ENI CBCMED
Cooperating across borders in the Mediterranean

Project funded by the EUROPEAN UNION

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

MEDWAYCAP

MEDWAYCAP
TRAVELING EXHIBITION

GENERAL DESCRIPTION AND GUIDELINES FOR THE EXHIBITION SETTING

SENZA STUDIO

svimed.
centro euromediterraneo
per lo sviluppo sostenibile onlus

INDEX

INTRODUCING MEDWAYCAP

Climate change impacts on water resources!

European and Mediterranean entities joined in responding to this challenge, while writing together the first chapter of a new pathway – MEDWAYCAP!

The project will strongly contribute to local water shortage mitigation by supplying concrete solutions for the use of Non-Conventional Water Resources (NCWR).

Harmonizing existing measures and integrating tools, partners make solutions more accessible, simplifying the transferability, thus enhancing their value and impact. MEDWAYCAP challenge owners are regulatory and planning authorities, scientific community, as well as economic and technical operators around the Mediterranean. They are the co-writer and co-protagonist of this process, facilitated by MEDWAYCAP's tailored and innovative methodology.

The MEDWAYCAP project faces those challenging issues and addresses final beneficiaries, thus contributing to the UfM – Union for the Mediterranean - Water Agenda.

Our Goals are our mission.

Expanding and consolidating the knowledge framework on NCWR management, by identifying and harmonizing best practices, key results, and lessons learnt in the Mediterranean while promoting benchmarking and access to capitalization.
Strengthening the value and impact of NCWR management solutions through effective policies and tailored financing programs.

Valuing challenge owners to jointly make the difference at Mediterranean level addressing water scarcity, social and environmental challenges, promoting green economy and a long-term endogenous economic growth.

MEDWAYCAP Exhibition ambition.

Be creative! This is the objective beyond the objective!

While informing and raising awareness, engaging and inspiring the visitors during a travel discovering the existing technical solutions for treating, reusing, valorising waste water and in general Non-Conventional Water Resources (NCWR).

CONTACT PERSON

SVI.MED – EuroMediterranean Center for the Sustainable Development
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AN EXHIBITION OVERVIEW

WHAT the Medwaycap travelling exhibition is.

Medwaycap is a travelling exhibition designed to travel and be hosted in partner countries.
The core of the exhibition is a collection of proposals on the management of 'Non Conventional Water Resources', i.e. case studies and methodologies with a focus on the reuse of treated wastewater.
The hosted proposals are illustrated through mock-ups and scale models, some supplied by the partners and some created ad hoc, through audio-visual content, printed information material and through a collection of posters.
The aim is to inform and raise the awareness of visitors also through their active involvement.
The exhibition is organised according to five categories: Info, Media, Models, Senses and Stories, for a total of six exhibition modules supported by ten free-standing panels. The five categories are characterised by colours and symbols that make them immediately distinguishable and recognisable.
Panels and modules are contained within six wooden boxes, designed to be easy to assemble and disassemble and suitable for transport.
The wooden boxes when closed, with the provided sturdy straps, become the containers for all the elements that make up the exhibition, ready for shipment. When open, they are an essential part of the exhibition modules, the main element of recognition and the support surface for scale models and information material. Modules and panels can be arranged within the exhibition space according to certain predefined configurations or according to the needs of the host.
Some modules house audio-video and interactive devices.
The wooden boxes are flanked by display panels, also made of wood, which house posters and audio-visual devices. The panels are of two types, integrated and free-standing. The integrated ones are attached to the boxes, the free-standing ones, thanks to their base, can be placed freely in the space or, alternatively, can be hung on the walls. All display panels are contained within the boxes.

WHY this exhibition.

The main objective is to facilitate the access and promotion of good practices in unconventional ways, taking care of the visitor experience, to make them enjoyable and to enhance their educational value. Setting up the exhibition is an opportunity to disseminate its contents, for networking, for promoting synergies and collaborations.

WHO it is designed for.

The exhibition is designed to be easily accessible and enjoyable, regardless of age and the geographical and cultural framework in which it will be displayed.
The focus on mainly visual communication helps to overcome any language barriers.
The accessibility of content is enhanced by offering multimedia content and interactive and sensory experiences that, in addition to sight, involve hearing, touch and, if desired, taste.
The exhibition can be customised by the host partner, integrating content and services, such as workshops and educational activities, involving and highlighting local resources and communities.
The exhibition also includes a carpet and a series of stools to facilitate moments of sociability and leisure.

WHERE it will be exhibited

It is a travelling exhibition designed to be displayed in different partner countries. It can be shipped from one country to another and those who welcome it will be able to assemble and disassemble it easily thanks to the accompanying video instructions.
If interested in hosting the exhibition, please get in touch with the project coordinator.

EXHIBITION MODULES AND DISPLAY PANELS

The exhibition consists of six modules and ten 'self-supporting' exhibition display panels that can be freely placed in the space. In addition there are eight stools and a circular rug to set up relaxation or socialising areas.
The heart of each module is a wooden box labelled with a different colour and icon according to the category to which it belongs (Info, Media, Models or Senses).
Once closed, the boxes work as transport containers and store all the components of the exhibition, including the display panels, stools, information materials and models. They are closed with ratchet straps. A QR code is engraved on each closing panel to access video instructions for assembly.
The boxes are made of solid wood treated with natural paints. The edges and corners are reinforced with steel sheet corners to better withstand transport. The feet are made of chestnut wood and are designed to allow manoeuvrability with a trans-pallet.
Once the box has been opened, the lid will be turned upside down and serve as the main support surface for the single module.
Each individual module will be equipped with a series of specific accessories and devices as explained in detail in the following sheets.
The display panels contain the exhibition posters on both the front and the back.
The printed posters are in english.
The posters text translation in other languages is available on the exhibition web site.
They are also made of wood and are of two types, integrated and free-standing. The integrated panels are attached to the boxes by means of very conspicuous bolts, the free-standing ones are equipped with two slip-proof bases that are attached to the underside of the panel.
All panels have two holes at the top for hanging them on a wall.
A description of the six categories and individual modules is given below.

INFO: 1 MODULE
A place for welcoming and to gather informations about the exhibition and its partners. A collection of general informative material. A panel to collect feedbacks and stories.

MEDIA: 1 MODULE
Two integrated audio-video devices and one free-standing monitor. To collect and stream best practices videos, educational contents, customized contents.

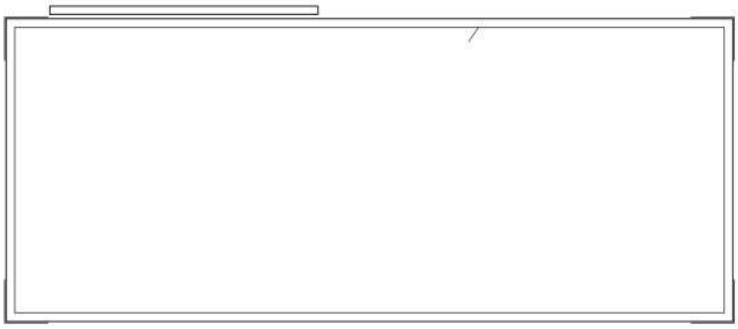
MODELS: 3 MODULES
Prototypes and scale models of best practices, case studies and methodologies.
Supplemented by integrated panels with explanatory A1 posters.

SENSES: 1 MODULE
A spot to relax, for immersive and sensorial experiences. A small playground.
A spot to taste and share a cup of local tea or herbal infusion.

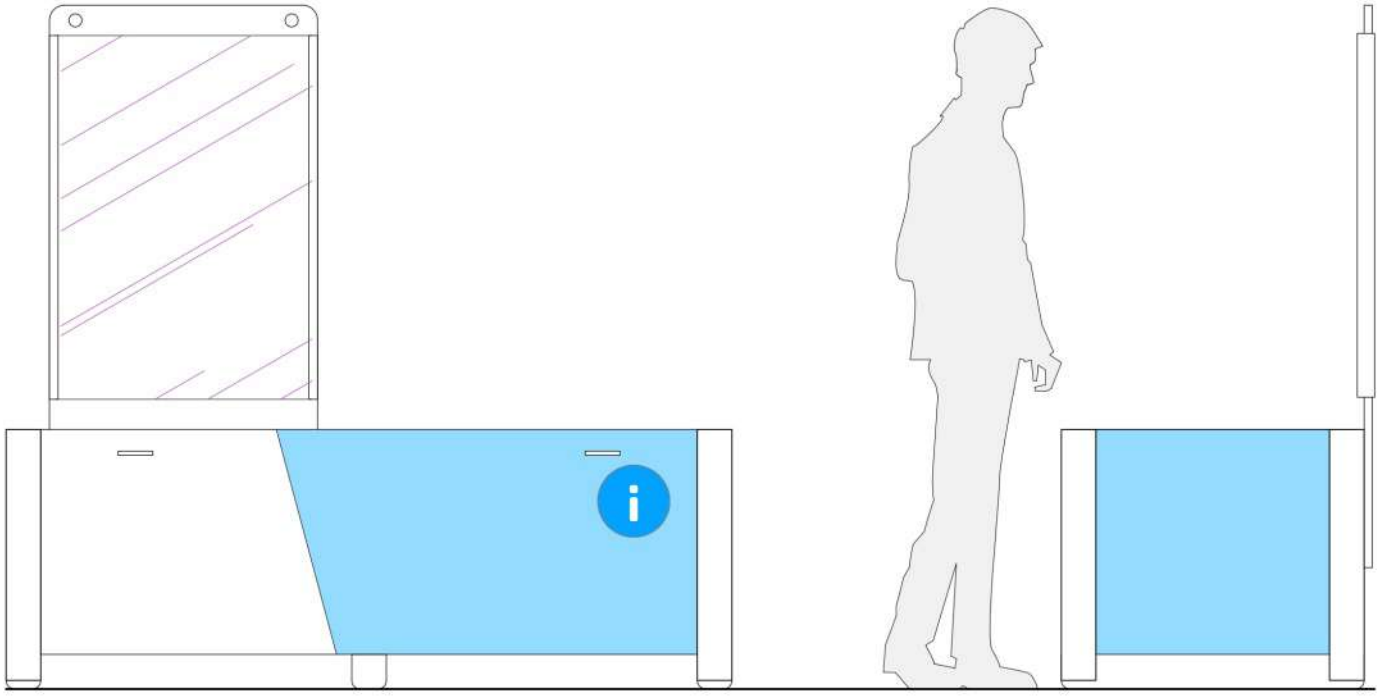
STORIES: 10 DISPLAY PANELS
Ten free-standing panels to host the A1 posters. For showing best practices, case studies and methodologies from the different partners.

INFO

The info module is designed to welcome visitors and provide them with the information they need to fully enjoy the exhibition and its contents.
On the front of the integrated panel is the poster presenting an introduction to the exhibition, on the back a space for leaving feedback.
Through a QR code it is possible to connect to an online platform to leave audio and video comments.
On the shelf of the box you can leave information material about the projects and partners of the exhibition.
Some of the stools provided can be placed next to the box to invite people to stop and meet.
Blue is the colour for the module.



TOP VIEW

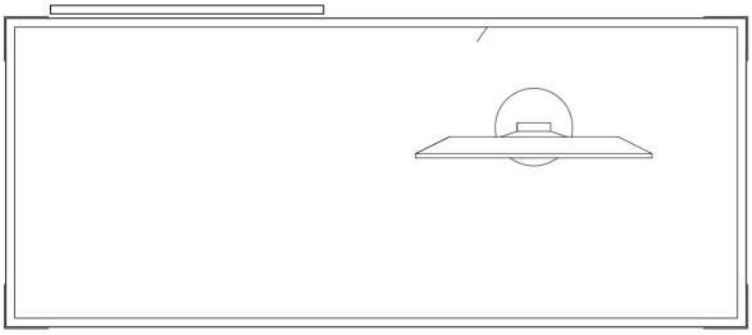


FRONT AND SIDE VIEW

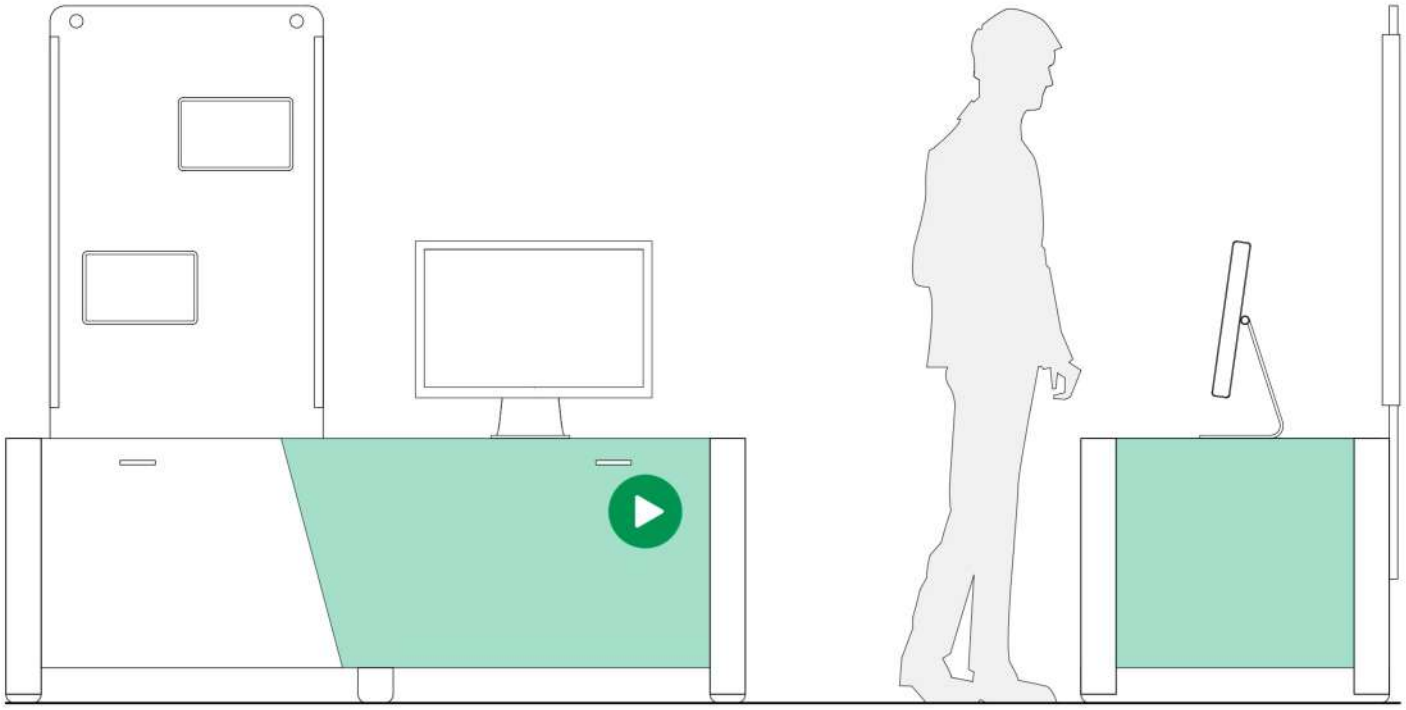
MEDIA

The media module is responsible for conveying the audio-visual content provided by the partners via three devices, two digital frames and a monitor, supplied with the module.
The two frames are integrated into the panel and once started will display audio-video content pre-loaded on SD cards.
On the other hand, a USB stick is plugged into the monitor, which allows, in addition to pre-loaded content, the upload of customised content according to the partner's preferences.

