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QUARTERLY INSIGHTS INTO A CHANGING WORLD

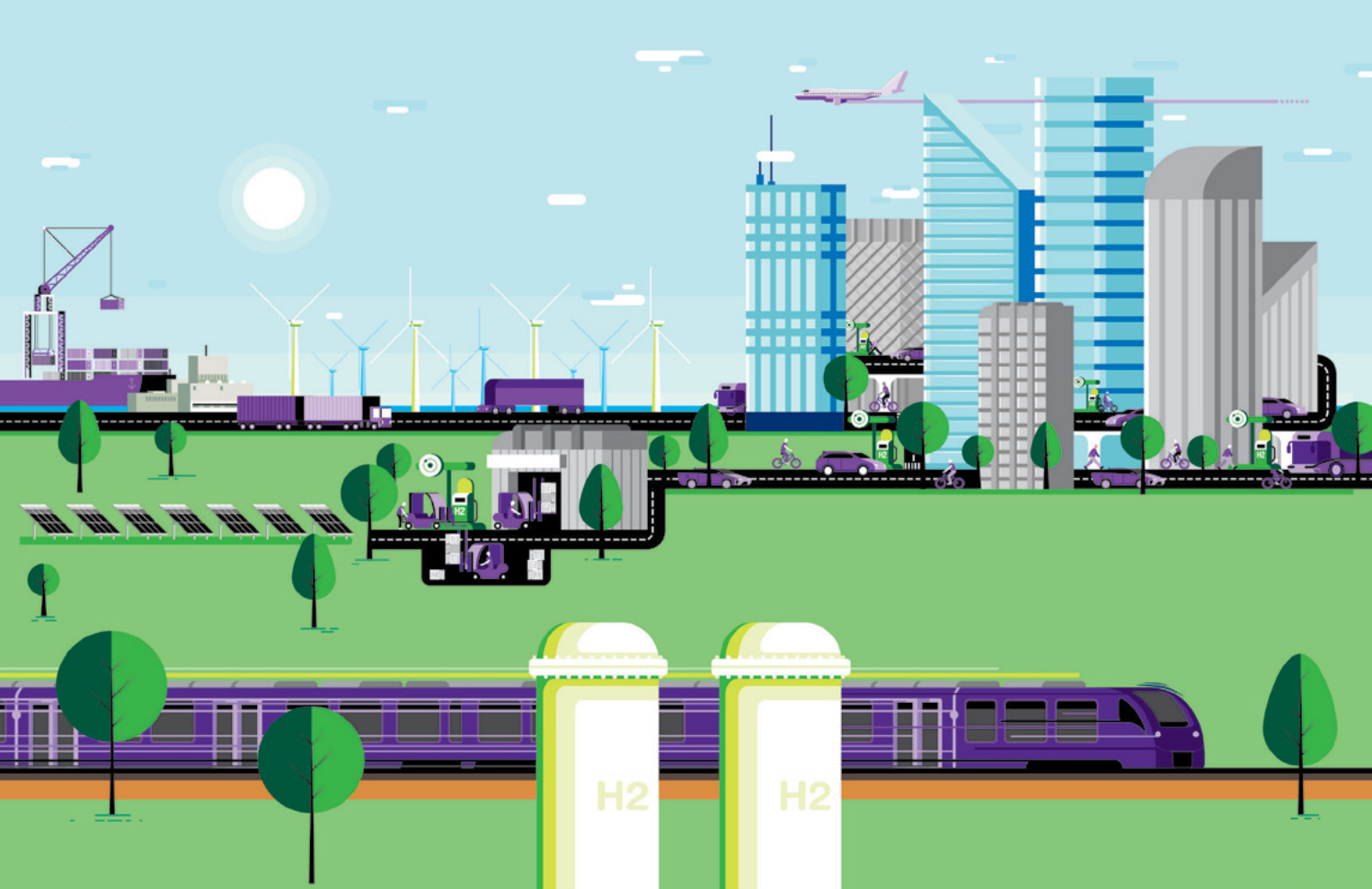
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Bruised Lands

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Hydrogen

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The **Hydrogen Report** is a special industry report developed in partnership with **Hydrogen Europe.** Launched during COP26, the report highlights the value of green hydrogen powered by renewables and provides in-depth features on market and policy developments. The report offers insights into case studies from leading industry members of Hydrogen Europe.

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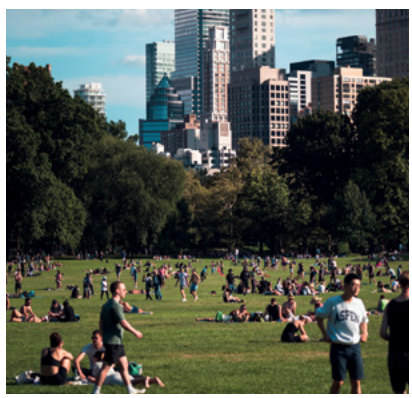
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Cover image:

Oil Sands: Tailings Pond, Fort McMurray, Alberta, Canada, 2010.

The unusable by-products of oil sands extraction and refining are stored in vast tailings ponds. These tailings ponds contain a toxic slurry of heavy metals and hydrocarbons which escape into the groundwater and threaten local wildlife and First Nations people living on the land.

Photo: Alan Gignoux

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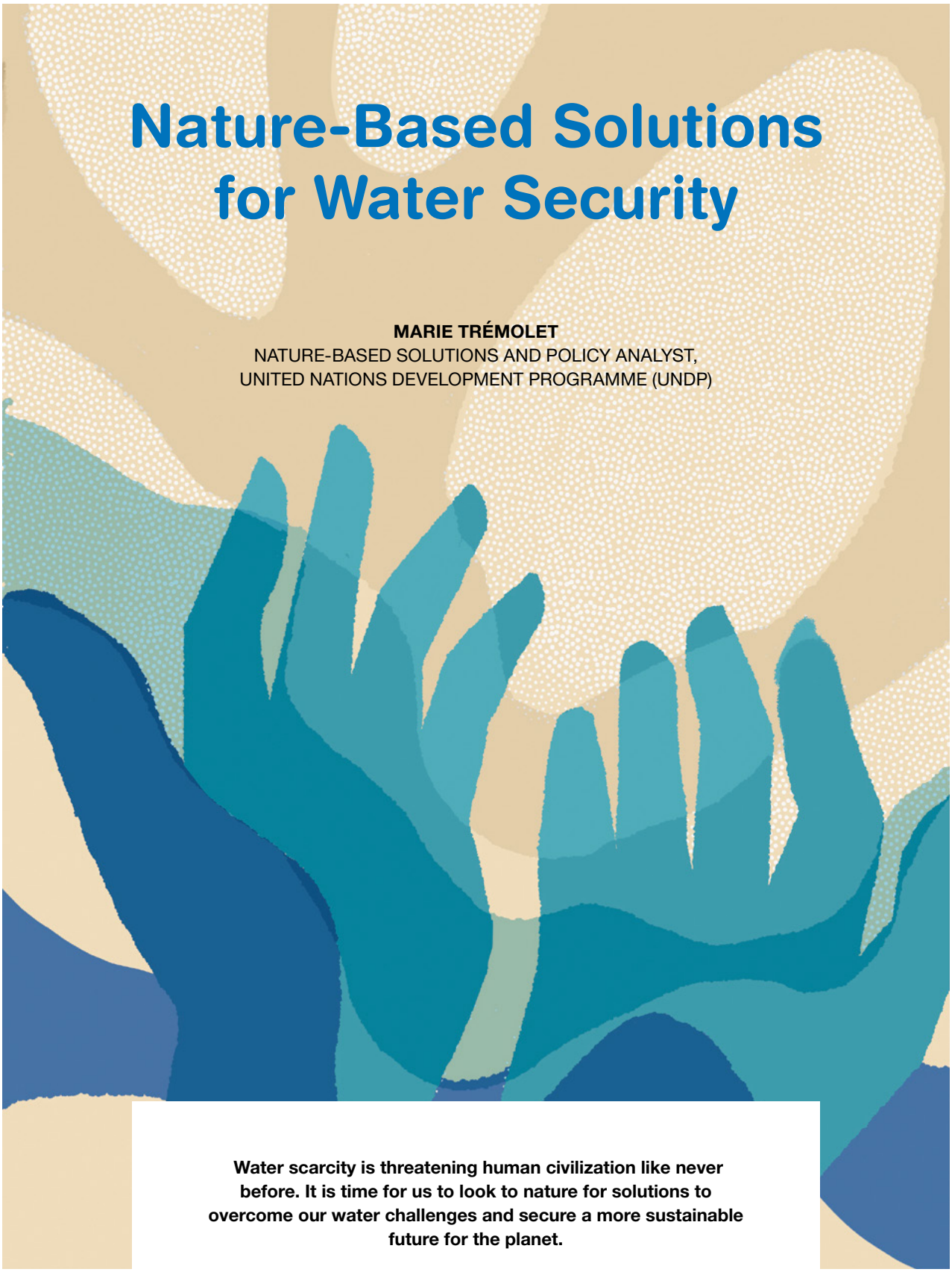
The REVOLVE communication group is about fostering cultures of sustainability. With offices and staff in Barcelona, Beirut, Brussels, Lisbon, and Vienna, we publish an international magazine (ISSN 2033-2912) that compiles the 'best of' from our online content in quarterly issues focusing on water (winter), nature (spring), energy (summer), and transport (autumn) with the circular economy as a recurrent theme. To subscribe, order back issues, or discover all our publications, including our country and industry reports, visit: **www.revolve.media/shop**

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Nature-Based Solutions for Water Security

MARIE TRÉMOLET
NATURE-BASED SOLUTIONS AND POLICY ANALYST,
UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)



Water scarcity is threatening human civilization like never before. It is time for us to look to nature for solutions to overcome our water challenges and secure a more sustainable future for the planet.

Freshwater is the most important resource for human survival and development. It is also a condition for all life on our planet. Yet, while nearly 70% of the Earth's surface is water-covered, only 2.5% is readily available freshwater.

Due to our unsustainable and linear management of water, freshwater scarcity has been increasingly perceived as a global systemic risk over the last few decades. Today, over a quarter of the world's population currently lives in areas with potentially severe water scarcity.

And this is not set to get better. Driven by population growth, economic development and changing consumption patterns, global demand for water is expected to grow by more than 50% by 2050. In addition, climate change is increasing extremes in water availability with more droughts, flooding and soil erosion. Along with the decline in water quality, these impacts will be further exacerbated urban water crises, food insecurity, vulnerability to natural disasters, political instability, and rising tensions – all of which will disproportionately affect the poor and vulnerable.

But there is hope in the horizon. Nature has a vital role to play in securing water resources. Its ecological processes maintain the water cycle, regulate water flow, ensure water quality, and reduce the impacts from natural disasters. Particularly important are wetlands, where our water directly comes from, but also forest, mountain, and grassland ecosystems. Forest protected areas supply drinking water for one-third of the world's largest cities, and over half the mountains in the world have an essential or supportive role in providing water to downstream communities.

Despite the necessary role that nature plays in water services, a large portion of the world's important areas for water security is unprotected, degraded, or converted. Today, nearly half of all drinking water sources are significantly degraded due to human activities.

We must face the fact that the water crisis is deeply intertwined with the nature and climate crises. This triggers vicious feedback loops that compromise our ability to achieve sustainable development.

Fortunately, we have solutions in sight that are proven and cost-effective. Nature-based solutions (NbS) are defined as actions to protect, sustainably manage, and restore natural and modified ecosystems. NbS can enhance water availability and quality while simultaneously reducing water-related risks and generating additional social, economic, and environmental benefits.

For a growing number of governments and companies, investing in water includes natural infrastructure like forests and wetlands. By improving the conditions of water sources, they complement the grey infrastructure to enable more circular and resilient water systems.

Governments around the world have already made bold commitments to protect, restore, and sustainably manage ecosystems – notably through their National Development Plans, their second Nationally Determined Contributions of the UN Framework Convention on Climate Change and their National Biodiversity Strategies and Action Plans of the Convention on Biological Diversity. Also, the new post-2020 Global Biodiversity Framework provides the opportunity to raise our ambition on nature to safeguard its vital services to humanity.

However, the power of nature-based solutions is still largely untapped. There is an urgent need to accelerate the uptake of NbS to deliver on water security and other development goals. The complex nature of the water crisis surely requires a lot more beyond governments committing to implement NbS at country levels. It calls for an all-of-society approach powered by key transformations, starting with an improved collaboration across sectors and countries, and leveraging financing from private and public sources.

Creating an enabling regulatory and legal environment at all levels of governance will be crucial to make water systems fairer and more sustainable. Besides water scarcity, conflicts over access to and use of water resources are directly linked to water governance and land tenure rights. Thus, improved collaboration across sub-national and national entities will be needed to achieve a better sharing of the limited freshwater resources. It is also crucial to emphasize that NbS should only be implemented with the full recognition of the rights of indigenous peoples and local communities (IPLCs), and with the free, prior and informed consent.

Finally, developing and compiling knowledge that documents the effectiveness of natural infrastructure for water is paramount to mainstream NbS. When managing water, engineers and scientists tend to work in silos, excluding social sciences and crucial stakeholders such as IPLCs, who are primarily affected by the changes in water systems. Traditional and place-based knowledge should be considered a significant asset and incorporated into assessments. Considering that IPLCs have long recognized the value of nature for water, NbS can act as a catalyst to include their voices in decision making. It is time for a paradigm shift in the way we consume and manage water – and nature will be our best ally in the movement towards a resilient and inclusive future. ●

The Equator Prize

WRITER: **MARIE TRÉMOLET**

Organized by the Equator Initiative within the United Nations Development Programme, the Equator Prize recognizes and celebrates indigenous peoples and local communities who advance local, innovative, nature-based solutions for tackling biodiversity loss and climate change, and achieving their local development goals. These are just two of the winners of this year's prize.

Enabling Afghanistan's Kishim River Valley to spring back to life

Deep in a remote valley of Afghanistan along the Kishim River, hillsides had been left barren from rampant illegal deforestation, and had given way to soil erosion and destructive landslides that destroyed farmland. Climate change brought more extreme weather, including intensified floods and droughts. The land was left unable to naturally absorb and regulate water, and families struggled to grow adequate food. Starting in 2012, the Rural Green Environment Organization responded through a massive wave of reforestation, planting more than 200,000 trees and vines, and protecting them with forest patrols. An additional 120 kilometers of river-facing slopes also were terraced, increasing water absorption and reducing excessive runoff. Through this effort, the hillsides of the watershed have been stabilized, slowing the flow of rain and snow towards the river, and reducing the likelihood of landslides and floods that once destroyed farmland below. By utilizing the natural ability of reforestation to regulate the water cycle, the Kishim River Valley of Afghanistan has sprung back to life.

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Reawakening water-filtering wetlands along Kenya's Kipsaina River

In the Great Rift Valley of Kenya in sub-Saharan Africa, biologically rich swamps and wetlands surrounding Saiwa National Park once served as a natural sponge and filter by retaining and cleaning water moving through. In their natural state, these wetlands improve water quality, protect communities from floods and droughts, and provide biodiverse habitat. But, following decades of degradation, much of this area was drained and converted to cultivation and livestock grazing land.

The change was so significant that the once healthy river was reduced to a stream and wildlife disappeared. Today, these wetlands are reawakening following 25 years of restoration and conservation education within local communities.

The Kipsaina Crane and Wetlands Conservation Group has inspired many community members to cease cultivation on smallholder plots in favor of establishing community-conserved wetlands. More than 200,000 native trees have been planted, and a 1.5 kilometer continuous wetland now thrives along the Kipsaina River in the place of formerly degraded lands. Leaders also promote organic farming practices that reduce water pollution caused by pesticides and fertilizers. By facilitating alternative livelihood activities such as agroforestry, fish farming, and beekeeping, the Kipsaina Crane and Wetlands Conservation Group provides additional incentive to allow the wetland to do one of its most important natural jobs: conserving water. As a result of this work, these wetlands also support an increasing level of biodiversity. The population of threatened Grey Crowned Cranes has doubled since the wetlands were restored. ●

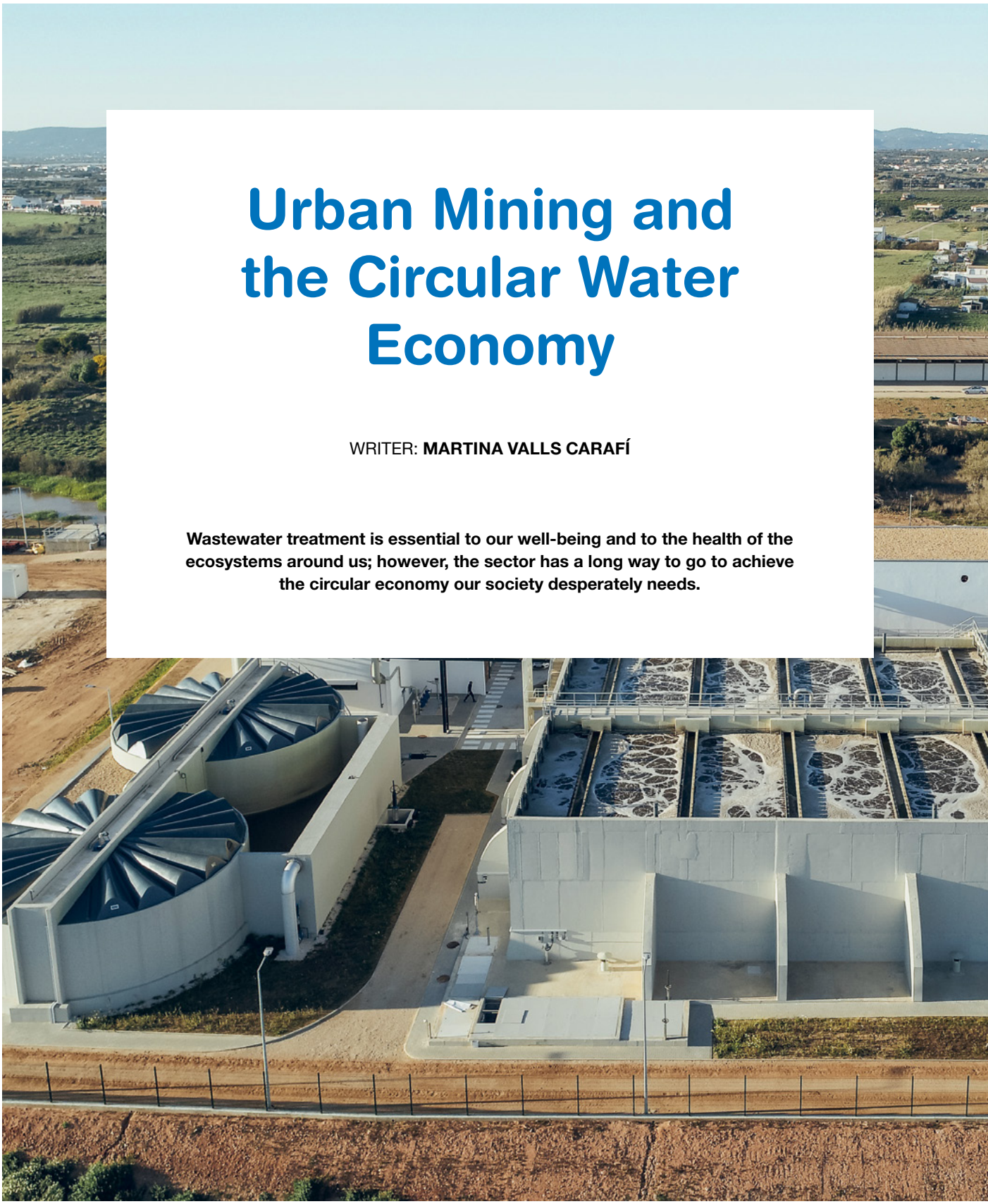
1. Aghanistan's Kishim River Valley. Photo: Rural Green Environment Organization, Equator Initiative.

