

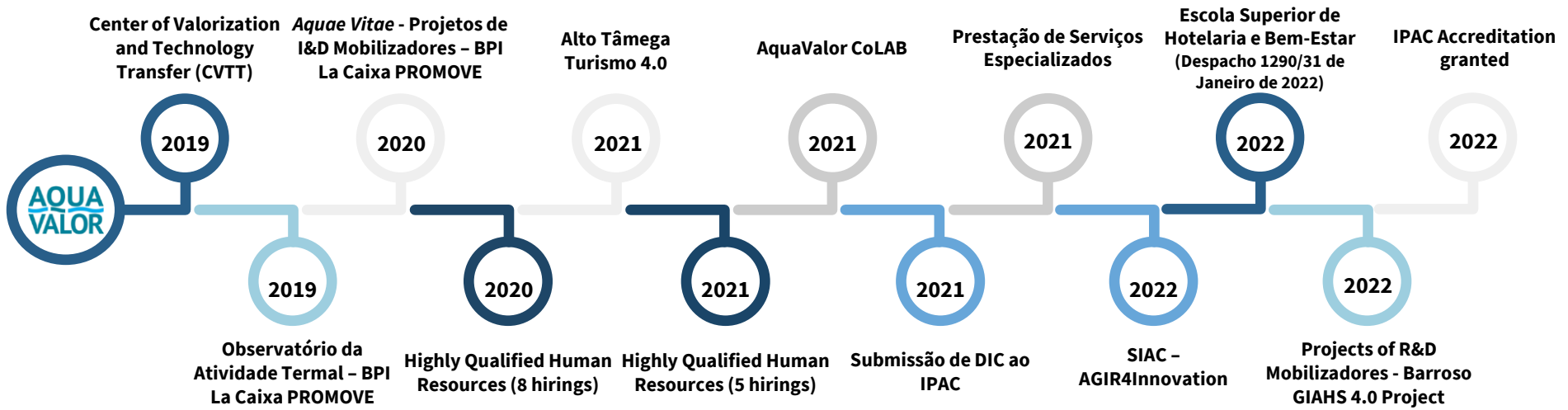
Aquae Vitae

Thermal Water as a Source of Life and Health

Catarina Milho

08.03.2023

AQUAVALOR TIMELINE



AQUAE VITAE

“THERMAL WATER AS A SOURCE OF LIFE AND HEALTH”

BPI | “la Caixa” Foundation- PROMOVE O FUTURO DO INTERIOR – 2020 CALL

Applicant entity: **CIMO-IPB**

Partner entities: **AquaValor, CeDRI-IPB, UBI, TARH, FCUL**

Total investment: **629 032,50€**

PROMOVE support (80%): **503 226€**

AquaValor investment: **181 335€**

Start date: 01-09-2021

Conclusion date: 31-03-2024

OBJECTIVES:

- Validate new thermal water therapeutic effects and their impact on public health;
- Develop thermal water-based functional beverages and foods;
- Develop thermal water-based sustainable cosmetic products in association with natural compounds;
- Investigate the hydromineral and geothermic resources from the Trás-os-Montes territory;
- Knowledge and technology transfer to the community-



CONTEXT

Thermalism is an activity with a significant impact

- Improvement of health and well-being conditions
- Promoting tourism and regional development in areas with low population and business density

There are still technical-scientific and medico-hydrological gaps in the demonstration of the therapeutic and preventive effects



Potential use of thermal water as a raw material



PROJECT'S TEAM

Mountain Research Center, CIMO (IPB)

- **Lillian Barros**

Research Centre in Digitalization and Intelligent Robotics, CeDRI (IPB)

- **Paulo Leitão**

Center of Valorization and Technology Transfer of Water, AquaValor

- **Maria José Alves**

University Beira Interior (UBI)

- **Ana Palmeira-de-Oliveira**

Terra, Ambiente e Recursos Hidrogeológicos (TARH)

- **Rita Martins de Carvalho**

Faculty of Sciences from the University of Lisbon (FCUL)

- **Maria do Rosário Carvalho**



CeDRI

Research Centre in
Digitalization and Intelligent Robotics

**AQUA
VALOR**



UNIVERSIDADE
BEIRA INTERIOR



**Ciências
ULisboa**

WORK PLAN

LA1. Therapeutic effects of thermal water – Leader: AquaValor



LA2. Thermal water-based functional and nutraceutical foods – Leader: CIMO



LA3. Thermal water-based sustainable cosmetics – Leader: UBI



LA4. Sustainability of the hydromineral and geothermic resources from the Trás-os-Montes territory – Leader: TARH/FCUL



