



Together for sustainable irrigation

EIA Spring Irrigation Forum

30 March 2023

THE HOUSEKEEPING RULES FOR A SMOOTH FORUM

- The event is recorded and will be shared
- Please present your full name and your organisation properly
- Please mute your microphones while you not participating
- Please use the chat box for questions and comments
- If you can, turn on your camera on so we can see each other

THE HOUSEKEEPING RULES EIA CODE OF CONDUCT

- EIA believes it is important that its activities are at all times carried out in accordance with the applicable law, especially competition law.
- EIA believes that business shall be conducted in an atmosphere of free competition, i.e. based on price and quality.
- The Code of Conduct aims at providing clear rules to EIA's members, thus reducing the risk of improper conduct and consequently of fines being imposed.
- This Code of Conduct shall be binding on all members as well as all other participants when taking part in EIA activities.

Agenda for this forum

16:30 -16:45	Opening The 2030 Agenda for sustainable Development, The EU taxonomy for sustainable activities	Moshi Berenstein/ EIA President
16:45 -17:00	Welcome & introduction of New Members	Fleur Martin/ EIA Communication Officer
17:00 -17:30	Guest speaker “Irrigated urban vegetation to mitigate heat waves in cities: Concepts and methodology of analysis”.	Martina Garcia de Cezar, Engineer in sanitation and environment (UFSC), PhD student (INRAE UMR G-Eau Montpellier and AgroParisTech)
17:30 -18:00	Innovation and Technology session « Agronomic reasoning of trees watering in the city to facilitate their cooling effects»	Coralie Tavassoli, Urbasense
18:00 - 18:30	Open session for Q&A	

EIA Working-Groups Review



Sustainability in
agriculture



Urban Landscape



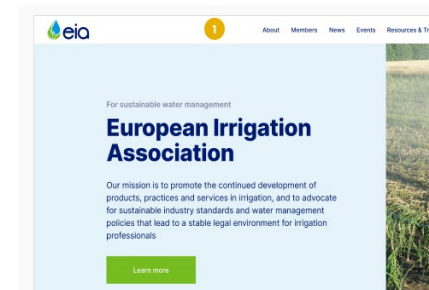
Standardization



Training



Wastewater Reuse



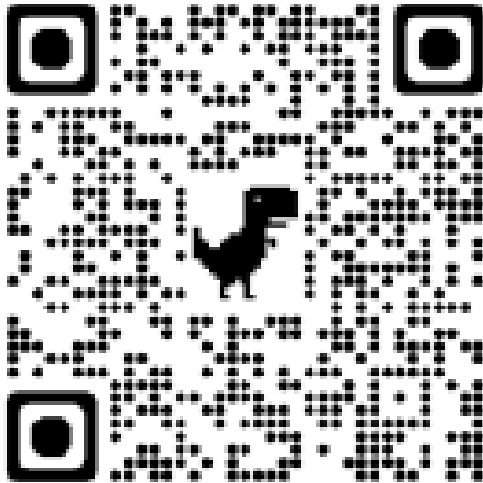
Communication

Working group 1: Sustainability

(led by Giulia Giuffre, Giusy Inferrera, Bruno Molle)



- 1) **Reminder from last forum:** European Agenda for Sustainable Development (Paris agreement 1.5°C , SDG sustainable development goals, the European commission policies and the new European growth strategy. The **EU taxonomy** as a classification system that establishes the rules for sustainable economic activities, a common language and a clear definition of what is 'sustainable).
- 2) **EU Taxonomy doesn't apply today to the irrigation sector.**
- 3) WG1 is dealing with this question of how to move the Irrigation sector from being considered only as a water consumer to a legitimate sustainability promotor. Work undergoing to better describe sustainability and qualification process (what to measure, what indicators...) based on the EU taxonomy for sustainable activities.
- 4) Bruno Molle and Fleur Martin interviewed **Francesco Dubini**, Consultant at **The European House – Ambrosetti** about the EU Taxonomy. Find it on our website <https://irrigationeurope.eu/en/challenges-and-opportunities-of-applying-the-european-taxonomy-to-the-irrigation-industry/>.
- 5) Analytical work was prepared by WG1 on the realisation of a working plan how the sector should approach the Taxonomy classification process to open channels to our members to public green funds & subsidies. The work to be done is technologically & methodologically oriented, both AG and LS.
- 6) It was presented yesterday 29/3/2023 to the board. The Board approved the direction and provided guidelines to the team on how to continue to the next level.



► WE INVITE YOU TO JOIN THE EIA AND TAKE PART IN BUILDING A SUSTAINABLE FUTURE FOR IRRIGATION!

► [HTTPS://IRRIGATIONEUROPE.EU/](https://irrigationeurope.eu/)

► LINKEDIN :

<https://www.linkedin.com/company/european-irrigation-association/?viewAsMember=true>

► FACEBOOK :

[HTTPS://WWW.FACEBOOK.COM/FLEURMARTIN207](https://www.facebook.com/fleurmartin207)



Quality Irrigation Water Savings
**EUROPEAN IRRIGATION
ASSOCIATION**

Welcome new members

- We are very pleased to welcome 3 new members in the association since our latest forum, in January.
- We now have 76 members



JAK Co.

Stepped into the first mile in early 2009.
Provide services in Road works and infrastructure across the state of Qatar.

Recently JAK start the landscaping business by designing & built of landscaping and Irrigation projects.



For more info please contact
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Landscape and irrigation Manager
e.fares@jakconstruct.com
[Mob +97455846067](tel:+97455846067)



SOLUTIONS FOR DIGITALIZATION OF WATER NETWORKS OPERATIONS

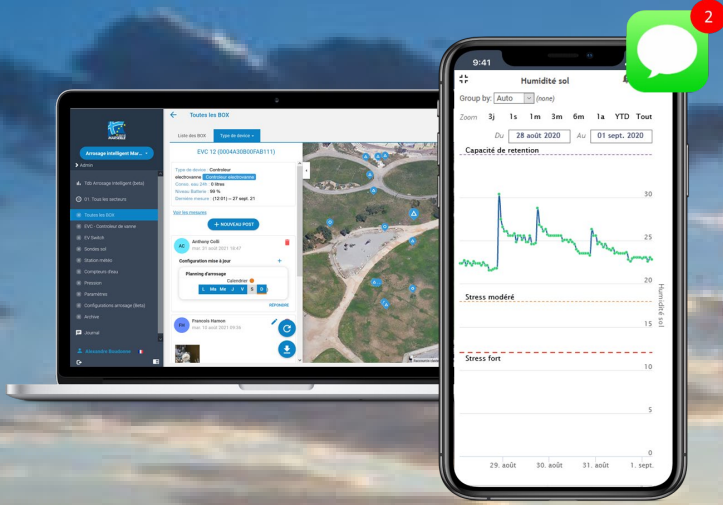
#sanitation

#rain_network

#green_space_irrigation

#access_to_drinkable_water





SMART WATERING

Irrigation of smart and sustainable cities

30% to 70%

water savings

40%

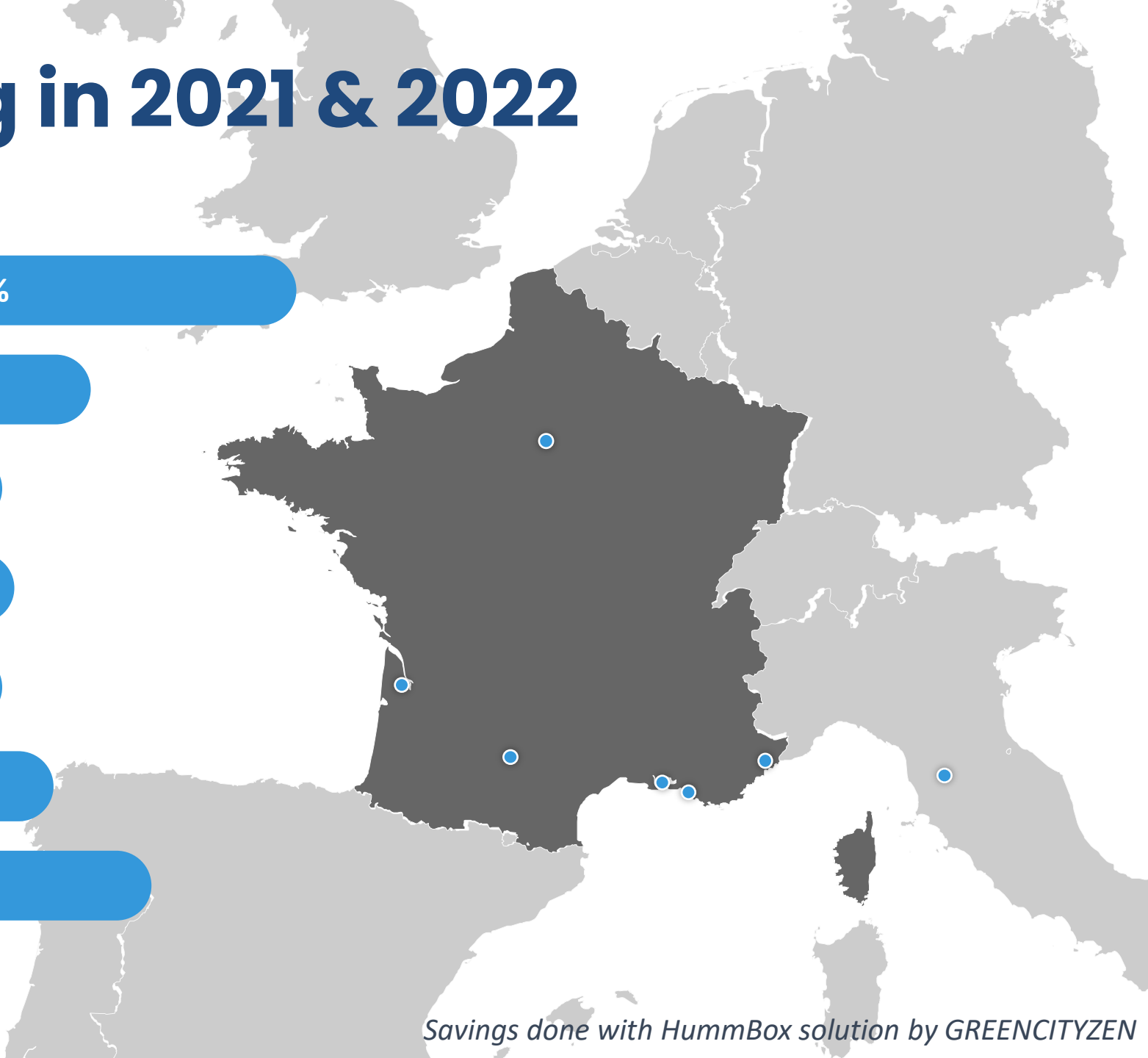
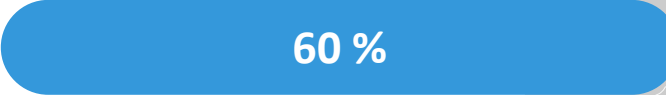
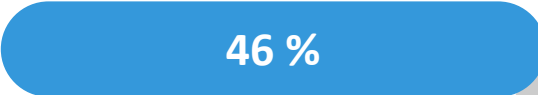
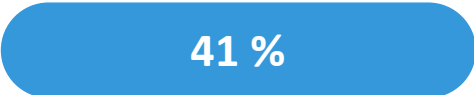
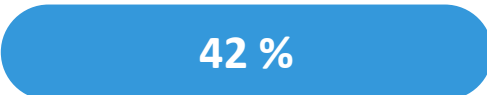
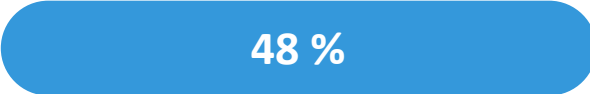
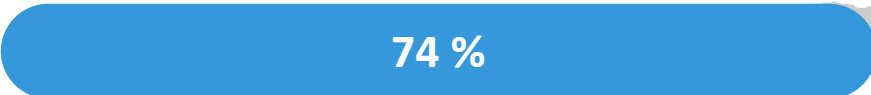
field trip reduction

