GOVERNMENT OF MALTA
MINISTRY FOR THE ENVIRONMENT, ENERGY AND ENTERPRISE
MINISTRY FOR THE ECONOMY, EUROPEAN FUNDS AND LANDS
PARLIAMENTARY SECRETARIAT FOR EUROPEAN FUNDS

WATER BE THE CHANGE

EU funds for Malta 2014-2020

CONNECTING THE DROPS: CIRCULAR WATER MANAGEMENT FOR URBAN GREENING

Workshop Day 2

Friday 28th April 2023

Table of Contents

1. Executive Summary

The Circular Water Management for Urban Greening Day 2 Workshop took place on Friday 28th April 2023. The workshop's focus was to highlight the need for more green areas in urban communities as well as encouraged attendees to come up with their own innovative solutions on making water circular economy this a possibility.

The workshop was held at Esplora Interactive Science Centre in Kalkara.

Participants were able to sign up for the workshop through the link https://water.org.mt/join-the-drops/conference-3, where they could fill in a form, or by calling +356 2777 2777, or by sending an email to info@emcs.com.mt to register.

The ample parking spaces and Esplora's perfect location facilitated the attendance of the participants. A standing and packed lunch was organised for all attendees as well where networking was also possible. A coffee break was organised during the Workshop which provided attendees with a short break and an opportunity to network and meet new people.

In total, 86 people attended this conference: consisting of 21 lecturers, mentors, and experts, and 65 students. The attendees were made up of private and public individuals, NGOs, and different ministerial representatives. All attendees registered their attendance at the registration desk. The workshop was open to all, including the general public.

The workshop lasted till the afternoon and was hosted by two well-known TV presenters and moderators: Ian Busuttil and Ashley Peschel who animated the event. The workshop consisted of two presentations delivered by different experts in the sector as well as a presentation from each of the competing teams, consisting of nine presentations overall. Throughout the report, one can find the presentations that were used by the various speakers, as well as the key points of each delivery.

One exhibition stand was set up next to the coffee facilities. Various Water Be the Change campaign related merchandise items including pencils, pens, notebooks and sticky notes were displayed at the registration desk and exhibition stand and handed out to participants, to also use during the workshop. Other merchandise and office supplies were prepared for every individual and placed on their respective tables.

2. Conference Agenda

Date: April 28th, 2023

Venue: Esplora, Kalkara, Malta

Time	
08:30	**Registration & Coffee**
09:00	**Opening of Day 2**
09:15	**Current Innovation Cases – Part 2** Enablers and Barriers to the Uptake of Effective Urban Greening | Dr Mario V. Balzan Irrigation Decision-Making with the Use of Soil Tensiometers | Mr John Galea
09:45	**Further Exploration: From Ideas to Solutions Pitches**
10:45	**Coffee Break**
11:00	**Prepare Pitches**
11:45	**Pitch the Challenges & Solution(s) to The Judges**
12:30	**Closing & Lunch**

3. Detailed report of workshop proceedings

3.1 Opening of Day 2

The moderators welcomed back all those in attendance and outlined the plan for the day. They explained that there will not just be the winning idea but also people that stood out in different categories on each table. The participants were then informed that only the winning team would be announced on the day; winners of other categories would be announced at a later date as the judges will not have enough time to evaluate all characteristics. The other categories were as follows:

- Best Innovator
- Stand out performer
- Most improved performer
- Go that extra mile
- Best thinker
- Best team player

MR BOUDEWIJN GRIEVINK & MS LAURA ROEBROECK, SENIOR PROJECT MANAGER & SENIOR PROJECT LEADER, WIJ ZIJN KATAPULT

Mr Grievink declared that today they would be building on the ideas developed yesterday and continue working on their solutions. Ms Roebroeck outlined the three things the participants will be working on:

- Work on the idea
- Visualise it
- Prepare a pitch

Mr Grievink followed this by assuring that there is no right or wrong, in this exercise and that it all boils up to persistent and innovative ideas are. Ms Roebroeck reiterated that they will be present to help the participants and highlighted the importance of rehearsing their pitch. Mr Grievink added that experts can be referred to for feedback on ideas.

The moderators emphasised the importance of presentation skills, stating that confidence makes a difference. Further stating that the team can choose a team member to present their idea, or they can present it all together.

3.2 Current Innovation Cases – Part 2

DR MARIO V. BALZAN, INSTITUTE OF APPLIED SCIENCES IN MCAST

TITLE: ENABLERS AND BARRIERS TO THE UPTAKE OF EFFECTIVE URBAN GREENING

In his presentation, Dr Balzan acknowledged that a growing number of projects, investments, and policy decisions are looking to incorporate nature and nature-based solutions (NBS). Both community wellbeing and biodiversity conservation could benefit from this. However, Dr Balzan posited a few key questions that are yet unanswered with regard to NBS, such as: their level of effectiveness and multifunctionality, as well as identifying their enablers and barriers.

Dr Balzan highlighted both the importance of population density and social status. Urban greening is not just about water, air, and playgrounds; it is also a social issue. In the presentation, three steps are outlined in order for the ecosystem benefits to arrive to beneficiaries. These are perceptions, institutions, and infrastructures. In terms of perception, there are many barriers. According to Dr Balzan, there needs to be an increase in awareness through means of developers and promotors. There is a lot of guidance on an international scale, but not on a local level.

Question: How do you select the areas? As space in Malta is an issue.

According to Dr Balzan, the first step is to assess what there is so far; to conduct a study looking where there is a demand for benefits. The second step is to then prioritise. He went on to highlight the importance of thinking bigger and wider. Dr Balzan added that although he is not a water specialist, he is a scientist, as are most of the people attending the workshop, and in science, data is what is used to make decisions.

Question: For public areas, what type of greening would be the most beneficial with respect to the lack of water requirements?

Dr Balzan sighted that in his presentation, where ecosystem regulation was looked into, tree cover was found to be quite important. Thus, there is a very strong relationship. There are other services which were looked into that are cultural: where people are going for recreation, what is of highest aesthetic value, or highest cultural value, and so on. Dr Balzan concluded that it is not about tree cover, rather it is about the type of green space.

JOHN GALEA, CENTRE OF AGRICULTURE, AQUATICS AND ANIMAL SCIENCES IN MCAST

TITLE: IRRIGATION DECISION-MAKING WITH THE USE OF SOIL TENSIOMETERS

Mr Galea disclosed a case study he worked on a couple of years ago. The scope of his study was to show the farming community a way to manage irrigation for their crops in a manner that is straightforward and efficient with the main goal being to use less water while still being productive and efficient. Reason being is that currently, farmers in Malta do not have the tools to measure the amount of irrigation needed.

In Mr Galea's presentation, a soil tensiometer is defined as a tool which measures the level of force roots need to exercise in order to absorb water from the soil. Prior to inserting the tensiometer into soil, it is first filled up with water and made sure that no air bubbles are trapped in. Mr Galea explained that if the soil is dry, the pressure gauge will give a high reading, while if the soil is wet, the pressure is reduced and will produce a low reading. Thus, the higher the pressure, the less water is present in soil. The tensiometer does not require power or electricity. According to Mr Galea, irrigating till field capacity is optimal. Hence, it is crucial to stop before the wilting point as it influences production.

In the aforementioned case study, two tensiometers were placed in the same row, between two plants, at different depths. Mr Galea elaborated that the deeper tensiometer is used to regulate the amount of water needed while the shallow tensiometer is used to determine when irrigation is needed.

Mr Galea concluded that although the case study cannot be replicated, farmers would know exactly when to irrigate as guess work would be removed with the help of tensiometers. No power consumption is needed, and they are very easy to store. Furthermore, crops would need less water when they are developing. However, the farmer still needs to assess the amounts needed and two soil tensiometers are needed for each crop.

3.3 Pitching the Challenges & Solutions to the Judges

The workshop challenge commenced their tasks for the day again during this section. The moderators introduced the judges and stated that each team would only have five minutes to give their pitch and that rules on time are very strict.

The judges were as follows:

- Ms Laura Roebroeck, Senior Project Leader, Wij Zijn Katapult
- Mr Marco Cremona, Water Treatment Engineer
- Mr Robert Vassallo, Ambjent Malta
- Mr Malcolm Borg, Centre of Agriculture, Aquatics and Animal Sciences, MCAST
- Mr Manuel Sapiano, CEO, Energy and Water Agency

Once time to prepare for the pitch elapsed, the 9 teams had to present it in front of the other teams, lecturers, experts, and judges.

TEAM GREEN

TITLE: FROM GREY TO GREEN – URBAN GREENING

Team GREEN tackled the issue of lack of knowledge on native species. Their aim was to educate the public on native species and elaborate on how they are adapted to the climate. The team created a questionnaire which involved questions that focus on presenting the study for the campaign. The campaign would be designed based on the results obtained from the survey. Team GREEN stated that their reason for choosing to go for a campaign was due to the fact that campaigns can be very successful. Leaflets would also be provided, as displayed in their presentation. Part of the team's plan included creating a nursery filled with native species with the purpose of educating and creating awareness. This nursery would be open for all ages and a starter pack would be given out to those who visit the nursery. They also discussed their future plans of creating an app to help people grow their plant and so that they could go see these plants in their natural habitat.

TEAM BLUE

TITLE: RAINWATER HARVESTING AND URBAN BIOSWALES

The challenge tackled by the BLUE team was how to use rainwater effectively. Team BLUE stated that they would target both commercial and residential reservoirs, but mainly residential. They further stating that the existing reservoirs situated in residential homes

are mostly neglected or lost their use. Their main target is to find individuals with legal connections so as to advocate for policy change for bill subsidies to pass through. Tanks are impermeable and so will collect dirt. Bioswales have the option of letting water drain if there is no use for it; there is a valve that can be opened which allows water to run through the streets and be collected through the water table. Team BLUE assured that the project would be fully sustainable and indicated that they would also introduce other bioswales.

Question

Mr Cremona: Is the intention to use the rainwater in the house?

According to Team BLUE, people will be given the option. They plan on doing this by mitigating the legal connections.

TEAM PINK

TITLE: THE MITIGATION OF FLOODS THROUGH BIOSWALES AND WETLANDS IN BURMARRAD ROAD

For their pilot project, Team PINK announced that they would be mitigating floods in Burmarrad road through bioswales and wetlands. The location was chosen due to the area's tendency of flooding. In the presentation, a bioswale is described as a piece of land that is between the road and pavement and is used to gather and filter contaminated stormwater runoff. Team PINK asserted that this would give pedestrians a feeling of safety.

In Team PINK's bioswale, endemic and indigenous plant species would be planted as they would have a higher resistance to being uprooted. The bioswale has to be able to percolate as much water as possible while also retaining enough water. As demonstrated in the presentation, water would flow from the bioswale to the wetlands to a sediment tank to a pump room and finally to a reservoir.

Questions

Mr Borg: Will this take up any land?

Team PINK affirmed this to be the case. However, positing that they would only take up land of specific farmers who are interested.

Mr Cremona: What maintenance is required to preserve the bioswales?

According to Team PINK, the bioswales would not need a lot of maintenance. The only maintenance needed would be that which is long term such as the filter room. Adding that the filter room is approximately the size of a pool's filter room, so it is a small room that is above ground and easy to access.

TEAM PURPLE

TITLE: HIDRA (HYDROPONIC INTEGRATED DOMESTIC RENEWABLE ALTERNATIVE SYSTEM)

Team PURPLE stated that the average person uses 110 litres of water every day. Thus, the team's aim was to reduce water by reusing it. Four main objectives were outlined as follows:

- Reduce water and electricity bill
- Clean the air
- Improve overall well-being
- Provide an ecosystem service

This mission consisted of two phases:

1. Hydroponic System
2. Roof Garden

One section of the roof garden would be dedicated to solar panels while the rest would be used as a green roof; it would be an area where people could relax. Drawbacks of such a project include limited space, property value increases and hence limited access, and PV panels are weather dependent. However, Team PURPLE assured a multitude of benefits to those who would like to invest in HIDRA, listing environmental, social, and economic benefits.

Questions

Mr Vassallo: Where do you plan to store the rainwater?

Team PURPLE explained that there would be a tank on the roof and that is where all the water will be stored.

Mr Borg: When it comes to the consumption of water by the plants, I do not think it will be a closed looped system. This will be a system where you pass the water through the plants and then discarding it.

Team PURPLE stated that further research needs to be done on this. However, they maintained that the idea is for the water to lead towards the toilets, but first the water would need to be treated.

LIGHT BLUE

TITLE: URBAN GREENERY, URBAN HAPPINESS

Every rainfall event, roughly half of the water is lost to surface runoff and urban areas. Team LIGHT BLUE came up with a plan to mitigate this. They discussed two ideas:

1. Bioswales
2. Permeable paving

In the presentation, bioswales were compared to a trench where water can be gathered but is also filled up with soil, which acts as a filtration system. This has been seen in Texas, which has a similar climate to Malta. The team explained that bioswales absorb rainwater and remove the pollutants, in addition to being aesthetically pleasing. Bioswales are also known to reduce heat island effect and increase overall well-being.

Team LIGHT BLUE stated that pavement which is permeable could be seen in Ta' Pinu and Mosta. Permeable pavements have pores and water can go in between the gaps and be filtrated. When incorporated with bioswales, flooding would be reduced. The pilot site for this project would be located in Swatar due to the high flooding tendencies of that area.

Prior to implementing this project, Team LIGHT BLUE stated the importance of raising awareness and including all generations.

Question

Mr Sapiano: Would there be negative impacts?

The team sited the cost of this project as the main issue.

ORANGE TEAM

TITLE: IMPROVE THE QUALITY AND REUSE GREYWATER

The aim for Team ORANGE was to improve quality and reuse greywater while sustaining the environment. Housing in St Paul's Bay was chosen as the location for this project. Renovations and piping systems would need to be done. The end result would be cleaner, reusable water to reuse and store water.

Questions

Mr Cremona: Why did you zone in on this specific area?

The chosen area is a housing system and thus, is managed by the Government. Due to this, Team ORANGE stated that the cost would be covered by the Government itself.

Mr Vassallo: Did you estimate the amount of water you would be collecting?

Team ORANGE estimated that 80% of the water would be saved from going into the street.

TEAM RED

TITLE: INEFFICIENT USE OF WATER IN AGRICULTURE

The problem chosen by Team RED was the inefficient use of water in agriculture. More specifically, the difference in substance between new water and ground water. The team came up with the idea of an app for farmers so that they could use it to mix new water and ground water. This app would help advise farmers in getting the correct ratio.

Measurements such as the pH of soil, temperature, crop type, level of sunlight, and so on need to be taken into consideration, as well as the electrical conductivity. Team Red affirmed that equipment would be needed for this, such as smartphone, tensiometer, and electric conductivity meter.

Farmers would need to upload the information then the app utilises this information and guides them. Eventually, the team would like to expand the app. The presentation was concluded by showcasing their slogan, “AgriBlue”.

Question

Mr Cremona: Do you expect farmers to invest and learn how to use these instruments? Or do you plan to provide this service for them?

The team stated that the app would have to be developed from a policy level. However, it is the farmer’s responsibility to buy the equipment.

TEAM YELLOW

TITLE: REVIVING GZIRA'S EMPIRE STADIUM

Team YELLOW's aim was to reuse greywater and rainwater for a greener approach. They would do this by choosing a location that is surrounded by buildings: The Empire Stadium. This stadium is no longer in use and so, according to Team YELLOW, is perfect for this project. There is a pumping station located next to the stadium which could be used to treat water. Certain areas would use rainwater while other areas would use new water. Part of the renovation plan included green walls which are placed for maximum environmental cleaning.

TEAM WHITE

TITLE: A VISION: GREYWATER TREATMENT SYSTEM AND GREEN SPACES AT MCAST

The idea Team WHITE posited was that of using greywater for flushing systems and using the leftover water for cleaning up the space. The problem to be tackled is the issue of flooding in MCAST. To combat this problem, a green area would need to be built. Even though there might be water leftover from the treatment system, there might not be enough for woodlands. Additionally, if trees were to be planted, they would have to be at a distance as their roots could cause damage to the buildings. In their presentation, Team WHITE listed numerous benefits this project would have, namely, efficient water usage and accessibility, as the green area would be accessible to all.

Question

Mr Cremona: What kind of greywater do you plan to collect?

The team stated that they only plan to collect water from the sinks and the toilets.

COMPETITION RESULTS

After the lunch break, Mr Sapiano announced that second place was a tie between Team BLUE and Team PURPLE. First place was given to Team LIGHT BLUE.

5. Presentations

Enablers and Barriers to the uptake of effective urban greening

Dr Mario V Balzan
Mario.balzan@mcast.edu.mt

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Photo - DOI - Jeremy Wonnacott

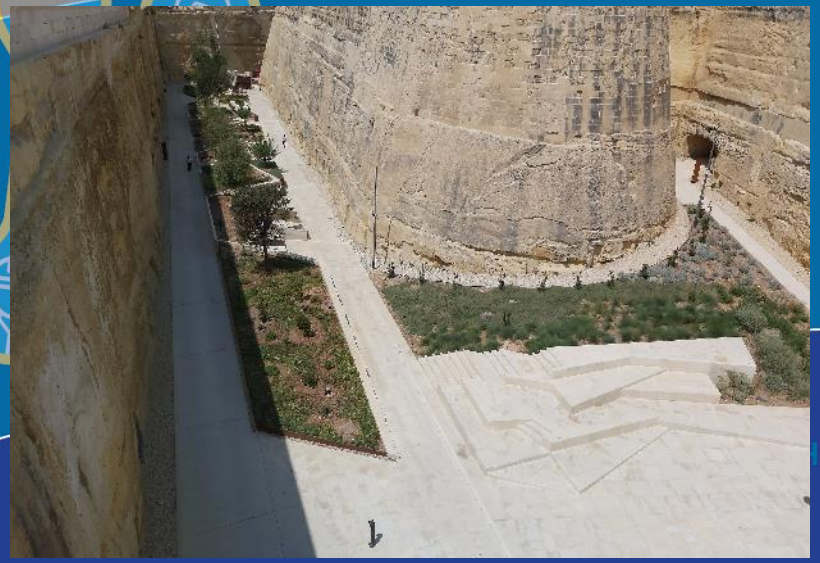
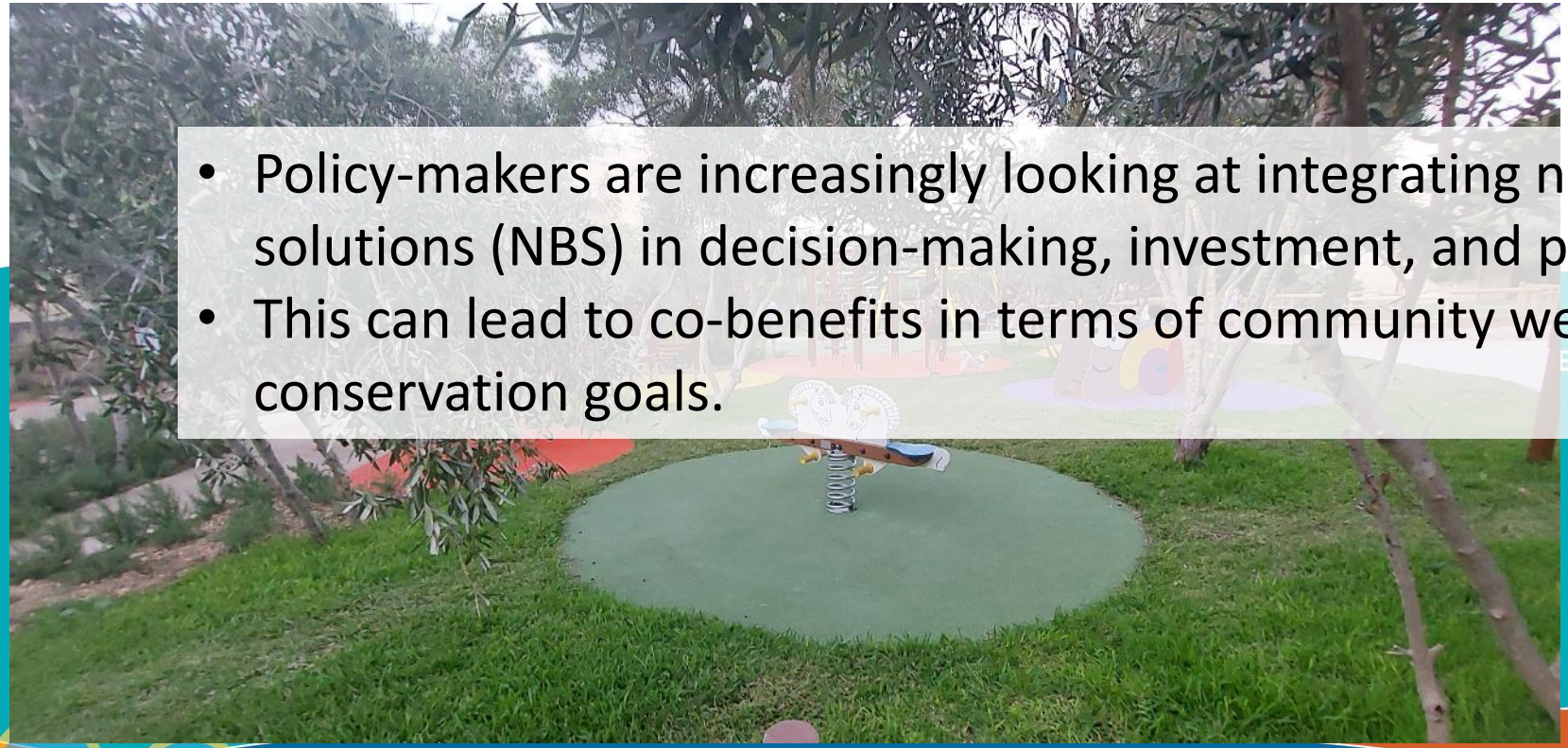


Photo – DOI – Pierre Sammut

- Policy-makers are increasingly looking at integrating nature and nature-based solutions (NBS) in decision-making, investment, and projects.
- This can lead to co-benefits in terms of community well-being and biodiversity conservation goals.



