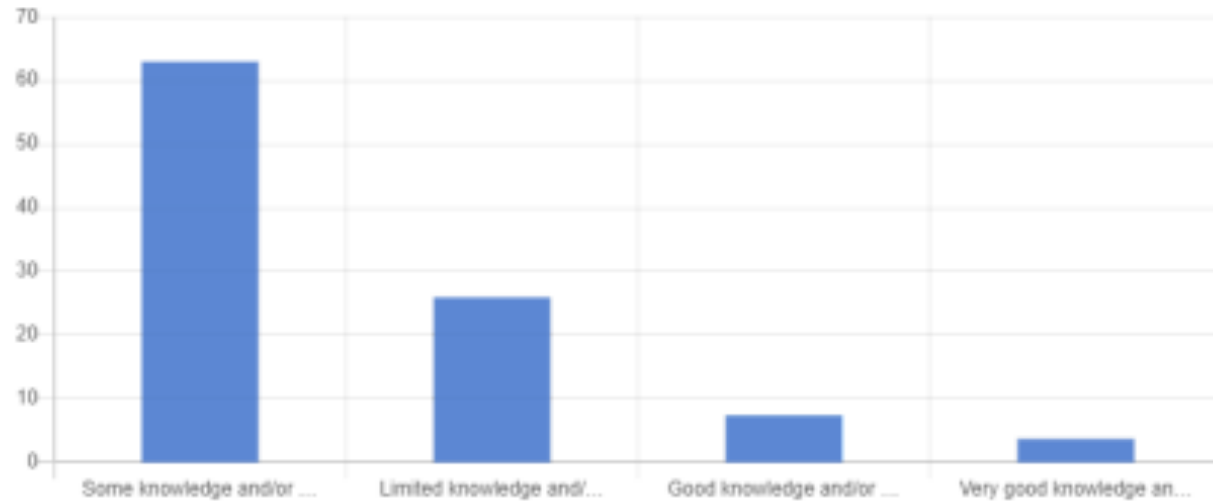
Value	Frequency	Percentage
I am currently employed with the Local Government of Baguio and I'm currently holding the position of DRRM Officer III. My job is specifically focused on disaster risk reduction and Management which includes climate change adaptation. As such we engage on DRRM and CCA activities which focuses on the four thematic areas of disaster management (prevention/mitigation; preparedness; response; rehabilitation/recovery).	1	3.7
Nature-based solution is the integration of grey infrastructure and nature to reduce the disaster in an area, ie: flood, urban heat island (UHI) effect. For example, in order to reduce UHI effect in an urban setting, a street trees and rooftop garden can be introduced. Trees undergoes evapotranspiration process that able to reduce surrounding air temperature.	1	3.7
My knowledge and understanding of Nature-based Solutions is primarily on its relevance for climate adaptation and resilience. My current work revolves around the management of a Nature-based Climate Adaptation programme in Penang which consists of urban greening, stormwater management and social resilience components.	1	3.7
<i>The environment has facilitated and encouraged the work to have a sustainable development until now</i>	1	3.7
<i>If there is pollution, the work must be carried out according to the expectations of the plan</i>	1	3.7
Nature-based Solutions are actions to address societal challenges through the protection, sustainable management and restoration of ecosystems, benefitting both biodiversity and human well-being. NbS, if planned in a holistic manner, could complement existing hard/grey infrastructure and gradually increasing the overall capacity of the system, and its efficiency on risk reduction.	1	3.7

<i>Natural treatment is a chain-linking approach to the environment, such as planting trees that can trap pollutants. Wastewater treatment in constructed wetlands and in many communities prefer to use wetlands use DEWATS treatment: as a combination of physical-biological treatment, making it comfortable and cost-saving. But it is necessary to take into account the parameter that comes back with the waste water to have the ability to treat it properly. In addition, there are many other ways to say more Later</i>	1	3.7
<i>Solving problems based on nature is also an appropriate way and uses low capital and has little impact on the environment</i>	1	3.7
<i>Due to the changes in the ground and the correct solution, such as treating the sewage before releasing it into the natural river, checking the emissions from the vehicles.</i>	1	3.7
Many of risks and opportunities that the City is experiencing can be addressed using nature-based solutions. Efforts to develop or restore urban nature are already having a positive impact on the environment and improving people's quality of life. Baguio has implemented a 15-minute city strategy based on blue and green infrastructure to help with this.	1	3.7
I am currently engaged with Disaster Risk Reduction and Management /Climate Change Adaptation, as such I have been working with projects involving the protection of human lives, its well being and the protection/preservation of natural environment that benefit both the human and the eco-system for greater disaster-resiliency and sustainable development.	1	3.7
<i>Nature-based solutions can make a difference everywhere, by leveraging nature to adapt to climate impacts, coastal wetlands can protect people from storm surges and sea level rise. Well-managed forests can protect water supplies, reduce the risk of fire, and prevent landslides. Urban green spaces can reduce heat stress and reduce flooding. For example, the restoration of mangrove forests – which increases climate resilience and protects against coastal flooding – is an example of a nature-based solution that provides multiple economic and climate benefits.</i>	1	3.7

Nature-Based Solutions is mainstreaming nature into decision-making for sustainable development. These are projects, programs, or activities supporting collective efforts that improve human well-being and at the same protect and preserve the environment in order to lessen the adverse impacts of negative events such as disasters. Ideally for disaster management and climate change adaptation, the results are food security, improved disaster risk reduction, and management, support for vital ecosystem services, biodiversity, improved water and air quality conditions, and improved quality of life.	1	3.7
In my perspective, this means solving problems that are environmentally-friendly, one that does not have an adverse effect to the environment.	1	3.7
<i>Makassar is one of the cities located on the coast or water front city, so it is necessary to maintain mangrove forests as a solution to the dangers of sea water intrusion.</i>	1	3.7
Nature-based Solutions use or mimic nature to solve various urban challenges. These solutions are often cost-effective and have economic, social, and/or environmental co-benefits.	1	3.7
NbS are systems that mimic natural processes (e.g. using microorganisms/flora in treating sewage)	1	3.7
<i>Nature-based solutions are efforts to control climate change by restoring or improving land, for example by planting trees so that there is an increase in CO2 absorption</i>	1	3.7
Nature-based solutions refer to understanding a problem or issue and determining a solution that is beneficial not only to the people but also to the environment.	1	3.7
Nature-based solutions are finding solutions that is environmentally-friendly.	1	3.7

What is your level of knowledge, understanding and/or working experience in relation to Nature-based Solutions?

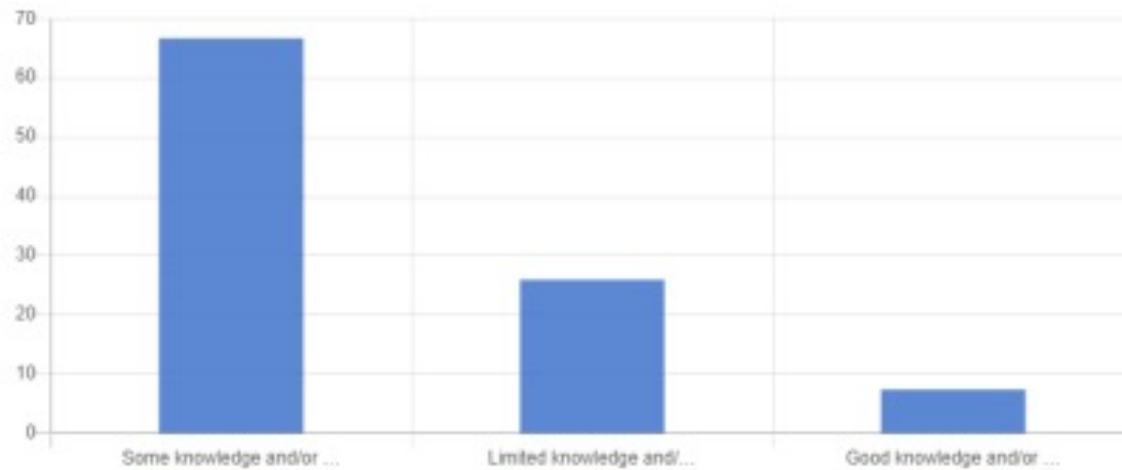
TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Some knowledge and/or working experience	17	62.96
Limited knowledge and/or working experience	7	25.93
Good knowledge and/or working experience	2	7.41
Very good knowledge and/or working experience	1	3.7

What is your level of knowledge, understanding and/or working experience in relation to climate hazards?

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Some knowledge and/or working experience	18	66.67
Limited knowledge and/or working experience	7	25.93
Good knowledge and/or working experience	2	7.41

Please either briefly describe below your understanding of climate hazards, or provide any specific references that demonstrate your previous work related to the above:

TYPE: "TEXT". 27 out of 27 respondents answered this question. (0 were without data.)

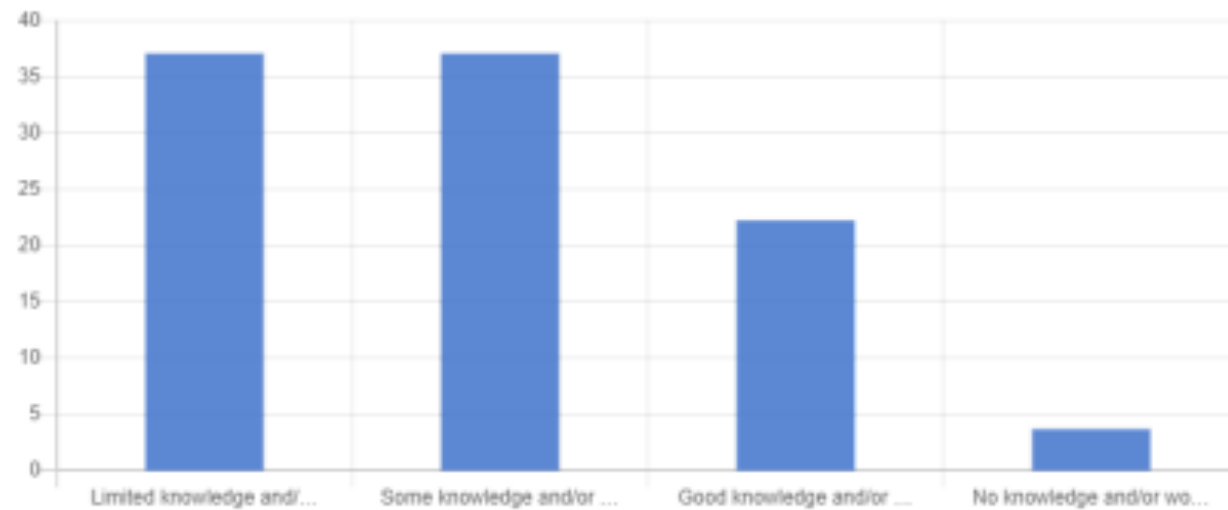
Value	Frequency	Percentage
Due to the geographical location of our country, we are very much prone to typhoons. With climate change, these typhoons are in increasing in intensity thereby affecting a lot of communities or rather our whole city. Especially that we are a mountainous area, there are increased frequencies of rain-induced landslides and flooding.	1	3.7
Currently, I have involved in the conceptual development of the Penang Nature-based Climate Adaptation Programme (PNBCAP), the main issue that we would like to cater for this programme are urban heat island effect (UHI) and flooding specifically at George Town and Bayan Lepas, Penang area. The flash flood mainly happened at George Town are happened due to the issues from the drainage system that is worsen might be due to the rise of sea level. The extreme heat at George Town and Bayan Lepas happen due to increase of hard surfaces and lack of green area.	1	3.7
My understanding on climate hazards is limited to knowledge acquired via research/secondary data and global climate assessments/datasets particularly on extreme heat, flooding and sea-level rise.	1	3.7
<i>Climate change conditions, the weather is hotter than usual in the past, living in poverty because the production does not meet the needs</i>	1	3.7
Our city has prepared the Climate and Disaster Risk Assessment (CDRA) and part of the workshops was on discussion on climate change and hazards.	1	3.7
<i>Doing the work is more difficult if the weather conditions are hotter than before, such as having to use more energy</i>	1	3.7
An event which can be harmful to human and can destroy natural resources.	1	3.7