6°C

of cooling

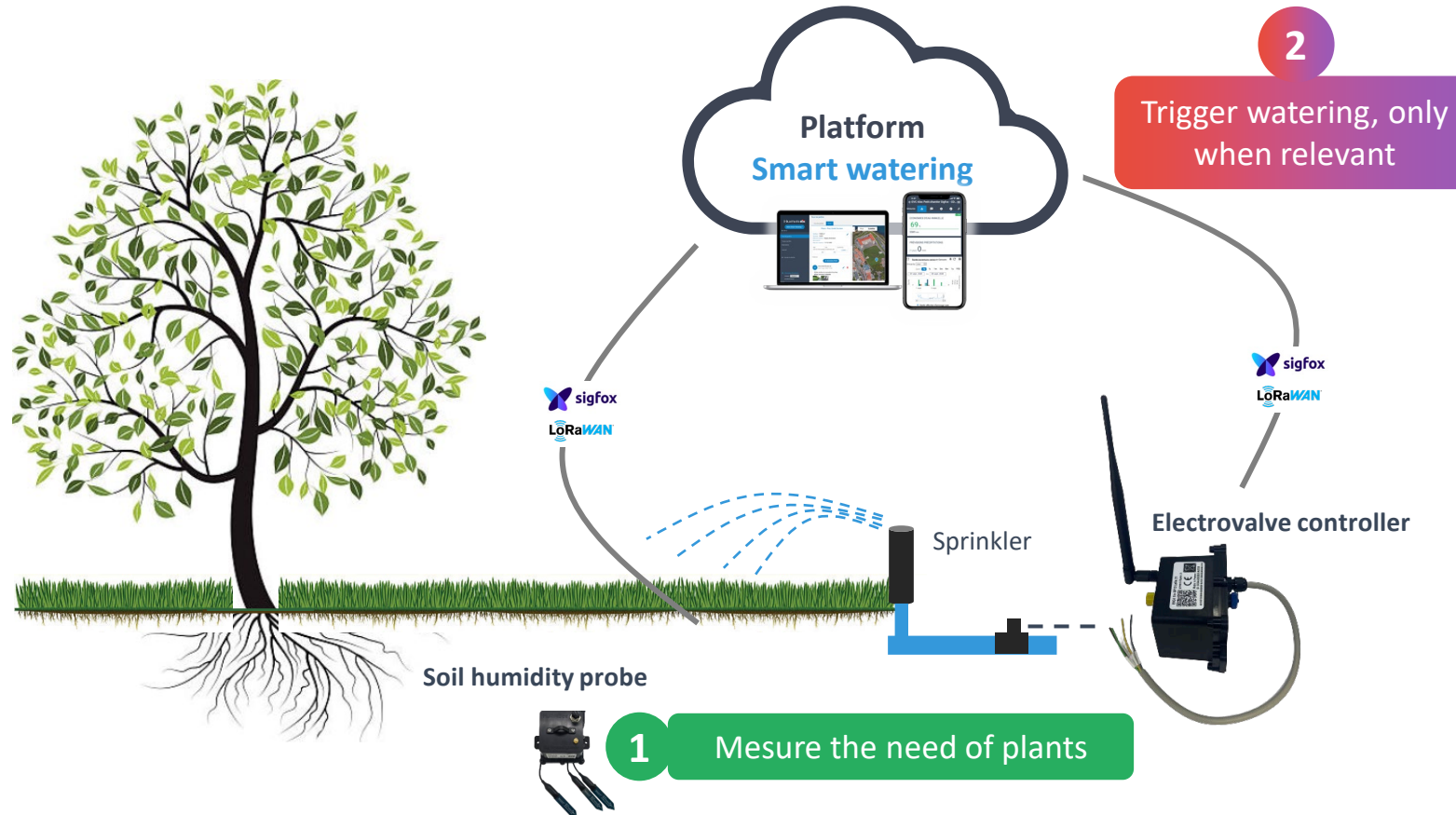
Smart watering in 2021 & 2022

WATER SAVINGS



Savings done with HummBox solution by GREENCITYZEN

Agronomic irrigation principle



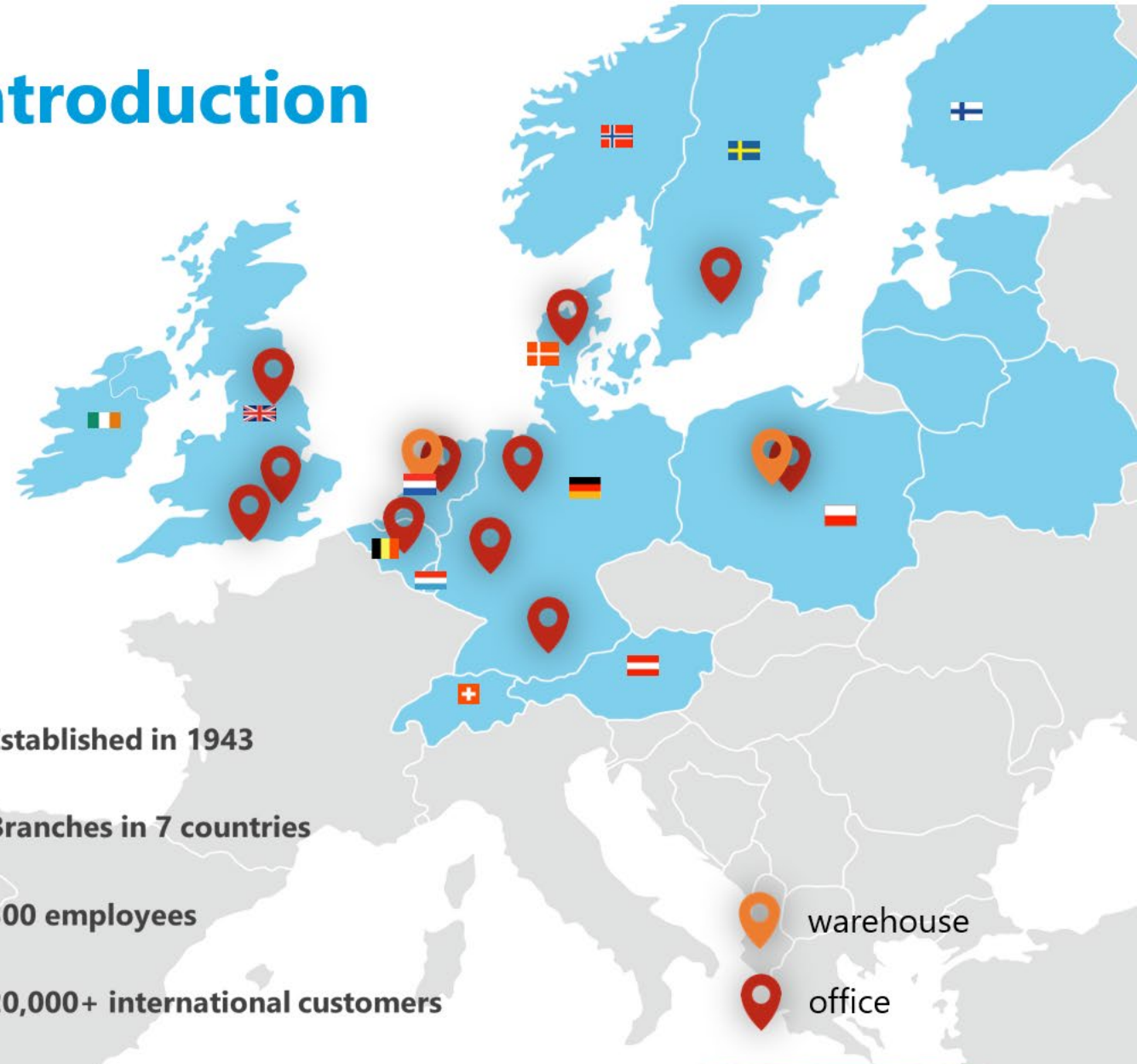
MegaGroup: an introduction

- Wholesaler in technical water products
- Complete solutions for:
 - Irrigation (Agricultural & Landscape)
 - Swimming Pool
 - Aquaculture
 - Industry
- Main driver is SUSTAINABILITY, with focus on
 - Water saving
 - Energy efficient solutions



OUR CHANNEL BRANDS

- 1946 Established in 1943
- Branches in 7 countries
- 300 employees
- 20,000+ international customers
- € Turnover 2021: over € 125 million



bringing water to life



VBS Irrigatiesystemen
If water counts.

ecofilae



LITE-SOIL®
ALL in ONE: Air-Soil-Water



DEBERNARD
IRRIGATION

sateam



STOCK
BEREGNUNGSTECHNIK
WASSERTECHN. ANLAGENBAU



IRRI@SPEC

PROMOSNASTKA

Sun'Agri
Soisy Arrosage

AQUAMATIC S.A.
SISTEMAS DE REGA AUTOMÁTICA

Irritrol

Green
CITYZEN

ARVALIS
Institut du végétal

B.J.Lamy
International
OEM Irrigation Specialist

Irrigazette
International Irrigation Magazine



Van den Borne
Kracht in water



Senninger®
AGRICULTURAL IRRIGATION | A Hunter Industries Company

TORO

Sentek

emrgy
INAQUA

mega
group
bringing water to life

NAANDANJAIN
A JAIN IRRIGATION COMPANY

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AZUD

LINDSAY™

SOLEM

HYDRALIANS

center
CENTRO NACIONAL DE
REGADIOS



AQUAMATIC S.A.
SISTEMAS DE REGA AUTOMÁTICA

komet
INNOVATIVE IRRIGATION

Irritrol

RITEC
AGROTECNOLOGIA
RIEGOS Y TECNOLOGIA S.L.



K
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AFEID

Urbasense®
La Ville, la Nature, l'Homme

Challenge Agriculture
L'eau et les minéraux maîtrisés

Crysberg

irritec
don't wait for rain™

Mazzei

NORMA
GROUP

RDI
RESPONSIVE
DRIP
IRRIGATION

University
of Ljubljana
Biotechnical
faculty



amiad
WATER SYSTEMS



INRAE
la science pour la vie, l'humain, la terre

Regaber
matholding group

Rivulis

rain
pro

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GRUNDFOS

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[Swiss efficiency.]



Majed Sabbarini

CLEARWATER ASIA

Rimopemar

ITC
DOSING PUMPS

PLASSON

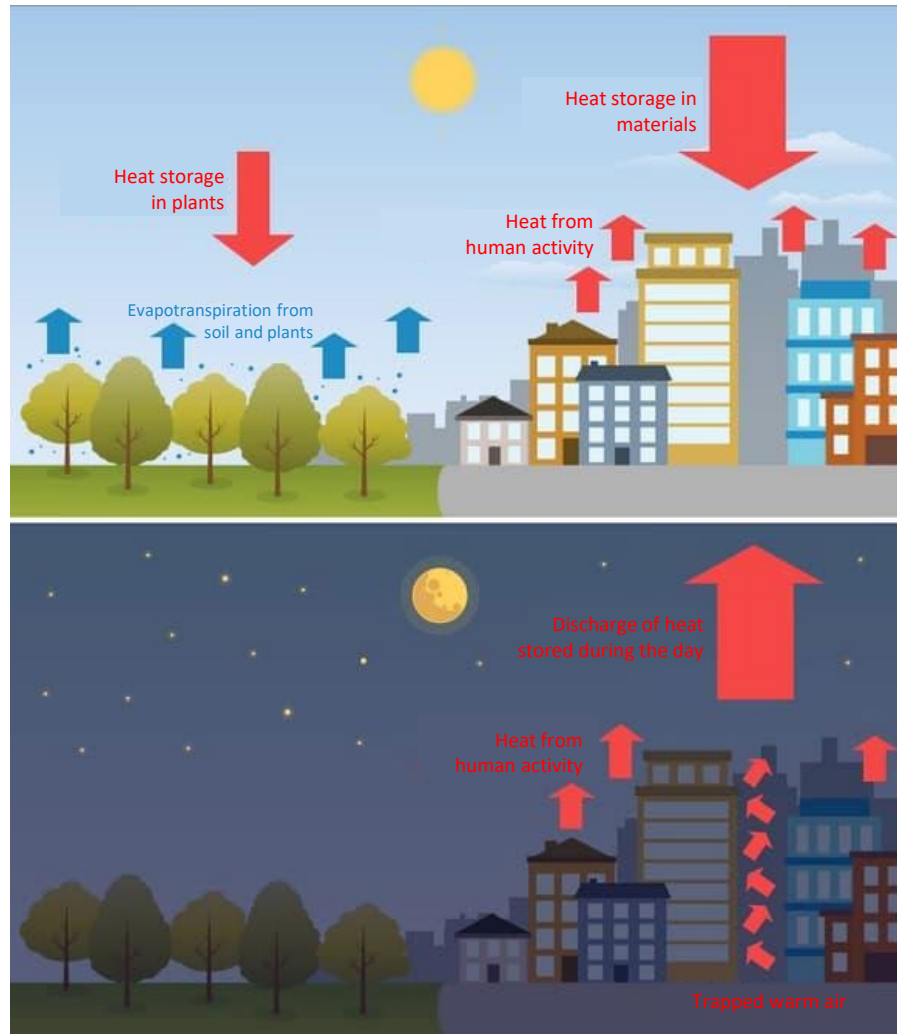


➤ Irrigated urban vegetation to mitigate heat waves in cities: Concepts and methodology of analysis

European Irrigation Association (EIA), 30 march 2023

Martina GARCIA DE CEZAR

> Climate context of urban centres



Source: Emeline Gaube - BFMTV

Urbanization

Morphology of the city

Waterproofing of soils

Low albedo of materials

Anthropogenic heat

Urban microclimate

urban heat islands

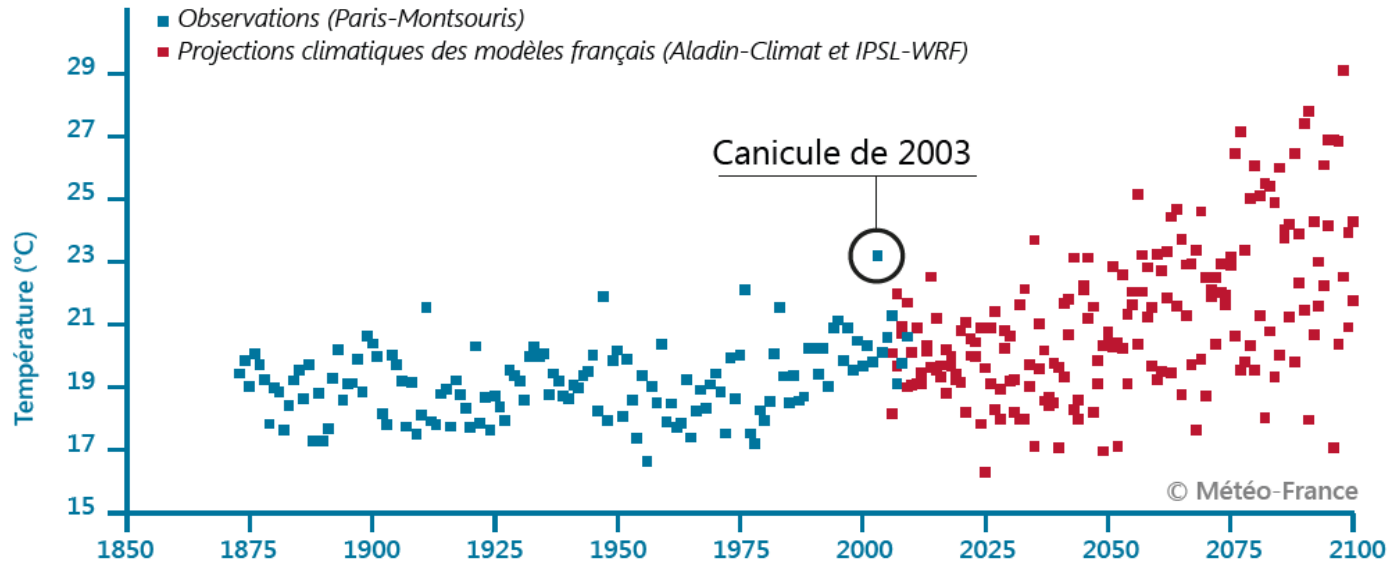
Consequences

↑
Temperatures
Greenhouse gases
Energy consumption

↓
Biodiversity
Quality of life of the population

> Perspectives in Paris XXI^e century

Average summer temperature in Paris (1873 – 2100)



Urban heat island effect exacerbating summer heatwaves, study shows

Reflective surfaces, green roofs can lower temperatures in sweltering cities



Portland residents took refuge at a cooling station as temperatures in the city hit a shocking 116F. Photograph: Kathryn Elseser/AFP/Getty Images

CLIMAT - PLANÈTE

2022, année la plus chaude jamais enregistrée en France

Ponctuée d'extrêmes climatiques, 2022 est un « symptôme » du changement climatique, indique Météo-France. Exceptionnelle dans le climat actuel, elle pourrait devenir « normale » en 2050.

