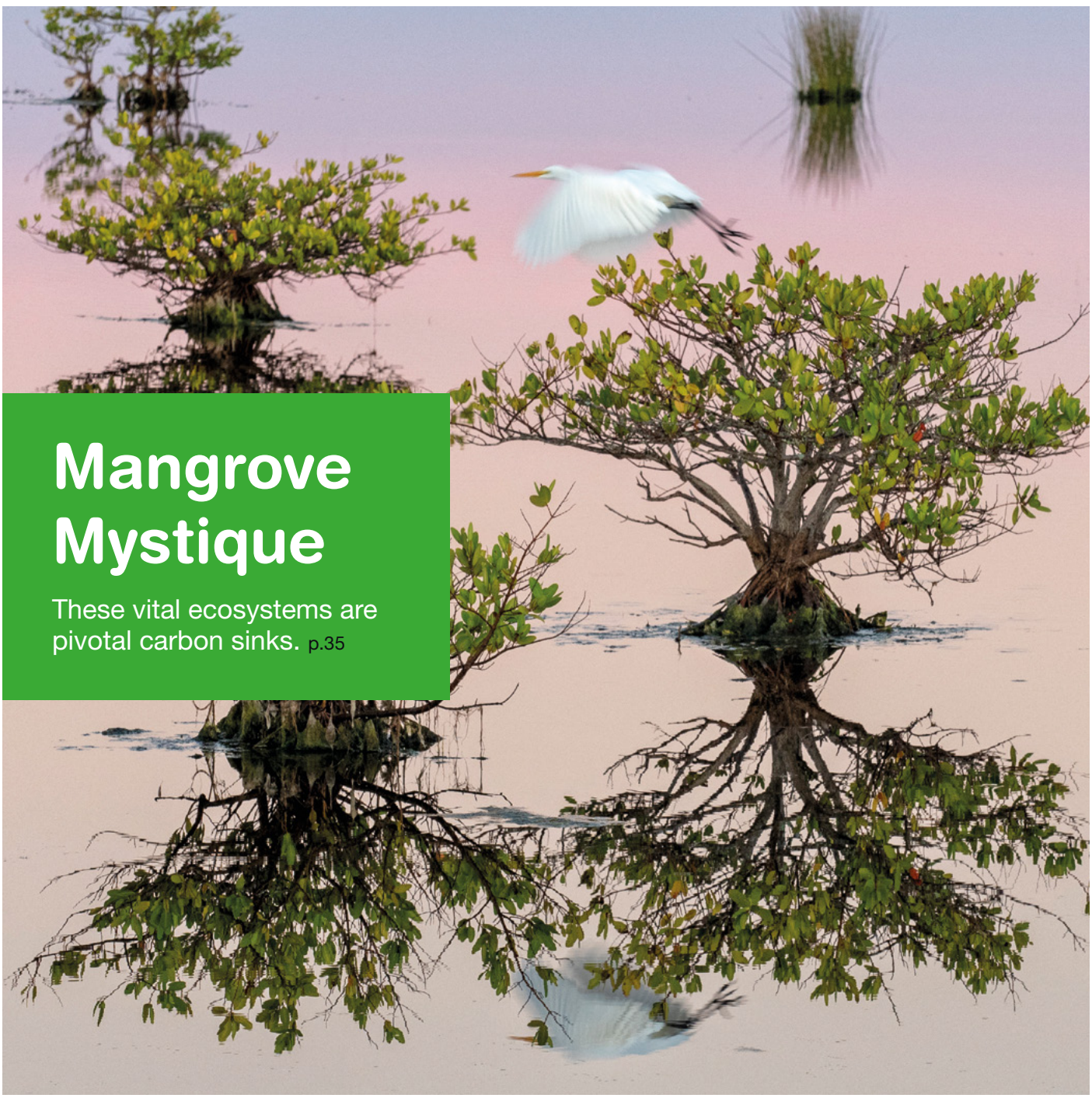
REVOLVE

QUARTERLY INSIGHTS INTO A CHANGING WORLD

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Mangrove Mystique

These vital ecosystems are pivotal carbon sinks. p.35

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Ecosystems at the Heart of Climate Resilience

The newly released Intergovernmental Panel on Climate Change (IPCC) Climate Report reiterates what we have been long told: climate change is a threat to human well-being and the health of the planet. Ecosystems are one of the most affected parts and at the heart of the solution – if we can preserve them. In this issue, we delve into one of the most sequential carbon sinks and endangered ecosystems: mangroves. While their destruction has slowed, rising sea-levels pose the single greatest threat as their root systems are unable to adapt, literally drowning these saltwater forests. This grim reality makes the advocacy and restoration work of actors like the Mangrove Action Project and Global Mangrove Alliance of utmost importance, as highlighted in our VIEWS.

At the institutional level, the UN General Assembly established its Decade on Ecosystem Restoration (2021-2030) to reverse the degradation of ecosystems worldwide, as attributed in our editorial. A large part of the work to restore landscapes involves mass reforestation efforts, supporting the IPCC claim that one billion hectares of forest will need to be planted by 2050 to restrict global warming to 1.5°C. But such reforestation efforts need to draw on local expertise, and according to Reforest'Action, the future of forests is in the hands of a new generation of reforestation entrepreneurs.

Acknowledging the role of cities and regions to build resilience and make the shift from linear to circular systems is also crucial, and the lighthouse cities of the HOOP project show how bio-based products can be made from urban biowaste. Infrastructure is key in doing so and cannot be taken for granted. In Romania, many still lack access to water and sanitation systems, making the case that financing needs to be effective but pragmatic in implementing the country's natural resilience plan.

Rural areas also cannot be side-lined and are essential in providing food security. Yet the intimate links between gender equality, sustainable development, and climate action are also apparent; the impacts of climate change amplify gender disparities and we can no longer ignore women's empowerment and their role as agents of change in the drive for climate action.

The concept of food sovereignty is also highlighted and how we can achieve better food systems. The city of Barishal in Bangladesh teaches us a valuable lesson on ecosystems and farming systems with one of the best agricultural adaptation techniques in flood-prone areas, while author of *Sustainable Gardening Made Easy*, Eva Pettersson, teaches us how permaculture can be used as a tool to pursue more sustainable living.

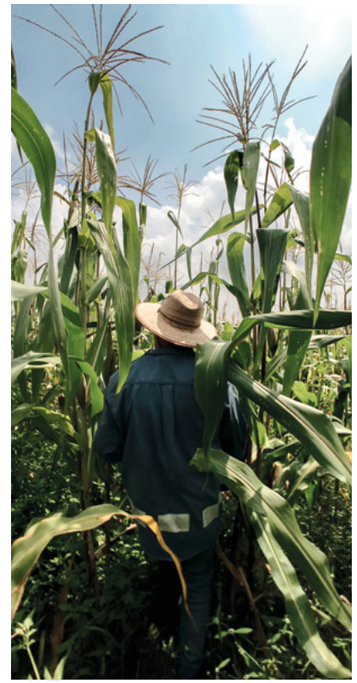
Thanks for revolving with us,

The Editorial Board


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REVOLVE is committed to climate-conscious reforestation and tree-planting initiatives as part of our company's sustainability policy to mitigate the impact from our corporate and project travel activities.

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To date, REVOLVE has planted 261 trees in reforestation projects in Roupage (BE) in 2020, Stoumont (BE) in 2021, and Martouzin (BE) and Zaragoza (ES) in 2022.



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Cover image:

United States – Mangroves at Dawn. Mangrove Photography Awards 2021.

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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), ecosystems (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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Illustration by Dariana Guevara / REVOLVE

#GenerationRestoration is on the Move!

TIM CHRISTOPHERSEN
HEAD OF NATURE FOR CLIMATE BRANCH, UNEP

We live in interesting times. Climate action failure and biodiversity collapse now top the World Economic Forum Global Risk Index. And the world is responding.

Finally, after decades of working towards strong climate action and a full recognition of the true value and importance of nature, we are seeing serious traction across governments, private sector and civil society –but much more remains to be done. This is why the UN General Assembly established the UN Decade on Ecosystem Restoration 2021-2030, with the aim to "prevent, halt and reverse the degradation of ecosystems worldwide." Nothing more, nothing less!

A daunting task, perhaps, but it is an idea whose time has come, and the momentum is building quickly. 2021 saw the successful launch of the UN Decade, co-led by UNEP and FAO. Under the motto "Reimagine. Recreate. Restore," World Environment Day was leveraged to kick off a global restoration movement. The "Snap Challenge" through which users could show before and after effects of restoration reached 200 million people on social media, with over 4 million actively contributing. More than 42,000 media articles were published on World Environment Day and the UN Decade Launch, a 17% increase from the previous year. Millions of citizens have since engaged in #GenerationRestoration, over 100 organizations have joined the UN Decade as partners, five Task Forces and an Advisory Board have been established, and a Multi-Partner Trust Fund has been operationalized.

An interactive digital hub for the UN Decade is under development, sponsored by in-kind private sector support and following an extensive digital design and user research process testing three different prototypes. A flagship report found that country commitments to ecosystem restoration now cover 1 billion hectares worldwide – an area larger than China. These commitments will be further strengthened with the adoption of a post-2020 global biodiversity framework later this year.