Bottle green is the colour for the module.



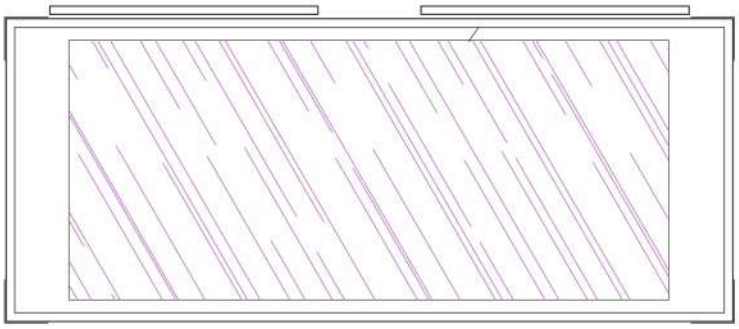
TOP VIEW



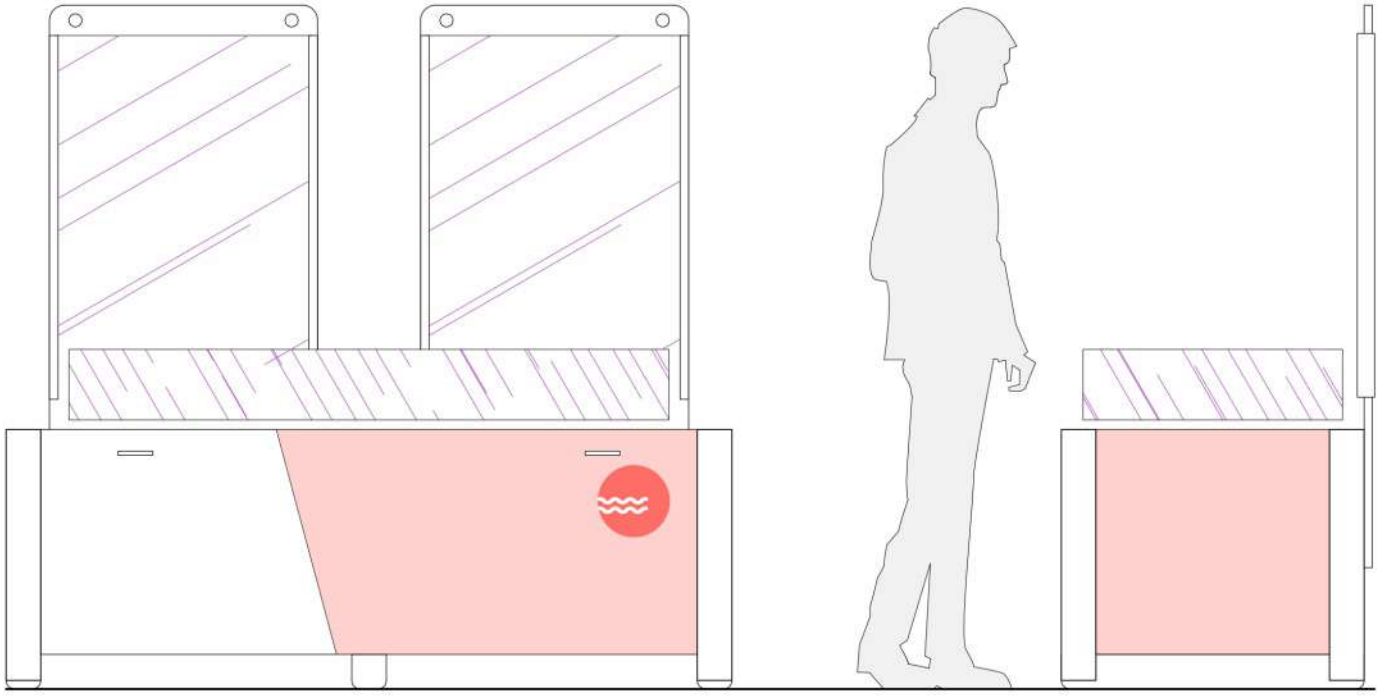
FRONT AND SIDE VIEW

MODELS

The three 'Models' modules house **physical models**, scale reproductions and models of some of the solutions proposed by three partners: Certh, Certe and Nawamed.
The panels integrated in the box contain additional scale models and dedicated posters explaining the proposed solutions.
Some of the models are **interactive** so that visitors can have an educational experience.
Coral red is the colour for the module.



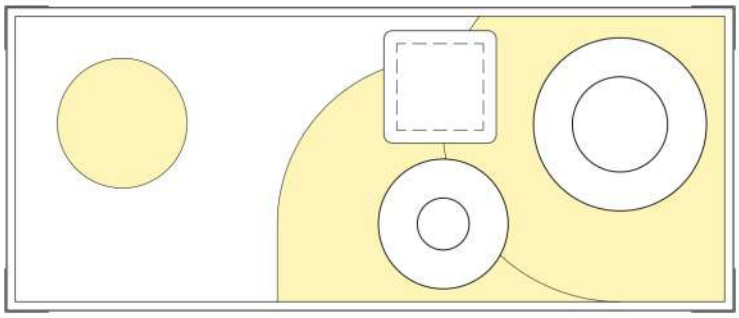
TOP VIEW



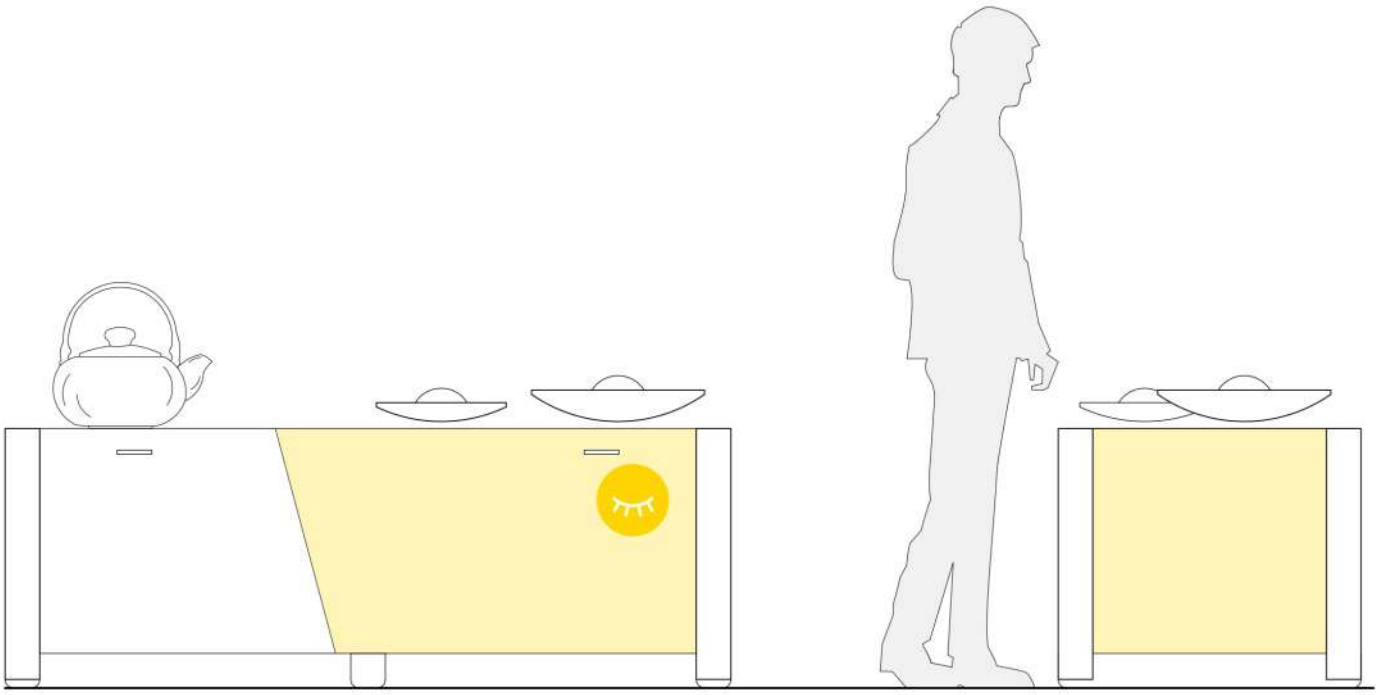
FRONT AND SIDE VIEW

SENSES

The Senses module, or the **sensory module**, is the module that experiences the connection between the visitor and the themes and values of the exhibition (water as a scarce and precious resource, water as a support for life) through **multi-sensory stimulation**. The module integrates a projector and an audio diffusion system that continuously broadcast water-related images and sounds.
On the shelf there are two large chestnut wood bowls to **caress**. The polished surface conveys the softness of water.
On contact with the hand, sounds and images change in response to hand movements.
A tea set can be placed on the yellow circle to add an **olfactory and taste experience** to be customised according to the host country.
The module also contains a seating kit and a carpet to set up a **small relaxing area or playground**.
Chrome yellow is the colour for the module.