Par Audrey Garric

Publié le 06 janvier 2023 à 11h00, mis à jour le 07 janvier 2023 à 05h37 - Lecture 5 min. - [Read in English](#)

A current and future issue...



INRAE

European Irrigation Association (EIA) 30 march 2023

« Irrigated urban vegetation to mitigate heat waves in cities: Concepts and methodology of analysis »

IMT Mines Alès
École Mines-Télécom

AgroParisTech
Talents d'une planète soutenable

Analysing and predicting

Modelling to improve action



Problematic

Vegetation and irrigation

Strategy to refresh the cities



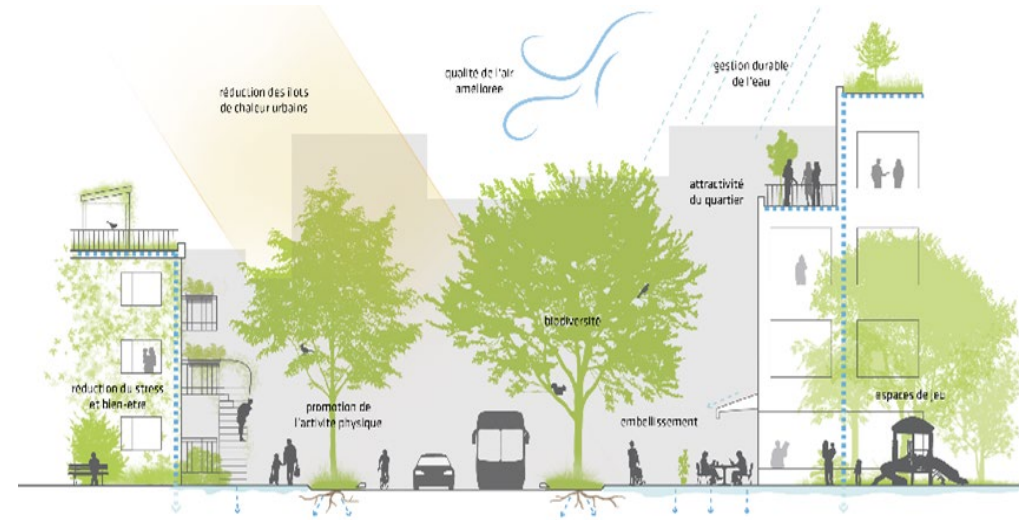
Several possibilities

What is the most appropriate strategy for each type of climate, urban area, etc.?

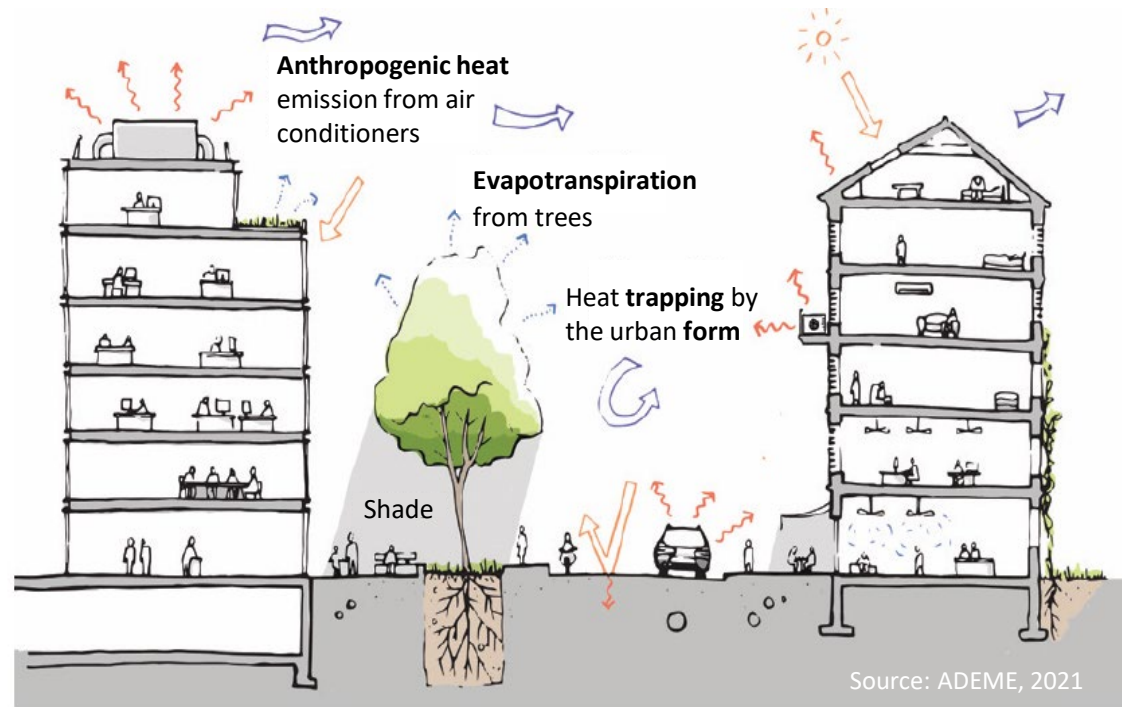


Urban heat islands

Need to find ways to thermoregulate cities



> Objective of the current project



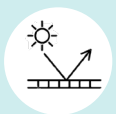
Identify the capacity of different urban irrigation and greening strategies to modify thermal comfort indices

Analysing and modelling dynamic urban flows at **micro-scale**

Thermal, radiative and aerodynamic



Geometry



Material



Natural



Anthropogenic

← COMPLEX STUDY AREA →

Climatic conditions



Radiation



Wind



Humidity



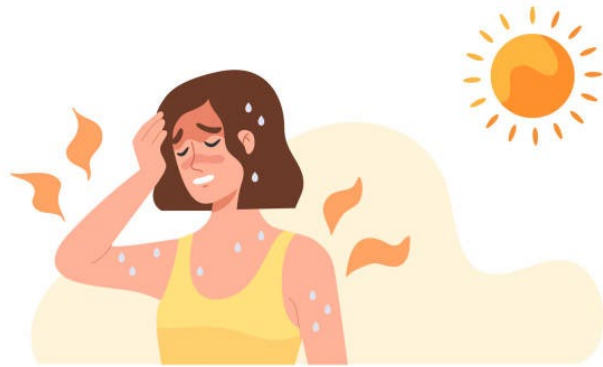
Rain



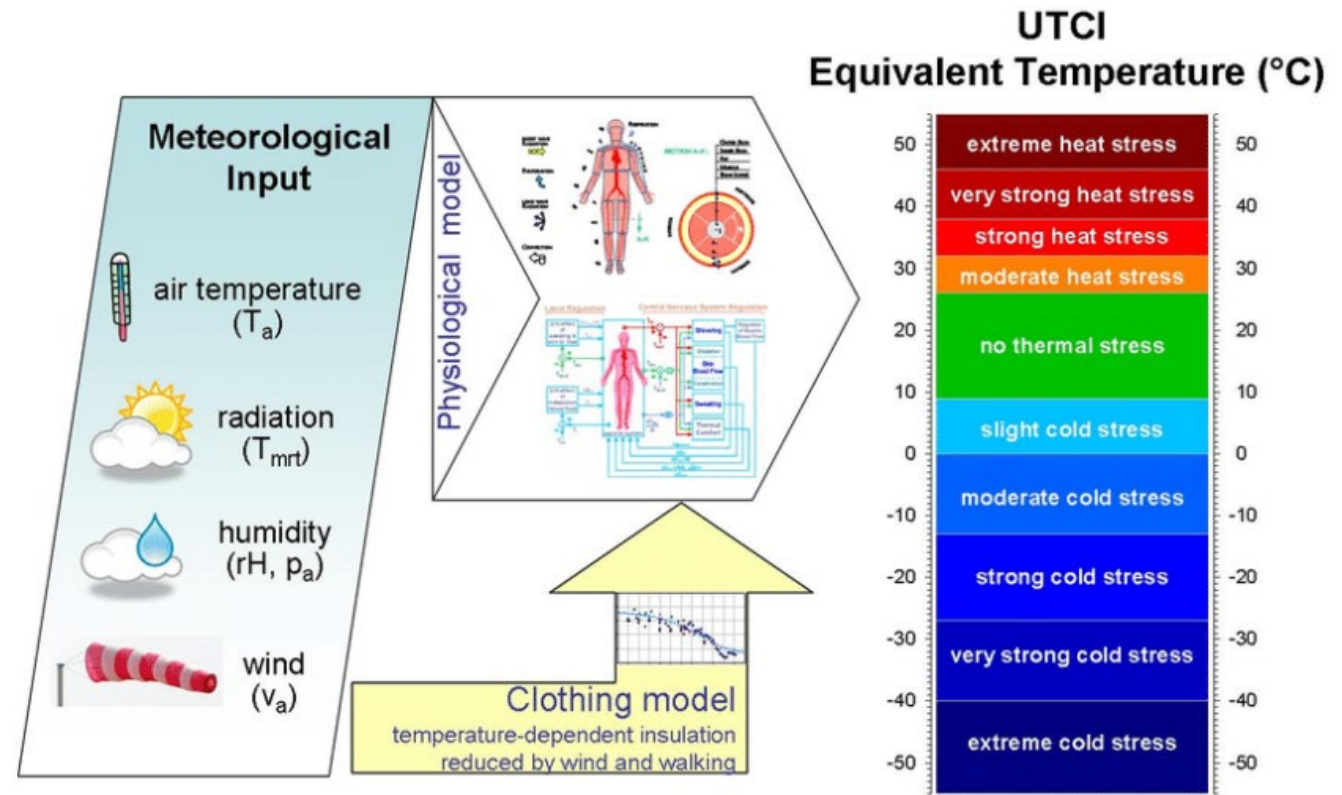
Cloud

> What are the thermal comfort indices ?