2. A woman works in the community-conserved wetlands in Kenya. Photo: Utooni Development Organization, Equator Initiative.

Urban Mining and the Circular Water Economy

WRITER: **MARTINA VALLS CARAFÍ**

Wastewater treatment is essential to our well-being and to the health of the ecosystems around us; however, the sector has a long way to go to achieve the circular economy our society desperately needs.



1



According to the United Nations' Sustainable Development Goals, access to clean water and sanitation is a basic human right, and European institutions have played a major role in securing access to safe water across the continent: Today, 97% of households in western-central Europe and 70% of households in southern, south-eastern and eastern Europe are connected to wastewater treatment facilities. However, whilst there has been important progress, existing wastewater treatment plants must be improved to support the achievement of other SDGs such as 'Good health and well-being', 'Responsible consumption and production', and 'Life on Land'. How can we therefore optimize wastewater treatment?

Existing wastewater treatment technologies and wastewater treatment plants still disturb our ecosystems by releasing pollutants into the surrounding natural environment. Furthermore, many of these 'pollutants' have valuable qualities, and if properly extracted and re-used, they can contribute to society and the economy. Urban-mining – the extraction of valuable materials from wastewater through urban waste water treatment – reverses this trend by recovering valuable resources and giving them a second use. After all, this is what circular economy is all about.

The organic matter and nutrients found in wastewater treatment facilities have a direct impact on the surrounding aquatic environment. For example, excess nutrients such as nitrogen and phosphorus flow into nearby rivers, causing plants and algae to overgrow, and making these rivers unsuitable for fish and invertebrates to thrive. Furthermore, as well as polluting surrounding ecosystems, treatment plants consume large amounts of energy. With an estimated 22,558 plants across Europe, wastewater treatment is one of the continent's most expensive public industries, accounting for over 1% of electricity consumption.

Wastewater treatment plants may be facing the 'Tragedy of the Commons'

While wastewater treatment facilities provide benefits for residents by dealing with polluted water, they also unintentionally impact downstream ecosystems that are critical for social and economic development – water's own 'Tragedy of the Commons'.

Introduced in 1968 by the ecologist Garrett Hardin, the concept of the *Tragedy of the Commons* refers to situations in which individuals or groups have unlimited access to a shared resource, which each consumes according to their self-interest, thus leading to a depletion of this resource in the absence of consumption regulations; since the introduction of this concept. Since water consumption has been a prime example. In this context, it makes no sense to have access to a shared resource (water), provide a concrete service (wastewater treatment), and thereafter, deplete this resource which is already having damaging effects on citizens, the economy, or the environment. This is where the modernization of wastewater treatment and the recovery of valuable materials have key roles.

To achieve sustainable water management, we must take one step back, and two steps forward, and urban mining is doing precisely this: identifying materials with economic and environmental value within the wastewater treatment cycle, studying how these value-added resources can be recovered, and creating market opportunities for them, whilst increasing the quality of the water treated.

Sustainability at its core

Work has begun to develop the innovative solutions needed to advance the circular economy in wastewater treatment. One EU-funded project, WATER-MINING, has taken on several case studies in areas where water management is crucial, helping them to mitigate against water-security risk, protect the local environment and be economically viable.

One such case study is taking place in Spain, where improving water management is crucial. Over the past decade, the country has experienced its hottest years on record, and the landscape has become increasingly dry, thus damaging the agriculture sector and increasing the risk of wildfires. The wastewater treatment plant in La Llagosta (Catalonia, Spain) is working to implement new technologies to treat municipal wastewater and boost water reuse in the following years (which is expected to increase from 0% to 68%), reduce energy consumption, and recover phosphorus from the water treated, whose effluent currently flows into the nearby Besós river.

Likewise, with persistent drought, Cyprus has the highest level of water stress in Europe. Tourism is one of

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1. Aerial view of the wastewater treatment plant in Faro, Portugal. Photo: Águas do Algarve

2. Biological Reactor of the Waste water treatment plant in La Llagosta, Spain. Photo: ACSA-Sorigué

3. Methanol Tanks at the Waste water treatment plant in La Llagosta, Spain. Photo: ACSA-Sorigué

the island's main sources of income, but agriculture – the most water-intensive sector in the world – is also significant, thus putting stress on Cyprus's limited water resources. Here, the wastewater treatment plant in Larnaca currently recovers water for agricultural use. However, after treatment this water still has high salinity which reduces soil fertility and affects crop production. Yet here there is also a high concentration of phosphorus that stimulates crop production, something that could ultimately lead to a change in farmers' choices and lead to higher financial returns from their crops.

To face this challenge, WATER-MINING is exploring alternative ways to treat Cyprus's water that provide higher-quality water, whilst extracting the excess salt and phosphorus, and finding alternative uses for these minerals.



Full-scale wastewater treatment

Portugal is connected to both the Mediterranean region and the Atlantic Ocean. Sitting at the division between these two regions makes Portugal a 'climate change hotspot' and increases the country's vulnerability. The wastewater treatment plant in Faro – near Ria Formosa, a protected wetland area – is the first full-scale greenfield Nereda installation treating complete flow in southern Europe. Thanks to this innovative technology, the plant has reduced its carbon footprint by 50%, and expects to have energy savings of between 20 and 30% compared to a traditional treatment system.

The WATER-MINING project intends to further increase the treatment plant's sustainability by extracting raw materials from the treatment process such as nitrogen, phosphorus, energy surplus, and Kaumera biopolymers, which have unique properties including plant grow stimulants, fertilizer coating, fire retardants and glues.

By increasing water availability, wastewater treatment plants have an important role to play in the water cycle, and adopting urban-mining innovations might avoid the *'Tragedy of the Commons'* in water consumption. By providing cleaner water, recovering valuable resources, reducing energy consumption, and enhancing water reuse, optimized wastewater treatment will not only safeguard water access, but will benefit society, the economy, and natural ecosystems.

Scaling up the circular water economy

The emerging circular water economy faces many challenges. Until now, our society and economy have been based on a 'take, make, consume, and waste' logic, but our social and economic environments are changing, and at a macro-level, we are moving from an unsustainable linear model to a sustainable circular model, which requires systemic changes at all levels.

As institutions, organizations, businesses and individuals begin adopting more sustainable habits, new opportunities emerge. Wastewater treatment plants are not an exception, and they can play an important role in building a water-smart economy and society. If wastewater treatment plants become more efficient, they can conserve both water and energy, as well as capture the full value of wastewater – including nutrients and materials – and reincorporate them into the cycle of production and consumption.

The circular water economy in wastewater treatment plants does far more than avoid the 'Tragedy of the Commons' from taking place. By increasing the number of stakeholders engaged in water management, it strengthens global partnerships, and can play a vital part in achieving our shared sustainability goals. ●

4. Secondary Clarifier of the Waste water treatment plant in La Llagosta, Spain. Photo: ACSA-Sorigué



4

water mining

value for society

By 2030, water demand is expected to be two times the sustainable water supply. New sources of water are needed, now.

WATER-MINING is an EU-funded research project that creates water management solutions based on circular economy principles. The project develops innovative methods to extract usable water from seawater and industrial and urban wastewater, whilst recovering valuable resources from the treatment process and improving the energy efficiency of the processes.

Advanced desalination combined with solar energy and waste heat

Energy-efficient nutrient recovery from wastewater

Sustainable techniques for extracting phosphate from wastewater

Production of a valuable bio-based product from the residues of wastewater treatment

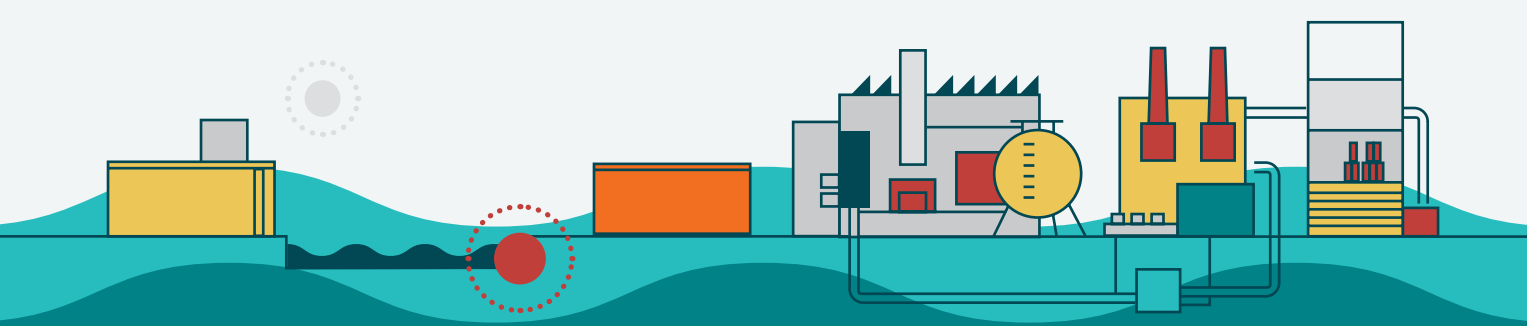
Zero-Liquid-Discharge loop systems for pollution-free wastewater

Circular economy business models within the wastewater cycle

Mobilise private funding through public-private partnerships

Bring circular water systems to public attention and increase awareness

Advance new policy and regulatory measures

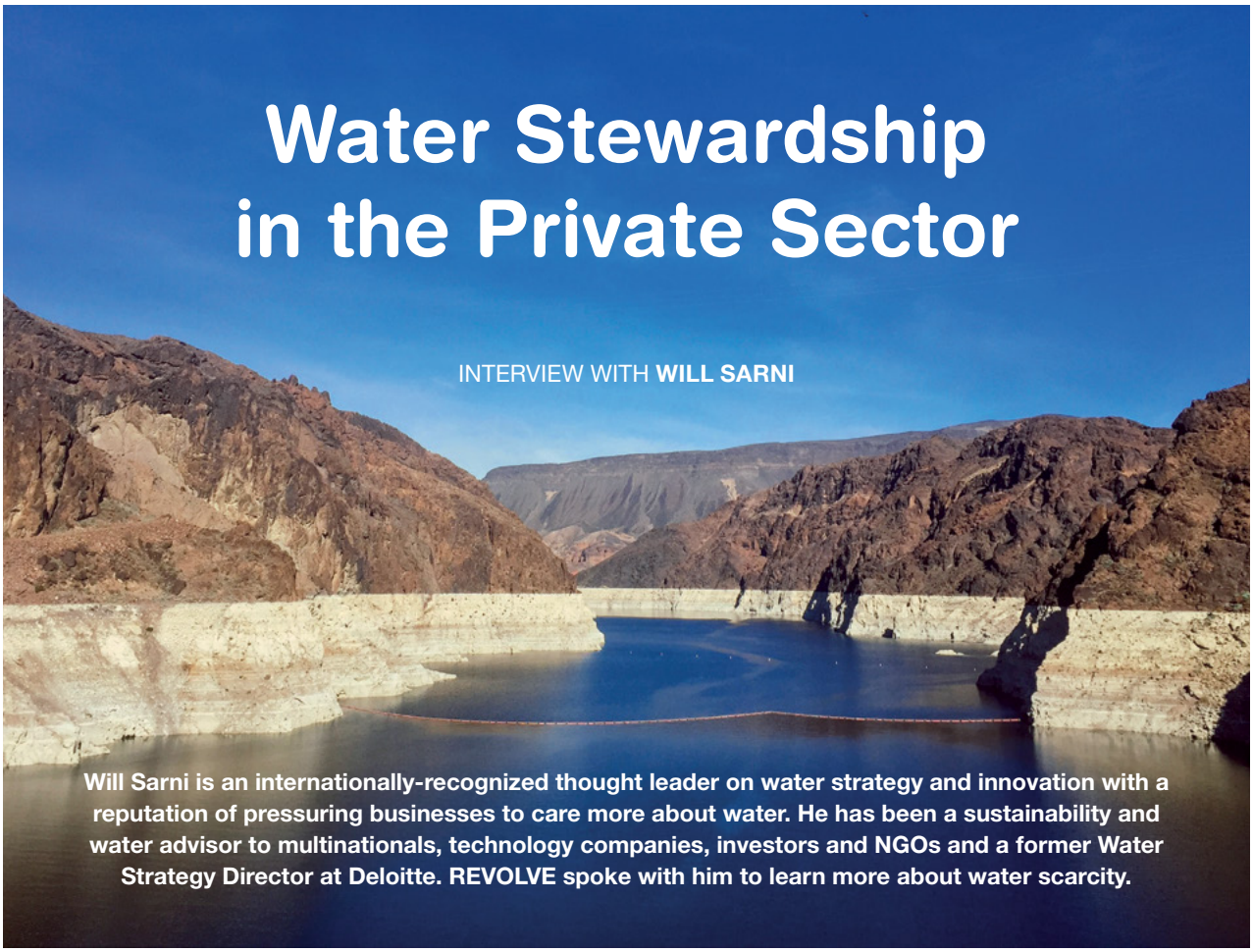


Want to know more?
Visit us at watermining.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 869474.

Water Stewardship in the Private Sector

INTERVIEW WITH **WILL SARNI**



Will Sarni is an internationally-recognized thought leader on water strategy and innovation with a reputation of pressuring businesses to care more about water. He has been a sustainability and water advisor to multinationals, technology companies, investors and NGOs and a former Water Strategy Director at Deloitte. REVOLVE spoke with him to learn more about water scarcity.

1

What are the greatest water stewardship achievements of the private sector?

The greatest progress has been in the private sector moving from water management to water stewardship and for some companies a water strategy (the progression is illustrated below). Companies that have developed and implemented water stewardship strategies have engaged with stakeholders across their value chain to manage water risks and, to the extent feasible, secure a social license to operate. Some companies have built upon their water stewardship strategy and added initiatives in innovation – technology, new products and services, investment, and partnerships (e.g. ABInBev and PepsiCo).

What are the biggest water stewardship failings of the private sector?

The opportunities for the private sector in addressing water risks and having a positive impact on solving 'wicked water problems' include engaging with a broader group of stakeholders (such as entrepreneurs and investors) to tap into their unique attributes such as speed and focus.

In addition, the private sector has primarily been focused on water footprint strategies (think: volumetric goals) instead of a 'handprint' strategy that quantifies the impact of the company's activities in products, services and workforce. My view is that while footprint strategies have some value, they ignore the greater value a company delivers through leveraging what they do best. The private sector can also be bogged down by engagement with too many pledges, commitments, and organizations. Perhaps doing few things better and at scale would move us closer to solving these water problems.

1. Colorado River Basin. Photo: Ricardo Frantz

You have a particular interest in the south-west USA where you founded the Colorado River Basin Fund for innovative water technologies to address the basin's serious water scarcity. Apart from climate change, what are the most important factors contributing to the region's water scarcity?

There are three primary factors driving water scarcity in the Colorado River Basin and the American West: Outdated public policy, overallocation of water resources, and aging and underfunded infrastructure. These factors are exacerbated by the impacts of climate change. It is essentially the status quo colliding with the reality of climate change.

The Colorado River Compact of 1922 is the key law that defines the 'Law of the River' for the watershed. At the time the Compact was negotiated by the seven Colorado River Basin states and the federal government it was an exceptionally wet period. As a result, allocations were made during a period not reflecting actual average precipitation and availability of surface water. In hindsight there was a greater allocation of water than availability within the upper and lower basins of the Colorado. Moreover, public policies and regulations have not kept pace with the reality of rapid population growth and urbanization within the region. Cities such as Denver, Salt Lake City and Phoenix have grown rapidly since 1922 and increased demand for scarce surface water supplies. The decrease in available surface water has led to increased pumping of groundwater, further straining available water resources within the region.

The existing water infrastructure is aging and underfunded, which makes it ill-equipped to deal with population growth, declining precipitation within the region and the impacts of climate change. What is needed is vastly increased investment in the right water infrastructure which is more sustainable and resilient (think: smart precision agriculture, decentralized treatment systems and water reuse).