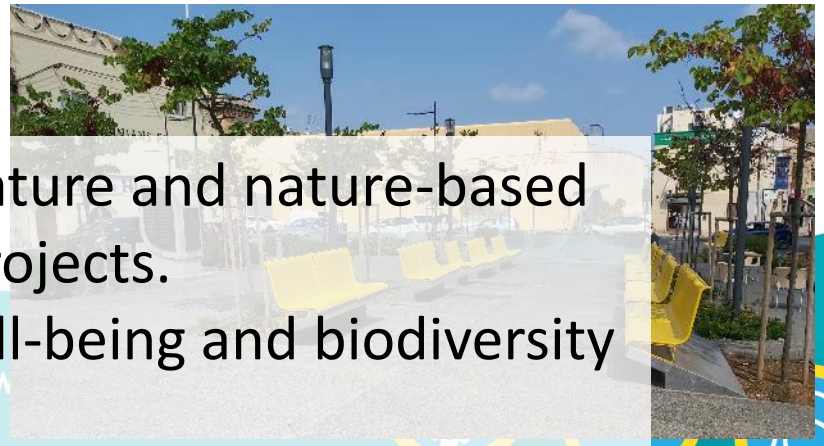
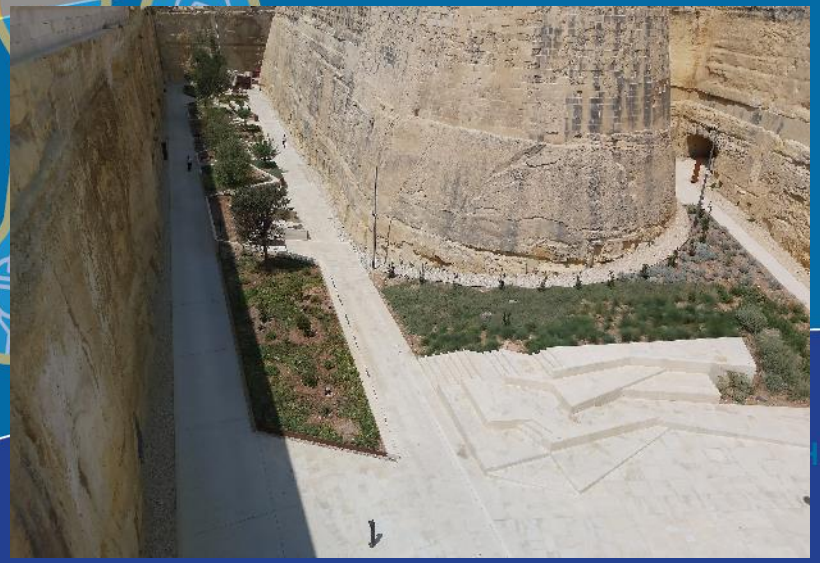


Photo - DOI - Jeremy Wonnacott



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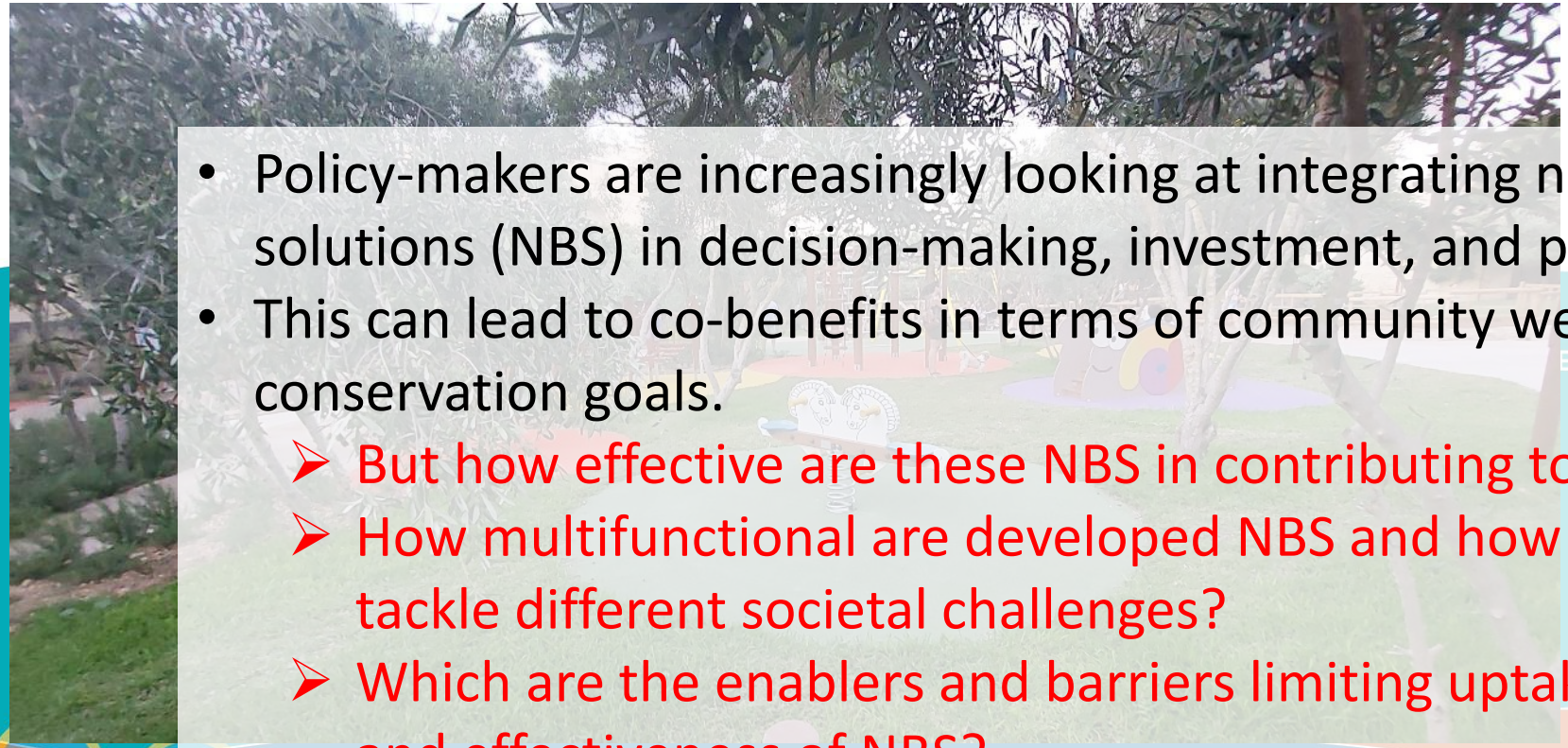
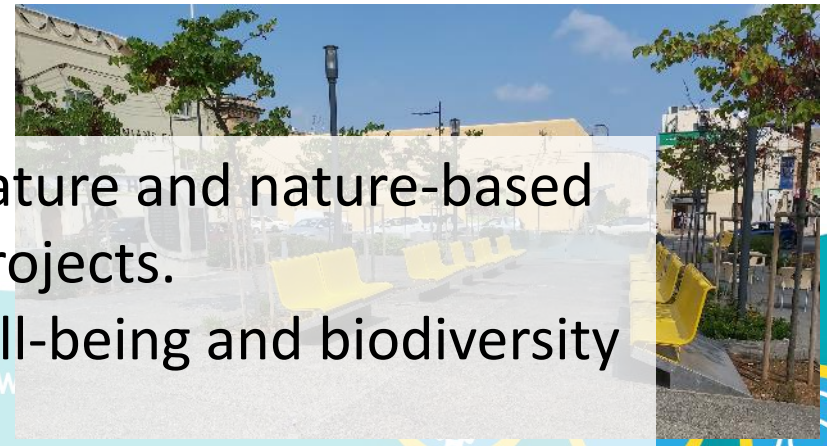
- Policy-makers are increasingly looking at integrating nature and nature-based solutions (NBS) in decision-making, investment, and projects.
- This can lead to co-benefits in terms of community well-being and biodiversity conservation goals.
  - ➢ But how effective are these NBS in contributing to co-benefits?
  - ➢ How multifunctional are developed NBS and how well-suited are these to tackle different societal challenges?
  - ➢ Which are the enablers and barriers limiting uptake, multifunctionality and effectiveness of NBS?





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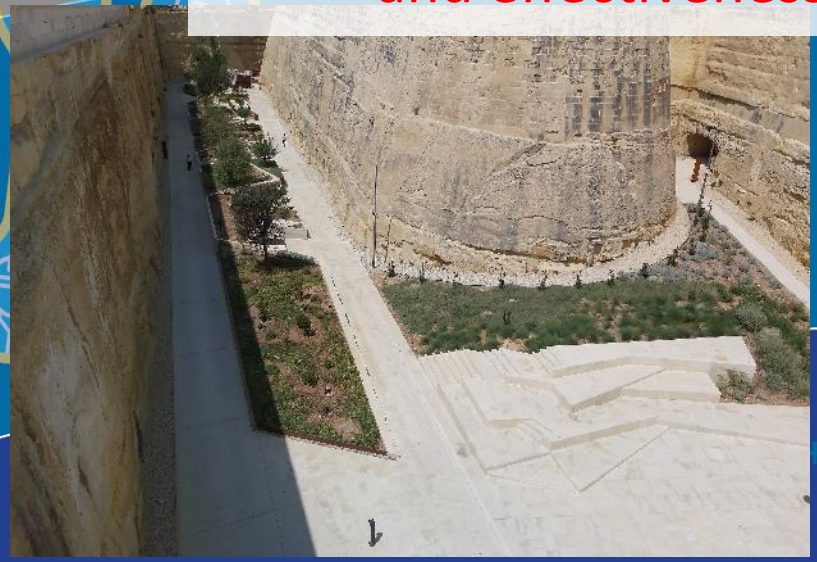

Photo – DOI – Pierre Sammut

- **Insights from the Malta case-study**: an archipelago with an interesting biogeography, high biodiversity but long cultural history; agricultural land cover is approximately 50%; urban land cover is c. 30% of the land surface
- Average population density is c. 1400 per Km^2
- Strong urbanisation and tourism trends; highest population density in EU
- *An interesting test for the application of the ecosystem services (ES) concepts – urban, terrestrial, coastal & marine ecosystems types in an island context*

- **Insights from the Malta case-study**: an archipelago with an interesting biogeography, high biodiversity but long cultural history; agricultural land cover is approximately 50%; urban land cover is c. 30% of the land surface
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- *An interesting test for the application of the ecosystem services (ES) concepts – urban, terrestrial, coastal & marine ecosystems types in an island context*

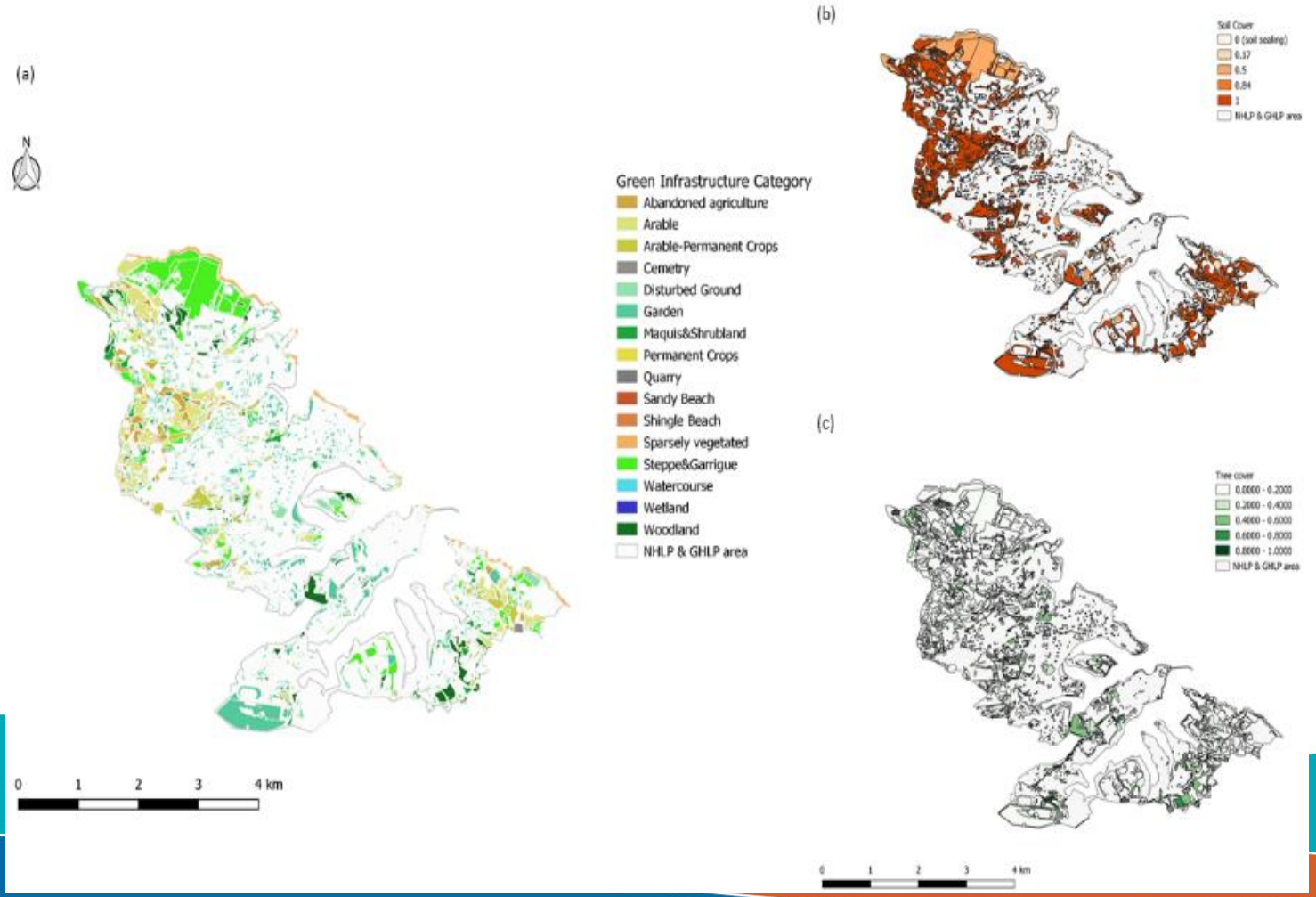
But how effective is current green space management?

Case-study located within Malta's Grand Harbour area (Valletta and surroundings)).

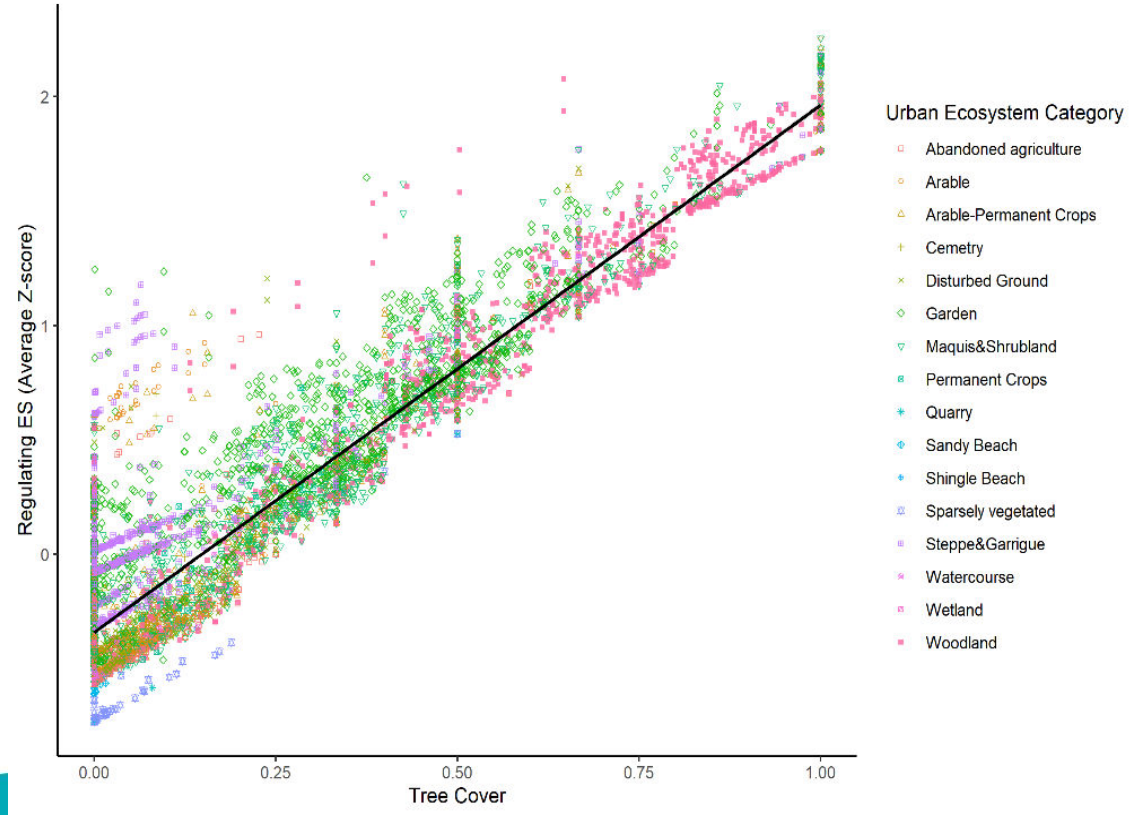
Case-study surface area: 22.21 km^2 (or 7.03% of the land surface

Population density: 6,658 ± 4,629 persons per km2.

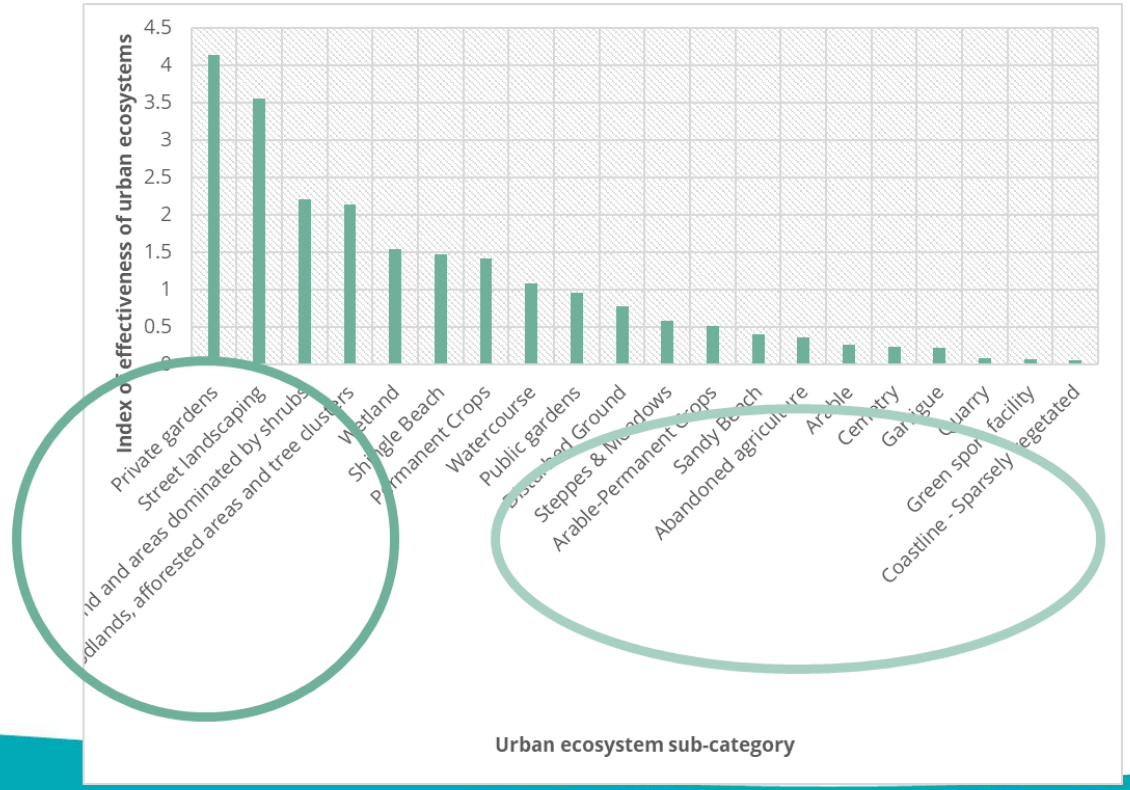
A total of 15 ecosystem services were mapped by Balzan et al., 2021.



