SMART MOUNTAINS

XII European Mountain Convention

25 – 26 – 27 October 2022

How to make our territories attractive and future- oriented?

Gian Antonio Battistel

Senior Technologist,

Fondazione Edmund Mach-Centro di Ricerca Innovazione

Technological innovation for the management of natural resources in the mountains

FONDAZIONE EDMUND MACH

Email: gianantonio.battistel@fmach.it

Technological innovation for the management of natural resources in the mountains

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- It widely recognized that the Technological Innovation (TI) is a key factor that:
  - facilitates and promotes socio-economic and sustainable environmental development of mountain communities
  - improves the knowledge on condition, status and dynamics of Natural Resources (NRs) as well as on interaction of concerned ecosystems
  - gives impulse to other kind of innovations

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- TI is a new or improved product (machines, equipment, plants), … or process (i.e., product's life cycle, waste reduction, circular & bioeconomy, environment modelling/monitoring) in the marketplace or in the public whose technological **characteristics are significantly different from before**
- The product or process is considered to be an innovation if it **achieves specified advantages** for the local enterprises/territory-community in sustainably managing NRs concerned (i.e. water (rivers, lakes, air, soil, forest, flowers, grassland, pastures, wild game, …)

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- When NRs are left unchecked or poorly managed, the above threats can critically undermine the benefits, or ecosystem services, that NRs generate and on which the ecosystem and mountain territories an d communities survival depends

- TI is helping to make a difference in the way governments and communities lead NRs Management (NRM)

