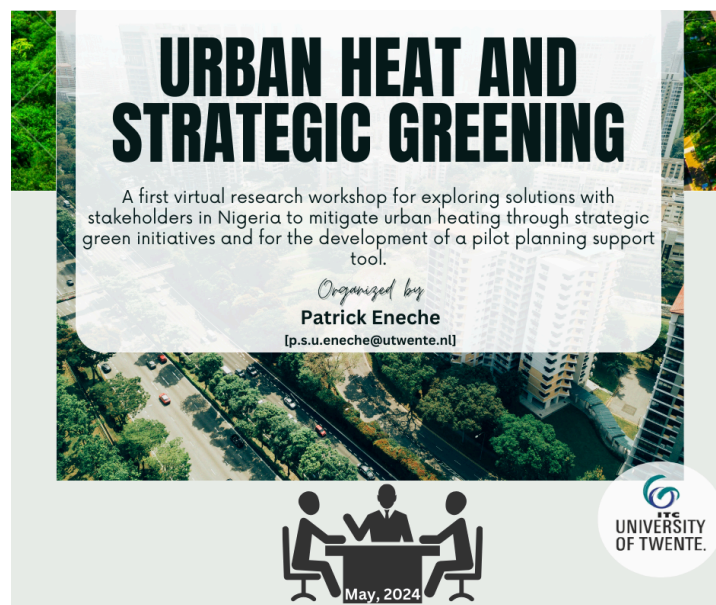


Stakeholders Research Workshop [Survey I]

Dear Stakeholder, kindly take your time to go through the questionnaire brief below.



Introduction

This survey is structured to collect data on urban surface temperature dynamics, which will inform the development of the pilot Green Infrastructure-based Planning Support System (GIPSS) for its mitigation. Comprising three sections, the survey seeks to categorise stakeholders collaborating in this research, obtain more information based on their local spatial knowledge and experiences related to urban thermal dynamics in their respective cities in Nigeria, and conduct a needs assessment to guide the development of GIPSS. Hence, this survey is tailored (or nested) to match different stakeholder personas, ensuring questions are uniquely associated with your experience and background. The survey should take approximately 35 minutes to complete. Also, note that your responses can be saved at any time (as a draft) and completed later online or offline or during the ongoing workshop.

NOTE: This questionnaire contains items for which ONLY registered stakeholders can participate. This also implies that you must have received a Participant ID. Please note that this ID is unique to you and should not be shared with anyone in line with our strategy to ensure that your privacy is protected. In other words, your participation in this workshop survey is only valid if the above conditions have been met.

Lastly, if using your mobile device for this survey, kindly note that features of this form (e.g. maps and tables) are best viewed in landscape format and desktop mode, in your browser. To effect the desktop mode, kindly go to the Settings Menu of your mobile browser and select "Desktop mode" or "Desktop site", as the case may be. Thank you.

» Consent Form

* I have understood the study information document, or it has been read to me. I have also been able to ask questions about the study and these have been answered to my satisfaction.

Consent of Participation

☐ OK

- * I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time without having to give a reason and no form of bias is attached to my responses.

Consent of Participation

☐ OK

- * I understand that all the workshops proposed in this study are virtual, necessitating internet connectivity. I will actively participate in these workshops and be reimbursed for any data cost incurred (up to 3GB) per session.

Consent of Participation

☐ OK

- * I agree to participate in audio recording and understand that my recorded data will be transcribed as text for analysis. In addition, I agree with my responses being manually noted down by the researcher.

Consent of Participation

☐ OK

- * In the event of my inability to attend planned workshop sessions, I can be contacted privately or in a group for my contribution.

Consent of Participation

☐ OK

- * I understand that my participation in this study may involve some risks and discomfort. For example, revealing my personal opinions and preferences on the study subject to close personal, community or professional acquaintance(s); and that the workshop surveys may be time-consuming, hence, stressful, amongst others.

☐ OK

- * I have been informed of my right to withdraw my consent at any time with erasure/rectification of my participation by contacting the researcher via email/phone.

Consent of Risk and Discomfort

☐ OK

- * I understand that participating in this study involves sharing some of my personal information (e.g. phone number, email, etc.) with the researcher and that my data will be pseudo-anonymized and stored with my permission.