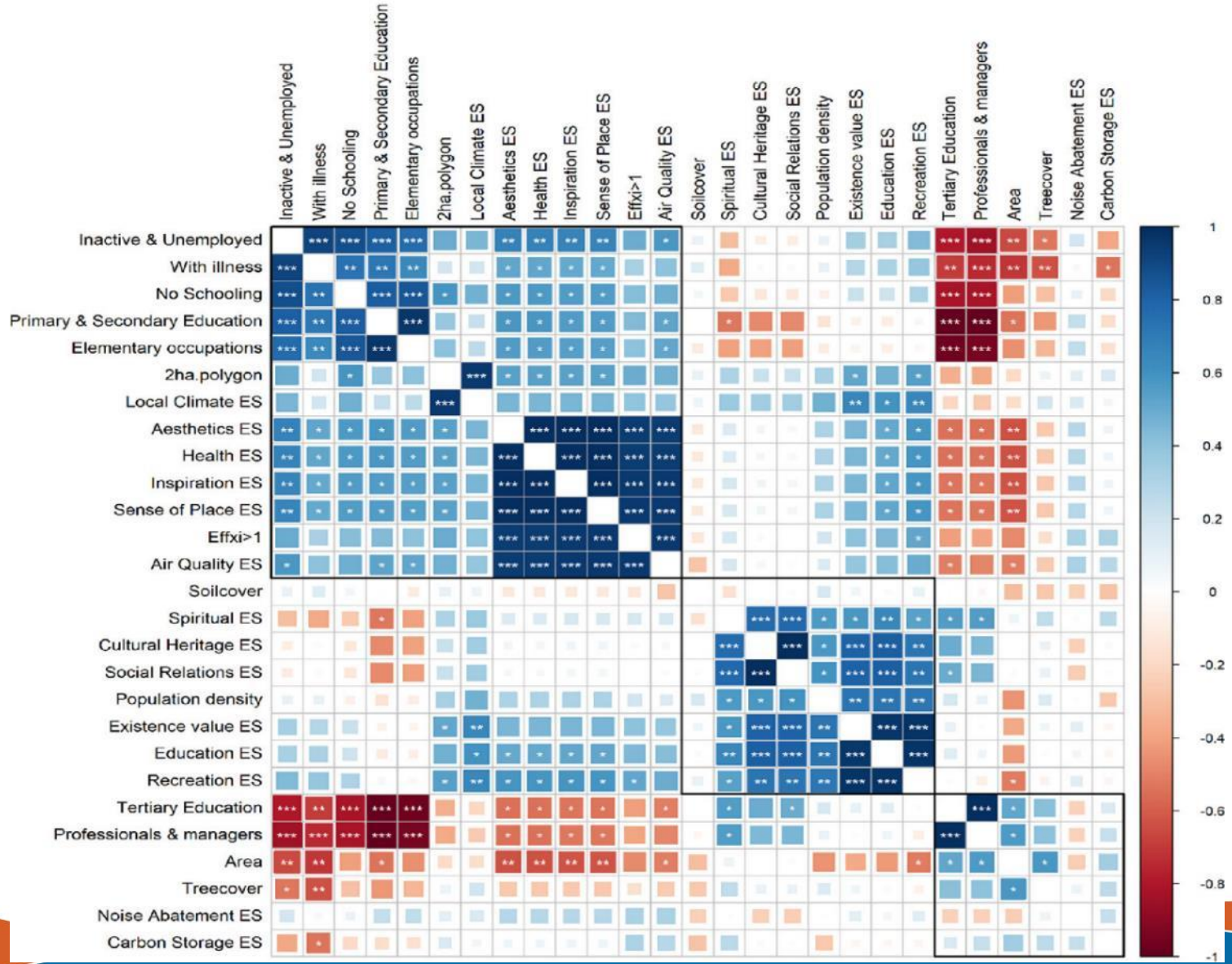
But how effective is current green space management?



Index of Effectiveness (RES: unit area)



Source: Balzan et al., 2021, Nature-based Solutions

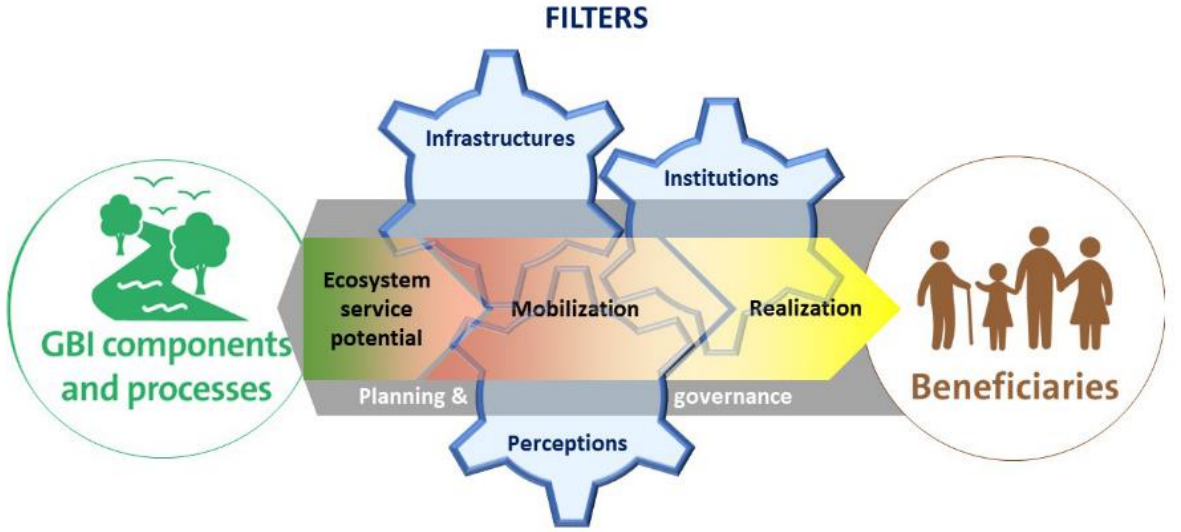


Who benefits?

Source: Balzan et al., 2021, Nature-based Solutions

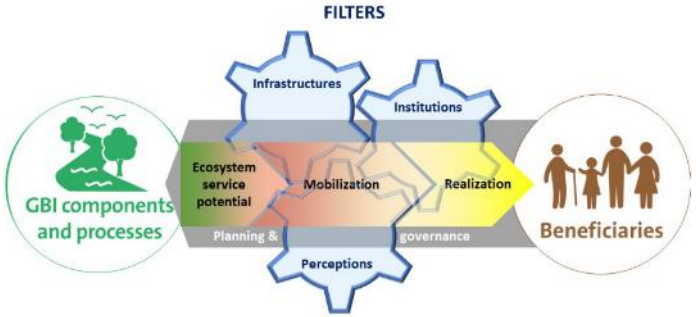
Enablers and Barriers

Filters shape the 3 steps in the flow of benefits from ecosystems to beneficiaries: perceptions, institutions, infrastructures (Andersson et al., 2021a, 2021b)

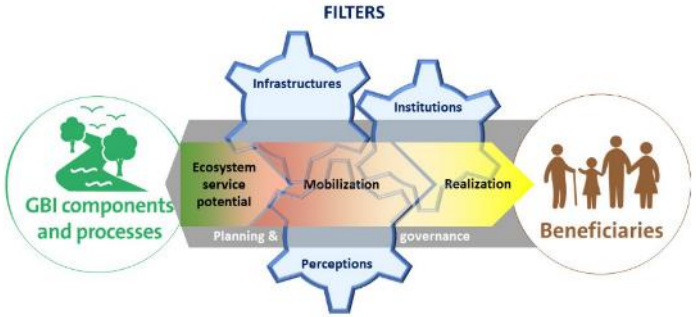


	Potential	Mobilisation	Realisation
Perceptions	✕ Need to increase public awareness of NbS alternatives and benefits	✕ Need to increase opportunities for NbS co-creation and co-design with communities	✕ Need to tackle the perception that NbS are high-cost alternatives
	✕ Need to increase awareness by developer/promoter of NbS alternatives to traditional vision focusing, primarily, on grey solutions		

Enablers and Barriers



	Potential	Mobilisation	Realisation
Institutions	✗ Lack of Cost-benefit assessments ✗ Low institutional capacities	✗ Lack of interdisciplinary approaches ✗ Lack of practical guidance at a national/local scale	✗ Difficulty in establishing coordination/cooperation between different entities ✗ Lack of ongoing compliance monitoring and standards at national/local scales
	✓ NbS are considered as CSR actions for businesses ✓ Interdisciplinary approaches involving multiple stakeholders ✓ R&I actions fill knowledge gaps and lead to new guidance for context adapted NbS at local scales ✓ Alignment with national and regional SD targets	✓ Availability of guidance documents produced by regional (e.g. EU, IUCN) scales supports local implementation ✓ Funding availability	



	Potential	Mobilisation	Realisation
Infrastructure	✕ Limited space availability for NbS implementation & competing value of land	✕ Need for better integration of NbS principles in the terms of reference of projects upgrading existing public infrastructure or leading to new private development	✕ Need to tackle the potential negative impacts (disservices) arising from NbS implementation
	✕ Few positive NbS examples are available at the national and regional level	✕ Finding a balance between planning for new NbS and protecting cultural heritage	✕ Need to improve the understanding of irrigation requirements of NbS in a Mediterranean climate

(Source: Balzan et al., 2022, Nature-Based Solutions)

Conclusions

- Increasing interest in greening cities through nature-based solutions. But how effective are interventions in leading to benefits to biodiversity and well-being to communities?
  - Measures of effectiveness are needed. How well do NbS interventions contribute to net benefits to ***biodiversity*** *(e.g. bird, pollinator species records);* ***ecosystem services*** *(e.g. runoff reduction; noise mitigation; local climate regulation and* ***well-being*** *(e.g. health impact; recreation; social interactions; who benefits?)*
- Key challenges and opportunities for increased uptake of nature-based solutions have been identified for the perceptions, infrastructure and institutional filters.

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THE ENERGY & WATER AGENCY IN COLLABORATION WITH MCAST & UNIVERSITY OF MALTA INVITE YOU TO AN INTERACTIVE WORKSHOP ON:

CONNECTING THE DROPS

CIRCULAR WATER MANAGEMENT FOR URBAN GREENING

THU 27TH APRIL 2023 | FRI 28TH APRIL 2023

WATER.ORG.MT

Irrigation decision-making with the use of soil tensiometers

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- Water is a limited resource in Malta
- High demand for fresh water for domestic use, industrial, farming
- Farmers rely only on their experience and intuition to decide how much to irrigate and when

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Scope of research

- Demonstrate to the farming community a simple and effective way to manage irrigations for their crops
  - Schedule irrigations (i.e. when the crop needs irrigation)
  - Quantity of irrigation water needed
- Overall objective: reduce wastage of water but remaining productive

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Research question

- Can the use of soil tensiometer help farmers to decide when and for how long to irrigate their crops?'

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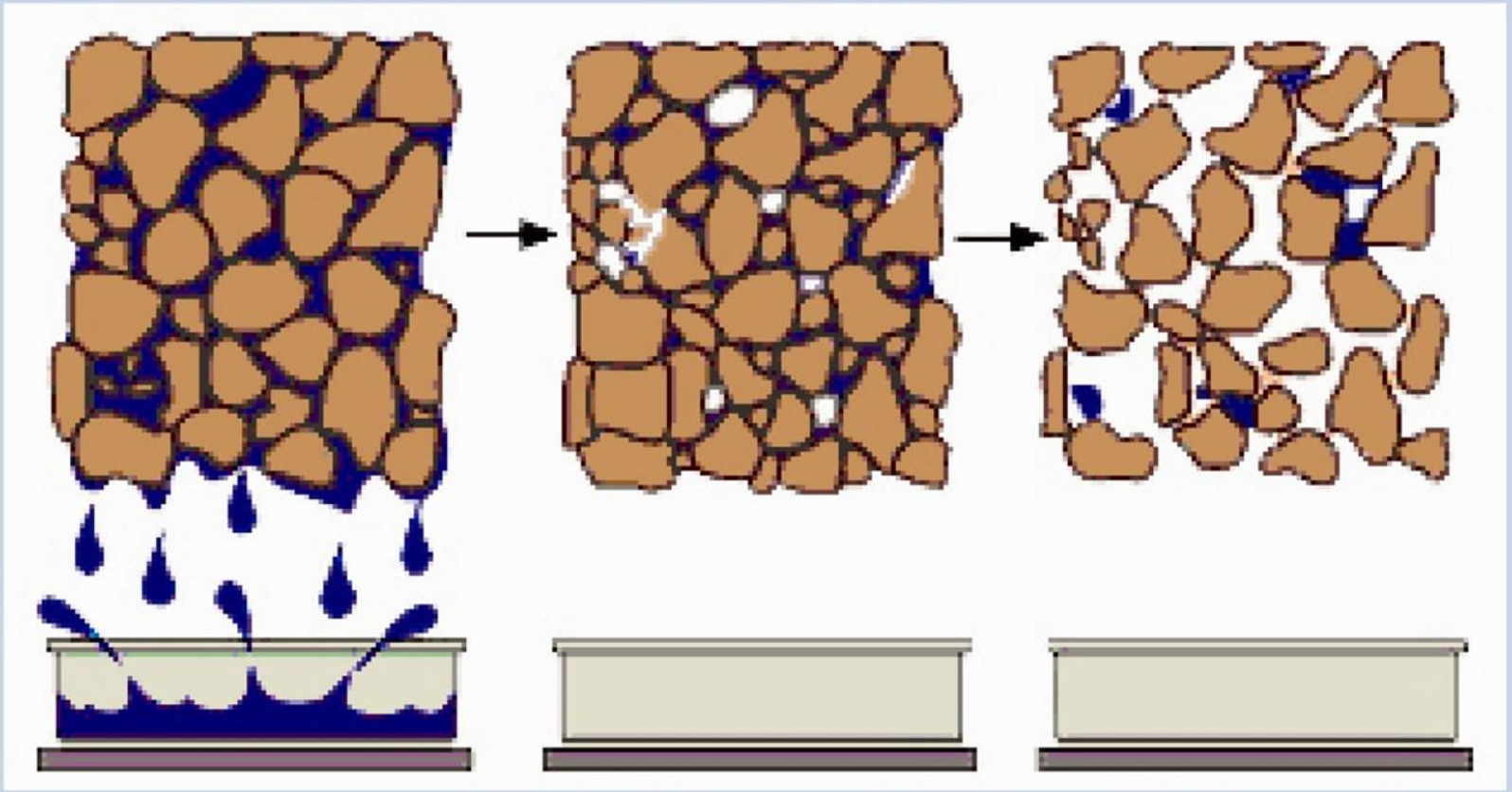
What is a soil tensiometer?

- Measures the amount of force that roots need to exert to take up water from the soil.
- Soil water tension – the amount of force that is holding the water in the soil
- Expressed in kPa
- More water in soil = low kPa reading
- Dry soil = high kPa reading

WATER
BE THE CHANGE



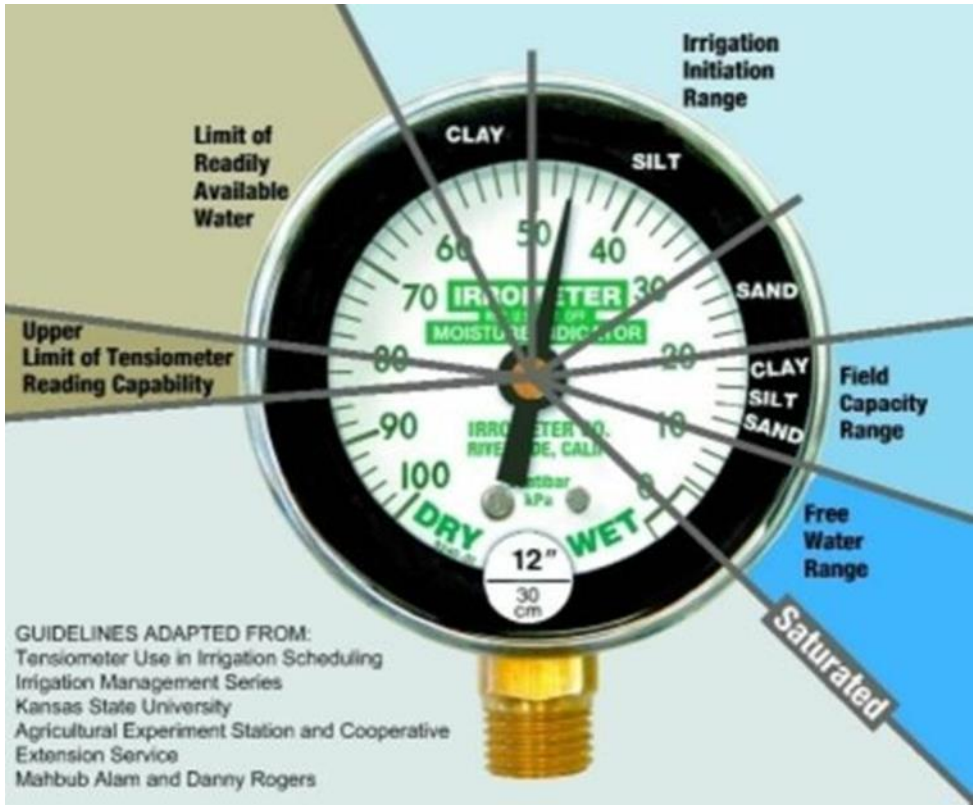
SATURATION
All pores are full of water. Gravitational water is lost.

FIELD CAPACITY
Available water for plant growth.

WILTING POINT
No more water is available to plants.

WATER
BE THE CHANGE

- Aim is to irrigate until **Field Capacity** is reached i.e. the quantity of water that a soil can hold against the force of gravity
- But do not let the soil dry enough to cause any stress to the plant especially do not reach wilting point!
- Soil tensiometer acts like an artificial root, it interacts with the soil through he ceramic tip



WATER
BE THE CHANGE

Experiment method

- Potato crop
- Planting date: mid-January, Harvesting: early June
- Planting distance: 1.3 x 0.3m
- 6 rows with tensiometer (experiment group)
- 6 rows without tensiometer (control group)

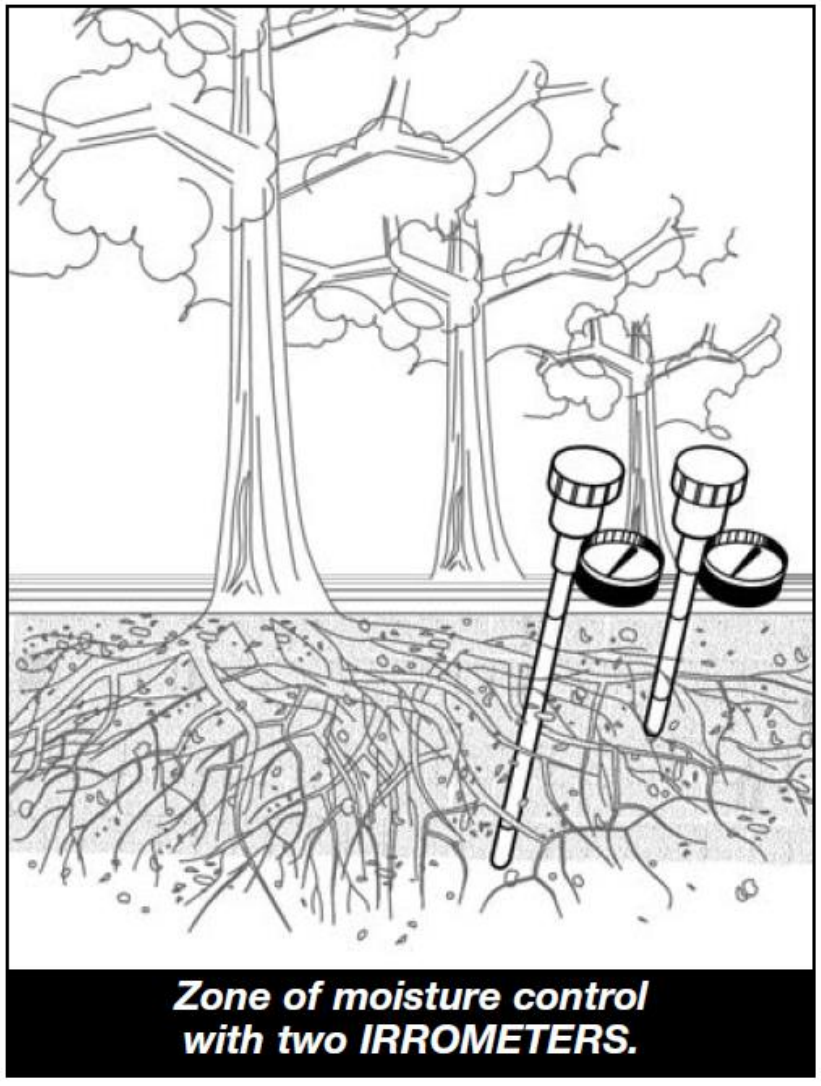
WATER
BE THE CHANGE

Placement of tensiometers

- Two tensiometers were inserted in between two plants of the same row, one at 30cm depth (in the middle of the root zone) and one at 45cm depth (at the bottom of the rootzone).
- **The shallow tensiometer** is used for determining **when** irrigation is needed and the **deeper tensiometer** is used for **adjusting** the amount of water to apply (when to stop irrigating).