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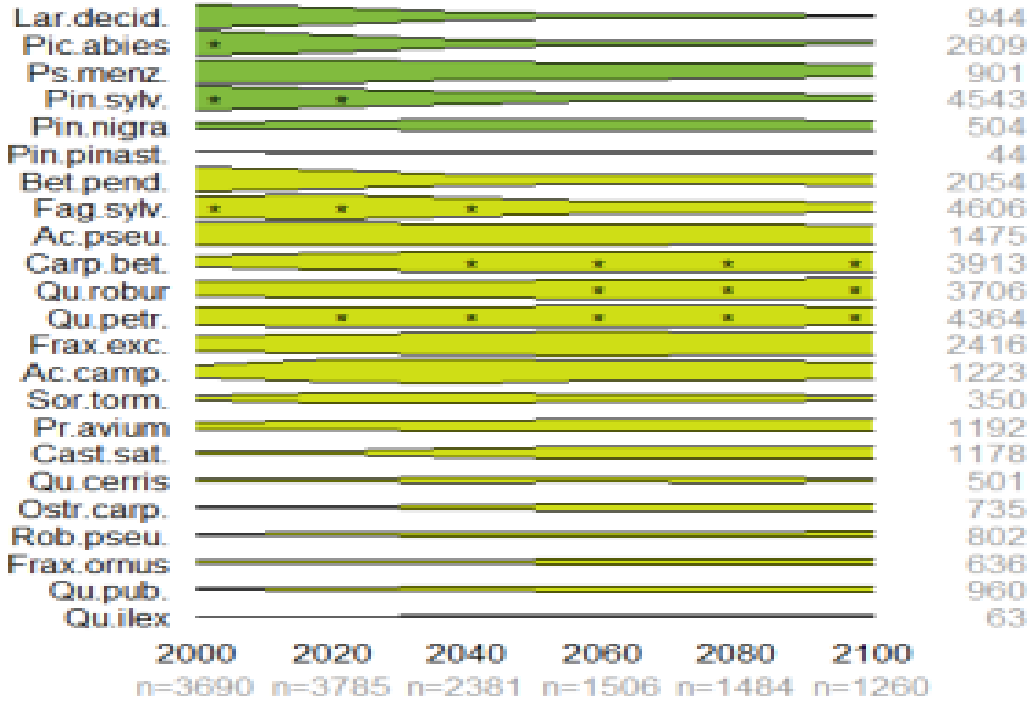
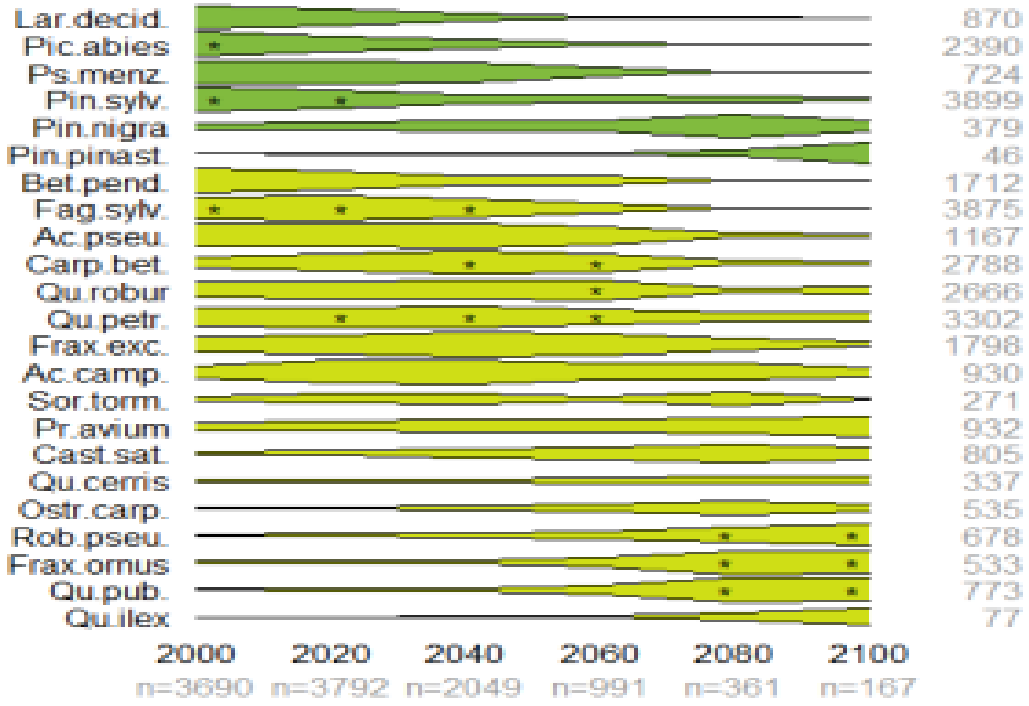
Mette, T.; Brandl, S.; Kölling, C. Climate Analogues for Temperate European Forests to Raise Silvicultural Evidence Using Twin Regions. Sustainability 2021, 13, 6522. https://doi.org/10.3390/su13126522



(a) Species prevalence trajectories for site Roth RCP 4.5 mean variant



(b) Species prevalence trajectories for site Roth RCP 8.5 mean variant

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- Digital TI is helping to make a difference in the way governments, communities lead NRM
- Digital solutions, when developed and applied in a customisable and scalable way, can enhance the quality and efficiency of data collection, empower local and global communities to be engaged in conservation efforts, and aid real-time decision making towards extreme events of climate change

