Impetus

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Innovative Measurement Tool towards Urban Environmental Awareness

ClimateScan

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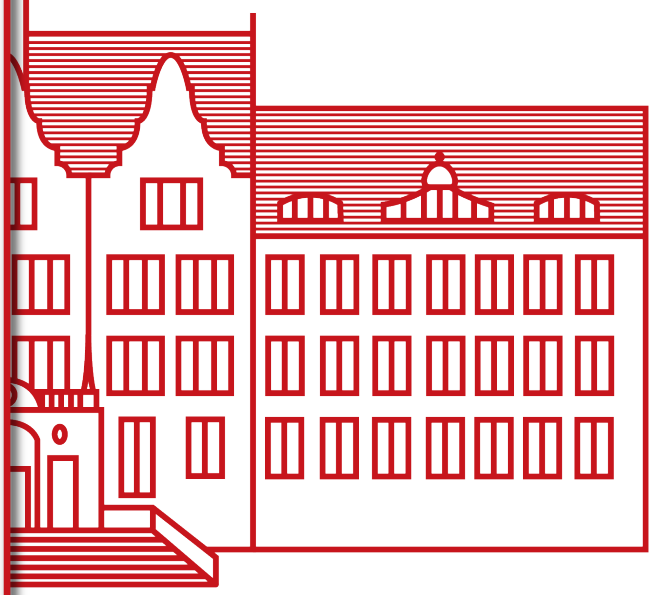

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Project Partners

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1 ClimateScan

1.1 Introduction

Climate change has a big impact on the livability in our cities. European cities are increasingly experiencing periods of high temperatures. The local climate is affected and outdoor human thermal comfort increases. The urban heat islands effect shows that the temperature in cities is several degrees higher compared with their surroundings (van Hove et al., 2015). This could be a risk to human health as growing urban populations exacerbate the heating effects of climate change. In addition to this, climate change has resulted in periods of heavy precipitation that occurs more frequently and more intensely than before (Stocker et al., 2013). A larger percentage of precipitation has come in the form of intense single-day events. Heavy precipitation may result in urban flooding. Urban flooding is a major problem in many parts of the world and is one of the most natural disastrous events which takes place every year (Eldho, Zope, & Kulkarni, 2018).

1.2 EU Green Infrastructure strategy

In order to stay livable, cities need to adapt to the changing climate. In fact, cities are increasingly taking action to be better prepared for the impacts of climate change and especially urban floods, heat stress and drought. Cities should also invest in nature based solutions to tackle water and heat risks (Global Commission on Adaptation, 2019). The European commission has formulated a Green Infrastructure (GI) strategy to enhance Europe's (Urban Green Blue Grids) natural capital. Ecosystem-based approaches are strategies and measures that harness the adaptive forces of nature. They are among the most widely applicable, economically viable and effective tools to combat the impacts of climate change according to the European Commission (European Commission, 2013). In addition to addressing the impacts of climate change Green Infrastructure features in urban areas creates a greater sense of community, strengthens the link with voluntary actions undertaken by civil society, and helps combat social exclusion and isolation Ecosystem-based approaches are strategies and measures that harness the adaptive forces of nature. They are among the most widely applicable, economically viable and effective tools to combat the impacts of climate change (European Commission, 2013).

1.3 Urban Green and blue spaces to combat effects of climate change

The world has recorded the hottest decade on record (2010-2020) during which the title for the hottest year was beaten 8 times. Implementing nature-based solutions on a larger scale would increase climate resilience and contribute to multiple Green Deal objectives. Blue-green (as opposed to grey) infrastructures are multipurpose, "no regret" solutions and simultaneously provide environmental, social and economic benefits and help build climate resilience (European Commission, 2021). Developing urban green spaces and installing green roofs and walls is mentioned will help to adapt in a cost-effective way. In 2018, an estimated 55.3 percent of the world's population lived in urban settlements. By 2030, urban areas are projected to house 60 percent of people globally (United Nations, 2019). All these people will be directly affected by the impacts of climate change. One of the solutions that has been suggested to make cities more resilient is Urban Green infrastructure (UGI). Urban green and blue spaces and green infrastructure are very effective to combat the effects of climate change and tackle water and heat risks. A common method to

evaluate such contributions is to measure the ecosystem services (ES) provided by the vegetation or water bodies present in urban green and blue spaces (UGBS) that constitute the UGI. (De Manuel, Méndez-Fernández, Peña, & Ametzaga-Arregi, 2021). The European commission initiated the Climate ADAPT project to raise awareness and increase the expertise of how green and blue infrastructure can help new and existing mixed use urban development adapt to projected climate scenarios of key bodies responsible for spatial planning and development (Climate ADAPT) https://climate-adapt.eea.europa.eu. The challenge is now how to integrate these measures in our cities and to assume directive roles in their implementation. The Urban Green Blue Grids toolbox was developed by the climate ADAPT project to help in the realization of green-blue urban grids and to illustrate and explain the synergetic potential of the various measures for the themes water, heat, biodiversity among others (Urban Green Blue Grids). https://www.urbangreenbluegrids.com/measures.

European cities need to adapt and to implement green and blue solutions. To share best practices and example worldwide, the website ClimateScan was launched
(Climate Scan) https://www.climatescan.org.

ClimateScan is an interactive narrative web-based map application for international knowledge exchange on blue-green projects around the globe. It focuses mainly on the topics surrounding the areas of urban resilience, climate proofing and climate adaptation. Over the past few years, more and more adaptive measures for climate change are being implemented by urban areas worldwide. The objective of climate scan is international knowledge exchange on climate adaptation projects through an interactive web-based application (Restemeyer and Boogaard 2020).

1.4 Measurement description

ClimateScan web page enables you to browse different green and blue solutions, or other measures in different categories. You can both:

- gain information on measures in any areas including in your locality,
- upload the measures to the interactive website with exact coordinates. The measures will appear on the world map (Figure 1.1).

Similarly, you can select one of eight categories and browse the measures from around the globe that are uploaded by practitioners worldwide. One of the categories is problem areas. Here you can upload areas that are characterized by a certain climate-change related problem like heat stress, drought, urban flood or areas that lack adaptive measures (Figure 1.2).

Climatescan.nl has proven to be a successful instrument with over 5000 international projects in the area of climate adaptation. The tool is used in various international Climate Cafés (climatecafe.nl), workshops and projects and meets the demands of various stakeholders.

Practitioners can investigate any area and visit successful projects and upload pictures, movies and descriptions to the climate scan website. Students and young professionals can also visit problem areas and upload pictures and movies to the website. After identifying a problem site, they can look for best practices on the ClimateScan website elsewhere in the world that are presented on the map. (Figure 1.3).

There are 7 focus topics.