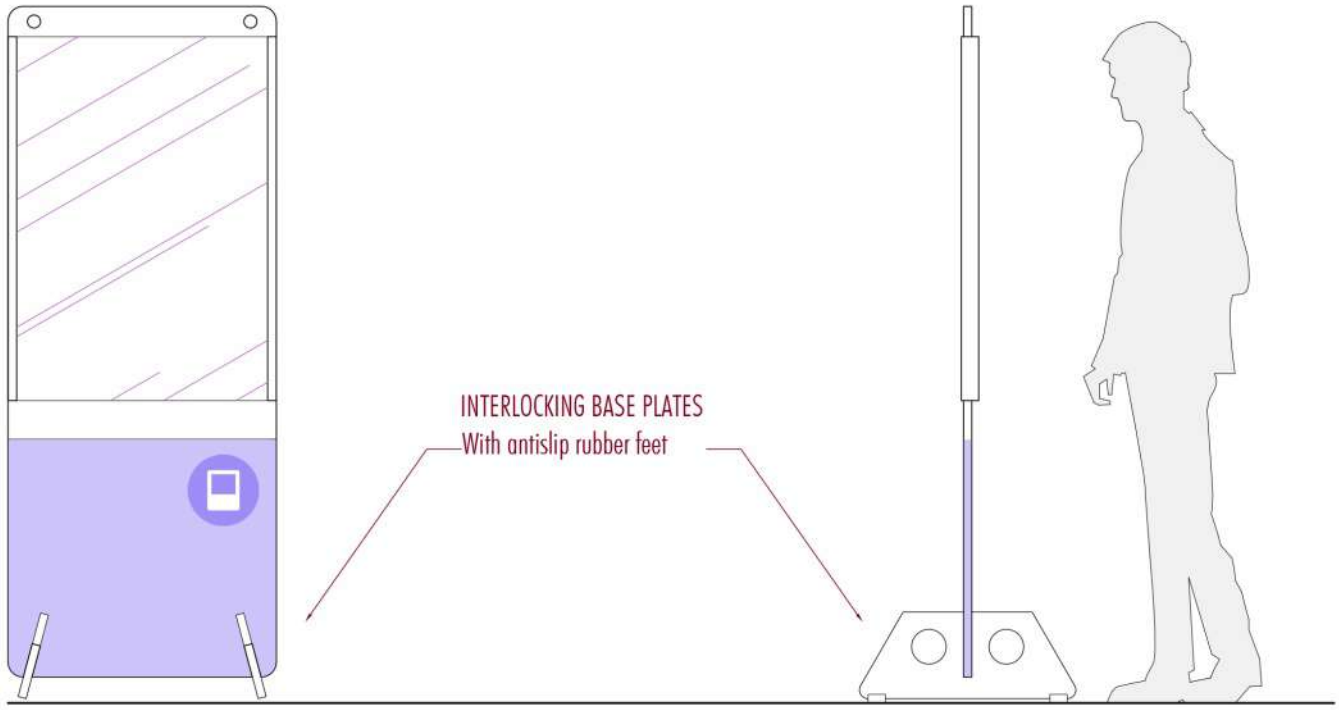
TOP VIEW



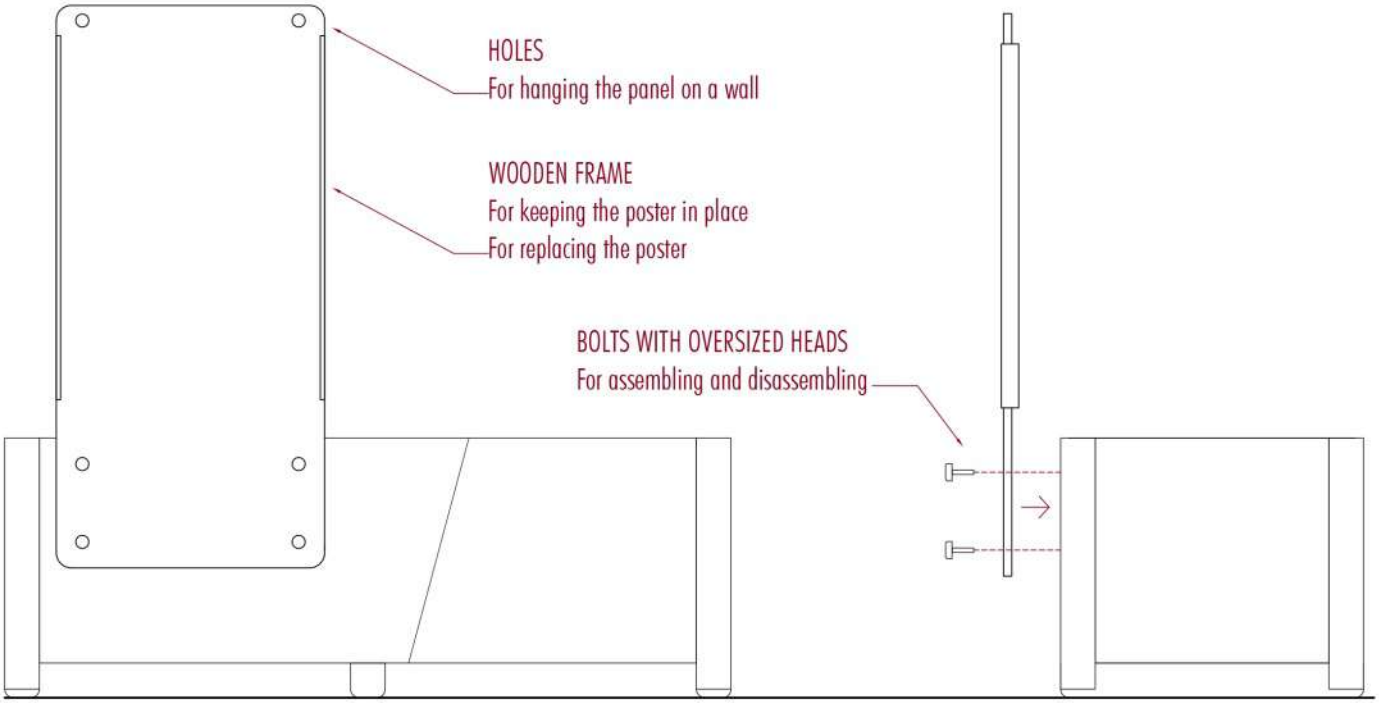
FRONT AND SIDE VIEW

STORIES

The fifteen panels, ten free-standing and five box-integrated, host the A1 posters with projects, case studies and proposals from the partners.
The integrated ones host posters related to the modules they are attached to.
The free-standing ones can be freely displaced around the room or hanged on the walls thanks to the two holes they are equipped with.
Violet is the colour for the free-standing panels.



THE FREE-STANDING PANEL: FRONT AND SIDE VIEW



THE INTEGRATED PANEL:FRONT AND SIDE VIEW

GUIDELINES FOR THE EXHIBITION SETTING

In the following lines we will lead you, step by step, through the setting up of the exhibition. From the opening of the boxes to the placement of all the elements in the exhibition space available.

First step: positioning the six boxes

Before proceeding with the opening of the six boxes, we recommend placing them in the exhibition space according to the chosen configuration. We recommend placing the Info and Media modules near the entrance and placing them close together. The Models modules could be placed in sequence so that the different models can be compared.
The Senses module, on the other hand, we would recommend placing it at the end of the exhibition tour, possibly in a quiet area, where it is possible to project onto a wall and listen without too much ambient noise.
The Media, Models and Senses modules need to be close to a power supply.
As regards lighting, only good, even diffuse lighting is required.

Second step: opening the boxes

A QR code is engraved on the top panel of each box, which provides access to video instructions for assembling and disassembling the box.
To open the boxes, the containment straps must be removed by releasing the ratchet at the top. Once the straps have been removed, you can proceed to lift the upper panel using the handles provided and place it on the floor after turning it upside down. In fact, remember that this same panel will act as a support surface for the module.
Inside, depending on the box, you will find exhibition panels, stools, multimedia devices, scale models, information material and accessories.

Third step: setting up the individual modules

Once the boxes have been emptied, the storage materials and straps should be placed back inside. It may now be closed again by placing the removed panel upside down.
Each individual module should be set up according to the attached instructions. In some you will hang one or two integrated display panels, in others you will place the scale models on the shelf and activate the media devices.

Fourth step: placing the display panels

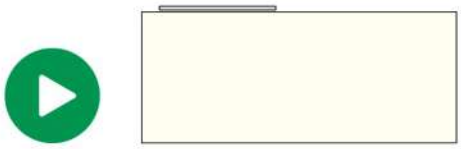
Once the six modules have been completed, the ten free-standing display panels, the Stories, are assembled by inserting the two interlocking bases at the bottom. Proceed with care to avoid breaking the interlocking. Once assembled, they can be placed inside the space. It is recommended to place them close together, even in groups, so that the visitor can navigate between the various experiences. Some also have posters on the back. Therefore, make sure that it is possible to walk around them and that the visitor is led to do so. It is advisable to leave at least 40 cm between one panel and another and a space of at least 150 cm in front of and behind each panel to make it easier to use.

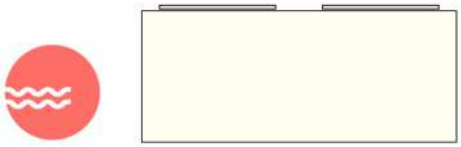
Fifth step: setting up rest and relax areas

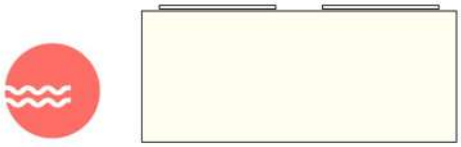
The last step consists of assembling the stools by fitting the two pieces of the base together and then the circular seat, which must then be secured with a bolt.
It is recommended to place some of the stools in the proximity of the Info and Media modules, or in groups to offer resting or socialising spots. The idea is that visitors then move them around as they please.
The circular rug, on the other hand, is suggested to be placed close to the Senses module, offering a resting point or playground for children.
At the Senses module it was envisaged a spot where visitors would be offered a hot drink selected by the host (infusion, tea, coffee).
This could be indicated at certain times of the day when the drink will be served at the module.
In such a case, the teapot and cups or glasses for serving it would be placed on the module shelf.