LA5. Project management, promotion and dissemination – Líder: CIMO



MAIN RESULTS

LA1. Therapeutic effects of thermal water – Leader: AquaValor

Antimicrobial and antibiofilm activity of thermal water from Chaves in association with endogenous plants (*Matricaria recutita*)

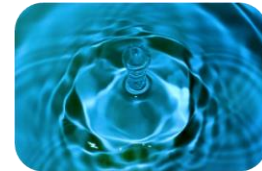
Flow
citometry

Promising mixture
with antimicrobial and
antibiofilm properties

- Mixture (50/50) of *M. recutita* with Chaves thermal water mineral salts
- Inhibition and reduction of cariogenic biofilms with little interference in biofilms of associated with oral health
- New formulations of mouthwash and toothpaste



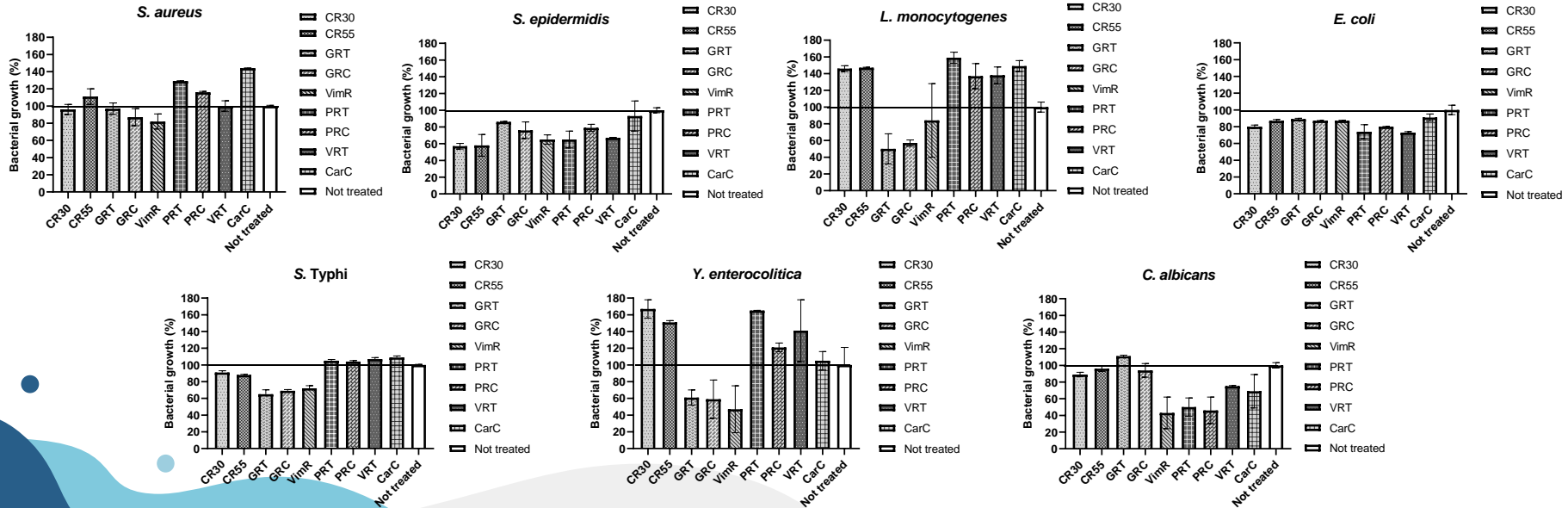
MIXTURE PATENT
SUBMITTED!!



MAIN RESULTS

LA1. Therapeutic effects of thermal water – Leader: AquaValor

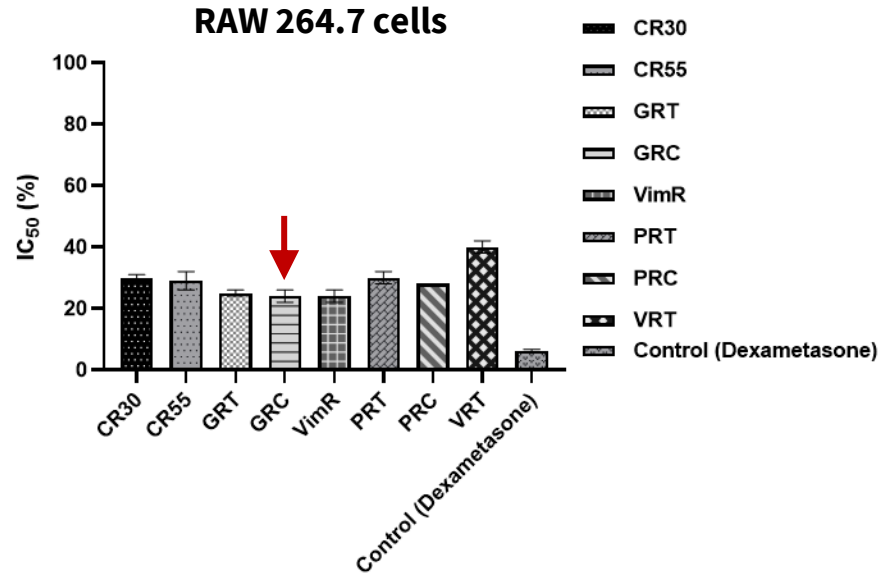
Antimicrobial activity of different thermal waters from the North of Portugal region – AquaValor