- It is a measure of the human physiological response to the **thermal environment**



- Based on several assumptions: the reference activity is **walking** with a speed of 4km/h for a metabolic level and insulation of **average clothing**

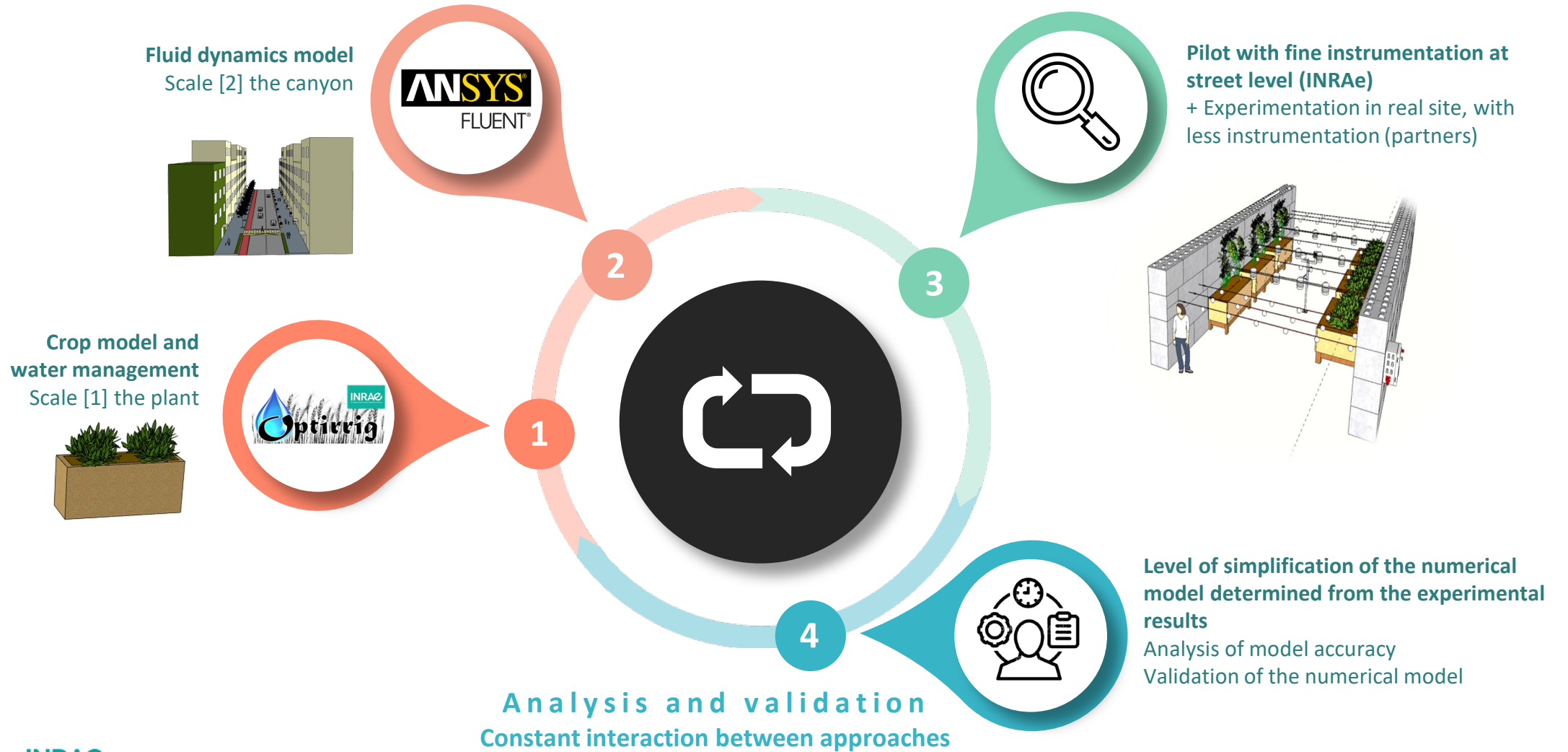


Universal thermal climate index (UTCI)

> Methodology

Numerical approach
Simplified representation of reality

Experimental approach
"All the physics" of the study area



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Concepts and methodology of analysis »

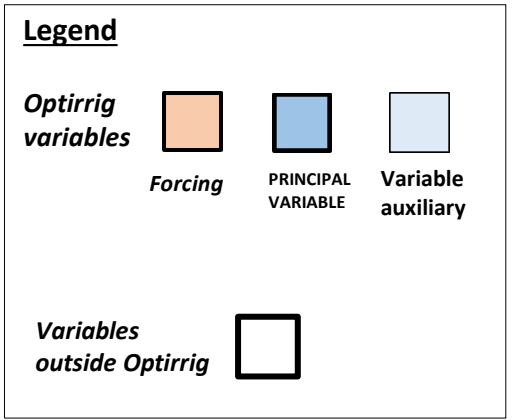
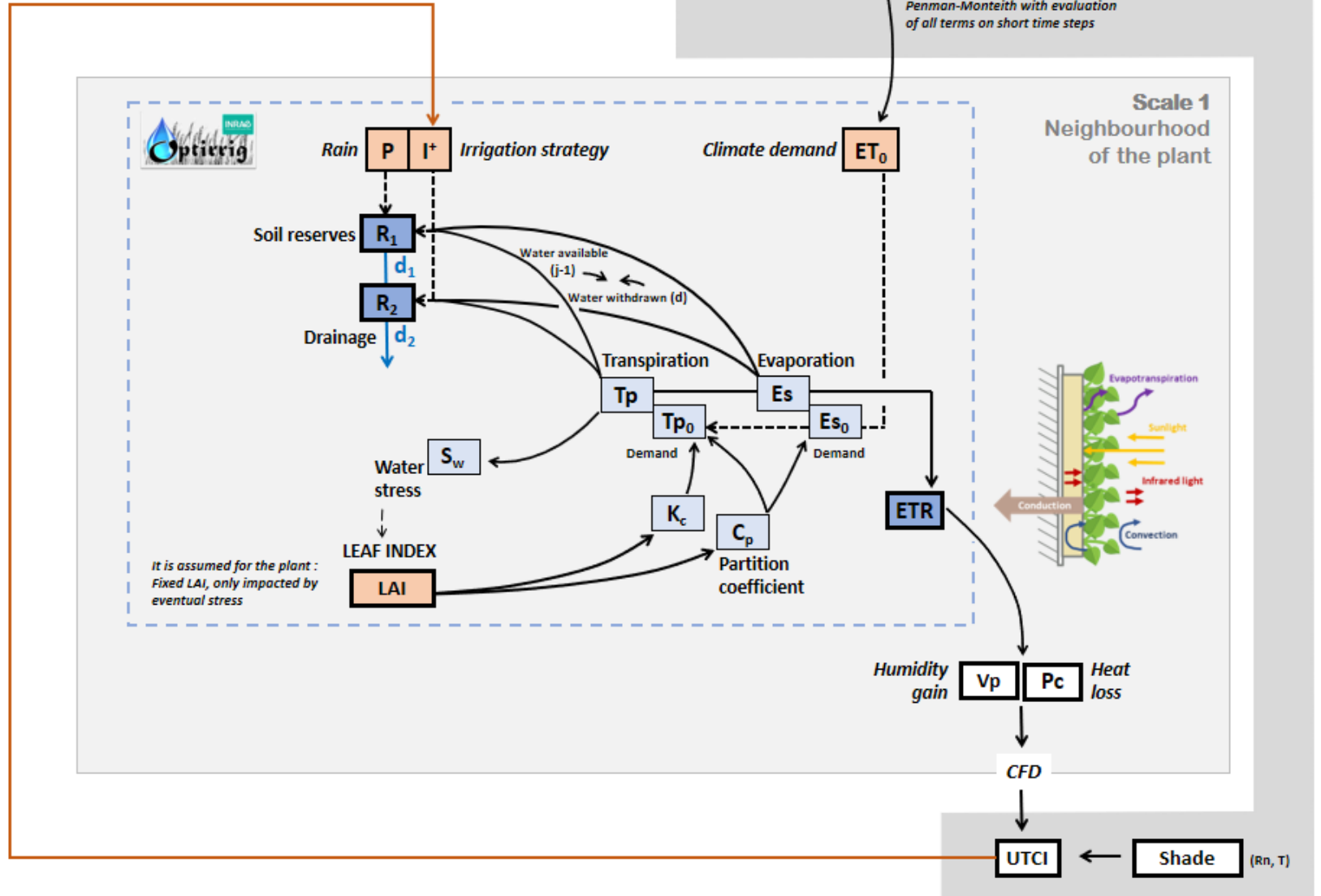
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> Numerical approach

We want to control the irrigation according to the targeted UTCI values (or a targeted dynamic for UTCI)

Control



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> Numerical approach Optirrig



Irrigation



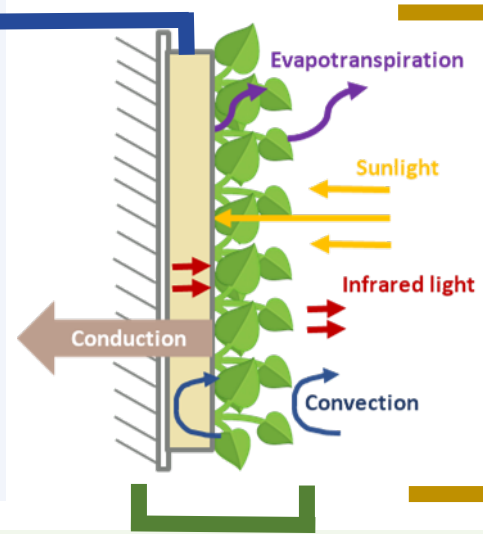
Input:
Irrigation technique
Strategy



Controlling the energy
balance and connecting
with the resources
available in the city

ACTIONS

- (a) Irrigation control for a **standard** situation
- (b) Irrigation control for a **crisis** situation



Climate forcings



Input:
Wind speed
Solar radiation
Air humidity
Temperature
Rain



Connected to urban
geometry +
Temporality



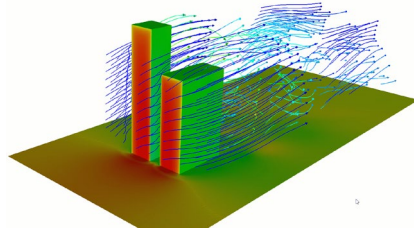
- Arboriculture
- Herbs
- Green walls

Input:
LAI
Kc max



Connected to the urban geometry
+ Plant species

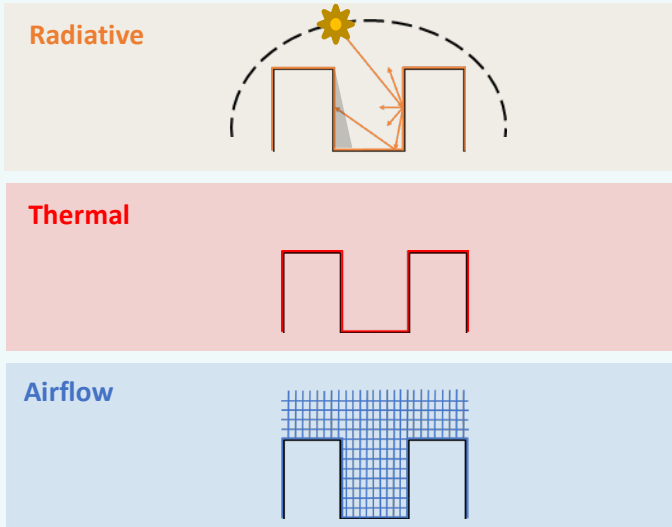
> Numerical approach CFD



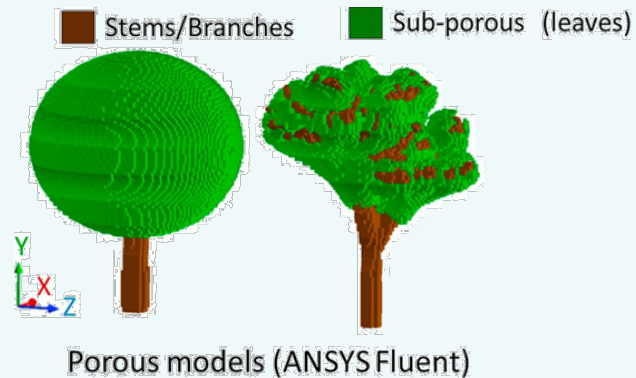
What is CFD?

- Finite volume method (discretisation of the study domain)
- High resolution algorithm that allows the interpretation of the multi-physics process
- Work with different scenarios and situations with accuracy close to real case studies

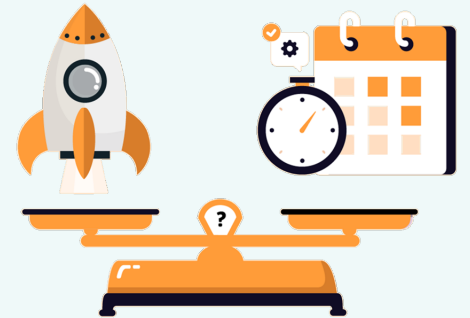
o Physical models



o Plant geometry and Optirrig coupling



o Accuracy and representations needed



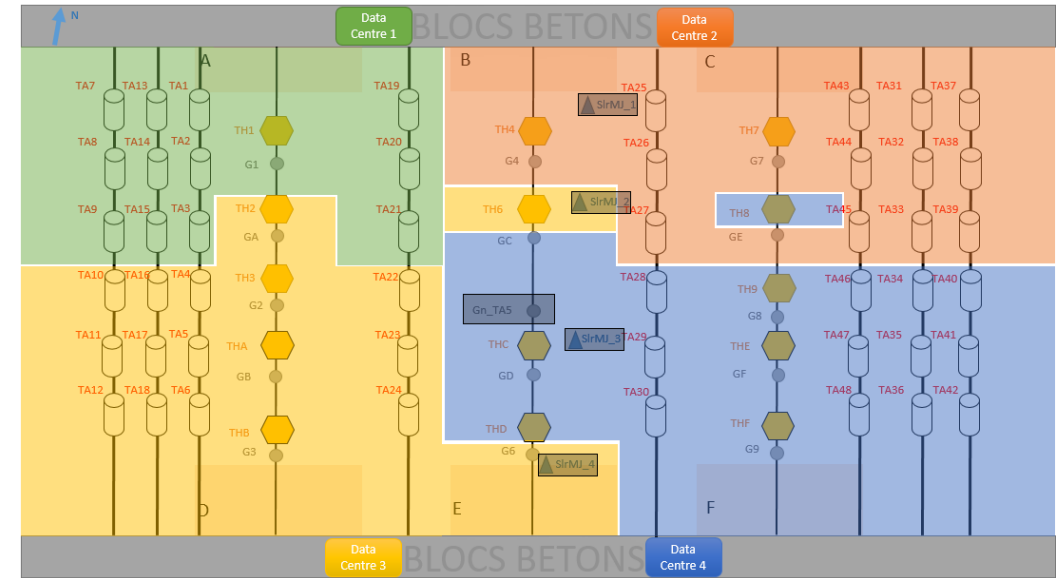
> Experimental approach

Monitoring the hydric and thermal status of substrates, plant species and their surrounding environment in an urban context (urban canyon)



Air Data > 117 measures, time step 30 s

Operational objective: thermal comfort index at different points of the pilot and its connection with the type of plant and the irrigation regime adopted