Consent of Rights and Retention of Data

☐ OK

- * I have been informed that my pseudonymized information will have a retention period of 10 years. This will only be accessed by an affiliate University of Twente (UT) credentials on UT data servers in compliance with the General Data Policy and Regulation (GDPR).

Consent of Rights and Retention of Data

☐ OK

- * I understand that the information I provide will be used for analysis and the outcome will be published and presented in academic/scientific journals, conferences, and data repositories as well as in the PhD thesis of the researcher.

Consent of Data Use

☐ OK

- * I hereby acknowledge that I have read the above introduction and instructions of this survey, given consent to participate in this workshop and also have my Participant ID.

☐ OK

Section A: About You

This section is to identify the category of stakeholders participating in this workshop. Again, stakeholders who are not from the research target sites can also respond to the questions as this has been properly nested.

What is your Participant ID?

This information is contained in the mail sent to you earlier and it is part of our strategy to ensure that your privacy is protected. If you are not sure of this, kindly contact the researcher, Patrick Eneche (p.s.u.eneche@utwente.nl)..

What category best describes your current profession?

Multiple selection is possible.

- ☐ Practitioner (public/private), e.g. Planner, Surveyor, Environmental Officer, Software Developer, etc.
- ☐ Academic, e.g. student, lecturer or researcher
- ☐ Geographic Information System (GIS) Expert
- ☐ Layman, with a basic idea of the city landscape, or temperature or software use/development
- ☐ Others

Specify:

What best describes your participation in this workshop?

Note that the target cities for this workshop is Lagos and Port Harcourt cities in Nigeria, however, other stakeholders outside the target areas can also participate in this workshop. In this case, only questions that apply should be answered.

- ☐ I live in Nigeria and also reside in one of the target cities
- ☐ I often visit/work in both target cities
- ☐ I often visit/work in one of the target cities
- ☐ I live/work in Nigeria but NOT (from) the target cities

Which of the target cities?

- ☐ Port Harcourt
- ☐ Lagos

Which of the target cities?

- ☐ Port Harcourt
- ☐ Lagos

Which city in Nigeria?

How recent have you been in touch with the target city (or cities) you indicated above?*This gives an indication of how current you are with changes that may have occurred, recently.*

- ☐ Within the last 5 years
- ☐ Between 5 - 10 years
- ☐ Between 11 - 15 years
- ☐ Over 15 years

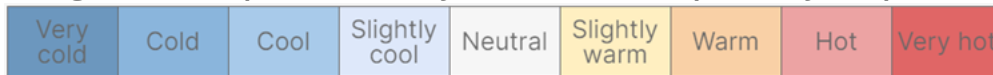
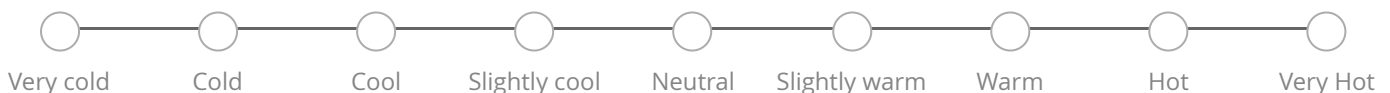
Section B: Knowledge & Experience

This section aims to delve into the dynamics of urban surface warming within your specified city/region, along with exploring the potential of green infrastructures (e.g. planting trees, shrubs, etc.) for its mitigation.

Questions in this section are nested based on your selected persona (Section A)

Based on your experience, at what time of the year is the temperature of the city at its peak?*This could also mean the hottest period of the year.*

- ☐ December – February
- ☐ March – May
- ☐ June – August
- ☐ September – November
- ☐ I am not sure

During the selected period, how will you describe the temperature you experience?*Use the chart below (Source: <https://www.emcllc.com/working-out-the-survey-questions-the-temperature/>)***When is the heat most severe (or unbearable)?**

- ☐ At night
- ☐ During the day
- ☐ Both

Has the temperature of your city increased in the last ten (10) years?*Or have you experienced a significant change in the temperature of the city?*

- ☐ Yes
- ☐ No
- ☐ I'm not sure

Are there areas that are characterized by higher temperatures or seem hotter than other places you know, in the city?

- ☐ Yes
- ☐ No
- ☐ I'm not sure

Indicate an approximate point (hot spot) on the map that is significantly hotter than other areas in the city. Follow the instruction below.