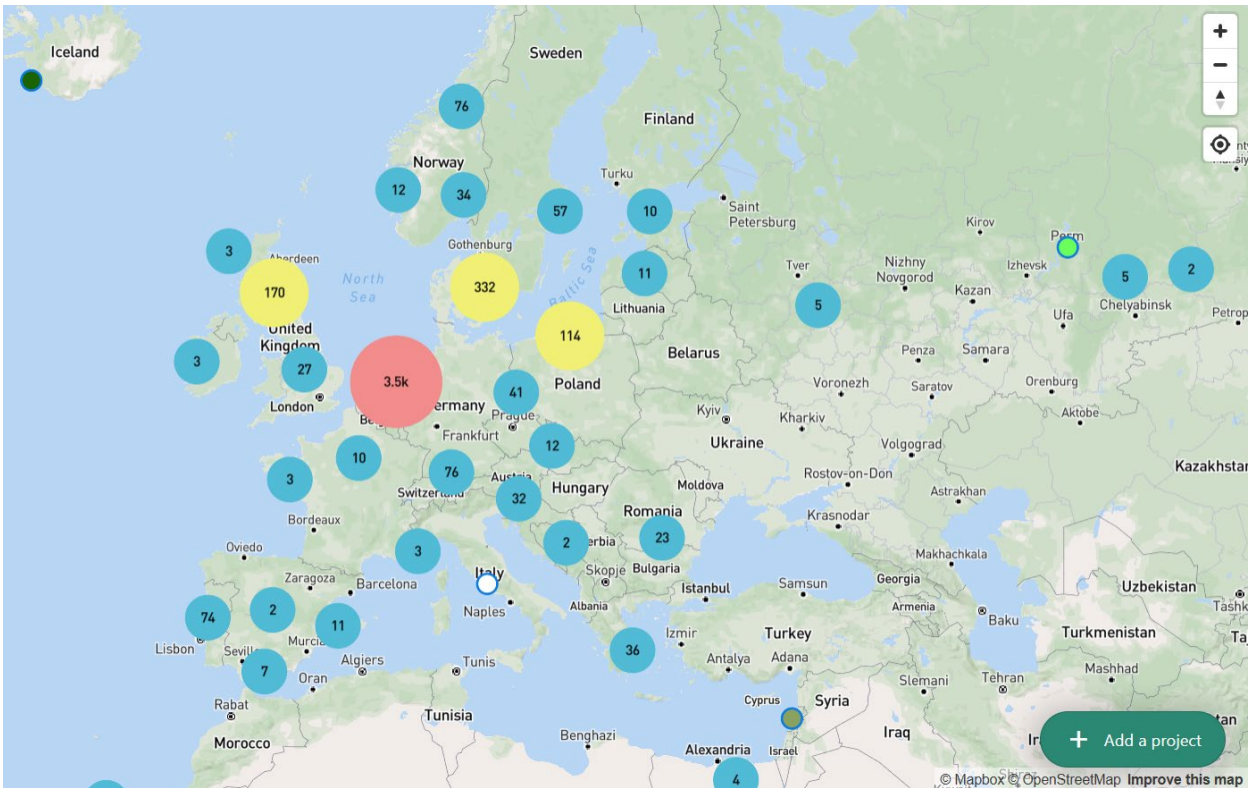

Figure 1.1. Climate adaptation projects in Europe.

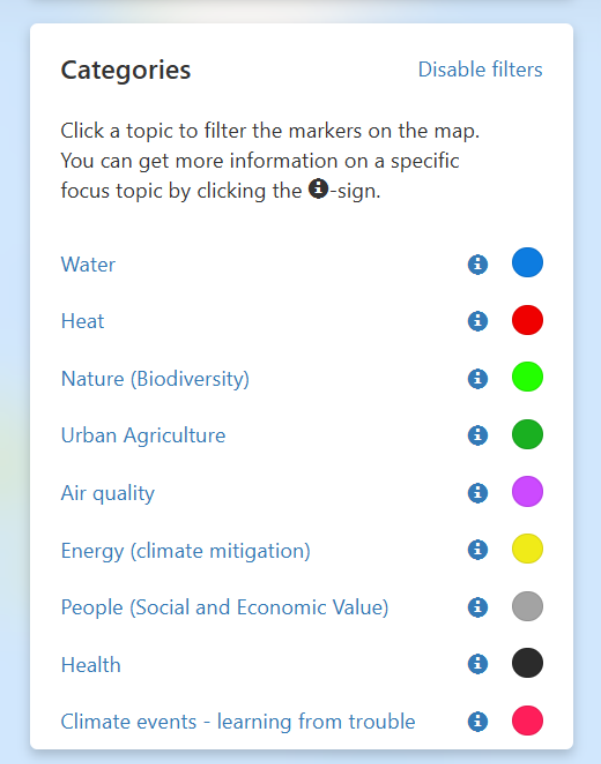

Figure 1.2. Categories.

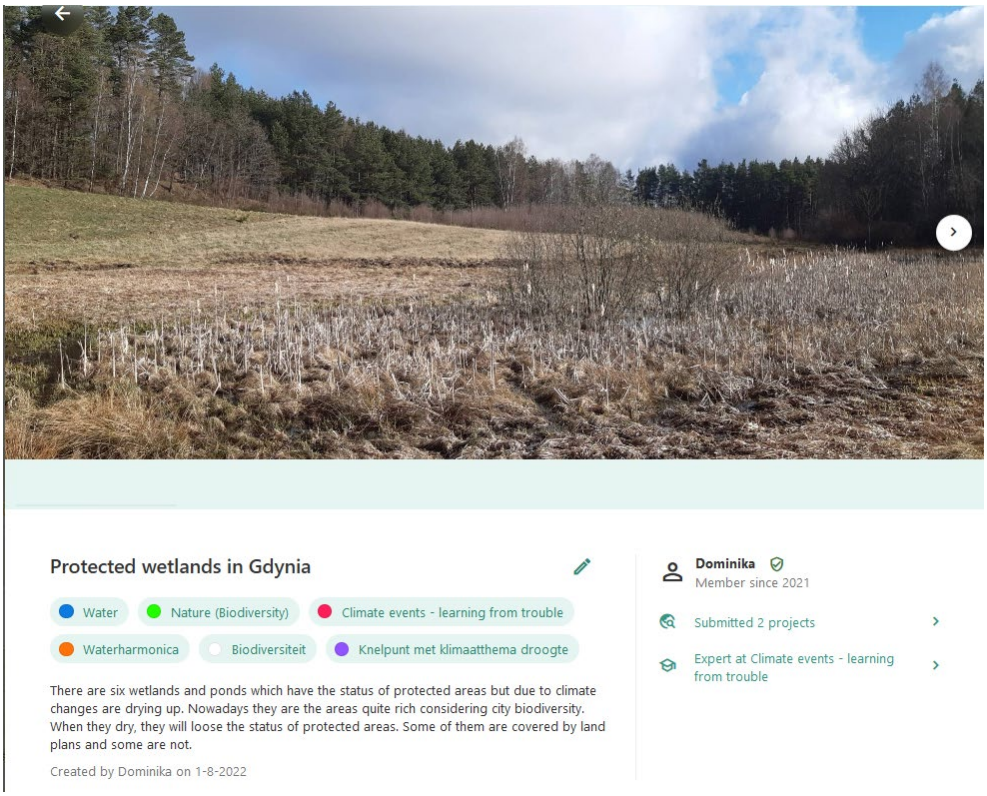

Figure 1.3. Project details.

Data collection & methodology

To add the information to the webpage you need to follow these steps:

1. Download the ClimateScan app on your smartphone or go to the website www.climatescan.org, to the tab "join us" and create an account and log in.
2. Start a new project. Visit blue-green measures in your city as shown in Table 1.1 (or another measure that you would like to upload). Open the app (see Figure 1.4) and click the GPS button. The coordinates of the project are now registered. Create a project title, write a description, select a category. Upload 3-5 pictures from different angles of the measure. Upload each 5-10 blue green measures in your city or neighborhood.
3. Identify blue-green infrastructure measures in your city or neighborhood, gather the information about them, do your measurements, take photos and upload all to the ClimateScan. Before you go outside, prepare yourself. Browse measures from locations around the globe at www.climatescan.nl. (Figure 1.2, Table 1.1). The website shows thousands of examples from around the world. You can also zoom into your city and see what measures are uploaded near your location. If you don't know what blue-green infrastructure measures are, visit the website https://www.urbangreenbluegrids.com/measures/ and click the tab 'water' or 'heat'. You can find multiple measures with a description at the website. Or you can use the NbS solution description in the IMPETUS Manual.
4. Identify problem areas in your city or neighborhood, take photos and upload to the ClimateScan.
5. Collect online details about the problem areas or blue-green infrastructure measures and finalize the text at the website for each measure/problem location.
6. Discuss the results. Find out why this measure is taken and the benefits of this measure. What can planners learn from this measure? Can it be implemented elsewhere?

