

MANGROVE TECHNOLOGY PLATFORM



**WE BROADEN SOIL AND WATER
AVAILABILITY TO REFOREST AT THE
SCALE TO ACHIEVE CARBON NEUTRALITY**

MANGROVE TECHNOLOGY PLATFORM



The **Mangrove** Technology Platform (MTP) provides **impact solutions for dryland reforestation** and agroforestry projects in order to fight global warming and climate change.

The MTP enables reforestation **on degraded and arid land** broadening the soil availability for trees planting at the needed scale to achieve **carbon neutrality**



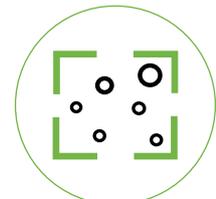
Sustainable water consumption and soil remediation

Enabling



Large scale High-Tech dryland reforestation

To achieve



CO₂ removal

THE CHALLENGE

Future land use depends, in part, on the desired climate outcome and the portfolio of response options deployed. All assessed modelled pathways that limit warming to 1.5°C or well below 2°C require land-based mitigation and land-use change, with most including different combinations of reforestation, afforestation, reduced deforestation, and bioenergy. Although most forests restoration options can be applied without competing for available land, some can increase demand for land conversion. At the deployment scale of several GtCO₂yr⁻¹, this increased demand for land conversion could lead to adverse side effects for adaptation, desertification, land degradation and food security. In order to deploy forest restoration practices at the needed scale but limiting at the same time the land conversion, innovative and bankable technologies are required to enable trees planting on arid and degraded soil.

THE SOLUTION

The MTP represents a cost-effective, nature-inspired system able to integrate already existing technologies in a truly innovative manner with the overall aim to scale-up trees planting practices at the needed scale, leveraging on sun, salt water and degrade land. The MTP allows for the cost-effective optimization of the three integrated core technologies, i.e. desalination units, organic incubators and IoT devices, with the strategic target to deliver a passive, modular and smart system enabling trees planting in adverse environments.

MTP IMPACT CAPACITY

Trees are still the most effective technology to capture and store carbon dioxide and trees planting is already becoming the next megatrend to fight global warming and climate change. Moreover, planting trees requires modest financial investments, is accessible to everyone and therefore is suitable to become a collective, mind-blowing behavior. Ecosystems could support an additional 0.9 billion hectares of continuous forest. This would represent a greater than 25% increase in forested area, including more than 500 billion trees and more than 200 giga-tonnes of additional carbon at maturity. Such a change has the potential to cut the atmospheric carbon pool by about 25%². However, climate change is already altering this potential tree coverage and according the actual trajectory, the global potential canopy cover may shrink by about 223 million hectares by 2050. In fact a significant part of worldwide soils are affected by one or more types of degradation such as soil sealing, erosion, depletion, contamination and compaction. The ongoing degradation of land due to the growing scarcity of water resources coupled with increased salinity of soil and water directly influence the potential tree coverage. A systemic approach able to combine trees planting, soil restoration and sustainable water use is needed in order to guarantee forest restoration at the proper scale to be effective and impactful. This challenge demands the development of nature-based and conservation-driven systems, capable of growing trees leveraging arid soils and saltwater, which represents 95% of the water available worldwide. The Mangrove Technology Platform (MTP) integrates a set of innovative, near-zero energy-demanding, cost-effective and nature-based technologies in order to kick-start trees planting on degraded land.

¹IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse gas fluxes in Terrestrial Ecosystems (2019)

²Jean-Francois Bastin & al. The global tree restoration potential (2019)



THE TECHNOLOGY

The Mangrove Technology Platform integrates:

- desalination units,
- organic incubators
- Internet-of-Things devices.

The modular desalination units provide fresh water to irrigate the nourishing trees incubators until the roots reach deep and moist soil. The IoT devices track the process parameters in order to improve the overall system efficiency and foresee predictive maintenance.

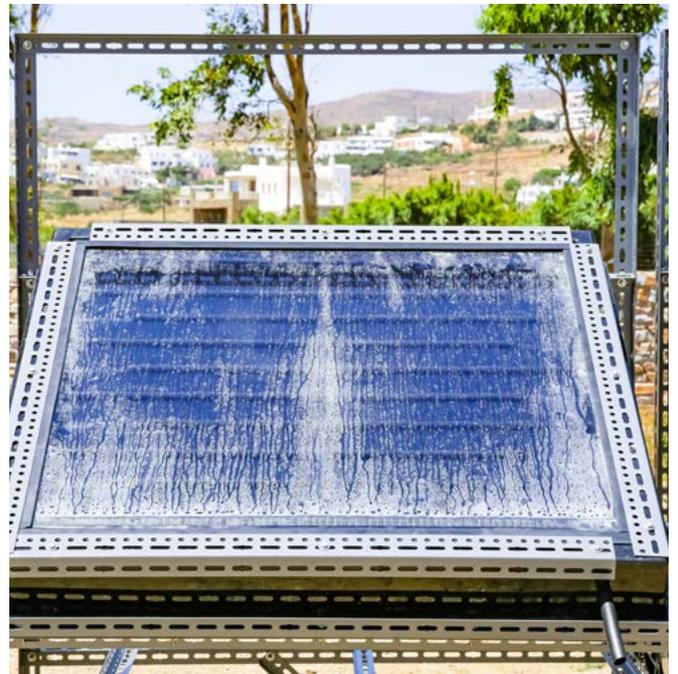
The MTP exhibits a near-zero energy coefficient and, driven by solar energy and naturally occurring biological and physical processes, emulates the Mangrove forests ability to desalinate water in order to kick-start other plants growth.