Climate hazards are natural events in weather cycles. But with climate change, the frequency and intensity of climate hazards could be increased and cause harm to human health, livelihoods, infrastructure, property and etc.	1	3.7
<i>Heavy rain caused fire and flood</i>	1	3.7
<i>The danger from climate change is causing both direct and indirect effects on the economy, society and the environment; Caused by human activities that emit greenhouse gases mainly: industry, energy, agriculture, land use and forest change; The important thing is that there is a small amount but it is caused by the way of managing the environment of the city: landfill, incinerator and waste water treatment (wastewater treatment) cause methane gas from anaerobic digestion.</i>	1	3.7
<i>Currently, we see that the weather conditions are changing and have an overall effect on humans and nature</i>	1	3.7
<i>If climate change causes emissions to rivers, warming from greenhouses and river erosion</i>	1	3.7
Climate change is already having a negative influence on people's lives and livelihoods in Baguio. According to the Climate Risk Assessment Study conducted by the WWF-Philippines and the Bank of the Philippine Islands Foundation Inc. in 2011, Baguio City is the most vulnerable to the effects of climate change, with rains being its primary adversary.	1	3.7
Climate hazards are hydrometeorological, geological or even phenomena that affects the community in terms of human, socio, economic, and the environmental aspect	1	3.7
<i>Climate change and hazards, especially floods (rob) in the city of Semarang are very important to be considered and handled because they threaten the sustainability of the city of Semarang from both the community's livelihood and related infrastructure. As a Community Engagement Specialist in the Semarang Livable City Study Project, I feel that the city of Semarang has the potential for extreme climate hazards, especially with the threat of climate change. the danger of tidal flooding that always hits the northern part of the city of Semarang where this greatly affects the livability criteria of the city of Semarang so that it can become a resilient city against disasters.</i>	1	3.7

Climate hazards are climate-related events that may cause damage and loss to humans, socio, economic, and the environment.	1	3.7
<i>climate change threatens natural conditions and water around us, especially tidal floods and land subsidence</i>	1	3.7
These are hazards brought about by the changing climate. I have experience working with these terms through the application of Climate Typology Codes in the annual investment program of the LGU.	1	3.7
A physical process and disaster that can cause damage and loss to livelihood and environment, such as flooding, heat waves, and drought. Related work - on-going proposal: Sponge Cities as A Strategic Approach to Flooding	1	3.7
none	1	3.7
<i>Geographically, the city of Makassar is lowland and the contours are flat, so if extreme weather occurs, it will be vulnerable to flooding</i>	1	3.7
Climate hazards are physical processes or events (hydro-meteorological or oceanographic variables or phenomena) that can harm human health, livelihoods, or natural resources.	1	3.7
Natural hazards associated with extreme events	1	3.7
Climate hazards are climate-induced situations that may bring harms to structures, humans, flora and fauna, the environment.	1	3.7
<i>Climate hazards are impacts of climate change that result in changes in the habitats of humans and other living things. Climate hazards caused by climate change include rising water levels seas, floods, extreme weather, landslides, droughts, mass extinctions and crop failures</i>	1	3.7
As MPDC, I work and coordinate with multi-sectoral agencies in our municipality.	1	3.7
I work with multi-sectoral agencies in our municipality.	1	3.7

What is your level of knowledge, understanding and/or working experience in relation to risk and vulnerability assessments?

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Limited knowledge and/or working experience	10	37.04
Some knowledge and/or working experience	10	37.04
Good knowledge and/or working experience	6	22.22
No knowledge and/or working experience	1	3.7

Please either briefly describe below your understanding of risk and vulnerability assessments, or provide any specific references that demonstrate your previous work related to the above:

TYPE: "TEXT". 22 out of 27 respondents answered this question. (5 were without data.)

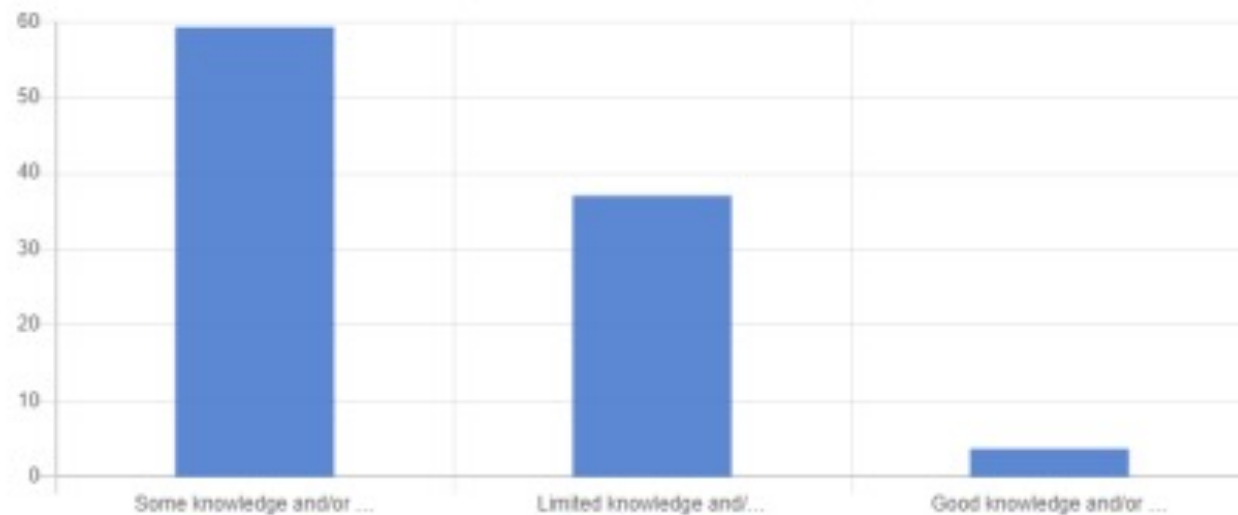
Value	Frequency	Percentage
In essence, risk assessment involves looking outside of an organization to determine what threats exist that could potentially lead to problems, while vulnerability assessment involves looking inside the organization for structural flaws and weaknesses.	2	7.41
Risk is very difficult to identify without identifying first the hazard or the threat in the community. Secondly, there should be a baseline data of communities so as to identify also the elements at risk (people; property; environment).	1	3.7
As part of a team developing climate adaptation proposals, I do have some understanding of climate risk assessment in terms of its approach (hazard impact, social and institutional assessment) and multilayered process from collating baseline data to mapping risks.	1	3.7
<i>The implementation of the work required to plan for climate change is only planned for the specific work in education</i>	1	3.7
Our city has prepared the Climate and Disaster Risk Assessment (CDRA) which shall serve as an input in our land use plan updating.	1	3.7
<i>If the use of energy increases more, the expenditure will increase accordingly</i>	1	3.7
Defining or determining possible things that can cause problem or negative effect to a subject	1	3.7
Risk and vulnerability assessments are usually the initial step in the adaptation planning process. The assessment forms understanding on climate change threats to an area, and helped to assess the adaptation measures to improve climate resilience.	1	3.7
<i>Some cities are located close to the water level, causing the water to flood quickly when it rains</i>	1	3.7

<i>Assessing risk and vulnerability is a very important task for: management, planning, services and other facilities.</i>	1	3.7
<i>Non-standard drainage systems lead to natural disasters (floods).</i>	1	3.7
Risk and Vulnerability assessments are vital in identifying gaps and issues, and in the development of a masterplan for urban nature, or integration of nature-based solutions into the city's existing masterplan	1	3.7
As a research and planning staff of CDRMO, We conduct risk and vulnerability assessment to evaluate the impact of hazards to the community	1	3.7
<i>To build resilience to climate change is to conduct a climate risk and vulnerability assessment (CRVA) as the basis for developing the necessary solutions through a series of plans, programs and policies. With nature-based solutions, we can actualize nature's potential to advance climate adaptation and protect the groups most vulnerable to the impacts of climate change.</i>	1	3.7
Is the identification of risks and evaluation of vulnerability that aid decision-makers to prevent or mitigate, preparing, responding to, and recovering from the adverse impact of hazards.	1	3.7
Risk vulnerability assessment, in my opinion means evaluating the risks that may occur or the level of risk a certain aspect is vulnerable to.	1	3.7
Related work / on-going proposal: Penang Nature-based Climate Adaptation Programme and Sponge Cities as A Strategic Approach to Flooding	1	3.7
<i>Makassar is one of the cities located on the coast or water front city, so that one of the threats is rising sea levels, sea water intrusion and tidal flooding.</i>	1	3.7
Climate risk and vulnerability assessments aim to quantify and consequently, reduce risks resulting from climate change to projects. They also aim to identify adaptation options that can be integrated into a project's design.	1	3.7

Risk assessments are the estimations/probabilities of entities (people/places/infrastructures/environment, etc.) to be recipients of a damage to be caused by a hazard; Vulnerability assessments illustrate the current status of the entities inclining them to be affected by hazards	1	3.7
<i>Assessment of ecosystem hazard and vulnerability risk due to climate change</i>	1	3.7

What is your level of knowledge, understanding and/or working experience in relation to flood risk in cities?

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Some knowledge and/or working experience	16	59.26
Limited knowledge and/or working experience	10	37.04
Good knowledge and/or working experience	1	3.7

Please either briefly describe below your understanding of flood risk, or provide any specific references that demonstrate your previous work related to the above:

TYPE: "TEXT". 20 out of 27 respondents answered this question. (7 were without data.)