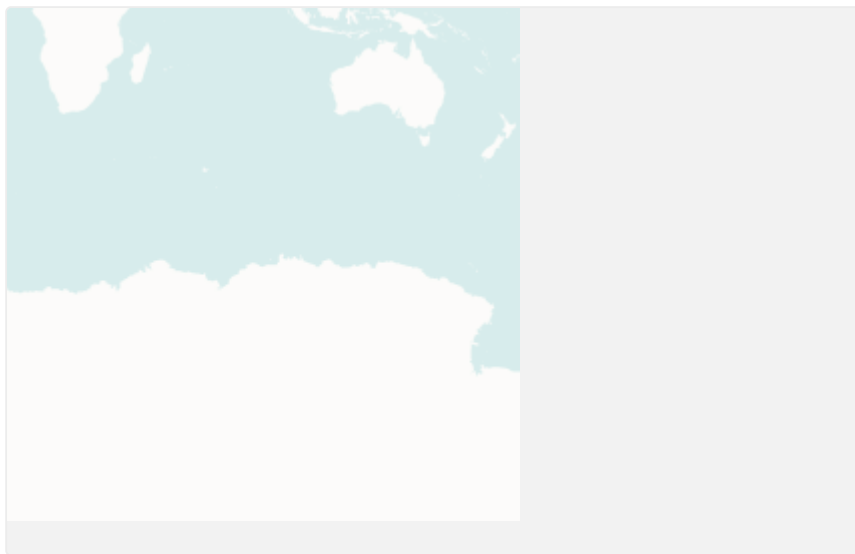
If the map is not visible, switch to desktop mode on your (mobile) device. Zoom to the area or use the search tool bar to navigate to the area (automatically). In the area, click once to mark a point and to register your input. NOTE: To display other layers, click the "Globe" icon on the map.

latitude (x.y °)

longitude (x.y °)

altitude (m)

accuracy (m)



Is there another thermal hotspot/area you will like to indicate?

☐ Yes

☐ No

Indicate the thermal hotspot/area - 2. Follow the instruction below.

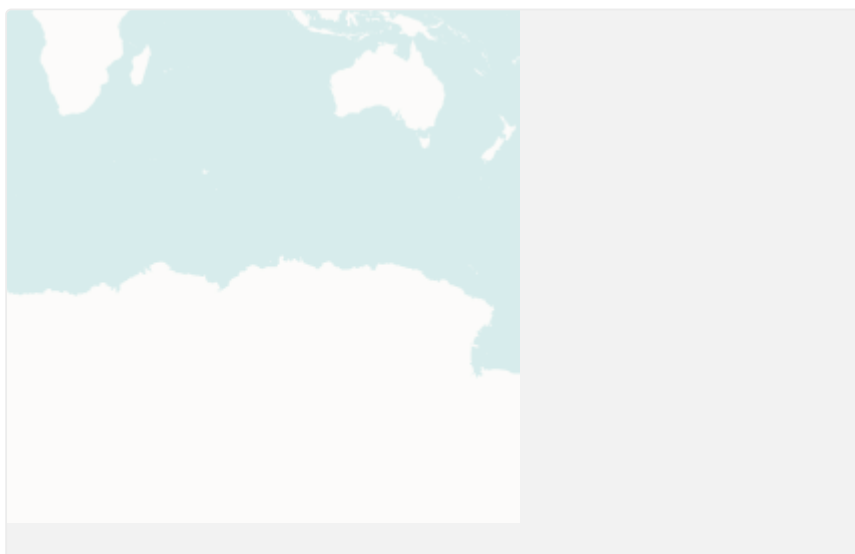
If the map is not visible, switch to desktop mode on your (mobile) device. Zoom to the area or use the search tool bar to navigate to the area (automatically). In the area, click once to mark a point and to register your input. NOTE: To display other layers, click the "Globe" icon on the map.

latitude (x.y °)

longitude (x.y °)

altitude (m)

accuracy (m)



What in your opinion is the main reason for the increased temperature in the area(s) you identified above?*Select one*

- ☐ Dense urban building
- ☐ Population density
- ☐ Concentration of automobile emissions
- ☐ Felling of trees (or devegetation) in the city
- ☐ Industrial/refining/manufacturing activities
- ☐ None of the above
- ☐ Others

State:*Be as concise as possible.***Are there areas that are characterized by low temperatures (cool spots) or seem lower than the temperature of other places you know, in the city?**