Table 1.1. Blue green measures.

• Bioswale • Green roofs • Rain Gardens • Permeable pavement • Constructed Wetlands • Vertical green (walls) • Green roofs • Type of vegetation in/around the measure	• Park • Playground • Parking space • Photo of surroundings • Age of the measure • Data added with desk research • Designs and dimensions of the measure • Potential secondary functions of the measures

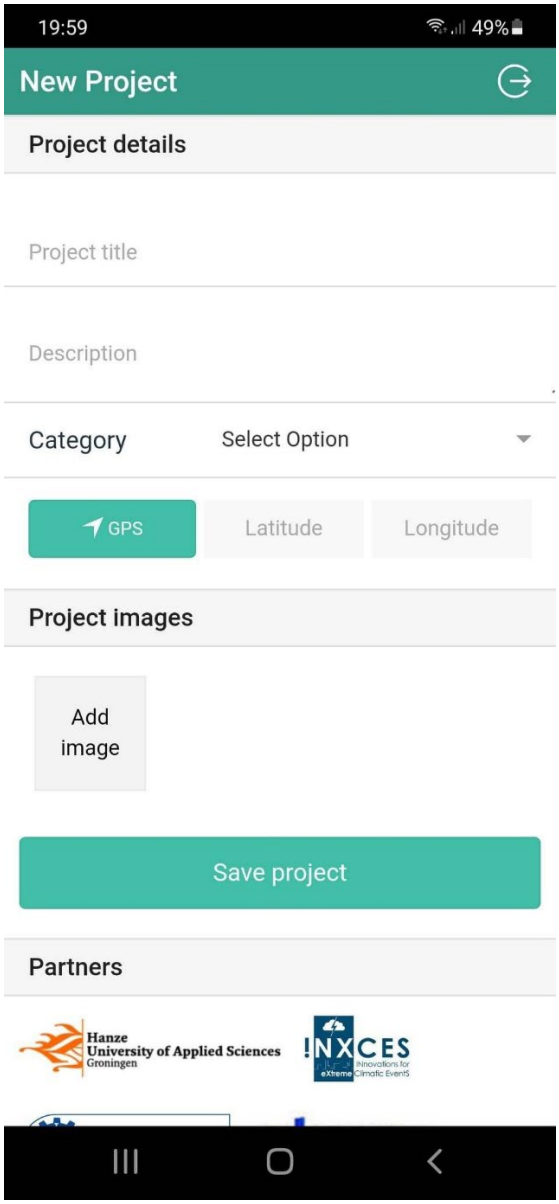

Figure 1.4. ClimateScan app in the app store, start of a new project interface.

If you need help use these tutorials as inspiration:

- 1 min tutorial app ClimateScan: https://youtu.be/VnTYWVU8hPA
- Tutorial ClimateScan desktop: https://www.youtube.com/watch?v=W11ktLkmsRg

ClimateScan activity – new project

The goal of this task is to identify problem areas in your city or neighborhood. Students are to collect data on problems related to climate change and to assess how adaptive the analyzed area is. This assignment is based on field research as well as online research.

Before the fieldwork students are asked to do research on the climate change effects and problems described in local newspapers. Look for the recent incidents of floods, or heat problems, or playgrounds without any shadow, or other environmental problems which can be uploaded to ClimateScan. The next step is field research and taking pictures of places where the problems appear or the solutions were applied to decrease the risk of hazards:

- pictures of water pollution in water bodies in your area - locations that show signs of water pollution (plastic waste, general waste, chemical pollution, other sources of water pollution).
- pictures of locations with (potential) heat stress at public squares and playgrounds - locations such as public squares, school playgrounds, playgrounds general, public places to sit and relax that do not have shadow from trees. The places are exposed to the sun that could result in heat stress in the summer months, and lack of cooling for the public.
- pictures of (lack of) neighborhood / spatial quality - litter in public space, vandalism/graffiti in public space other problems with signs of lack of climate adaptation

Visit the problem locations in your city or neighbourhood. Open the app (see Figure 1.5) and click the GPS button. The coordinates of the project are now registered. Select on your smartphone the 'problem area' in the tab 'category'. Create a project title and write a description. Upload each 5-10 problems in your city or neighbourhood.

The next step is to describe the project and add the verified information illustrated by your photos. Open each item that you uploaded and add (if possible) the following details (see Figure 1.5):

- add a title
- add an additional category
- add a summary
- edit or add images
- edit or add video's
- edit or add files
- edit or add website links
- edit or add your research data
- edit or add a polygon (if applicable)

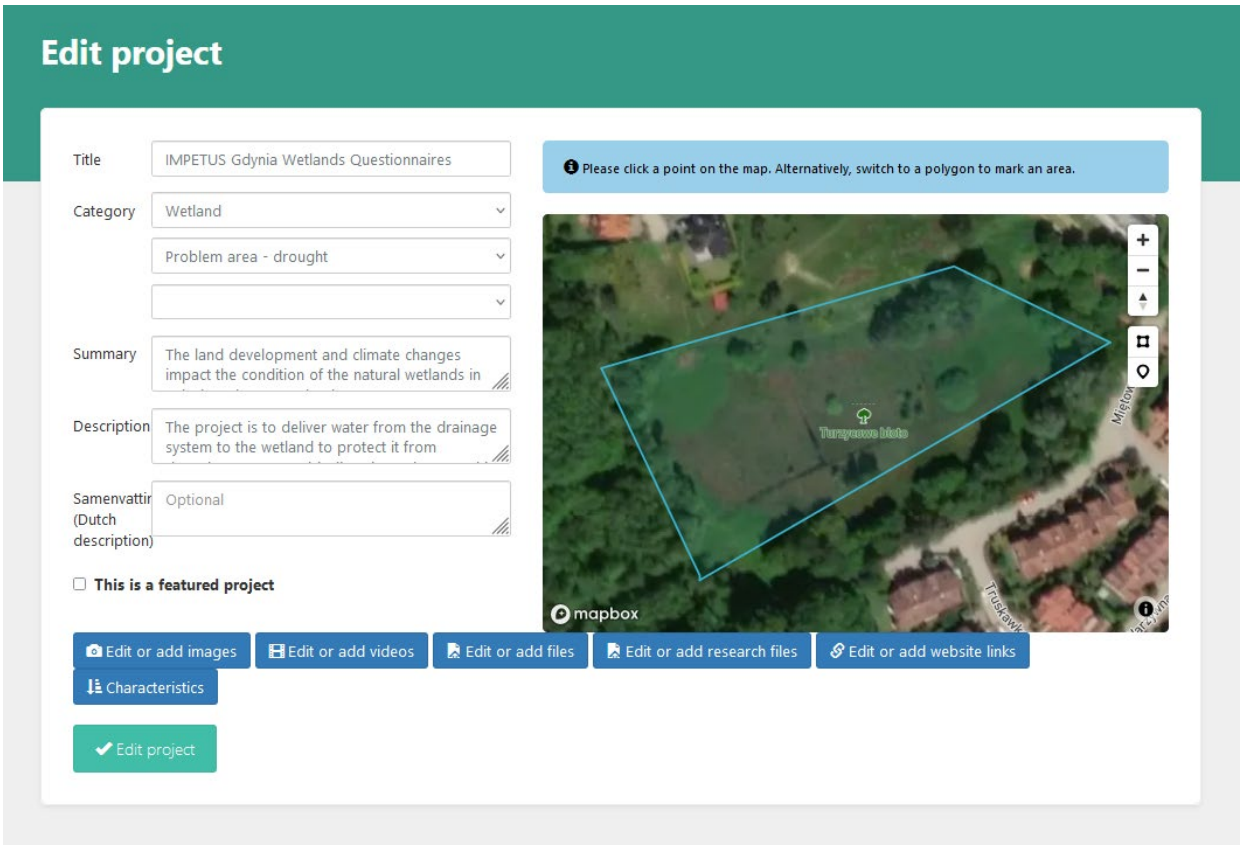

Figure 1.5. Interface for edition of the project data.