The American West is also experiencing aridification, which is a long-term shift to a dryer climate with significant implications in vastly reduced surface water supplies. We need to stop referring to this as a drought – the layperson interprets a drought as short-term with less urgency and therefore sees no need to change behavior.

Given that reducing GHG emissions cannot have immediate impact, what are the most urgent actions required to alleviate the Colorado water crisis?

The priorities to address current water scarcity within the watershed and the need for a more sustainable and resilient water infrastructure are:

- Changes in public policies to mandate water reuse and conservation;
- Increased funding of innovative water technologies and commercialization;
- Investment in smart precision agriculture including things like drought tolerant crops and precision irrigation

The view that the current conditions are a 'drought' and not a long term aridification of the region jeopardizes economic development, business growth, social well-being (access to safe drinking water) and ecosystem health.

What is your message to water stewards around the world?

There is much discussion on what needs to change to address water scarcity, poor quality, lack of access to safe drinking water and the impacts of climate change like extreme weather events and flooding. We must start by improving how we engage with civil society on the value of water. Water services come at a cost, and the notion that water should be inexpensive masks the real cost of infrastructure to deliver access to safe drinking water, protect ecosystems, support business growth and economic development. We can ensure the human right to water while also adopting policies that value water through market mechanisms such as proper pricing to drive conservation and reuse. Finally, we should view water as an opportunity for collaboration and not conflict – water is the 'glue in humanity.' Virtually every one of us needs it and cannot live without.



Technology Solutions Empowering Agency in Food Production

1

WRITERS: **MERIEM SAOUD & HAMDI HATO**

Smart water management is key to sustainable, fair food production across the globe. This is only emphasized in vulnerable communities in high risk areas where access to food is restricted due to both the climate, and lack of agency. Addressing this challenge, technology developed in Palestine could provide one of the solutions.

The Intergovernmental Panel on Climate Change's (IPCC) 2021 report is a code red for humanity. Droughts, deforestation and other climate change phenomena are expected to occur more often in many parts of the globe, threatening people's steady access to water, food, and other essential survival materials.

This is even more prevalent in the Middle East, where the need for water preservation is of high importance. The future of sustainable and consistent water supply in the region is highly questionable, due to climate change, rising temperatures, and the persistent drought the region has been witnessing. Some countries experiencing a decrease in rainfall, such as Jordan and Iraq, resorted to pumping enormous amounts of water from the ground for irrigation with the purpose of improving their food self-sufficiency.

Food sustainability is extremely important, as the FAO estimates that food production will need to increase by 70% by 2050 in order to meet the needs of the world's growing population that is expected to surpass 9 billion in the next 30 years. Using the most effective techniques in agriculture to secure food and preserve water are therefore essential to maximise the efficiency of our resources.

So how can this be achieved?

Palestine's food challenge

Perhaps answers can be found in Palestine. With the fast population growth, high density of people, and economic deterioration that Palestine witnessed in the past 43 years, agricultural systems have been subject to many changes. This has posed challenges to Palestine's ability to secure food for its population.

One of the major obstacles facing the agricultural sector in Palestine is the continuous confiscation of land by Israel. Palestinians, for example, do not have the right to work in Area C, which makes up 61% of the West Bank, according to Ma'an Development Center. Moreover, many Palestinian farmers are prevented from accessing and cultivating their lands, which lie behind the Separation Wall constructed by Israel. The wall annexed 10% of the total area of the West Bank, including its most arable lands. In addition, the Israeli army also controls 85% of Palestine's water resources. With this situation, a different approach to traditional farming methods is needed.

Rooftop gardens

Due to a lack of space for farming, Sara, a pregnant 35-year-old lady from Al-Am'ari camp in West Bank, Palestine, uses a rooftop garden to grow her own food at home. The garden was donated through a start-up program in a collaboration between the Al-Amari Camp Program Center and Babil.bot, a start-up working with the camp to pilot new technology to better manage water resources and increase agency in food production.

Her experience with the garden has been very beneficial, as she now has consistent and sustainable access to food that is grown in her own home. The self-sufficiency provided by the garden has allowed her to be independent in a region where food insecurity affects over more than one in five people.

What helped Sara sustain her rooftop garden was Babil.bot, a scalable, automated, precision irrigation machine, created by Hamdi Hato, an environmental specialist and entrepreneur.

The innovative solution aims at decentralizing food production and creating fairer access to the most vulnerable members of society. By making the option to grow your own food accessible, home rooftop gardens will help to decentralize food production, giving the power of food back to the people. Food production practices, availability, and prices will no longer be determined by the food producers, the government, or the economy.

1. Photo: Elias Halabi

2. Remains of a bombed well lie by bulldozed farmland in the Israel-imposed "buffer zone" east of the Palestinian Gaza Strip's Maghazi refugee camp. Photo: Joe Catron

2





3

Decentralizing food production

Babil.bot consists both of software and hardware. It allows its users to control the lifecycle of their plants, how much water they need, and specify the right temperatures at the right timing using a dashboard.

The machine is controlled using software, its main benefit. "By using the hardware to take extensive data measurements, the software can create data maps," explains Hamdi. "These maps can be used to show where modification is needed, where to water more, or less, and what the temperature and pH of the soil is. It will be easier to learn and analyze more with such extensive data."

Using the data gathered allows the user of Babil.bot to make better decisions for plant placement in the future. In fact, both the hardware and software are designed to be scalable, simple, and hackable – meaning that new features can be added to the program, as well as the ability to adapt it to the user.

Initially designed to aid women in Palestinian camps to grow their food at home, this technology was essential due to the food scarcity and the water shortages many camps struggle with. This also makes this technology applicable to many different situations. Not just for farmers, the software can be used in houses or apartments in different temperatures and locations.

Enabling better decision-making

With more people growing food in smaller operations, food production will be partially decentralized and localized. This will make each community and even household more independent and resilient to crop failures and other large-scale disasters. It will give more people access to fresher food and provide greater abundance for all. In addition, it will save on shipping costs and infrastructure requirements.

3. Innovative solutions make it possible to cultivate vegetables without having access to agricultural land and with limited water resources. Crops are cultivated on the balconies, terraces and in the courtyards, and special attention is paid to optimal watering methods. Photo: Elias Halabi

Droughts, deforestation and other climate change phenomena are expected to occur more often in many parts of the globe, threatening people's steady access to water, food, and other essential survival materials.

Self-sufficient ecosystems

The solution also aims at creating self-sufficient ecosystems for the most vulnerable. The use of Babil.bot should sustain the needs of one household, whether through increased food security should the food be consumed at home, or through income generation, if they sell their produce.

Babil.bot is a solution that uses the most efficient irrigation methods with 95-100% water use efficiency, compared to sprinkler irrigation systems that only have 80 to 85% water use efficiency, as well as flood and furrow, which are 60 to 70% water-use efficient.

Women empowerment

Given that an estimated 40% of rural Palestinian women are carrying out unpaid work, food insecurity is even more prevalent among women in the region.

This initiative is working to alleviate this. One aspect of these attempts is placing women empowerment at it's core. 67 women at Al Am'ari camp in West Bank were given intensive theoretical and practical training on the techniques of planting rooftops and using Babil.bot.

"The technology embedded in the machine with its great irrigation system has helped me better take care of my plants, which used to easily die before. All I need to do is set it up and it takes care of the rest, which I personally used to do before manually," said Tasnim, one of the attendees of the training.

A sustainable future

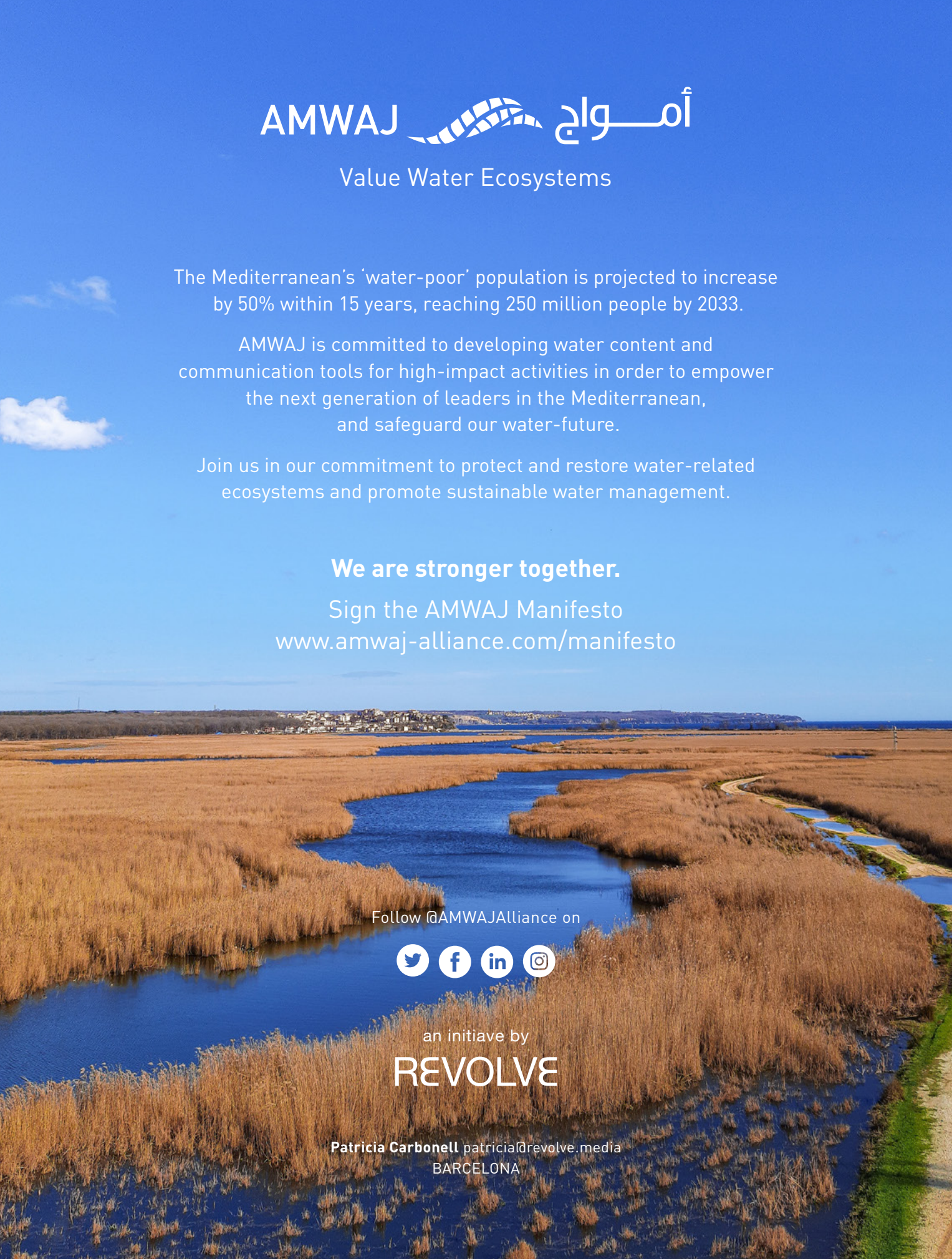
Access to food and water is already severely limited to much of the world's population. 1 in 3 people don't have access to safe, clean drinking water, with 1 in 9 not getting enough food. Climate change will increase these numbers, but the problem already exists. Investment in technologies that can alleviate the strain on our water resources is essential, not only to keep our population fed and watered but also prevent the politicization of food access.

40% of Palestinians face food insecurity, compared with 10% of Americans, according the Economic Research Service. Without more innovative solutions to the growing lack of space and resources, these numbers will continue to escalate.

Decentralizing food production is key, but is also just the beginning of the process of placing fair access to food back in the hands of the many, not the few.

4. Innovative solutions make it possible to cultivate vegetables without having access to agricultural land and with limited water resources. Crops are cultivated on the balconies, terraces and in the courtyards, and special attention is paid to optimal watering methods. Photo: Elias Halabi




AMWAJ أمـــواج
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BARCELONA

Forests: A Nature-Based Solution for Sustainable Cities

WRITER: **JONATHAN BALLANTINE**

As the world becomes increasingly urban, cities are looking towards forests as a cost-effective nature-based solution to address numerous societal and environmental challenges.





Cities today have become the engines of growth and prosperity around the world and account for more than 80% of global GDP. But this urban-fueled progress has negative impacts on public health and social equity and is leading to the degradation of vital ecosystem services that cities and their residents depend on. Urbanization, in its current form, is not sustainable, inclusive, nor healthy, and, working in conjunction with megatrends such as climate change and resource scarcity, it threatens the future livability of cities.

To counter these trends and future-proof their cities, city leaders must balance economic progress with social and environmental protection. Nature-based solutions — such as trees, forests, and green areas — are increasingly being recognized as key for balancing social, economic, and environmental development by generating essential ecosystem services, such as mitigating carbon emissions, improving air quality, regulating temperatures, and providing recreational areas that promote social cohesion and well-being. Nature-based solutions have been embraced by many leading institutions such as the World Bank, the European Commission, the United Nations, the International Union for Conservation of Nature, and the World Resources Institute.

As a nature-based solution, forests — which includes everything from street trees to woodlands to faraway tropical forests — provide city leaders with a low-tech, high-impact solution that can contribute to sustainable urban development. Cities and forests may seem like unlikely allies, but their futures are becoming increasingly interlinked across various scales, from those in and nearby cities, to faraway tropical forests.

1. Inner, nearby and faraway forests.
Photos: Chris Turgeon (left), Gus Ruballo (middle), Karl Anderson (right)



1

Taking inner forests to the next level

Many cities around the world have started to consider how inner forests can be used to address social and environmental challenges and have put the protection, expansion, and growth of urban tree canopy at the center of their master plans. By providing cities with essential ecosystem services, urban forests are a cost-effective, nature-based solution for tackling multiple urban challenges and play a vital role in transforming cities into more sustainable, resilient, and healthier places to live. Here´s a look at three cities that are taking inner-city forests to the next level:

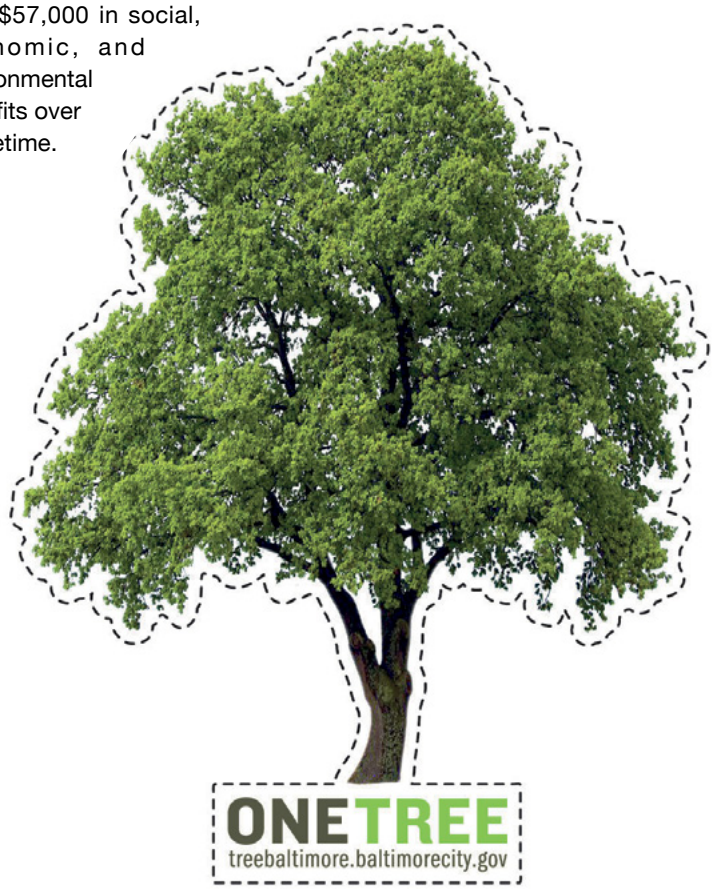
Baltimore, United States

Baltimore has become a surprise role model for urban forests programs in the United States and beyond. According to the U.S. Forest Service, American cities are losing trees, approximately 36 million trees per year. But not in Baltimore, where its urban forest is growing by 5,000 trees a year.

Following a city-wide assessment in 2007 that showed a lack of urban tree canopy cover in Baltimore, TreeBaltimore was launched as a mayoral initiative charged with the goal of increasing urban tree canopy from 27% to 40% by 2037.

Operating as an umbrella organization, TreeBaltimore brings together city agencies, non-profits, private companies, and citizens to create an urban forest community.

The city of Baltimore also pioneered a technological breakthrough that has enabled cities to better understand the benefits of urban tree canopy coverage. In 2006, the U.S. Forest Service and the University of Vermont created a new type of land cover map in Baltimore that allowed forest maps to be synchronized with other urban data. This breakthrough has enabled the city of Baltimore to understand and quantify the ecosystem benefits of urban forestry programs in monetary terms. It is estimated that a single tree in Baltimore can provide $57,000 in social, economic, and environmental benefits over its lifetime.