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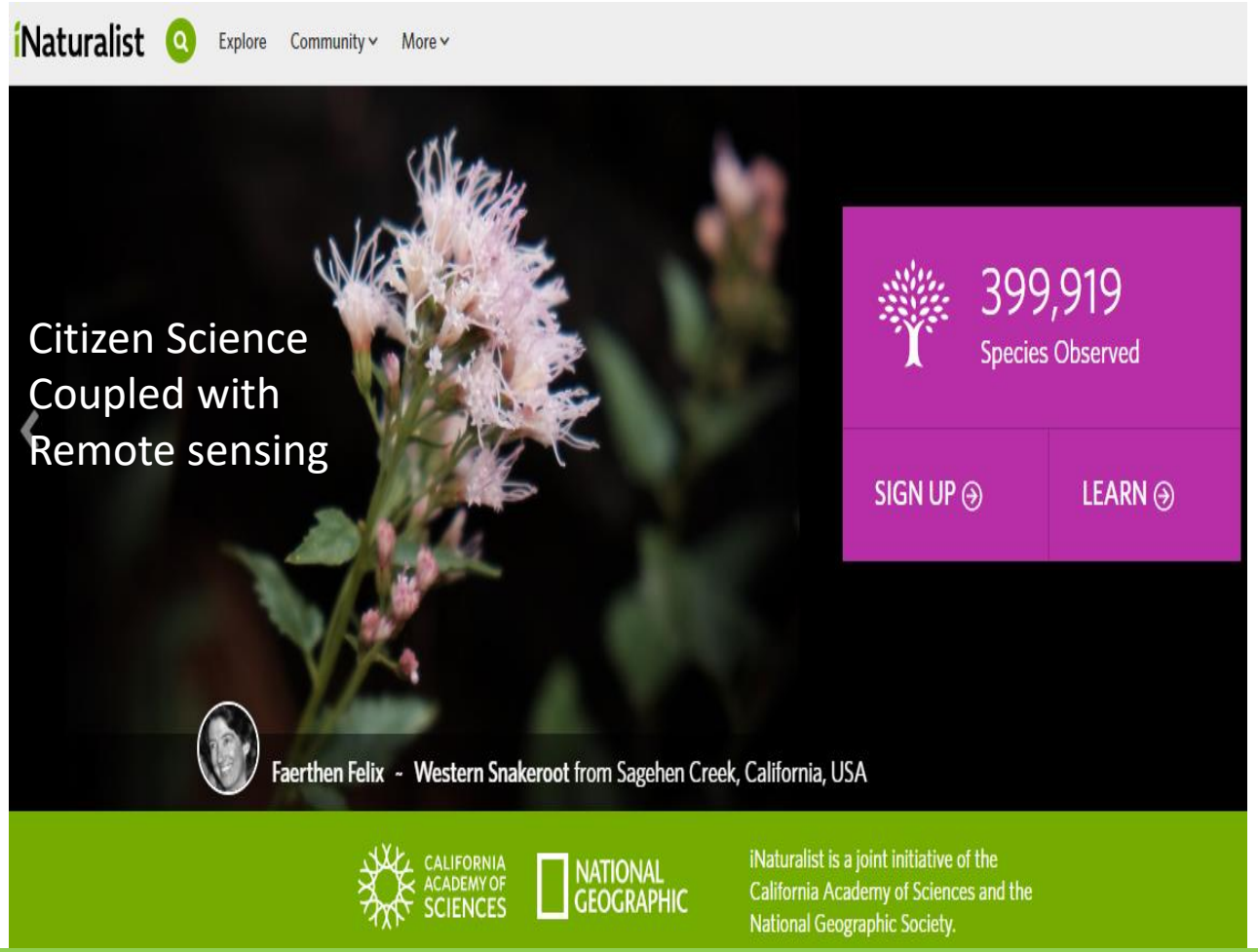

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The use of tools such as mobile devices, satellites, the Internet of Things (IoT) and artificial intelligence (AI) in NRM is still nascent

Over the last decade, a growing body of evidence has emerged showing how these technologies can bring incremental, and sometimes transformational, improvements to the way communities are tackling climate change, reduce biodiversity loss and optimizing NRs contribution to resilient livelihoods

Digital technology is raising productivity and improve data mining and monitoring operations to assess the quality and quantity of ecosystem services (provisioning, regulating, cultural) provided by NRs