- ☐ Yes
- ☐ No
- ☐ Not sure

Indicate an approximate point (cool spot) that is significantly cooler than other areas in the city

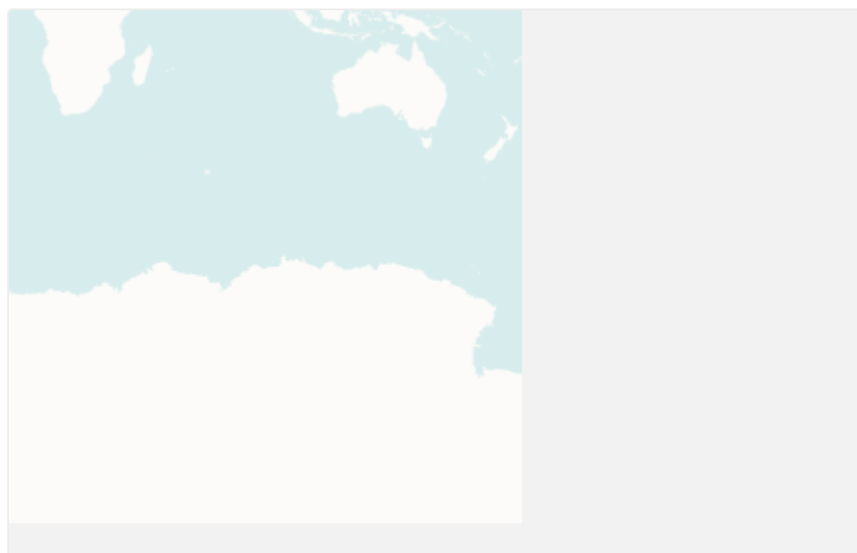
If the map is not visible, switch to desktop mode on your (mobile) device. Zoom to the area or use the search tool bar to navigate to the area (automatically). In the area, click once to mark a point and to register your input. NOTE: To display other layers, click the "Globe" icon on the map.

latitude (x.y °)

longitude (x.y °)

altitude (m)

accuracy (m)

**Is there another area (or cool spot) you will like to indicate?**

- ☐ Yes
- ☐ No

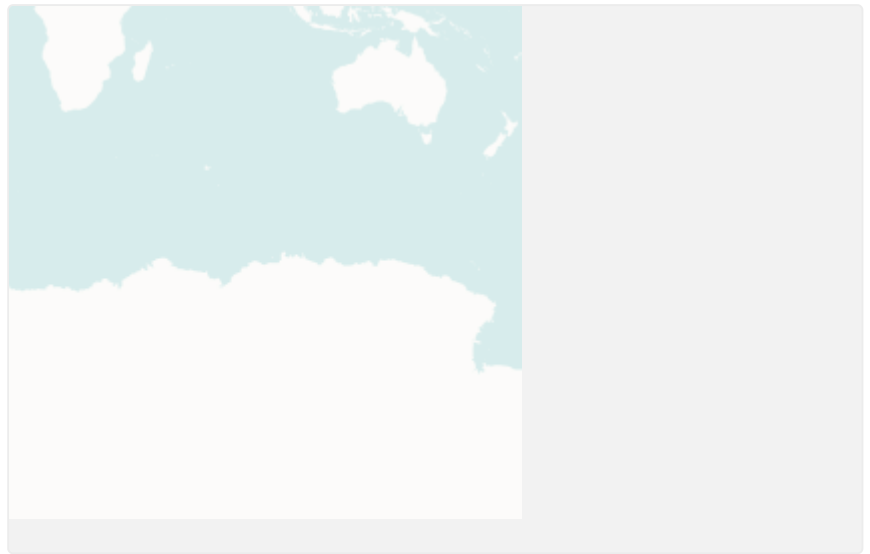
Indicate Cool spot 2

If the map is not visible, switch to desktop mode on your (mobile) device. Zoom to the area or use the search tool bar to navigate to the area (automatically). In the area, click once to mark a point and to register your input. NOTE: To display other layers, click the "Globe" icon on the map.

latitude (x.y °)

longitude (x.y °)

altitude (m)

accuracy (m)**What is common in the surrounding(s) of the places selected above that makes the area(s) cool?**

Multiple answers are possible

- ☐ Presence of parks/gardens and recreational areas
- ☐ Proximity to the Atlantic Ocean or other waterbodies
- ☐ Presence of forest reserves
- ☐ Others

If Others, specify:

To reduce the temperature of cities, what in your opinion is a more sustainable or preferred solution?