WATER
BE THE CHANGE

Placement of tensiometers



Zone of moisture control with two IRROMETERS.

- Irrigation started when the shallow tensiometer reading was between 35 and 45kPa.
- When the shallow tensiometer reads between 0-15kPa and the deeper tensiometer reads between 15-25kPa, irrigation was stopped.

Reference:
Irrometer Moisture Indicator Reference Book

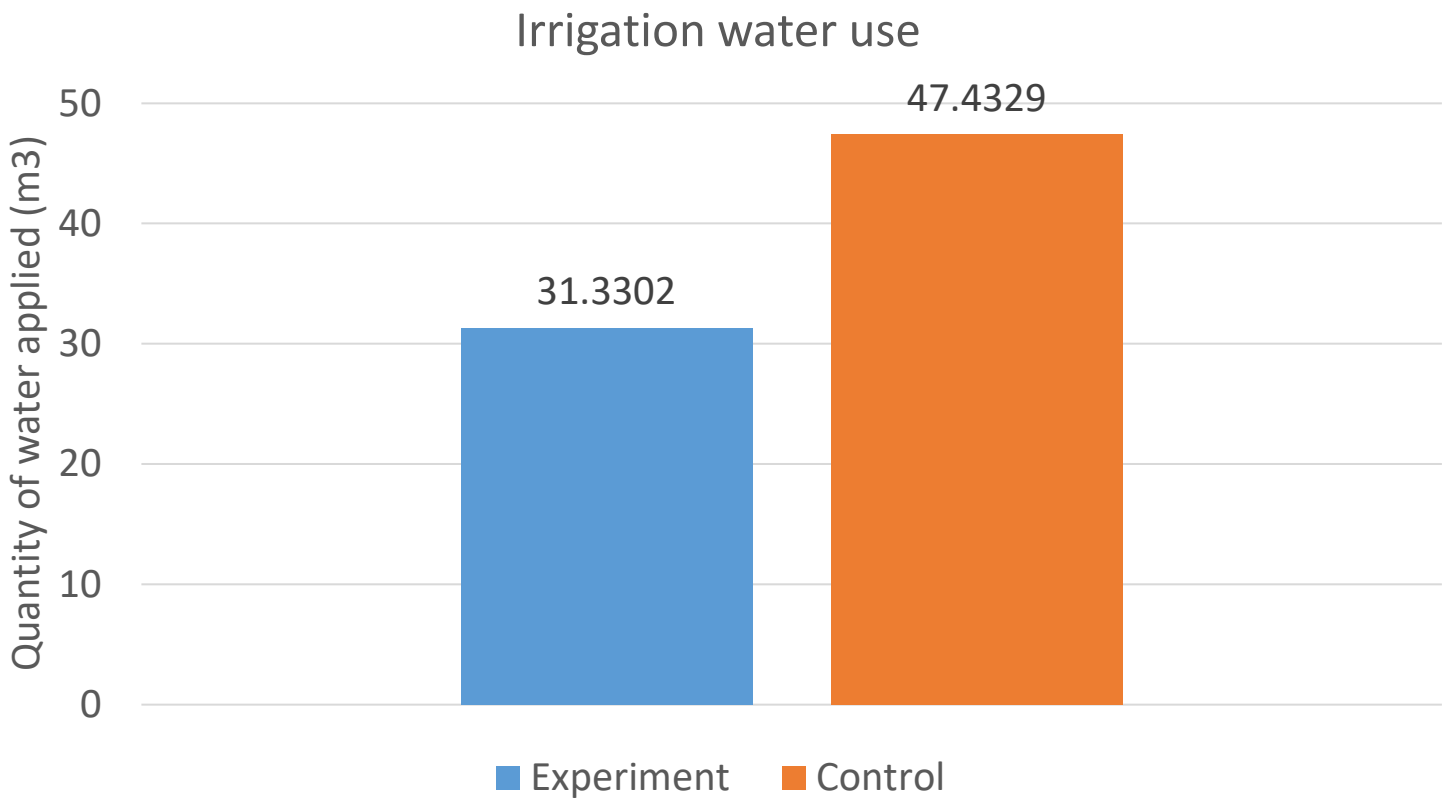
WATER
BE THE CHANGE

Shallow tensiometer (35cm long)

Deep tensiometer (45cm long)

WATER
BE THE CHANGE

Results

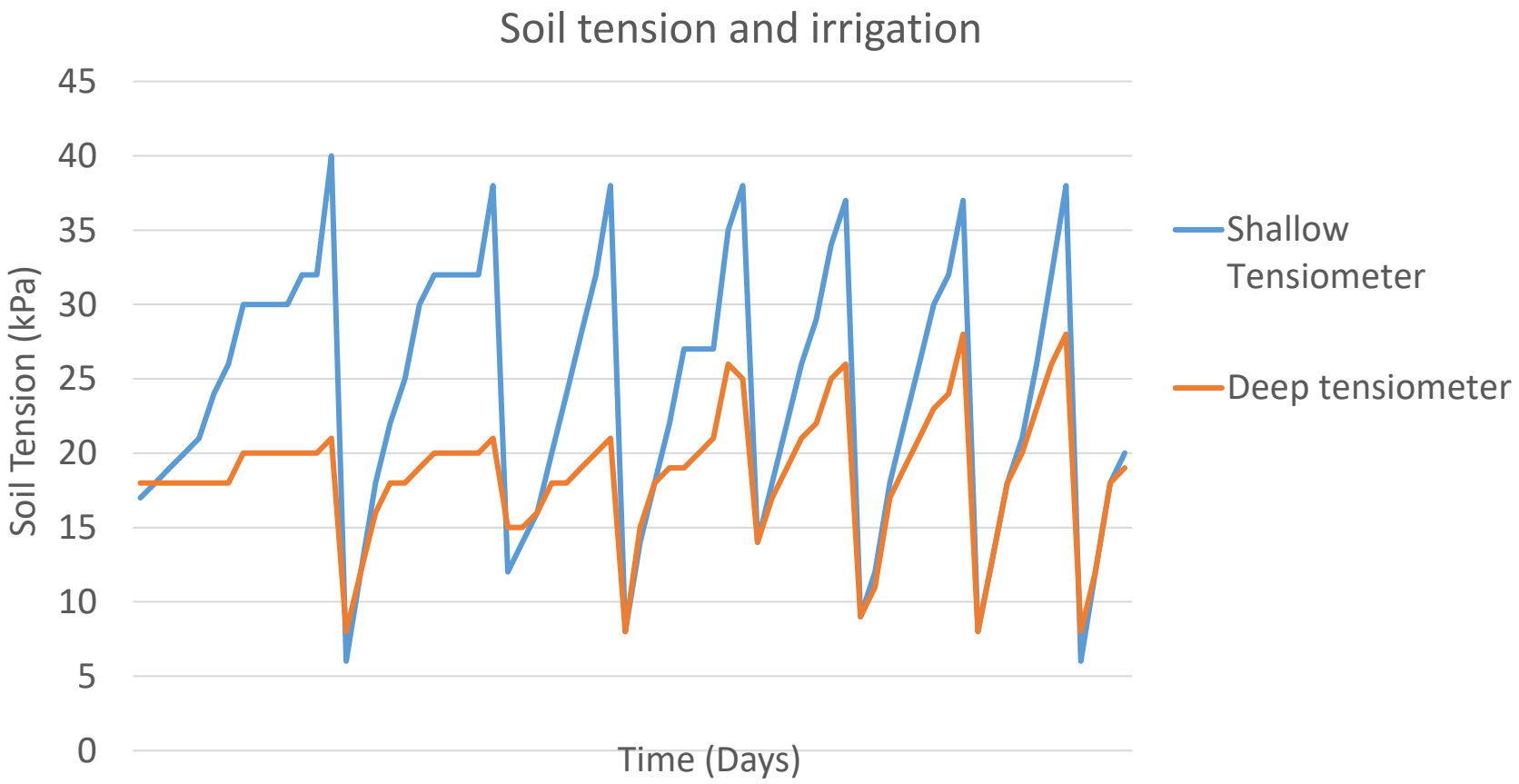


Experiment group – 9 irrigations

Control group – 14 irrigations

WATER
BE THE CHANGE

A bar graph showing the water used for irrigation purposes in the experimental and control groups over the duration of the research



Irrigation timing (in days) showing soil tension (kPa) for the shallow and deep tensiometers (blue and orange lines respectively)

WATER
BE THE CHANGE

	Total yield (kg)	Total irrigation (m^3)	WUE (kg/m^3)
Experiment	723.7	31.3302	23.1
Control	769.6	47.4329	16.2

WATER
BE THE CHANGE

The cost of water, the total price of potatoes, and the returns (in euro)

	B	A	C	D	E
	Total irrigation (m^3)	**Total yield (kg)**	**Total cost of water (€)**	**Total price of Potatoes (€)**	**Return (€) (D-C)**
Experiment	31.33	723.7	68.61	578.96	510.35
Control	47.43	769.6	103.88	615.68	511.80

WATER
BE THE CHANGE

Conclusions

Although statistically the experiment was not significant (i.e. figures obtained are due to chance), one can realise that tensiometers can:

1. reduce the irrigation volumes whilst obtain good productions
2. remove the guess work of when and how much to irrigate
3. User friendly and easy to install and maintain with no need of power supply
4. will only take into consideration the soil water tension and not the physiological need of the plant e.g. crop next to harvest will need less water compared to the same crop at development stage
5. each crop will need a set of soil tensiometers

WATER
BE THE CHANGE

GOVERNMENT OF MALTA

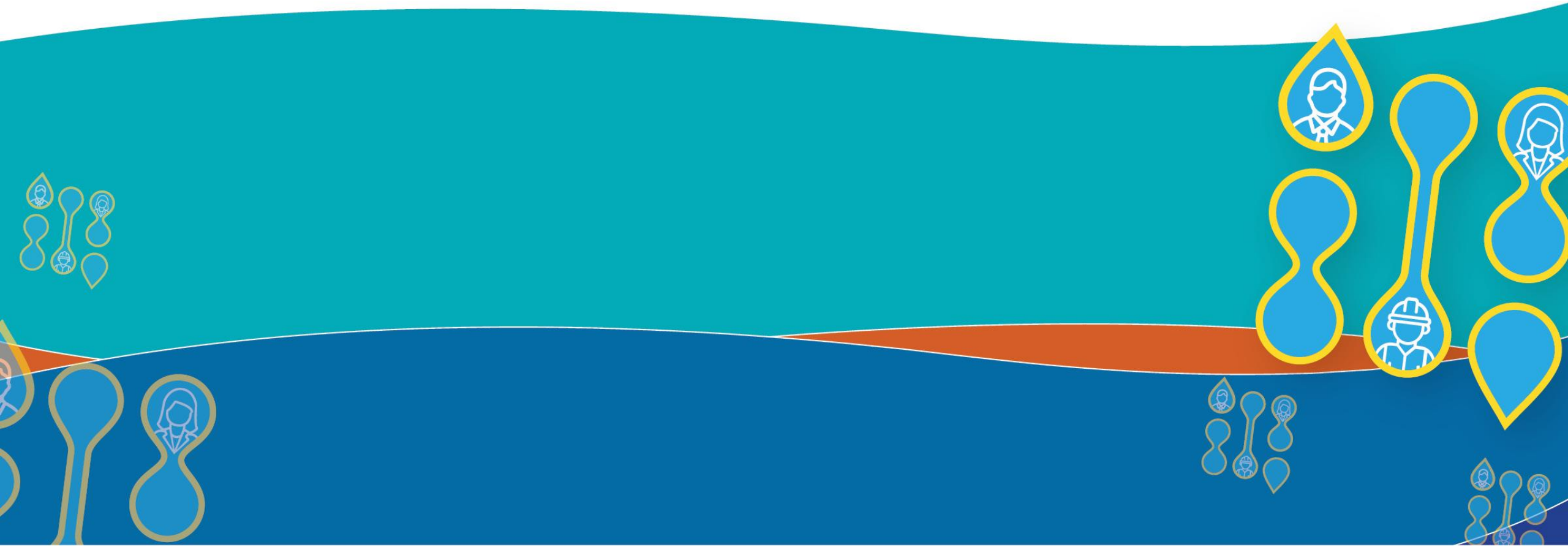
MINISTRY FOR THE ENVIRONMENT, ENERGY AND ENTERPRISE

MINISTRY FOR THE ECONOMY, EUROPEAN FUNDS AND LANDS

PARLIAMENTARY SECRETARIAT FOR EUROPEAN FUNDS

WATER
BE THE CHANGE

EU funds for Malta 2014-2020



MCAST

L-Università ta' Malta

THE ENERGY & WATER AGENCY

Operational Programme I – European Structural and Investment Funds 2014-2020
"Fostering a competitive and sustainable economy to meet our challenges"
Project part-financed by the Cohesion Fund
Co-financing rate: 85% European Union Funds; 15% National Funds

FROM GREY TO GREEN – URBAN GREENING

By: Paula Buttigieg, Estelle Camillieri, Mark Caffari, Matthias Martino, Erik Cassar, Dylan Attard, Daniel Falzon and Victor Friggieri

Grey to Green

Our problem is the lack of knowledge on native species of the public and their adaptions for the lack of water in the Maltese Islands

Grey to Green

Our aim is to educate the public on native species and how they are adapted to the Maltese climate at the same time making the urban areas more green while saving water.

grey to green

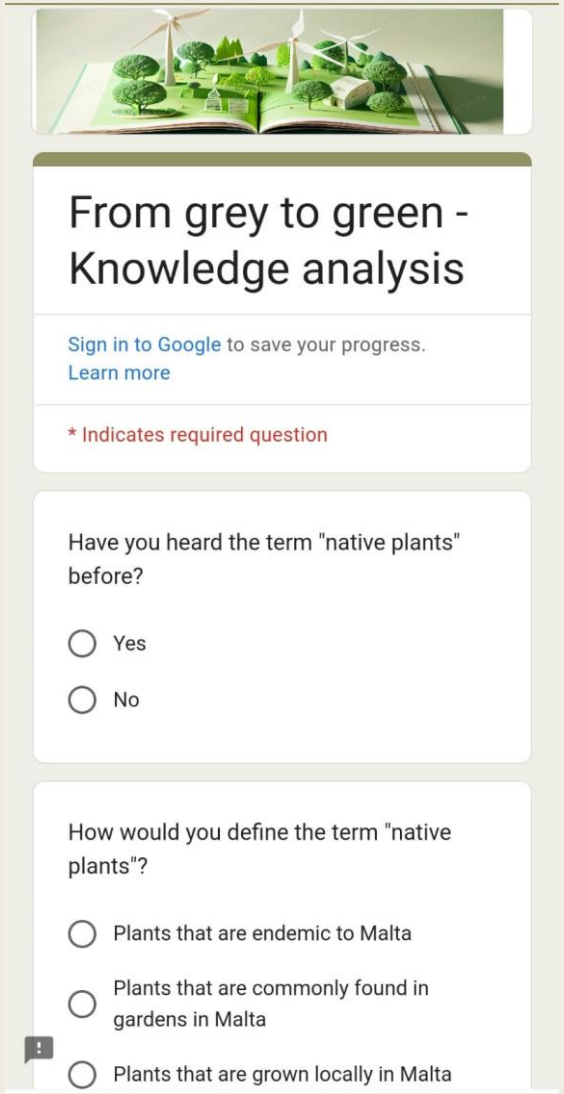


Figure 1: Questionnaire used

In order to help tackle the problem, we will be conducting a campaign targeting all age groups

Grey to Green

Successful campaigns:

- Let's Do It Malta – 2017
- Greening Malta - 2017
- Say No to Plastic Bags – 2018

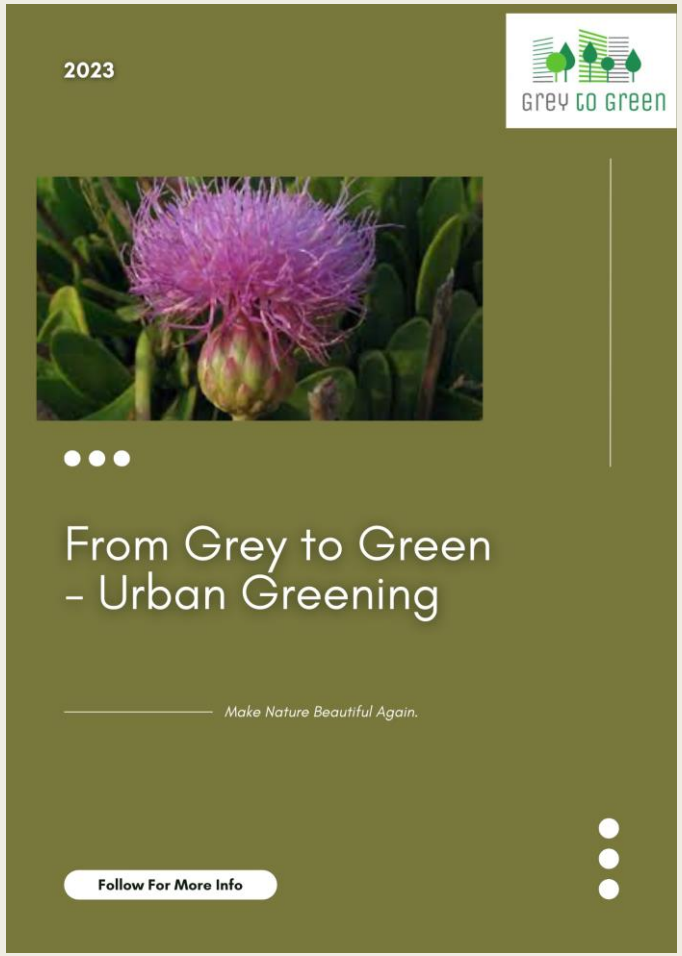


Figure 2: Creating a leaflet

Figure 3: Creating a website

Figure 3 source: https://grownative.org

The plan includes creating a nursery having native species (obtained through sponsorship) available to educate the public and spread awareness on their importance.

Figure 4: Activity sheet given to the kids

Figure 4 source: BirdLife

Figure 5: The starter kit given

Figure 5 source: HGTV

Grey to Green

Thank you for your attention!