In 2022, the UN Decade on Ecosystem Restoration will focus on identifying, celebrating and scaling World Restoration Flagships – the first, best, or most promising examples of large-scale and long-term ecosystem restoration in support of the Sustainable Development Goals. And we will celebrate the UN Decade on Ecosystem Restoration as a connector and catalyst for action across the three Rio Conventions. The European Union and its Member States can play an important role in creating the right inspiration for #GenerationRestoration by establishing a strong and ambitious nature law, and by nominating European Flagships for worldwide recognition. The United Nations call on everyone, everywhere to join the global movement to restore Planet Earth. There is no time to lose. We are all #GenerationRestoration! ●



New Generation of Reforestation Entrepreneurs Rising

WRITER: **HÉLÈNE BOURELLE**

Protecting, restoring and creating new forest ecosystems is a top priority for many governments and environmental stakeholders globally. With the significant number of restoration and preservation projects emerging, attention must be given to the central role of local communities that are giving rise to a new generation of local reforestation entrepreneurs.

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A global recognition of the need to preserve forests

Today, tree planting and restoration projects are rife. And for a good reason: forests are essential for life on Earth. Forests provide habitat for a vast array of plants and animals, supply oxygen, store carbon, protect water resources, stabilize soil erosion, and provide valuable materials such as wood, timber, vegetables, and fruits. In the context of climate change, they act as vital carbon sinks that contribute to regulating climate. Forests are also home to three quarters of all life on earth: 300 million people live in forests and 1.6 billion depend on the resources they provide for their livelihoods.

In spite of this, the world's forests continue to be destroyed at a dramatic rate, a tendency that wreaks havoc with local ecosystems, especially within humid tropical zones of Central America, Southeast Asia, Madagascar, Central Africa or Northeastern Australia, where losses are particularly severe. If the instrumental role of forests in the fight against climate change is now common knowledge, time is running out to protect them. According to the Intergovernmental Panel on Climate Change (IPCC), 1 billion hectares of forest will need be planted by 2050 if we want to restrict global warming to 1.5°C. A goal we need to commit to, at global and local levels.

As tree cover loss increased dramatically in 2020, many political, environmental and corporate actors are now joining forces to stop forest destruction, a commitment illustrated by the launch of the 2021-2030 UN Decade on Ecosystem Restoration as well as the UN Climate Change Conference (COP 26) that took place in Glasgow in November 2021.

Referred to by many as the 'Forest COP,' this global event brought together major political and economic stakeholders from all around the world to place forests high on the political agenda, calling for collaborations to halt forest and land degradation by 2030. This pivotal progress towards conservation and sustainable forest management however must not obscure the necessity to put local communities at the heart of forest ecosystem restoration processes.

1. Woman working the land, Morogoro, Tanzania, 2021. Photo: Delphine Dekeister / Reforest'Action

2. Narino, Colombia, 2021. Photo: Reforest'Action / Impulso Verde

3. A mother teaching her child how to plant a tree, Addis Ababa, Ethiopia. Photo: Eyoel Kahssay

According to the IPCC, 1 billion hectares of forest will need be planted by 2050 to restrict global warming to 1.5°C.

Relying on local community skills

As many organizations in different parts of the world are now grabbing shovels to contribute to the global movement for forest restoration and biodiversity preservation, priority must be given to engaging local populations in reforestation programs.

The first reason for this is that indigenous people and local communities are more concerned than any other stakeholder with the changes that are happening to the land, since they often rely on their immediate environment such as water sources, local agricultural resources, and forest products to meet their livelihood needs. In parts of the world where forests are fully integrated into people's everyday lives, natural ecosystems are also integral components of community cultural heritage and traditions. In this regard, the degradation of natural resources negatively affects local population's food resources, health autonomy, social structures and overall well-being.

Because they hold an intimate knowledge of the land and the nature surrounding them, indigenous and local communities have always and will always be the best environmental stewards. Since forest restoration projects provide locals with direct and indirect income as well as social benefits, these stakeholders must be integrated at every step of the restoration projects that affect their territories. This approach, that needs to be led in accordance with their traditions and customary institutions, will, in the long run, ensure community engagement in tree monitoring and maintenance, commitments that are instrumental to the survival of ecosystems.

Instilling a new vision of reforestation

Since WWII, tree-planting projects led by governments multiplied, but not all of them have proved beneficial to populations and the environment in the long term. Often, endemic species have been replaced by fast-growing evergreen, an approach that mainly sought to support the expansion of agriculture and was consequently detrimental to biodiversity and land's ecological properties.

It should also be noted that in the past, indigenous and community participation to restoration activities initiated by national and local environmental policies has not always been well documented. For restoration initiatives to be more relevant and sustainable, it is now necessary to acknowledge the importance of local community contributions and inputs to those projects.

As evidence shows that intensive forest management and monoculture hinder forest resilience, reforestation projects need to draw on local knowledge of the land to contribute together to the restoration of of forest ecosystems.

Agroforestry, for example, was commonly used by farmers before machines led to mechanization led to sweeping changes in agriculture at the turn of the 20th century. This traditional technique relies on the introduction of woody perennials on the same land management unit as agricultural crops or pastures, providing many environmental benefits.

We should draw upon traditional practices, such as interplanting species to increase diversity, identifying keystone species, supporting natural regrowth of trees to maintain their resilience and productivity, implementing agroecosystems, and assessing and restoring the natural elements surrounding parcels. Integrating traditional approaches will help to develop an environmental culture among local communities in the field that will help maintain ecosystems as well as preserve the landscape in a context of the general growth of urbanization and infrastructure expansion.

On the international stage, the necessity to involve local communities has become, for many reforestation project leaders, a central component of restoration projects. For example, the Circular Bioeconomy Alliance (CBA) that seeks to accelerate the transition towards a climate-neutral circular bioeconomy, relies heavily on communities as a major source of ecological resilience. To this end, the CBA created the Living Labs, a global network dedicated to nature and people empowerment, integrating traditional knowledge, placing local communities at the center of their land and forest restoration projects. This recognition of the role played by local communities as well as the need to provide them with the financial and technical resources to carry out major restoration projects stands as a source of inspiration for any stakeholder wishing to commit to ecosystem preservation.



4. Women working the land before implementation of agroforestry, Taza, Morocco, 2021.
Photo: Delphine Dekeister / Reforest'Action

Giving rise to a new generation of reforestation entrepreneurs

To build sustainable economic models that are based on natural resources, we need to join forces to conduct without delay a collective movement to fight against the destruction of forests and biodiversity.

Inspiring young generations in the field to become reforestation entrepreneurs, empowering them and giving local projects a holistic dimension is the surest way to generate a global restoration movement across the world, as well as to reconcile economic and environmental concerns for local populations. This vision transcends the need to implement tree-planting projects but intends to help developing countries generate sustainable resources that are based on nature ultimately to contribute to the building of a global circular bioeconomy.

As funds dedicated to ecosystem restoration embody the growing environmental awareness of companies, we need to connect with local professionals who can source, develop and implement projects that address environmental and social issues on the ground. With the help of companies that wish to redefine their core values and build sustainable economic models founded on community-based natural resource management, we need to work together to generate economic and ecosystemic resilience, both in the field and at a global scale.

Because transmission and heritage are central to the notion of sustainability, this new generation of reforestation entrepreneurs needs to flourish in every part of the world where land and forest degradation threatens environmental and social resilience. A generation that will learn from their elders and their peers, but also be given digital, technical and scientific data and tools to embrace this global movement of ecosystem restoration. A generation that will also raise youngsters' awareness on the necessary preservation of ecosystems, to ensure the perpetuation of virtuous sylvicultural and agricultural practices.

To this end, priority should be given to training young ecopreneurs, determined to participate in the building of economic models that rely on forest resilience and support sustainable development.

5. Tree-planting in a school garden, India. Photo: Kasturi Laxmi Mohit

6. Village members involved in restoration project, India, Balipara. Photo: Reforest'Action / Balipara Foundation

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Food Sovereignty for the Future of Farming

WRITER: **LARA BARANGÉ**

The term 'food sovereignty' is spreading and embodies a transformation of our current food system. The concept resonates with our instinctive desire for autonomy over what we consume, but what exactly does it mean and how can it address the crucial challenges we face today?

To build a picture, let us first look at the evolution of modern agriculture. Humanity's transition from hunter gathering to the establishment of towns and cities is attributed to agriculture, and for most of human history we lived this way – in proximity to nature, eating organic, local produce. It was only in the 1960s with the so-called Green Revolution that multinational corporations began to play a role in the food system, arguing that the globalized free market of food exportation would eliminate food shortages and create wealth. Although the Green Revolution is credited for an exponential growth in food production in the second half of the twentieth century, the environmental impacts of industrial agriculture – with its dependence on mechanization, chemical inputs, and genetically modified seeds – began to be questioned by ecologists and agronomists for its impact on soil fertility and biodiversity.

However, the Green Revolution impacted far more than soil health. From the displacement of indigenous people for the expansion of monoculture, to the extinction of heirloom seeds due to genetic modification, industrial agriculture is left with few supporting arguments. Observing the range of impacts of modern agriculture on society and culture, the Via Campesina – a global movement of farmers advocating for a fairer future of food since 1993 – coined the term

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‘food sovereignty’ in 1996 as “the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems.” Food sovereignty is a call-to-action and a framework of values to guide a holistic reconceptualization of our food system.