Legend

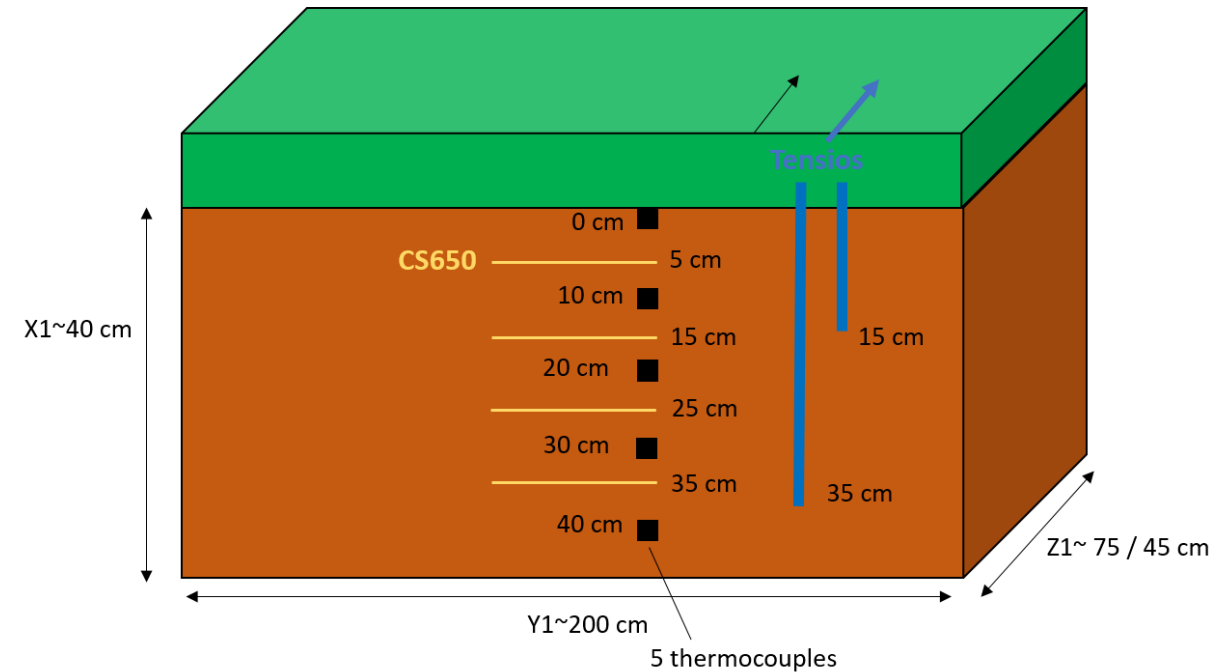
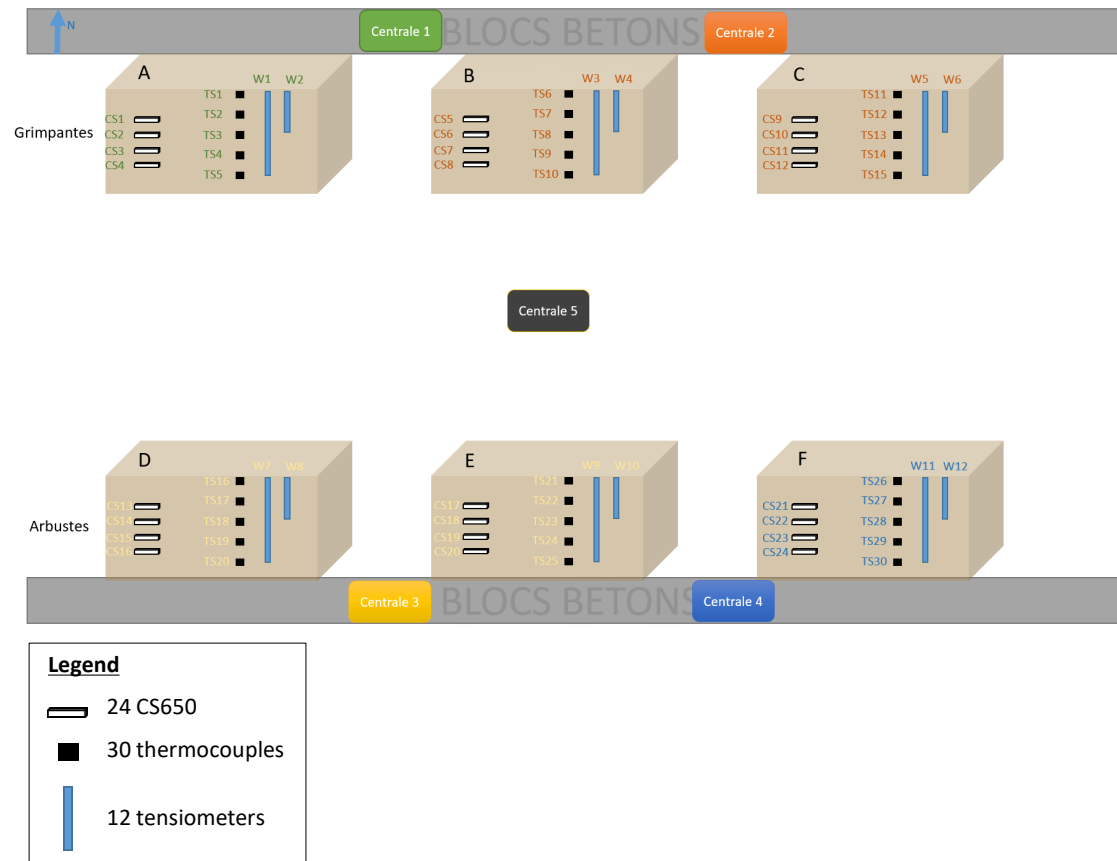
- 66 thermocouples
- 15 thermo-hygrometers
- 15 grey globe
- 4 pyranometers
- 1 weather station
- 5 data acquisition centres with a storage capacity of 23 days

> Experimental approach

Monitoring the hydric and thermal status of substrates, plant species and their surrounding environment in an urban context (urban canyon)

Soil data > 114 measures, time step 10 min

Operational objective: check the water status of the soil and the plant as a criterion for triggering irrigation



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Concepts and methodology of analysis

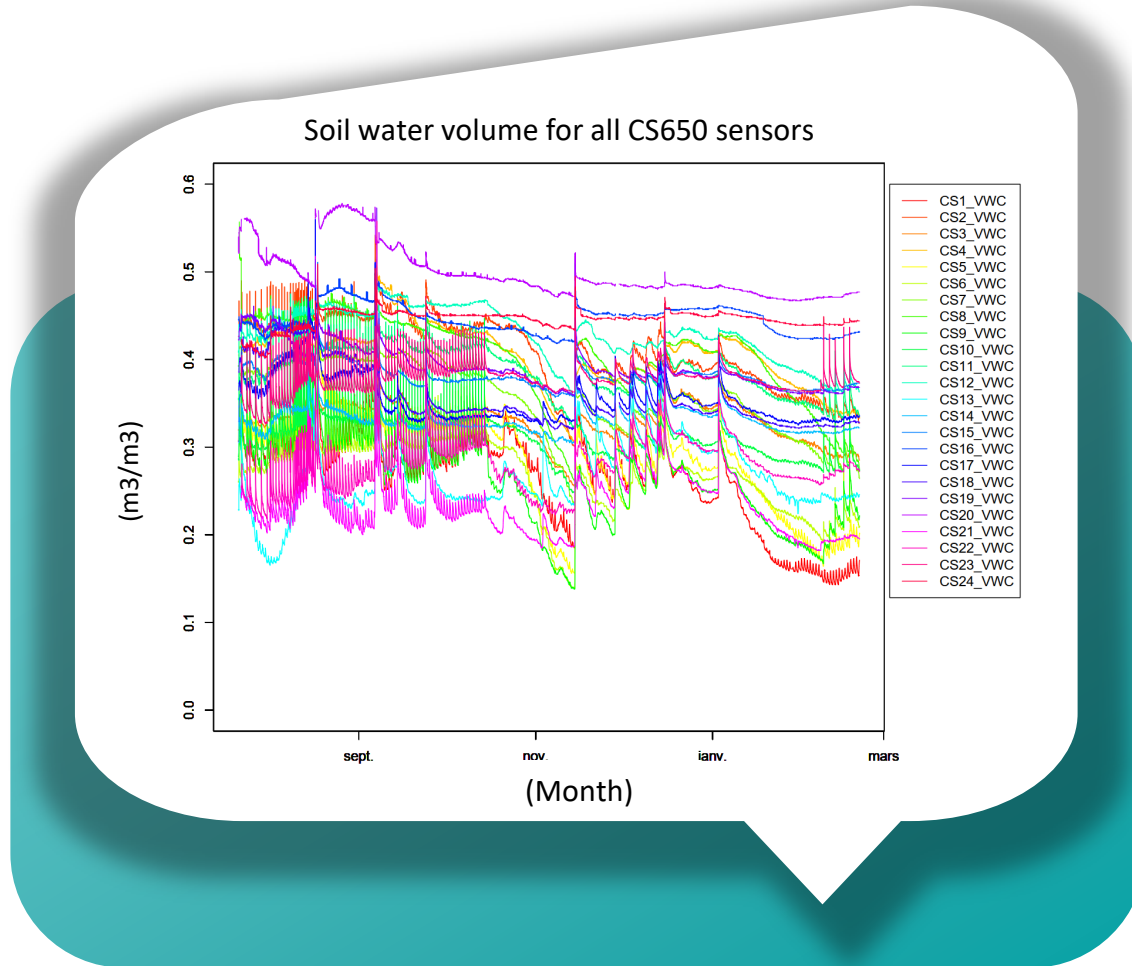
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AgroParisTech Talents d'une planète soutenable p.27

> Experimental approach

How can we analyse this large amount of data?

- Global analysis



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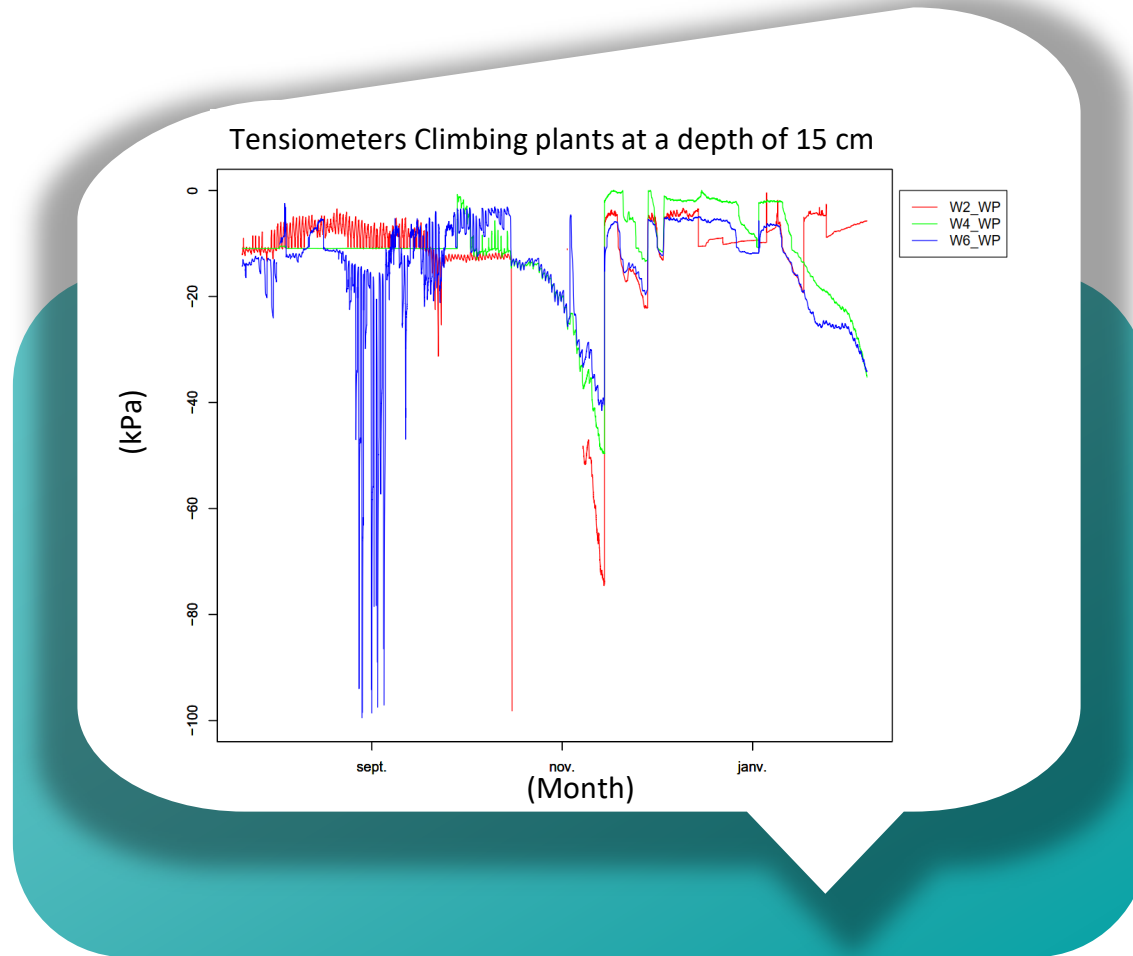
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> Experimental approach

How can we analyse this large amount of data?