- ☐ Planting trees and other vegetation types
- ☐ Development of waterfronts like ponds, lakes and fountains
- ☐ Adoption of green walls, cool roofs and other retrofitted building materials
- ☐ Urban layout design, e.g. using building orientation design to influence air flows through a city
- ☐ None of the above
- ☐ Others
- ☐ I don't know

If Others, specify:

Are you aware of common tree types (or species) that can be planted/grown to reduce or mitigate the increasing surface temperature of the city?

A general knowledge of common trees that thrive easily in your city will be very helpful as this research proposes the use of green spaces (particularly trees) to reduce the surface temperature of the city.

☐ Yes

☐ No

What tree type(s) or species do you suggest?

Feel free to state the local names or any description that is helpful to guide the researcher. Also separate each tree type with a "," comma.

Is there a location/place where the type of tree(s) you mentioned is/are predominant in your city?

This could be a park, a forest reserve or an area that you are aware of.

☐ Yes

☐ No

☐ I don't know

Can you locate an area on the map where such tree/plant specie could be found in the city?

This will form the basis for field survey and for which the cooling effect of your selected tree types will be assessed. It will be helpful if the said tree species are still present, and it is no problem if otherwise.

☐ Yes

☐ No

Choose Location 1 on the map

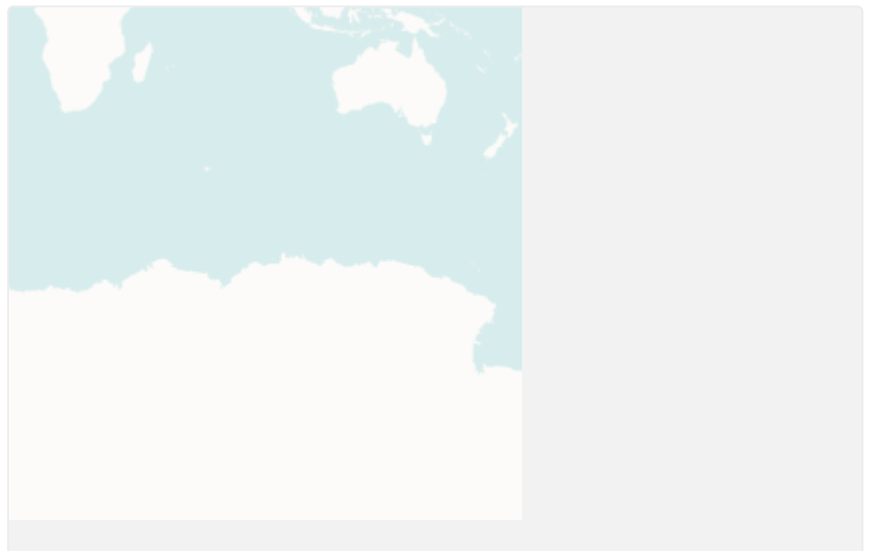
If the map is not visible, switch to desktop mode on your (mobile) device. Zoom to the area or use the search tool bar to navigate to the area (automatically). In the area, click once to mark a point and to register your input. NOTE: To display other layers, click the "Globe" icon on the map.

latitude (x,y °)

longitude (x,y °)

altitude (m)

accuracy (m)

**Can you locate another area where such tree/plant type(s) is/are predominant?**

This is optional

☐ Yes

☐ No

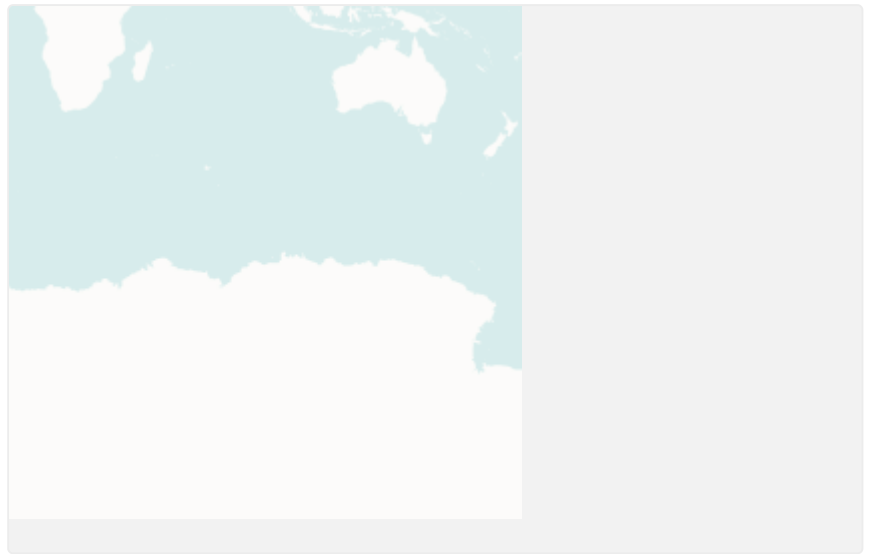
Indicate the second location on the map.