The concept of food sovereignty was consolidated with the Declaration of Nyéléni in 2007, following a forum held in Mali by the Via Campesina, family farmers, indigenous peoples, landless rural workers, pastoralists, fisherfolk, and numerous NGOs advocating for food system transformation. The Declaration established six actions of food sovereignty: focuses on food for people, values food providers, localizes food systems, puts control locally, builds knowledge and skills, and works with nature.

Food for people

Food security is typically measured using the Food and Agriculture Organization of the United Nations (FAO)’s definition: “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”. While the FAO’s definition focuses on access to sufficient caloric intake for human well-being, Via Campesina highlights that this definition does not distinguish where the food comes from, the conditions under which it is produced, or the social and environmental impacts it may have. Food sovereignty on the other hand advocates for supporting local production and empowering producers as an alternative to food aid and subsidies that support agribusiness corporations.

Valuing food providers

Farmers – regardless of their country – carry out one of the most important tasks for society. Despite navigating the unpredictability of the seasons and the economy, they often receive little reward – according to the World Bank, 65% of poor working adults made a living through agriculture. For this reason, one of food sovereignty’s priorities is to “value and support the contributions, and respect the rights of women and men, peasants and small-scale family farmers, pastoralists, artisanal fisherfolk, forest dwellers, indigenous peoples and agricultural and fisheries workers, including migrants, who cultivate, grow, harvest and process food; and rejects those policies, actions and programs that undervalue them, threaten their livelihoods and eliminate them.” Inclusivity is a cornerstone of food sovereignty’s framework.



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1. Harvest season. Mexico. Photo: Erik Aquino / Unsplash

2. Man picking yellow cocoa fruit. Photo: Pexels

3. Man working in field. Photo: Kelly L. / Pexels

Whilst seeds and chemical inputs are also connected with the sixth pillar of working with nature, as part of its concern for food producers, the framework of food sovereignty opposes the use of genetically modified organisms (GMOs), and of chemical fertilizers and pesticides, due to the economic costs for farmers, and the long-term health impacts of handling these products. One key example of the potential impacts of GMOs on farmers’ wellbeing is the case of Percy Schmeiser vs Monsanto: In 1998 small-scale Canadian farmer Percy Schmeiser was sued by Monsanto for growing their genetically modified canola. Farmers traditionally save seeds to replant from year to year, but in the case of GMOs, farmers must pay Monsanto yearly for rights to plant the seed. Schmeiser was found to be growing Monsanto’s canola without a license, although he claimed that the seed had spread onto his land from neighboring fields. The case gained international attention, and was brought to the Supreme Court, where Schmeiser lost the case 5-4. According to Reuters, Monsanto has sued hundreds of farmers across the world for using their patented seeds, putting their livelihoods at risk. For this reason, the Declaration of Nyéleni proposes to “ensure that the rights to use and manage our lands, territories, waters, seeds, livestock, and biodiversity are in the hands of those who produce food.”

Localizing food systems

With this belief in mind, the third and fourth pillars of food sovereignty focus on fulfilling people’s food needs through local production. Not only are local food chains more environmentally



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friendly due to reduced transportation and refrigeration, but they also generate income in rural areas and build a connection between producers and consumers. According to the FAO, community-supported agriculture schemes (CSA) have flourished across the world in recent years, showing a growing consumer interest in local produce. CSA takes numerous forms, such as the distribution of fresh produce directly from farms to local consumers, or programs where subscribers regularly visit a nearby farm and participate in the harvesting process. This is the case with the organic farm Stadtbauernhof Saarbrücken in Germany – participating in the EU-funded project AGROMIX on regenerative farming – where subscribers meet weekly to sow, tend to and harvest the farm's crops. According to the Stadtbauernhof managers, public interest in schemes like this has increased during the COVID-19 pandemic, as the unpredictability of international food chains becomes visible.

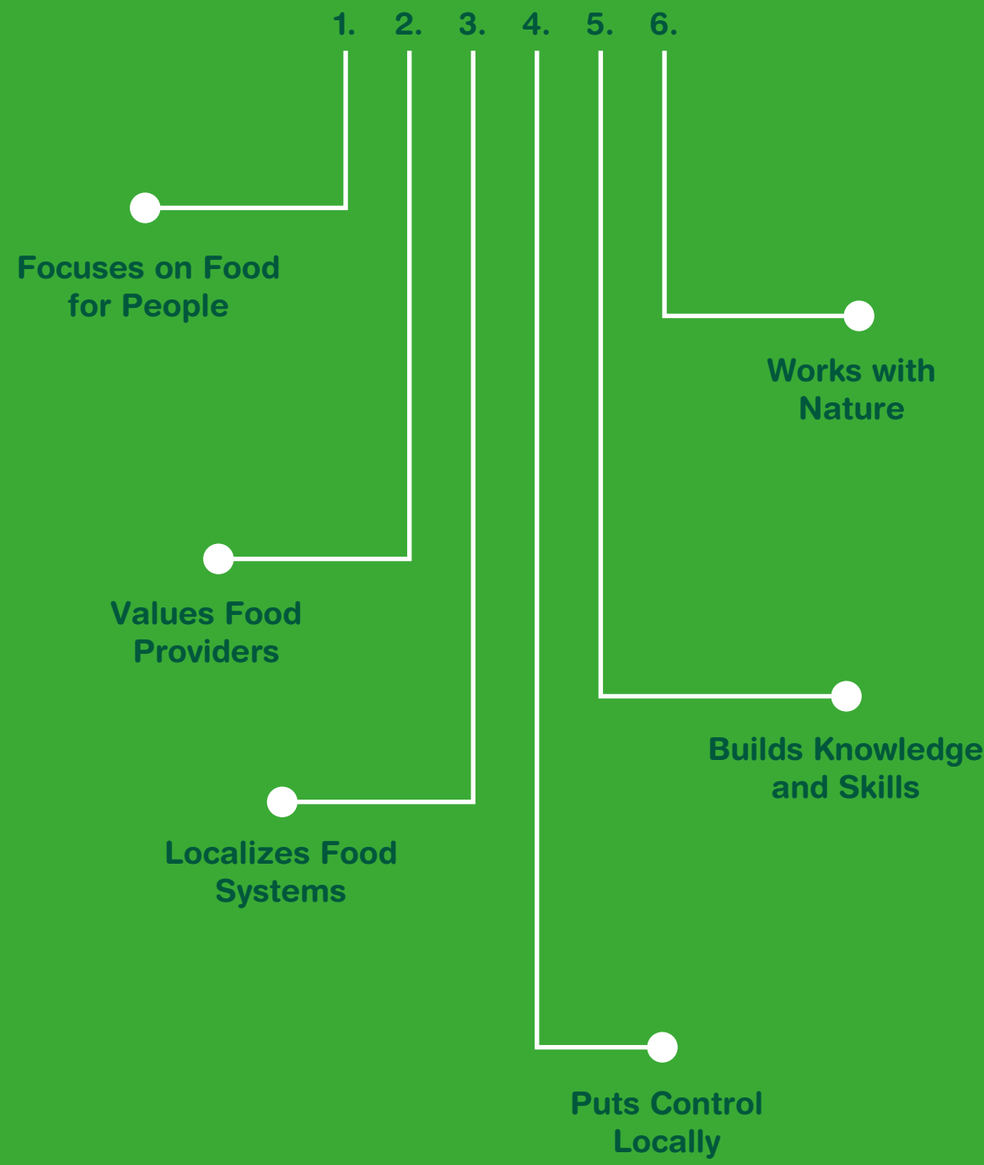
Building knowledge and skills

According to the FAO, 80% of global food supply is produced by family farmers, who typically store their most productive seeds from year to year, using the varieties most adapted to their region and climate. However, as more farmers adopt GMO seeds and industrial practices, many heirloom varieties and farming techniques have been lost. Indigenous communities across the world hold the knowledge for recovering agrobiodiversity, but these groups are rarely given a voice. For this reason, the fifth pillar of food sovereignty focuses on conserving local knowledge, and establishing networks to pass on these skills to future generations of farmers.

While indigenous groups lack the fora to spread their knowledge, many grassroots organizations are emerging to spread awareness amongst consumers about the origin of the food they consume. For example, the Spanish cooperative Eixarcolant carries out workshops, guided walks,

4. Photo: Marcos Quinteiro / Pexels

5. Photo: Tuan Anh Tran / Unsplash



and seed exchange events to encourage local farmers to prioritize heirloom varieties, and to encourage consumers to support those who prioritize agrobiodiversity.

Working with nature

The final pillar of the food sovereignty framework is about reducing the environmental impacts of food production. According to the FAO, agriculture is responsible for more than one third of global greenhouse gas emissions, and to reach the 2015 Paris Agreement objective of limiting global warning to 1.5°C, changes must be made. Implementing the agroecological practices within the framework of food sovereignty would significantly reduce the current environmental impact of food production. For example, deforestation is currently responsible for 11% of human greenhouse gas emissions, roughly 90% of which takes place for the expansion of large-scale crop production and livestock management. Meanwhile, the local, small-scale, and agrobiodiverse practices of agroecology bypass mass deforestation and the costs of international food exports. Furthermore, it is increasingly clear that the application of chemical pesticides and fertilizers are damaging soil fertility, putting the future of food production at risk. Countering this, food sovereignty advocates for organic production to regenerate agricultural soils. Whether we can feed a growing population using organic methods is a core debate, but according to the FAO, fields that have received chemical inputs for decades would need a carefully planned transition to maintain yields, while areas with low current external inputs have the potential to increase yields under well-managed organic methods, boosting the argument for using organic methods to pursue food security.