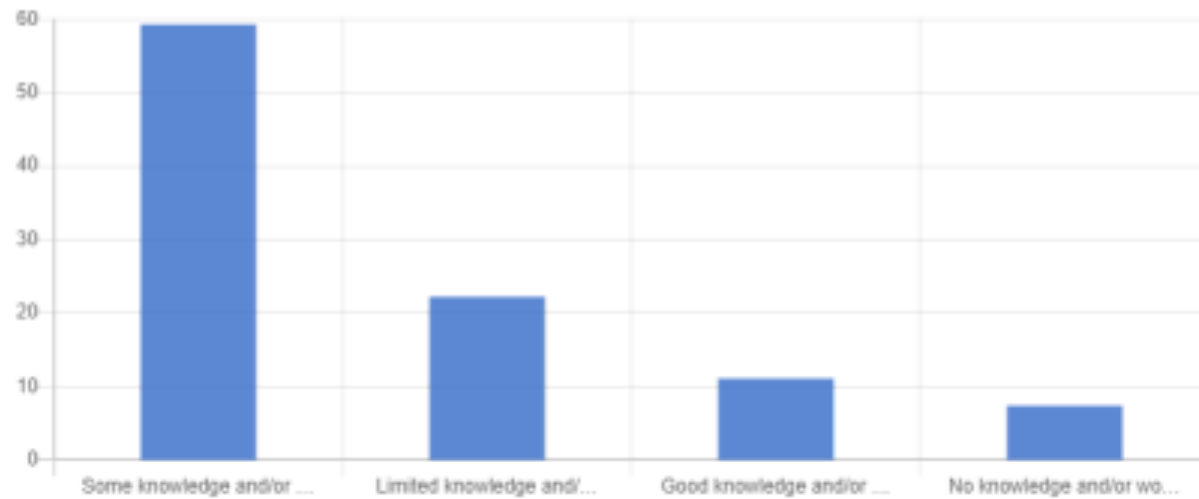
Value	Frequency	Percentage
Flood risk is the product of the vulnerability to flooding multiplied by the total value of the assets at risk to flooding.	2	7.41
I'm a bit familiar with flooding, for it has been a common hazard here in our city. Especially during the monsoon season here in the Philippines wherein we constantly monitor the flood areas for the provision of early warning and pre-emptive evacuation as the situation dictates.	1	3.7
Based on my understanding, there are a few type of flood such as monsoon flood, and flash flood. The monsoon flood usually experience by east Malaysian state and usually impacted cities that is close to the shoreline. The flash flood usually happened at highly dense city area. The flood only occur several hour due to high intensity of rain and inefficient drainage system.	1	3.7
I have limited technical/scientific knowledge on flood risk and would like to better understand flood risks due to irregular rainfall, tidal factors, sea level rise and elevation. I would also like to understand flood risk map ie ARI maps better.	1	3.7
<i>The implementation of the work has not gone deep into the flood as an important lion, but most of the work is deep into the work of education and sports</i>	1	3.7
My attendance to ADB-sponsored webinars had provided me a working knowledge on flood risk.	1	3.7
<i>Flood prevention is limited and only face to face, there is no support plan for many years</i>	1	3.7
Determining ways on how to prevent and avoid floods.	1	3.7

The risks of flooding include injuries, drowning, being stranded, power outage, water pollution, stress/anxiety, infectious diseases etc.	1	3.7
<i>The capital city of Prabang is located on the banks of the Nam Khan River, which causes the risk of flooding because there are many power stations built on the upper part of the two rivers.</i>	1	3.7
Flood risk is one of the studies that the City must assess, since there are still areas in the City that are identified as flood prone areas	1	3.7
Flood risk involves flood hazards and the vulnerable	1	3.7
<i>Floods that often hit the city of Semarang in particular are tidal floods in the North Semarang area which are mostly caused by rising sea levels and the impact is quite significant where many infrastructures are damaged and disrupted economic activities and people's livelihoods.</i>	1	3.7
Flood risk is the identification of areas that is prone to flooding and often cause damage or loss.	1	3.7
Flood risk in my opinion means, the level of risks a certain area is vulnerable to flood. Example of this is the community residing nearby a quarry site.	1	3.7
Related work / on-going proposal: Penang Nature-based Climate Adaptation Programme and Sponge Cities as A Strategic Approach to Flooding	1	3.7
<i>Land use, lowlands, relatively flat contours, and coastal areas that are very vulnerable to flood hazards, both caused by extreme climates and due to rising sea levels due to high tides that can cause tidal flooding</i>	1	3.7

Flood risk is higher in urban areas than in rural areas because they have a high proportion of tarmac and paved surfaces. These limit water infiltration and increase surface water runoff.	1	3.7
<i>The risk of flooding in urban areas is increasing due to climate change which causes sea level to rise. The risk of flooding in urban areas is exacerbated by increased land use change and poor drainage management</i>	1	3.7

What is your level of knowledge, understanding and/or working experience in relation to climate adaptation in cities?

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Some knowledge and/or working experience	16	59.26
Limited knowledge and/or working experience	6	22.22
Good knowledge and/or working experience	3	11.11
No knowledge and/or working experience	2	7.41

Please either briefly describe below your understanding of climate adaptation, or provide any specific references that demonstrate your previous work related to the above:

TYPE: "TEXT". 27 out of 27 respondents answered this question. (0 were without data.)

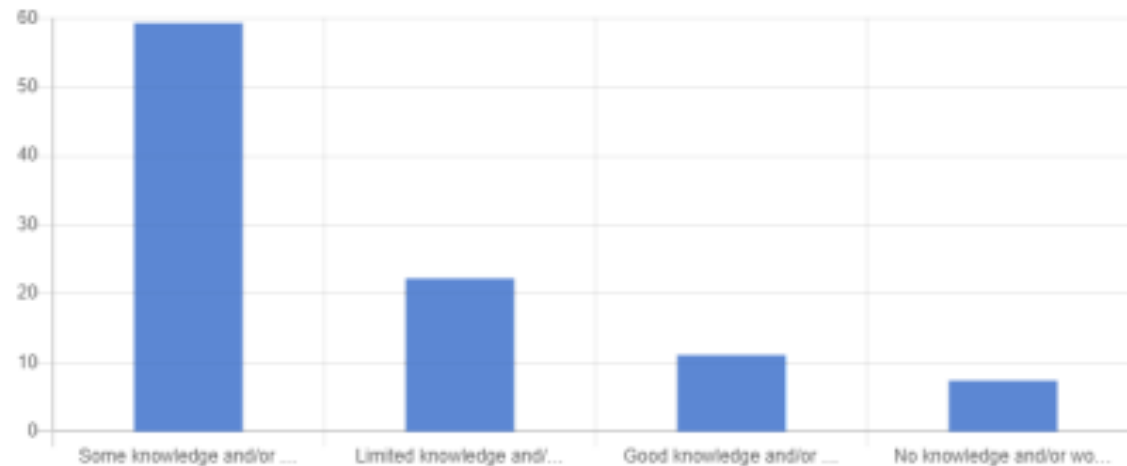
Value	Frequency	Percentage
In my understanding climate adaptation is the ability adjust to the current situation. Since we are expecting stronger typhoons in the coming days and years	1	3.7
Climate adaptation means the action to prepare, adjust and adapt to the current/ future disaster risk that is related to climate change. Currently, I have involved in the conceptual development of the Penang Nature-based Climate Adaptation Programme (PNBCAP). The main issue that we would like to cater for this programme are urban heat island effect (UHI) and flooding specifically at George Town and Bayan Lepas, Penang area. For the flash flood mainly happened at George Town, climate adaption approaches that we've planned includes bioswale and infiltration well. Besides that, for the extreme heat at George Town and Bayan Lepas, climate adaptation approaches that we've planned includes street trees, rooftop garden and urban farming.	1	3.7
I understand climate adaptation to be actions to reduce climate risks by increasing social, infrastructural and environmental resilience against climate change. My current work revolves around developing and managing an urban climate adaptation programme.	1	3.7
<i>Adapting to the climate is a human necessity, and everyone must have knowledge and seek</i>	1	3.7
I have attended trainings on climate change adaptation and mitigation strategies.	1	3.7
<i>Dealing with the weather must be planned in advance in order to carry out the work with high success</i>	1	3.7
None	1	3.7

Climate adaptation is about adapting to life in a changing climate which involves adjusting to actual or expected future climate. The goal is to reduce our risks from the harmful effects of climate change.	1	3.7
<i>No knowledge of adaptation to the climate</i>	1	3.7
<i>From this challenge, we need to change our lifestyle, taking into account the residual and long-term environmental effects.</i>	1	3.7
<i>Adapting to climate change in various cities? It is very challenging to develop the urban infrastructure in general, especially in the capital city of Prabang.</i>	1	3.7
<i>Because of the preservation of natural systems such as green areas and forest areas</i>	1	3.7
All Projects, Programs and Activities of the city are identified whether it contributes to Climate adaptation or mitigation.	1	3.7
these are actions or activities that results to the reduction of impacts due to climate change.	1	3.7
<i>Global climate change has affected the phenomenon of poverty and has become a challenge for society. The impact, among others, causes the extinction of various types of biological and ecosystem damage. Damage to ecosystems caused by climate change will cause huge losses to the community. Therefore, climate change adaptation and mitigation strategies are nature-based solutions that seek to reduce vulnerability</i>	1	3.7
While it is evident that we are experiencing a changing climate, efforts through a global response has been vital through adaptation. The community mutually adjusts with the ecosystem in making or limiting the negative effects of climate change and equivalently benefit from it improving quality of life and revitalizing the environment.	1	3.7
<i>Making a giant sea wall is one way to deal with tidal flooding</i>	1	3.7
Climate adaptation is incorporating climate-resilient solutions in our establishments such as vertical gardens in urban areas.	1	3.7

Related work / on-going proposal: Penang Nature-based Climate Adaptation Programme and Sponge Cities as A Strategic Approach to Flooding	1	3.7
Incorporating indoor plants inside a buildings, offices or close facilities & vertical garden at major areas in town & also use of environmental friendly appliances at home, offices & all other establishments	1	3.7
<i>Because Makassar City is a lowland with relatively flat contours so that it is vulnerable to inundation in the event of extreme weather, so that some of the roads in flood-prone areas have their construction changed from asphalt to concrete construction.</i>	1	3.7
Climate change adaptation is the process of adjusting to the current and future effects of climate change. It includes Nature-based Solutions, such as planting trees next to streets, river-catchment management, and sustainable urban-drainage solutions.	1	3.7
Actions or strategies to reduce the negative impact of climate change	1	3.7
Climate adaptation is acclimatizing/getting used to the effects of climate change and acting/building/living with this awareness	1	3.7
<i>Climate adaptation is an action taken to adapt to the risk of harm due to climate change climate change, for example the elevation of building structures to avoid flooding, use of yard land for food crops</i>	1	3.7
Climate change adaptation is the adjustments societies or ecosystems make to limit the negative effects of climate change or to take advantage of opportunities provided by a changing climate	1	3.7
Climate change adaptation is the adjustments societies or ecosystems make to limit the negative effects of climate change or to take advantage of opportunities provided by a changing climate.	1	3.7

What is your level of knowledge, understanding and/or working experience in relation to urban challenges?

TYPE: "SELECT_ONE". 27 out of 27 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
Some knowledge and/or working experience	16	59.26
Limited knowledge and/or working experience	6	22.22
Good knowledge and/or working experience	3	11.11
No knowledge and/or working experience	2	7.41

Please either briefly describe below your understanding of urban challenges in your city, or provide any specific references that demonstrate your previous work related to the above:

TYPE: "TEXT". 22 out of 27 respondents answered this question. (5 were without data.)