2

2. With the slogan “One tree can make a difference, where will you plant yours?", the TreeBaltimore campaign is a call to action for residents to plant and care for a tree. Photos: TreeBaltimore

3. Milan's current tree canopy cover (top) and its potential (bottom). Images: ForestaMi

Hyderabad, India

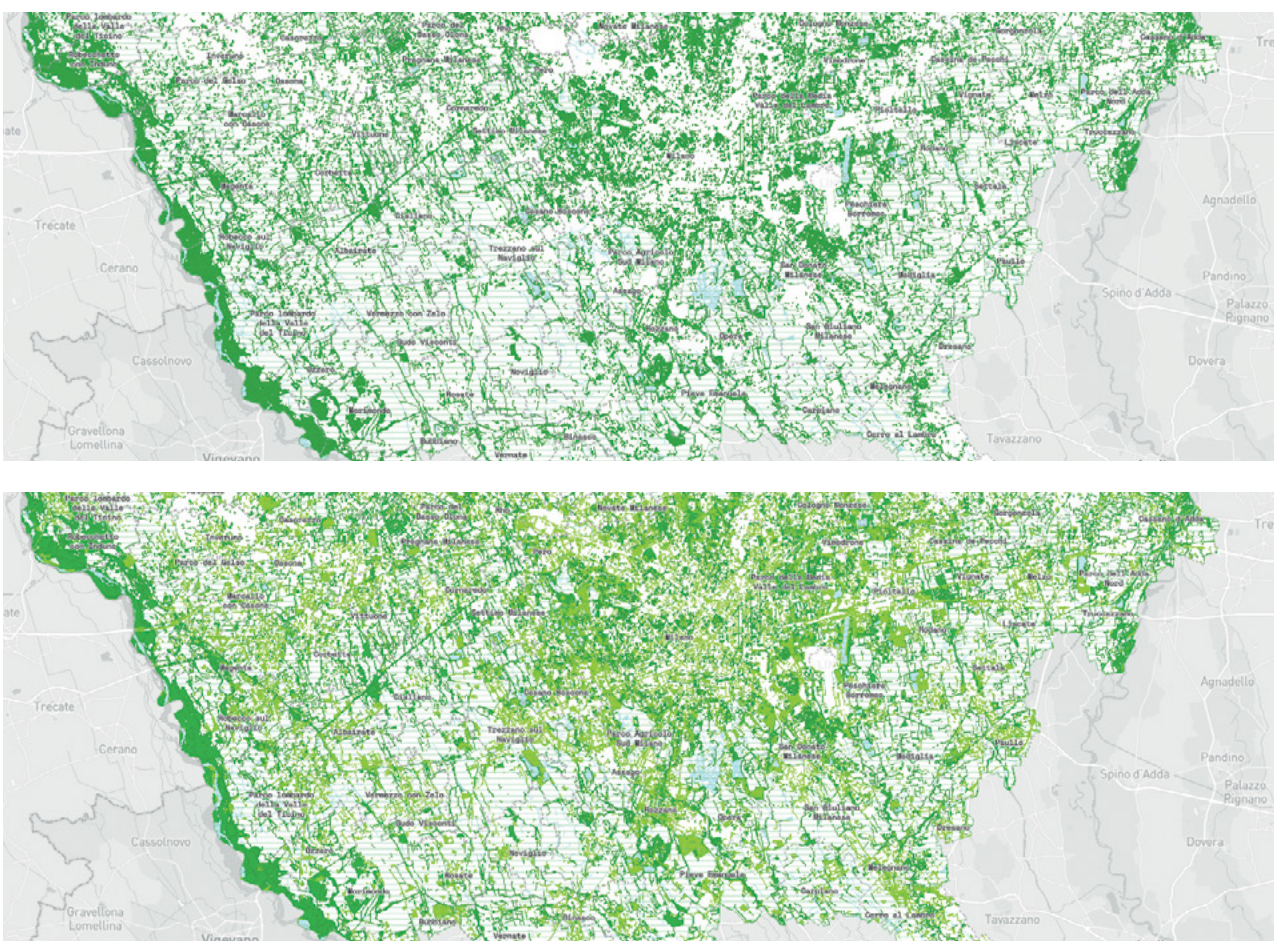
In recognition of its commitment to growing and maintaining its urban forest, Hyderabad was selected by the Arbor Day Foundation as a "Tree City of the World" in 2021. It is the only city in India with this status. According to the Greater Hyderabad Municipal Corporation, the civic body that oversees Hyderabad, this is a testament to the city's "sustained and institutional efforts to plant, nurture, and celebrate trees".

Hyderabad's forests are maintained by the city's Telanganaku Haritha Haram program which aims to develop the city's forest blocks into urban forest parks. The State of Telangana, where Hyderabad is located, plans to develop 129 forest blocks into urban forest parks, covering an area of 150,000 acres within the Hyderabad Metropolitan Development Authority territory.

Milan, Italy

In 2019, the city of Milan launched an ambitious plan to plant three million trees by 2030 as part of a strategy to green the city and address the climate crisis at the local level. The ForestaMi project aims to plant these trees within the metropolitan area to reduce the urban heat island effect, improve air quality and enhance green areas.

A combination of geographical features, high car ownership and a lack of tree canopy coverage contribute to Milan having one of the highest levels of air pollution in Europe, almost double the recommended maximum limit. A key feature of the project is citizen participation, which has been unexpectedly high, which can be attributed in part to the global pandemic, which significantly impacted the Lombardy region. Preliminary studies have shown a positive correlation between COVID-19 and air pollution, making the case for improving the city's air quality all the more important. The ForestaMi project, inspired by Italian architect Stefano Boeri (Bosco Verticale), is a major step towards creating a greener and healthier city for its residents.



3

Developing relationships with nearby forests

Nearby forests underpin the existence of many of the world's cities by filtering water, increasing resilience to flooding and improving air quality. From greenbelts hugging the outskirts of cities to forests located in the cities' watersheds, nearby forests play an invaluable role in supporting urban life. But despite their importance, nearby forests are often threatened by development needs, such as energy production, urban expansion, agriculture, and timber harvesting. Here´s a look at three cities that are looking to improve their relationships with nearby forests:

Greater Manchester, United Kingdom

Greater Manchester has always been committed to bringing communities and organizations together to make the city's spaces greener and more climate-resilient. Building on this commitment, the Greater Manchester Combined Authority hopes to set a precedent and highlight the shared responsibility of developing city-forest relationships by transforming a former industrial site on the outskirts of the city into an amazing forest for its residents.

The City Forest Park project brings together over 330 hectares of key green spaces and woods to create a natural space for recreation, culture, wildlife, and well-being. The site is environmentally diverse and is home to 250,000 trees and varied habitats including woodland, meadow heath, and wetland, and incorporates nearly 60 hectares of designated biodiversity sites.

New York City, United States

New York City (NYC) is engaging with forest-based solutions to reduce carbon emissions and to increase its resilience to the effects of climate change. It has been a leader in public urban green spaces for over a century, but especially in the last decade, with its comprehensive restoration, planting, and preservation programs.

NYC also depends on a large, forested watershed outside its city boundaries to supply its fresh drinking water. This protected forest is the result of generations of planning, conservation, and political leadership by the city. Maintaining, enriching, and expanding these forest areas is a current priority for numerous reasons including, improved human wellbeing, ambitious environmental goals, greater infrastructure efficiency, resilience planning, water resources, and social equity for its diverse neighborhoods.

4. Tree planting activity in the Greater Manchester area. Photo: City of Trees

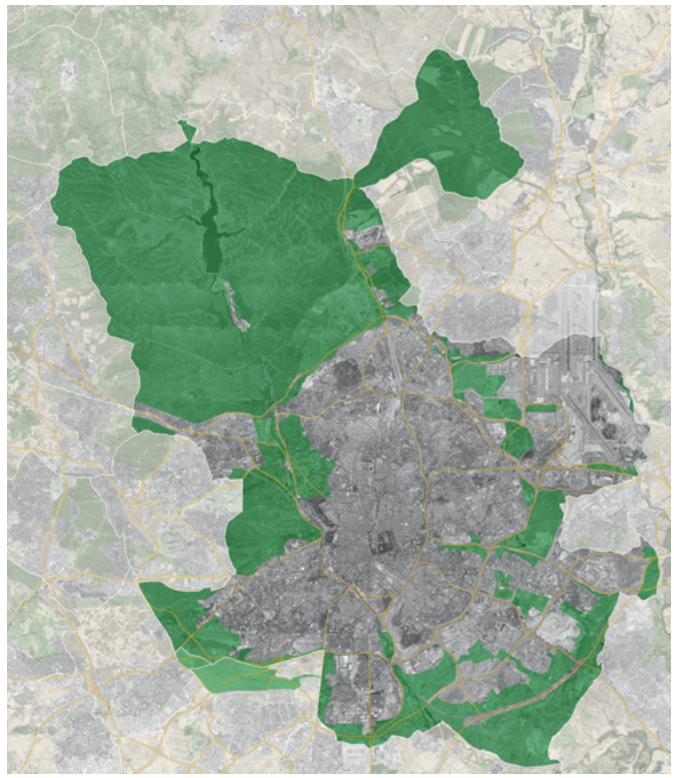
5. Map of New York City Water Supply System. Image: NYC gov.

6. Map of El Bosque Metropolitano. Image: Ayuntamiento de Madrid





5



6

Madrid, Spain

To address climate change, air quality and the urban heat island effect, the city of Madrid is building a 75-kilometer green belt around the metropolitan area. El Bosque Metropolitano is one of the most ambitious projects launched in Madrid and will connect existing parks, forests, wetlands, and other ecosystems. At a cost of €77 million, the project will be divided into five parts and will take around 12 years to be completed.

During the project nearly half a million trees will be planted, most of them indigenous to the region, and it is estimated that the green belt will absorb 175,000 tons of CO_2 per year, improve air quality, and provide much-needed natural cooling during the summer months. El Bosque Metropolitano will also increase green areas, notably in the southern part of the city which have been currently lacking.

Stewards of faraway tropical forests

Faraway tropical forests are vital ecosystems for supporting life on earth. These forests include some of the world's most iconic ecosystems, from central Africa and southeast Asia to the Amazon basin, they sequester vast amounts of carbon from the atmosphere, influence precipitation patterns, and are centers of biodiversity. Despite the vital ecosystem services these forests provide, their very existence is under constant threat from deforestation and forest degradation. According to an analysis carried out by the publication Nature, over 15 billion trees are cut down every year, and the percentage of trees felled since the start of human civilization is 46%.

The threat of climate change is now becoming real and present. Globally we are witnessing an increasing number of climate disasters, ranging from wildfires to storms to droughts. According to the National Oceanic and Atmospheric Administration, the US sustained 22 weather and climate disasters in 2020 where damages exceeded $1 billion. Healthy forests can play a vital role in stabilizing the climate through the absorption of carbon emissions, where it is estimated they could contribute to achieving more than one-third of the Paris Agreement targets. To realize this climate benefit requires halting deforestation at scale and the promotion of forest restoration. With UN projections estimating that nearly 70% of the world's population will be living in urban areas by 2050, it is the responsibility of city leaders and residents to understand their interdependence on the health of faraway tropical forests and support conservation and restoration efforts.

The next decade is seen as being critical for limiting global temperature increase to below 1.5 degrees, and as

world leaders travel around the globe to debate the scale of ambition and time-frame for carbon reductions, the great forests of the world are bei ng felled and degraded. In July, the Guardian published an article stating that the "Amazon rainforest is now emitting more CO_2 than it absorbs". When the world's biggest carbon sink becomes a source of carbon emissions, surely it is time to act…

Hundreds of cities around the world have acted by supporting the protection and expansion of inner and nearby forests. At the local level, these actions are to be applauded and will help them to better cope with the effects of climate change, but at the global level, they are not sufficient for addressing a major contributor of climate change: deforestation and forest degradation. By becoming stewards of faraway tropical forests, cities across the world can play a vital role in the protection and expansion of natural carbon capture and storage technologies that will help to stabilize the climate and secure a better world for all of humanity.

Investing in forests to build back better

As global economies work to bounce back from the global pandemic there is a unique opportunity to direct recovery spending towards green initiatives in order to build back better. Embracing natural systems such as trees, forests and/or green areas can provide cities with cost-effective solutions for addressing multiple urban challenges.

Many cities across the world are beginning to recognize that the livability of their city is dependent on the health of forests. In 2018, Cities4Forests, was launched to help cities better support forests, both within and beyond their urban boundaries. Today, Cities4Forests has more than 70 members who are committed to protecting, restoring, and investing in forests.

The initiative helps cities to better conserve, manage and restore forests across multiple scales by providing technical assistance, capacity building, and facilitating financial investment. Visit Cities4Forests to learn more about what these cities are doing and how you can get involved.

As a nature-based solution, forests — which includes everything from street trees to woodlands to faraway tropical forests — provide city leaders with a low-tech, high-impact solution that can contribute to sustainable urban development.

Cities4Forests

WE CONNECT CITIES WITH FORESTS FOR A HEALTHIER WORLD

Every city, and our collective future, depends on healthy forests around the world. It is time for cities and their residents to join the global effort to conserve and restore forests — inside and outside city boundaries.

Barcelona x Cities4Forests

The Metropolitan Area of Barcelona seeks to reinforce the interconnection of the spaces that make up the green infrastructure, permeating the urban fabric, guaranteeing biodiversity and the functioning of ecological processes, maximizing the ecosystem services offered by these spaces.

www.cities4forests.com | #Cities4Forests



Cities4Forests is an initiative by Pilot Projects, REVOLVE and the World Resources Institute (WRI)

Photo: Dimitry Anikin

The Water Framework Directive: Europe's Environmental Success Story?

INTERVIEW WITH **CLAIRE BAFFERT**

The Water Framework Directive (WFD) is widely considered one of the most important and successful examples of environmental legislation from the EU. We sat down with Claire Baffert, Senior Water Policy Advisor at WWF to learn more.

Other regions in the world look to the WFD as a suitable model for managing the complexities of equitable water management in a multinational and multicultural region. What do you see as the WFD's principal successes?

The WFD has set very high and comprehensive standards for water management in Europe. It has translated into legislation the central idea that we must protect and restore our freshwater ecosystems in order to secure a sufficient supply of good quality water for humans and nature. To me the first recital of the directive is very telling: "Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such."

Water legislation was previously fragmented into several sectoral policies. The WFD gathers all parts of water management into one directive. It requires the protection and restoration, not only of our rivers, streams and lakes, but also of our wetlands, coastal waters, and groundwaters, to ensure no deterioration, and to ultimately bring those waters into "good status" (as defined in ecological, chemical and quantitative terms).

By setting those objectives and putting together a framework to measure progress against them, it gives water managers across Europe a common language and reference. With the introduction of river basin districts which extend beyond administrative or political boundaries, it also creates a governance system that puts water first and encourages cooperation with multiple stakeholders, sometimes across international borders.

What are the main areas where the WFD has not achieved or is not achieving its ambitions?

The WFD was adopted back in 2000 setting the objective to bring all waters back to "good status" initially by 2015. This deadline was later postponed to 2027. Twenty years after the WFD's adoption, we are still far from reaching this objective. Only 40% of surface waters (rivers, lakes, etc.) are in good status. We are progressing far too slowly. In particular,

the European Environment Agency (EEA) notes there has been limited change in the ecological status of rivers and lakes since river basin authorities started to report on their status.

In October 2021, WWF, together with NGO partners, released an analysis of draft River Basin Management Plans – six-year plans prepared by river basin authorities and outlining their 'Programme of Measures' at basin level - for the period 2022 to 2027. We learned that 90% of the 21 river basins studied in various EU countries will still be unhealthy by 2027, unless the final plans are significantly improved compared to their draft versions.

The main pressures are hydromorphological – affecting the flow and shape of water courses – mainly due to man-made infrastructure such as river barriers (dams, weirs, dikes, etc.), pressures from hydropower and pressures from inland navigation. Also of primary concern are pollution pressures, including point source pollution, diffuse source pollution, mainly from agriculture, and pollution pressures from mining; as well as abstractions and water scarcity.

Are the failings mainly due to weaknesses in the legislation or in Member States failing to sufficiently comply with the requirements and spirit of the legislation?

A major issue is indeed the fact that Member States are not properly implementing the Water Framework Directive. In particular, not enough is being done to prevent harmful infrastructure from being built, to address illegal water abstraction, and to significantly tackle pollution from agriculture. As an example, according to the draft Polish Odra River Basin Management Plan for 2022-2027, 29% of the basin's water bodies have deteriorated since 2015, and one third of the previous Programme of Measures has not been implemented because of inadequate funding.

A sign of this insufficient implementation is the overuse of exemptions, which allow, in certain conditions (overriding public interest, disproportionate costs, etc.), to derogate from the achievement of the WFD objectives. While those exemptions were foreseen in the law to account for exceptional circumstances, they cover around half of Europe's water bodies. This shows a lack of political will to take water protection and the WFD's environmental objectives for Europe's waters seriously.

Another sign is the insufficient financial budgets dedicated to water management. This is caused by the failure to recover environmental and resource costs from strong economic sectors including energy, mining, agriculture, and navigation. Financial support for the implementation of measures needs to be mobilized from all available funding sources.

1. View of Elbe River, Switzerland. Photo: Sangga Rima Roman Selia

1





Pathways
FOR SUSTAINABLE FOOD

Pathways for transitions to sustainability in livestock husbandry and food systems

With the aim of reducing environmental impacts while addressing societal demands for safe, nutritious and affordable meat and dairy products, PATHWAYS is about identifying and increasing sustainable practices along the supply and production chains of the European livestock sector.

pathways-project.com

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 101000395.

VIEWS

Bruised Lands

PHOTOGRAPHY BY **ALAN GIGNOUX**
WORDS BY **JENNY CHRISTENSSON**

***Bruised Lands* brings together four unique yet interconnected bodies of work by documentary photographer Alan Gignoux: *Oil Sands, Monuments, Appalachia,* and *Russian Rust Belt.* Focusing on four locations across Canada, Europe, the US, and Russia, the photographic series document the harvesting of natural resources, and the impact these processes are having on the surrounding environment.**

Alan Gignoux has been investigating and documenting the impacts of fossil fuels extraction and metals mining and refining on local communities for the past ten years. His photographs record the way in which local landscapes have been permanently altered to make way for mining, scarred by the infrastructure of the mining industry, and poisoned by pollution of the air, soil, and water.

To avoid the catastrophic effects of global warming, all nations will need to work towards a low carbon future by drastically reducing their dependence on fossil fuels and protecting and restoring nature on an unprecedented scale. The window within which we have the possibility of averting climate disaster is closing and we are at a critical moment on which the future of the planet depends. In the words of one of Gignoux's interviewees, Mike Hudema at Greenpeace in Canada: "The stakes could not be higher in this battle."