Rainwater Harvesting and Urban Bioswales

Two part plan to harvest rainwater, reduce contamination, and create an urban green area for ecosystems services and water infiltration

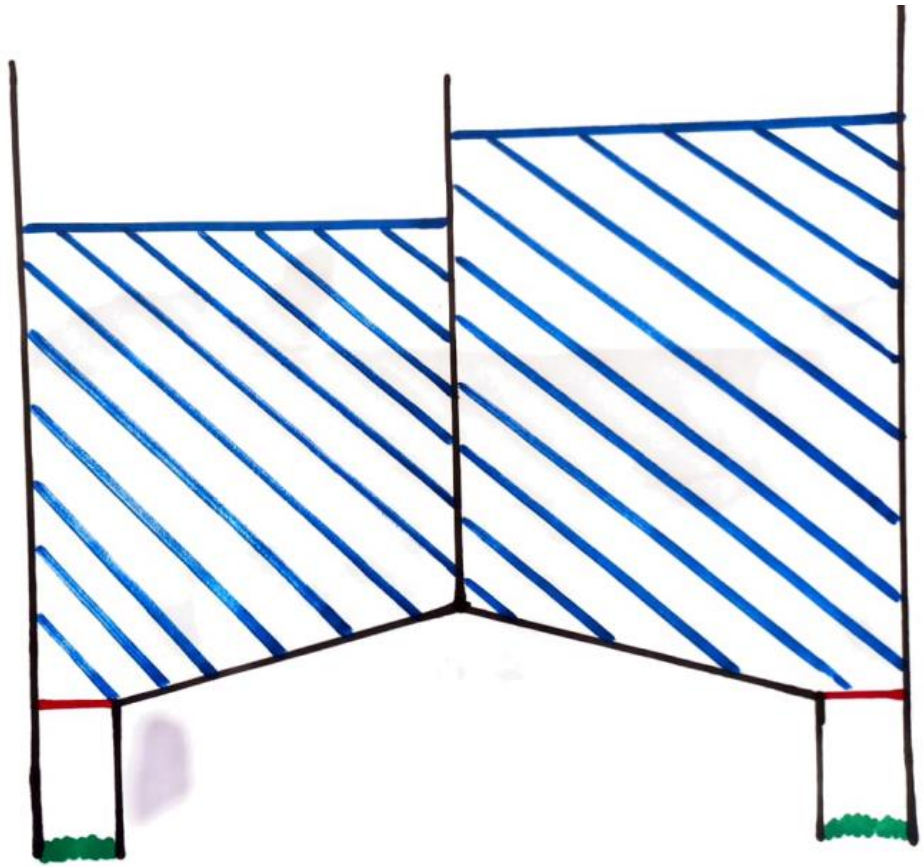
Rainwater Harvesting System

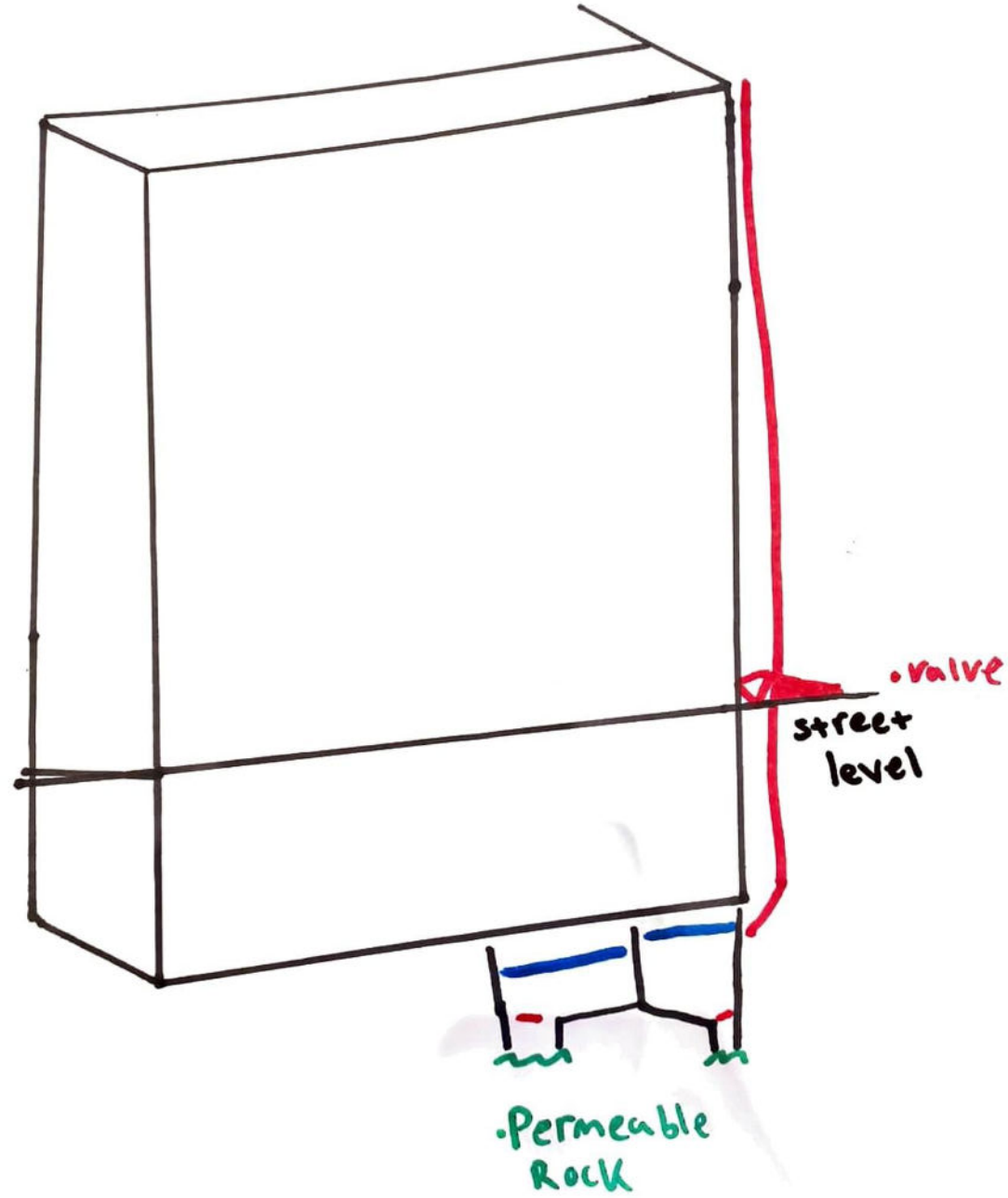
- Reservoir and or water containment and infiltration
- Prevention of illegal connections of rainwater to sewer systems.
- Increased use of rainwater/infiltration of rainwater.
- Ratio of reservoir capacity to the surface area of your roof determines tank size

Water

Valve

Permeable Rock





Incentives and Disincentives

Residential

- Bill subsidies through collaboration with Regulator for Energy and Water Services
- 2018 Domestic Cistern Restoration Scheme (active)

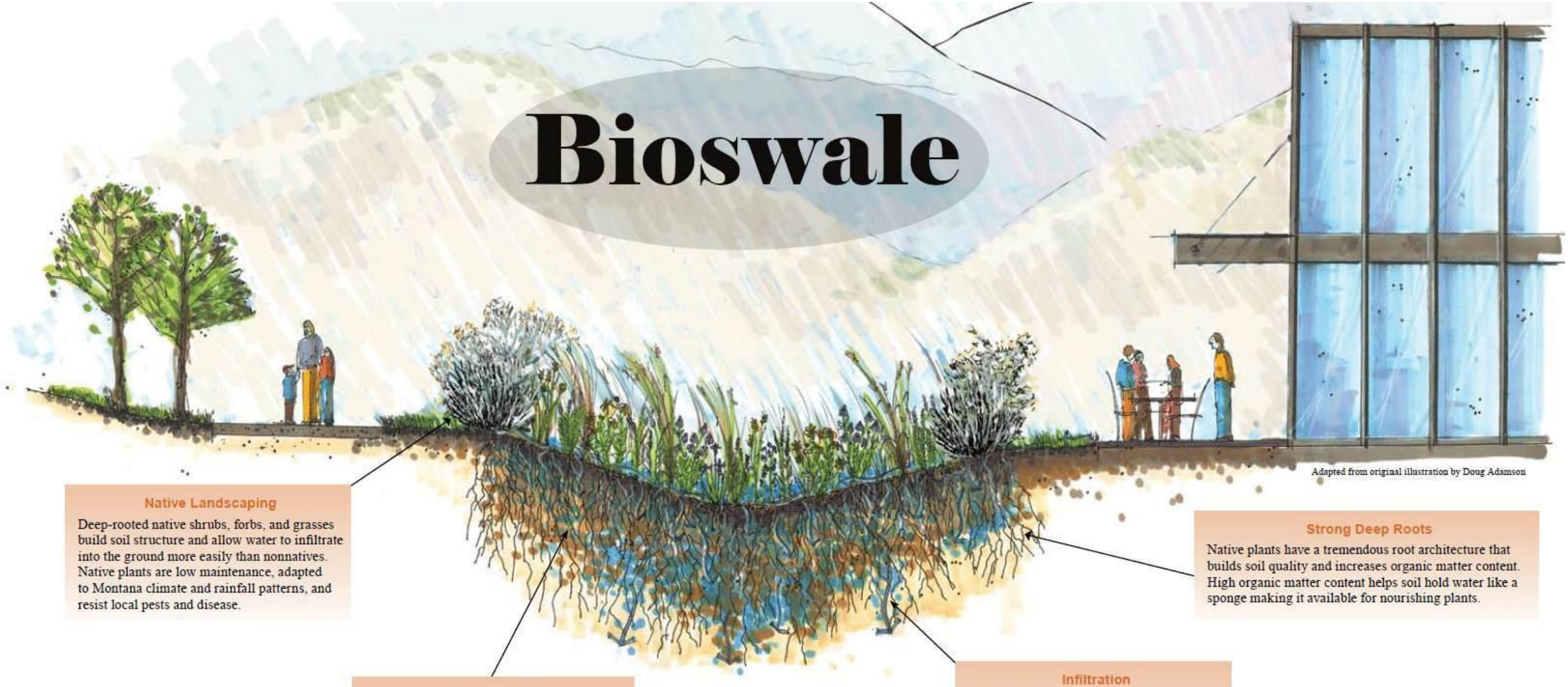
Commercial

- Corporate Social Responsibility
- Rainwater harvesting systems would help businesses with ISO certification process

Marsa Channel Bioswale Park Project

- Current greening project above the channel
- Creation of urban park with native species that functions as a bioswale
- Smaller bioswales in the surrounding area help reduce the quantity of water directed to this project if necessary

Bioswale



Adapted from original illustration by Doug Adamson

Native Landscaping

Deep-rooted native shrubs, forbs, and grasses build soil structure and allow water to infiltrate into the ground more easily than nonnatives. Native plants are low maintenance, adapted to Montana climate and rainfall patterns, and resist local pests and disease.

Soil Amending

Along with native plantings, soils amended with compost and sand may be needed to facilitate infiltration. A rock trench can be installed down the center of the swale.

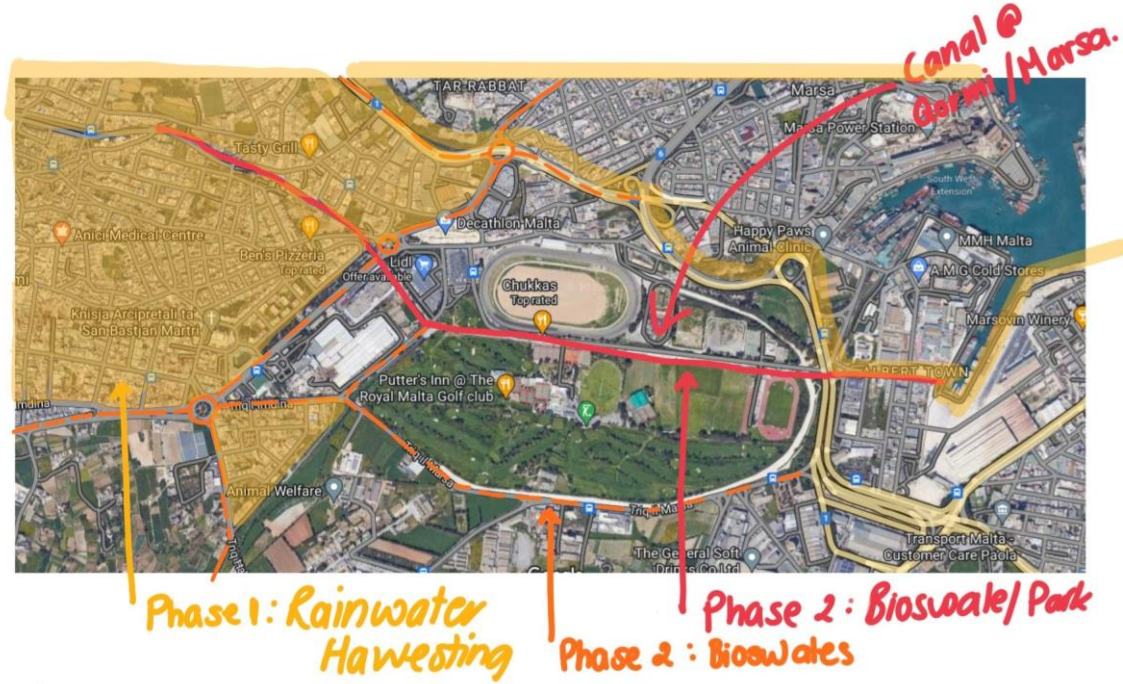
Infiltration

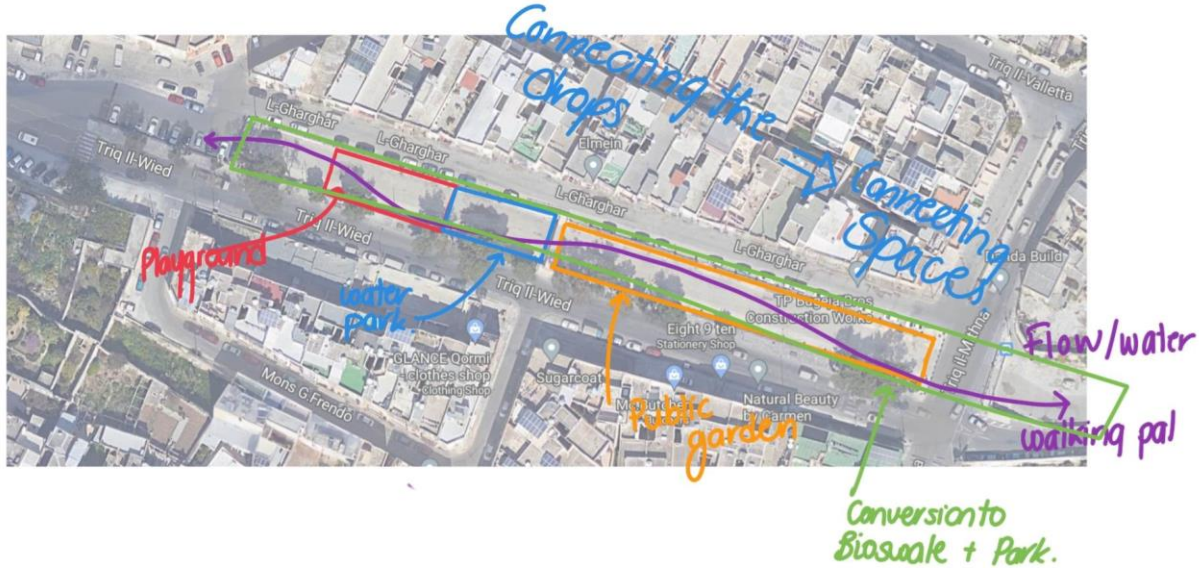
Water infiltrated through bioswales helps recharge groundwater, which supplies rivers and streams with a slow, purified seep rather than surges of polluted surface runoff from roofs and other impervious areas.

Strong Deep Roots

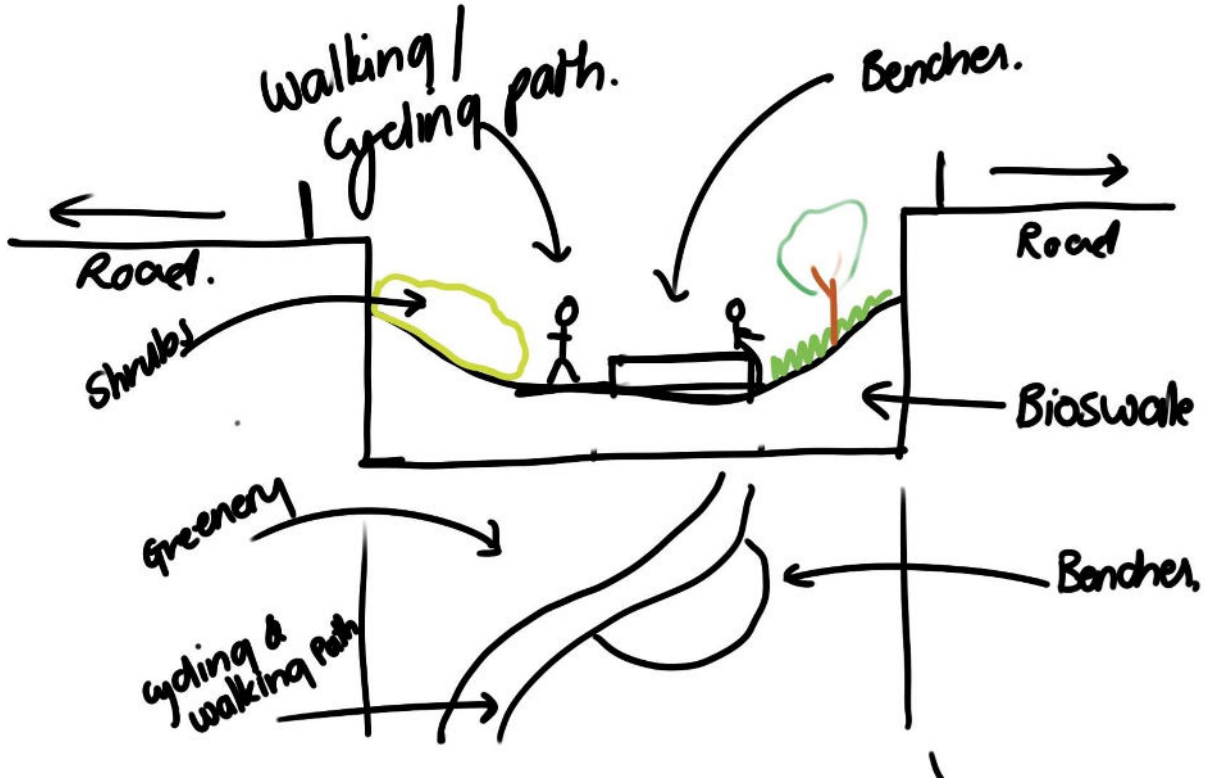
Native plants have a tremendous root architecture that builds soil quality and increases organic matter content. High organic matter content helps soil hold water like a sponge making it available for nourishing plants.

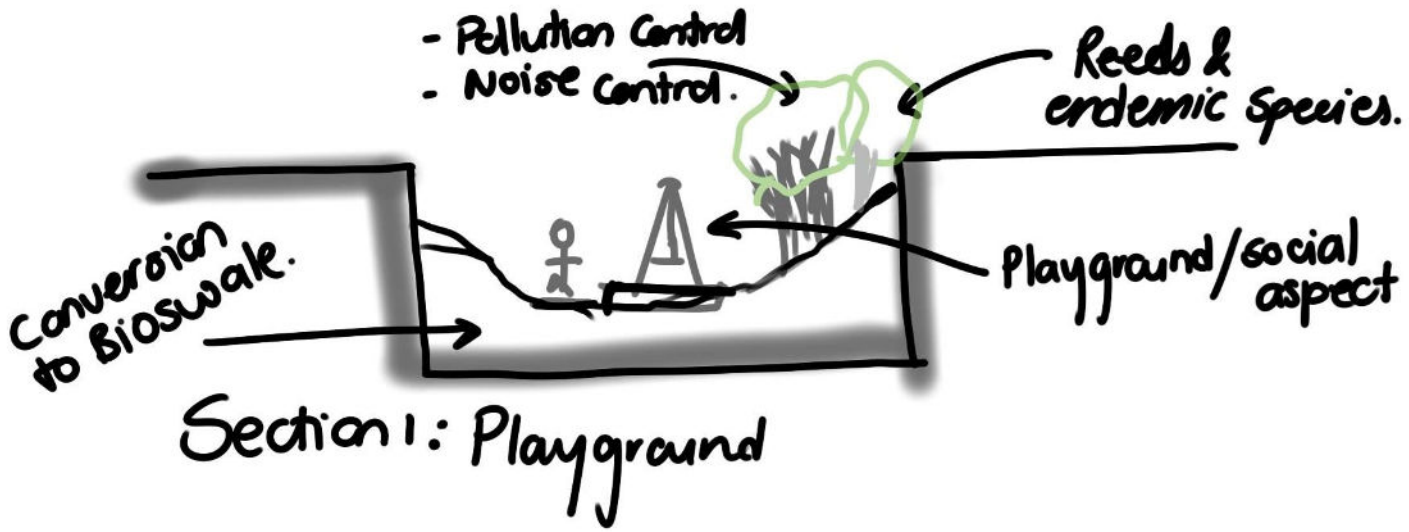

Triq Il-Wied
L-Gharghar
Triq Il-Valletta
Elmein
Triq Il-Mithna
Danda Build
TP Bugeja Bros Construction Works
Eight 9 ten Stationery Shop
GLANCE Qormi - clothes shop
Sugarcoat
Mr Butcher Butchers
Natural Beauty by Carmen
Mons G Frendo
Conversion to Biosuale + Park.