MAIN RESULTS

LA1. Therapeutic effects of thermal water – Leader: AquaValor

Anti-inflammatory activity of different thermal waters from the North of Portugal region – AquaValor



MAIN RESULTS

LA2. Thermal water-based functional and nutraceutical foods – Leader: CIMO

Development of an innovative product in bread-making – AquaValor

Bottled Natural Mineral Water
Thermal Water from Chaves

BIJU BREAD
CHAPATA BREAD



Nutritional profile

- Energetic value
- Carbohydrates
 - Sugars
- Fatty acids
- Dietary fibre
- Proteins
- Sodium

Organoleptic assessment

- Slicing
- Chewability
- Hardness
- Firmness
- Elasticity
- Cohesiveness
- Resilience
- Adhesiveness

	Biju Bread	Chapata Bread
Nutritional profile	↓ Water content - ↑ Shelf life ↓ Soluble sugars - ↓ Glycemic index?	↑ Protein content - ↑ Nutritional value
Mineral content	↑ Total mineral content ↑ Magnesium and potassium	↓ Potassium - good for CKD patients?
	Add less salt (NaCl) to bread?	

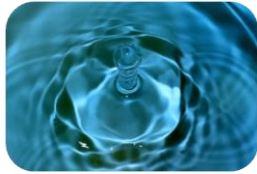
MAIN RESULTS

LA2. Thermal water-based functional and nutraceutical foods – Leader: CIMO

Development of an innovative isotonic drink – CIMO



Watermelon juice



Chaves thermal water mineral salts



Chestnut flower extract



Rosemary extract

Antimicrobial activity

Escherichia coli

Pseudomonas aeruginosa

Yersinia enterocolitica

Bacillus cereus

Listeria monocytogenes

Staphylococcus aureus



Antioxidant activity

↑ Sodium, potassium and magnesium content
(↑ nutritional value)

Fructose, saccharose and glucose
Lipids, proteins and carbohydrates
Shelf-life



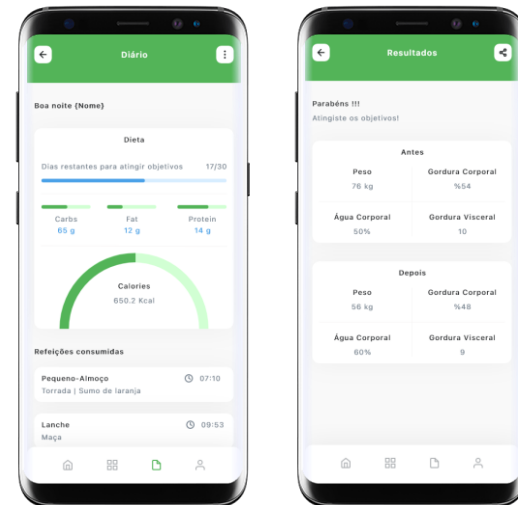
Watermelon juice alone!

MAIN RESULTS

LA2. Thermal water-based functional and nutraceutical foods – Leader: CIMO

Implementation of an intelligent management and recommendation system for healthy eating – CeDRI