↑ Mountaintops to Moonscapes

Mountaintop Removal Mining, Wise County, Virginia, 2012

The mountaintop removal mining process used for coal extraction in the Appalachian region has been described as "strip mining on steroids." With this process, each mountain is cleared of all vegetation and explosives are used to take as much as 800 feet off the top of the mountain to expose the coal seams beneath.

↓ Mountaintops to Moonscapes

Mountaintop Removal Mining, Wise County, Virginia, 2012







↓ Oil Sands

Andy Labrecque, Peace River, Alberta, Canada, 2012

Andy Labreque was a resident of the Three Creeks community in Peace River, Alberta. After the development of a CHOPS (Cold Heavy Oil Production with Sand) mining facility in the area, he and his neighbours suffered from a variety of symptoms, such as headaches, nausea, dizziness and aches and pains, which they suspected were caused by toxic emissions. After years of complaints to the mine operator Baytex, he joined a class action against the company, received compensation and moved away from the area.





↑ Mountaintops to Moonscapes

Wise County, Virginia, 2012. Activist Jan Branham works with the Southern Appalachian Mountain Stewards to lobby against mountaintop removal mining.

Tailings Dam Embankment, Fort McMurray, Alberta, Canada, 2010. The by-products of oil sands extraction and refining are stored in tailings ponds that contain toxic heavy metals and hydrocarbons that threaten wildlife and contaminate groundwater.

↓ Oil Sands





↑ Monuments

Condemned House, Old Morschenich, North-Rhine Westphalia, 2019. The Hambach mine once threatened the village of Old Morschenich. Demolition of the village has been halted because of the government's coal reduction plans. However, it is too late to save people's homes.

Felled Trees, Fort McMurray, Alberta, Canada, 2014. The oil sands around Fort McMurray in Northern Alberta include shallow bitumen deposits that are extracted using surface mining techniques that require the felling of large tracts of boreal forest.

↓ Oil Sands







↓ Monuments

Garzweiler Surface Mine, North-Rhine, Westphalia, Germany, 2019

The Garzweiler II mine is a vast 48km2 open pit mine operated by energy company RWE and used for mining lignite, the dirtiest grade of coal. Digging began in 2006 with plans to displace up to a dozen communities and thousands of residents. Garzweiler I preceded this mine and grew to 66km2 before excavations ceased.





↑ Russian Rust Belt

Asbestos Mine, Asbest, Sverdlovsk Obalst, Russian Urals, 2009

The mining city of Asbest takes its name from the mineral on which its fortunes depend: asbestos. Asbestos, banned in over 60 countries, causes cancers of the lung, ovaries, and larynx. The World Health Organization estimates that about 107,000 people die globally every year from exposure to harmful fibres in the workplace. Despite these cautionary statistics, Russia continues to mine, use, and sell asbestos.



↑ **Russian Rust Belt**

Karabash New Town, Chelyabinsk Oblast, Russia, 2009. In the mid-1990s, the volume of air emissions from the copper mine plant exceeded 7 tons per person every year. One resident described living in the mining town as 'like living in a gas chamber.'

Beryozovsky, Sverdlovsk Oblast, Russian Urals, 2009.

↓ **Russian Rust Belt**





↑ Russian Rust Belt

Sak-Elga River, Karabash, Chelyabinsk Oblast, Russia Urals, 2009. Harmful metals from the nearby copper mine outstrip safe levels tenfold, while chemical effluents stain the town's lake and nearby river orange.

Landscape Near Russian Copper Company Mine, Karabash, Chelyabinsk Oblast, 2009. Industrial waste - cinder banks, pyrite tailings, and sedimentation ponds - continually accumulates in the copper mining town and its surroundings.

↓ Russian Rust Belt





↓ Russian Rust Belt

Nizhny Tagil, Sverdlovsk Oblast, Russian Urals, 2009

Nizhny Tagil is one of the Ural region's leading industrial centres, with over six hundred factories. Smokestacks belching harmful chemicals into the atmosphere crowd the urban skyline, giving rise to the nickname: 'city of the colourful sky.' Nizhny Tagil Metallurgical Plant is the city's largest polluter, accounting for roughly 60% of local air pollution. During the Soviet period, the plant poured 660 thousand tonnes of harmful fumes into the air annually. By 2020, modernisation had substantially reduced emissions to 60,000 tonnes per year; nevertheless, this figure represents more than 100kg of dust per person. Tellingly, in that same year, Nizhny Tagil came second in an official list of 12 Russian cities with the worst air pollution.





↓ Russian Rust Belt

Magnitogorsk, Chelyabinsk Oblast, Russian Urals, 2009

In 2007, the Blacksmith Institute included Magnitogorsk, known as 'the steel heart of the Motherland' in their 'dirty thirty' of the world's most polluted cities. In 2020 the city was ranked third in an official list of 12 Russian cities with the worst air pollution. Today, many who live and work there succumb to disease and premature death because of long-term exposure to pollution. Local hospitals claim that only 1% of children in the city are classifiable as 'in good health,' and one study showed that 40% had chronic diseases.

ECOSYSTEMIC TRANSITION UNIT
ETU

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The ETU Initiative works with rural and island areas in the Mediterranean, offering tools for municipalities to increase renewable energy consumption in their region, following five key principles:

- Holistic response to climate change
- Territorial equity
- Social innovation
- Green economy
- Cooperation and commitment

Do you agree with our principles?

Sign the ETU Manifesto to increase the impact of our work, and to show your support for the energy transition in the Mediterranean!



Sign the ETU Manifesto!
www.etuinitiative.eu

Together we'll create a resilient future

The ETU Initiative is run by the Interreg MED Renewables Energy project.

Interreg Mediterranean RENEWABLE ENERGY

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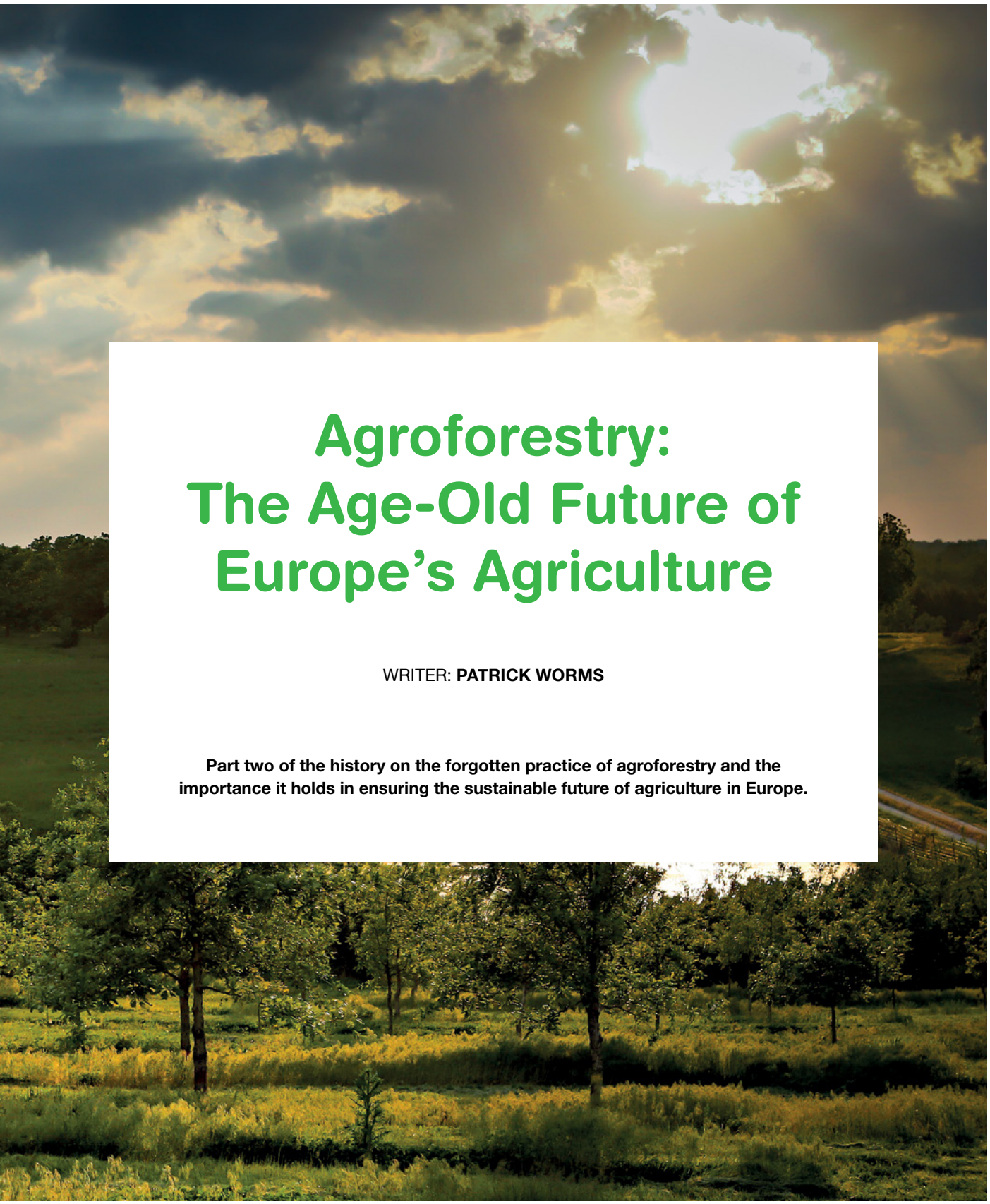
REVOLVE

ΠΕΓΑ

REGEA



1



Agroforestry: The Age-Old Future of Europe's Agriculture

WRITER: **PATRICK WORMS**

Part two of the history on the forgotten practice of agroforestry and the importance it holds in ensuring the sustainable future of agriculture in Europe.

The flame of agroforestry, kept alive by the farmers of the global south, started attracting the attention of modern science. The International Centre for Research in AgroForestry (ICRAF) was founded in 1978. Soon, a trickle of papers describing and outlining the fascinating issues surrounding tropical agroforestry began to grow into a river.

In Europe, researchers started bringing back to their continents what they had learned in the tropics. In the UK and in France, countries with long colonial histories, research programs about these systems began in the late 1970s. In addition, pockets of agroforestry research had survived the onslaught of industrialization here and there, usually in marginal landscapes. Examples include a group in Avignon, France that had been studying silvopastoral systems since the 1960s, and Spanish, Portuguese and Italian efforts to look at the silvopastures of Iberia and Italy. But there was practically no research into silvoarable systems before the late 1980s, when the first papers about the walnut/arable systems of the Dauphiné (France) were published. It is a measure of how little collaboration existed across borders in this field that to date there is no systematic history of Europe's national research efforts in agroforestry.

European agroforestry really began as a European collaborative discipline with the first European research project devoted to agroforestry, Silvoarable Agroforestry for Europe (SAFE), which ran from 2000 to 2005. This was the first European research project to demonstrate that agroforestry is a management technique that is fully compatible with modern agricultural techniques. It was also a gateway that allowed agroforesters from across the continent to realize that they were not alone, and that they had colleagues in far more countries than many suspected. The SAFE partnership meetings were the first that brought together agroforestry researchers from much of Europe, and it those conversations that would, years later, lead to the genesis of the European Agroforestry Federation (EURAF).

Meanwhile, national authorities remained broadly blind to the potential of agroforestry. In countries whose agricultural trees had already been grubbed up a generation or two earlier, the whole idea seemed bizarre, little better than the dreams of permaculturally-inclined hippies. In countries whose trees were still there, mostly around the Mediterranean, the reaction was one of disbelief that this absolutely standard traditional agricultural technique would excite anybody's interest. Just to take one example, a call to the French government to invest in agroforestry research and promotion, signed by over 200 people in 1999, only received a reply in 2006. And that was in the European Union!

In the countries of Central and Eastern Europe, agroforestry was broadly ignored to, but for different reasons. The important thing there was to adapt as rapidly as possible to the regulatory and legislative environment of the European Union to facilitate membership. Traditional farming systems, despite their resilience under Communism (and, often, the complicity of local officials to allow farmers to continue practicing age-old management techniques even against the wishes of the central authorities, as in the forest grazing systems of Hungary), completely fell off the radar.





1. Agroforestry research plots at the Horticulture and Agroforestry Research Center in New Franklin, Missouri, USA. Photo: Kyle Spradley

2. Kalapana polycropping in lava field Noni, mango, papaya and coconut. Photo: Scot Nelson

3. Walnut trees and maize, France South East, Dauphiné, (near Grenoble). Photo: AGFORWARD



2



3

Establishing the European Agroforestry Federation

Just as the negative externalities of industrialized agriculture became evermore obvious, so the responses of industrialized agriculture interests to these externalities sounded evermore hollow. Soil erosion, ground- and river-water pollution, the collapse in rural biodiversity and livelihoods, the desertification of the countryside, and a succession of animal welfare scandals led to increasingly serious attempts by national and European authorities to tackle these issues. That no doubt contributed to the first mention of agroforestry in a major European Union strategy, the Forestry Strategy, in 1998, a commitment reiterated in the 2006 EU Forest Action plan, which called on Member States to promote agroforestry systems in their rural development programmes. Sadly, the impact of these encouragements were never evaluated. Neither the evaluation of the 1998 strategy nor that of the 2006 action plan mentioned, let alone measured the implementation of, agroforestry.

Against this background, over a hundred pioneers founded EURAF in 2011 to pursue four complementary objectives:

1. To boost European investment in agroforestry research
2. To encourage the adoption of agroforestry-friendly agricultural and forestry policies at European level
3. To promote the adoption of agroforestry by farmers
4. To encourage the growth of national agroforestry associations across Europe.

From the very start, its ambitions covered the whole geography of our continent rather than its political boundaries. Amongst the founders were

active agroforesters from Switzerland and the Ukraine – and even from Africa and the United States.

Its first objective soon started bearing fruits: pioneering research efforts like AGFORWARD in 2014 and innovation networks like AFINET in 2017 undoubtedly helped the subsequent focus on agroforestry research in Horizon 2020 programming, culminating in the funding of five agroforestry-focused research projects from 2020 onwards: UNDERTREEES, NextLand, AGROMIX, MIXED and Trees4CLIMA.

Focus on influencing European policy

But it was with its policy focus work that EURAF really came into its own. What Winston Churchill called the 'sausage factory' – the messy political process that eventually delivers a shiny legislation which is all the public sees – in Europe is institutionally complex, requiring the collaboration of the European Commission as the initiator of legislation and the European Parliament and the Council of Member States as co-legislators. It is by collaborating with its own members that this particular factory can best be influenced by a European body. EURAF focused on the departments responsible for agriculture, environment and climate, which soon delivered results in the form of various measures: direct subsidies and support to plant trees on farms in the common agricultural policy, the inclusion of agroforestry in the European Green Deal and the Biodiversity Strategy, and the inclusion of agroforestry as one of the two pre-eminent agricultural interventions to be deployed under the Carbon Farming initiative. The EU's new Forestry Strategy includes additional support measures for agroforestry.

Meanwhile, in a number of European Member States, agroforestry became recognized by the authorities as a promising set of agricultural interventions that could help deal with the desire to produce safe, nourishing food in ways that restored rather than damaged environments. The pioneer in that regard was French agriculture minister Stéphane le Foll, whose initiatives included launching national agroforestry and agroecology plans, pushing the country's agricultural colleges to start teaching agroforestry, encouraging the state extension services to hire agroforestry advisors, and at an international level launching the "4per1000 initiative," an effort to encourage farmers to add four parts per thousand of carbon to their soil every year through appropriate management. French influence at a European level was also felt

4. Sheep grazing in a valonia oak silvopastoral system in Greece. Photo: Anastasia Pantera, AGFORWARD

5. A traditional grazing system in Guaviare, Colombia. Photo: Neil Palmer

6. Typical silvopasture field developed from a slash pine plantation. Photo: Jim Robinson



in the successive iterations of the EU's agriculture and forestry strategies. It was also the close collaboration between EURAF and the Czech Agroforestry Federation that led that country to revise its agricultural approaches to aggressively support agroforestry, culminating in its 2019 offer to host and fund the newly founded International Union of Agroforestry (IUAF) in Prague.

Of course, policy support requires detailed measures. And today, the ones that are most likely to encourage farmers to experiment with trees are hard technical measures. They include ensuring that farmers can use specific codes to record the EU's eight recognized agroforestry practices in Integrated Administration and Control System (IACS) and Land Parcel Identification System (LPIS). Member States should pre-identify all landscape features in IACS/LPIS, something remarkably easy to do with modern geographic information system (GIS) techniques. They should also clarify that any farmer is entitled to a full CAP Direct Payment on their agroforestry areas, fully include agroforestry in their arable and permanent pasture Good Agricultural and Environmental Conditions (GAEC)-9 thresholds, and perhaps most importantly include guidance on agroforestry in their national rules for good agricultural and environmental practices.

For its part, the European Union needs to recognize the necessary flexibility that agroforestry demands, notably by allowing Member States to set their own criteria for the recognition of landscape features, as long as the rules are easy to understand, transparent and available to all farmers. In that regard, the current reform process of the Common Agricultural Policy, which repatriates a lot of the detailed rule-making to the Member States through a procedure known as the strategic plans development process, is potentially very encouraging.



5



6

Managing the future of agroforestry

EURAF has also succeeded in its objective to grow national agroforestry associations or federations and today has members from 20 European countries, with Ireland, Latvia, Denmark and Austria joining since 2018. Despite these encouraging signs, the headwinds against a broader spread of agroforestry in Europe remain strong. In vast parts of Europe's landscapes, all memory of the agroforestry-based production systems that were common practice until the 19th century have disappeared. Very often, rules, regulations and inspectors are not only unaware of the potential of agroforestry, but actively hostile to the idea of adding trees to agricultural lands. Extension services and agricultural colleges fail to teach agroforestry. Farming, as we all know, is a risky business. Most farmers work extremely long hours for less than a poverty wage and quite rightly cannot afford to take any undue risks. Without strong advisory and support measures, it is only the most adventurous amongst them that will dare go against the grain and add some trees to their farms.