Value	Frequency	Percentage
Constant and consistent typhoon warning for weather bureau.	1	3.7
Urban challenges that George Town, Penang faced are mainly flash flood, urban heat island (UHI) effect and congestion in the city. For the city congestion, the public transport in the city are highly reliable on bus/ taxi and grab. Most of the people choose to bring their car to work which usually causing traffic jam during peak hour.	1	3.7
Like many cities in developing countries, Penang faces the challenge of meeting growing demand for infrastructure and resources coupled with an urgent need to address its increasing exposure to water issues, flooding and urban heat island effect.	1	3.7
<i>Rank 1. Cleanliness, Rank 2. Beauty, Rank 3. Peace and safety and Rank 4. Self-strength</i>	1	3.7
I have worked as a consultant on the environmental carrying capacity of Baguio City.	1	3.7
<i>To complete a task must have the best understanding of that task</i>	1	3.7
None	1	3.7
Southeast Asia is one of the three regions in the world which will be hardest hit by climate change. Increasing temperatures will severely impact Penang with more number of days per year with heatwaves. Increasing temperatures means increasing rainfall and flooding. A combination of increased urbanisation, heavy rain and high tide inevitably results in floods as storm waters are unable to discharge into the sea or infiltrate into the ground table. As Penang is highly built-up, there is limited space for expansion of drainage canals to accommodate a deluge of rain.	1	3.7

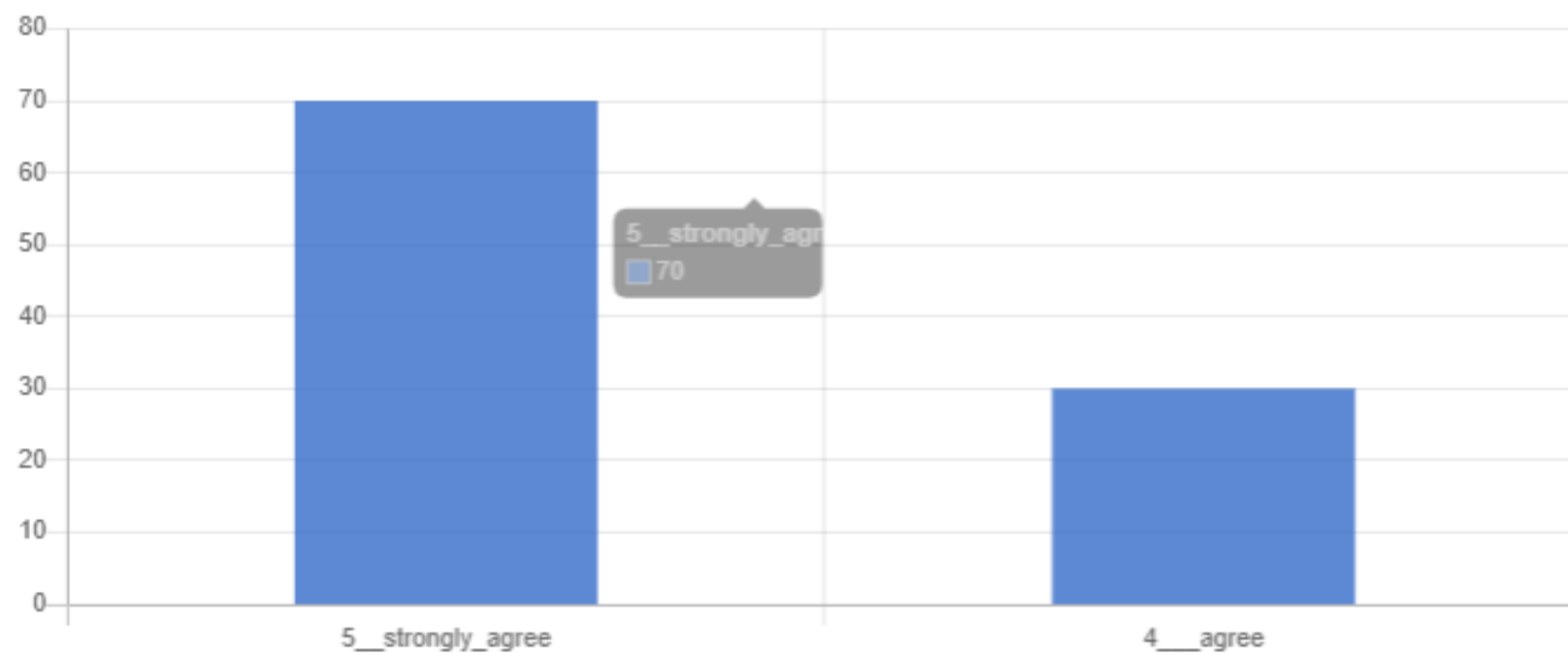
<i>The various challenges of the capital city of Prabang, especially the comprehensive development involving many sectors and in accordance with the economic development plan of the city in the short term and long term.</i>	1	3.7
I work for the City Planning and Development Office part of the TWG for the Updating of the city's Comprehensive Land Use Plan	1	3.7
Urban Challenges involves unsustainable development that result to urban decay, challenges in the urban's carrying capacity in terms of land area for housing, traffic, electricity, water, etc.	1	3.7
<i>A livable city is an urban challenge that must be addressed and addressed to improve the quality of life for both the community, the city government and supporting infrastructure. Access to clean water, health, education, open public spaces, transportation and communication are important aspects of the livability of a city so that the city can grow and sustainably for the prosperity of its people.</i>	1	3.7
Urban challenges include the carrying capacity of urban areas to achieve a livable environment that contributes for a sustainable development. Frequently challenges land use, housing, transportation (mobility), waste management, infrastructure, energy supply, water and air quality, etc, that if neglected could result to urban decay.	1	3.7
Urban challenges is the problems in the urban areas on how they can cope up with the fast-changing environmental problems.	1	3.7
Related work / on-going proposal: Penang Nature-based Climate Adaptation Programme and Sponge Cities as A Strategic Approach to Flooding	1	3.7
Inclusions of carbon footprints in the urban areas due to pollutions	1	3.7

<i>Urban challenges, especially Makassar City, as described earlier, in addition to being located in coastal areas, there is also an increase in congestion, land use and increased air pollution.</i>	1	3.7
Among the 13 states of Malaysia, with 90.8% of urbanization level, Penang is one of the most urbanized states in the country. Therefore, urban challenges in Penang include but are not limited to congestion in the city and lack of space for terrain-based stormwater management.	1	3.7
Issues/problems that a city experience due to urbanization	1	3.7
Most probably due to poor implementation of regulations and/or the lack of a city masterplan, Baguio has been facing multiple challenges. A study on Baguio's urban carrying capacity documents breaches in capacities of utilities, land, transportation pollution and others still. These are urban challenges long existing.	1	3.7
Urban challenges are the dilemmas in the urban areas like for our municipality, drainage is a problem because we do not have sufficient drainage system.	1	3.7
urban challenges means coping up with climate change in the urban areas.	1	3.7

Appendix D – EVALUATION SURVEY

After taking part in the program, I consider that my knowledge of Nature-based Solutions (NbS) has improved

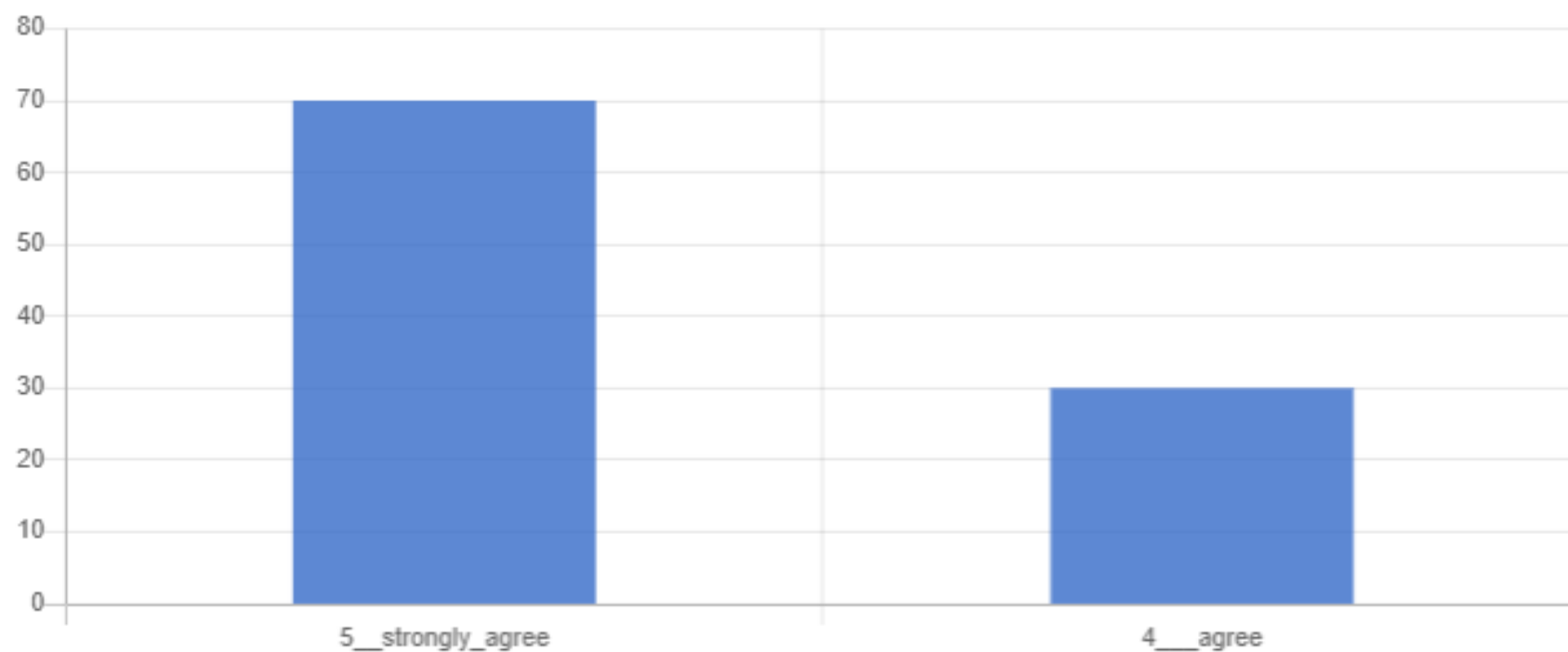
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
5__strongly_agree	7	70
4__agree	3	30

The program was well-structured, and the format was good

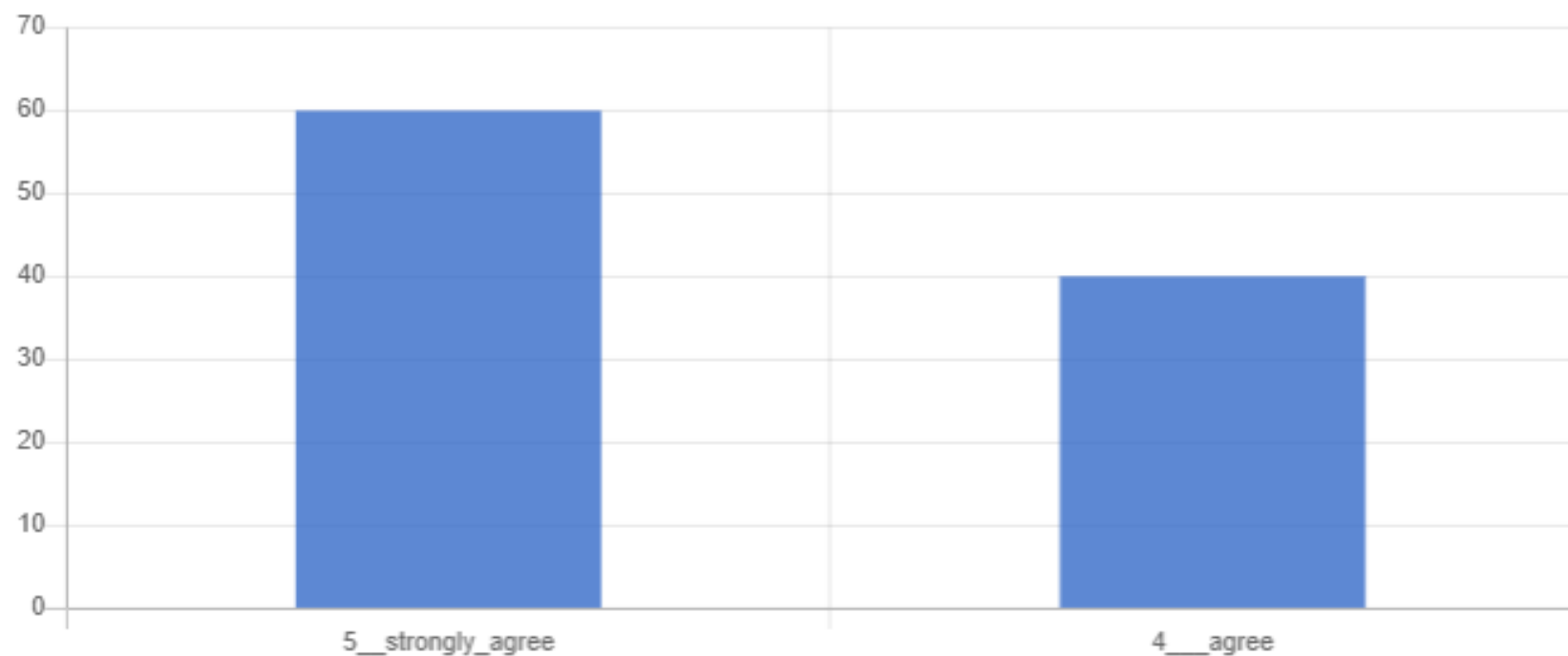
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
5__strongly_agree	7	70
4__agree	3	30