DNA of a city

DNA of the city is the visualization of the data that help to get a clear picture of what kinds of measures have been implemented in the city (Figure 1.6).

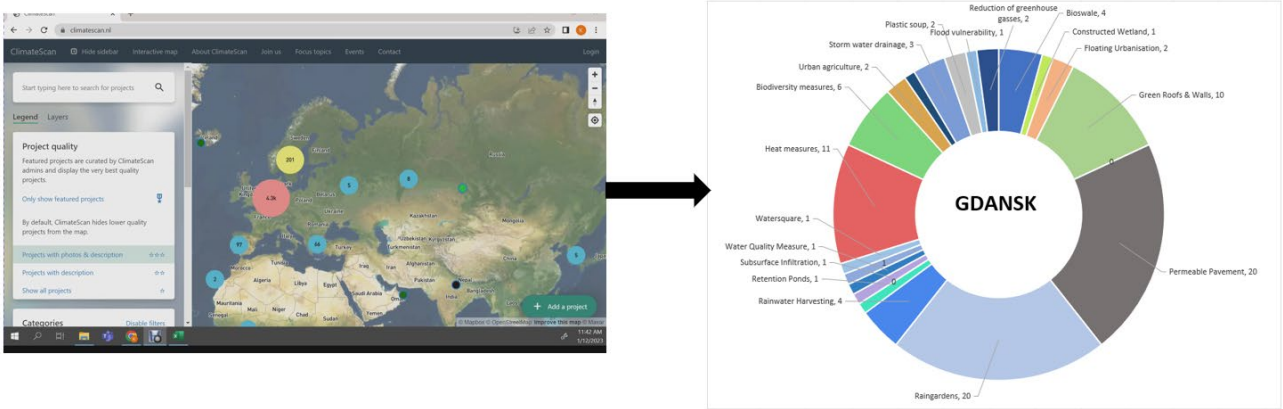

Figure 1.6. Gdańsk DNA.

To create the final report on measures the following steps should be followed:

Step 1: Go to ClimateScan website (www.climatescan.nl)

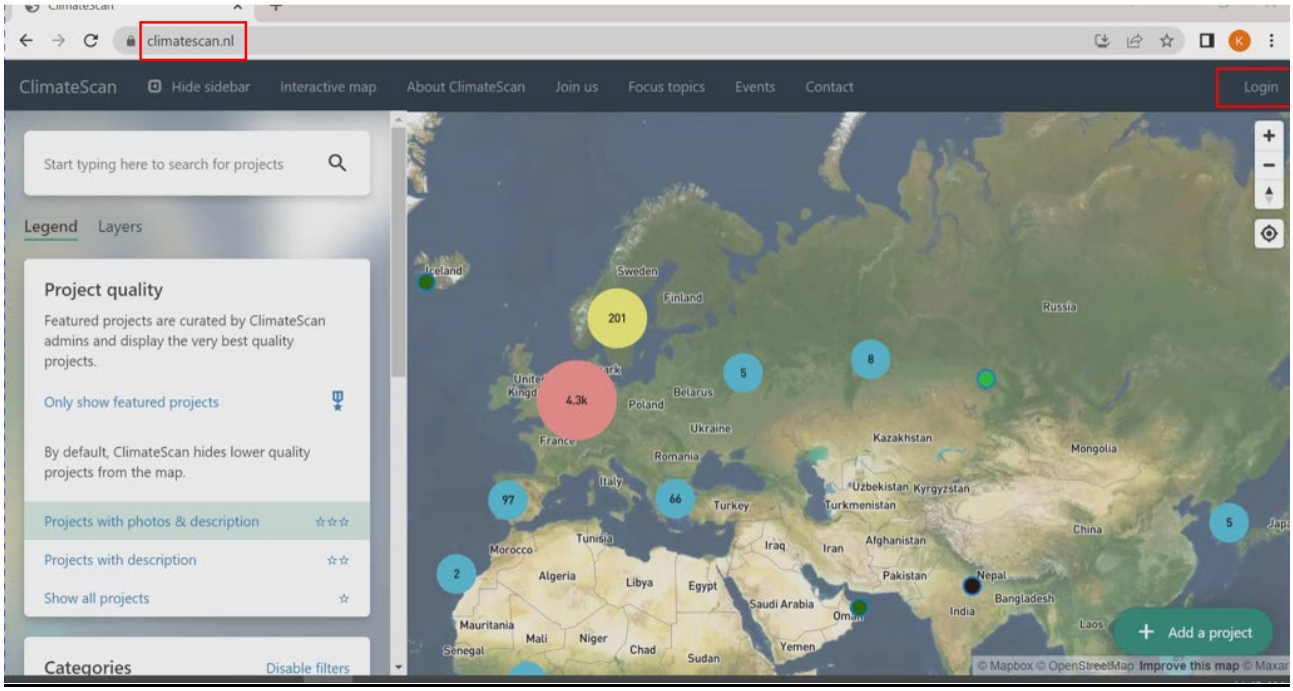

Figure 1.7. The home page of ClimateScan website showing the map viewer and general information. Navigation through the website is possible by clicking the options buttons on the top of the screen.

Step 2: Zoom in the area of interest and make a list with all the existing projects from ClimateScan in that area

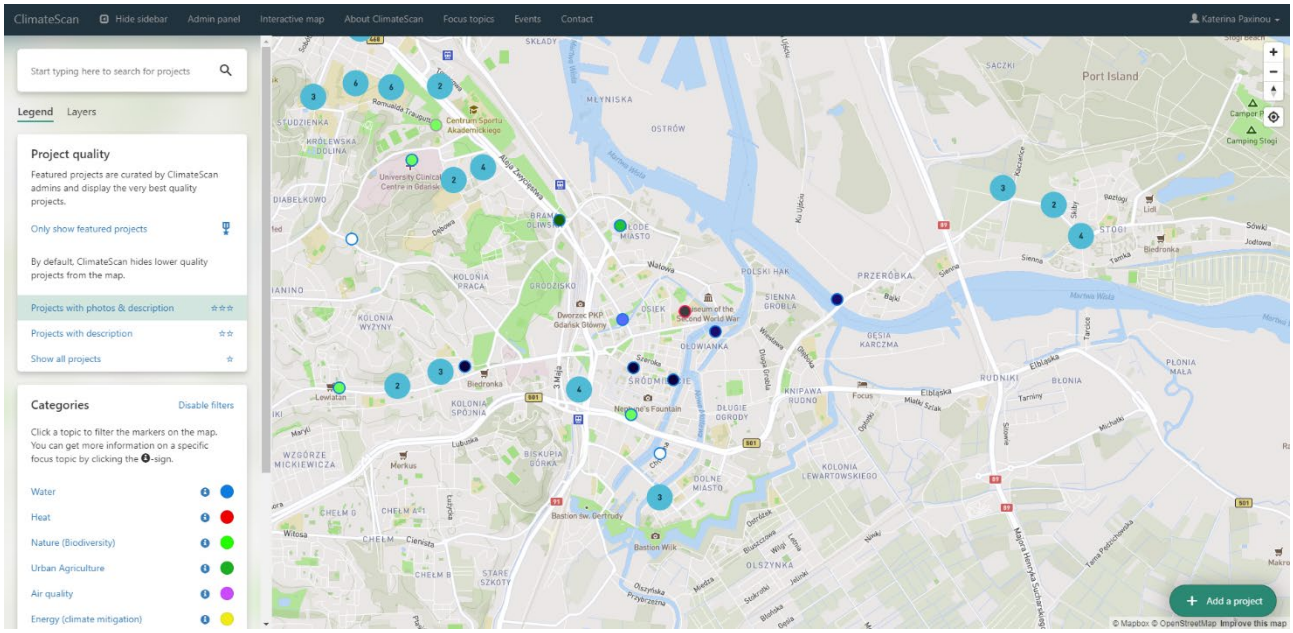

Figure 1.8. By zooming in the map viewer of ClimateScan you can click on specific projects and see more details about this project.