Sustainable food production is a defining trait of the *zeitgeist* of the twenty-first century, gaining the attention of public, private, and non-profit actors, and receiving attention on platforms ranging from Expo 2020 to Netflix in its trending documentary *Kiss the Ground*. From 2014-2020 the EU's Horizon 2020 Program – the largest public funding scheme in Europe – invested 3.7 billion euros in research and innovation for societal challenges, at least 50% of which was invested in agriculture and forestry, showing the increasing interest in the topic. This is just the beginning, and now is the time to integrate food sovereignty into the movement. We are now in the final decade of working towards the United Nations Sustainable Development Goals, and at the time of evaluating our progress towards towards SDG 2 (Zero Hunger), this movement is an invitation to shift our focus from food security to food sovereignty. ●



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

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Floating Farms and Water Bodies

WRITER: **MOHAMMAD SHAHADAT HOSSAIN**

Mohammad Shahadat Hossain traveled to the remarkable floating gardens in Barishal, Bangladesh. This historic farming system might be one of the best adaptation techniques for agriculture in flood-prone areas.



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Gagan is a small village in Pirojpur district of southern Bangladesh. Innumerable rivers and canals crisscross the area. Most of the villagers are farmers and their lives are closely connected to these water bodies.

But the water is not always a blessing for them. They face extreme hardships when it rains too much. As the water level rises, so do the worry lines on their foreheads. Sometimes, they have to live with flood water inside their homes. The longer the water stays, the more damage it does. Often, they have to rebuild their houses or leave their village to look for new livelihoods.

But with time the villagers are learning to adapt to life that centers around water. Today, they dream of a future in the land of their ancestors. The proverb "necessity is the mother of invention" is a reality here. Some people have survived for generations through their own ingenuity in the low-lying areas of Bangladesh

Over time, they have come up with new innovations and methods that not only provide food security but also create employment for many people. One of the most innovative approaches is floating agriculture. In areas where the land is under water for six to eight months of the year, farmers prefer to cultivate using this floating method.

Floating farms are popular in Barishal, Gopalganj, Pirojpur, and Satkhira. In the submerged lowlands during the monsoon season, water hyacinths and other aquatic plants grow in abundance and local farmers use these as floating beds to grow a variety of vegetables and produce seedlings.

Farmer Monir Hossain cultivates paddies for three months in the dry season and grows vegetables on floating farms for the rest of the year. For a long time, his forefathers have been practicing floating agriculture. Following in their footsteps, he specializes in floating farms and has successfully engaged in the profession for over a decade.

1. Jisan is working at his father's farm. Photo: Mohammad Shahadat Hossain

2. A pod waiting to be planted on a floating bed. Photo: Mohammad Shahadat Hossain

3. Children playing in the river. Photo: Mohammad Shahadat Hossain



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Ancient technology

Talking about floating farms, Hossain said, "our ancestors have been cultivating in this way. This farming method is about 200 years old. Floating agriculture is becoming more and more popular these days. Some people, who had once migrated to the cities in search of jobs, have now returned to the village and are making a living through floating farms."

The village women make small seed pots with sonali lata, a kind of aquatic plant. When there is no work in the field, the men help the women in this work. After the seeds germinate, they transplant the pots on to the floating beds where the seedlings grow and are ready for sale within 10 to 15 days. The farmers also cultivate seasonal vegetables, herbs, and spices. The floating farm produce includes chilies, garlic, turmeric, and strawberries, as well as vegetables, rice and wheat seedlings.

Realizing the importance of these farms, the Bangladesh government has taken various steps to promote floating farms. Marginal farmers receive various types of training and assistance through their local agriculture officer. In addition, insolvent farmers can get loans from private financial institutions which they can repay in monthly instalments.

The government and some local and foreign NGOs have also been working to introduce the system in other parts of the country. The Department of Agricultural Extension (DAE) is doing research and working on expanding and popularizing the floating farm method.

Experts believe that floating farms are one of the best adaptation techniques in agriculture in the flood-prone areas of Bangladesh. Floating farms were recognized as a Globally Important Agricultural Heritage System

Experts believe that floating farms are one of the best agricultural adaptation techniques for the flood-prone areas of Bangladesh.

(GIAHS) in December 2014 by the United Nations' Food and Agricultural Organisation (FAO).

Produce from the floating farms is safe and environment friendly as farmers usually do not use pesticides or chemical fertilizers. In some areas, when the floodwaters subside during the dry season, the floating beds become well-decomposed organic fertilizers for the next crop.

As a result of climate change and global warming, Bangladesh, along with other countries, is struggling more and more as rainfalls increase and sea levels rise. In the future, floating farms may become their mainstream farming method and help mitigate the dramatic changes being seen in the country.

4. A farmer at his floating farm. Experts believe that floating farms are one of the best adaptation techniques in agriculture in the flood-prone areas of bangladesh. Photo: Mohammad Shahadat Hossain



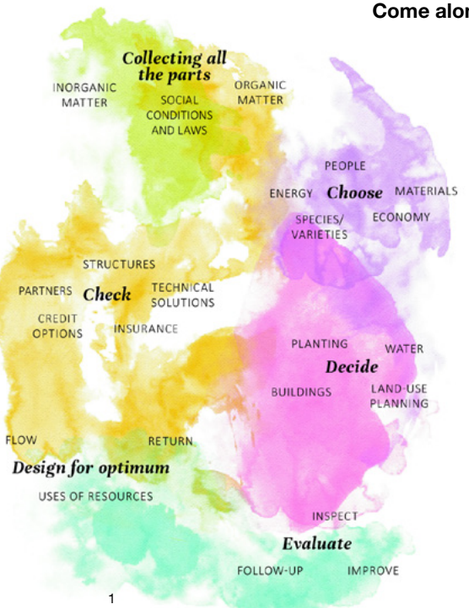
4

Sustainable Living Starts with Soil

WRITER: **EVA PETTERSSON**

Part I

Author of *Sustainable Gardening Made Easy*, Eva Pettersson, invites us to become stewards of more sustainable lives, sharing excerpts from her book on how permaculture is the best tool for doing so. Come along with us this spring and get your hands dirty.



1

Personal note

Today's industrial farming practices cause enormous problems such as deforestation, soil erosion, and pollution. Fresh ground is continuously being broken for producing corn, soy, grains, oilseeds, and raising livestock. Our diets have also become dependent on transporting food from all over the world - an unsustainable system that risks collapse at the slightest disruption.

Growing our own food is essential, and when we can't, choosing local, in-season organic produce is key. This is where permaculture can provide solutions.

Learning to cultivate is exciting and fun, yielding healthy food that contributes to sustainable living.

Spring is the best time to start. Whether you have a windowsill for a few pots or an entire garden, anyone can grow their own food.

Start with what you like to eat. Some easy beginner plants are herbs, lettuce, tomato, cucumber, zucchini, and chilli. You can find good cultivation advice online and in books such as *Sustainable Gardening Made Easy*. Learning how nature works is key to cultivating sustainably and imitating nature's way.

Permaculture is a holistic tool that can help us back to a sustainable life, integrating land, resources, people and the environment through mutually beneficial synergies – imitating the no waste, closed loop systems seen in diverse natural systems.

Permaculture's ethical principles are:

Caring for the Earth
We are part of the planet and live in synergy with all life.

Caring for people
Support individuals and society so everyone can live well and sustainably.

Fair distribution
To not overuse and fairly distribute the Earth's limited resources to all people.

Versatile soil for a happy environment

Industrial agriculture of today, with all its chemical fertilizers, poisons and irrigation systems, gradually destroys, and eventually kills our fertile soils. Taking your own first steps towards sustainable gardening and producing your own food can have both a positive impact on the environment, and your own physical and mental well-being.

The 12 design tools of permaculture

Together, the design tools reflect the three ethical principles of permaculture.

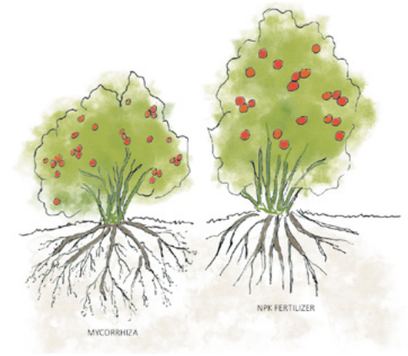
- Observe and interact
- Catch and store energy
- Obtain a yield
- Apply self-regulation and accept feedback
- Use and value renewable resources and services
- Produce no waste
- Design from patterns to details
- Integrate rather than segregate
- Use small and slow solutions
- Use and value diversity
- Use edges and value the marginal
- Creatively use and respond to change

1. Permaculture design. Illustration: Eva Pettersson

2. Root systems with and without mycorrhiza. Illustration: Eva Pettersson

Book Excerpt – Protecting our soil

Without healthy soils, we cannot survive. In the soil, there are more than 50 million species of bacteria and more than 50 million species of fungi. So far, we have only named 1% of these, and our knowledge of this 1% is limited.