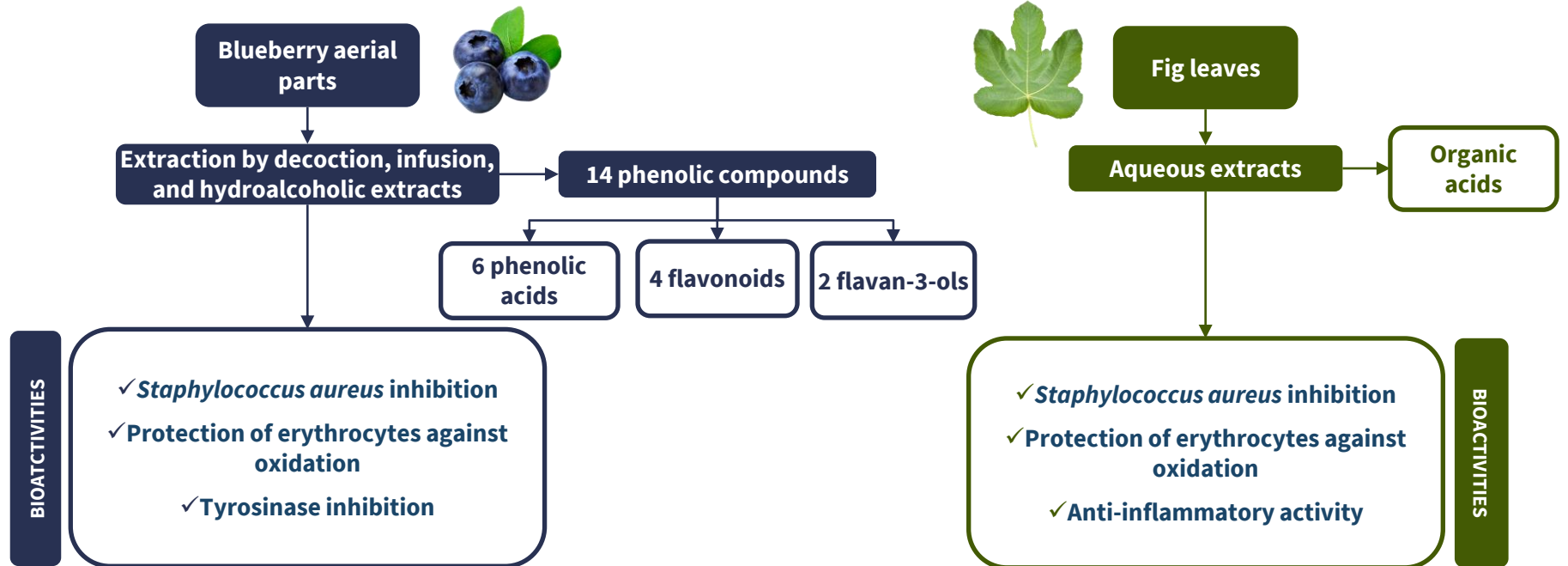
- Promotion of a healthy diet incorporating thermal water-based products;
- Development of an intelligent algorithm for individualised and personalised suggestions (data analytics, machine learning, artificial intelligence);
- Multi-platform system, mobile and web, for continuous and dynamic monitoring of the diet.



MAIN RESULTS

LA3. Thermal water-based sustainable cosmetics – Leader: UBI

Agro-industrial waste characterisation for cosmetic use – CIMO



MAIN RESULTS


LA3. Thermal water-based sustainable cosmetics – Leader: UBI

Combination of thermal water with agro-industrial wastes for cosmetic use – UBI


Cytotoxicity

RAW 264.7
L-929 cells

BIOCOMPATIBLE AQUEOUS EXTRACTS




25% (v/v) of S. Pedro do Sul thermal water with 0.626 mg/mL of blueberry extract




12.5% (v/v) of S. Pedro do Sul thermal water with 5 mg/mL of fig leaves extract

25% (v/v) of S. Pedro do Sul thermal water with 3.13% (v/v) of lemon thyme extract

12.5% (v/v) of S. Pedro do Sul thermal water with 3.13% (v/v) of rockrose extract



12.5% (v/v) of Unhais da Serra thermal water with 3.3% (v/v) of lemon thyme extract



25% (v/v) of Unhais da Serra thermal water with 3.3% (v/v) of rockrose extract

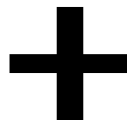
Antioxidant activity
ROS inhibition in cells

MAIN RESULTS

LA3. Thermal water-based sustainable cosmetics – Leader: UBI

Combination of thermal water with agro-industrial wastes for cosmetic use – UBI

12.5% (v/v) of Unhais da Serra
thermal water with 3.3% (v/v) of
lemon thyme extract

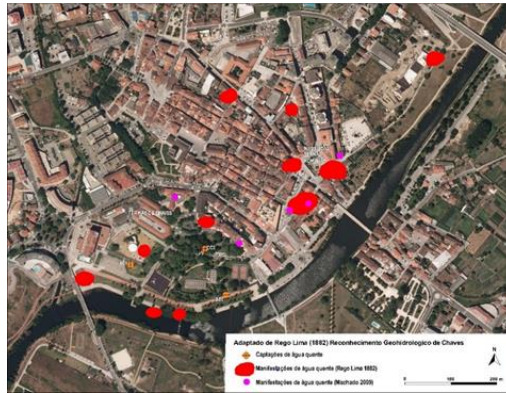


Humectants, emollients and vegetable oils



MAIN RESULTS

LA4. Sustainability of the hydromineral and geothermic resources from the Trás-os-Montes territory – Leader: TARH/FCUL



Compilation of the State of the Art on the hydromineral and geothermal resources of Trás-os-Montes

Caldas de Chaves pilot area - field validation and detailed cartography, remote sensing and photogeology activities for geostructural characterisation of the area, hydrodynamic studies in the thermal springs...