When zooming in the area of interest one can click on specific projects that have been created in that area. When clicking on a project you can see more information about this project from the details panel that pops in the screen as shown in Figure 1.9. The details panel contains among other features, pictures and/or videos, text description with more information about this project and in which category the project is listed on.

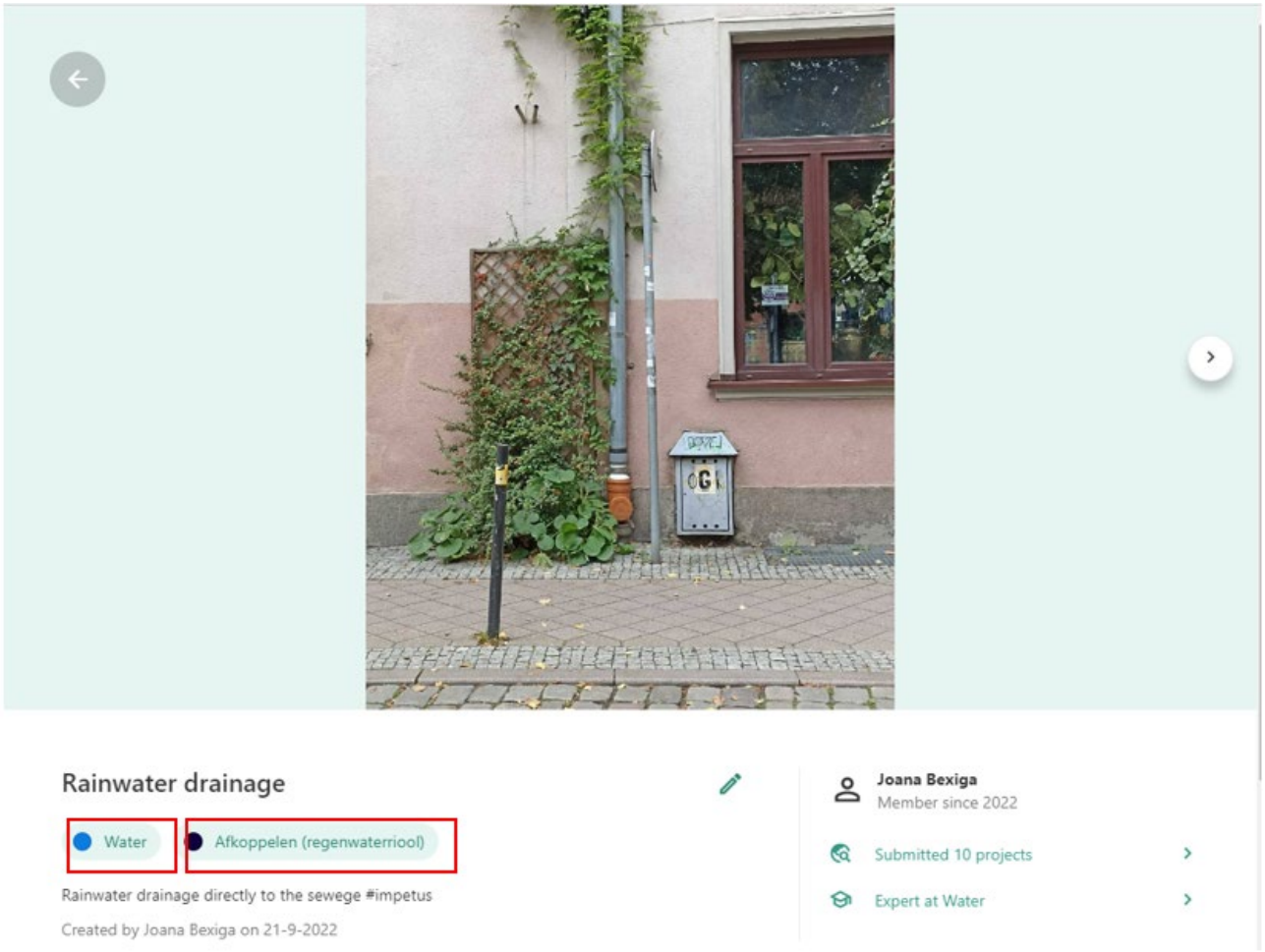

Figure 1.9. When clicking to see the details of a project you can see in which category the project is listed (red squares on the Figure) among other information about this project.

Step 3: Create a list with the existing ClimateScan projects on an excel file

Write down in excel (.xlsx) all the different categories from ClimateScan that projects have been created on the ClimateScan website. You can see in which category every project is listed by looking at the project details as it is explained in Step 2. The list on the .xlsx format should look like the one in Figure 1.10.

City : Gdansk	
Measure Type	Nr
Bioswale	4
Constructed Wetland	1
Floating Urbanisation	2
Green Roofs & Walls	10
Gully Free Roads	0
Permeable Pavement	20
Raingardens	20
Rainwater Harvesting	4
Retention Ponds	1
Water Storage	0
Subsurface Infiltration	1
Water Quality Measure	1
Water Conservation Measures	1
Watersquare	1
Heat measures	11
Biodiversity measures	6
Urban agriculture	2
Energy measures	1
Storm water drainage	3
Plastic soup	2
Flood vulnerability	1
Reduction of greenhouse gasses	2

Figure 1.10. The list in excel format (.xlsx) has information on the project categories for the area of interest and the number of projects listed in that area.

Step 4: Create a doughnut chart with the listed projects

Select the two columns in excel and click on "Insert" → "Insert Pie or Doughnut Chart" → "Doughnut". The doughnut chart should appear on the screen like in Figure 1.11. Information is not very clear on the chart yet. Let's fix the chart to look more understandable and clear.