DESALINATION UNITS

The cascade-wick solar still is a single effect-slope passive solar still combining the wick and cascade standard. It leverages the internal heat generated by the sun irradiation to evaporate the saltwater (seawater, brine, saline underground water), while the condensation phase is performed by one layer of glazing placed over the water surface. It consists on a polymeric thermoformed component of one m² with a total evaporation surface area of 0.7 m² over a projected area of 0.57 m². The today design is able to produce 3.9 – 4.1 l/m²/d using regular seawater as input (so around 35 gr/L of salt).



ORGANIC INCUBATORS

The organic incubator is a container aimed to the return of vitality to places with low fertility conditions. With a hole in the middle to be placed around a seedling, enables the growth of trees, bushes and plants in extreme circumstances. It guarantees a survival rate of over 90% without using (drip) irrigation technologies. Additionally, it uses less water than a normal plant would need as the technology develops a water feeding system based on capillary process: saving up to 99% of water for trees, and up to 75% for vegetables. It also prevents the evaporation of ground water, stabilizes the temperature around the roots, destroys weeds near the planted tree and prevents rodent damage. The box needs to be fed una tantum with 25 liters of fresh water.



IoT DEVICES

The IoT modules are based on low cost components (sensors, controllers, actuators). All components have low energy consumption, and their communication is achieved using a Low Power Wide Area Network (LoRaWAN), allowing the components to work efficiently using mini solar panels. For increased interoperability and extendibility, the IoT infrastructure is based on open source technologies as: Arduino based boards for communication and controlling implementation; Apache Hadoop open-source library for Big Data infrastructure for developing the data repository; and Adafruit open source monitoring platform for monitoring and controlling activities.



THE BUSINESS MODEL **NO GREEN WITHOUT BLUE**

The **MTP multiplies land availability for trees planting** enabling reforestation projects on arid and degraded soil. The increase in land availability (supply side) represents a **strategic asset** for companies and organizations deploying reforestation projects in order to both meet the increasing demand and to avoid competing with fertile soil for food production. Moreover, the MTP integrates the trees planting within a **systemic approach to sustainable water and soil management**, irrigating the trees with desalinated water and supporting the soil texture regeneration. Finally, the MTP is a modular, easy-to-use, semi-passive system designed to require **modest initial investments and limited maintenance**.

While trees planting contribute to carbon neutrality, the MTP contribute both to carbon neutrality and to water use reduction realizing a circular, regenerative system. This virtuous circle has been labeled with the Pay Off **No Green Without Blue**.

The *No Green Without Blue* reforestation project, enabled by the MTP, are the **premium segment** of the trees planting market, attracting the willingness of the partners clients to pay the rewarding (premium price) needed to **plant trees leveraging arid soil and saltwater**



**NO
GREEN
WITHOUT
BLUE**



THE FOUNDERS

Alessandro Villa is Planet CEO and co-founder with more than 10 years of experience in business development and product industrialization, especially in the industrial applications sector. He has a Master's degree in Philosophy (Cognitive Science) and a Biomimicry Specialist Certificate by Biomimicry 3.8 Institute (USA). Former General Secretary of the Italian-Slovak Chamber of Commerce, he was Board Member of the Italian-German Chamber of Commerce. He is also co-founder of several start-up: Opendot and Ultrafab active in the digital fabrication, Digital Universitas active in the digital education and Qualis dedicated to bio-inspired medical applications.

Alessandro Bianciardi is a senior environmental engineer, PhD candidate on bio-inspired filtration technologies at the Politecnico di Milano (Italy). He has a Certification in Education for Sustainability at Schumacher College – UK, a Master in Biomimicry at the Arizona State University and Biomimicry Professional Certificate by Biomimicry 3.8 Institute (USA). He worked for international organization such as UNDP and European Commission in Developing Countries, consulting companies and NGOs for over 20 years as consulting expert and program manager on sustainable development, integrated energy systems, renewable energies. He has also 4 years of experience in conducting applied research topics in environmental management and water resources. He is currently R&D manager at Planet and has so far three scientific publications around the Mangrove Still and Bioinspired Filtration processes.

THE ACHIEVEMENTS SO FAR

2016_San Francisco

US \$ 10.000

Ray of Hope Prize as Finalist at the Biomimicry Global Design Challenge

2017_Dubai

US \$ 100.000

Grant by the **Dubai 2020 Expo Live Program** as 'Global Innovator'

2018_Bruxelles

€ 339.000

Grant as project partner within the **EU-funded project HYDROUSA**

2020_Muscat

US \$ 90.000

Grant by **MEDRC – Middle East Desalination Research Center** as R&D Expert within the Oman Humanitarian Desalination Challenge

ADDITIONAL INFORMATION

A short TV show produced by CNBC and dedicated also to the MTP facility on Tinos Island
<https://www.cnn.com/2020/10/16/natures-influence-on-design-part-one.html>

The Mangrove Technology Platform Official Video

<https://vimeo.com/user40960993>

The Mangrove Technology Platform Teaser

https://www.youtube.com/watch?v=6j9vSRDfICY&feature=youtu.be&ab_channel=NoGreenWithoutBlue



CONTACT

Alessandro Villa

planet@wemimic.it

alessandro.vija@gmail.com

+39 389 21 88 237

www.nogreenwithoutblue.org