If the map is not visible, switch to desktop mode on your (mobile) device. Zoom to the area or use the search tool bar to navigate to the area (automatically). In the area, click once to mark a point and to register your input. NOTE: To display other layers, click the "Globe" icon on the map.

latitude (x.y °)

longitude (x.y °)

altitude (m)

accuracy (m)**What is your main reason for mentioning the stated tree type(s)?**

Multiple selection is possible.

- ☐ Economical value
- ☐ Medicinal value
- ☐ Cultural value
- ☐ Just for reducing surface temperature
- ☐ Aesthetics (or beautifying the city)
- ☐ Other environmental values (e.g. reduce air pollution, noise, etc.)
- ☐ I don't have a main reason
- ☐ Others

If others, specify:

Comment freely on the use of green infrastructure (e.g. trees, shrubs, green roofs, etc.) to reduce/mitigate urban surface temperatures in your city (Optional).

For example, mentioning possible setbacks or possibilities for a green mitigation strategy either implemented presently or in the past will be helpful.

Section C: End-User Needs Assessment (Pilot GIPSS)

This section starts with a game where participants are expected to explore a dashboard and provide feedback via a shared link or barcode. The dashboard's feedback is encouraged post-workshop due to time constraints. This exercise aims to demonstrate how (smart) tools can address complex questions related to identifying the main drivers of surface temperatures in diverse urban landscape characters. Consequently, this section is dedicated to a needs assessment survey, to identify key features for the proposed GIPSS tool that could support all (concerned) stakeholders in mitigating surface warming in Nigerian cities.

Note: The result of this section which focuses on user needs assessment that will inform the development of user stories for guiding the tool development, its review, and testing in future workshops.

Have you ever made use of a digital tool(s) similar to the dashboard developed in this research?

Example of such tools include dashboards (e.g. Covid-19, population, etc.) Google Maps, Bing maps, global positioning system, AutoCAD, ArcGIS, QGIS, etc.

- ☐ Yes
- ☐ No
- ☐ I'd rather not say

How often do you engage with these tools?

Select only one option that mostly apply to you.

- ☐ I can't remember the last time
- ☐ Few times per year
- ☐ Once per month
- ☐ Every week
- ☐ Almost daily
- ☐ Only whenever the need arises

In the use of the above selected tool which device do you preferably utilize?

Select only one option that apply.

- ☐ Desktop/Laptop computer
- ☐ Tablet
- ☐ Mobile phone
- ☐ Others

Others, please specify:

Is a planning tool which can support urban managers in mitigating the increasing surface warming of your city (urgently) needed?

- ☐ Yes
- ☐ No
- ☐ I'm not sure

What is the reason for your answer?

Optional

Do you have suggestions or (core) requirements that the proposed GIPSS tool should possess?

While it is possible to develop all features desired, the researcher's interest here is to identify very important features that will ensure that the tool is useful and usable by you or your colleagues (i.e. with similar persona)

- ☐ Yes
- ☐ No, I don't have any at this time
- ☐ No, I am okay with what will be developed and will only have suggestions afterwards

» Data Visualization Features**Is it important for the proposed tool to support the visualization of different geographic datasets**

- ☐ Yes
- ☐ No, not at this point
- ☐ No, it is unimportant

Why are visualization features not important for consideration (or at this point)?