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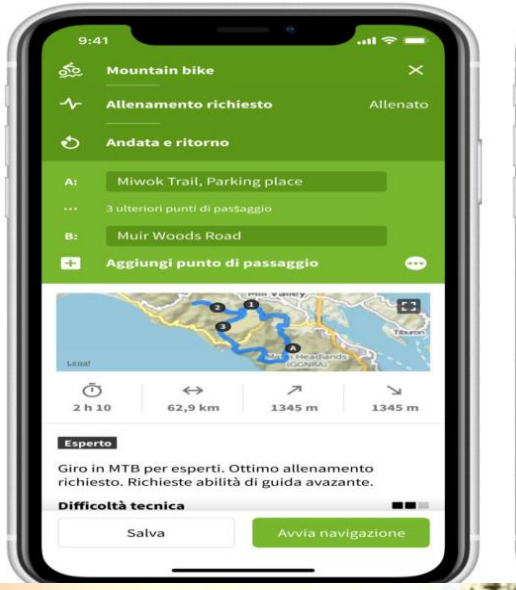

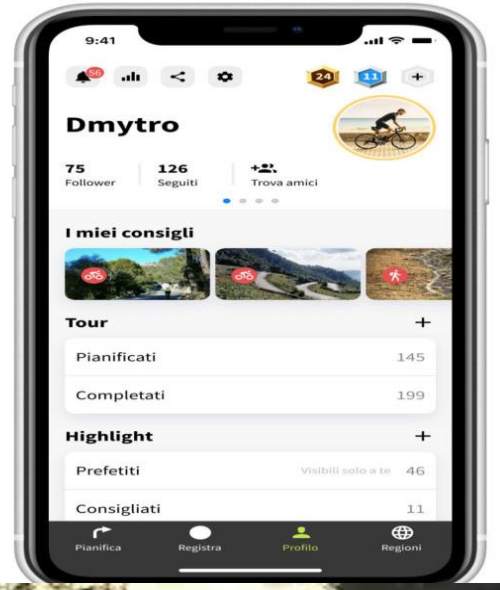

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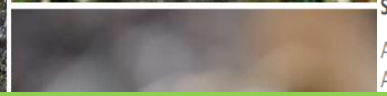
EUROMAMMALS is an umbrella project coordinating species-specific movement databases for several species and 1 group including different taxa:

- roe deer (*Capreolus capreolus*);
- red deer (*Cervus elaphus*);
- alpine ibex (*Ibex ibex*);
- wild boar (*Sus scrofa*);
- eurasian lynx (*Lynx lynx*);
- european wildcat (*Felis silvestris*);
- small mammals (rodents, insectivores, ...).

The approach of the EUROMAMMALS projects for data and knowledge sharing has proven to be effective in creating a strong network of researchers and ultimately to produce science not possible at the single study area level. The experience and success of the pioneer project EURODEER inspired the scientific community studying movement ecology of different species to experiment the same method.

The EUROMAMMALS databases are connected, facilitating inter-species studies. EUROMAMMALS has been established to coordinate each species-specific database as much as possible.

Other communities are truly welcome to join!



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SPONSOR

VECTRONIC Aerospace

In 2012, Vectronic Aeropsace GmbH has become the official sponsor for EURODEER. In 2018, it has started to support the entire EUROMAMMALS initiative, showing to strongly believe in collaborative science and in the scientific potentiality of animal-borne information, such that provided by their products. Vectronic has always been aware of the EURODEER initiative and progress-through the long-term co-operation with many research groups joining EURODEER. Vectronic has decided to actively support activities and spatial database development and maintenance, so directly supporting wildlife science, and the bio-logging approach in particular. On top of this, Vectronic applies 10% discount on collars for the network species to all EUROMAMMALS members.

VECTRONIC AEROSPACE GMBH PRODUCTS FOR EUROMAMMALS, AND BEYOND

Vectronic Aerospace GmbH develops and manufactures GPS collars, software, and sensor options for EUROMAMMALS projects and other wildlife research around the world. It was the first company in the world to release GPS-GSM collars for wildlife applications in the year 2000. Since then, its engineers have constantly improved their products: they keep up to date with wireless communication and other electronics, and stay in close contact with their customers to react on the needs of current research. GPS collars are not simply business for Vectronic, they want to offer reliable equipment for researchers with high performance and low impact on the animals. Vectronic sponsorship for EUROMAMMALS is a clear sign of the tight relationship with the scientific world.
For detailed information on Vectronic products for wildlife, and deployments please visit the company's website.