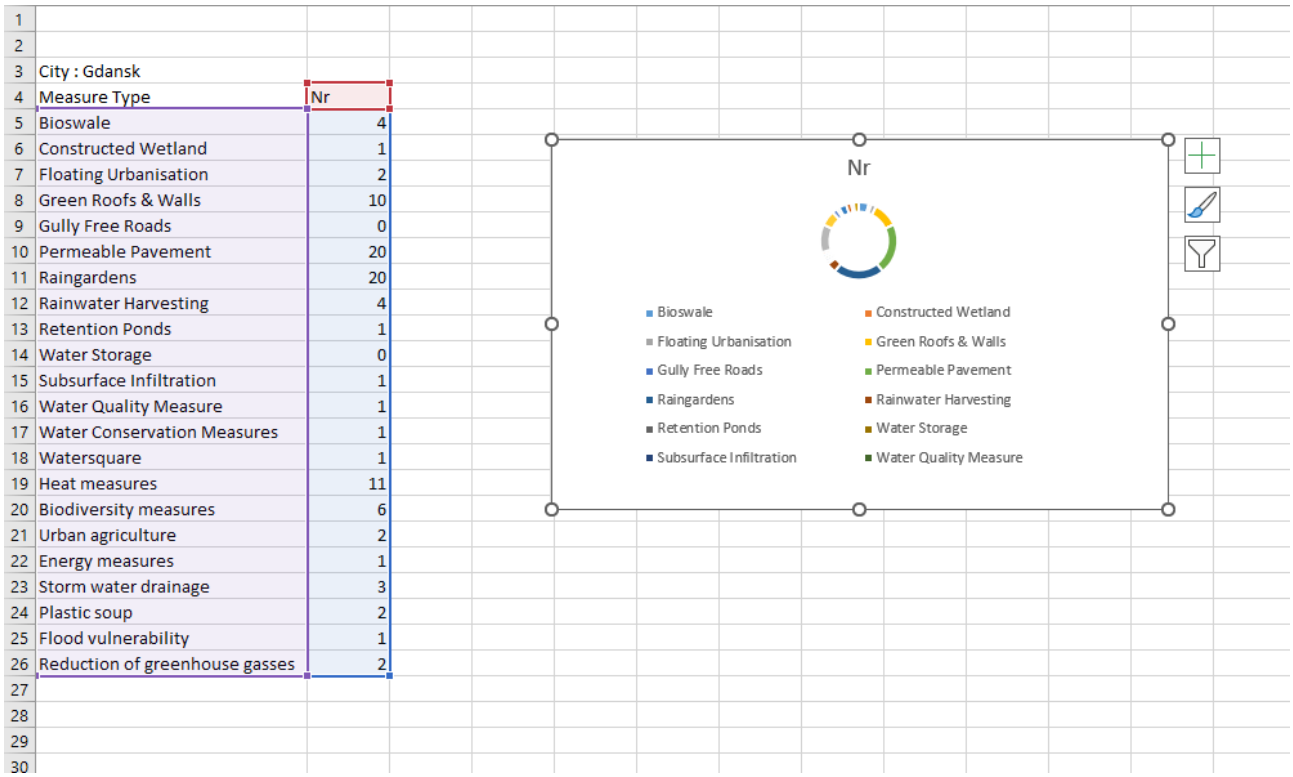

Figure 1.11. This is how the DNA of the city looks in the beginning after creating the doughnut chart. After fixing the chart to look more clear it will get to the final form of Figure 1.6.

Step 5: Go to Format Data Labels

When clicking on the plus (+) sign on the top right corner of the doughnut chart (Figure 1.11) the format labels panel opens up. Choose the "Category Name" and "Value" attributes to be visible as it is shown in the Figure 1.12.

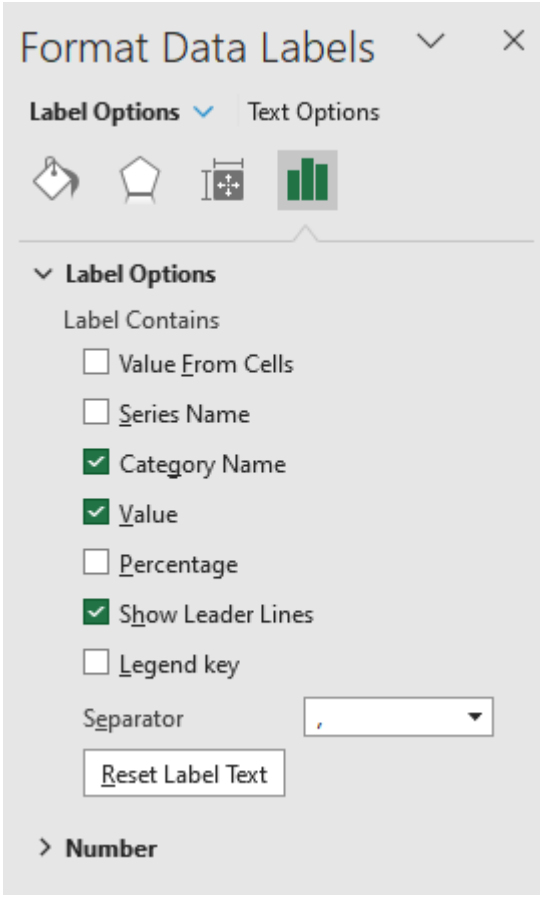

Figure 1.12. The Format Labels panel opens up when clicking on the plus (+) sign that you see on the top right corner of the doughnut chart.

Step 6: Click on the "Series Options" (icon in the red circle of Figure 1.13) and click on "Series "Nr"".

There, select the doughnut hole size to be 50% as it is presented in Figure 1.14.

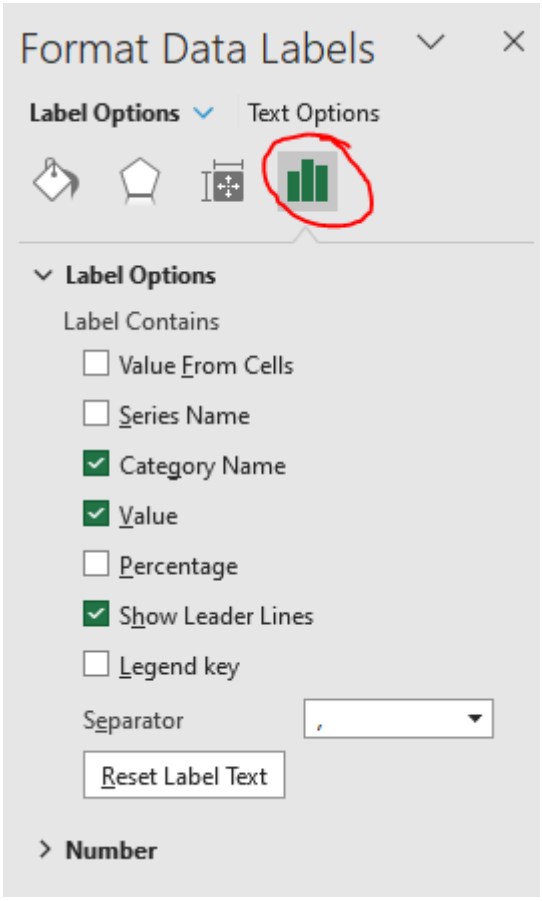

Figure 1.13. Click on "Series Options" to open up the Label options panel.

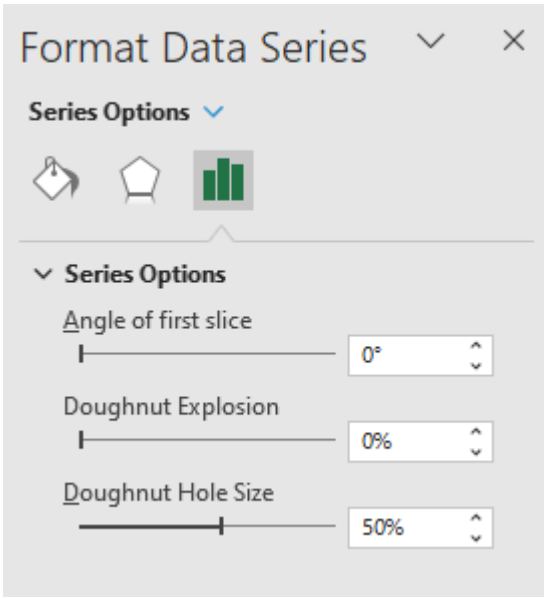

Figure 1.14. Click on the "Series Options" to open up the Series Options panel and adjust the doughnut hole size.

The DNA of the city chart should look something like Figure 1.15 by this step. Information is still not understandable. Insert a textbox in the center of the doughnut hole and write the name of the study area (Figure 1.16).