Agroforestry as an agricultural practice demands changes in management at least as much as access to the right seedlings or equipment. That management must be taught, and to date the private sector has found it difficult to figure out how to provide that service. To caricature, it is a lot easier to sell bags of inputs than to sell tailored consultancy advice. And this embodies the challenge for Europe's ministries of agriculture and the European Union. Just like the French have done, they will have to start allocating political and financial capital to the development and deployment of these promising agricultural practices.

7. Livestock waterer is placed inbetween rows of a set of trees in a silvopasture sytem. Photo: Jim Robinson

7



agromix

Transforming landscapes

AGROMIX brings together **farmers**, **researchers** and **policymakers** to explore **agroecological solutions** for more **resilient land use in Europe**, developing tools to implement these practices.

agromixproject.eu



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 862993.

The EU Green Deal: A Balancing Act

WRITER: **PETER EASTON**



An ambitious and utopian vision that bears potential negative consequences that need to be transparently recognized and mitigated.

1



Inspired by the New Deal of the mid-1930s when U.S. President Franklin D. Roosevelt launched numerous programs to activate the economy after the disastrous Great Depression (1929-1933), the Green Deal espoused by the European Union and propounded by Vice-President Franz Timmermans is an attempt to position Europe at the forefront of sustainability while simultaneously advancing solutions to achieving net zero carbon for Europe. Europe's response to this double global challenge is formidable and while it is not without its controversies as we put forward here, the Green Deal is intended to serve as an inspirational roadmap for all to learn about how to become more conscientious of our impact on Earth.

The Green Deal Roadmap represents an ambitious policy development for Europe, and for the world, in particular its trade partners. This is without a doubt. But it carries implications for these trade partners which may bring up concerns and unexpected consequences. The primary aims of the Green Deal is to promote ongoing economic and social development for European citizens and residents while protecting human health, boosting the so-called 'green' economy, and reducing negative environmental impacts across the spectrum of initiatives and programs that are being funded and rolled-out across Europe and beyond.

Legislation to protect human health and the natural environment represents an EU success story to date including examples as the Water Framework Directive, Habitats Directive, Drinking Water Directive, Floods Directive, Industrial Emissions Directive, and many more.

First published in December 2019, the EU Green Deal came just before the start of the COVID-19 pandemic. Today it has taken it's place as a central part of the COVID-19 recovery package.



2

EU Green Deal Commitments:

- Achieve net neutral greenhouse gas emissions by 2050
- Impose a carbon price on imports from non-EU countries with weaker climate commitments
- Commit 25% of the EU's budget on climate action.

Beware of over-simplified language

While doing things better is certainly the way to go, actions to achieve these commitments without sufficient recognition of negative impacts and their mitigation could lead to unintentional and undesirable consequences. As a comparison, we have seen with the ongoing COVID-19 crisis that a single-focus 'zero-COVID' policy has often left the negative impacts of lockdowns inadequately recognized or addressed. Some have argued there is a point where the negative impacts of lockdown restrictions eventually outweigh the intended benefits. This could be the outcome of some climate policies if comprehensive and balanced impact assessments are not undertaken whereby negative impacts are adequately averted or mitigated.

The detail and complexity of environmental and social issues means a simplification of messaging is necessary to capture and engage an audience and, most importantly, to gain committed support from policy-makers and the public. The concept of 'carbon footprint' is a classic example. However, an over-simplification of message can lead to an imbalanced appreciation of eventual outcomes of wide-ranging policy actions.

Delivering the EU Green Deal:

- 55% emission reduction from cars by 2030
- 35 million renovated buildings
- 40% new renewable energy target for 2030

Over-simplification can start with language. Below are some examples of basic terminology of the Green Deal that could potentially mislead on realistic expectations of outcomes.

1. Photo: James Lee

2. Photo: European Commission

3. Solar voltaic technology and batteries, rely on mining for rare metals often in regions with poorer environmental standards. Solar farm, Offingen, Germany. Photo: Andreas Gucklhorn

Clean energy is a term the roadmap and associated communications regularly interchange with 'renewable energy'. But no energy source is truly clean or pollution free. Many aspects of renewable energy, including solar voltaic technology and batteries, rely on mining for rare metals often in regions with poorer environmental standards and working conditions than in the EU. Examples include cobalt from the Congo (The New Yorker, 2021) and lithium from Chile (The Guardian 2021). The massive increase in battery capacity required for the main electricity grid and for transport will result in much more mining under such sub-standard conditions. Batteries also bring fire risk and the challenges of handling, disposal and recycling of associated toxic chemicals.

While many environmental groups including WWF are opposed to large-scale hydro power because of its interference with the natural river habitats, reduced reliance on fossil fuels will inevitably create an increased incentive for more hydro power, especially in developing regions (both in eastern Europe and the rest of the world) where rapid economic growth outstrips the current capacity of wind and solar energy. An example is The Grand Renaissance Dam on the Blue Nile that provides essential energy for Ethiopia's rapidly growing economy.

And the toll on birds and bats (disproportionately on large and rarer birds) from wind turbines will only increase with wind energy expansion at a time when biodiversity loss is also high on the agenda.

These observations are not presented as opposition to renewables. Instead, they are to argue that in the drive to do better, scientists and policy-makers should not downplay or even ignore the negative impacts of new approaches. They must be recognized and taken into account in decisions and actions. Only then can we make an informed judgement on how far and fast to go and to prepare to mitigate the negative



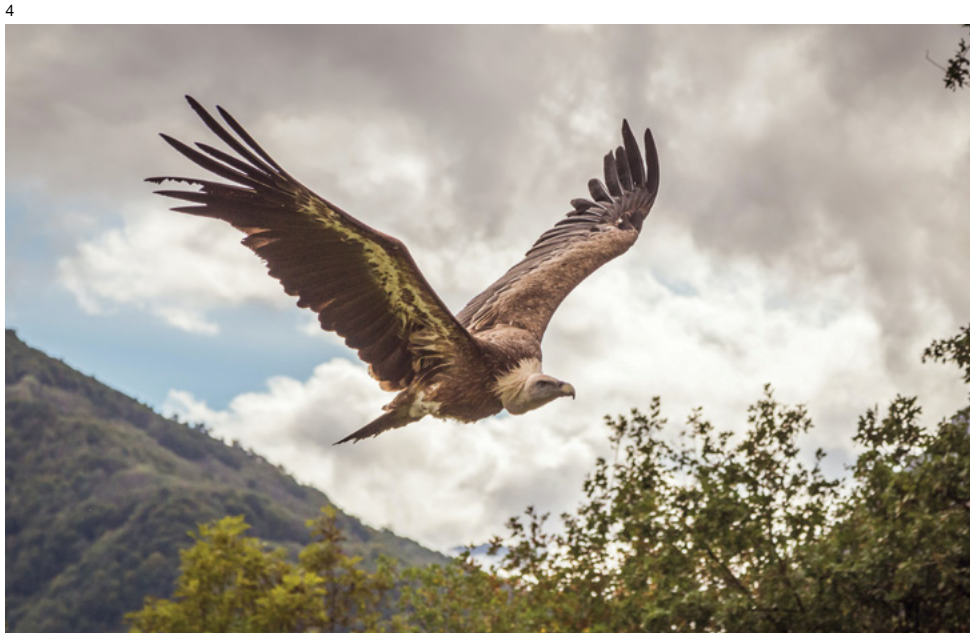
consequences. The term 'clean energy' risks undermining this need.

'Climate neutral' is intended to mean 'net neutral GHG emissions' (commonly termed 'carbon neutral'). However, it risks giving the impression that once 'carbon neutral' is achieved the climate will return to a benign and 'neutral' condition. Of course, that is quite wrong. We will always need to be prepared for extreme weather, regardless of GHG emissions and atmospheric CO_2 concentrations.

The term **zero pollution** risks setting a target that is fundamentally unachievable unless given a clear and unambiguous definition. In the modern world we create and use many products and chemicals for the benefit of humanity including such examples as chlorination for safe drinking water, medicines for health care, fertilizers and pesticides to boost food production, fire retardants, fuels for energy and lighting, and many more. We also use many materials for packaging and the many objects and tools that surround our daily lives. For much of the general public, 'zero pollution' means no manmade chemicals or litter. While we can achieve much on litter through recycling and proper disposal, zero residues of manmade chemicals is unachievable unless we stop using them, and thus missing out on their many benefits. A zero pollution definition needs to recognize that residues will remain, but that concentrations must be low enough to be non-toxic to humans and nature. Otherwise, the EU may always be seen to have failed its own target.



4



4

The Green Deal and impact assessment

The many intended advantages of the Green Deal are widely communicated. But as already mentioned, communications on the Green Deal show an apparent lack of recognition that <u>all</u> policy choices produce both positive and negative impacts and outcomes. Here are a few examples of the negative impacts of well-intentioned policies:

- A drive for biofuels (as low CO_2 emitters) restricts the land and resources available for food production, and according to *The Guardian* has reportedly pushed up food prices.

4. Many environmental groups are opposed to large-scale hydro power because of its interference with the natural river habitats. Kölnbrein Dam, Austria. Photo: Jacek Dylag

5. In one frequently cited study, one windfarm in Spain created feeding sites away from turbines and shut down turbines at peak flight times. Griffon vulture deaths were reduced by 50 per cent for an electricity production loss of just 0.07 per cent. Photo: Eric Terrade

6. Coal mine in Germany. Photo: Dylan Leagh

7. Activists gathered outside the European Commission to stand in solidarity with local communities in Europe resisting fracking. Photo: Friends of the Earth Europe

8. Gas pipeline, Ukraine. Photo: Dmytro Glazkov / World Bank

• Public opposition to nuclear energy in many countries has maintained dependence on fossil fuels. Germany, at least in the short-term, has increased its reliance on coal and lignite since moving away from nuclear following the Fukushima disaster.

• Opposition to shale-fracking in Europe maintains increased dependence on imported gas from regions with lower environmental and working standards, delaying our transition away from coal and oil and maintaining Europe's vulnerability to political tensions with our suppliers.

The European Commission has been undertaking impact assessments on its climate policies, such as on 'Stepping up Europe's 2030 Climate Ambition', but a question remains whether these are comprehensive and transparent enough, with a couple of examples below.

And there's carbon leakage…

The Green Deal Roadmap recognizes that as the EU implements a strict move to internal carbon neutrality, there will be a growing risk of 'carbon leakage' whereby production and imports transfer to external countries many with less strict emissions policies. The EU proposes to address 'carbon leakage' by imposing a "WTO-compatible carbon border adjustment mechanism" (a carbon price) on imports as an incentive for others to tighten their own policies. However, this can be interpreted as applying trade barriers that will arguably favor richer nations over poorer ones. Thus, without adequate mitigation, this policy may contradict the roadmap principal to "put people first" – which should surely include those outside of Europe. The impact assessment mentioned above does not address this risk. While the EU is committed to



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supporting Least Developed Countries (LDC's) towards climate action through technological and financial support, it will remain a challenge to ensure LDC's do not lose out on trade that can help lift them out of poverty.

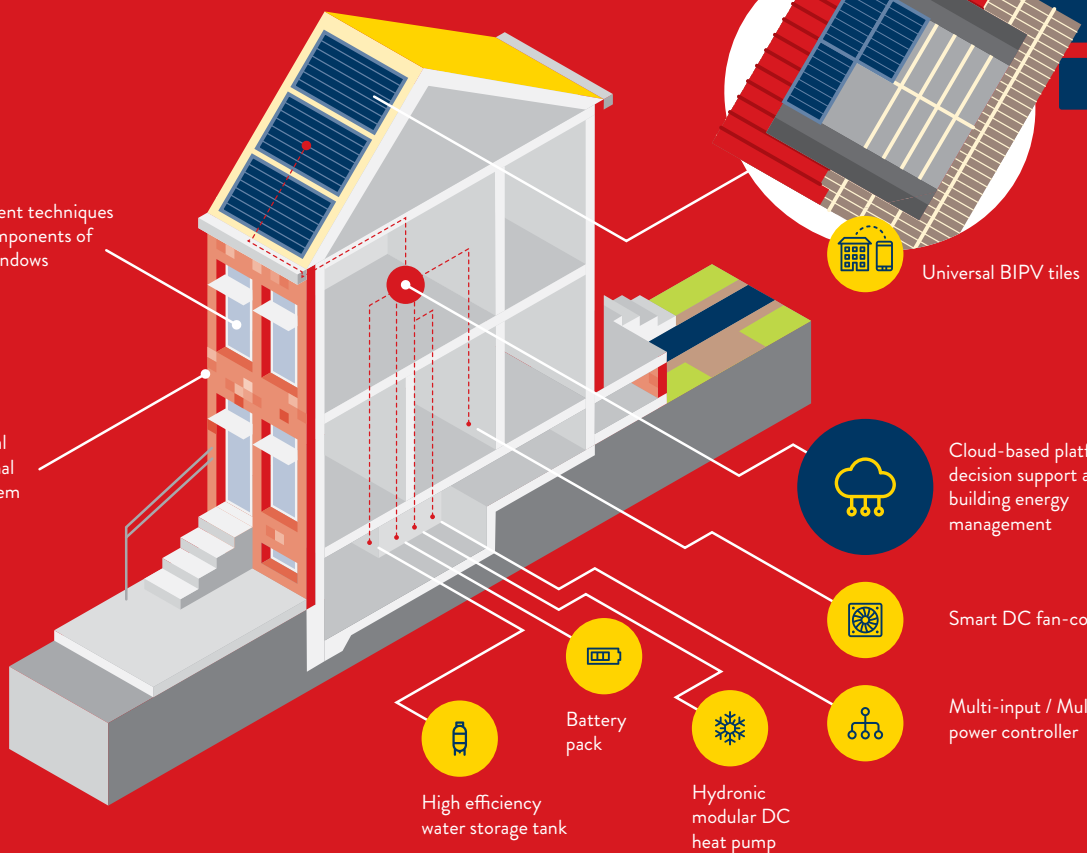
Some neighboring partners in the southern and eastern Mediterranean, and south-eastern Europe, see the new restrictions as a form of neo-protectionism, whereby the legislation that will be passed by Europe will not permit products below certain environmental standards in their supply and productions chains from access to Europe. This would reduce access of their products, decreasing their external trade to Europe, their fragile GDP and further lowering foreign direct investments from Europe to neighboring economies, thereby diminishing any competition they may be able to bring to the market. All of this makes a more integrated global market rather difficult. Perhaps this will herald an inward turn towards relying on local markets for locally-produced goods. Once again, and everywhere we look, the major challenge is how to develop sustainably while not destroying the environment in the process.

What risk will the transition to renewables put on security of energy supply? We have already seen in 2021 a sharp rise in energy prices of more than 400%, due in part to low wind conditions across Europe. As we move into winter, it is the poor and vulnerable who will least afford to heat their homes adequately. The impact assessment includes a section on 'security of energy supply' (6.4.1.4) but makes no mention of the affordability risk to citizens. Instead, it states that the energy system will need to become more innovative and flexible to address the variability of renewables. Without highlighting the negative risks, this sounds worryingly like a 'fingers crossed' approach.

Strong environmental policies are essential for improving human and environmental wellbeing, but we must be honest about the negative consequences as much as the positives and ensure we counter or mitigate them in ways that are transparent and inclusive, and which comply with the Green Deal principal to put people first – whether EU citizens or not.

The major challenge is how to develop sustainably while not destroying the environment in the process.

HEART



HOLISTIC ENERGY & ARCHITECTURAL RETROFIT TOOLKIT.

The core of HEART is a cloud-based computing platform developed to address and support your specific energy-related needs and choices.

HOW HEART BENEFITS YOU:

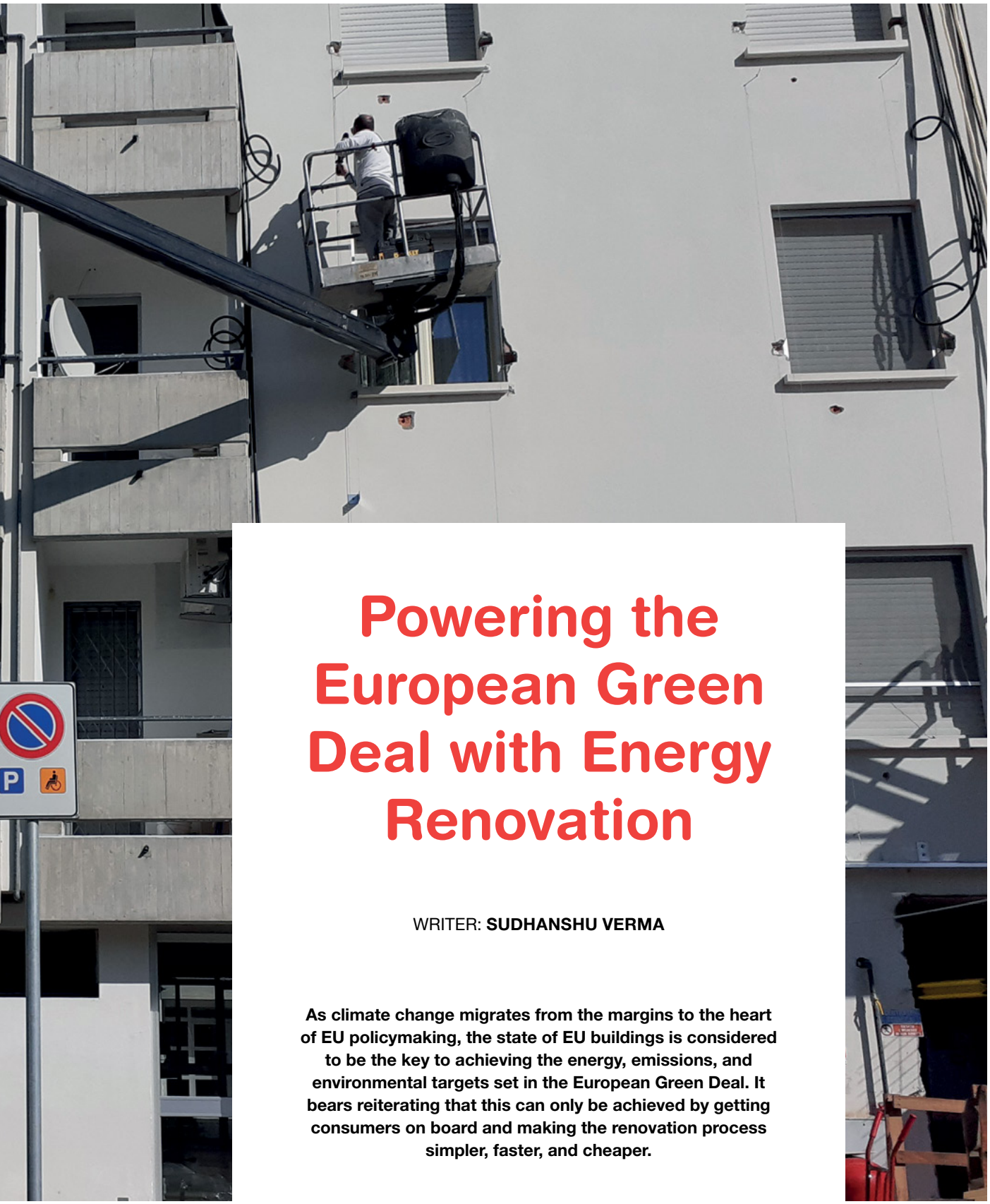
HEART is a toolkit that ensures benefits for all, including industry leaders, housing providers, and most importantly the residents living in these buildings.