- Specific analysis



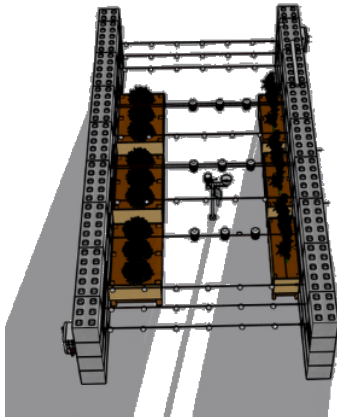
> Experimental approach

How can we analyse this large amount of data?

- Correlation between different variables
- Linking the reasons that can explain the different results obtained in the study area

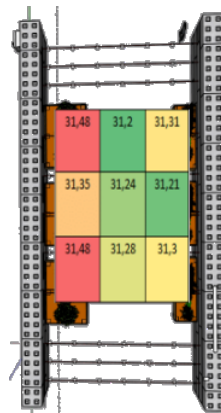


Shadow dynamics in the pilot
Day: 27/08/2022
Time: 6h00 p.m
Site: Lavallette, UMR G-Eau Montpellier

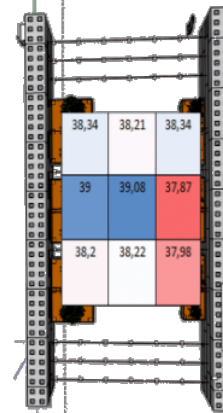


Thermo-Hygrometers results

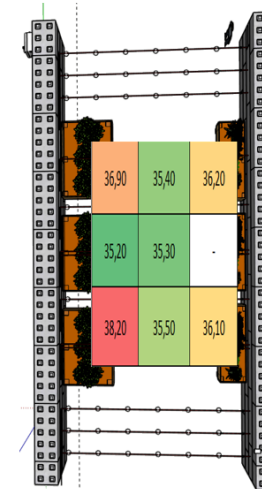
Air temperature (°C)



Relative humidity (%)



UTCI variation at 6pm of
the day 27/08/2022



> Conclusions

- > Evaluation of **irrigated vegetation** to regulate **urban temperatures**
- > **Understanding** urban metabolism for better **actions**
- > The challenge of making **generalisations**
- > **Experimental and numerical** approach

Thanks for your attention !



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Agronomic reasoning of trees watering in the city to facilitate their cooling effects

Av. Garibaldi, Lyon

coralie.tavassoli@urbasense.fr



Urbasense[®]

La Ville, la Nature, l'Homme



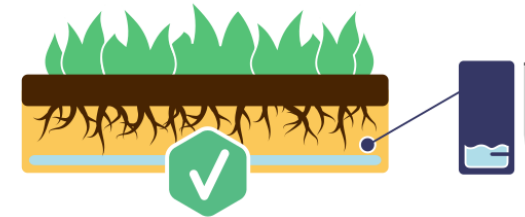
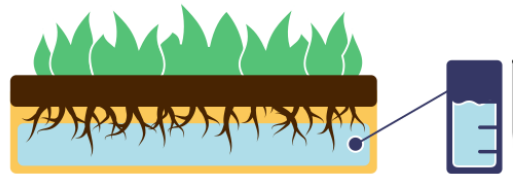
Measurement of water reserve for roots



48h after rainfall



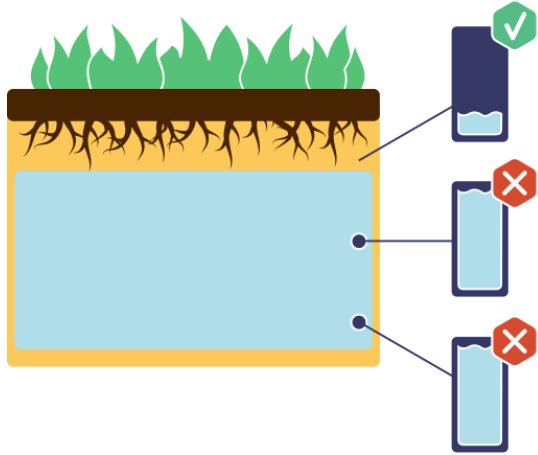
No root activity



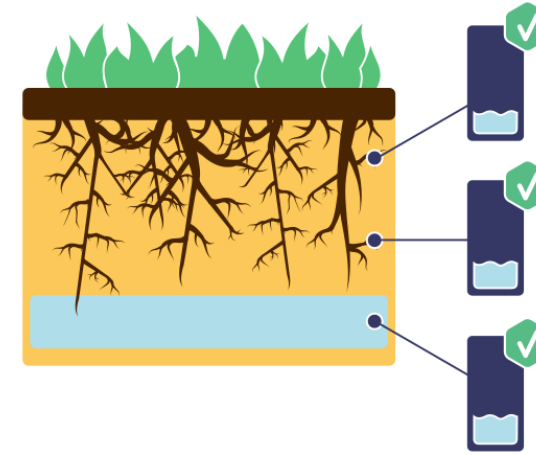
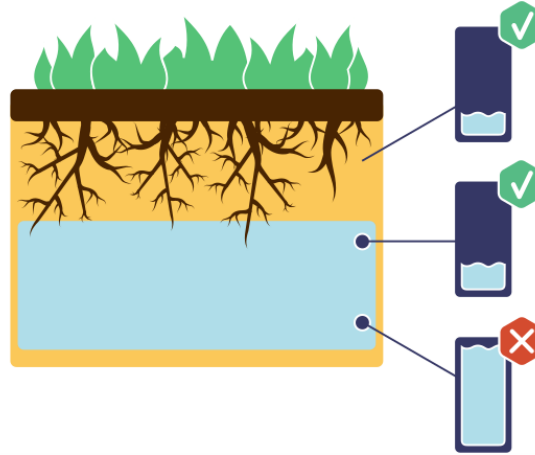
Root activity