After taking part in the program, my understanding of benefits of NbS has improved

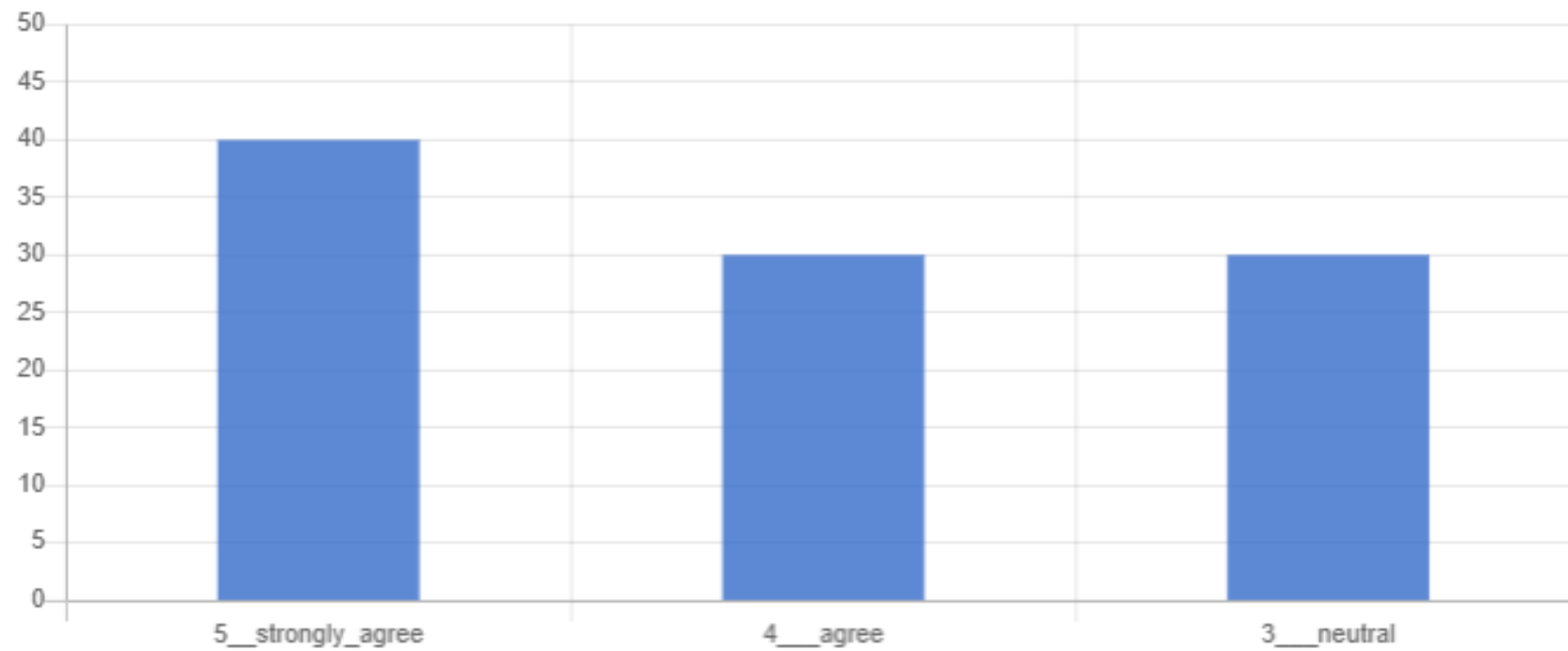
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
5__strongly_agree	6	60
4__agree	4	40

My work and practices will change due to knowledge I gained from this program

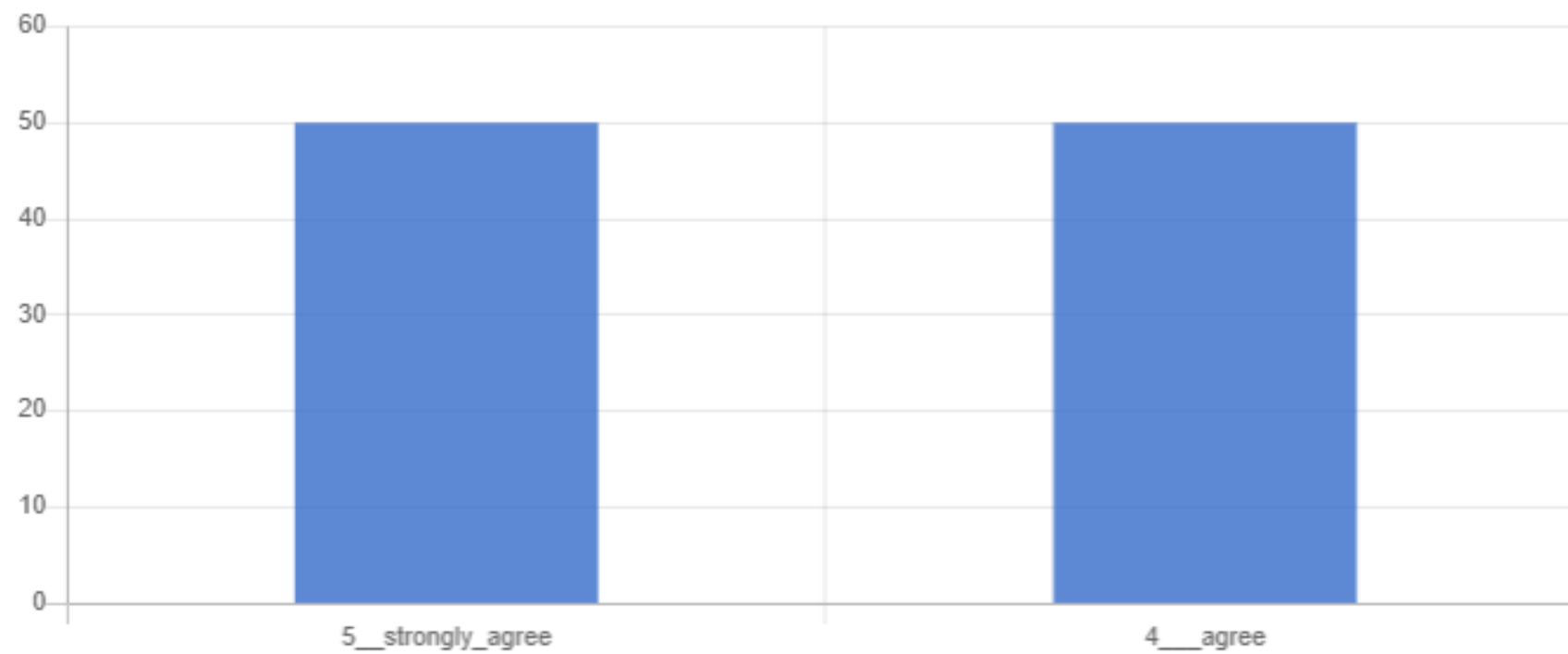
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
5__strongly_agree	4	40
4__agree	3	30
3__neutral	3	30

The information and materials presented during the program were relevant to me

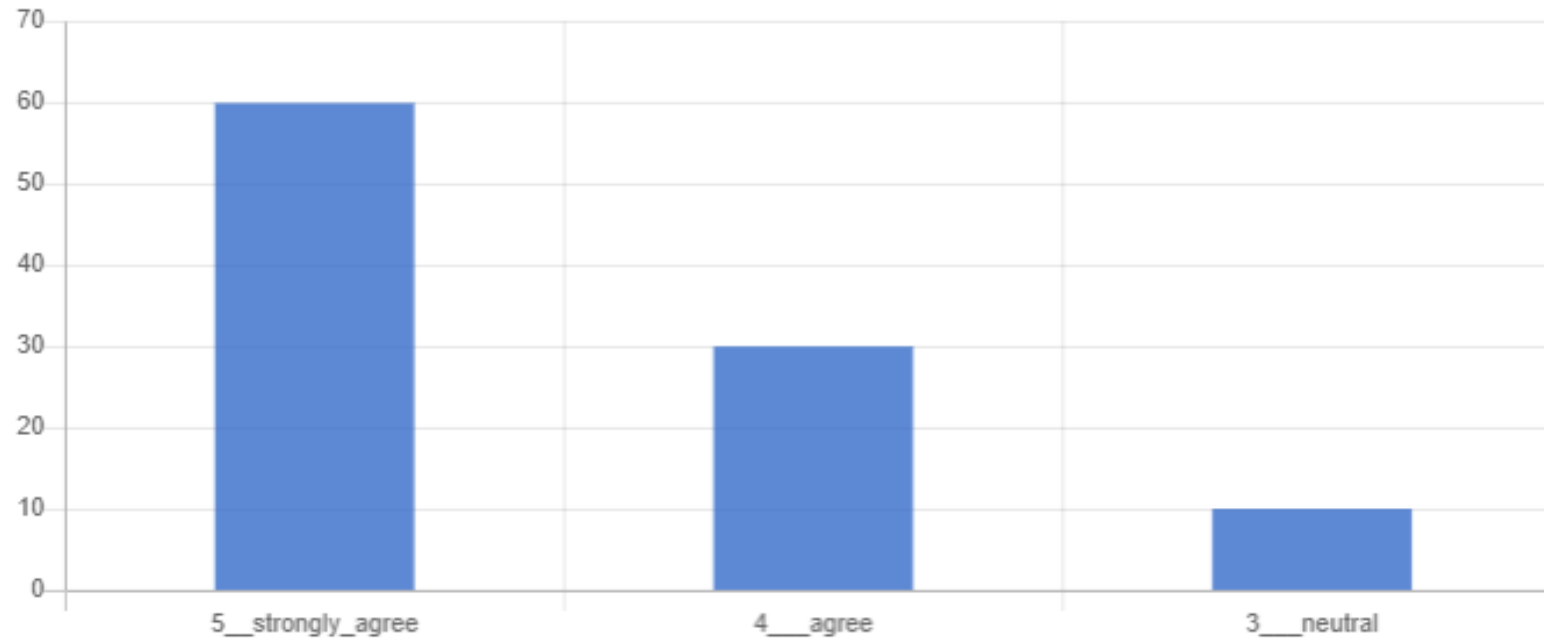
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
5__strongly_agree	5	50
4__agree	5	50