GPS COLLARS: AN OVERVIEW

GPS PLUS collars are built on a modular concept that allows choosing a configuration which is best suited for the study. Users can choose between several communication and sensor options, seven different battery sizes, and suitable belt shape, width, and thickness. The belt is made of durable, UV- and water-resistant polyurethane. Due to its round edges it causes no or only a little irritation on the animal's neck. All antennas are integrated into the belt or the electronic housing. This prevents antennas from breaking or injuring the animal. Vectronic collars are designed to operate at the wide range of temperatures from - 40°C to + 70 °C. They are waterproof and can withstand even total immersion for several hours. To simplify the recovery of the collar, Vectronic offers additional drop-off mechanisms with radio and timer control, which are integrated into the battery pack to keep the collar more compact without unnecessary weak points. Battery packs and drop-offs can be exchanged in the field, so the collar can be easily re-deployed. Users are also welcome to send us the collar for a check-up, battery change, and refurbishment. If needed, Vectronic can change a roe deer collar into a wild boar collar - or even into a lion collar!

SENSOR OPTIONS: MORE THAN JUST GPS POSITIONS

All collars can be equipped with activity, mortality and temperature sensors without adding weight or energy consumption.
Activity sensor plus Activity Pattern software: all Vectronic collars can be equipped with a three-axes acceleration sensor without adding weight or energy consumption. Activity can be stored in

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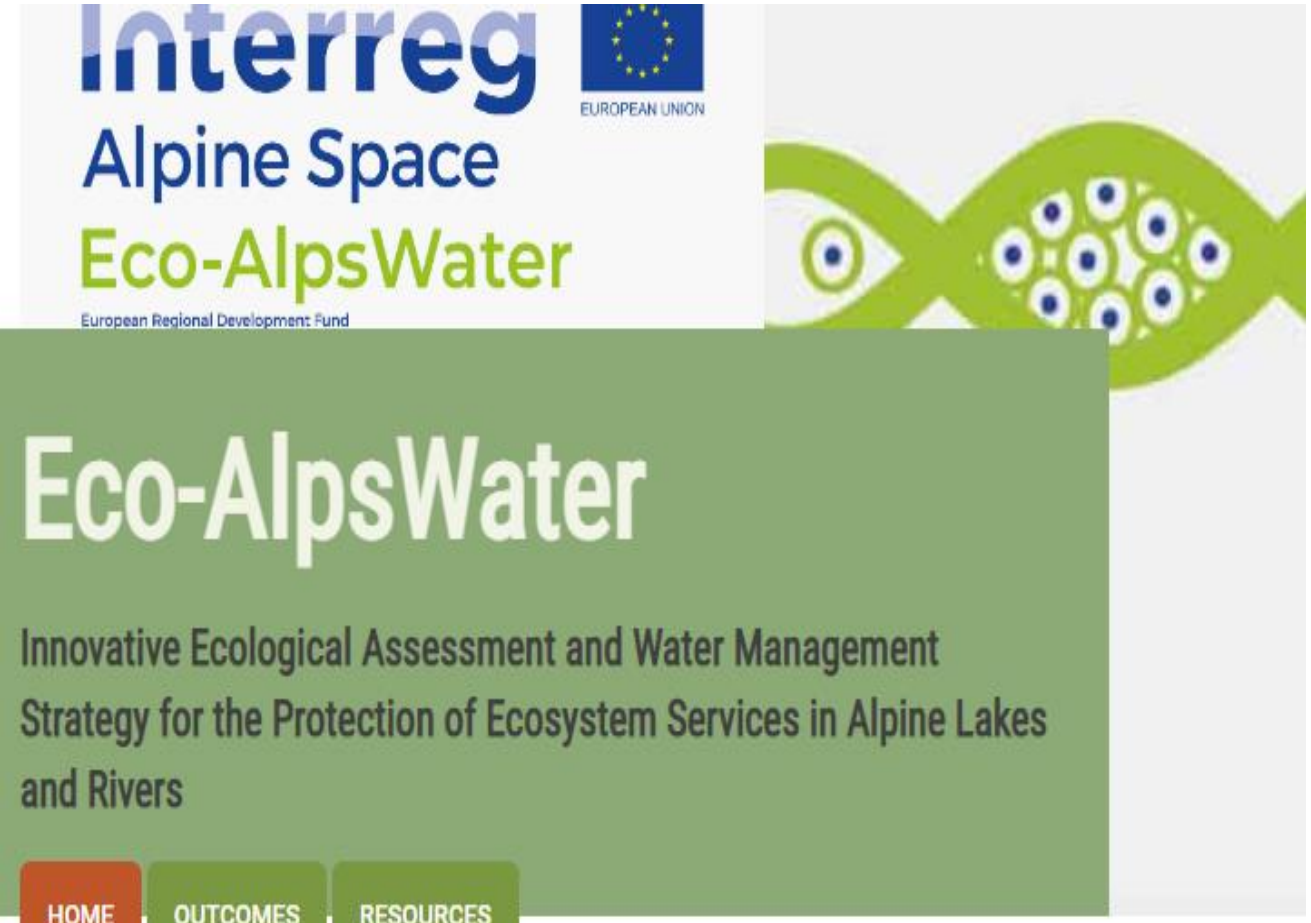