- The root strongly dries the soil
- The probe detects root activity

From root activity to root growth



Superficial roots only



Deep roots

- Several points of measurement
- Roots grow deep

Different ways to conduct watering



Dose



Frequency



Root Growth



Water consumption

CALENDAR

Constant

Constant

Superficial

Over consumption

ETP COMPENSATION

Variable

Constante

Superficial

Over consumption

ROOT WATER RESERVE

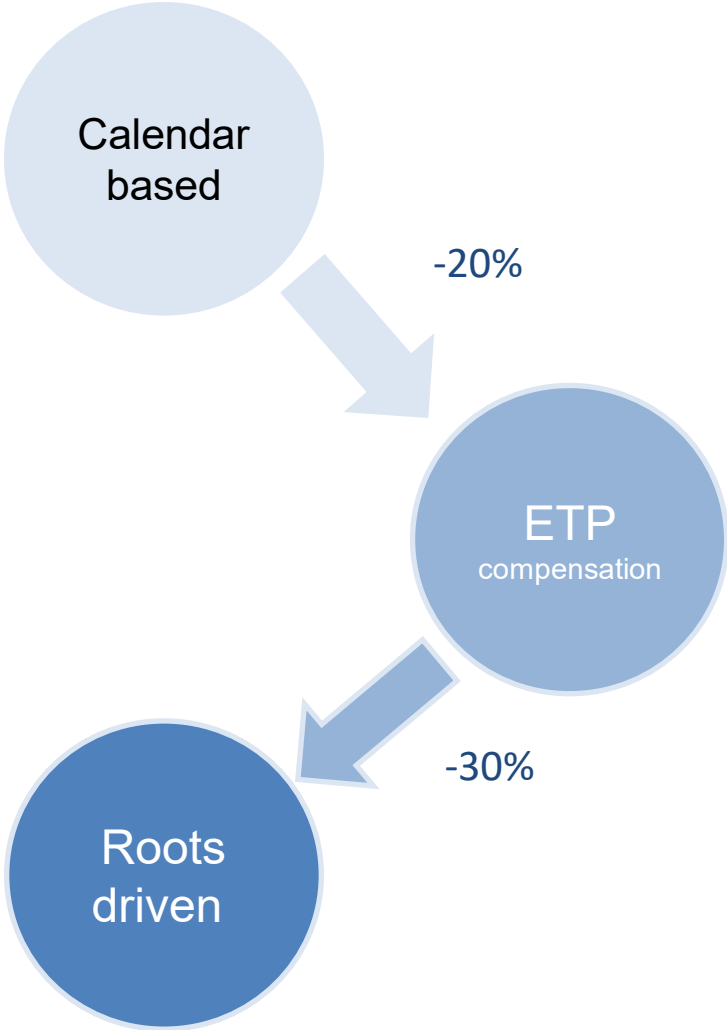
Constant

Variable

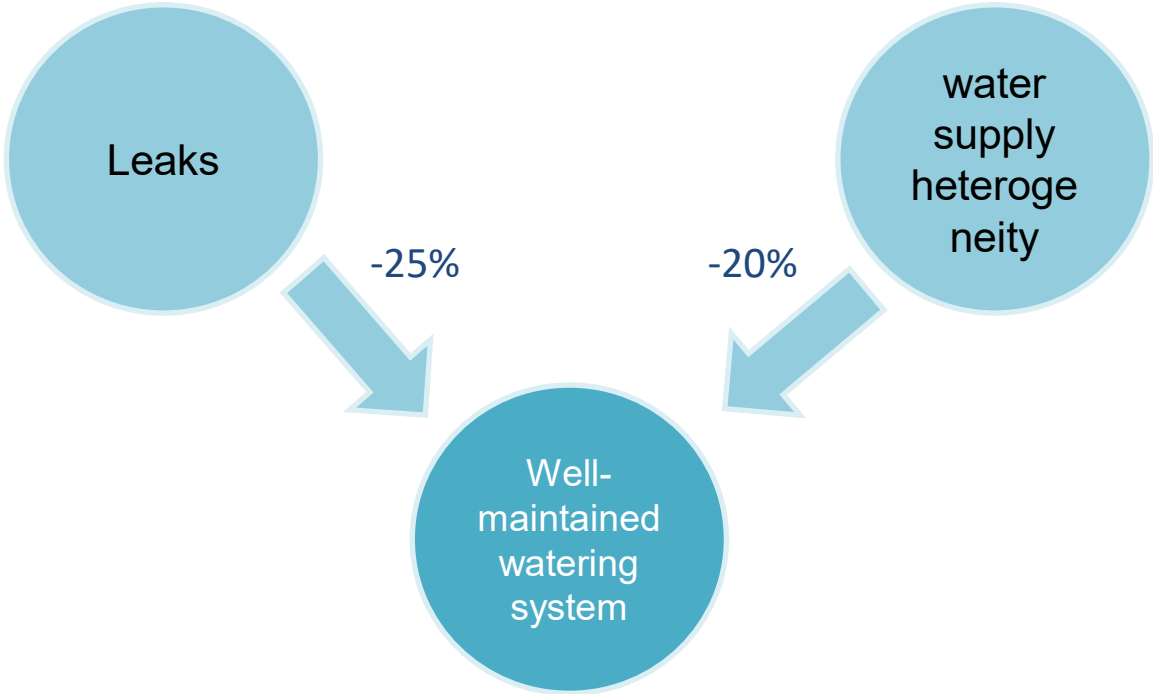
Deep

Optimisation

Ways of reducing water used for irrigation



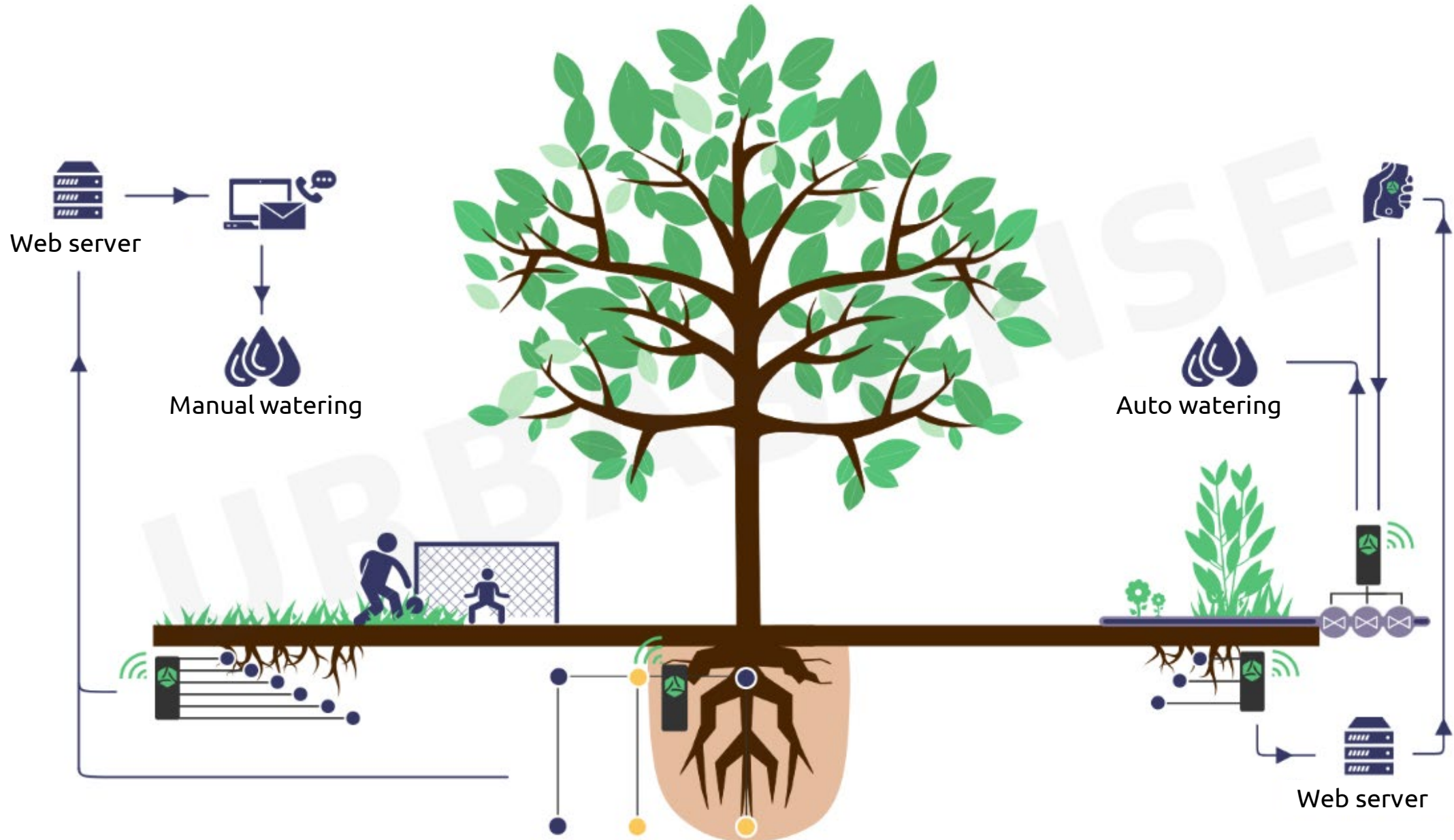
Watering decision

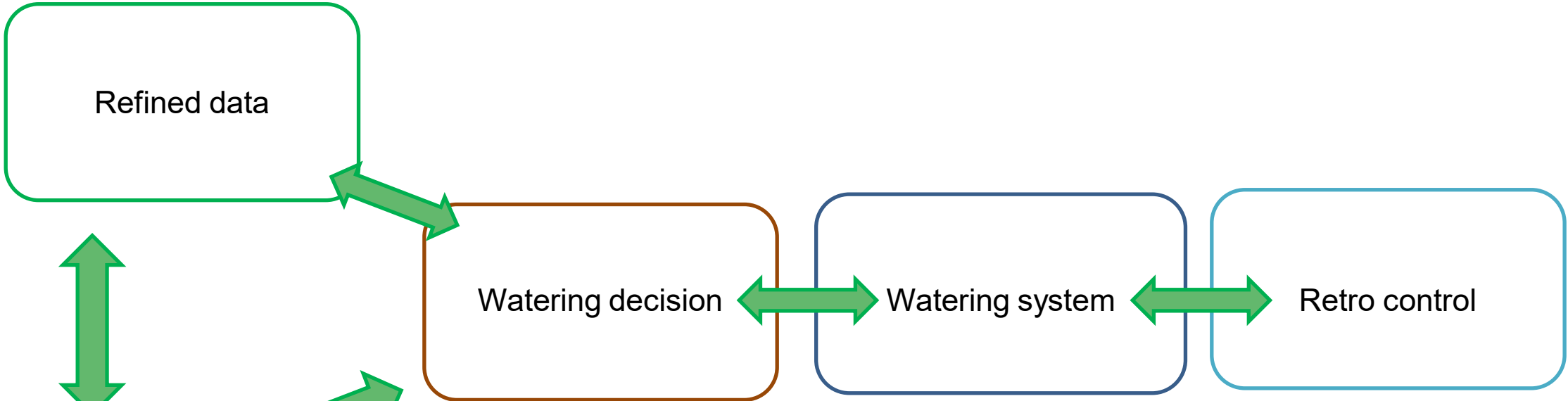


Watering system

Orders of magnitude from sites monitored with tensiometric measurements

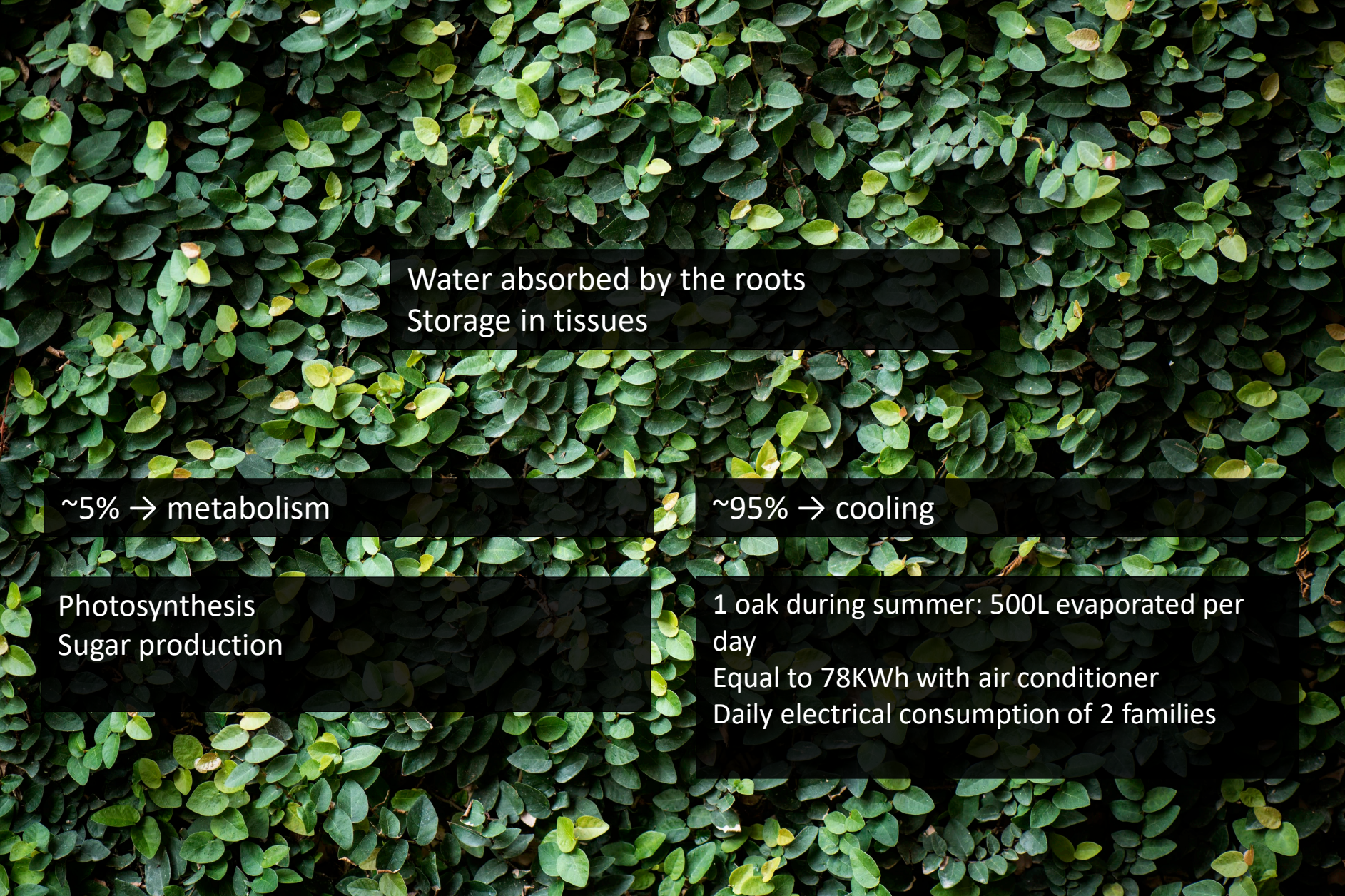
Data Cycle





Interoperability !

Vegetal water usage



Water absorbed by the roots
Storage in tissues

~5% → metabolism

~95% → cooling

Photosynthesis
Sugar production

1 oak during summer: 500L evaporated per day
Equal to 78KWh with air conditioner
Daily electrical consumption of 2 families



→ What effect does vegetation have on cooling?

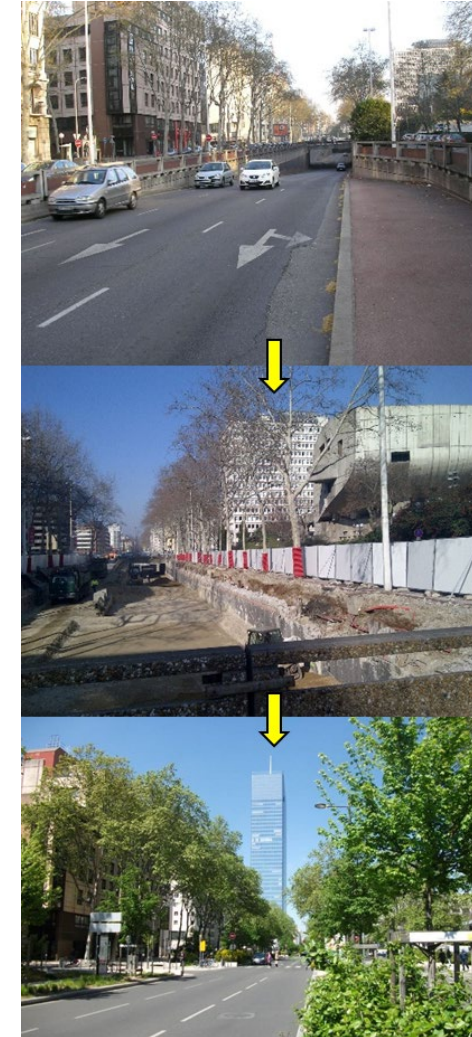
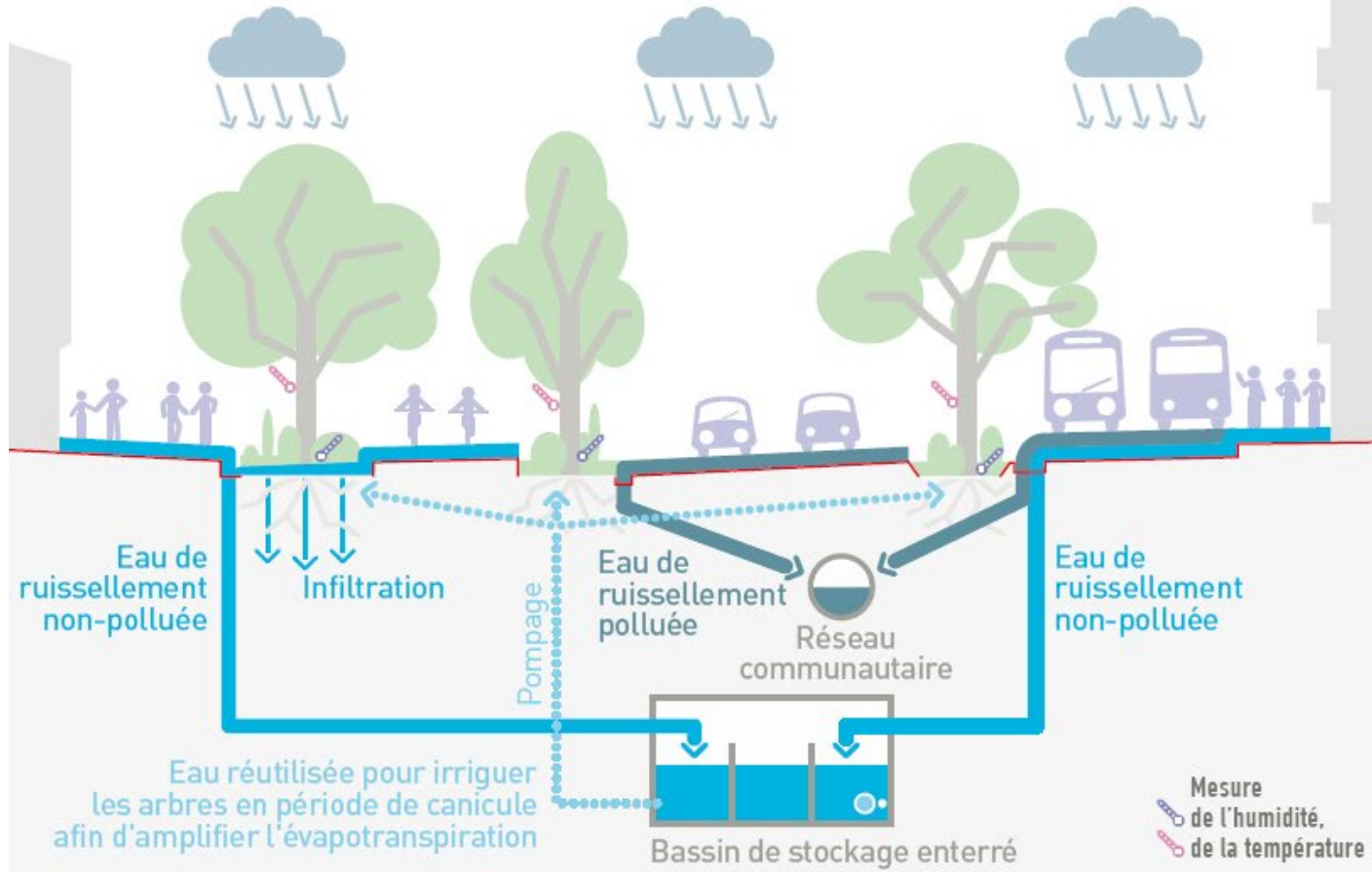
→ What contribution of specific watering to amplify this effect?



Experimental site (Garibaldi, Lyon, France)



DANS LE CADRE DU RÉAMÉNAGEMENT DE LA RUE GARIBALDI,
UNE EXPÉRIENCE PILOTE DE RAFFRAÎCHISSEMENT D'AIR DE LA VILLE EST MENÉE.