The group exercises were relevant and allowed me to apply knowledge of NbS

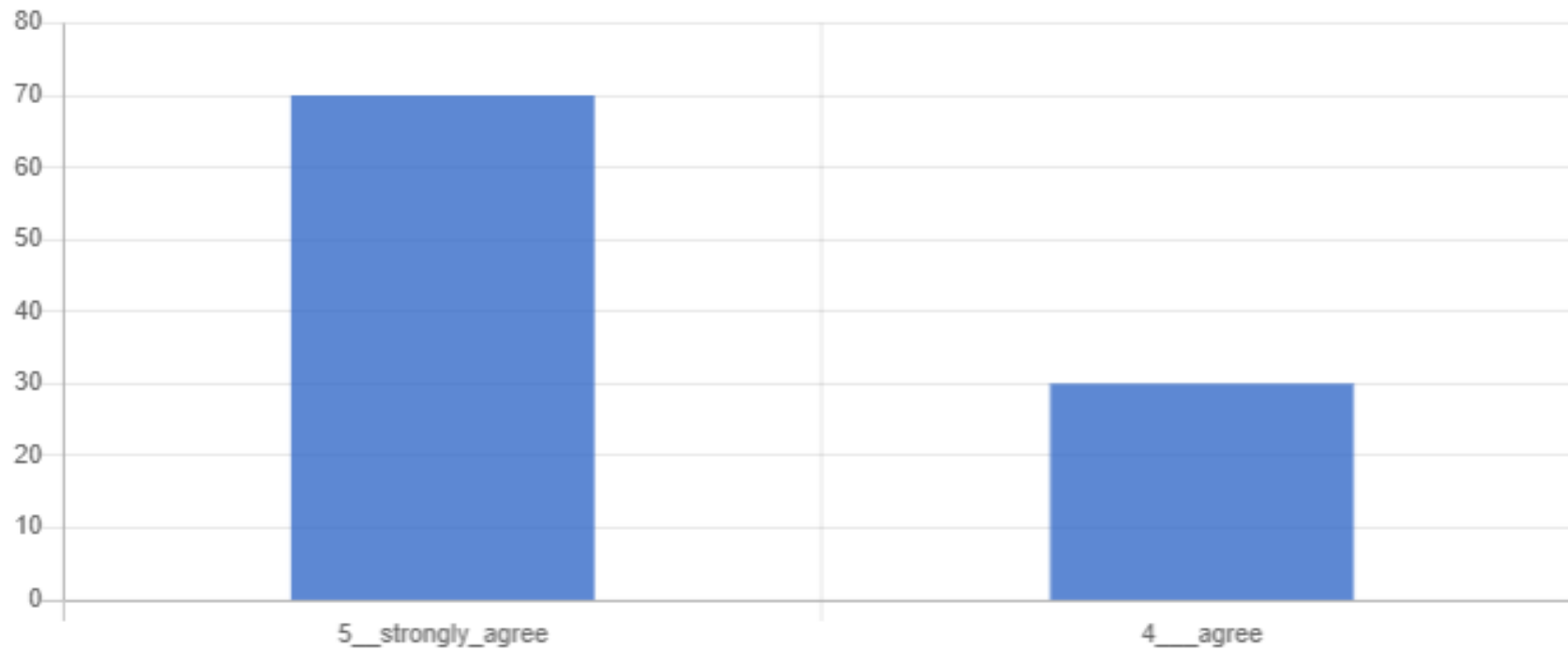
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
5__strongly_agree	6	60
4__agree	3	30
3__neutral	1	10

I enjoyed using Miro for the group exercises

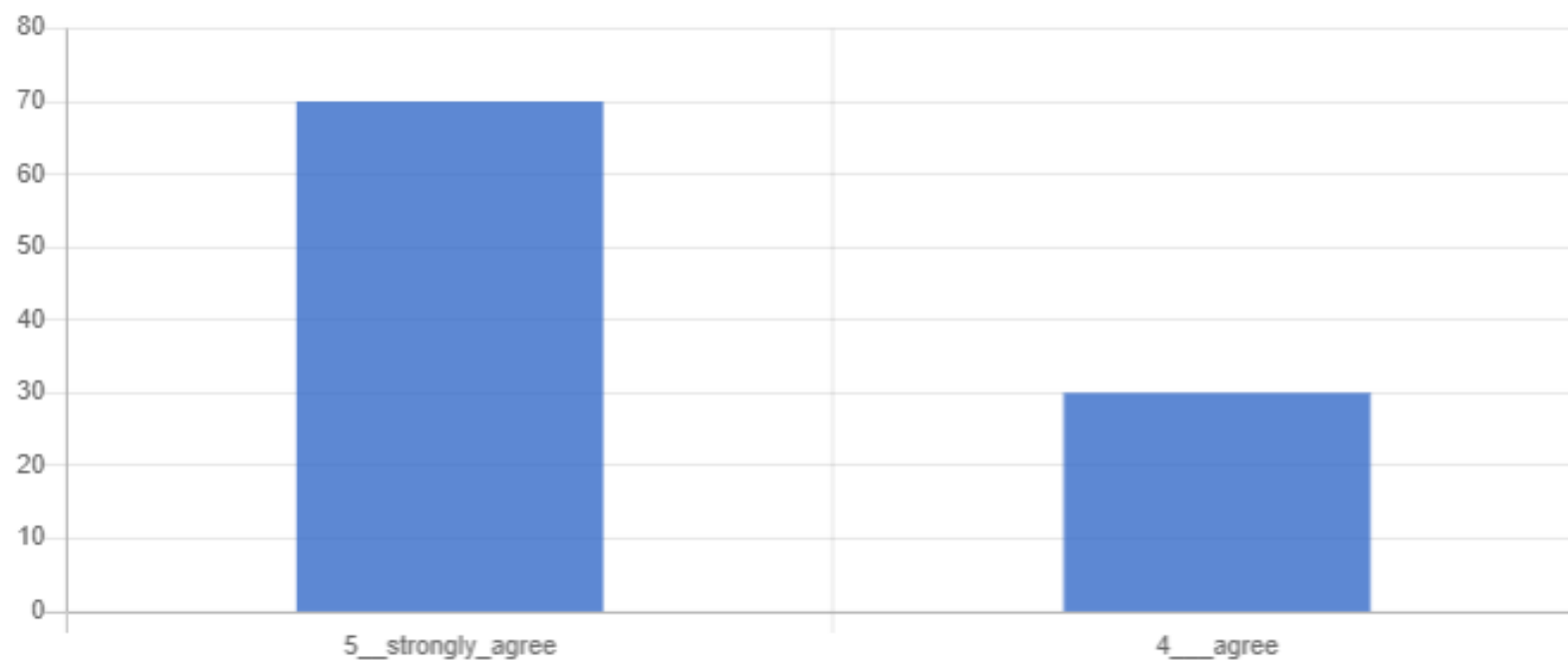
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
5__strongly_agree	7	70
4__agree	3	30

I was satisfied with the level of interactivity and engagement during the program through the use of online interactive tools

TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



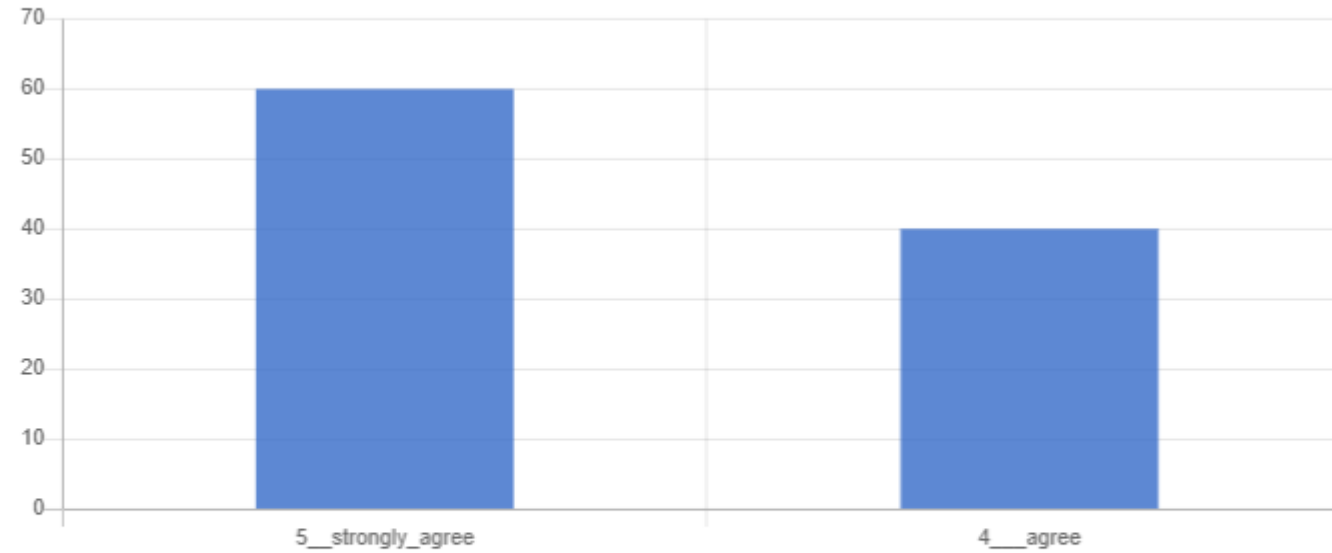
Value	Frequency	Percentage
5__strongly_agree	7	70
4__agree	3	30

I was satisfied with the level of interactivity and engagement during the program through the use of online interactive tools

TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)

The instructors/trainers were well-qualified, and their technical knowledge was adequate

TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)

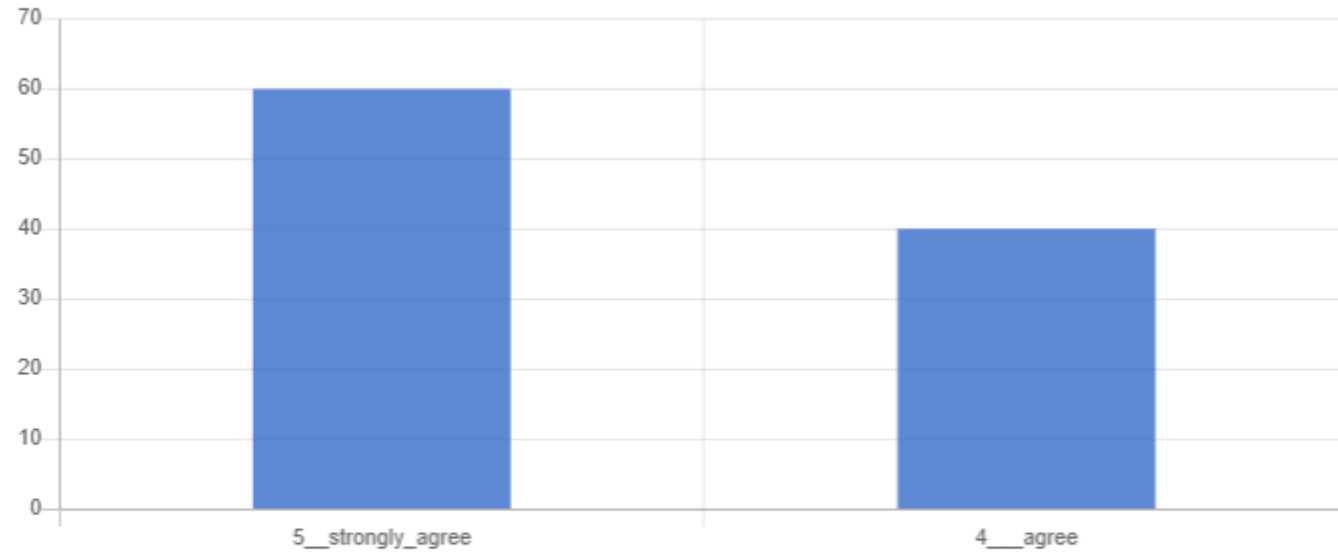


Value	Frequency	Percentage
5__strongly_agree	6	60
4__agree	4	40

I was satisfied with the level of interactivity and engagement during the program through the use of online

The instructors/trainers were well-qualified, and their technical knowledge was adequate