Inland waters are one of the most precious natural resources on Earth, but they are also highly endangered by human activities. To detect changes in inland waters, a regular monitoring is indispensable. Eco-AlpsWater improved the traditional monitoring approaches by using advanced DNA sequencing techniques such as metabarcoding. It makes use of Next Generation Sequencing (NGS) to analyse environmental DNA in waterbodies. This technique allows for rapid and improved species identification at low costs (e.g. fish or bacteria) as well as an automation in data processing, data storage and information retrieval. The method was tested and optimized in 37 lakes and 23 rivers, and the new findings and experiences were gathered in a toolbox shared with decision makers and water managers.

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- TI for NRM is a process of many discrete decision and behaviors involving
  - social units at many different levels of aggregation (including individuals, groups, organizations, industries and economies) and most of them are not even selfconsciously aware of being part of such process
  - institutions (as regulation, standard, …) at national, regional and local level not always interconnected and prone to digital transition

- Use and benefits from development of connecting technologies may be locally delayed due to low digital literacy of communities of rural remote areas or even limited by bureaucracy or inadequate investments on infrastructures.

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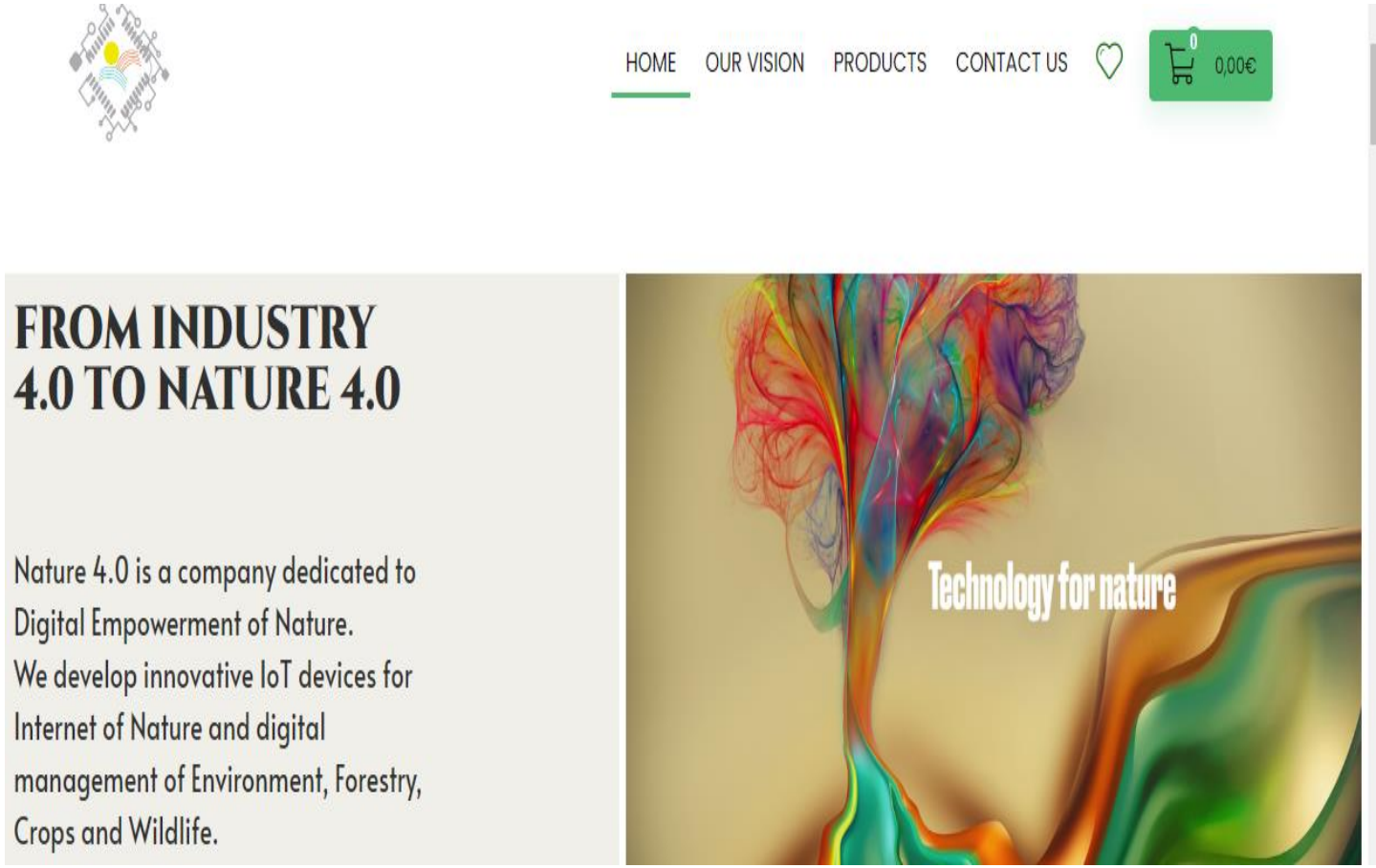