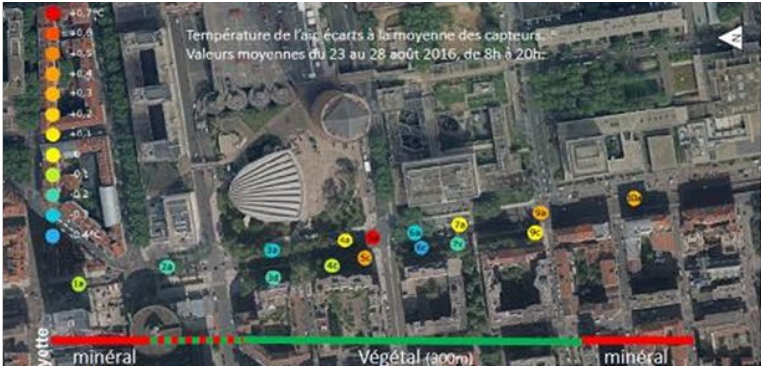
Source - Grand Lyon

Sensors and actuators



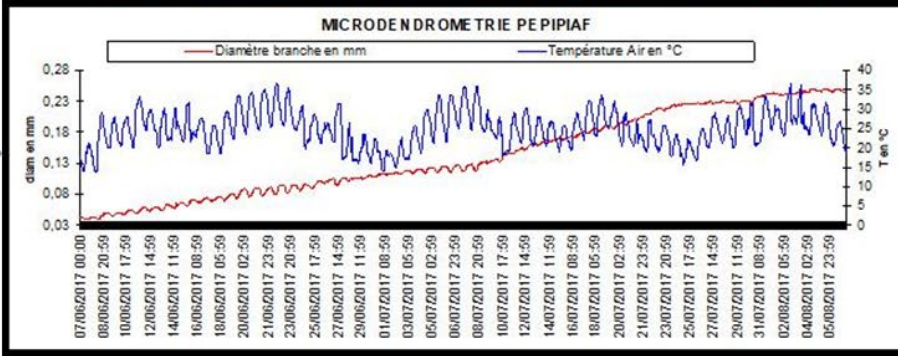
**Effet sur la
Température**

Thermal
attenuation



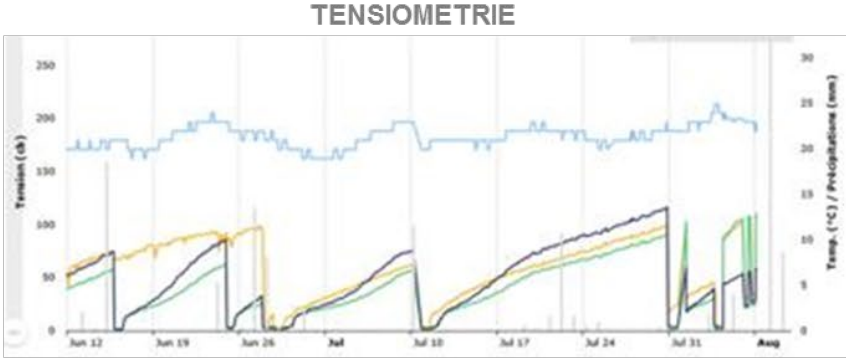
**Gain de
croissance**

Cooling
effect

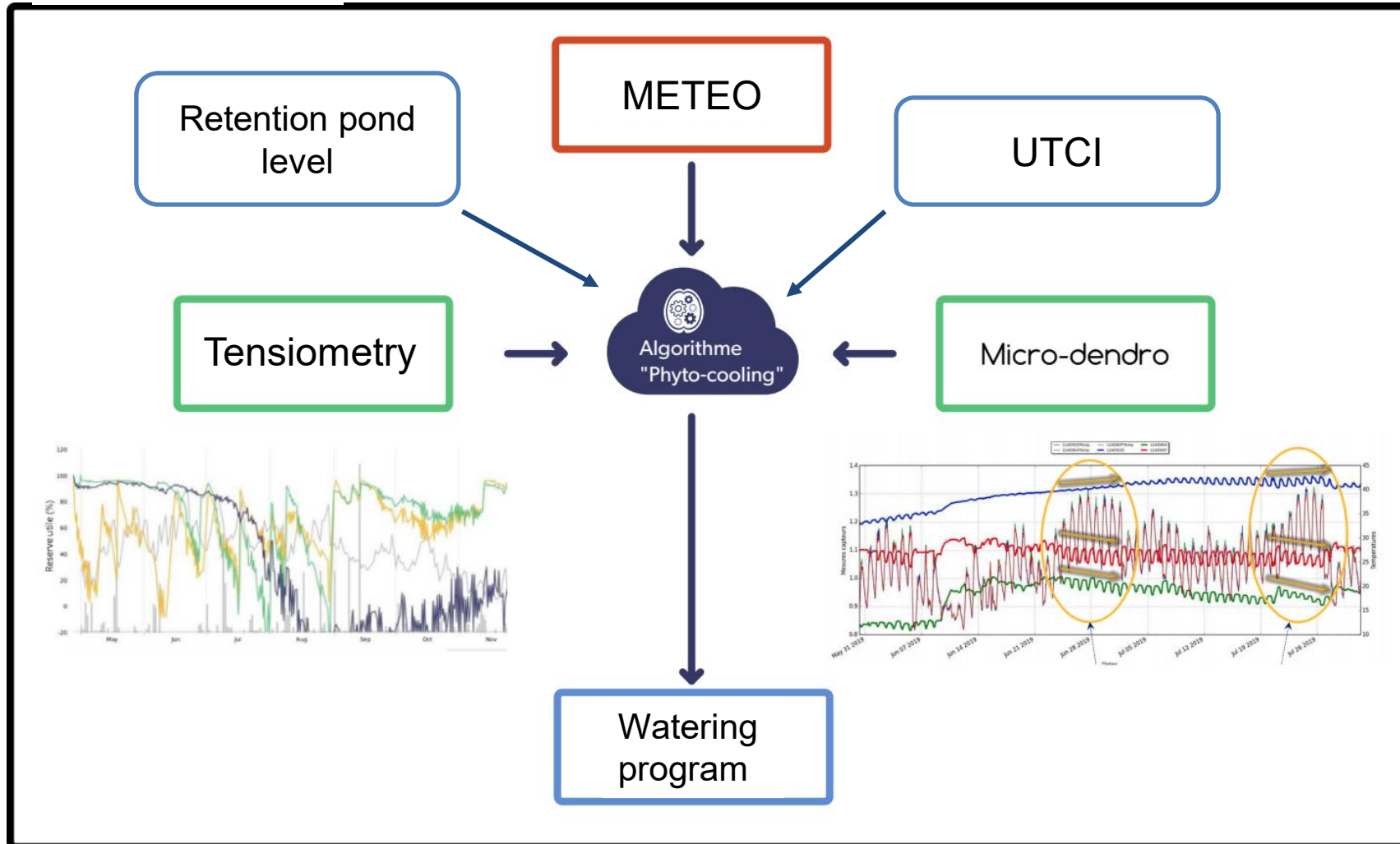


**Confort
hydrique**

Efficient
root activity



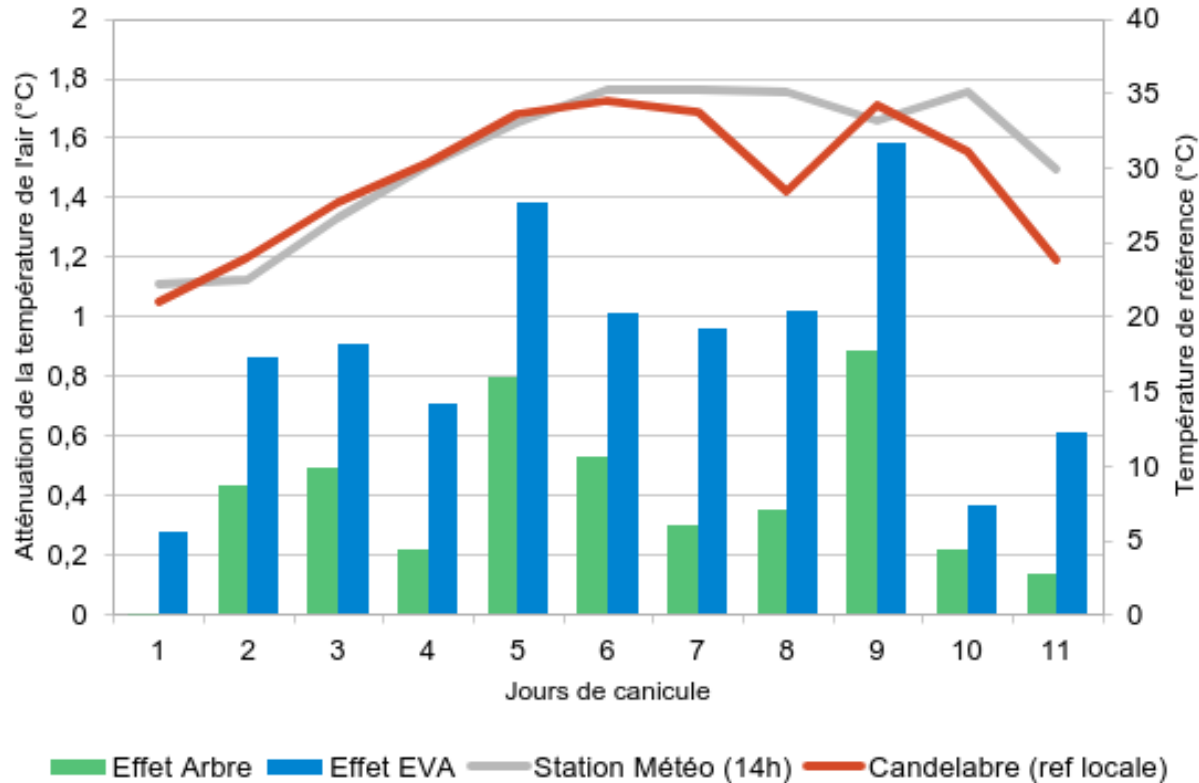
Decision Algorithm





- Self regulating drippers
- 3 hours per night during 1 week
- Inertia : 3 days
- Other option: flood irrigation (Sprinkler not an option with non-potable water)

Heatwave august 2020



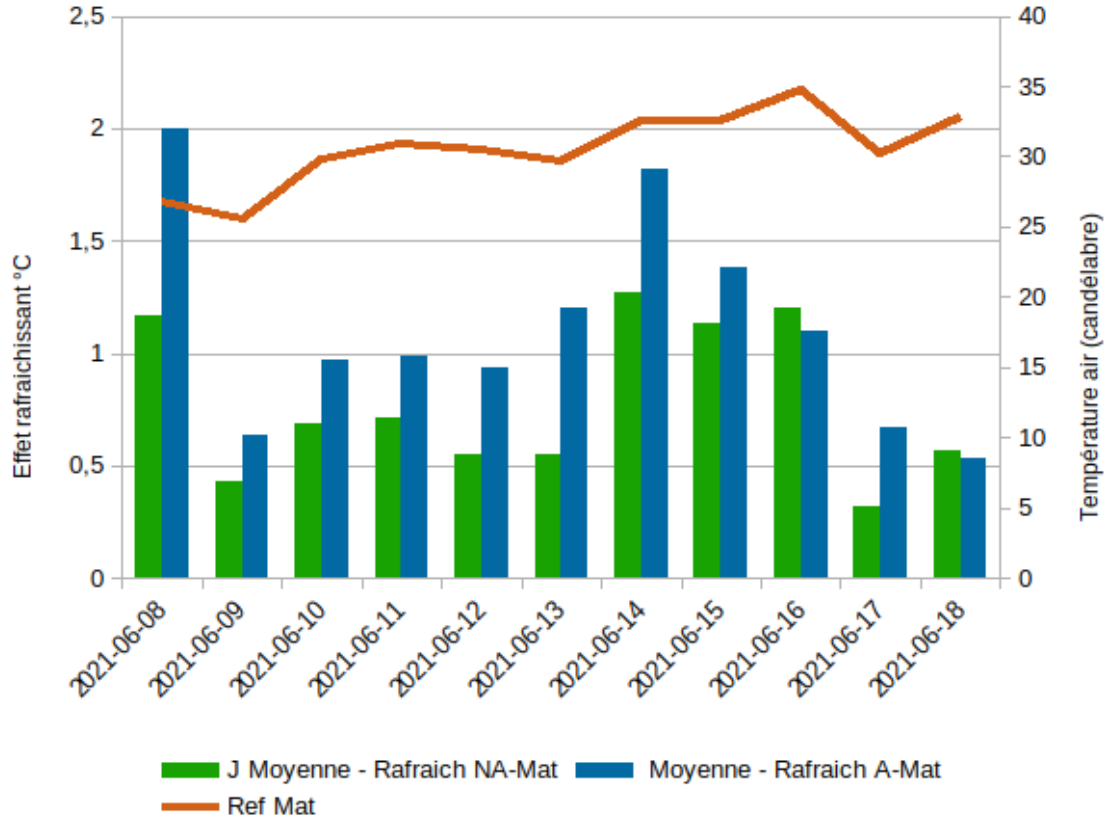
Watering → Thermal attenuation
Average compared to the candelabra

Tree alone -0.43°C
Tree watered -0.93°C

Watering → 105% increase in cooling



Heatwave june 2021



Watering → Thermal attenuation
Average compared to the candelabra

Tree alone -0.78°C
Tree watered -1.1°C

Watering → 50% increase in cooling





- Understanding plants needs to save water
- Opening systems to data driven decision
- Watering as a health concern



Always balance
Artificial Intelligence
with Natural Intelligence



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