2

Plants' taproots "drink" water and water-soluble nutrients, which in today's agricultural industry almost exclusively comes from the chemical fertilizer NPK that consists mainly of salts with nitrogen making the plant green and lush, phosphorus promoting growth, and potassium supporting blossoms and increased winter hardiness.

Even in organic farming, plants "drink" a saline solution as they can only absorb nitrogen as nitrates. The difference is that here, the nutrition comes from organic matter, such as manure or blood meal.

However, just "drinking" does not make a balanced diet. The plant also needs to "eat", and the most important factors for this is the work of the microorganisms and the mycorrhiza.

The plant's fibrous roots "eat" the nutrients in the soil with the help of countless microorganisms found on the surface of the fibrous roots. Through these microorganisms, the plant gains access to the soil's nutrients. In return, the soil's microorganisms get their "food" in the form of carbohydrates (starch from photosynthesis) from the plant. But different types of soils are not equally fertile. This means that not all nutrients are found everywhere, and it is here that mycorrhiza enters the picture.

Mycorrhiza is the nutritional interplay between fungal mycelium and the plant roots. Acting like a giant fish net, the mycorrhiza gives the plants a much larger area to collect nutrition while the fungi receives carbon from the plants. Mycorrhiza also gives the plants better protection from diseases, withstanding lower water levels, and coping with acidification.

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VIEWS

Mangrove Mystique

PHOTOGRAPHY BY **MANGROVE PHOTOGRAPHY AWARDS 2021**
WORDS BY **DANIELLE KUTKA**

Crowns of lush foliage and spindly stilt roots emerge from the mirror of calm water: the otherworldly juxtaposition of forest and sea, the allure of mangroves is compelling. But mangroves are more than their aesthetic appeal – these threatened ecosystems are vital for sustaining life as well as mitigating the impacts of climate change.

The only trees able to inhabit saltwater, mangroves are found on just under 12% of coastlines. They are hotspots for biodiversity, providing critical habitat for both terrestrial and aquatic life, including 341 threatened species, from tigers to sea turtles. In addition, over 100 million people living in the vicinity of mangroves rely on them for a variety of ecosystem services and goods, from forest products, clean water, and food – to protecting coastlines against erosion and weather-related events.

While they cover just 0.1% of the planet's surface, mangroves store more carbon per unit than any other ecosystem – and sequester up to 5 times as much carbon as rainforests. Current estimations project that mangrove ecosystems are storing over 21 gigatons of blue carbon.

Given their crucial role, it is paramount that the global community recognize the significance of mangroves and join the movement to support their protection and revitalization. The 2021 Global Mangrove Alliance's *The State of the World's Mangroves* report concluded that over the 20 years preceding 2016, the world has seen a net loss of 4.3% of its mangroves, yet global mangrove habitats still cover 136,000 square kilometers in 2016 – an area slightly larger than Greece.

While rates of mangrove loss have slowed globally, they are still being lost faster than any other type of forest, with 60% of all mangrove losses due to human impacts. The net change of these ecosystems can be tracked on the Global Mangrove Watch platform, the world's most comprehensive monitoring tool to date, which is also run by the Global Mangrove Alliance and supported by many partners including universities, NGOs and government agencies from around the world.

This VIEWS highlights images from Mangrove Action Project, a member of the Global Mangrove Alliance, and their 2021 Mangrove Photography Awards with the aim of capturing the beauty of life that rely on mangroves, while highlighting the challenges and work that needs to be done to conserve and restore these invaluable ecosystems.

↑ **Netherlands Antilles**

A rare and occasional encounter. Photo: Lorenzo Mittiga

Mangroves at a Glance



Mangroves include about 80 species of trees, three of which are found in the US - red, black, and white mangroves.

Northern Brazil is home to the largest continuous portion of legally protected mangrove ecosystems worldwide.

Guinea Bissau is one of the most mangrove-covered countries in the world; approximately 11% of the country surface is covered with mangroves.

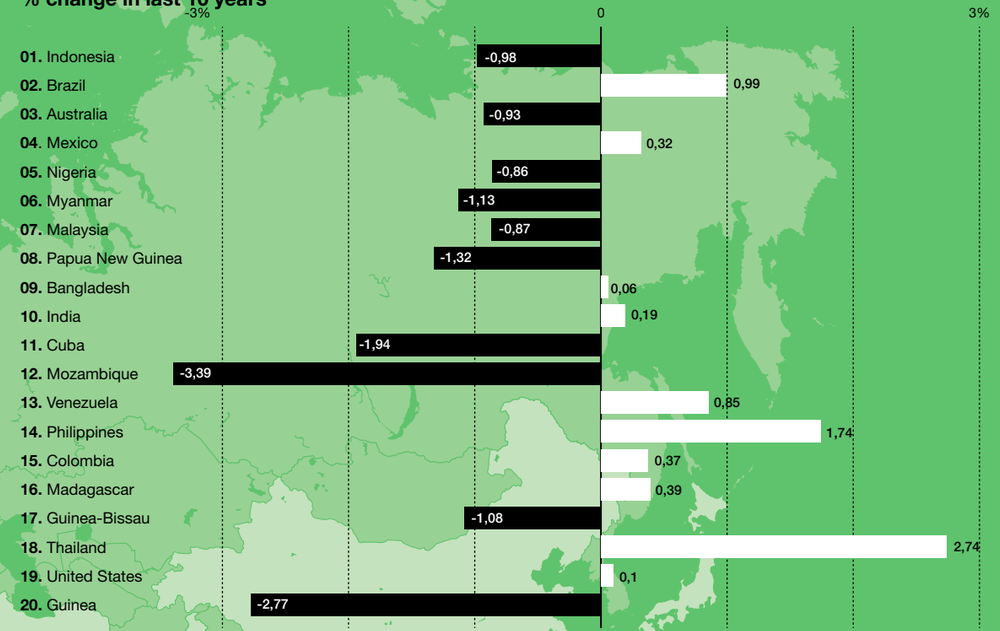
Sundarbans is the largest mangrove forest in the world with an area of nearly 10,000 km².

Indonesia has 20% of the world's mangroves. 70% of its mangrove losses are due to aquaculture, such as shrimp farming.

Mangroves can mitigate coral bleaching resulting from climate change, an alarming but increasingly regular occurrence in the Great Barrier Reef.

Top 20 countries with the largest mangrove areas

% change in last 10 years



↑ United Arab Emirates

A walk through the mangroves. Photo: Akbar

↑ India

Adaptation of Bengal Tiger. Photo: Arijit Das

↑ Indonesia

Diminishing mangrove forest. Photo: Anil T. Prabhakar

Kayaking at Al Reem Island. Photo: Hooreya Al Muflahi

↓ United Arab Emirates

↑ Philippines

Garbage on mangroves. Photo: Mark Kevin



↑ Mexico

The mangroves of Laguna Ventanilla grow thanks to the community. Photo: Andehui Danay Morales Flores



↑ Bahamas

A green sea turtle (Chelonia mydas) hides among mangrove trees. Photo: Shane Gross

Mangrove propagators. Photo: Mark Kevin

↓ Philippines



↑ Cayman Islands

Black red and white mangroves growing side by side. Photo: Ann Stafford

Poverty the root cause of mangrove degradation. Photo: Abel Kiprono

↓ Kenya

↑ India

The Fishhunter of mangroves. Photo: Agniswar Ghosal

↑ Mexico

The journey of propagules (germinated seeds). Photo: Angel Francisco Zaragoza Mendez

↑ India

The Observer – A tiger hides amongst the Garan trees. Photo: Agniswar Ghosal

↓ Mexico

Embrace Life – Marine wetlands provide ecosystem services that keep coastal communities healthy. Photo: Andehui Danay Morales Flores