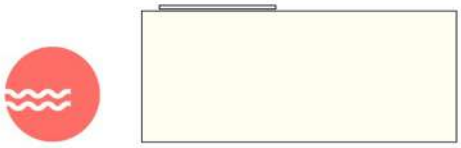
ALL THE EXHIBITION ELEMENTS

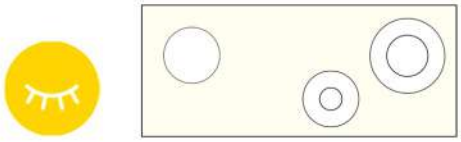
SIX MODULES



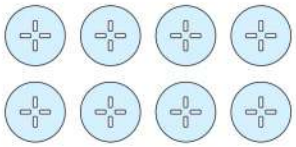




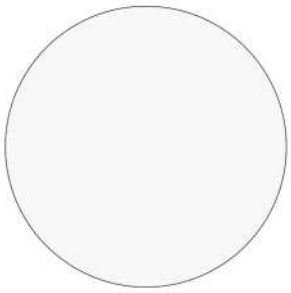




SEVEN
INTEGRATED
PANELS

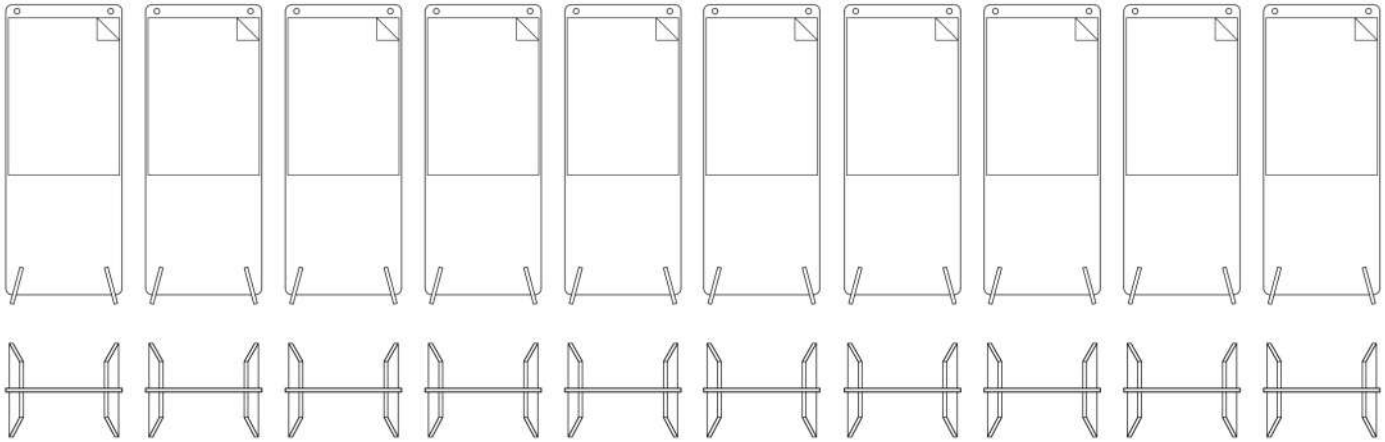


EIGHT STOOLS

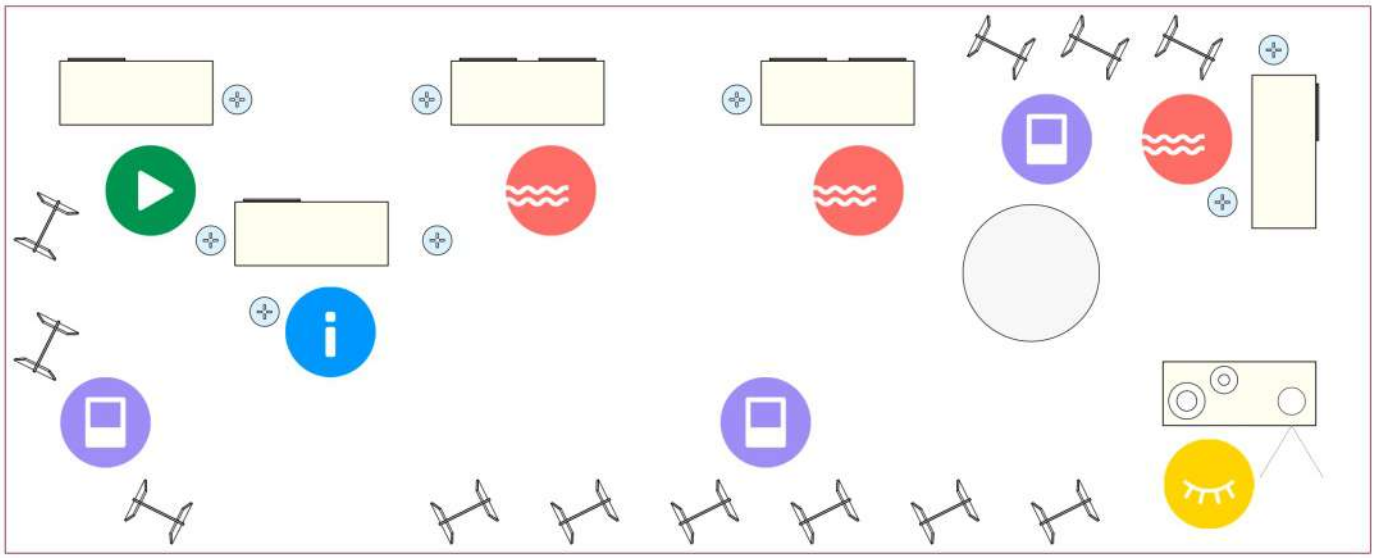


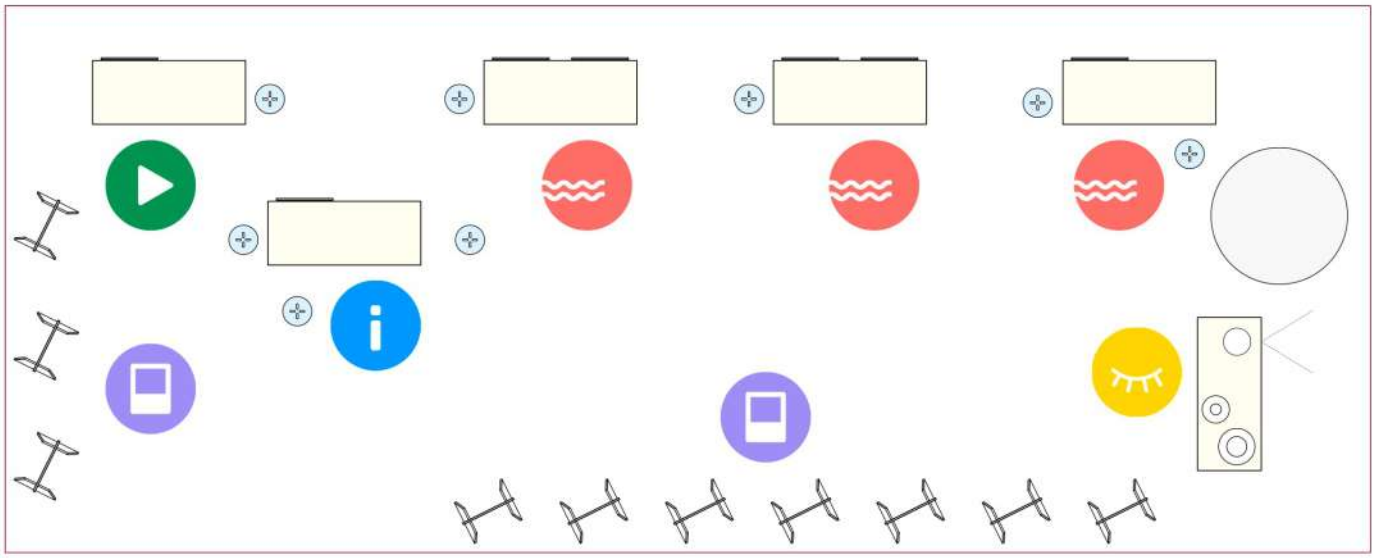
ONE CIRCULAR RUG

TEN
FREE-STANDING PANELS



TWO POSSIBLE SET-UPS FOR A 15X6 M ROOM





ATTACHMENTS

. LIST OF THE POSTERS DISPLAYED

. CONTENT OF THE WOODEN CRATES

. OVERALL DIMENSIONS AND WEIGHT OF THE WOODEN CRATES

. EXPLODED 3D MODEL OF A SAMPLE WOODEN CRATE

. PICTURES FROM THE EXHIBITION OPENING IN SIRACUSA

LIST OF THE POSTERS DISPLAYED

Aquacycle
CERTH, Center For Research and Technology, Greece

Alter Aqua
Global Water Partnership Mediterranean

Einaudi Ambiente Sostenibile
Secondary education institute (IIS) Luigi Einaudi, Syracuse, Italy

FIT4REUSE (01-03)
ALMA MATER STUDIORUM University of Bologna, Italy

Hydrousa (01-04)
NTUA - National Technical University of Athens, Greece

MEDISS
PWEG Palestinian Wastewater Engineers Group, Palestine

MENAWARA
NRD-UNISS Desertification Research Centre, University of Sassari, Italy

Nawamed (01-03)
Iridra, Italy

PROSIM
NARC National Agricultural Research Center, Jordan

ValEUr Gabès
Metropolitan Area of Barcelona, Spain

Zer0-M
CERTE Centre de Recherches et des Technologies des Eaux, Tunisia

CONTENT OF THE WOODEN CRATES

CRATE 01. INFO

. 5 Self standing wooden display panels with posters
. 1 wooden display panel with poster
. Brochures

CRATE 02. MEDIA

. 5 Self standing wooden display panels with posters
. 1 wooden display panel with 2 LCD monitors
. Cables and plugs
. Brochures

CRATE 03. MODELS

. 2 wooden display panels with posters and devices
. 2 fragile 3d models
. Brochures

CRATE 04. MODELS

. 1 wooden display panel with poster
. Large fragile 3d model
. Cables and plugs
. Brochures

CRATE 05. MODELS

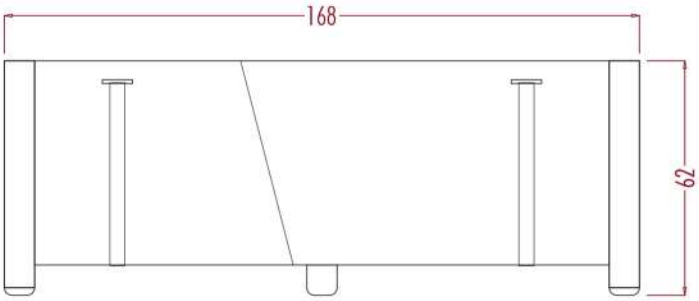
. 2 wooden display panels with posters and devices
. Large fragile 3d model
. Brochures

CRATE 06. SENSES

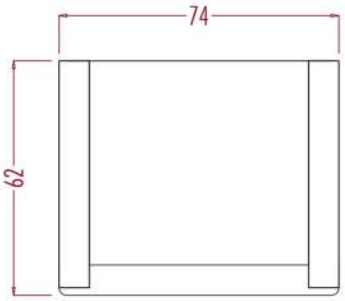
. Wooden sensory device
. Audio devices
. LED projector
. 8 stools
. Free standing 24" LCD display
. Cables and plugs
. 150 cm rug

OVERALL DIMENSIONS AND WEIGHT OF THE WOODEN CRATES

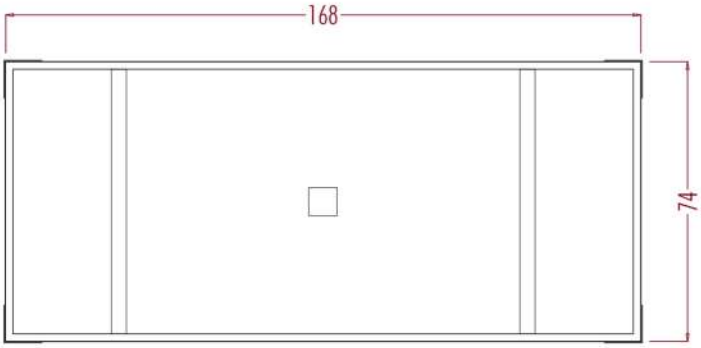
(measurements in centimeters)
. NUMBER OF CRATES: 6
. SINGLE CRATE MAXIMUM WEIGHT: 130 KG
. OVERALL ESTIMATED WEIGHT (FOR 6 CRATES): 1.200 KG
. SUITABLE FOR HANDLING WITH A PALLET TRUCK



FRONT ELEVATION

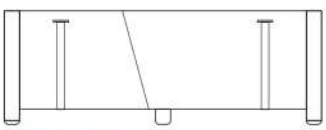


SIDE ELEVATION

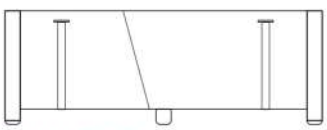


TOP VIEW
QR code with video instructions for assembling and disassemling each module, in the center

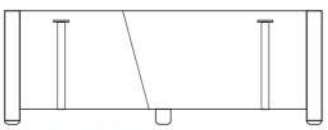
THE SIX WOODEN CRATES



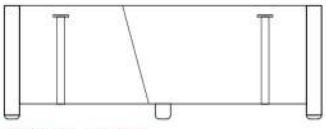
CRATE 01: INFO



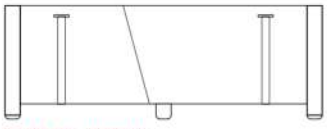
CRATE 02: MEDIA



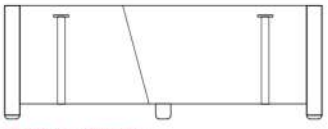
CRATE 03: MODELS



CRATE 04: MODELS

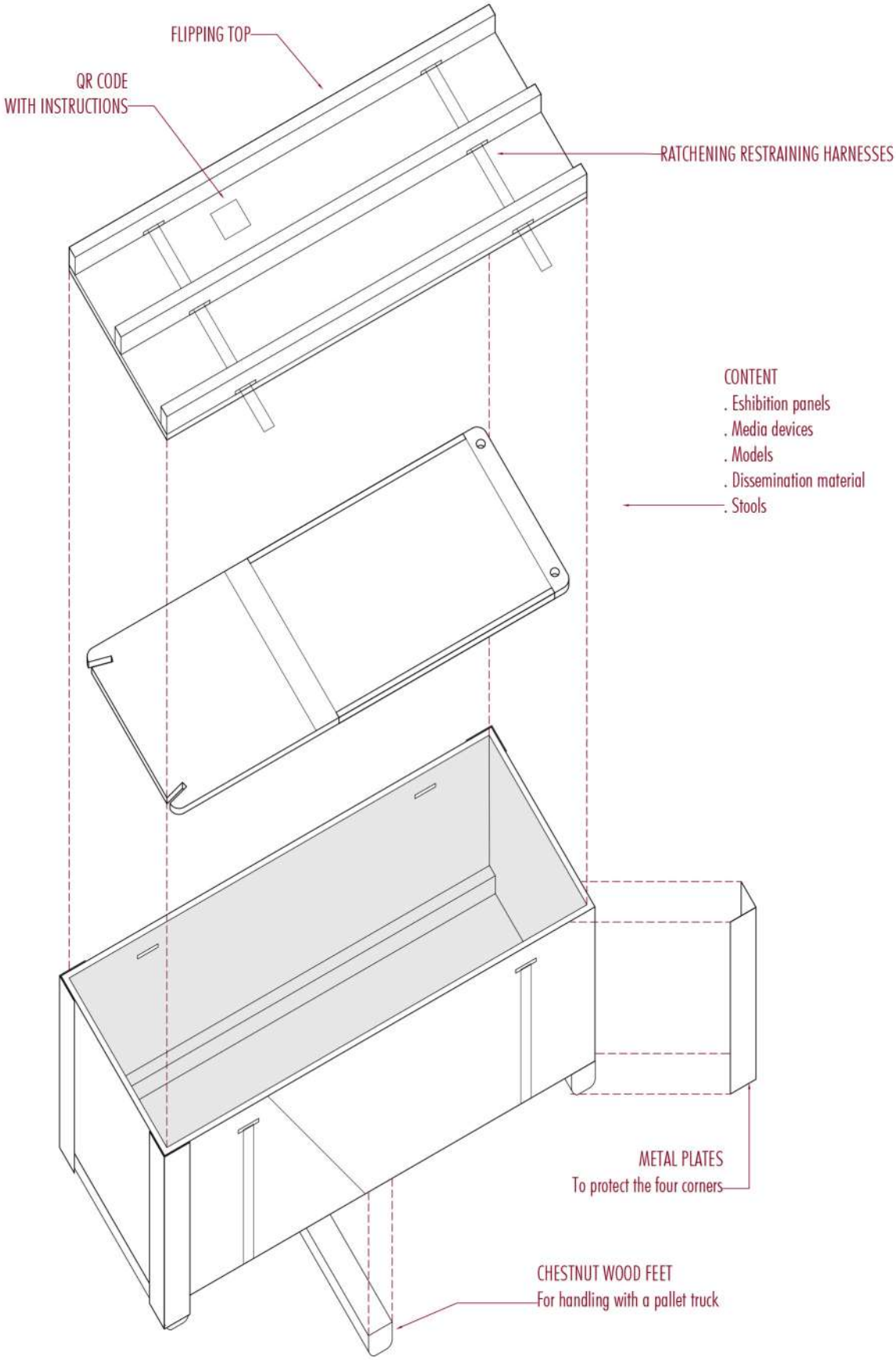


CRATE 05: MODELS



CRATE 06: SENSES

EXPLODED 3D MODEL OF A SAMPLE WOODEN CRATE



PICTURES FROM THE EXHIBITION OPENING IN SIRACUSA

COLOPHON

Barbara Sarnari
SVI.MED
Euro-Mediterranean Centre for the Sustainable Development
Exhibition creator

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AQUACYCLE

Towards Sustainable Treatment and Reuse of Wastewater in the Mediterranean Region

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Greece
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Konstantinos Plakas

ENI CBCMED Cooperating across borders in the Mediterranean

Project funded by the EUROPEAN UNION

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

MEDWAYCAP

AQUACYCLE

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more info

project

WHAT

APOC
eco-innovative wastewater treatment system

The eco-innovative wastewater treatment system proposed by the AQUACYCLE project has the acronym APOC which stands from the three components that compose the system, namely the “Anaerobic digestion”, the “Photocatalytic Oxidation” and the “Constructed wetland”.

HOW

APOC system uses special microorganisms that “eat” with the absence of oxygen the organic matter of the sewage, leading simultaneously to the production of an organic fertiliser and biogas as energy source.

Next, the liquid product is treated by a system that is designed to mimic processes found in natural wetland ecosystems (called constructed wetland).

It acts as a natural filter where plants oxygenate the effluent and allow the growth of beneficial microorganisms.

These microorganisms, naturally growing in the wetland ecosystem, break down pollutants and purify water without the use of chemicals and energy.

Finally, with the aid of sun and the addition of environmentally friendly chemicals (e.g. oxygenated water and iron species), the municipal wastewater is purified at a level that satisfies the most stringent standards for reuse in agriculture (irrigation water), or for domestic, industrial or other applications.

WHY

This new technology enables the recovery of valuable substances from treated effluents, such as fertilisers and biogas, representing a good example of the transition to a circular economy.

AGRICULTURE
DOMESTIC/INDUSTRIAL USE
-
WETLANDS
WASTEWATER TREATMENT
CIRCULAR ECONOMY
MICROORGANISMS
WATER POLLUTION

Alter Aqua

Global Water Partnership Mediterranean

-

Nikos Skondras

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alter aqua

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project

WHAT

Rainwater harvesting cisterns

The cistern in Victory Square is thought to date back to around the 17th Century and is one of the largest reservoirs in Vittoriosa.
Due to its central and historical importance, this reservoir was selected to be rehabilitated through the ALTERAQUA Project.