several devices on microprocessor and wireless data transmission via radio (LoRa- Sigfox) for monitoring environmental parameters with applications in the agricultural and forestry fields. In particular, the company has developed a device called TreeTalker (TT +) capable of measuring in real time the water consumption of trees, the growth of biomass (diameter) and the state of health of the leaves



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- Role of digital TI on NRM crucially depends on ability of communities to keep up with the change. This induces shifts in their skill education and long-life learning. “Learning communities” generate roadmapping/backcasting pathways in a long run (vision) to foresee and monitor their digital transition and to become real “Smart communities” able to anticipate uncertainties on NRM
- Digital TI on NRM requires an accompanying process of organizational change. National, regional, local or sectoral innovation systems (see clusters, hubs competence centers) of each region should enhance networking with those of other territories and involve in a participatory way digital TI users, interested decision makers, research centers and further stakeholders
- Effective digital TI on NRM needs to overcome the fragmentation and reluctance to share the collected data, to standardize their quality and to enhance their interoperability. Data should be accessible from one entry point in order to use them for NRM policy monitoring and better guide public and/or private subvention, …

THANK YOU / MERCI / GRAZIE !

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GAL SILA gruppo di azione locale ®

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ARSAC Azienda Regionale per lo Sviluppo dell'Agricoltura Calabrese

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