Canal @ Qormi / Marsa.
TAR-RABBAT
Marsa
Marsa Power Station
Tasty Grill
Decathlon Malta
Happy Paws Animal Clinic
MMH Malta
A.M.G Cold Stores
Anici Medical Centre
Ben's Pizzeria
Lidl
Chukkas
Knisja Arcipretali tal-San Bastjan Martri
Marsovin Winery
Putter's Inn @ The Royal Malta Golf club
Animal Welfare
Transport Malta - Customer Care Paola
Phase 1: Rainwater Harvesting
Phase 2 : Bioswales
Phase 2 : Biosuale/ Park


Connecting the Drops
Connecting Spaces
Playground
water park
Public garden
Flow/water
waiting pal
Conversion to Biosuale + Park.


Connecting the Drops
Connecting Spaces
Flow/water
waiting pal
Conversion to Biosuale + Park.





Section 1: Playground

Bioswale considerations

Pilot Swale:

- Testing different types of vegetation and methods of irrigation during plant establishment (approx. first 3 years)
- Involving local businesses through investment in bioswale project to improve local area.

Tree genera for infiltration, shading and temperature control, etc.

- *Ficus*
- *Tamarisk*

Thank you

The mitigation of floods through bioswales and wetlands in Burmarrad Road

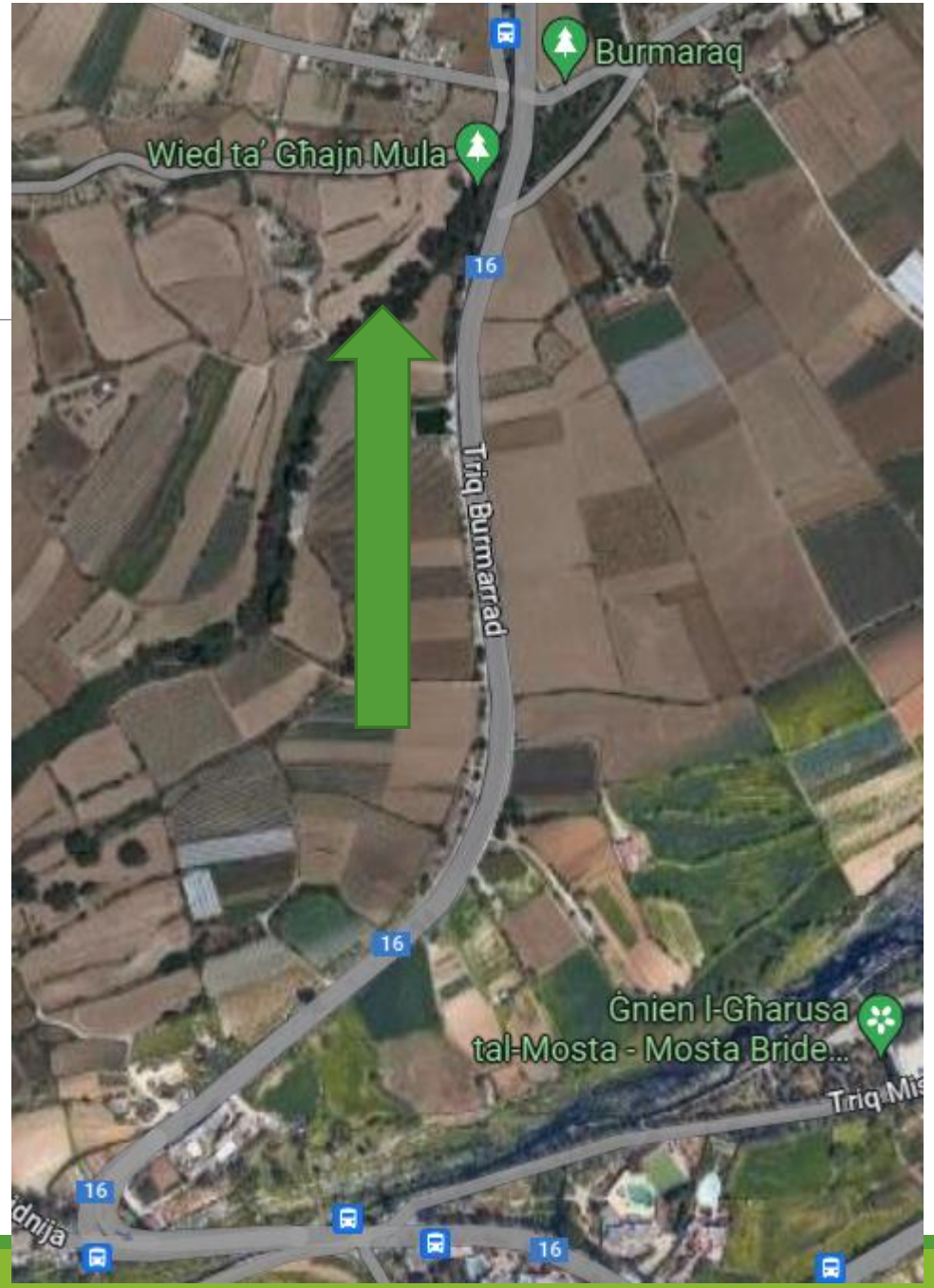
TEAM PINK

BY MATTIA, DAMIAN, MATTHEW, KIM, KESTER, MATTHEW, ASIYA, JULIA

Location

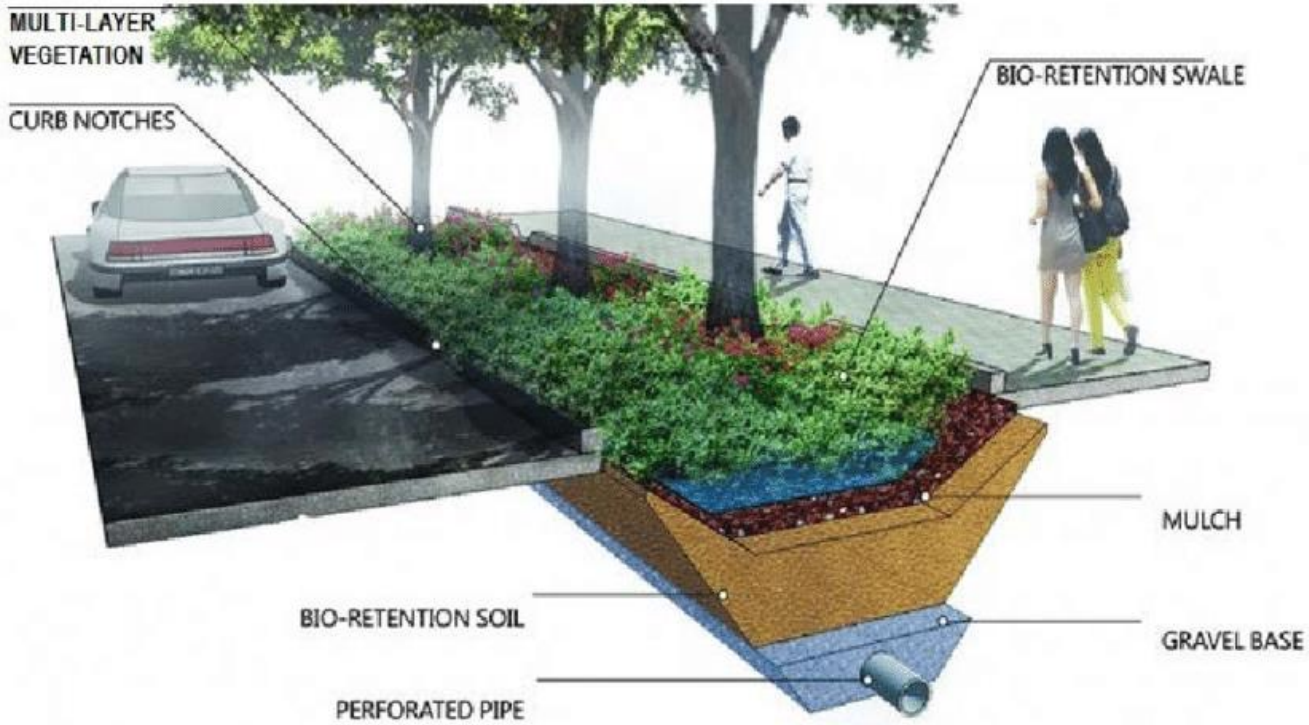
Burmarrad catchment is 38.5km²

Second largest catchment in Malta



What are Bioswales?

- Used to catch contaminated stormwater runoff
- Filter the stormwater runoff


MULTI-LAYER
VEGETATION
CURB NOTCHES
BIO-RETENTION SWALE
MULCH
BIO-RETENTION SOIL
GRAVEL BASE
PERFORATED PIPE

Plant Species

In Bioswale:

Using endemic and indigenous plant species

- Rosemary
- Sage
- Tamarisk
- Different palms

In Wetland:

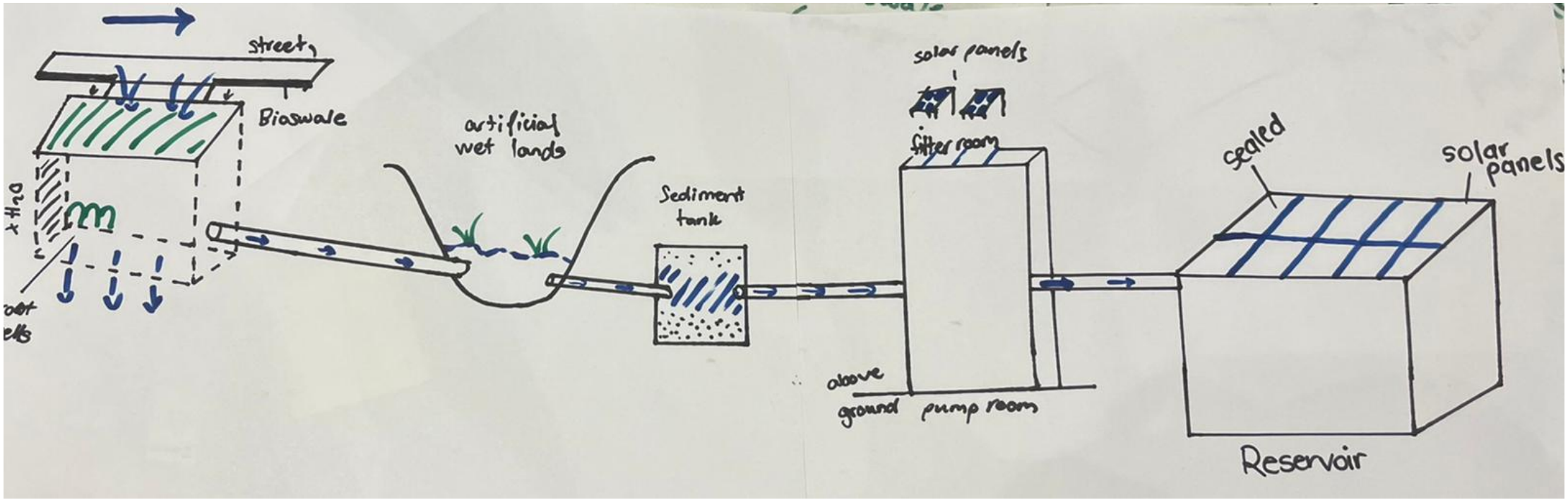
Using algae

Soil

Bioswale soil structure:

- 50-60% sandy
- 35% silt
- 5% clay

Soil Lifespan above 20 years



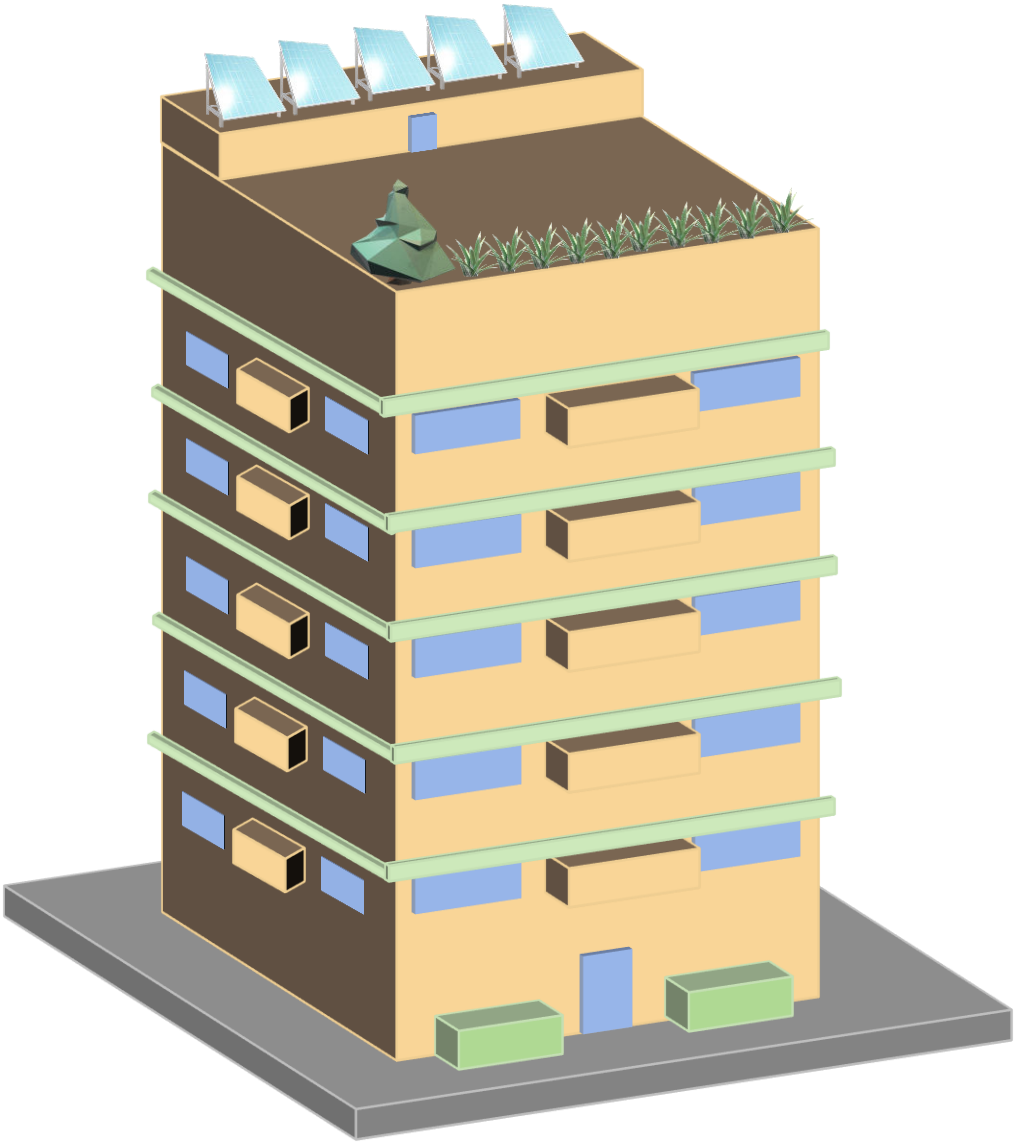
Bioswale → Wetland → Sediment Tank → Pump Room → Reservoir

Thank You For Your Attention!

Any Questions?

HIDRA

Hydroponic Integrated Domestic Renewable Alternative System



What is HIDRA?

An integrated system incorporating biophilic design

Our Mission

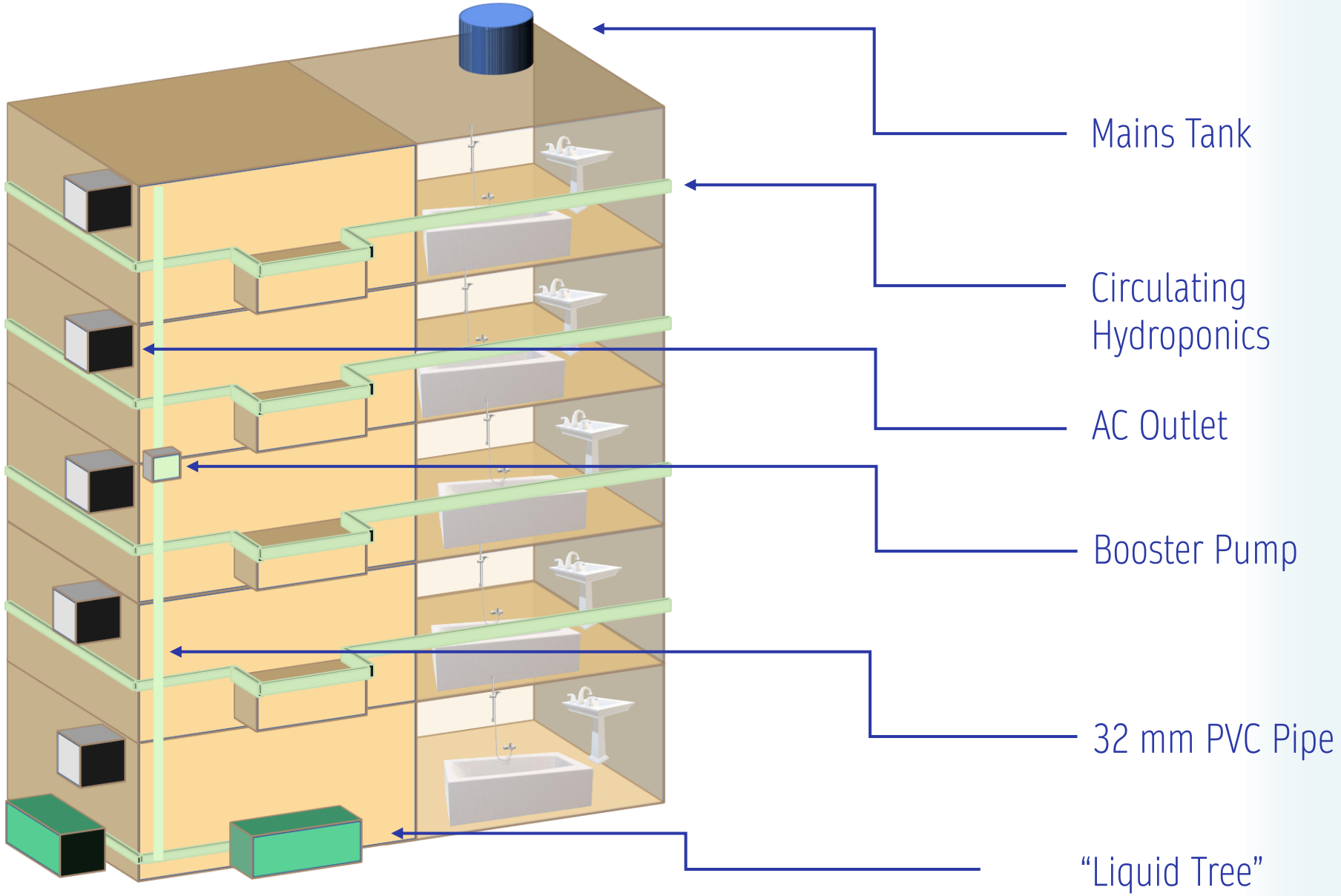
Reuse water to reduce

Our Vision

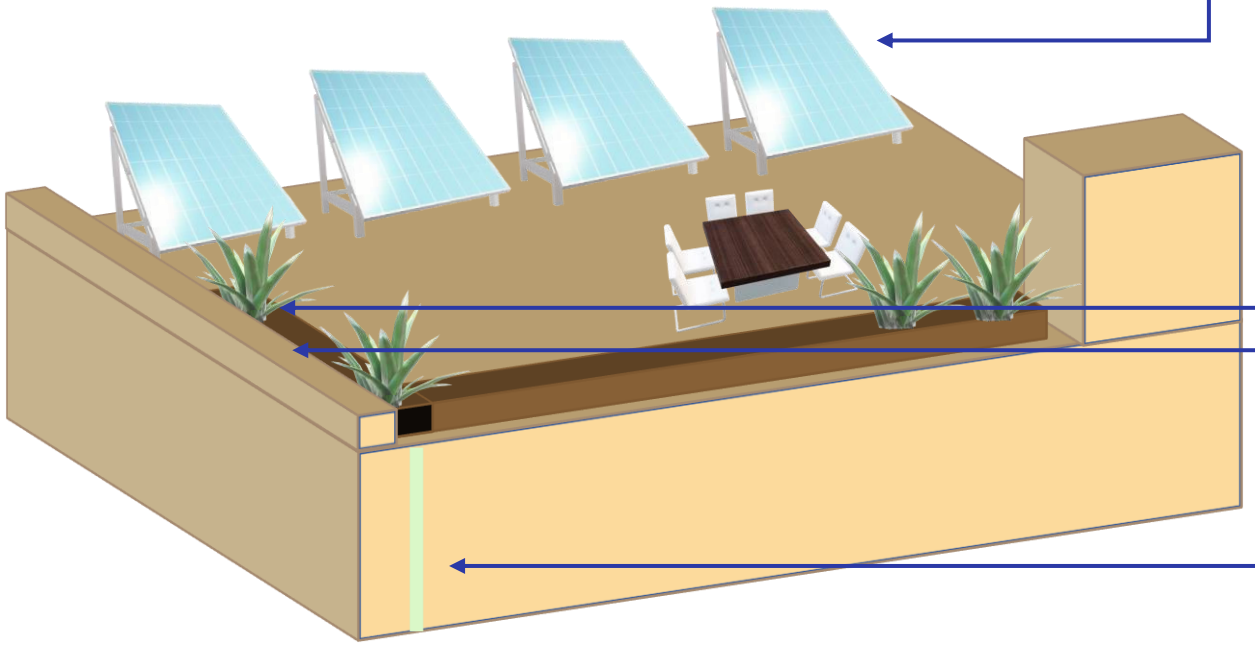
To create a future-proof energy efficient system, use your wastewater to:

- Reduce your electricity and water bill in the long-run
- Clean your air
- Improve overall wellbeing
- Provide an ecosystem service

Phase 1
Hydroponic System



Phase 2
Roof Garden



Solar Panels

Gulleys

Semi-Intensive green roof containing:

- Wind and drought-tolerant plants such as:
  - Zinnia
  - Mediterranean Thyme

Hydroponics pipe

Stakeholders

- Tenants
- Building Manager
- General Public
- Contractors
- Policy Makers

Drawbacks

- Increase in property value
- Limited space in Malta
- PV Panels are weather dependent

Why Should You Invest?