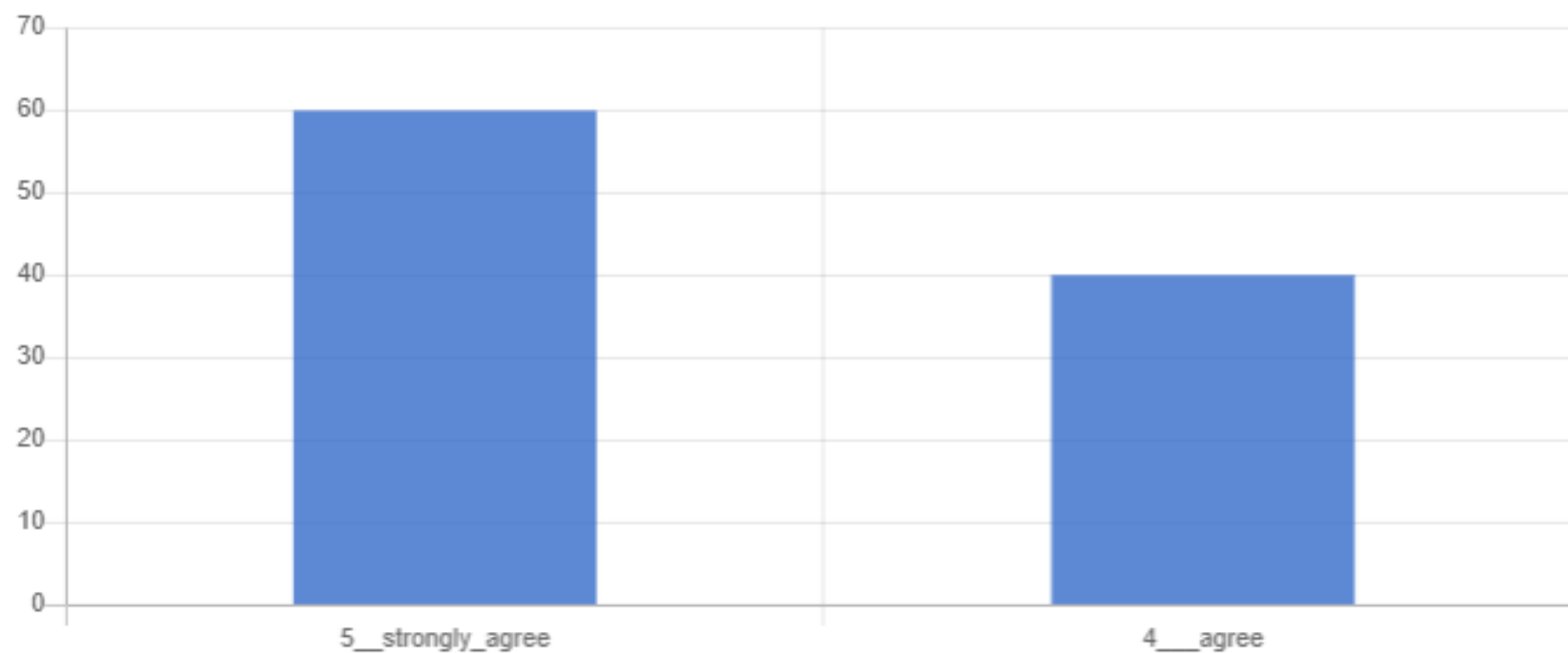
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
5__strongly_agree	6	60
4__agree	4	40

The instructors/trainers were well-qualified, and their technical knowledge was adequate

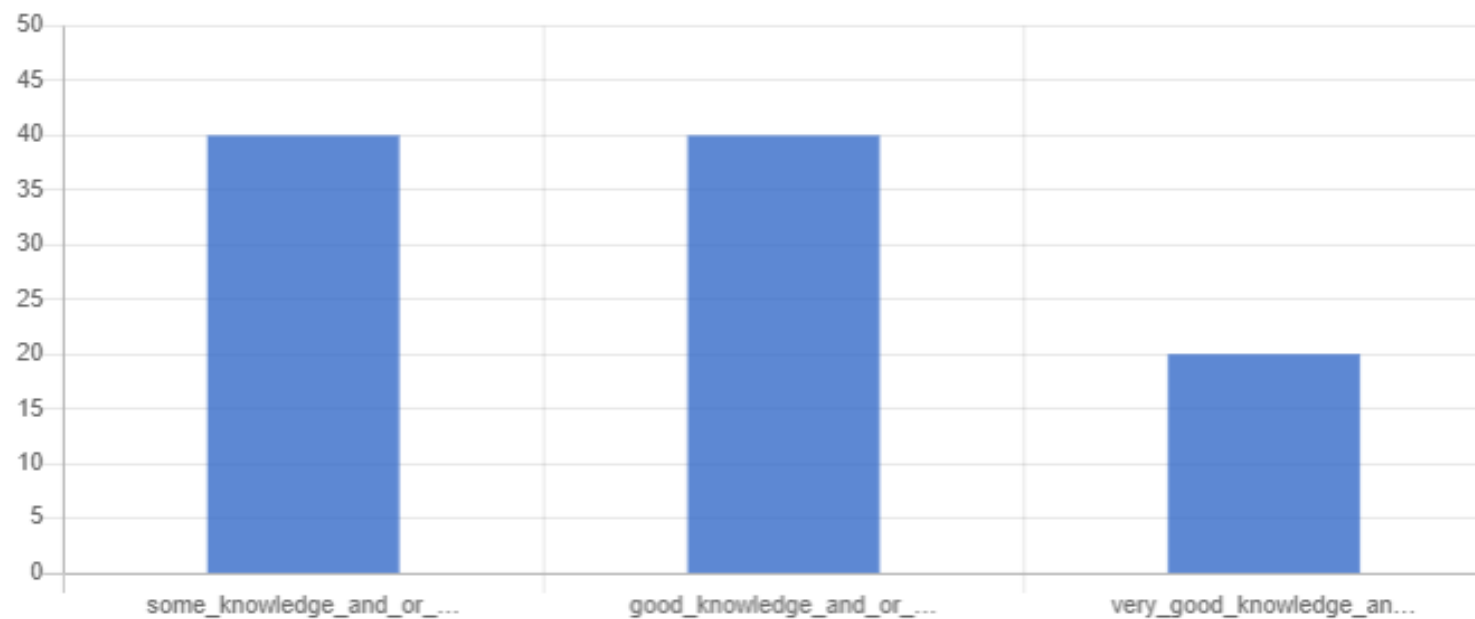
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
5__strongly_agree	6	60
4__agree	4	40

What is your level of knowledge, understanding and/or working experience in relation to urban challenges?

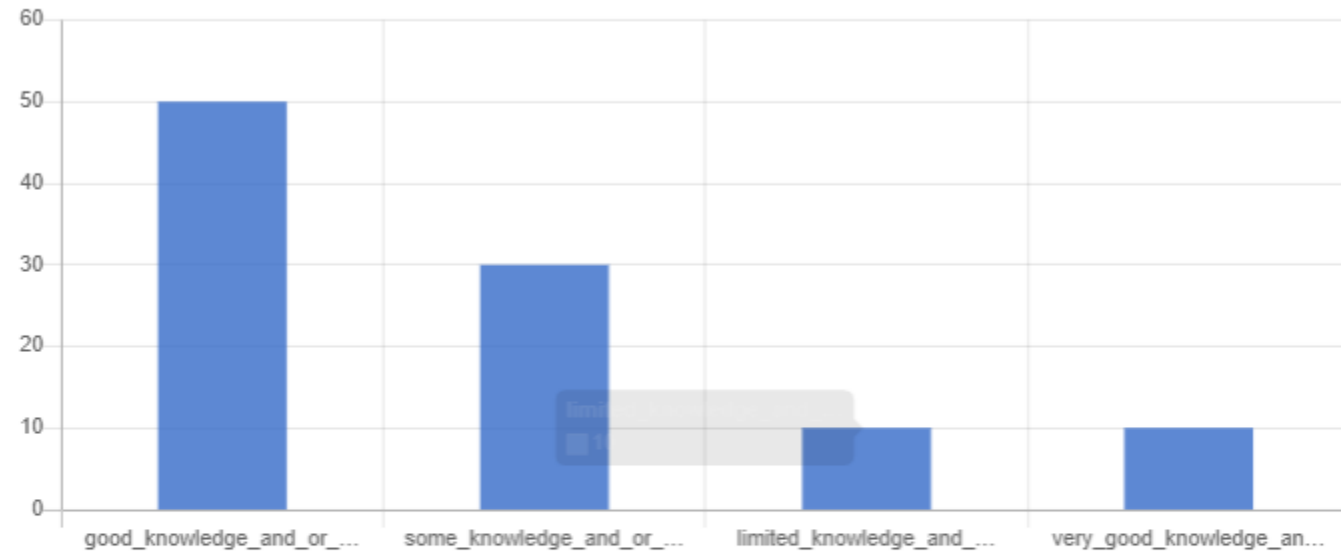
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
some_knowledge_and_or_working_experience	4	40
good_knowledge_and_or_working_experience	4	40
very_good_knowledge_and_or_working_exper	2	20

What is your level of knowledge, understanding and/or working experience in relation to flood risk in cities?

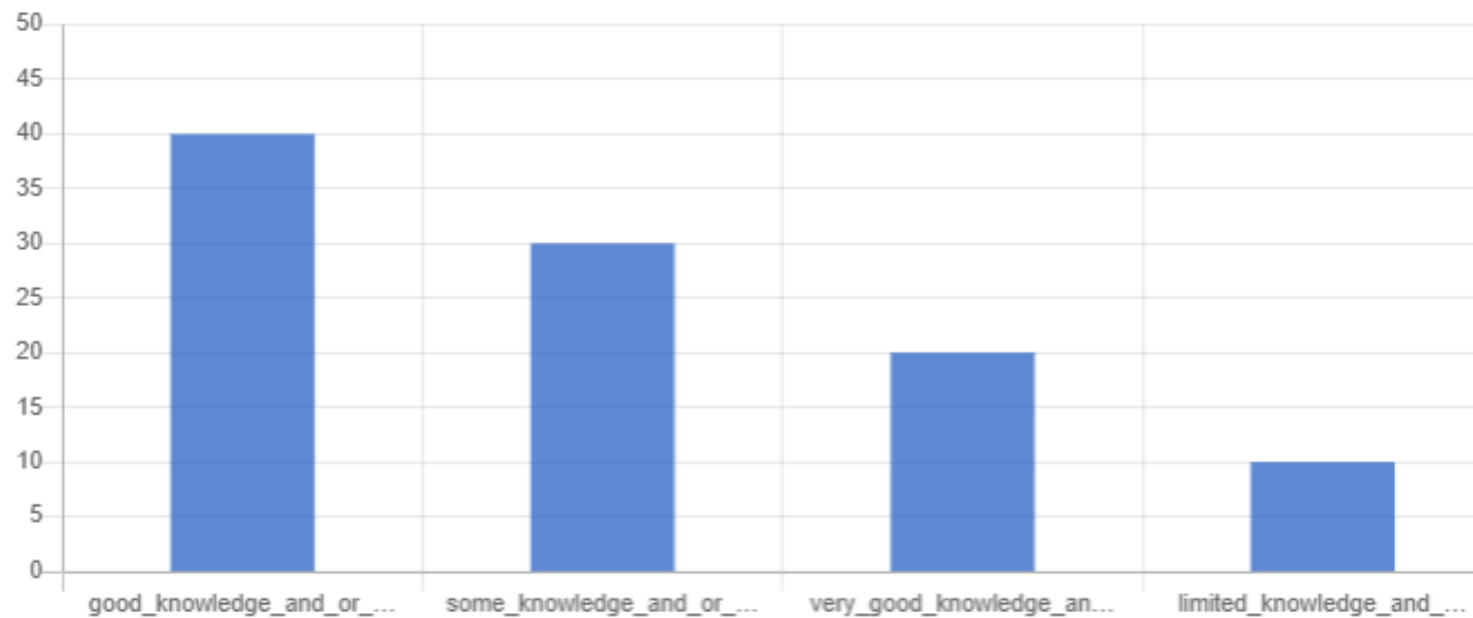
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
good_knowledge_and_or_working_experience	5	50
some_knowledge_and_or_working_experience	3	30
limited_knowledge_and_or_working_experie	1	10
very_good_knowledge_and_or_working_exper	1	10

What is your level of knowledge, understanding and/or working experience in relation to climate hazards?