↑ Indonesia

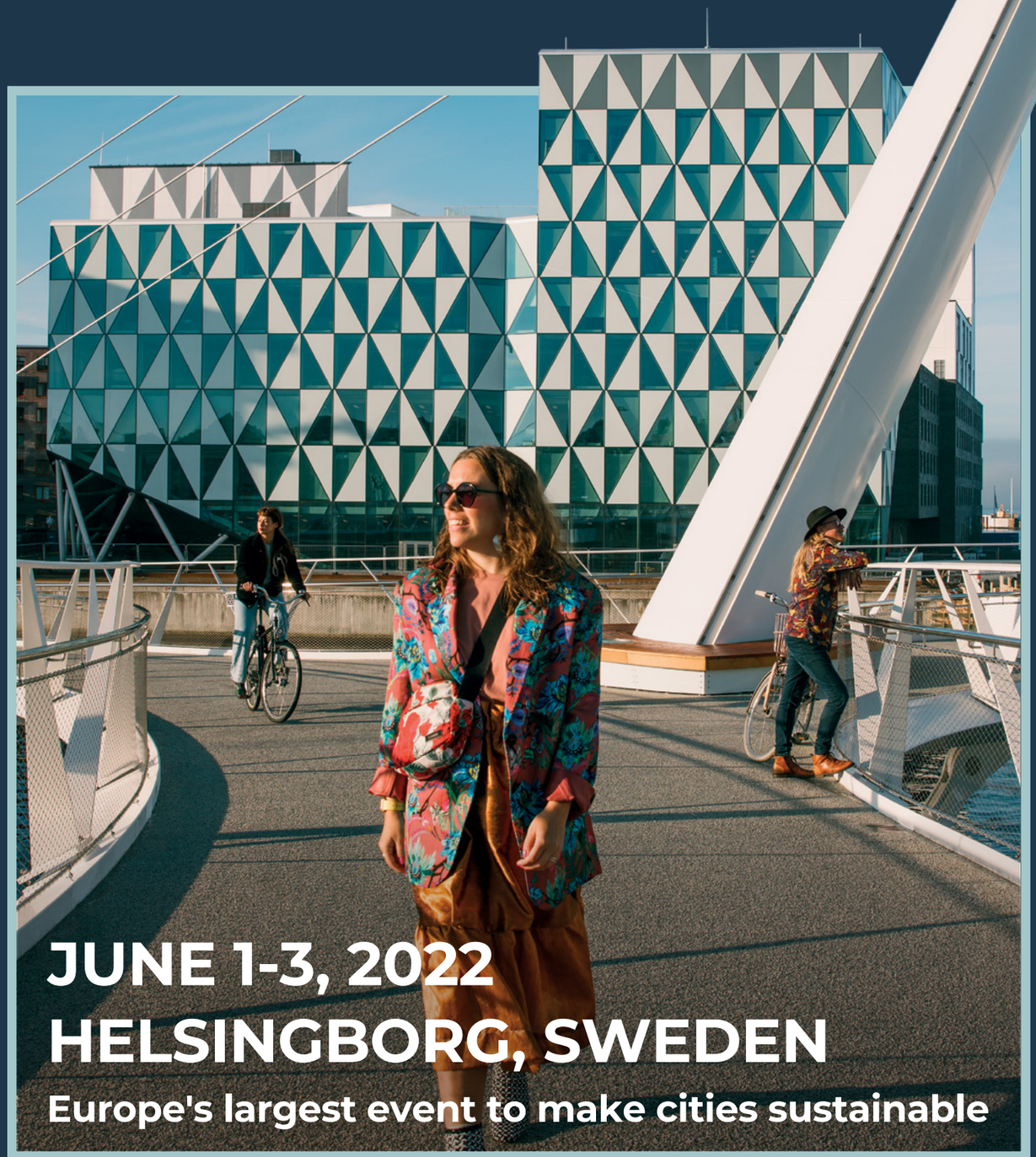
A little hope for the future. Photo: Aldo Restu Agi Prananda

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There is Still Hope if We Act Now

WRITER: **SUDHANSHU VERMA**

The evidence is clear we must limit the rise in global average temperature to less than 1.5°C to avoid the most catastrophic effects of climate change. Global temperatures have already risen about 1.1°C. If we act now, we can still secure a liveable future.

1

When I read the Working Group II contribution to the IPCC Sixth Assessment Report published on 28 February 2022, it took me down memory lane. I wrote the first press release in my career in March 2008. It was for the launch of The Climate Project – India under the 'patronage' of Dr R. K. Pachauri and the ex-U.S Vice-President Al Gore. They had just received the Nobel Prize. Dr Pachauri, at that time, was the chairman of IPCC, and I was fresh out of college. The buzz words for the climate change communication were "mitigation" and "adaptation". Over the years, slowly, the 'mitigation' part is fading, and the emphasis is on 'adaptation' now. The latest IPCC Working Group II report says the window is closing even for adaptation. There is a limit to how much we can adapt; eventually, as conditions become so extreme that the associated risks are "intolerable."

While reading the report, the realization sank in that these IPCC reports are not just about what will happen in the future anymore. It seems the warning phase is over. Hundreds of plant and animal species have disappeared from local areas, both on land and at sea. The heatwave, windstorms, wildfires, and tropical cyclones – we are living them. These weather extremes are coinciding, causing cascading impacts that are increasingly difficult to manage. They have exposed millions of people to acute food and water insecurity, especially in Africa, Asia, Central and South America, on small islands, and in the Arctic.

The Working Group II contribution to the IPCC Sixth Assessment Report probes into what it might look like if we cross the 1.5°C threshold. The report concludes that if the increase in some parts of the world exceeds 1.5C briefly, before dropping again by mid-century, it is probably still possible to avoid widespread irreversible changes. However, if we allow global warming to linger above 1.5°C for decades, climate change will transform the earth for centuries. People relying on glaciers and snowmelt for freshwater will face acute shortages. At 2°C, essential food crops would not grow in many places. And if we overshoot and spend a few decades above 1.5°C warming, many impacts will be irreversible.

At REVOLVE, we do not make grim warnings; we communicate about solutions. Still, it would be foolish not to highlight that the window to act is closing while we still have options. The report emphasizes that existing adaptation options can reduce climate risks if they are sufficiently funded and implemented quickly. The report breaks new ground by analyzing various climate adaptation measures' feasibility, effectiveness, and the potential to deliver co-benefits like improved health outcomes or poverty reduction. The report talks about utilizing indigenous and local knowledge to inform land-based mitigation and adaptation options. For example, including indigenous and local people in programs related to environmental conservation, formal education, land management planning, and secure tenure rights could be a key to facilitating climate change adaptation.

There are viable options to help us adapt to climate change, but time is of the essence. At least 170 countries' climate policies now include adaptation, but many have yet to move beyond planning into implementation. The next few years offer a narrow window to realize a livable future for all.

Changing course will not be easy. The report calls for a wholesale revision in how we live alongside nature. It will require immediate efforts to drop emissions, build resilience, conserve ecosystems, and dramatically increase finance for adaptation. However, such an exceptional response is not unprecedented. We have seen the extraordinary global response to contain the COVID-19 pandemic and the scale of the West's resolve in response to the Russian invasion of Ukraine. The latest IPCC report calls for another ambitious and concerted global action for the planet's sake. Both governments and the private sector must all step up. The upcoming COP27 in November 2022 will be a crucial opportunity for governments not just to make big promises and sign-off on non-binding ambiguous policy goals, but to show meaningful actions, commit to concrete proposals and for developed countries to demonstrate their solidarity with vulnerable nations.

At REVOLVE, we will step up to utilize our resources to mobilize public support for action and solutions. We will communicate about the choices we can make, which will determine what kind of future we will have. Do it the REVOLVE way by challenging the status quo. Changing our future by focusing on stories of hope, possibility, and human agency because perspective is everything, and everything is changing. We all need to help to bring this change because everything is at stake. ●

1. Protesters marching for climate action. Photo: Mika Baumeister / Unsplash

2. Activist in Germany campaigning for immediate climate action. Photo: Markus Spiske / Unsplash



2



1

Land Ownership: A Glass Ceiling for Rural Women

WRITER: **BEATRICE BACCARINI**

The impact of climate change amplifies gender disparities in rural areas. Women have reduced access to resources, face societal pressures, and have less land to farm. For lasting, meaningful climate action, we first need gender equality in rural land ownership to facilitate change.

In 2015, the United Nations set out a series of objectives in the 2030 Agenda for Sustainable Development that aim to improve life for all, both on an environmental and societal level. The Agenda contains 17 Sustainable Development Goals (SDGs) including SDGs 5 and 13 on gender equality and climate action.

Gender equality and climate change are interlinked. According to the United Nations Secretary General, António Guterres, “Rural women are the first adopters of new agricultural techniques, first responders in crisis and entrepreneurs of green energy” and are a powerful force for driving global progress. However, the impacts of climate change, including access to productive and natural resources, amplify the gender disparities existing in rural areas.

Rural women perform nearly half of the world’s agricultural work. One in three women are employed in the agricultural sector, yet this figure rises to over 40% in developing countries. Women cultivate fields, make agricultural products, and are responsible for taking care of families at home. In many regions, they are also responsible for water collection in areas with no running water, with rural women in Sub-Saharan Africa spending 40 billion hours a year collecting water.

In low- and middle-income countries, persistent gender discrimination and related norms mean that adolescent girls living in poverty are often the most vulnerable to the less visible impacts of climate change. This includes disruptions to their education, increased poverty over time, and an increased risk of early and forced marriages.

This inevitably stunts their economic empowerment and participation in political and public life, as well as access to services, health care, adequate food and nutrition, and to water and sanitation services. The complex articulation of discrimination against rural women makes them too often invisible victims: women produce 50% of the world's food, but own only 1% of the land.

The number of rural women living in poverty has doubled since the 1970s. According to a study by the European Commission, almost half of the rural population in the European Union consists of women, but only 30% of farms are run by women. The differences from country to country are significant: 45% of positions of responsibility are held by women in Latvia and Lithuania, to 10% or less in Germany, Denmark, Malta and the Netherlands. Yet several studies show that women could be able to increase their farm yields from 20% to 30% if they had equal access to resources.

Bigger yields would translate into bigger incomes. This would be a win for the planet as increasing crop yields on existing farmland is an essential part of food security and resource efficiency. By focusing on these areas of inequality in rural communities, it is possible to facilitate the positive social, economic and environmental change needed to tackle global planetary challenges such as climate change.