In fact, during 2021 the reservoir underwent extensive rehabilitation works to enable the reinstatement of its water catchment capacity.
The rehabilitation works started with the removal of 64 tons of sludge. This was then followed by the cleaning and plastering of the walls and floors of the reservoir.
New manholes were also installed to facilitate future cleaning works on the reservoir.

Vittoriosa's rich water conservation history is seen in the numerous public and private cisterns located within its urban area.
These cisterns, if effectively used, could provide an opportunity for optimising the management of rainwater runoff flows within the city, reducing the risk of urban flooding and increasing urban climate resilience

CISTERN
RAINWATER HARVESTING
RESERVOIR
WATER SECONDARY USE

HOW

The Victory Square reservoir has a storage capacity of around 800,000 litres of water. The rehabilitated reservoir in Victory Square provides a new source of water for secondary uses within the city, such as street cleaning and the irrigation of green spaces.

Through the reservoir's restoration, the Alter Aqua project also aims to raise awareness on the important role of rainwater harvesting as an alternative, or non-conventional, water resource for addressing urban water demands.

FIT4REUSE

Sustainable and accepted ways of water supply
Pilot 1

ALMA MATER STUDIORUM
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FIT4REUSE

media link

more info

project

HOW

Intensive systems are implemented through the developmenct of biotechnology, membranes and ingenious nanotechnology, through which urban wastewater is treated so that it can be safely reused in agriculture.

WHAT

Municipal wastewater treatment

Seven pilot sites were implemented for municipal wastewater treatment. Nature-based solutions (i.e. constructed wetlands) were implemented at three of them, while intensive technologies were adopted at the other four sites.

These practices aim to design and improve nature-based solutions centred on single-stage and hybrid wetland systems for the treatment of municipal wastewater and safe effluent reuse in agriculture.

These solutions are being optimised, energy efficiency is improved, important nutrients are recovered and, at the same time, pollutants in the effluent, pathogens and pharmaceuticals are removed.

WETLANDS
BIO-ELECTRIFIED WETLAND
MICROFILTRATION
ADSORPTION COLUMNS.

WHY

The specific objective is therefore to optimise different wastewater treatment technologies and to enable nutrient recovery in south and north Mediterranean areas; to enhance removal of pharmaceuticals and toxic compounds by membrane and nano-technologies and, finally, to assess and compare toxicity, eco-toxicity and phyto-toxicity of treated effluent.

FIT4REUSE

Sustainable and accepted ways of water supply
Pilot 2

ALMA MATER STUDIORUM
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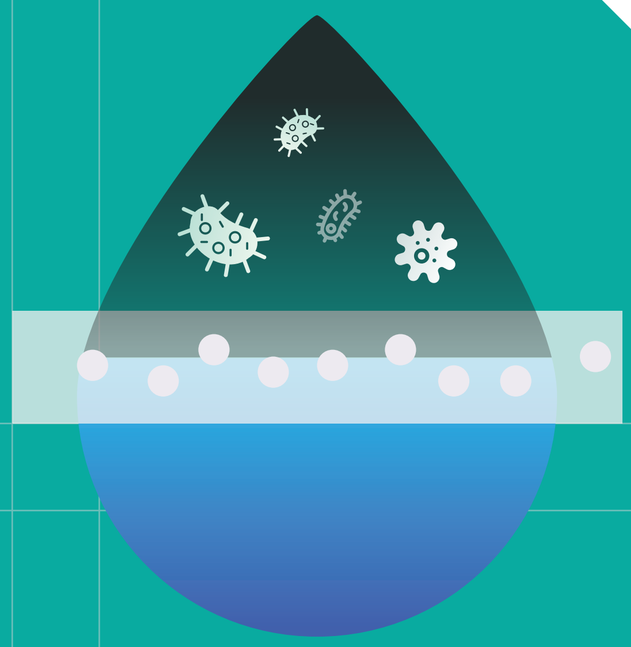

WHAT

Integrated treatment solutions

Integrated systems were implemented at three pilot sites where different combinations of intensive and/or wetland systems were tested.

The general objective is to study removal efficiencies of pollutants, pathogens and pharmaceuticals. At the same time, energy and cost saving performances of combinations of these technologies are being assessed.

Furthermore, thanks to these sites, the optimum combination of the developed technologies is investigated at different regions with different reuse requirements.

MUNICIPAL WASTEWATER
INTEGRATED SYSTEM
WETLAND
FILTRATION

HOW

In addition to setting up three pilot sites, a simulation platform was also realised. Its objective is to simulate the FIT4REUSE solutions and predict their performance under conditions different from the experimental one, and therefore it can also serve as a tool for decision making.

The platform is able to execute steady state and dynamic simulations for the individual units as well as for combinations of several process units with the result of system performance in terms of water quality, energy and carbon footprint. Each module includes significant design and operational parameters of each unit, inputs (e.g. wastewater characterization) and relevant conversion processes physico-chemical and biochemical) involved.

FIT4REUSE

Sustainable and accepted ways of water supply
Pilot 3

ALMA MATER STUDIORUM
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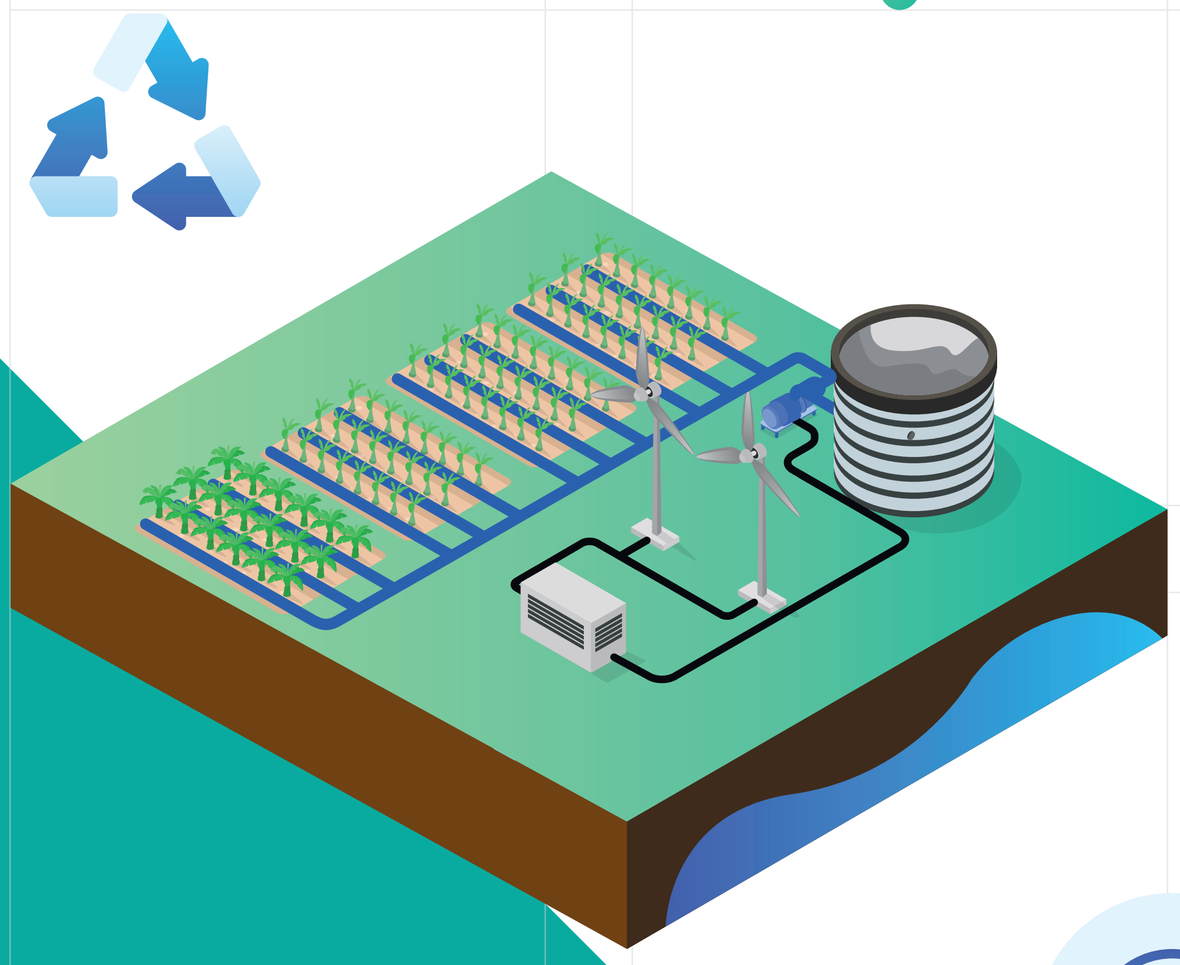
FIT4REUSE

WHAT

Agricultural use of non-conventional water resources

The project studies the use of high-quality non-conventional water resources, treated with the FIT4REUSE technologies, in irrigation, fertigation and aquifer recharge, both as direct and indirect water reuse schemes.



In particular, effects of these water resources on soil, crops and drainage water are being tested and the optimisation of the Soil Aquifer Treatment (SAT) systems is being done in order to increase infiltration rate.

The project will also produce supporting guidelines for practitioners in the use of non-conventional water resources with the aim of good management of irrigation and recharge systems in a frame of water scarcity/bad water quality situation to meet market, safety and consumer demands.

HOW

Two experimental sites have been set up to test the effects of treated wastewater on clogging of irrigation drippers, soil and crop health quality, and the effect of wastewater nutrients on crop growth. These tests also enable assessment of the benefits of water reuse in terms of fertilisation and overall yield. In addition, FIT4REUSE also evaluates the evolution of water quality in open storage since it is an important component when planning water reuse.

AGRICULTURE
-
NON-CONVENTIONAL WATER
WATER QUALITY
IRRIGATION
FERTILISATION

Hydrousa

Hydro 1 & 2
Demonstration of water loops with innovative regeneratives business models for the Mediterranean region

NTUA - National Technical University of Athens
Greece
-
Simos Malamis

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Cooperating across borders in the Mediterranean

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MEDWAYCAP

HYDROUSA

media link

more info

project

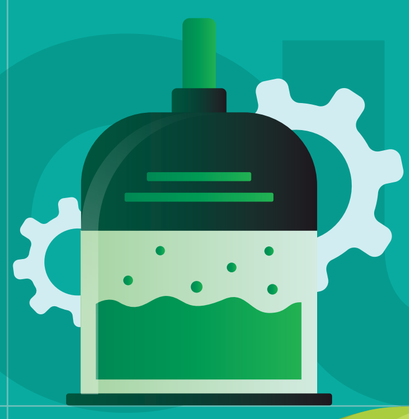
HOW

The anaerobic treatment takes place in two UASB (Up-flow Anaerobic Sludge Blanket) reactors, leading to the production of biogas and a small amount of sludge.

The process recovers energy in the form of biogas, has low operating expenses and low footprint. The biogas produced is collected in a gasometer and is being upgraded in order to produce pure biomethane which is used as fuel, while the sludge is treated in a sequence of a sludge drying reed bed, a composting unit and a biofilter. The anaerobic treated effluent is fed in the constructed wetlands, which serve as a secondary treatment providing further reduction of the organic carbon content and suspended solids of wastewater.

The treated effluent from the wetlands is further fed to a post-treatment unit which consists of membrane filtration coupled to a UV disinfection system.

HYDRO2 is a 1ha of an agroforestry system that is fertigated using reclaimed water with a high nutrient content that is the result/output from HYDRO1 system. The agroforestry is divided into 3 main groups: trees for fruit production; orchards bushes; and herbs and annual crops.



WHY

HYDRO2 combines the regenerative capacities of agroforestry with the use of reclaimed water and nutrients.

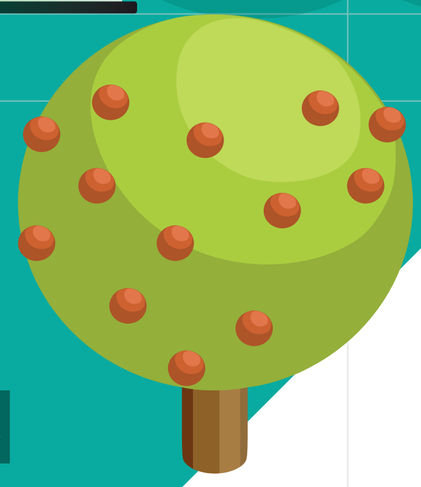
Up to 100 m³ of reclaimed water per day (in summertime) is available for irrigation.

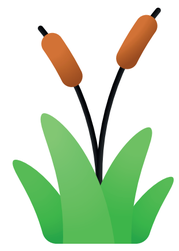
WHAT

From sewage to fruits/crops

HYDRO1 is a circular wastewater treatment system applied in decentralised areas with high seasonal loads.

It combines anaerobic processes with constructed wetlands and disinfection to treat domestic wastewater as a completely circular solution where water, nutrients and the produced sludge are reused.