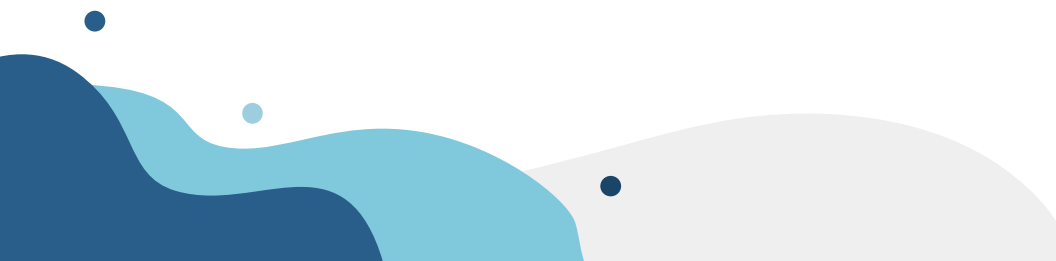
Recharge assessment of the Caldas de Chaves pilot area

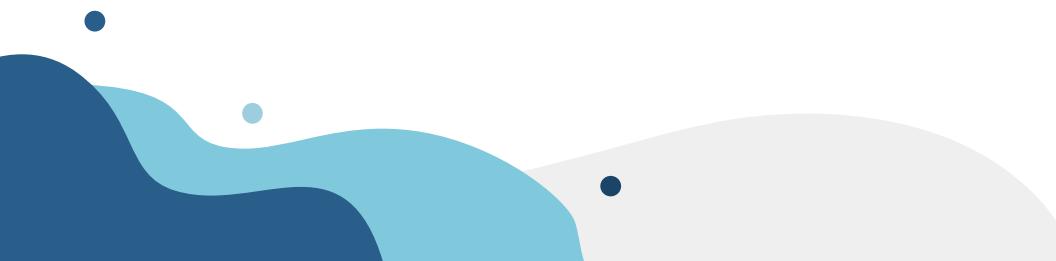
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Thank You!

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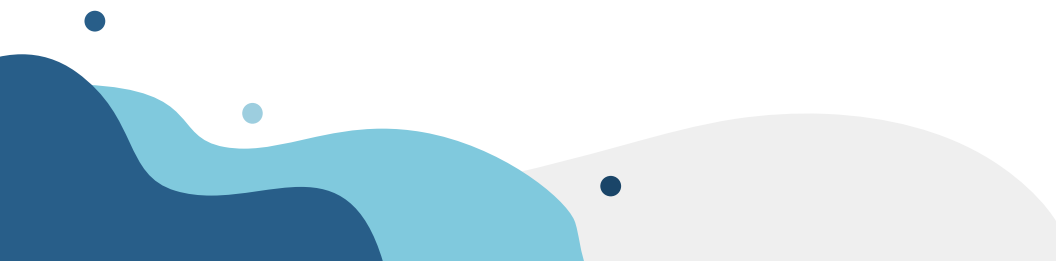
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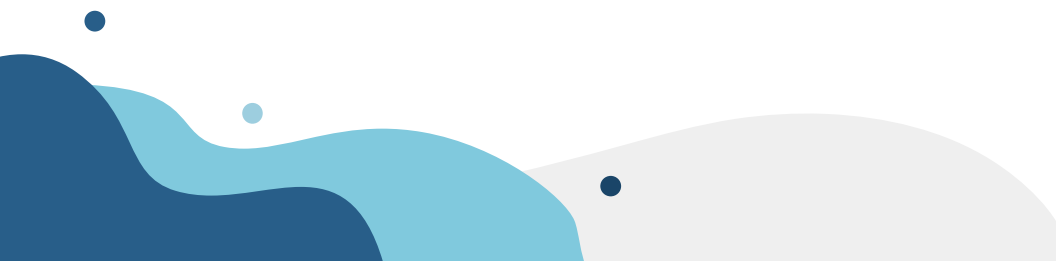














MAIN RESULTS

LA3. Thermal water-based sustainable cosmetics – Leader: UBI

Combination of thermal water with agro-industrial wastes for cosmetic use – AquaValor