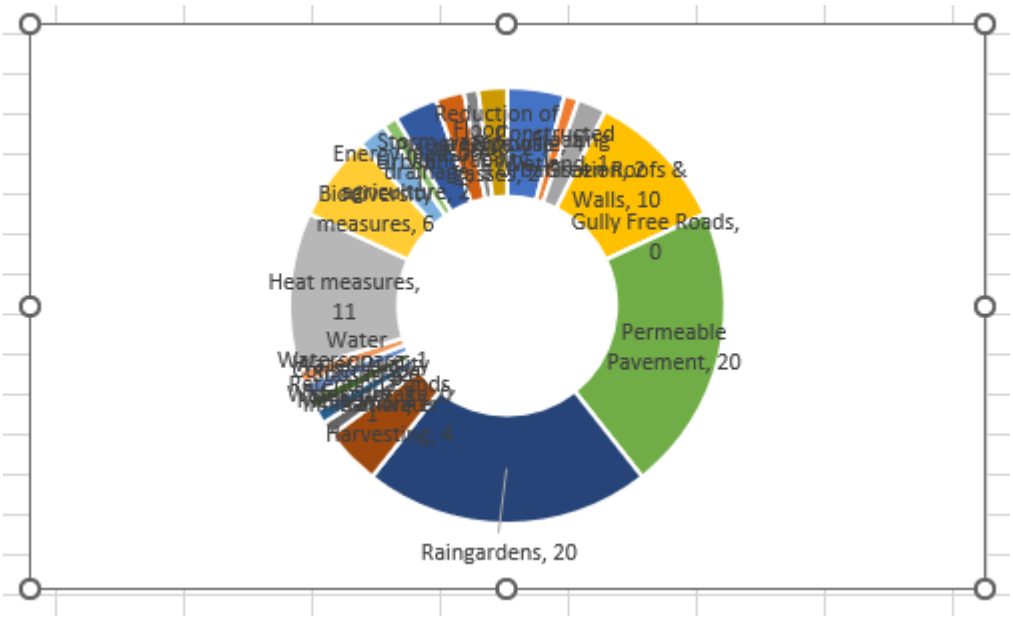

Figure 1.15. After adjusting the hole size of doughnut chart the DNA of the city looks something like this.

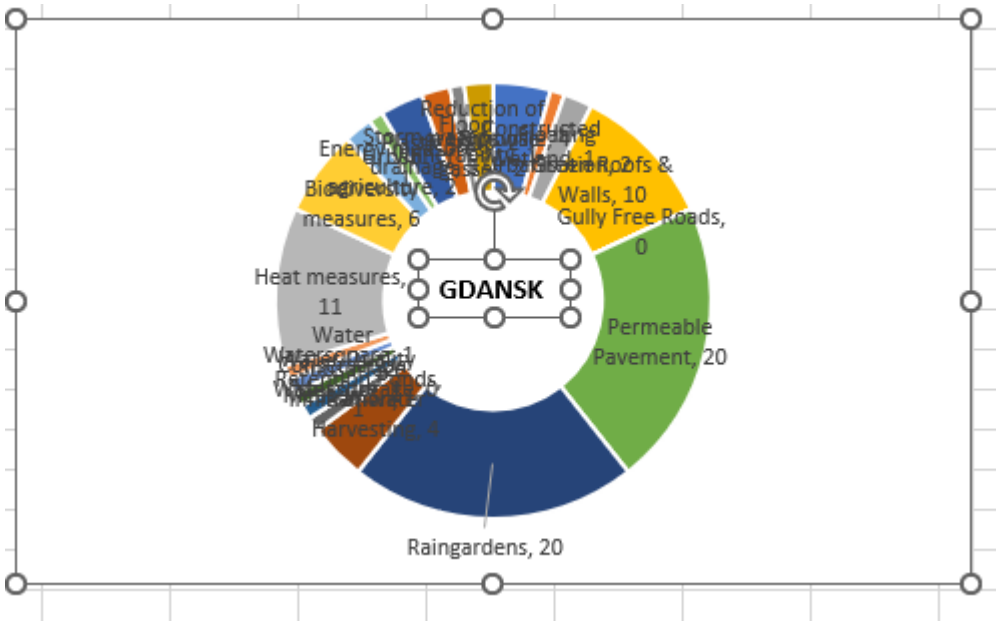

Figure 1.16. Insert a textbox on the center of the doughnut hole to name the DNA of the city.

Adjust the size and the position of the text box by dragging it in the desired position while holding pressed the left click of the mouse to appear on the center of the doughnut hole. Then, select each name category by clicking on it and drag it outside of the chart in the white canvas area of the chart while holding the left click pressed (Figure 1.17).

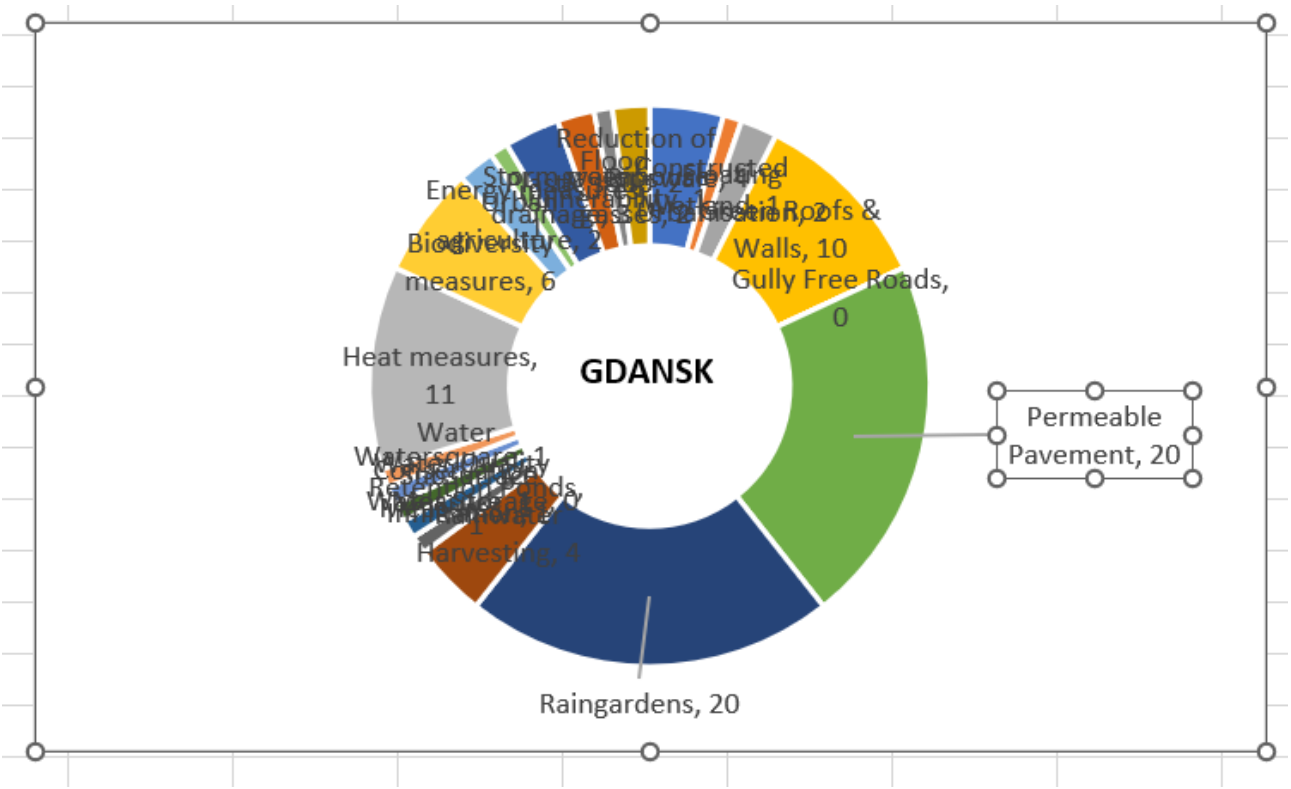

Figure 1.17. Drag each category name outside of the chart area in the white canvas around.

After adding the name of the city in the center of the doughnut hole and dragging all the category names outside of the chart area the DNA of the city is complete and look similar to Figure 1.18.