CIRCULAR WASTEWATER TREATMENT
MUNICIPAL WASTEWATER
ANAEROBIC TREATMENT
CONSTRUCTED WETLANDS
COMPOST
BIOGAS
RECLAIMED WATER FOR FERTIGATION
AGROFORESTRY

Hydrousa

Hydro 3 & 4

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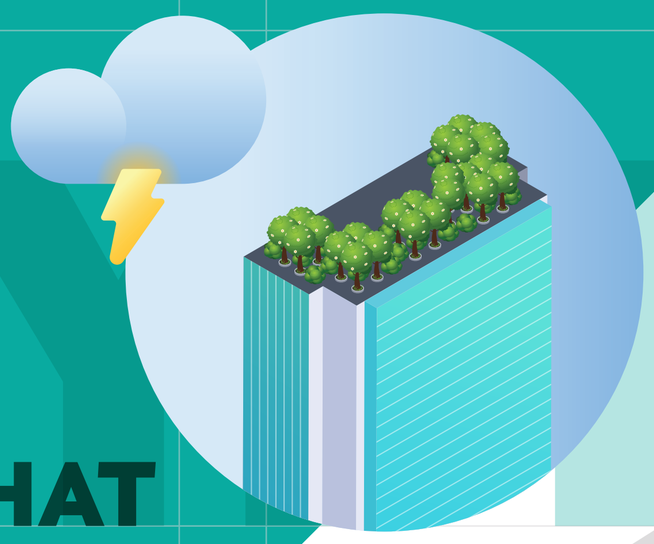
HYDROUSA



WHAT

Rainwater harvesting systems
First demo system

In Mykonos island, HYDROUSA project has implemented systems that recover and reuse water from non-conventional water sources.

The first one (HYDRO3) is an innovative nature inspired rainwater harvesting system.
A shallow, sub-surface rainwater collector is designed to harvest rainwater by draining, transport it into two cylindrical light structure storage tanks and eventually to irrigate a 0.4 ha oregano cultivation.

Precision irrigation of oregano and online monitoring of the water quantity and quality are implemented. The oregano yield is processed to produce essential oil giving an added value to the whole chain that will be locally exploited.

WHAT

Rainwater harvesting systems
Second demo system

The second demo case (HYDRO 4) is a smart residential water management system.
In this site, rainwater, stormwater and surface runoffs are collected and stored into buffering tanks, in order to recharge the aquifer.
The system consists of three subsystems.

The first one collects the rainwater from house roofs through a piping system in a water storage tank. The water is reused for domestic non-potable purposes, e.g., washing, flushing toilets, etc.

The second refers to the Slow Sand Filter (SSF), which is a water purification system composed of a sand-bed system that purifies the water to potentially potable level.

In the last one the rainwater is collected from two sources: surface runoff and stormwater through a bioswale system. The latter is an open-channel linear drainage system with geomembrane and geotextile that collects and partially treats storm water, and prevents the lavender crop from flooding. The stored water is used during the summer period for the irrigation of 0.2 ha of lavender.

The lavender harvested is used for the production of essential oil.

NON-CONVENTIONAL WATER SOURCES
RAINWATER
STORMWATER
8HERBS
ESSENTIAL OILS
RECLAIMED WATER FOR IRRIGATION
POTABLE WATER

Hydrousa

Hydro 5

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HYDROUSA

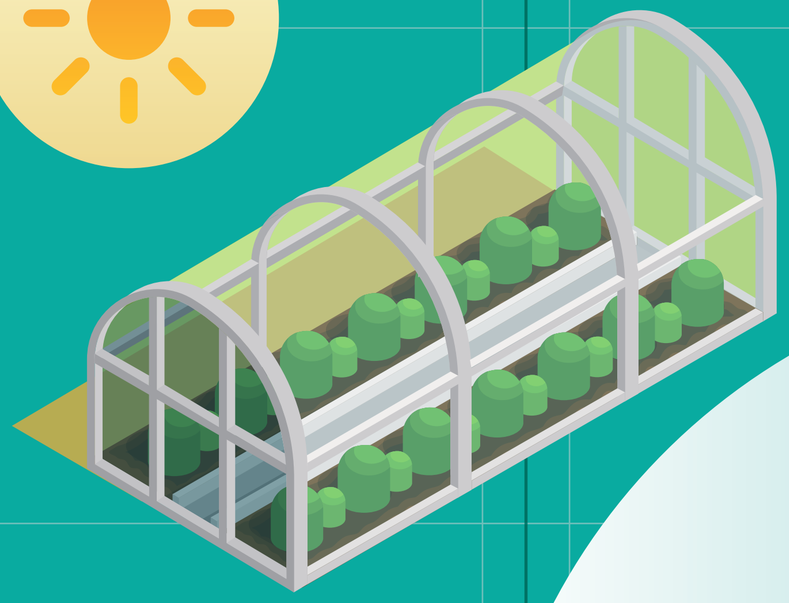
HOW

The desalination system is composed of a series of interconnected desalination panels where evaporation and condensation processes occur.

The outputs of each unit are freshwater and brine. In addition, each unit can gather occasional rainwater falling on its external surface. Once the feed water is pumped into the tank, the hydraulic circuit works by gravity.

The water produced by the panels, together with the rainwater, are collected and pumped to a cultivation greenhouse while the brine is pumped to a salt factory. In this unit salt is produced by evaporation and ventilation of the brine.

The produced water is used to irrigate a greenhouse and produce tropical fruits.

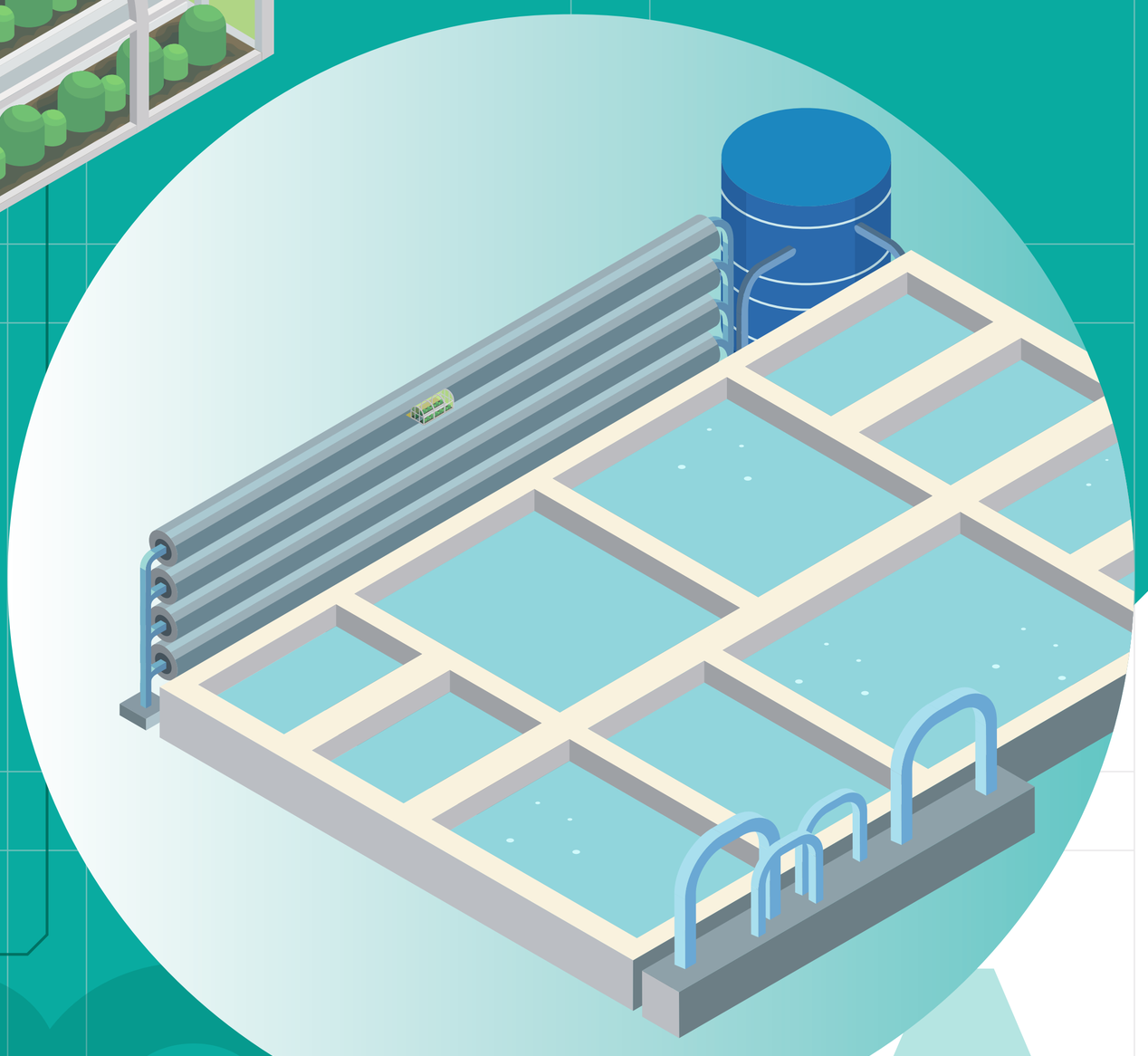


WHAT

Seawater desalination system Greenhouse

HYDRO5 is a nature-inspired, low-cost solar driven desalination system based on the principles of evaporation and condensation, which is implemented in Tinos Island.

Seawater and brine from the existing desalination plant is treated in the Mangrove Still System to produce freshwater and salt. The treated water is channeled to a 200 m² greenhouse irrigating tropical plants.



LOW-COST DESALINATION SYSTEM
FRESH WATER PRODUCTION
BIOMIMICRY TECHNOLOGY
MANGROVE STILL SYSTEM
TROPICAL FRUITS CULTIVATION
PRECISION IRRIGATION

Hydrousa

Hydro 6

NTUA
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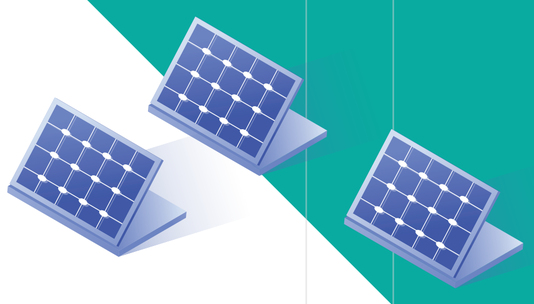
HYDROUSA

WHAT

Closing the water loop in a touristic facility

HYDRO6 is an innovative combination of water management cycles coupling agricultural and touristic activities.

It aims to demonstrate how a small touristic unit can be self-sufficient and sustainable in using their resources efficiently.



HOW

Within an eco-tourist facility, in an off-grid area of Tinos, rainwater and vapour harvesting systems as well as wastewater reclamation systems are applied.

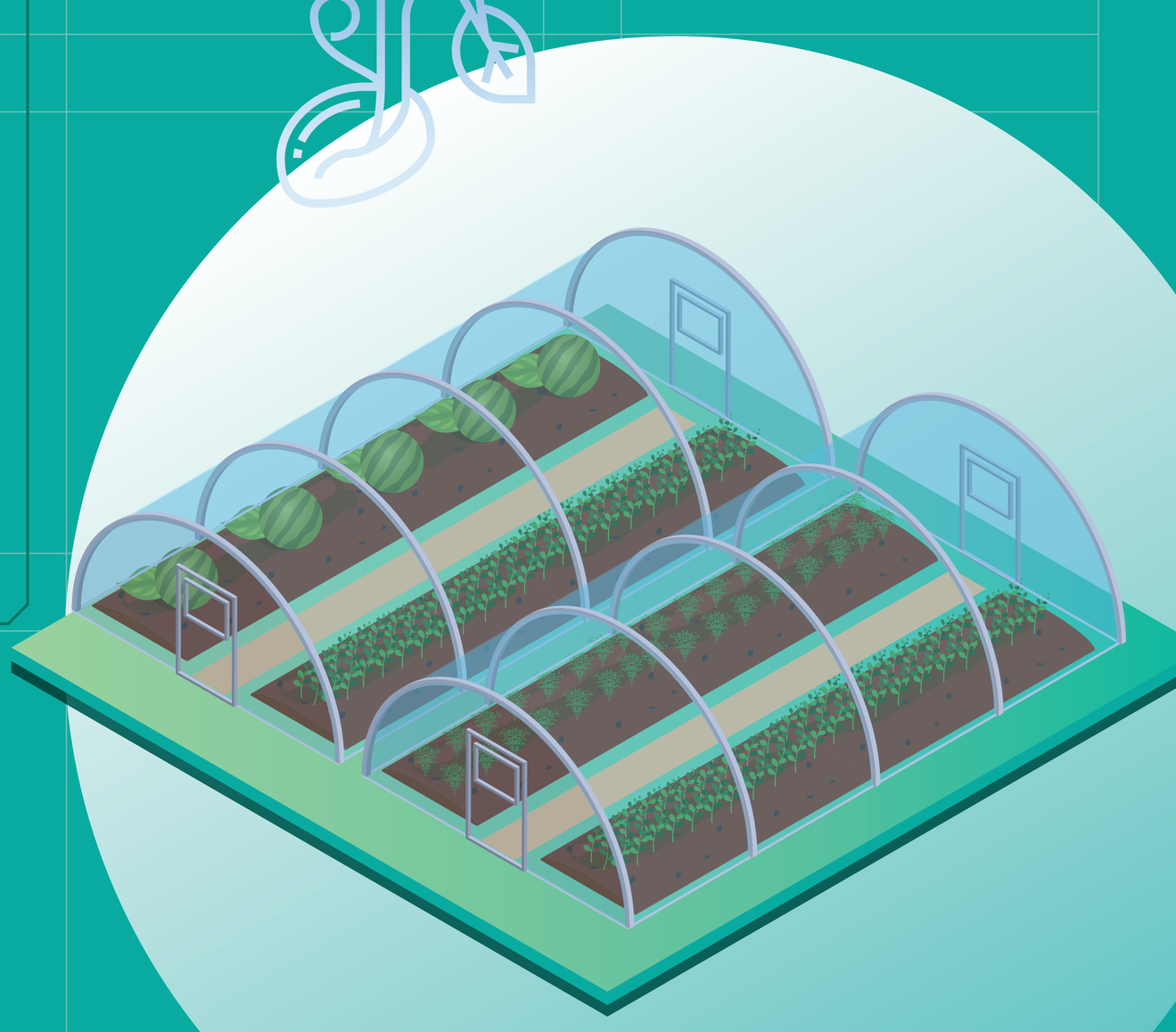
The rainwater harvesting systems implemented consist of two cisterns (100m³ and 80 m³) collecting rainwater from several surfaces (roofs, terraces etc. of the lodges) of approximately 500m² harvesting surface area.