- Improving the European building renovation process by simplifying it.
- Reducing total energy consumption, integrating renewable energy, and rationalising energy flow between buildings and smart grids.
- Involving stakeholders, supporting energy financing and the exploitation of renewable energy.
- Concept can be extended to new residential buildings in addition to existing buildings.
- Decreasing operating costs and consumer bills.
- Increasing thermal comfort for building users.
- Reducing the performance-related risk of the energy retrofit investments;

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement № 768921.

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Powering the European Green Deal with Energy Renovation

WRITER: **SUDHANSHU VERMA**

As climate change migrates from the margins to the heart of EU policymaking, the state of EU buildings is considered to be the key to achieving the energy, emissions, and environmental targets set in the European Green Deal. It bears reiterating that this can only be achieved by getting consumers on board and making the renovation process simpler, faster, and cheaper.

1

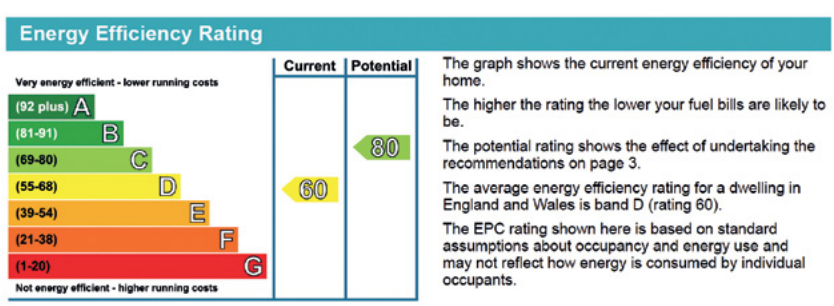
"We will come forward with proposals to boost renewable energy and improve energy efficiency," said Ursula von der Leyen earlier this year and promised that the EU will revise its entire climate and energy legislation to make it 'fit for 55". Buildings account for 40% of EU energy demand and 36% of carbon dioxide (CO_2) emissions. According to the Danish Energy Agency, approximately 85% of the buildings we will live in by 2050 already exist today. Therefore, we need to decarbonize the existing buildings to move further towards a green transition by 2050.

The EU's 2050-vision requires most buildings to be highly energy-efficient; in other words, to be at least compliant with 'Label A' energy certification. A study by Buildings Performance Institute Europe (BPIE), with data from 16 countries/regions across the EU, shows that 97% of the building stock must be upgraded to achieve the 2050 vision. The European Commission's recent Renovation Wave Strategy is an attempt to mark a turning point. It proposes speeding up the renovation of buildings while also making them more energy-efficient and less carbon-intensive over their entire lifecycle. However, a stakeholder, the consumers, will only get on board the Renovation Wave if the renovation process is simplified, making it quicker, easier and cheaper for them to do so. As Fabian Viehrig from the Federal Association of German Housing and Real Estate Companies, said (GDW), "The most important thing is to reduce the complexity of energy renovations and to eliminate uncertainties regarding costs and time. If it is then possible to generate attractive prices, the breakthrough could be achieved." The focus should be to remove the barriers consumers face with energy-efficient retrofits through the different initiatives.

What do consumers need?

The first step in making the renovation process more accessible would be to standardize and revamp Energy Performance Certificates (EPCs). EPCs should be easy to read, and their content adapted to different consumer profiles such as tenants, homeowners, landlords, detached houses, and multi-unit buildings. EPCs provide general information about the energy performance of a property and are mandatory at the time of sale or lease. They allow prospective buyers and tenants to factor energy performance into their choice of home. EPCs originate from the Energy Performance of Buildings Directive (EPBD) in 2002 and are now regulated under the amended EPBD. EPCs display information on the property, featuring a range of estimated performance ratings resulting in an energy label. EPCs show a range of letters from A to G, along with a colour range from deep green to bright red and indicate where the property stands. General recommendations on possible improvement works, such as insulation, heating system or window replacement, are also included. The overall accuracy relies on the skills of the energy assessor, who issues the EPC. However, EPCs are not yet reliable tools for consumers as they provide limited and poorly designed information. As recommended by the Bureau Européen des Unions de Consommateurs (BEUC) for EPCs to gain consumer trust, they need to be improved in terms of information, design and reliability. This information should be sourced in on-site observations of the property and made available in local registries and databases covering the local market conditions (i.e., the average cost of works).

Providing renovation advisory at the local level is critical. Ensure consumers are given easy access to local energy advisors that are independent of energy suppliers or banks. These energy advisors should be available in one-stop shops, which should provide



Summary of this home's energy performance related features

Element	Description	Energy Efficiency
Walls	Solid brick, as built, no insulation (assumed)	★★☆☆☆
Roof	Pitched, 100 mm loft insulation	★★★☆☆
Floor	(another dwelling below)	—
Windows	Fully double glazed	★★★☆☆
Main heating	Electric storage heaters	★★★☆☆
Main heating controls	Manual charge control	★★☆☆☆
Secondary heating	Portable electric heaters (assumed)	—
Hot water	Electric immersion, off-peak	★★★☆☆
Lighting	Low energy lighting in all fixed outlets	★★★★★

Current primary energy use per square metre of floor area: 561 kWh/m² per year

The assessment does not take into consideration the physical condition of any element. 'Assumed' means that the insulation could not be inspected and an assumption has been made in the methodology based on age and type of construction.

2

1. Windows refurbishment at HEART demo case, Bagnolo In Piano, Italy. Photo: HEART

2. Extracts from British EPC certificate.

To unlock the potential reduction in energy consumption, many apartment or office buildings require a solution to address the complex decision-making process, including the multiple property owners and building managers.

consumers with support and access to service providers to carry out the renovation works. Followed by providing easy access to finance for their home renovation by allowing for innovative financial products from either bank and/or the public sector.

Energy renovation: Sum of all things

A survey conducted by Housing Europe for the EU-funded HEART Project showed that most residents were willing to play their part in this green transition. However, the same study showed that they would need guidance and support along the way. Current solutions for building renovation are both expensive and complex. Buying a state-of-the-art heat pump or investing in full heating insulation is a significant investment for most consumers. Also, most consumers do not have the expertise or knowledge to navigate the complexities of making their homes more energy-efficient.

This is where renovation 'toolkits' come in. These are integrated packages of prefabricated components such as insulation/facades, heating; ventilation; air-conditioning, (renewable) energy systems; user interfaces; and digital solutions. A group of suppliers offer these to ensure quicker, higher quality and more cost-effective home renovations. This out-of-the-box solution removes the hassle of finding the right equipment and appliances needed for the renovation project.

A significant energy retrofit potential lies in multi-story residential buildings built between 1960 to 1990. These buildings have deficient energy performance levels, are not in general subject to cultural heritage restrictions, and their retrofit is scalable and replicable. The most common among these are 4-5 floor linear condominium buildings, and these buildings are very similar and their construction techniques.

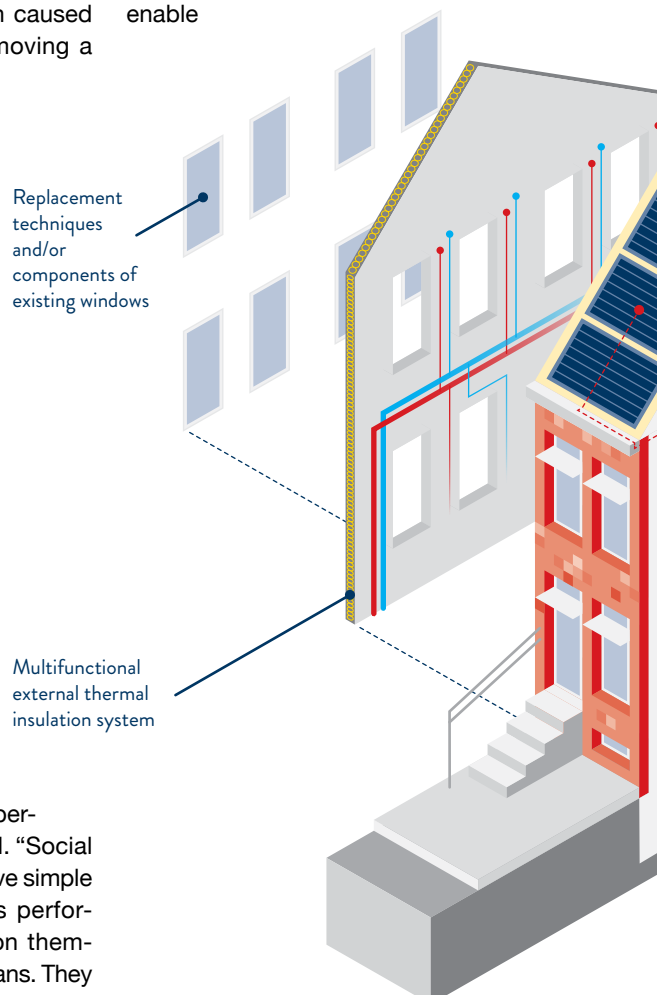
One such toolkit – being developed by the HEART project – is at an advanced stage of development, and is already being used in demonstration cases in France and Italy. At the site in Italy, already game-changing opportunities for consumers are being tested, with renovation work being carried out on the building while residents continue to live in their apartments. This reduces both the cost and restriction caused by the renovation work, removing a significant barrier to consumers.

To unlock the potential reduction in energy consumption, many apartment or office buildings require a solution to address the complex decision-making process, including the multiple property owners and building managers.

A Housing Europe member in France (l'Union Sociale pour Habitat – USH) highlighted that cloud-based services could offer the sector a clearer overall picture of the energy performance of buildings as well. "Social housing providers need to have simple cartography of their stock's performance to be able to position themselves and make long-term plans. They need to identify their stock's needs to understand the potential demand existing on the area."

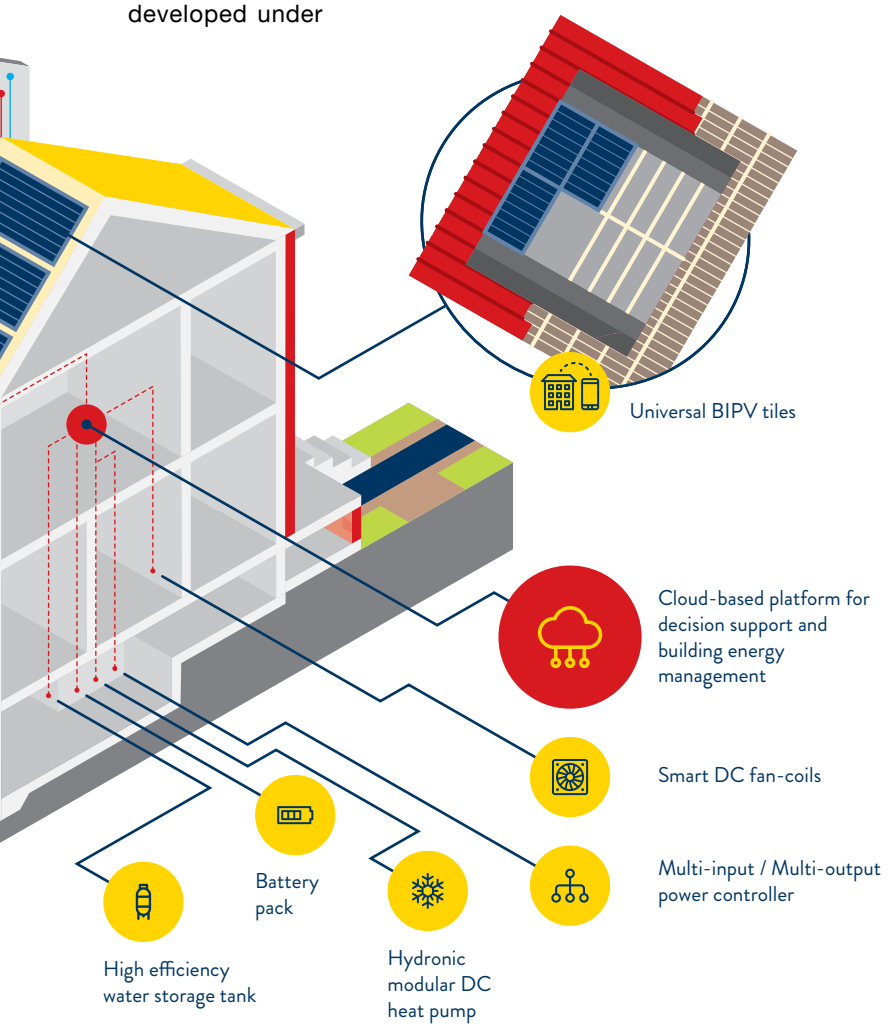
The HEART project has developed one such cloud-based decision support system that includes a useful multi-user operational tool to support the whole building retrofit intervention, from decision-making, through the design phase to the operational phase. It allows the tenants and energy managers to access necessary data to assist their decision-making.

Analytics from this data are available in customised interfaces that communicate information about the building system's performance. The data comes via specially designed gateways. The gateways enable



data acquisition from multiple sources and communication between devices, the electric grid (enabling smart-grid interaction), and external monitoring services (such as weather forecasting). The cloud-based platform simplifies the renovation process by providing possible variations and choices during renovation planning.

To further the uptake of the retrofit toolkit technology, Claudio Del Pero, Associate Professor at the Politecnico Di Milano, explained, “The toolkit developed under the HEART project will reduce the investment and risk of the renovation projects. The real-time monitoring features will allow prompt information actions on the system, and cloud-based data management will fully utilize the collected information. Advantages of these key features and the innovative business models developed within the HEART project will further help in scaling up renovation.”



Getting consumers on board

The fight against climate change and reducing emissions and energy consumption requires a substantial rethinking of the building sector. Improving buildings’ energy efficiency has been considerably developed and applied in recent years. However, this is often uncoordinated and fragmented while underestimating synergies and benefits gained through different technologies’ systemic integration. It simplifies one of the most daunting tasks for the consumer in their renovation planning.

Access to finance and one-stop-shops for renovation advisors to guide the consumer are key to getting consumers on board to make the Renovation Wave successful. Making buildings energy efficient should not have to be so complicated. However, consumers face an uphill battle with conflicting and scattered advice, technologies, and the options to finance their renovation project are not so easily accessible.

Out-of-the-box retrofit toolkits such as HEART will remove the hassle of choosing the suitable materials and appliances, equipment or dealing with installers. However, barriers such as access to finance and lack of renovation advisory at the city level must be addressed by the public authorities if the EU’s Renovation Wave is to be a success. The EU’s climate goals depend on getting people on board.

HEART toolkit

Who is Responsible for Latin America's Waste?

WRITER: **PAULINA GODÍNEZ ESTRADA AND SÖREN BAUER**

Packaging. Chemicals. Tires. These are just three kinds of waste that countries around the globe increasingly need to deal with. Many industrialized countries export their waste to far-away regions, often in other continents. Out of sight, out of mind.

REVOLVE Circular's latest investigation looks into waste management in Latin America, and the role of consumers, producers and governments.

From Guatemala to South America and Back

Sandra Moran in Guatemala City is concerned: "Solving the continuously growing problem of waste and reducing its impact is not easy here at all," says the former Guatemalan Congresswoman. Back in November 2016, she presented a law proposal alongside the late Guatemalan congressman Álvaro Velásquez and another colleague. Their intention: regulate recycling and sustainable management of solid and liquid waste.

"Our proposal was meant to result in the sustainable management of waste, generate jobs and contribute to the care of the environment," Sandra Moran explains. With its almost 17 million inhabitants the Central American Guatemala is one of many Latin American countries in which access to waste collection is limited and where waste is poorly managed. According to a 2018 report by the United Nations Environment Program UNEP using data from 2014, 90% of the 541,000 daily tons of Latin America's urban waste was not utilized for any further purpose.

While many countries of the region lack a comprehensive framework for waste management until date, some governments, such as Chile, have regulations since many years - and go beyond waste management by public authorities by also including a scheme referred to as 'Extended Producer Responsibility' (EPR).

When governments transfer responsibility for waste management

EPR schemes enable governments to address waste-management related issues by transferring parts of the responsibility to the producers; in the long run, the aim is to encourage so-called eco-design, change the packaging and composition of products, enable repairing and more.