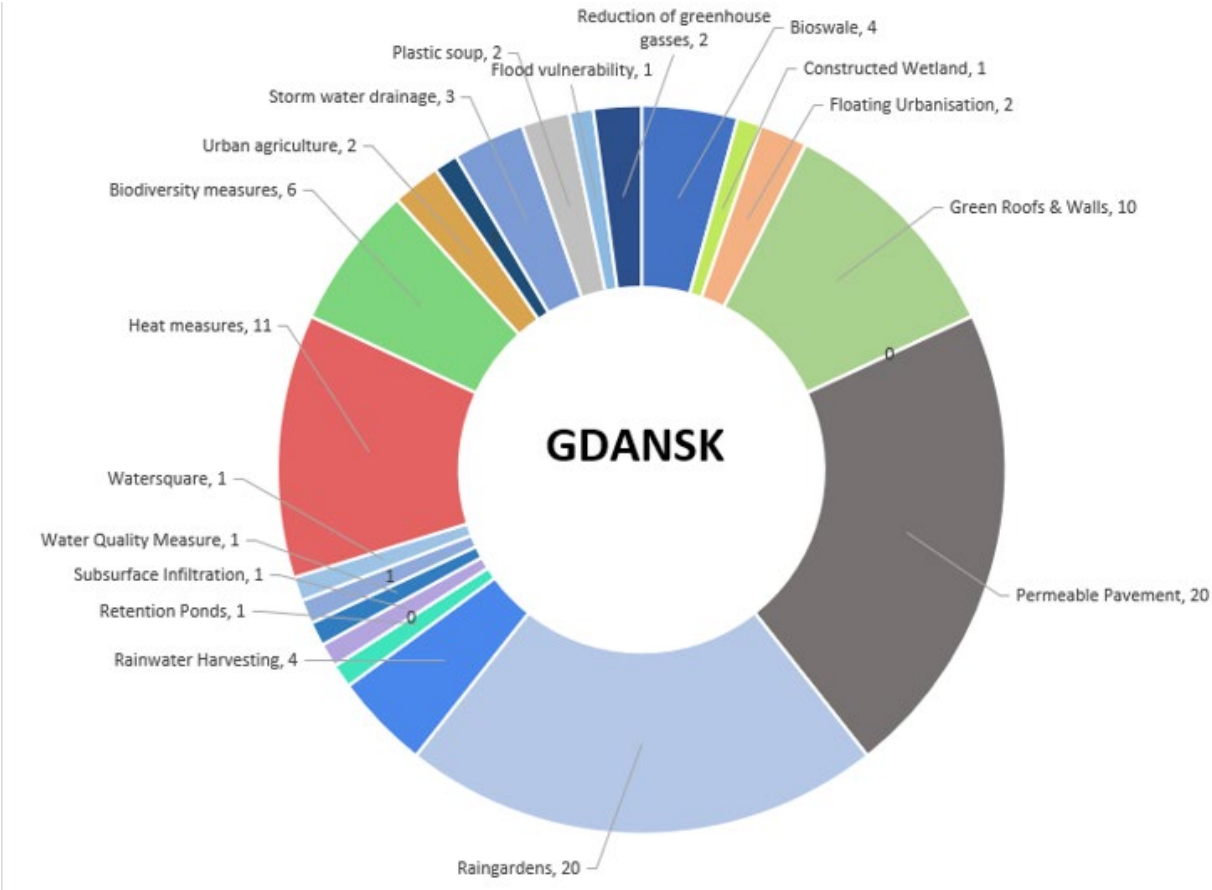

Figure 1.18. After following all the previous steps the DNA of the city should look like this (Gdansk DNA, 2023).

Then it is easy to compare the applied measures at the area at different years or how the citizens or other bodies are engaged in the city scanning (Figure 1.18 and 19).

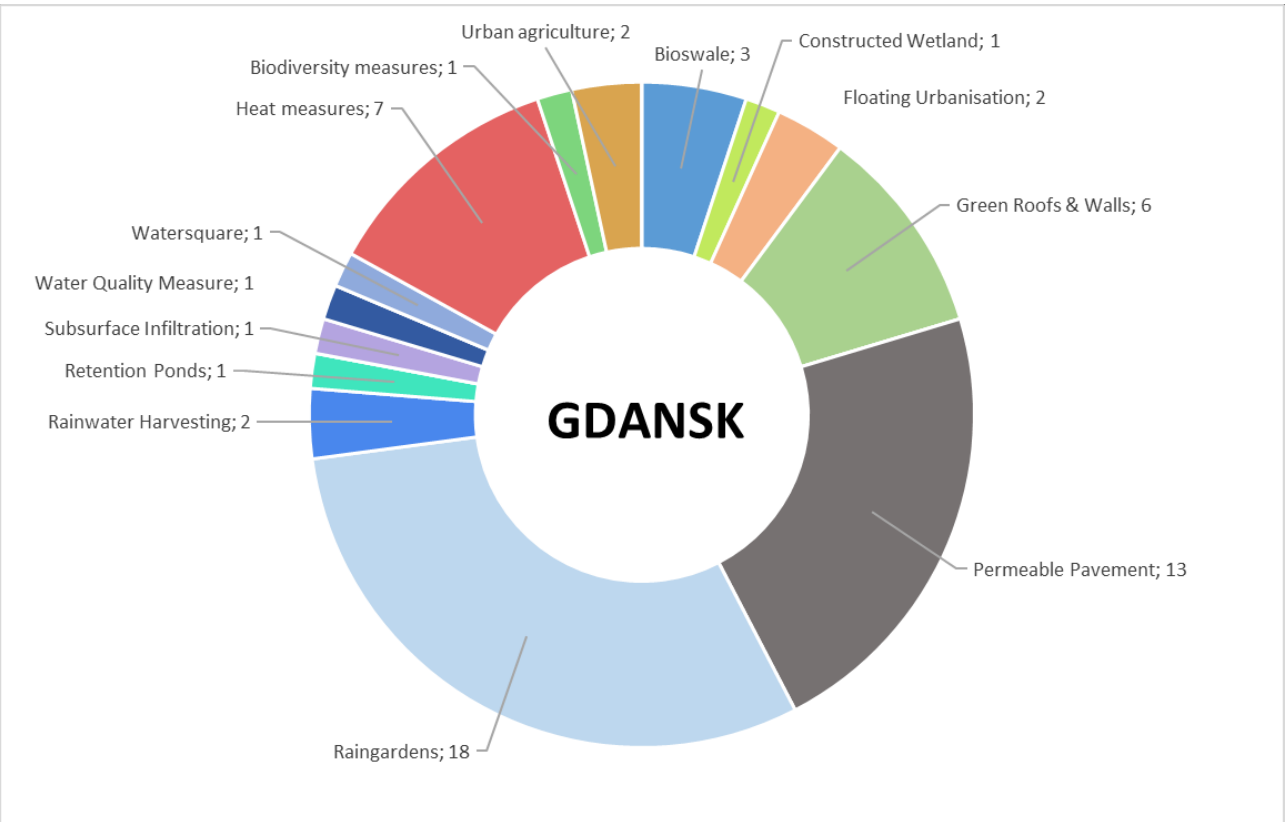

Figure 1.19. Gdańsk DNA 2021.

ClimateScan can give the feedback on the amount of various solutions implemented and described by the database users. These data are as complete and their reliability is based on the users, who scan the city, describe solutions and give the input to the database climatescan.nl. But still they are valuable for the analysis and gaining knowledge on relations between city development, NbS, city climate change problems and strategies to cope with them. Thus, the template of the report on mention above issues was developed which can guide students in processing simple analysis and looking for the solutions among NbS measures to adapt the analysed area. The best results can be achieved considering small neighbourhoods (streets, small districts) but also depending on the amount and value of the data, it can be also used for the cities. In the Tylor-made solutions–report template.doc two cities were presented: Groningen and Gdańsk.

1.5 External materials

See: https://impetus.aau.at/outputs/

Folder: ClimateScan

- ClimateScan instruction.pdf
- Tylor-made solutions-report template.doc

1.6 Literature

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