The wastewater from the premises is treated by reed beds (constructed wetlands) coupled with UV disinfection to produce reclaimed water.

The reclaimed and harvested water is used for the cultivation of fruits, vegetables and herbs using precision irrigation techniques. A greenhouse was built to increase productivity for a variety of crops.

Also, solar-driven vapour condensation units, which work with absorption and condensation chambers are installed to recover drinking water from water vapour. Compost is produced using sludge from the composting toilet system and greens from the gardens in order to produce a valuable fertiliser for the cultivation of plants and crops.

The Ecolodge is completely energy autonomous, and all activities are powered by PV panels.



WATER MANAGEMENT CYCLES
TOURISTIC ACTIVITIES
RAINWATER GREY WATER VAPOUR
RECLAIMED WATER FOR IRRIGATION
FRUITS VEGETABLES HERBS
COMPOST ESSENTIAL OILS

MED WAY CAP *Info*

SVI.MED. *Italy*
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Barbara Sarnari

media link

web site

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WHAT

The core of the exhibition is a collection of solutions, case studies and methodologies with a special focus on non-conventional water use at urban and rural level.

Readymade prototypes and customized scale models, demonstrating how some of the processes such as constructed wetlands system work, are showed in an easy way to reach both technicians and the general public.

The aim is to inform and to raise awareness engaging the visitors. The proposed solutions modules are supported by videos, projections and soundscapes.

MEDWAYCUP is part of a cluster of projects that are contributing to a wider ambition, addressing “water scarcity” and related common challenges for the Mediterranean region as identified by the 2014-2020 ENI CBC “Mediterranean Sea Basin Programme”.

ENI CBC Med is the largest Cross-Border Cooperation (CBC) initiative implemented by the EU under the European Neighbourhood Instrument (ENI).

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Interaction & web design

Vincenzo Cancemi
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Graphic design

MEDISS

Mediterranean Integrated System for Water Supply

PWEG
Palestinian Wastewater Engineers Group
Palestine
-
Monther Hind

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MEDISS

WHAT

It addresses the issue of improving the quality of saline groundwater present in the Mediterranean area, opening alternative irrigation for higher quality and more diversified cultivations (dates, citrus, etc.).

According to the features and specific needs of the partner areas, MEDISS will test innovative solutions in the use of treated wastewater and desalination of brackish water. In the longer term, the project will contribute to reducing stress on freshwater, as well as costs for water supply.

At the same time, higher productivity and diversification of crops will increase food security and income for farmers.

AGRICULTURAL FIELD
NON CONVENTIONAL WATER RESOURCES
TREATED WASTEWATER
BEST AGRICULTURAL PRACTICES

media link

more info

project

HOW

1

Blending of treated wastewater (TWW) with fresh wadi water and brackish groundwater in Jericho/Palestine:
Surface water in Wadi Quilt is collected, stored in a ground pool, blended with saline underground water and TWW from Jericho Wastewater Treatment Plant (WWTP), and then used to irrigate 400 ha of palm farms, benefiting 55 farmers.

2

Reverse osmosis (RO) desalination with innovative long-lasting membrane and PV energy in Aqaba Governorate/Jordan:
Innovative approach never tested before in Jordan, is applied to desalination plant of brackish groundwater, extending membrane's lifetime with innovative treatment and using photovoltaic panels for energy supply.
Fresh water is provided to the people of the village with a 32m³/hr.

3

Prototype ammonia stripping plant for fertilization in Arborea in Italy:
Sludge is used for ammonia stripping in the pilot WWTP, the plant is also equipped with a system for energy recovery through biogas cogeneration, which allows it to produce large amounts of electricity and heat that contribute to the support of the plant itself.
The pilot plant has a high-efficiency biogas-powered cogenerator, produced by anaerobic fermentation of biomass and sewage stored is special structure.
The pilot plant is equipped with photovoltaic plant to reduce the cost of energy in the system.

4

Tertiary treatment with innovative filter bed in Bechima/ Tunisia:
Improving irrigation water quality by using a pilot WWT system through an innovative infiltration-percolation method with different filtration mixtures.

MENAWARA

Non Conventional WAter Re-use in Agriculture in Mediterranean countries

NRD-UNISS
Desertification Research Centre, University of Sassari
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Alberto Carletti

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MENAWARA

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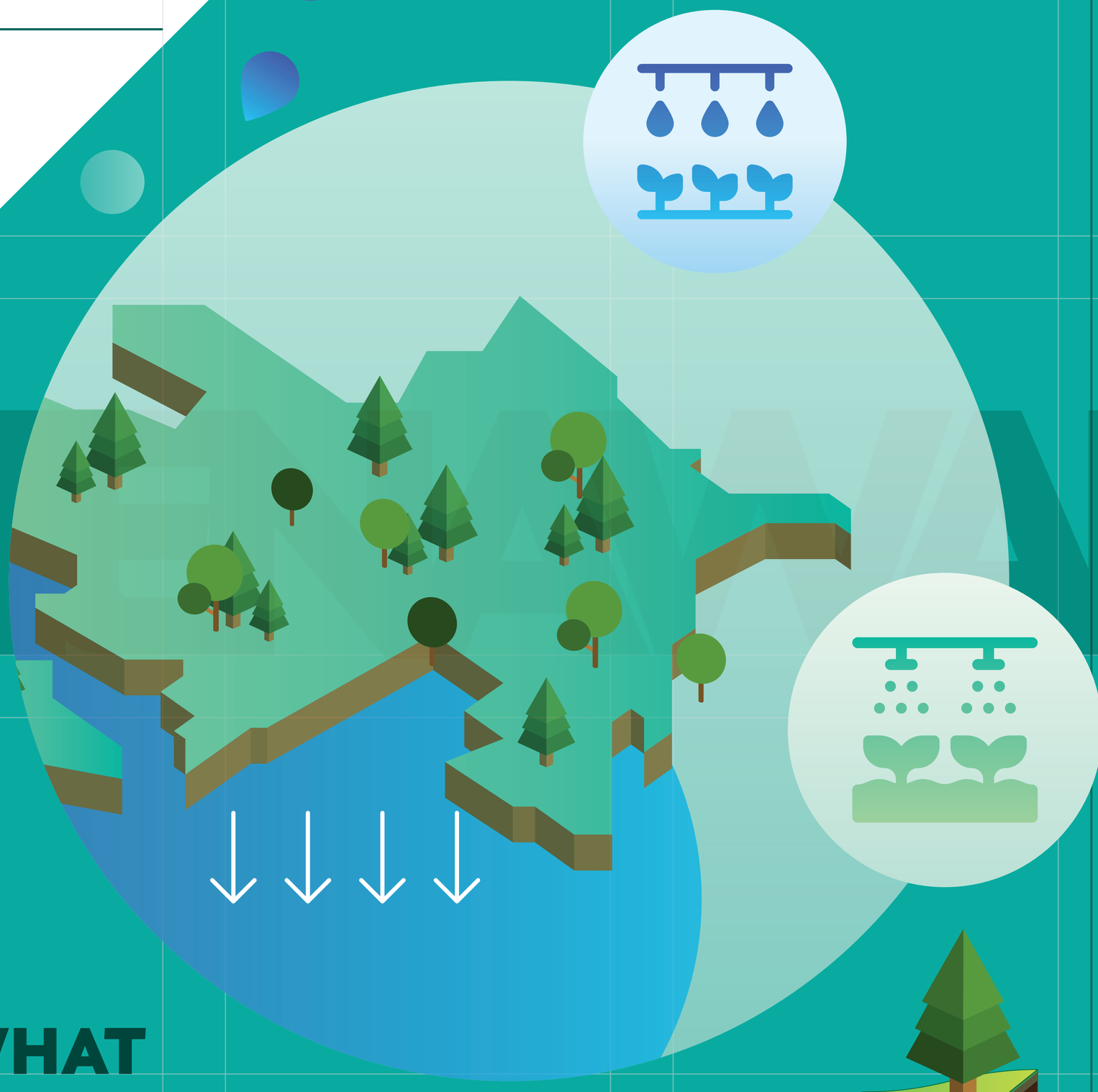

WHAT

Forested Infiltration Area

The Forested Infiltration Area (FIA) system aims at mitigating the groundwater nitrate contamination for the shallow sandy aquifer in the Nitrate Vulnerable Zone (NVZ) of Arborea (Italy).

AGRICULTURAL

-

DRAINAGE WATER AS RECHARGE WATER
MANAGED AQUIFER RECHARGE
PASSIVE TREATMENT SYSTEM

HOW

It consists of parallel recharge trenches with a depth of 1 m which are supplied with drainage water, pumped from an existing dewatering pumping station. Water infiltrates into the sandy soil through the trenches towards the aquifer. The recharge trenches are placed between rows of white poplar trees (Populus alba). In such forest areas, the water that infiltrates into the soil meets an effective filter made up of tree roots.

The depurative action occurs in the rhizosphere where, in conditions of almost oxygen-free soils and in the presence of abundant organic matter provided by the woody plants, the denitrifying bacteria, living in symbiosis with the roots, have a very effective action to promote nitrate attenuation.

This function will be ensured in the medium-long term when the forested area will be fully developed. Considering that in the case of the Arborea pilot site, drainage water characterised by low quality is used for the aquifer recharge, the depurative action in the short term is ensured by the innovative Passive Treatment System installed on the bottom of the recharge trenches.

The Passive Treatment System consists of a mixture of inert and organic materials (e.g. eucalyptus wood chips), to promote the denitrification process, attenuate organic and inorganic contamination and prevent clogging processes at the infiltrating surface.

Nawamed

Nature Based Solutions for Domestic Water Reuse in Mediterranean Countries

Iridra
Italy
-
Fabio Masi

ENI CBCMED Cooperating across borders in the Mediterranean
Project funded by the EUROPEAN UNION
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NAWAMED

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project

HOW

The use of green walls for the treatment of grey waters involves a double advantage: reducing water and the energy footprint of green walls currently used in architecture; and generating potentially reusable waters for non-potable uses (e.g. refilling of toilet flush cisterns, green areas irrigation, yard cleaning).

Hence, green walls are considered among the most promising green architecture solutions capable of combining the need for wastewater treatment and recovery and the acceptance by residents of the inclusion of decentralised treatment solutions in urban environments.

Two types of greenwalls for greywater treatment and reuse are tested: living walls with pot modules and green facades.

The green facades solution decreases the investment cost in comparison to the treated flow rate of living walls, indeed, it basically is a vertical flow constructed wetland planted with ornamental and climbing plants. The solution is highly innovative and the suitability for greywater treatment as well as the survival of climbing plants were recently successfully reported from Greek experiments.

NAWAMED foresees the implementation of green facades at the university premises in Amman and Beirut, taking the grey water from students' dormitories. The treated water is pumped back into the buildings, reducing drinking water use.
In Beirut, the green facade and a living green wall are integrated into the same building, facilitating the comparison of the two solutions.

WHAT

Nature-based solutions for greywater treatment

The technique used for the treatment of the greywater in living walls, green facades, and green roofs, derives from the constructed wetlands technology. Whenever possible, vertical submerged subsurface flow systems have been chosen for the following key reasons: limited weight, reduction of evapotranspiration (the project will be implemented in water-scarce arid environments), and a wide choice of plant species.

LIVING GREEN WALLS
CONSTRUCTED WETLANDS
NATURE-BASED & LOW-COST SOLUTIONS
NON CONVENTIONAL WATER
PHYTODEPURATION

Nawamed

Nature Based Solutions for Domestic Water Reuse in Mediterranean Countries

Iridra
Italy
-
Fabio Masi

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MEDWAYCAP

NAWAMED

WHAT

Living wall

Living walls with pot modules are an innovative solution and many of the experiences available to date are still on a pilot scale in laboratories under controlled conditions, technologic innovation is proceeding rapidly, leading to already having several full-scale applications reported in literature as well as full-scale demonstratives, such as the demonstrative realised within the CONSUMELESS project, where a green wall was implemented for the treatment and reuse of greywater in a beach resort.

HOW

The first installation of this solution was set in Ferla (IT). The system involves collecting grey water (mainly from the wash basins) in a small tank from which it is pumped to feed the green wall. The water flows into the pots, where it undergoes purification treatment.
It is then collected in a tank for later reuse to flush toilets instead of using drinking water. The green wall consists of modules hanging on the wall madeup of vases whose filling material encourages the development of bacterial biofilm, which plays a key role in the treatment processes.
The plant species housed in the pots play several roles: to encourage bacterial biodiversity; to allow the water to distribute evenly in the pots, ensuring purifying efficacy; and to provide an aesthetic and refreshing function.

Before being sent to the drainage cisterns for reuse, the purified water is disinfected with an ultraviolet light lamp.
The green wall covers an area of approximately 30 square metres, facilitating maintenance by municipal technicians, thus reducing running costs.
With this system, it is estimated that around 1,000 litres of drinking water are saved per year per student (around 200).