Economic Benefits

- Reduce energy and water consumption
- Effective allocation of resources
- Potential for green loans
- For businesses: ISO14001 and ISO50001

Environmental Benefits

- Use of endemic plants
- Reduce air pollution
- Ecosystem services
- Less dependant on non-renewable energy sources

Social Benefits

- Easy access to green areas
- Domestic crop production
- Improvement to wellbeing
- Enhance building aesthetics

Thank You for Your Time From the Purple Team

Invest in your future

URBAN GREENERY
URBAN HAPPINESS

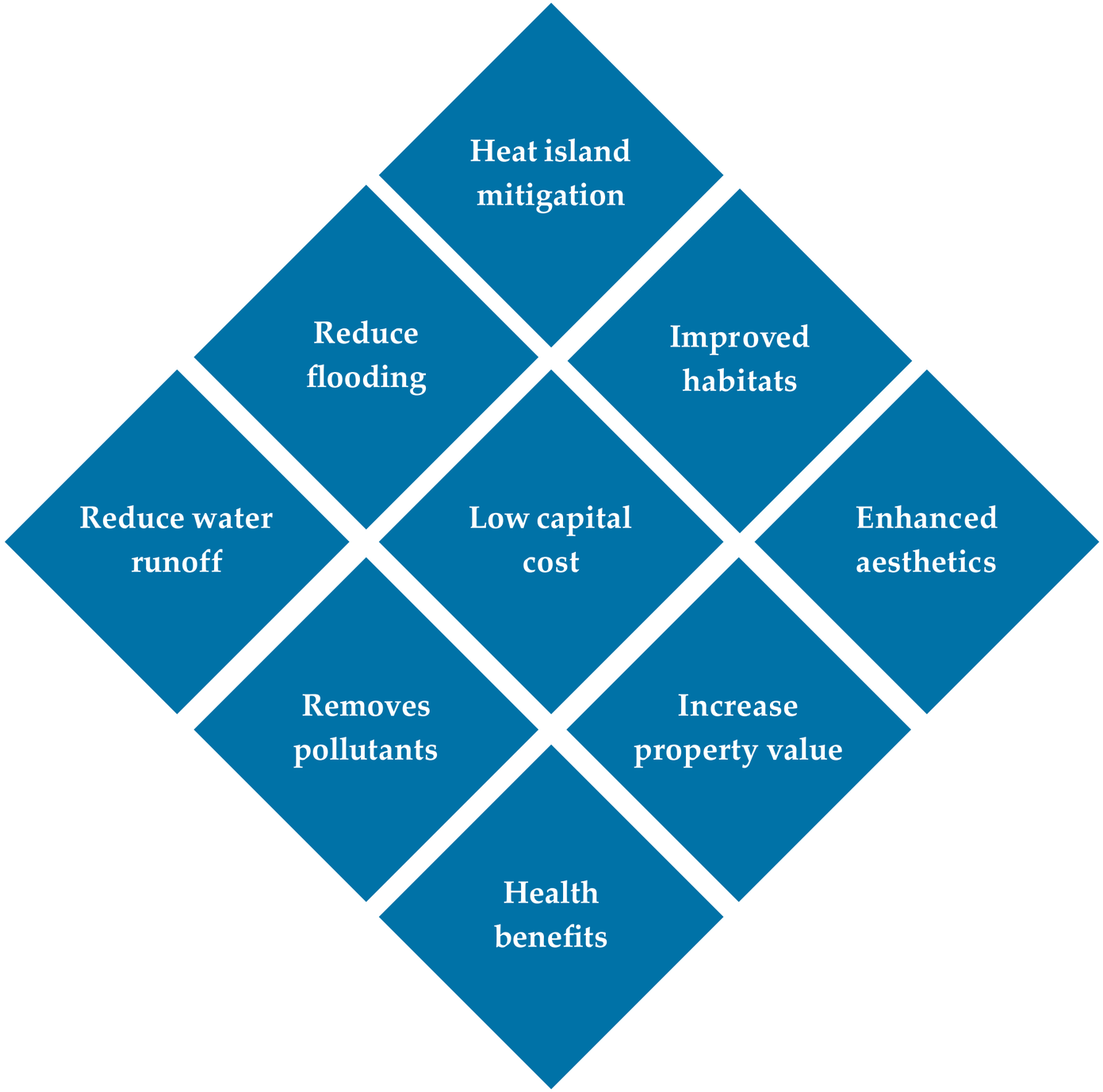
Morgan Zammit, Marija Cassar, Giulia Cassar, JeanCarl Bartolo, Mirhea Abdilla, Gabriel Grech, Linus Egger, Charles Gambin

BIOSWALES

Concentrate and convey stormwater runoff, therefore reducing runoff and flooding in the streets

Example: Texas

BIOSWALES BENEFITS

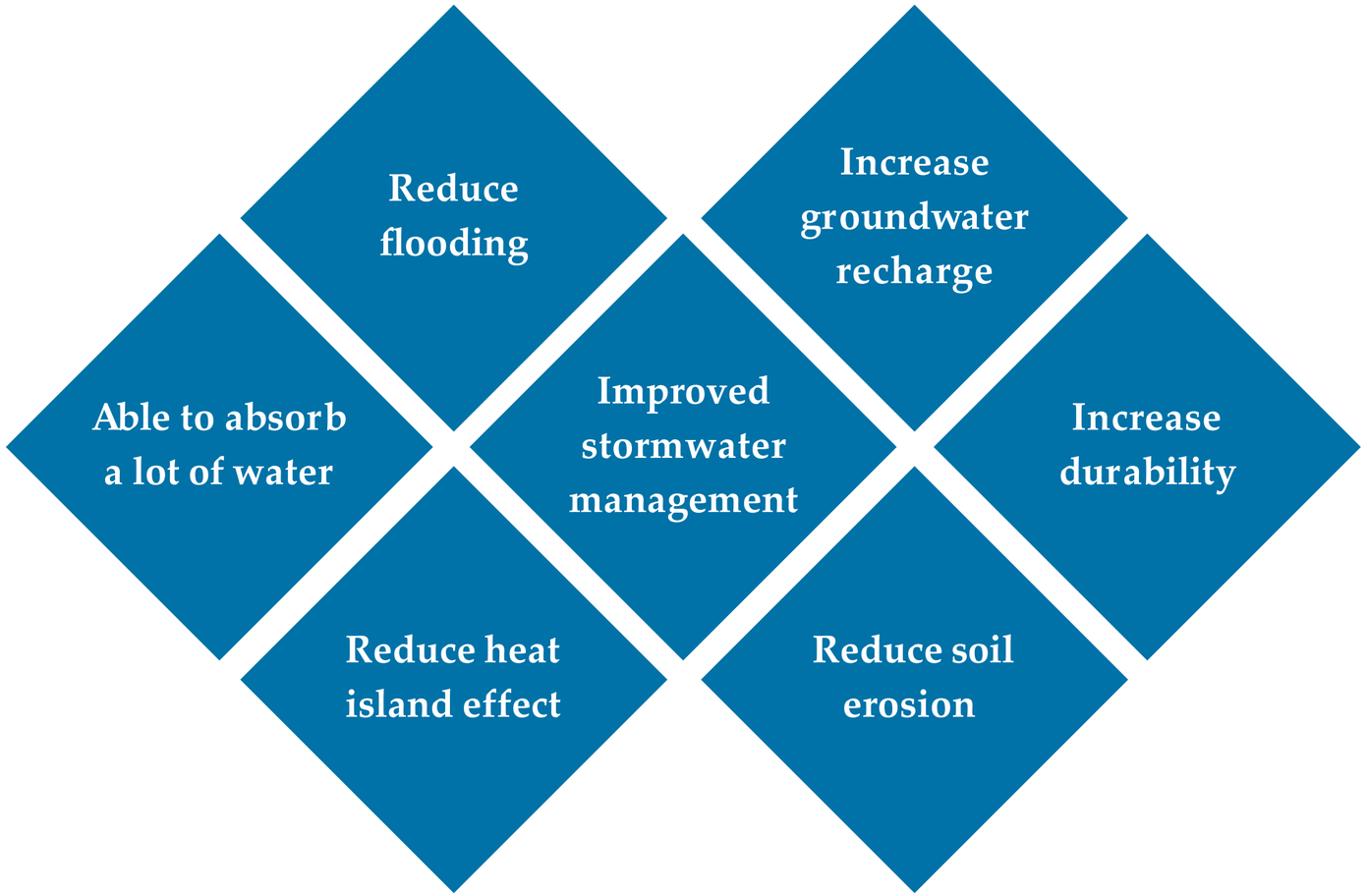


PERMEABLE PAVING

Porous urban surfaces with open pores so that water can infiltrate in between gaps

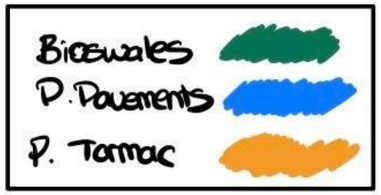
Example: Australia, Ta' Pinu and Mosta

PERMEABLE PAVING BENEFITS

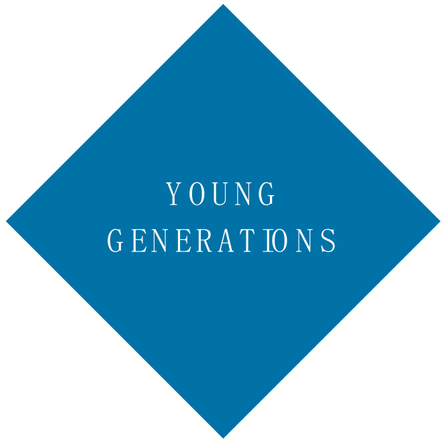


PILOT SITE

Area of Tal-Qattus in Swatar

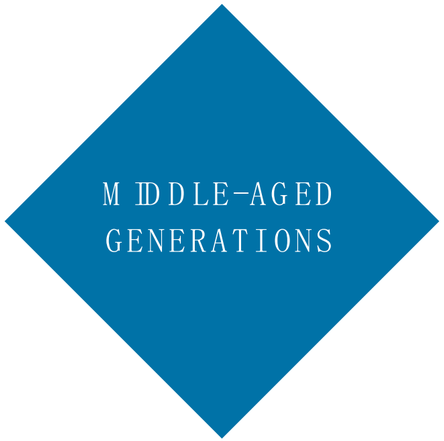


COMMUNICATION PLAN



- **Mascots; 'SAMMY THE SWALE" & 'RAINY THE RAINDROP'**
- **School outings**
- **Cartoons /interactive videos**
- **Comics/ Short Stories**
- **Gadgets**
- **Mascot Soft Toys**
- **Muppet shows**
- **Social Media**

  Instagram stories/feed, Tik Tok Posts



- **Word of mouth from children**
- **Commercials on billboards and social media**
- **Magazines**
- **Compost bins with bokashi bacteria**

- **Stakeholder meetings**
- **Adverts on TV**
- **Newspaper Adverts**
- **Magazines**

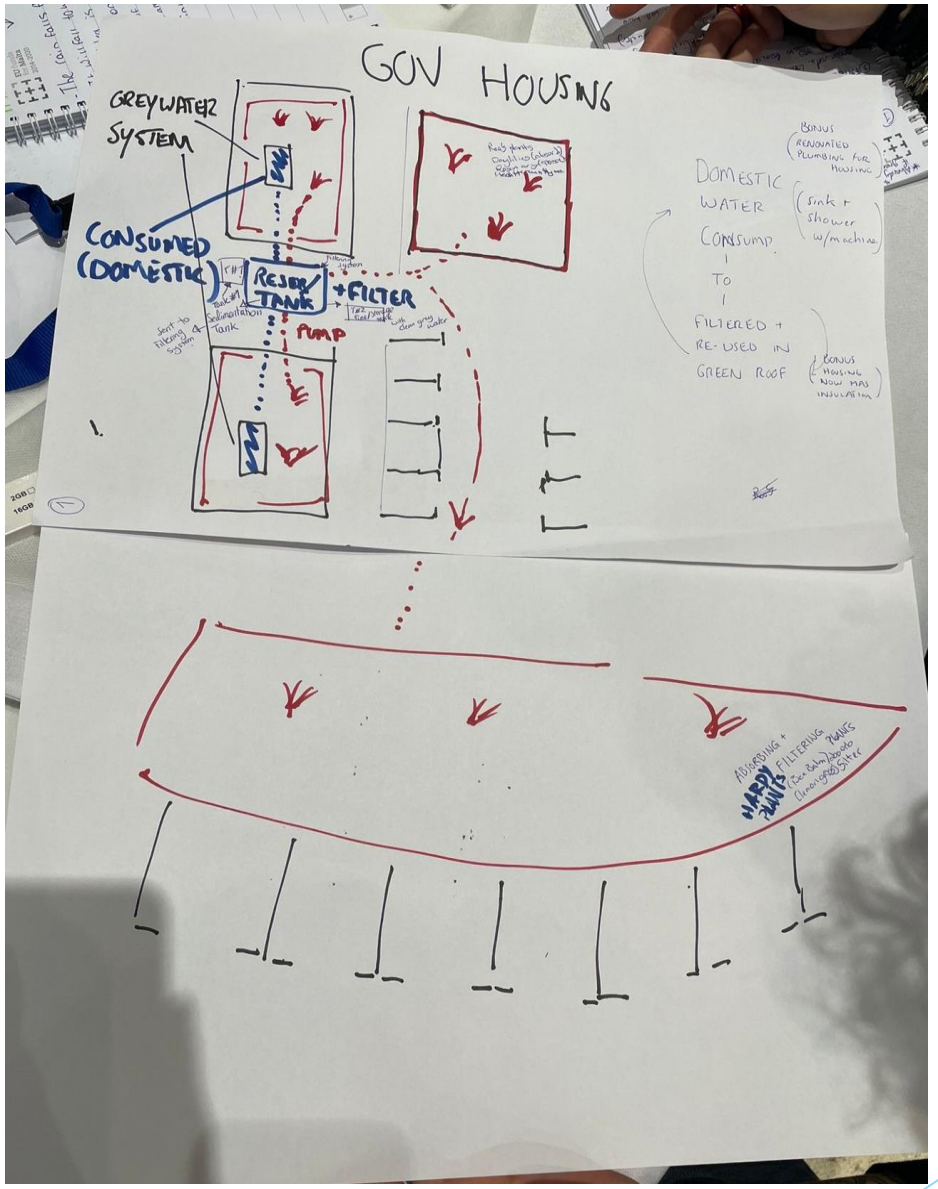
Thank you!

Improve the quality and re – use of grey water

Site Location

GOV residential houses in San pawl il-bahar

Project


GOV HOUSING
GREYWATER SYSTEM
CONSUMED (DOMESTIC)
RESERVE TANK
+FILTER
PUMP
DOMESTIC WATER CONSUMP
TO
FILTERED + RE-USED IN GREEN ROOF
BONUS RENOVATED PLUMBING FOR HOUSING
BONUS HOUSING NOW HAS INSULATION

Thank you for your attention !

Inefficient use of water in Agriculture

A. Micieli, A. Chonavel, D. Mercieca, M. Grima, A. Cuschieri, M. Xuereb, M. Spiteri, V. Zammit & T. Krijthe

Implications

- New water is too pure

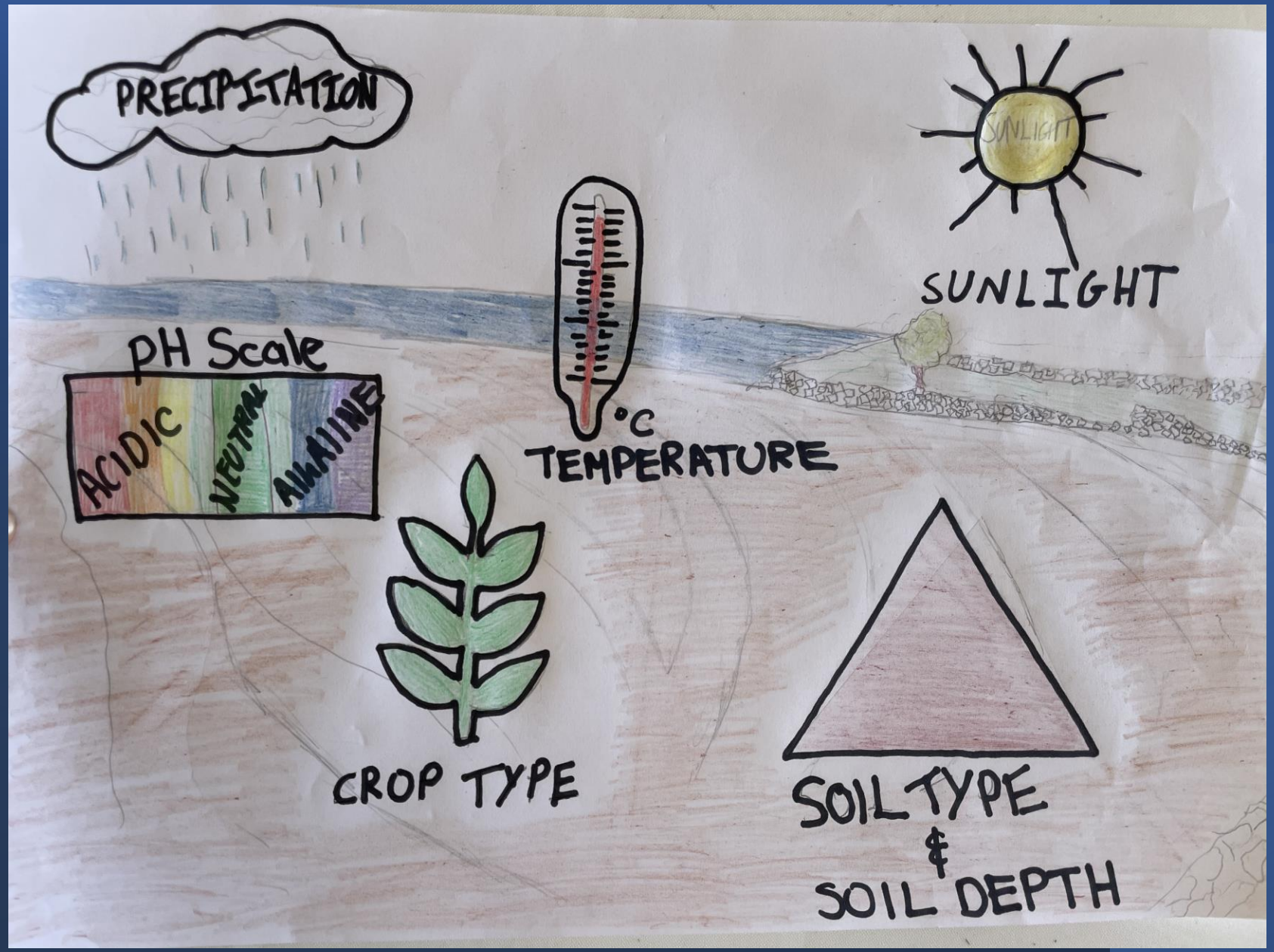
- Mineral water is too saline

Intelligent App for Agricultural Water Management

Objectives

- Help farmers manage their water supply effectively
- How to mix new water with groundwater to blend the characteristics of both resources
- Obtaining the right water quality for the crop
- Reducing water usage in agriculture
- Increasing crop yield