Within Latin America, Chile's current draft resolution for EPR and products that constitute packaging seems the most advanced: it defines as many as 138 products from 13 different industries, such as construction, agriculture, clothing and others, and also distinguishes between domestic and industrial waste. The resolution shall be applied to several existing laws concerning waste management and packaging.

Other legislative reforms are on their way: Mexico plans a reform of its waste management which would redefine single-use plastics and enable energy production from it. According to Greenpeace Mexico, this reform is a setback in single-use plastics regulation as it does not include sufficient

responsibilities for producers, that civil society has been demanding. In the south, Argentina intends to include EPR schemes, and proposes an environmental tax, for packaging and to integrate informal waste pickers into the management chain.

In the region, the reality of waste management and EPR is distinct - what's considered waste in one country is far from being waste in another. Costa Rica's law, for example, covers used tires, electronics, and special waste only. While Argentina also holds tire producers responsible and has a law for 'agrochemical's containers', it does not have a national framework law for waste management. Colombia's 2016 'National Policy for Integrated Solid Waste Management' on the other hand includes light bulbs, pharmaceuticals, pesticides, various electronics and diverse other products. Some of these national waste management laws have included EPR schemes since as far back as 2003, such as Mexico's national legislation, but are they achieving their objectives?

The problem with EPR schemes: good intentions, low impact?

Costa Rica introduced an EPR scheme in 2010, "but the targets to measure its performance are only being set now," says Karla Chávez, Regional Director of ecoins, a digital waste currency originating from this Central American country. At a global level, researchers at Utrecht University in the Netherlands provide a strong critique: "The main problem with EPR schemes is that they are not democratic institutions; in most cases, they are entirely controlled by the companies that pollute in the first place," explains Martin Calisto-Friant, a French-Ecuadorian researcher. "The recovery options they choose are often the cheapest, and not always the best from a social or environmental standpoint. Moreover, these companies have very little or no incentive to reduce production and consumption of their goods, one of the main goals of a circular economy. In fact, there is no evidence so far showing that EPR schemes anywhere in the world have led producers to redesign their products by choosing sustainable materials, or making them easier to repair, recycle or refurbish."

What is Extended Producer Responsibility (EPR)?

According to the Organization for Economic Co-operation and Development (OECD), EPR is a policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products. Assigning such responsibility could in principle provide incentives to prevent wastes at the source, promote product design for the environment and support the achievement of public recycling and materials management goals.

In Spanish-speaking Latin America, EPR schemes are either referred to as Responsabilidad 'Extendida' or Responsabilidad 'Ampliada' del Productor, meaning that the producing company is the only responsible for managing its respective waste. Some countries also use 'Responsabilidad Compartida' where the waste-accountability is shared among various actors including producers, consumers, distributors and the State.

1. Guatemala City garbage dump, one of the largest in Central America. Photo: Paul Hart

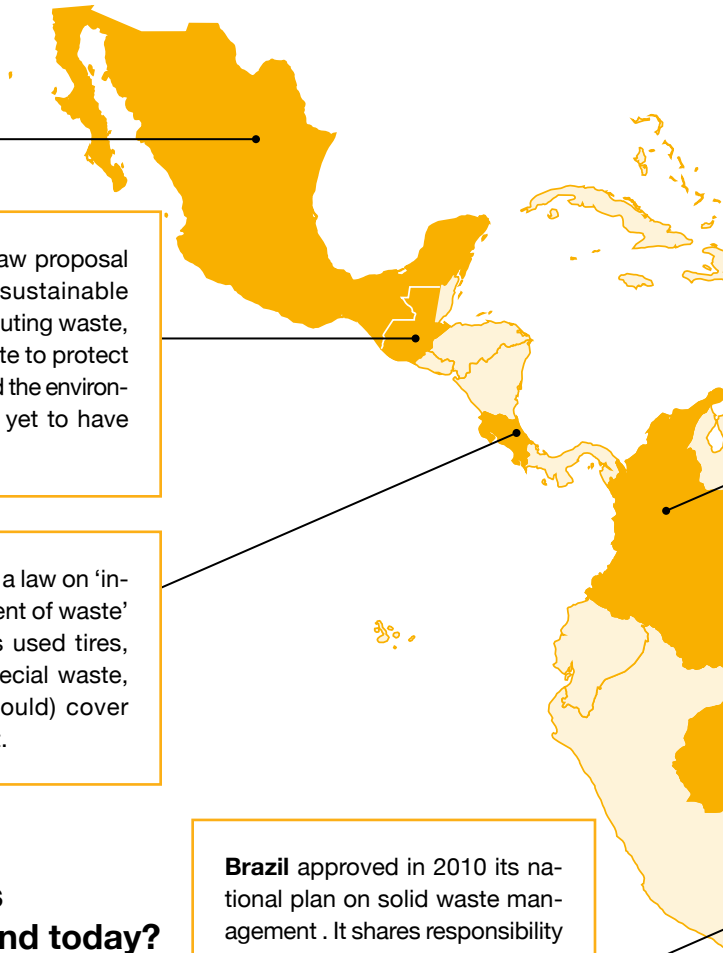
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México is currently discussing reform for single-use plastics. Its 'general law for the prevention and comprehensive management of wastes' passed in 2003 includes plastic packaging, used tires, cells and batteries, hazardous waste and special waste, and distributes responsibility between producers, distributors, consumers, users of by-products, and three levels of government.

Guatemala had a law proposal on 'recycling and sustainable management of polluting waste, solid and liquid waste to protect life, the economy and the environment' in 2016. It is yet to have been adopted.

Costa Rica passed a law on 'integrated management of waste' in 2010. It includes used tires, electronics, and special waste, and producers (should) cover waste management.



Brazil approved in 2010 its national plan on solid waste management . It shares responsibility between manufacturers, importers, distributors, consumers and public service providers for street cleaning and solid waste management, and includes pesticides, cells and batteries, used tires, lubricating oils, fluorescent lamps, electronics, plastic, metal and glass packaging.

Chile is currently developing new legislation. Its 'national law regarding waste management, extended producer responsibility and recycling' was approved in 2016, which includes lubricating oils, electrical and electronic equipment, batteries, containers and packaging, used tires, batteries. Producers cover waste management and can delegate responsibility to other actor(s) but must bear all costs.

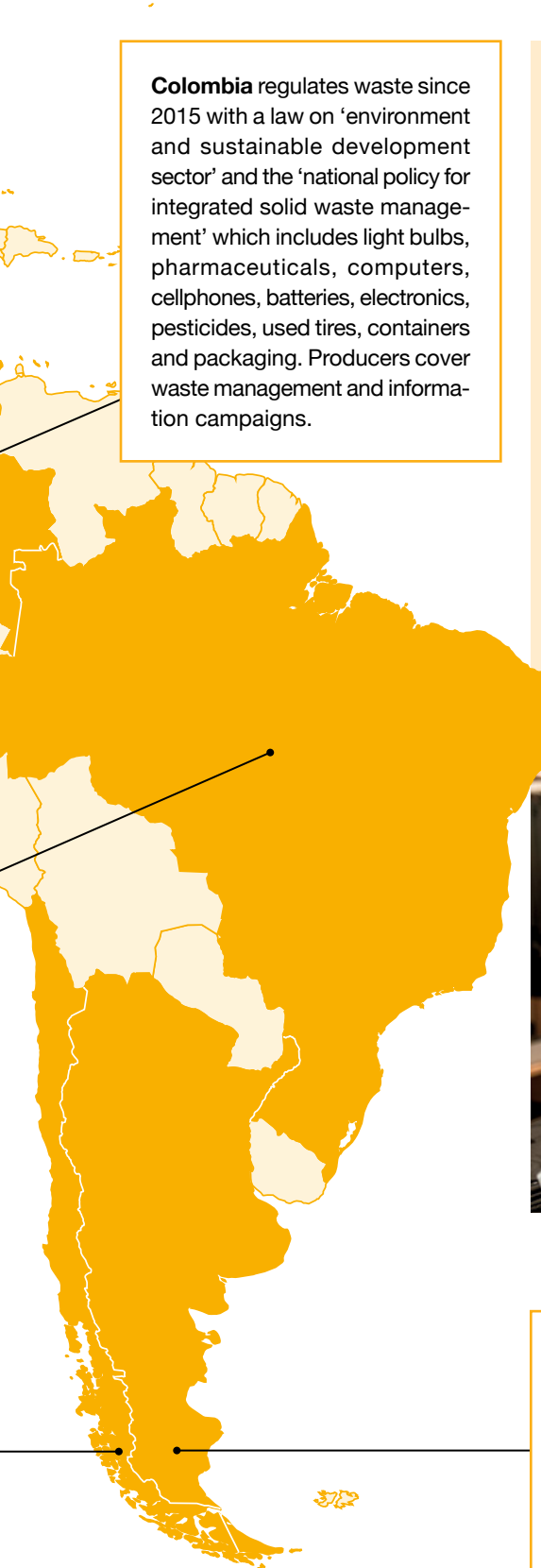
This is particularly problematic as all Latin American governments have signed the 2015 Sustainable Development Goals (SDGs) planned to be achieved by 2030 - including SDG 12 on 'Responsible Consumption and Production'. While EPR schemes are considered an important component for achieving this SDG, only few Latin American governments have moved towards updating their waste management regulations or, more importantly, at least enforce existing laws. "The success of implementing EPR depends to a large extent on the existence of control and monitoring of the established obligations and targets, as well as on the transparency with which management systems and product traceability are carried out" argues the Centro de Objetivos de Desarrollo Sostenible para Latinoamérica y el Caribe (CODS) based in Colombia in a recent analysis of EPR in Latin America.

Martin Calisto-Friant at Utrecht University adds: "There is a need for strong civil society and government participation in EPR schemes; they need to be governed in a more democratic manner and take decisions considering social and ecological implications rather than simply dealing with waste in the cheapest possible manner".

So where does Guatemala stand today?

Waste management and particularly EPR schemes can raise controversy since they are driving and aiming for change against well-established industry lobbies; political instability and high levels of corruption in many Latin American countries do not make their implementation easier. "Our waste management is still not properly regulated "says Sandra Moran in Guatemala City. "The laws discussed in congress are based on the personal interests of its members who look after their own agenda and business. Unfortunately, there is lack of a vision for the country and for solving problems for the common good of Guatemala's people. What other Latin American countries do is exactly what we need: laws for recycling and waste transformation which could also create jobs, plus raise awareness and increase responsibility for our waste."

Colombia regulates waste since 2015 with a law on 'environment and sustainable development sector' and the 'national policy for integrated solid waste management' which includes light bulbs, pharmaceuticals, computers, cellphones, batteries, electronics, pesticides, used tires, containers and packaging. Producers cover waste management and information campaigns.



Circular fashion for Latin America

Lack of conscious consumption. Awareness raising strategies. Too few innovations and technological developments in the textile-clothing sector. These are the most important barriers to a more circular fashion industry in Latin America and the Caribbean (LAC). Other take away messages from the investigative piece by Bogotá-based Andrea Mejia Fajardo, supported by Circulatam & 7191 Clothing Sustainable Ethical Lifestyle:

- Fashion has the capacity to change consumption habits. If the industry in LAC countries better understood the opportunities of a circular economy, it could generate new patterns of production and consumption, achieving business sustainability with a triple impact: environmental, social and economic.

- There is a need for regulations to discourage the use of toxic chemicals, non-recyclable fibres, waste and greenwashing, as well as regulations that stimulate the reuse of materials, EPR, research and technological innovation.

Discover more about circular fashion in Latin America at **revolve.media/circular**



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Argentina has no framework law for waste management. One 2013 resolution holds tire producers responsible for waste management, and a 2016 law calls for extended and shared responsibility of agrochemical's containers between the producer and the whole supply chain.

2. Photo: RODNAE Productions

How a Digital Currency Drives Latin America's Recycling

INTERVIEW WITH **KARLA CHÁVEZ**

Ecoins is a Costa Rica-based company dedicated to the recycling of household waste – with a digital currency. It is already present in Colombia, Costa Rica, Guatemala, Nicaragua and Perú; REVOLVE Circular spoke with Karla Chávez, ecoins Regional Director to find out more.

Karla, how does ecoins work?

Our system rewards households who commit to recycling with a digital currency: ecoins. After the users deposit their household waste in specific collection facilities, they receive ecoins which they can redeem for sustainable products and experiences. This is a clear incentive for people to start thinking about the value of the materials they discard and to start learning new habits.



At the moment, ecoins focuses on recycling household waste. Could the system also make people reflect about their consumption habits and contribute to more sustainable consumption? If yes, how?

Ecoins users learn to recognize the value of waste; they carry out the process of separation and thus identify which materials have no recoverable value and avoid them as far as possible. They consult, learn, educate themselves. They become more sensitive to the environmental impacts of their poorly treated waste and to positive social impacts of good waste management, also concerning local employment.



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How many companies does ecoins currently work with? What are your standards for accepting companies or organizations as ecoins members?

We currently have partnership agreements with more than 200 companies in five countries. Before joining the alliance, all brands are asked to submit information about their sustainability actions, such as the use of solar panels, social responsibility programs, environmental certifications, etc.

From your perspective, what are the biggest barriers to a more Circular Economy in Central America? And what are the biggest opportunities?

The main barriers are the lack of education and the lack of recognition of the value of post-consumer materials. As for the biggest opportunity, the current logistics crisis in international trade is a perfect time to take back what is already in use and put into action the benefits of a circular economy model maximizing the use of materials and resources, starting with more circular product design.



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4. Plaza Vea, Lima, Peru. November, 2019. Ecoins users handing over their recyclable waste at the Plaza Vea at a collection campaign.

5. October, 2018. Collection Centre La Carpio (a women-led collection center), San Jose, Costa Rica. Activity in collaboration with partners to promote recycling and proper nutrition in La Carpio area. People earned ecoins for their delivery of recyclable waste, which they could exchange for food products.

6. December, 2018. Pedregal, Heredia, Costa Rica. Second Guinness World Record attempt for the most plastic bottles to be recycled in 8 hours. This time the record was broken with 30 tons of plastic bottles collected.

Policies for More Circularity

INTERVIEW WITH **NICOLE STOPFER AND MARIA PINEDIA**
FROM THE LATIN AMERICA OFFICE OF THE GERMAN KONRAD ADENAUER FOUNDATION (KAS)

Due to the increasing prominence of a circular economy in Latin America's public and private sector, civil society and digital space, EKLA commissioned a report on "Circular Economy and Public Policies" in 2019. One of its key findings: there were already over 80 public circular economy initiatives in the region. "This model is a significant contribution to the conservation of natural resources, which shows its present and future importance. The circular economy is perceived as an important opportunity for employment generation and poverty reduction in Latin America," argue EKLA and the report's authors from the Innovation Centre for the Circular Economy (CIEC) in Chile.

REVOLVE Circular sat down with Nicole and Maria to find out more:

Nicole and Maria, your report presents opportunities for a Circular Economy (CE) in Latin America. So, what are the main problems which the predominant linear "take-make-waste" economy poses to the region?

According to the nearly 700 people surveyed and 40 interviews with experts in the region, we identified one main risk: the disproportionate and unconscious levels of consumption based on a linear economic model. In Latin America, this model opens space for the continuous generation of waste and the degradation of natural ecosystems due to the exploitation of raw materials needed for production.

7. Cobblers in Bolivia at work. Our research found that images showing people pro-actively engaging with sustainable practices (rather than being pictured near to low-carbon technologies) were well received. Photo: Rocco Lucia

8. Compost temperature: Andrea Rivera, co-founder and eco-social director of sinba, monitors the temperature of compost made from organic waste. Sinba, Peru

9. Organic waste – biofactory: The sinba team performs a manual quality control of the day's organic waste. The waste that is suitable for the production of animal feed is selected. Sinba, Peru

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Your report on CE policies also analyzes private sector entrepreneurship initiatives and circular business models. What are the main conclusions?

The first edition of the report identifies around 40 circular economy-related initiatives, many of which still focus on the end-of-life recycling phase of products. Thus, there is a need for more research and development between business-university-public sector to leverage technological development for circular innovations to focus on the regeneration of ecosystems and opportunities for scalability.

Could you highlight two or three Latin American initiatives which have circular thinking at their core and drive the agenda?

The *Centro Tecnológico de Economía Circular para la Macrozona Norte in Tarapacá-Chile,* for example, is a public-private initiative promoted by the *Corporación de Fomento de la Producción* (CORFO) and led by CIEC. It seeks to support companies in their transition towards a more circular model and to demonstrate that circular mining is possible.

Another example is Sinba, a Peruvian B-corporation with a circular business model; it focuses on the management of organic resources from restaurants. Sinba is also a partner of EKLA for circular economy trainings and support for Peruvian local governments that wish to develop circular roadmaps.

Why should Latin American governments care about a more Circular Economy? What is their role?

The good news is some governments are already supporting an accelerated transition towards a circular economy. In February 2021, the circular economy coalition in Latin America and the Caribbean was created with the participation of Colombia, Peru, Dominican Republic and Costa Rica. Its steering committee is developing a circular economy vision from and for the Latin American region; it will allow us to face the common challenges that unite us. By working in a coordinated and united way, the governments of Latin America can achieve favorable alliances for the development of sectors such as plastics, biofuels, electronics, food, agriculture and industrial symbiosis approaches.

Another positive trend is that local governments are taking the lead. Since they are the closest to the population, their role in raising awareness of and pushing for a circular economy is crucial. EKLA started the project “Ruta Circular” in Costa Rica, Chile, Argentina, Peru and Guatemala, which trained 20 teams from municipalities and local organizations to strengthen their local circular route.

All content is available online at **revolve.media/circular**

Todo el contenido está disponible en Español en línea: **revolve.media/circular**

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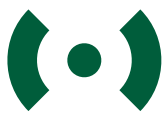
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