NAWAMED also foresees the implementation of Living green walls at the university premises in Tunis and Beirut, taking the grey water from the campus facilities and students' dormitories. The treated water is pumped back into the buildings, reducing drinking water use.
In Tunis, the pot modules will be hung on the building walls and wood structures designed to create a recreational area.

LIVING GREEN WALLS
CONSTRUCTED WETLANDS
NATURE-BASED & LOW-COST SOLUTIONS
NON CONVENTIONAL WATER
PHYTODEPURATION

Nawamed

Nature Based Solutions for Domestic Water Reuse in Mediterranean Countries

Iridra
Italy
-
Fabio Masi

ENI CBCMED Cooperating across borders in the Mediterranean
Project funded by the EUROPEAN UNION
REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA
MEDWAYCAP
NAWAMED

WHAT

Constructed wetland for greywater and rainwater treatment.

A constructed wetland (CW) is an artificial wetland to treat sewage, greywater, stormwater runoff or industrial wastewater. Constructed wetland systems are highly controlled engineered systems that intend to mimic the occurrences of soil, flora, and microorganisms in natural wetlands to aid in treating wastewater.

LIVING GREEN WALLS
CONSTRUCTED WETLANDS
NATURE-BASED & LOW-COST SOLUTIONS
NON CONVENTIONAL WATER
PHYTODEPURATION

HOW

Horizontal constructed wetland systems consist of earthen basins sealed with geotextile coverings filled with gravel of a suitable size in which rooted macrophyte plants are planted. Similar to natural wetlands, constructed wetlands act as a biofilter and can remove a range of pollutants (such as organic matter, nutrients, heavy metals) from the water.

The planted vegetation and the filter bed, consisting usually of sand and gravel, play an important role in contaminant removal.
Vegetation in a wetland provides a substrate (roots, stems, and leaves) upon which microorganisms can grow as they break down organic materials.
Different species of aquatic plants have different rates of heavy metal uptake, a consideration for plant selection in a constructed wetland used for water treatment.

Constructed wetlands are one example of nature-based solutions.
They are constructed with flow regimes, micro-biotic composition, and suitable plants in order to produce the most efficient treatment process.

NAWAMED foresees the implementation of two constructed wetland systems.
In Lebanon, at the Beeka Valley university campus, the CW treats greywater from the students' dormitories. The treated water is pumped back into the buildings for flushing toilets. In Latina (Italy), the system collects rainwater and treats it to make it available for other uses, such as cleaning and washing.

Furthermore, NAWAMED foresees constructing an innovative transportable CW to be deployed in refugees' camps. This solution is based on Aerated CW technology, in which innovative components are included to improve the treatment performances and reduce the footprint area.

PROSIM

Promoting Sustainable Irrigation Management and non-conventional water use in the Mediterranean

NARC
National Agricultural Research Center
Jordan
-
Naem Mazahrih

ENI CBCMED Cooperating across borders in the Mediterranean

Project funded by the EUROPEAN UNION

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

MEDWAYCAP

PROSIM

WHAT

11 innovative solutions for water efficiency in irrigation will be tested in 27.5 hectares, involving 104 farmers.

The evaporation pan is one of the innovative solutions being installed in Jordan for crops of vegetables in greenhouses as well as open fields. Since Jordan is endemically affected by drought, the situation imposes an optimal management of its water reserves through accurate estimation of the climatic evaporative demand and the potential evapotranspiration (E.T.P.). Thus, this low cost innovative solution allows farmers to evaluate local evaporation and water needs for irrigation at plot/greenhouse level.

AGRICULTURAL
-
IRRIGATION
NON-CONVENTIONAL WATER
EFFICIENCY
WATER
MANAGEMENT PLAN

HOW

It consists of a water basin or tank with a large enough surface and sufficient depth to measure the change in water level due to evaporation.
It measures the evaporation rate of a given volume of water and surface exposed to the air (expressed in mm per day, month or year).

This data depends exclusively on the temperature and humidity of the air, as well as on precipitation.
The basin size ranges from 1 to 5 meters in diameter and from 10 to 70 cm deep.
It is usually placed 15 cm above the ground on a wooden pallet that allows air to circulate underneath it.

This prevents the transmission of thermal energy between the ground and the tank, which could distort the results obtained. In all cases, the water level is maintained at a short distance below the edge of the tank.
The variations in the water level of the tank, measured at fixed intervals, reflect the intensity of evaporation.
The information provided by the evaporation pans will provide farmers with how much water the farmers should use for irrigating their fields given a fixed irrigation interval.

media link

more info

project

ValEUr Gabès

Valorisation of urban water
through innovative actions and instruments

Metropolitan Area of Barcelona
Spain
-
Txomin Martino

ENI CBCMED
Cooperating across borders in the Mediterranean

Project funded by the EUROPEAN UNION

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

MEDWAYCAP

ValEUr Gabes
تثمين المياه الحضرية من خلال أعمال و أدوات مجددة
Valorisation de l'eau urbaine à travers des actions et instruments innovateurs

media link

more info

project

HOW

The pilot implementation focuses on promoting rainwater valorisation through the implementation of two interconnected infiltration basins in the urban area of Gabès in order to manage stormwater runoff, prevent flooding and downstream erosion, and improve water recharge of the aquifer.

The two sites selected are complementary, since site 1 is a wooded area that is part of the natural drainage of the area towards a small stream which connects directly with site 2. The second site will host a basin for the retention of urban runoff water coming from upstream, with a multiplier effect on the management of rainwater in this part of the city.

The basins will be open-air and will be designed as multipurpose areas, promoting their integration into the environment.

The implementation of such basins, although they do not represent a technological innovation, are forthe first time implemented at urban level in Tunisia.

WHAT

Gabès is a coastal city in the South of Tunisia, facing extreme hydric stress due to the bad quality of the aquifer and the high demand for water as a result of the important agricultural activity in the urban Oasis.

ValEUr Gabès promotes better management of non-conventional water resources with a focus on rainwater valorisation, through a participatory, multi-stakeholder Municipal Strategy of non-conventional water resources.

NON-CONVENTIONAL WATER RESOURCES PLANNING
SUSTAINABLE URBAN DRAINAGE
RAINWATER VALORISATION

Zer0-M

CERTE
Centre de Recherches et des Technologies des Eaux
Tunisia
-
Latifa Bousselmi

ENI CBCMED
Cooperating across borders in the Mediterranean

Project funded by the EUROPEAN UNION

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

MEDWAYCAP

WHAT

Closing water loop in a student house

The global concept aroundthe TDC/SWM-House (Technical Demonstration Center / Sustainable Water Management House) is local water management with the integration of unconventional water as resource and multi-use adapted solutions for zero discharge. The TDC scheme is divided into three lines of treatment relating to grey water, black water and rain water and three objectives of re-use for toilet flushing, landscaping and showering, respectively. Technologies to be established are membrane bioreactor (MBR), sequencing batch reactor (SBR) and Constructed Wetlands. Research studies are conducted by Zer0-M partners to optimise and evaluate the performances of these technologies with respect to grey or black water.

DOMESTIC/URBAN FIELD
-
SAVE WATER TREAT WATER
GREY WATER BLACK WATER
CLOSING WATER LOOP
RAIN WATER IRRIGATION
ZERO DISCHARGE REUSE MULTI-USE

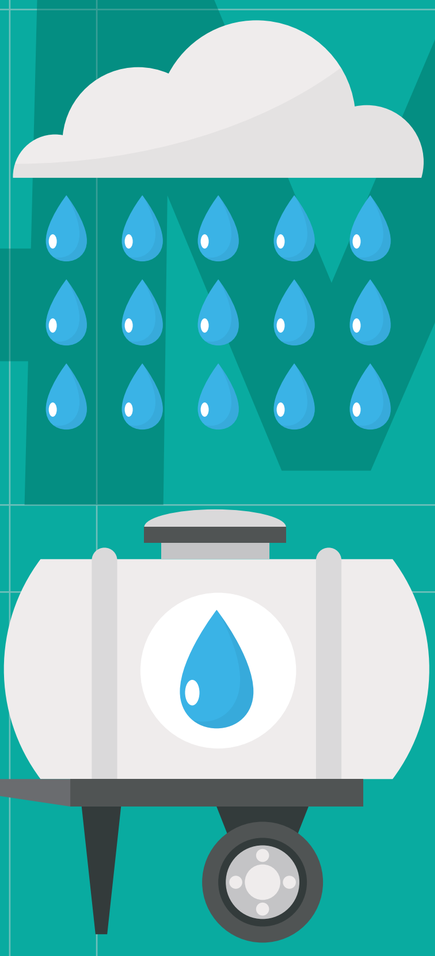
HOW

Grey Water: the grey water is first introduced from a manhole to a tank serving as storage and homogenising unit. Coarse and fine particles are removed by screens placed in the manhole and the holding tank. Two technologies of treatment are selected, MBR and SBR.

The principle of the SBR is a biological treatment in a compact reactor with different sequences (example: aerobic/anoxic/settlement) of which the order, the number and the duration are variable and have to be optimised according to the nature of the effluent.
The disinfection of treated water is ensured by UV lamps.

Black water: the black water is introduced to a storage tank and then 1m3/day is treated in three septic chamber tanks followed by horizontal subsurface flow (HSSF) and vertical subsurface flow (VSSF) constructed wetlands.
The treated water is stored in a tank for green area irrigation.

Rain water: the rainwater is collected from the roof of the student house building in a storage tank (14 m3) after screening. The outflow of the storage tank discharges into the sand bed for rainwater infiltration. The pumped water is filtered with a sand filter and heated using solar energy before being recycled to supply one shower. Sludge produced by the TDC is treated in a planted composting bed.



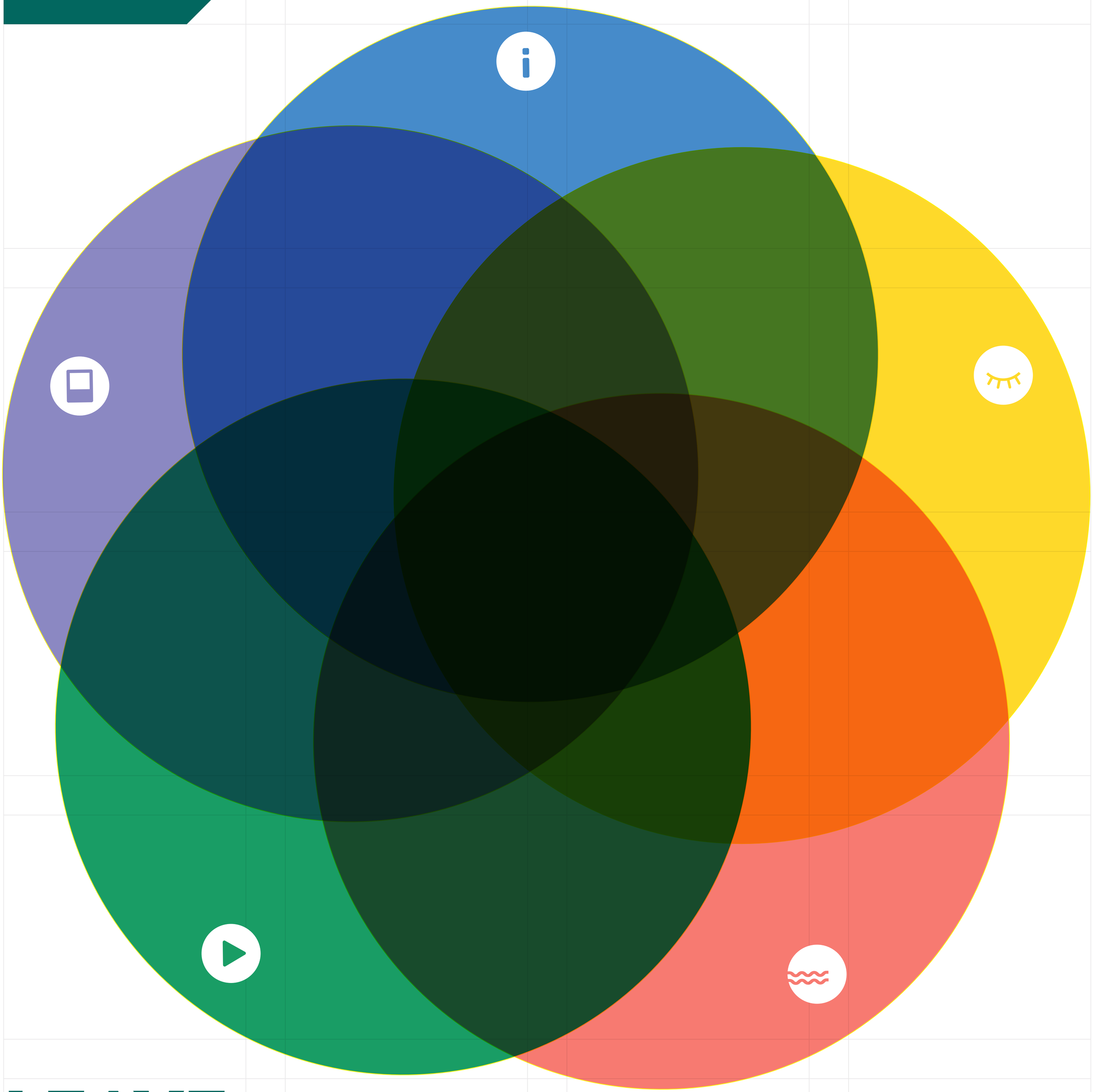
media link

more info

project

MED WAY CAP

WHAT IS THE MOST BEAUTIFUL THING YOU LEARNED TODAY?



LEAVE YOUR FEEDBACK

ONLINE