Multiple selection is possible

- ☐ Not relevant to our processes
- ☐ We already have a similar tool
- ☐ This will make the tool too complex to understand
- ☐ I'd rather prioritize functionality over aesthetics
- ☐ Others

Others, specify:

Kindly select the level of importance of the following features of the city that should be included (as base maps) in the tool, in your opinion

Note that the proposed tool is limited to the use of open access or freely available dataset

	Very Important	Moderately Important	Slightly Important	Not Important
General landscape of the city	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Land use/cover of the city	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Existing green infrastructure (e.g. vegetation - trees, shrubs, grasses, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Surface temperature of the city	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Significant hot and cool spots in the city	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Are there other visualization features you suggest to be very important, to be included in the tool?

- ☐ Yes
- ☐ No
- ☐ No, may be later

Kindly state other visualization features:

Please be concise.

All the visualization features indicated/selected will enable you achieve what?*Multiple selection is possible*

- ☐ Connect better with the results obtained from the tool
- ☐ Enhance productivity
- ☐ For better decision making
- ☐ Improve data accuracy
- ☐ Ease of collaboration with colleagues/team
- ☐ Enhances transparency of the result and function
- ☐ Others

Others, specify:**» User Interaction – Analytical Features****The tool should support simple to complex user interactions***Such as adding features (e.g. points, lines, polygons) and notes on the map, to advanced scenario analysis or computations.*

- ☐ Yes
- ☐ No, not at this point
- ☐ No, it is unimportant

Why do you suggest user interaction/analytical features of the proposed tool is not important (at this point)?*Multiple selection is possible.*

- ☐ Not relevant to our processes
- ☐ We already have a similar tool
- ☐ This adds unnecessary complexity to the tool
- ☐ Not a priority for now
- ☐ Others

Others, specify:

Kindly select the level of importance to the following types of interactions features that should be included in the tool, in your opinion.

The aim here is to identify components that are easy to perform by you or your colleagues

	Very Important	Moderately Important	Slightly Important	Not Important
Adding features on the map	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Modification of input data, e.g. the use of different dates or periods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform simple calculations (e.g. area and distance)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Modification of model parameters (in case of scenario analysis)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Are there other interaction/analytical features that should be included in the proposed tool, GIPSS?

- ☐ Yes
- ☐ No
- ☐ No, may be later

If Yes, kindly state such interaction/analytical features:

Please be concise.

All the interaction/analytical features will enable you achieve what while using the tool?

Multiple selection is possible

- ☐ Connect or relate better with the results obtained by the tool
- ☐ Enhance productivity
- ☐ Improve decision-making process
- ☐ Increase the reliability of the tool
- ☐ Improve data accuracy
- ☐ For easier collaboration between users
- ☐ Others

Others, specify:

» Accessibility/Integration Features

Is it important to consider how the proposed tool (GIPSS) can be accessed and integrated with your needs or that of your colleagues?

- ☐ Yes
- ☐ No, not at this point
- ☐ No, it is unimportant

Why are accessibility/integration features not important in your opinion (at this point)?

Multiple selection is possible

- ☐ Not relevant to our processes
- ☐ Shouldn't be a priority for now
- ☐ We already have a similar tool
- ☐ I'd prefer to focus on a single platform rather than multiple devices
- ☐ This adds unnecessary complexity
- ☐ Others

Others, specify:

Kindly select the level of importance of the following accessibility/integration features that should be included in the proposed tool.

This is your opinion and in consideration of other prospective colleagues/users.

	Very Important	Moderately Important	Slightly Important	Not Important
Intuitively simple interface	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Capability of running on multiple devices (e.g. phones, tablets, laptop/desktops, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Capability of running on the web (different browsers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Capability of running offline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The tool should be open-access (made freely available to everybody)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Export of the result in the tool to raster/vector form	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Export to other formats (e.g. PDF, PNG, JPEG, TIFF, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Are there other interaction/analytical features that should be included in the proposed tool, GIPSS?

- ☐ Yes
- ☐ No
- ☐ No, may be later

State:

Be concise.

All the access/integration features you have suggested will enable you achieve which of the following?

Multiple selection is possible

- ☐ Connect or relate better with the results obtained by the tool
- ☐ Enhance your productivity or that of users
- ☐ Improve decision-making process
- ☐ Increase the reliability of the tool
- ☐ Improve the tool's accessibility
- ☐ For easier collaboration between users
- ☐ Facilitate information exchange among stakeholders
- ☐ Improve the engagement with the tool between all stakeholders involved
- ☐ Others

Others, specify:

Be concise.