AgriBlue


PRECIPITATION
SUNLIGHT
SUNLIGHT
pH Scale
ACIDIC
NEUTRAL
ALKALINE
°C
TEMPERATURE
CROP TYPE
SOIL TYPE
&
SOIL DEPTH

Input

- Weather conditions
- Climatic conditions
- Soil type / depth
- Crop type
- Electric conductivity

Sodium & Chloride + Nitrate from groundwater

Equipment

- Electric conductivity meter
- Smartphone
- Tensiometer – water quantity
- Groundwater
- New water

Output

- Recommendation for ratio between new water and groundwater
- Recommendation for quantity of this water
- Type of irrigation
- Frequency of irrigation
- Alerts and notifications

How it works

- Farmer uploads information
- App utilizes this information
- Farmer can track his/her water usage and compare it to recommended levels.
- Alerts and notifications will inform the farmer of conditions

Expansion

- App would be able to learn from the farmers data.
- Increase accuracy
- Expansion to additional features
- Implementation

AgriBlue

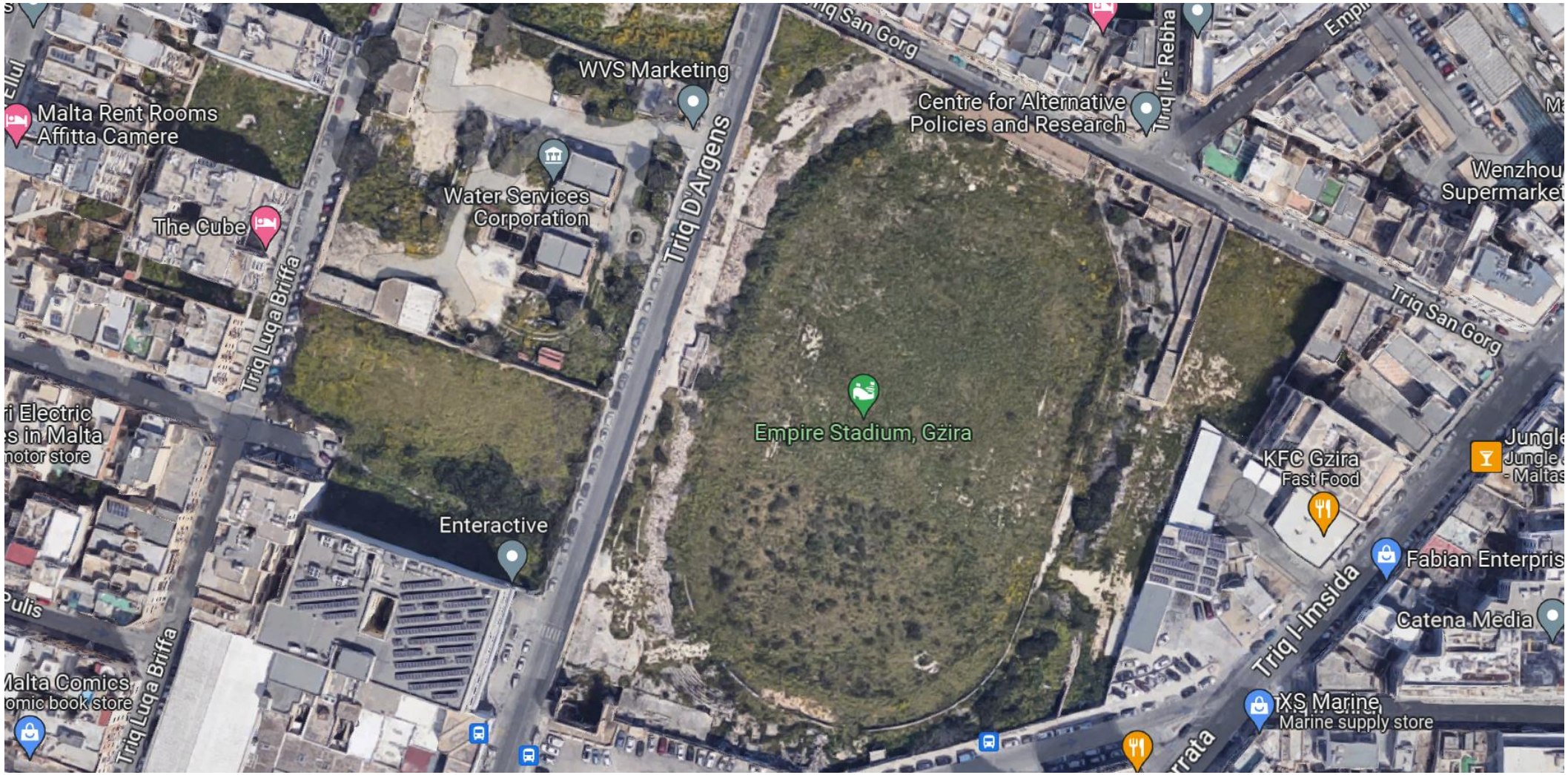
FERTILE FIELDS, SUSTAINABLE YIELDS

Reviving Gzira's Empire Stadium

Bringing back nature to the urban environment

Area of Interest

Current State



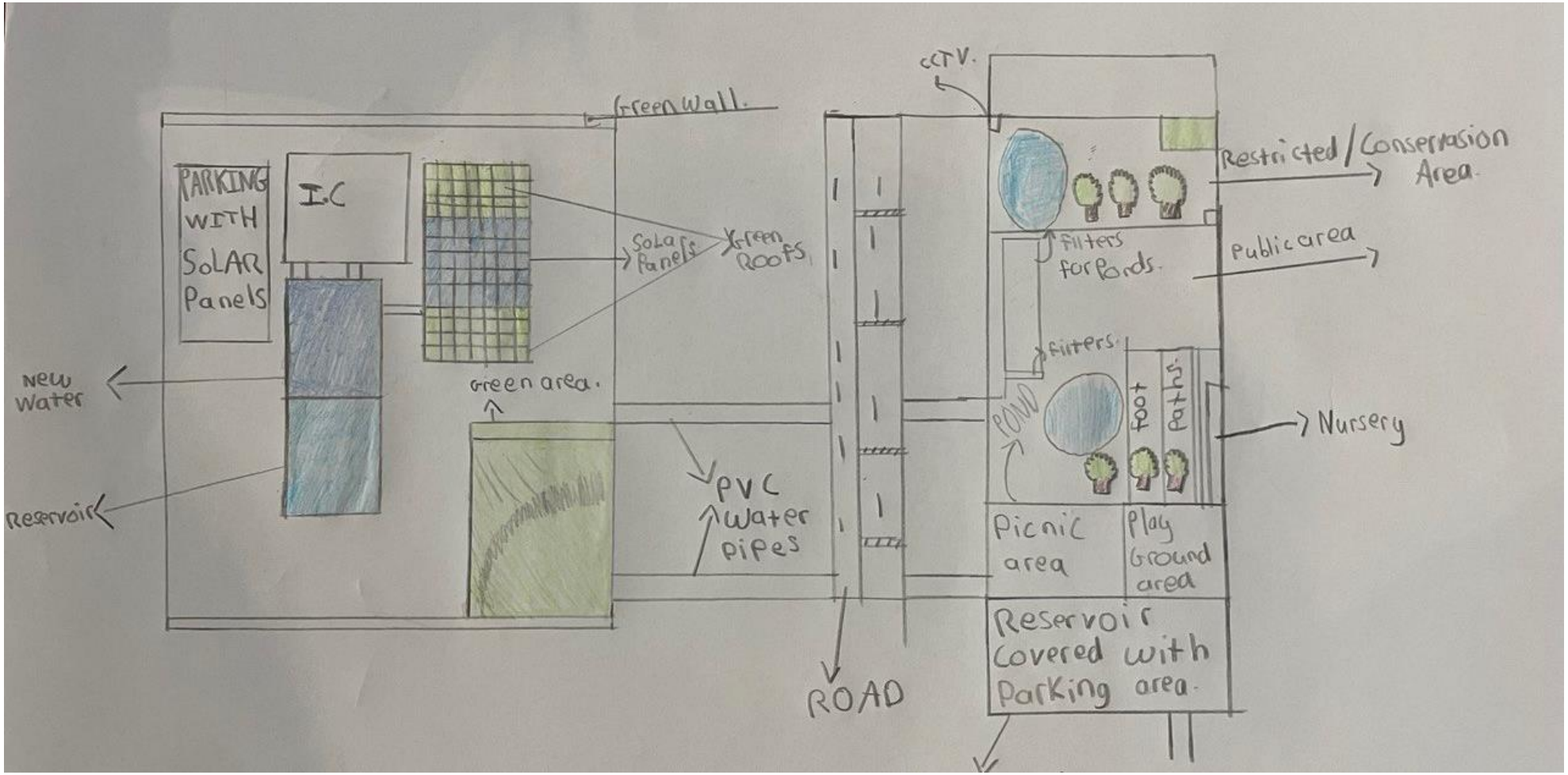
Front Street View of Areas

Wastewater Pumping Station

Parking Area Entrance

Wastewater Pumping Station

Renovation Plan

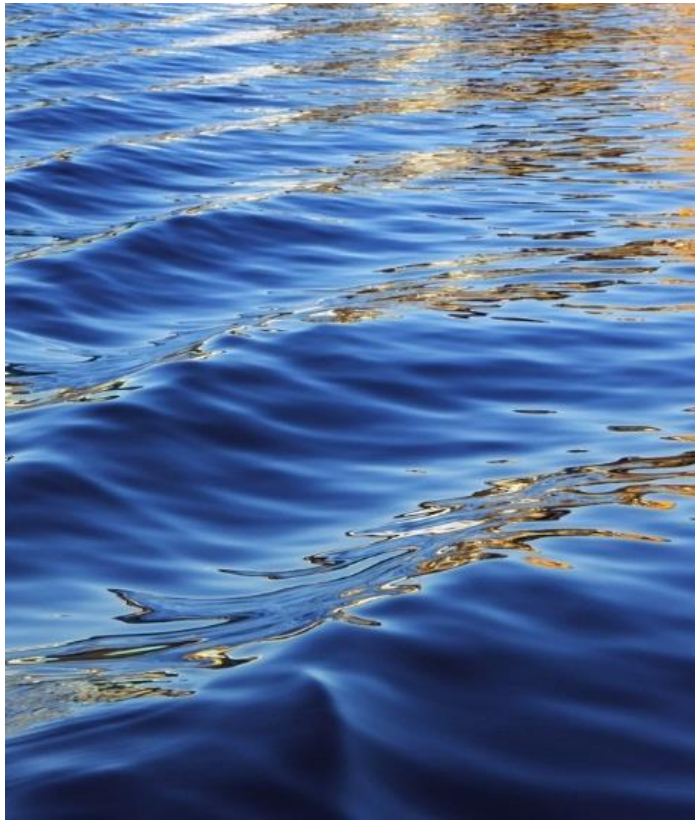


Benefits of this Project

- Cooling effect (Heat Island)
- Noise mitigation
- Health and social (Air Quality)
- Education and Awareness (Workshops and Volunteering)
- Plant farming for the community
- Ecosystem benefits
- Reduced water runoff
- Reusing waste water (including grey water and rainwater)
- Reclamation of abandoned land
- Provide habitat for local species

Thank You!

Jean Claude Bugeja
Connor Lanzon
Xylon Mizzi
Jethro Bugeja
Francesa Buhagiar



WHITE TEAM

A VISION: GREYWATER TREATMENT SYSTEM AND GREEN SPACES AT MCAST

By Cosette, Amber, Lukas, Zachary, Charles & Venus

The Problem

Waste of greywater

Flooding

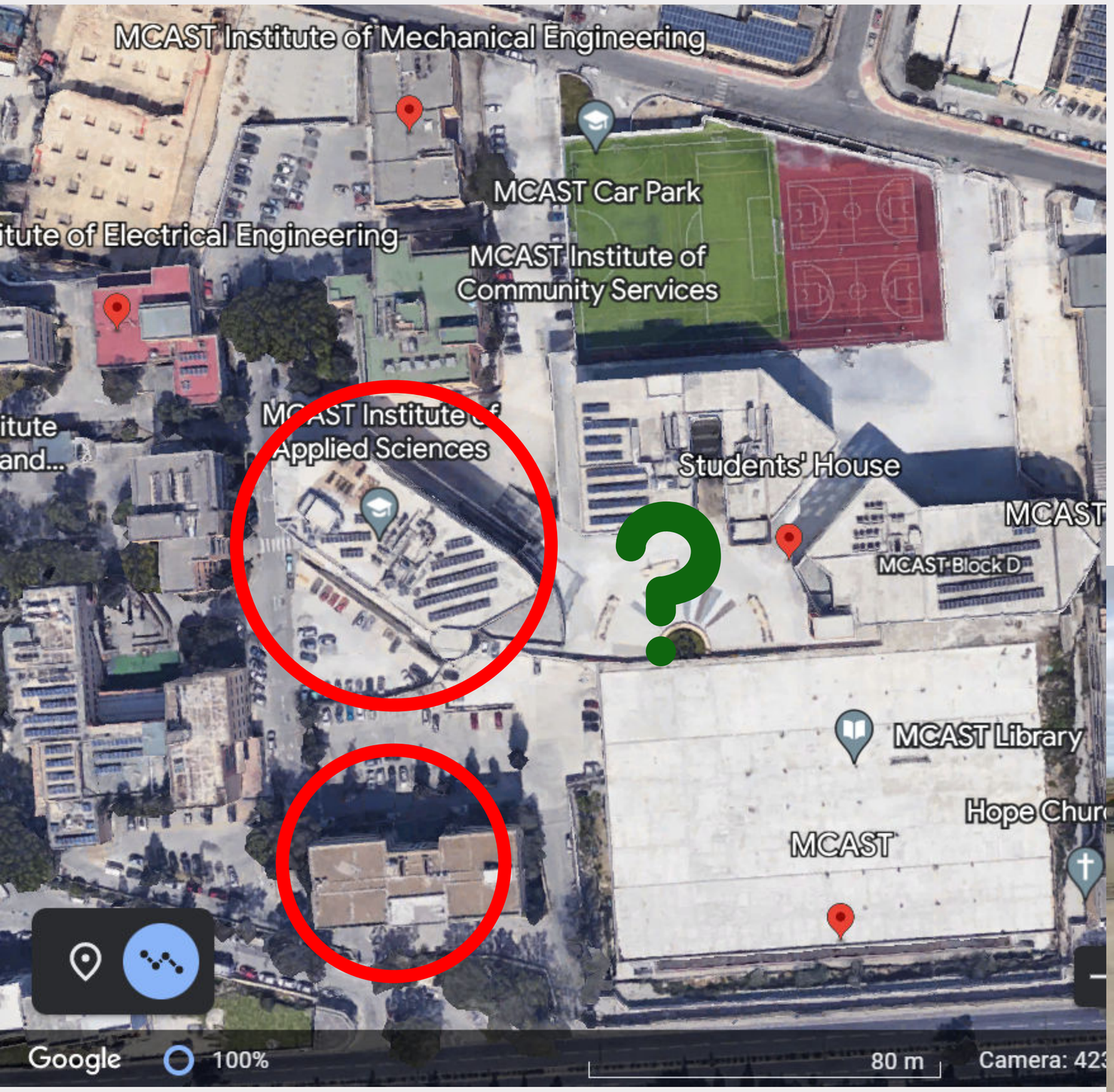
Space

Green spaces

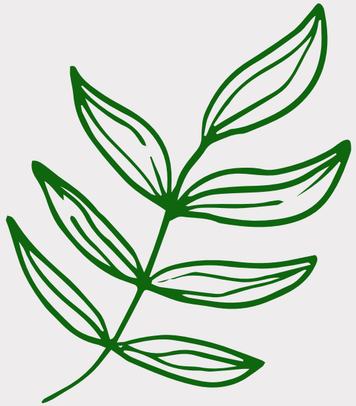
Indicator 6.3.2

Location

- Institute of Appied Science
- New ICT building (in construction)
- Green space on piazza



Benefits



Environmental

- Ecosystem services
- Efficient water usage

Social

- Nature-connectedness
- Accessibility

Financial

- Efficient water usage
- Investment on students

Wouldn't it be nice if MCAST treated greywater and promoted green spaces.

6. Images

Below one can find a number of images that were taken during the event.

6.1 Attendees

The workshop was once again well attended mainly by students.

6.2 Merchandise

Tables were set up with merchandise for every participant, along with the necessary tools for the competition.

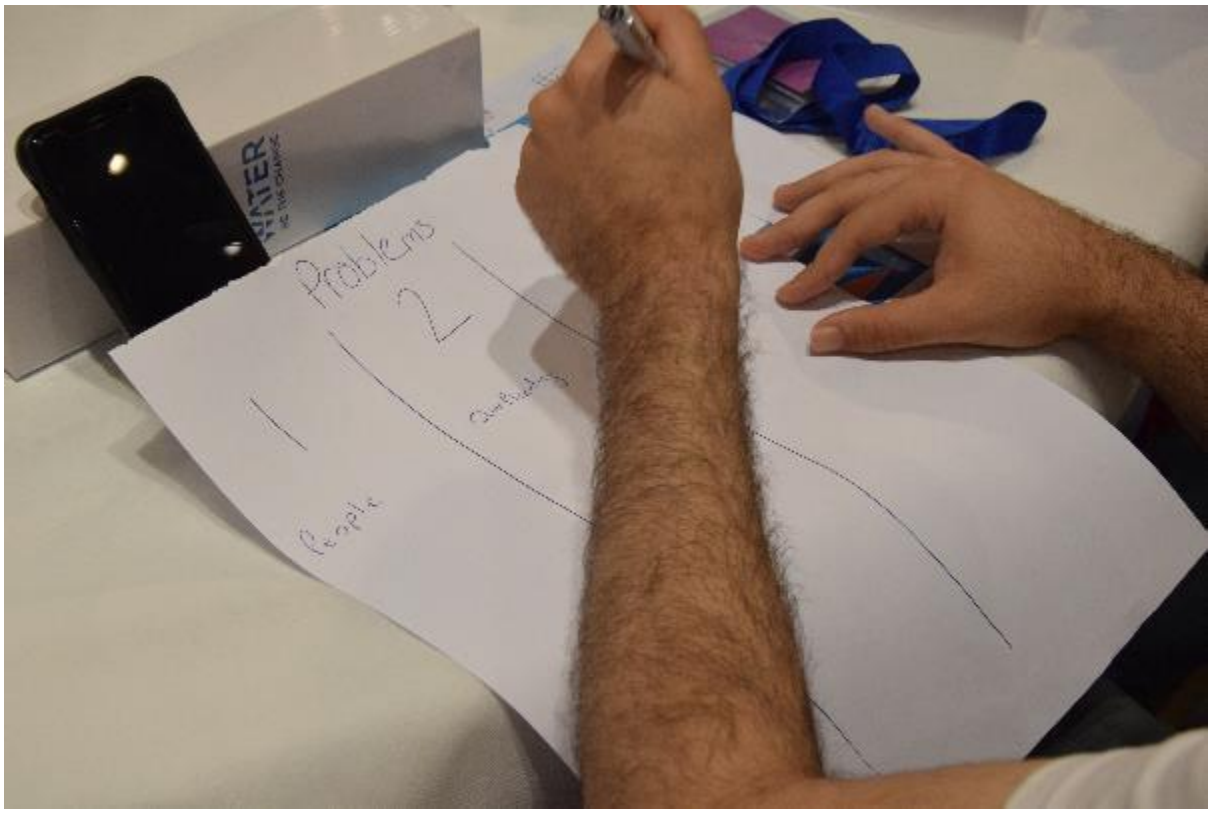
6.3 Tensiometer

Mr Galea brought a tensiometer as demonstration for his presentation.

6.4 Workshop

Participants were working in teams, along with their mentors.


CONNECTING THE DROPS


Problems
People


Creative
Artist
Problem Solver

6.5 Pitching of Ideas

Each team presented their ideas on stage.


CONNECTING THE DROPS
CIRCULAR WATER MANAGEMENT
FOR URBAN GREENING
WATER
Location

6.6 Competition Winners

The winning teams were brought up on stage. The second image shows Team LIGHT BLUE, who came in first place.


CONNECTING THE DROPS
CIRCULAR WATER MANAGEMENT
FOR URBAN GREENING
WATER
BE THE CHANGE