Agents of change facing climate change

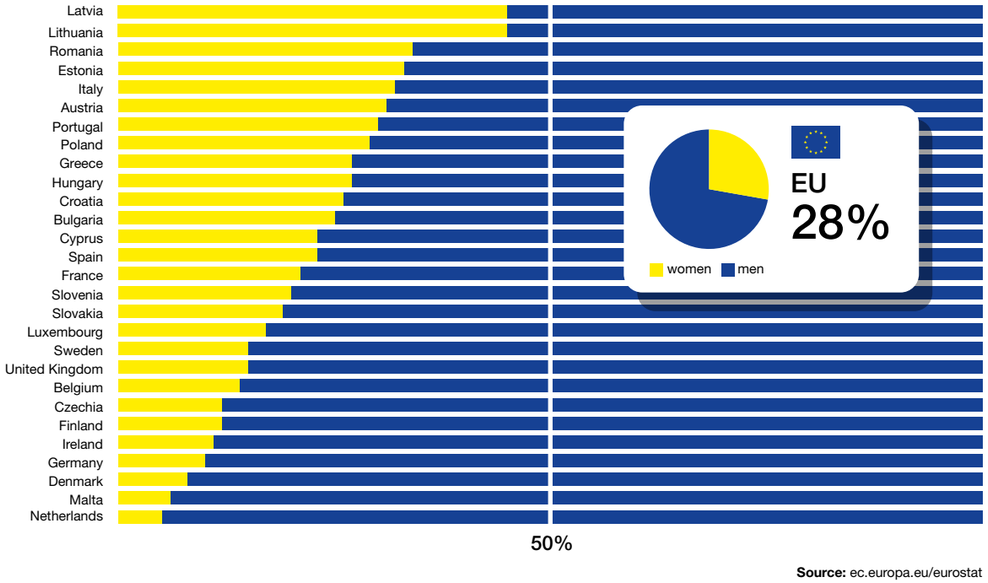
Climate change affects the well-being of women and men in different ways in terms of agricultural production, food security, health, water resources, migration, climate-induced conflicts, and natural disasters. In rural areas, women are often the first to suffer the consequences of damage to natural resources and agriculture. For instance, one-quarter of the total damage and losses undergone between 2006 and 2016 was sustained by the agricultural sector in developing countries, with a significant impact on food security and the productive potential of women and girls.

In developing regions, women and girls are primarily responsible for the supply and use of water, yet these are the areas most susceptible to the adverse effects of climate change. Drought, for example, means an increase in the amount of work for rural communities, for instance, a greater number of hours required to collect water. With women acting as the main suppliers for rural families, these additional responsibilities almost always fall on them. This results in a consequent drop in school attendance amongst girls, with ripple effects from a reduced education restricting their possibilities for future employment or public service.

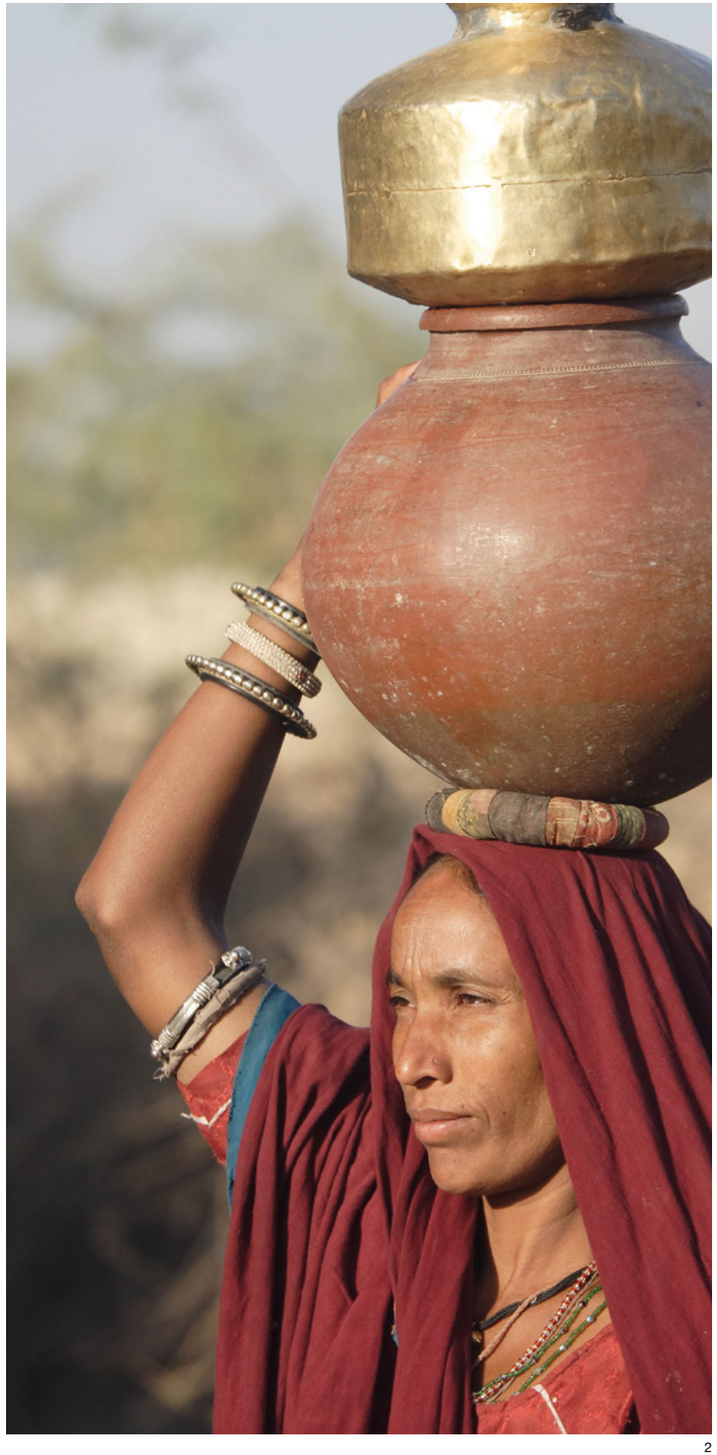
Yet despite these hardships, there is no doubt of the added value of women to rural communities. According to the FAO, rural women produce about half of the food consumed in the world and are responsible for a variety of related tasks including searching, collecting and processing food – tasks that are vital to areas suffering from food-insecurity. But still the risks of climate change loom over rural women more than men. According to the FAO, because women rely more on natural resources for their livelihood, they are exposed to the climate risks more than men thus absorb greater climate-related shocks while not benefiting from in advancements in climate-smart technologies or practices, which is a key to enhancing sustainable food systems.

This example makes clear the intimate relationship between climate change and gender equality: addressing one issue while neglecting the other will fail to secure a sustainable future for all of those living in these vulnerable areas.

Proportion of farm managers who are women, 2016 (%)



Source: ec.europa.eu/eurostat



1. Farmers evaluating traits of wheat varieties, Ethiopia. Photo: Bioversity International/J. van de Gevel

2. Tulsi Devi, wife of farmer Jay Ram, carries water to her house. Photo: ILRI / Stevie Mann

2

Women taking action

For the harsh realities faced by rural women, there are examples worldwide of rural women fighting for sustainable change. In the Sunderbans mangrove forest in India and Bangladesh, Rita Kamila has been striving for nearly a decade to achieve the right blend of farming and livestock husbandry in an area particularly susceptible to a changing climate.

In recent years, her farm has successfully transitioned to organic, growing a variety of foods using integrated farming concepts to grow livestock and farm fish. A biodigester plant was installed to generate biogas from farm waste such as livestock manure and fish waste. The biogas is then used for cooking and the residues are recycled back as nutrients to crops.

Another example are the farmers from the Medak District in Telangana, India, that are teaching peasants in Maharashtra's Vidarbha region how to use sustainable rain-fed farming techniques. As some of the poorest members of their village communities, these women were once landless laborers, but today, thanks to the women-led, village-level farmer associations, these women have not only tackled their farming problems but are generating an additional income through innovative and eco-friendly ways.

Using traditional preservation techniques, these women preserve organic seeds that they barter with other farmers in the region. Chandramma, who heads the Seed Bank at Pastapur, explained how they pick and keep the healthy grain in a mud container, layered with neem leaves, ash and dry grass. They then seal the whole box with mud, dry it and keep it in a secure space.

On their month-long seed bartering journey to 30 villages in the region, Chandramma and her fellow farmers teach other villagers how to follow organic farming methods and grow climate-resistant crops like traditional varieties of millets. Many of them have also become filmmakers despite no formal training, and have produced documentaries on organic farming, seed sovereignty, biofertilizers and good farming practices that have been screened worldwide and also launched the Sangham community radio, educating farmers in in over 200 villages in the region.



3

Women produce 50% of the world's food but own only 1% of the land.

Their rights and struggles concern all of us

These social movements, among others, are part of a long advocacy process that has led to the Declaration on the Rights of Peasants adopted in 2018 by the United Nations. This document is an elaboration on the rights of rural people and also addresses sectors such as artisanal and small-scale agriculture, crop planting, tourism, fishing, forestry, hunting, and also addresses different groups like indigenous and nomadic people, among others.

Article 2 of the Declaration pays particular attention to the rights and special needs of people working in rural areas, recognizing women as a discriminated group, which is an important step to increasing gender equality, but there is still a long way to go.

Rural women are references for the entire rural community and are at the frontline when natural resources and food are threatened by natural and political events. Despite the landmark UN Declaration on the Rights of Peasants, rural women are still far from being treated as equals in all aspects of society, and particularly in agriculture.