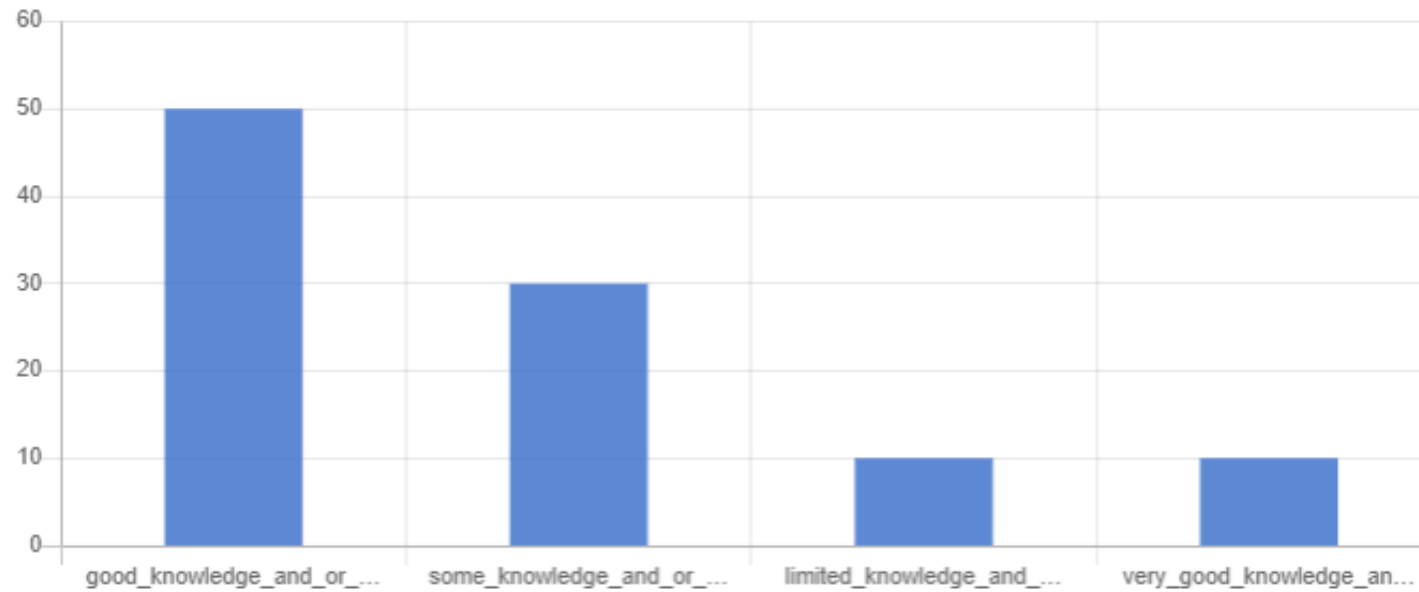
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
good_knowledge_and_or_working_experience	4	40
some_knowledge_and_or_working_experience	3	30
very_good_knowledge_and_or_working_exper	2	20
limited_knowledge_and_or_working_experie	1	10

What is your level of knowledge, understanding and/or working experience in relation to Nature-based Solutions?

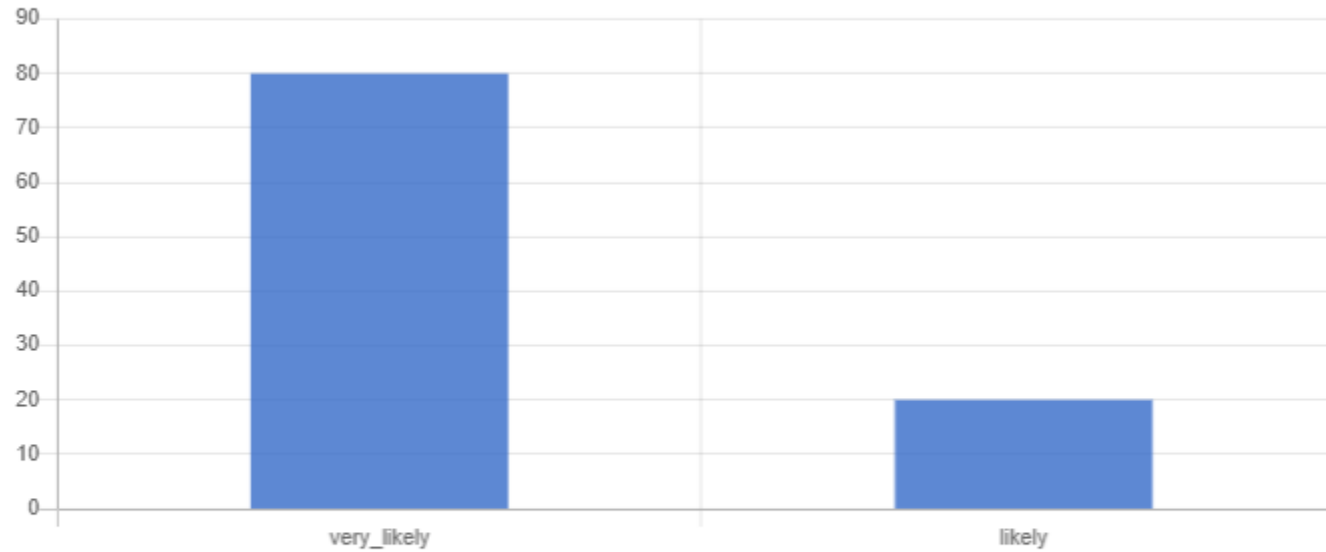
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
good_knowledge_and_or_working_experience	5	50
some_knowledge_and_or_working_experience	3	30
limited_knowledge_and_or_working_experie	1	10
very_good_knowledge_and_or_working_exper	1	10

Based on experience during the workshop, how likely are you to participate or recommend future AASCTF workshops or training events to a colleague/peer?

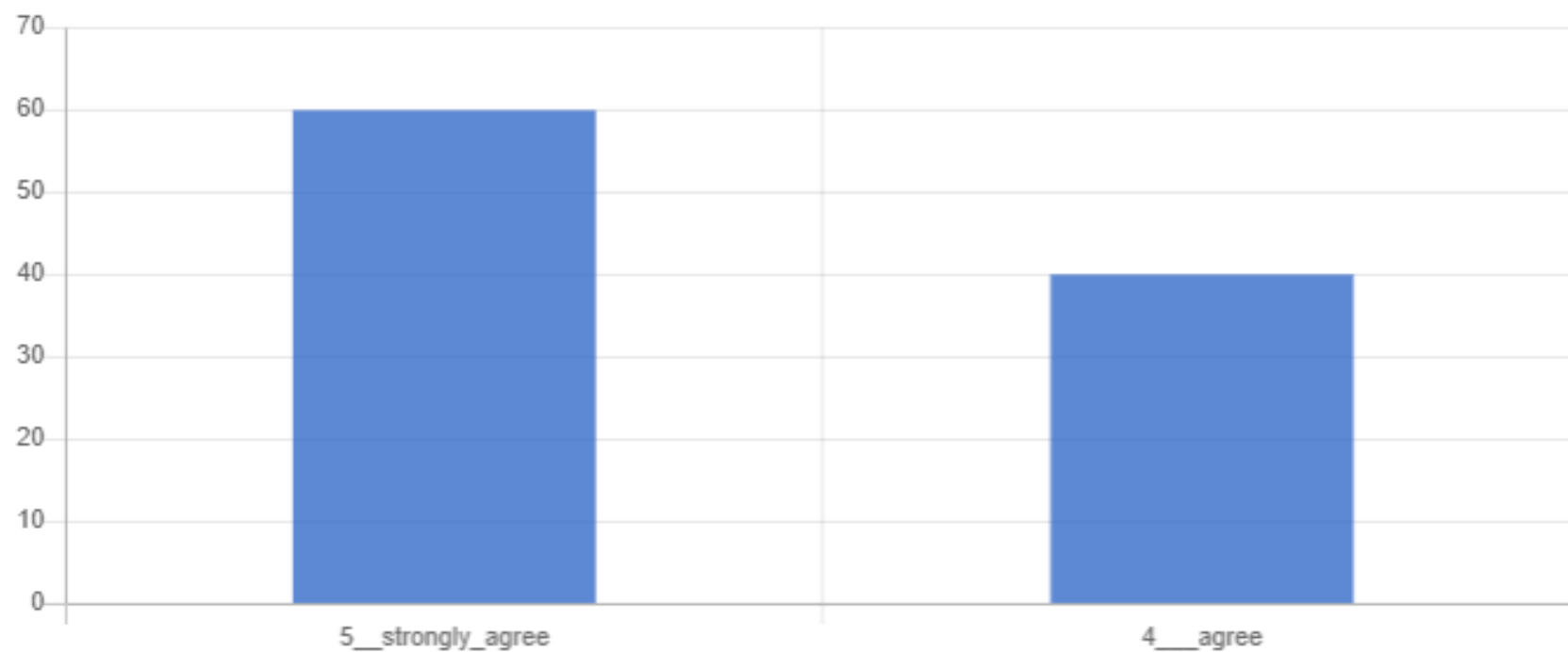
TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
very_likely	8	80
likely	2	20

The program met my needs and expectations

TYPE: "SELECT_ONE". 10 out of 10 respondents answered this question. (0 were without data.)



Value	Frequency	Percentage
5__strongly_agree	6	60
4__agree	4	40

Is there anything the organizers can improve on to make future workshops or trainings better?

TYPE: "TEXT". 10 out of 10 respondents answered this question. (0 were without data.)

Value	Frequency	Percentage
None	1	10
my experience in the program is entire new to me, I appreciated much of its uniqueness	1	10
More interaction among the participants	1	10
more break-out workshops	1	10
<i>Want to spend more time training and organize the brand continuously and go down to see the area</i>	1	10
<i>Translation of the language of the five animals is very important</i>	1	10
I suggest to make face to face training	1	10
Research topic related to development	1	10
The weakness of the webinar is the sometimes poor network connection	1	10
please make the local facilitator more attractive to raise some idea	1	10

Is there anything the organizers can do to make future workshops or trainings more interactive and engaging?

TYPE: "TEXT". 10 out of 10 respondents answered this question. (0 were without data.)

Value	Frequency	Percentage
None	2	20
a combination of virtual and face to face engagement with participants	1	10
-	1	10
<i>In the future, I would like to have an exchange of experience from each area in order to bring experience to improve and apply it to the Prabang capital area.</i>	1	10
<i>More training time</i>	1	10
...	1	10
Submit the topic before the training	1	10
Preparation of participants is necessary, especially internet connection	1	10
perhaps the workshop will add some VR or hologram to meet in online version	1	10

Is there anything you particularly enjoyed in the NbS program?

TYPE: "TEXT". 10 out of 10 respondents answered this question. (0 were without data.)

Value	Frequency	Percentage
Using Miro	1	10
Miro	1	10
The group exercises using the Miro board	1	10
the structure, format and delivery of the course	1	10
<i>Nbs natural problem solving course is important for solving urban problems, especially in areas with wetlands, community areas, especially in the capital city of Prabang.</i>	1	10
<i>Want to have more activities than before (homework)</i>	1	10
How to solve flooding	1	10
Participate in development	1	10
The presentation is very interesting and easy to understand	1	10
this workshop is very joyful to meet the others from different country	1	10



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