» Collaboration Features

Is it necessary to consider features of the proposed tool (GIPSS) that can enhance collaboration among different stakeholders?

- ☐ Yes
- ☐ No, not at this point
- ☐ No, it is unimportant

What is/are the likely reason(s) for not considering collaboration features (or at this point)?

Multiple selection is possible

- ☐ Not relevant to our processes
- ☐ Shouldn't be a priority for now
- ☐ We already have a similar tool
- ☐ I'd prefer to focus on a single platform rather than multiple devices
- ☐ This adds unnecessary complexity
- ☐ Others

Others, specify:

Kindly select the level of importance of the following collaboration features that should be included in the proposed tool.

This is your opinion and in consideration of other prospective colleagues/users.

Tool should be equipped with features for sharing data and files

☐
☐
☐
☐

Permission access for different levels of access should be enabled

☐
☐
☐
☐

Provision of immediate feedback concerning different inputs (provided by users) to the tool (e.g. area suitable for green infrastructure development, financial implication, etc.)

☐
☐
☐
☐

Support real-time team collaboration so that inputs (such as preferred locations for siting trees) can be made and new results obtained

☐
☐
☐
☐

Are there other collaboration features that should be included or considered in the proposed tool, GIPSS?

- ☐ Yes
- ☐ No
- ☐ No, may be later

State:

Be concise.

All the collaboration features you have suggested/rated will enable you achieve which of the following?*Multiple selection is possible*

- ☐ Connect or relate better with the results obtained by the tool
- ☐ Enhance your productivity or that of users
- ☐ Improve decision-making process
- ☐ Increase the reliability of the tool
- ☐ Improve the tool's accessibility
- ☐ For easier collaboration between users
- ☐ Facilitate information exchange among stakeholders
- ☐ Improve the engagement with the tool between all stakeholders involved
- ☐ Others

Others, specify:*Be concise.***» Additional Features****What is your most preferred method by which the proposed tool (GIPSS) should be deployed?***this will increase how usable the tool will be to your work and that of your colleagues.*

- ☐ Desktop application requiring installation
- ☐ Web application (map, dashboard, etc.) that does not require installation
- ☐ Fused with installable open-source (free) GIS software, e.g. QGIS, etc.
- ☐ Fused with installable enterprise (or subscription-based) GIS software, e.g. ArcGIS, etc.
- ☐ Mobile application to be used on phones, tablets, etc. (Android, IOS, etc.)
- ☐ Others

Others, state:**Are there other additional features which you expect the tool to possess?***These features should further make the tool useful and/or usable by you or your colleagues*

- ☐ Yes
- ☐ No

First proposed feature*Kindly state the feature and what it will help you achieve.***Second proposed feature (Optional)***Kindly state the feature and what it will help you achieve.*

Third proposed feature (Optional)

Kindly state the feature and what it will help you achieve.

Fourth proposed feature (Optional)

Kindly state the feature and what it will help you achieve.

Fifth proposed feature (Optional)

Kindly state the feature and what it will help you achieve.

What is your preferred method of learning to use the proposed tool, GIPSS?

- ☐ Tutorial document
- ☐ Online workshop/training
- ☐ Tutorial video
- ☐ Others

State other method(s) you prefer:

Do you have other general remarks to make concerning the development of the proposed GIPSS?

- ☐ Yes
- ☐ No

Comment freely:

Unlimited word count.

Acknowledgement

As we conclude this comprehensive survey, we would like to understand how you prefer to be acknowledged in any publication or presentation that result from this research.

- ☐ I prefer to remain anonymous and do not wish to have my name or any personal identifiers associated with my responses in any publications or reports.
- ☐ I am comfortable with only my first name being used to acknowledge my contribution in any publications or reports.
- ☐ It is okay to use my full name to acknowledge my contribution in any publications or reports.
- ☐ My full name and affiliation can be used to acknowledge my contribution in any publication or reports.
- ☐ I prefer not to have my name mentioned, but I am comfortable with my organizational affiliation being acknowledged.

Kindly state your first name:

Kindly state your full name:

Surname, First name and others.

Kindly state your affiliation:

Kindly state your preferred type of acknowledgement

THANK YOU FOR YOUR TIME AND RESPONSES!

All responses will be analysed and shared with you in the next Workshop which will be communicated in due time, via e-mail. Again, we appreciate your collaboration and willingness to co-develop the GIPSS tool with us.