Giving women access to agricultural resources, training and services could increase the productivity of their farms and feed up to 150 million hungry people around the world. As long as we are not giving proper importance to women and their living conditions, how can a

3. A woman catching fish in the river close to the Sundarbans forest area, Bangladesh on April 25, 2021. People living in the Sundarbans region suffer from a water shortage in the dry season as a result of increasing salinity in the groundwater, and of the river Satkhira, caused by rising sea levels. Photo: IMF Photo/K. M. Asad

4. Young Farmer Climate Champion Aimee Budge of Bigton Farm, Shetland, UK. Photo: ScotGov Rural/ Barrie Williams

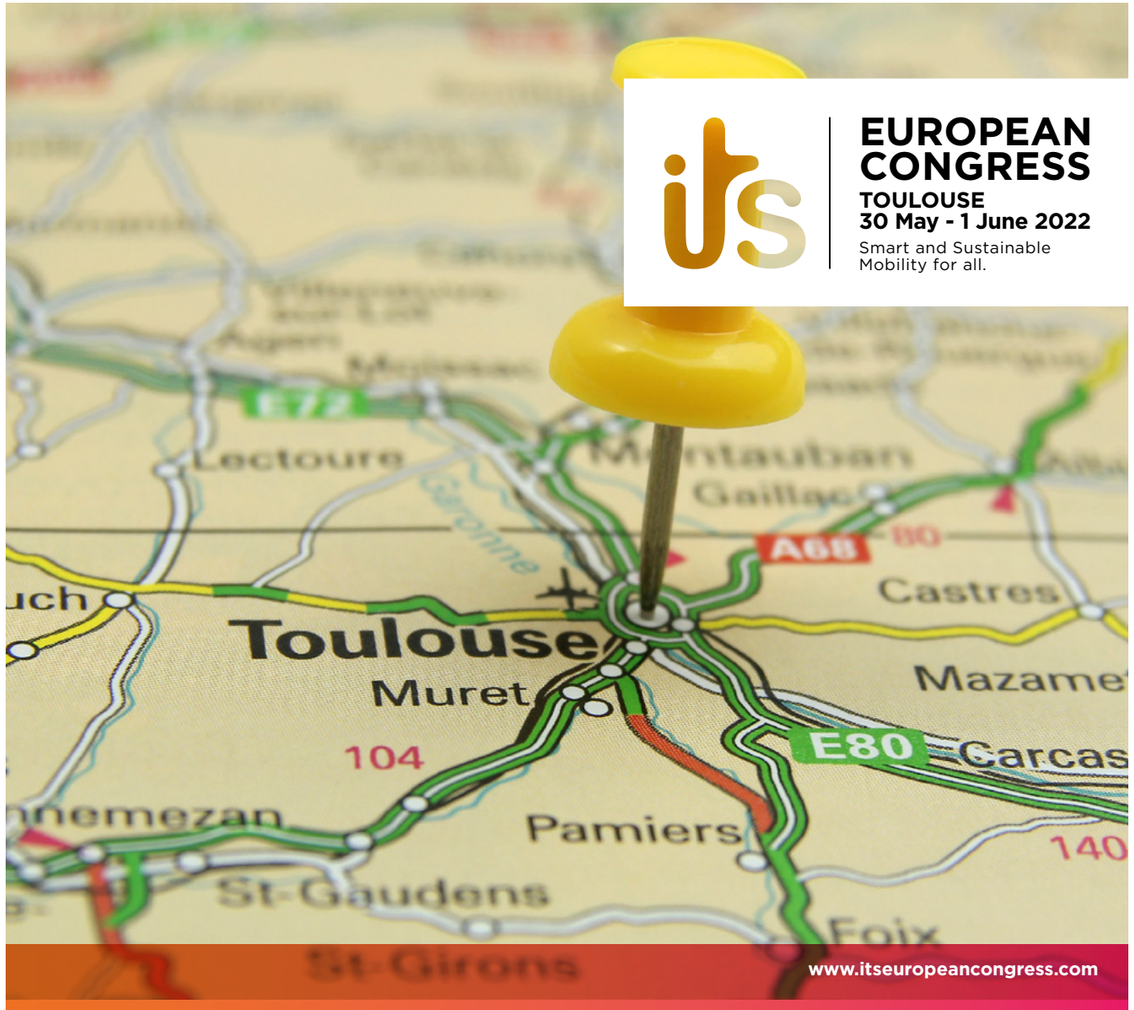
family, or a society, or indeed a country be cultivated for the better?

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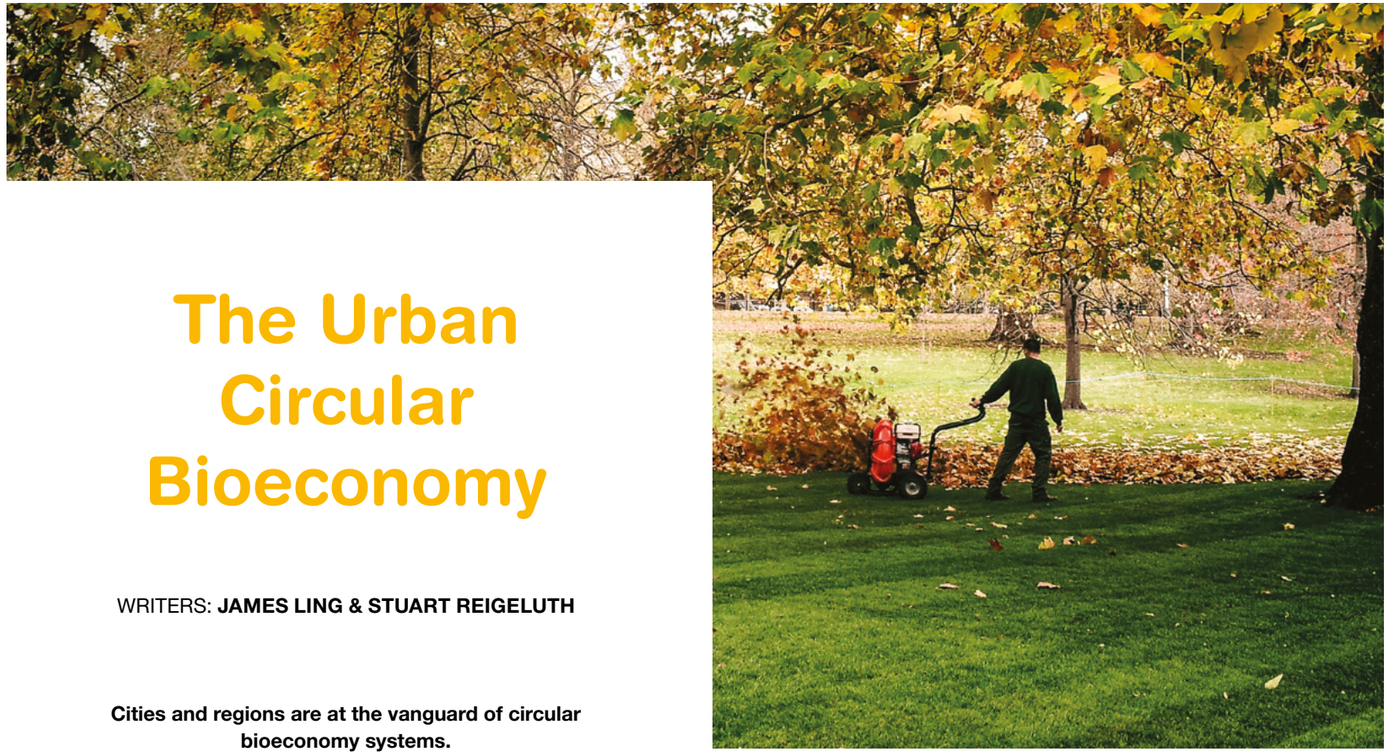
Women are change agents, meaning that if a change is needed they will often be instrumental in identifying what needs to be done and then making it happen. Climate change is a huge and existential threat, but women play a fundamental role in our fight against it. Any problems we face as a result will be easier to solve if both men and women are equally included in solving them. To this aim, the campaign SHE Changes Climate was launched during COP26. Its global mission is to ensure all delegations in climate negotiations have at least a 50% representation of diverse women at their top levels, now and in the future. That is why they have launched a campaign #5050Vision calling for all parties to be represented in decision-making processes - because it affects all parties. ●



4







The Urban Circular Bioeconomy

WRITERS: **JAMES LING & STUART REIGELUTH**

Cities and regions are at the vanguard of circular bioeconomy systems.

1



2

3



4

Largely as a result of exploitative capitalism, the linear economy of extracting, producing, consuming, and discarding materials has dominated our lives for the past centuries. But now, as we go deeper into the 21st century, things are changing. Irrevocably, we are moving towards a more circular economy – a system in which materials and waste are reduced and recycled in order to be reused and repurposed into new products. Of course, it's not possible to reuse or recycle every element of a given material, meaning that there will always be waste at some level – even the energy and water used to repurpose old materials into new products can be wasteful if not used efficiently. But systems are changing now.

1. Well sorted waste in Münster, Germany.
Photo: Rasmus Schübel / AWM

2. LIPOR composting plant in Porto, Portugal.
Photo: LIPOR

3. Cleaning up fallen leaves in a city park.
Photo: Garry Knight

4. Truck for collecting biowaste in Western Macedonia.
Photo: DIADYMA

The entire design thinking of systems is changing, and with it a general mind shift is occurring: a collective realization that we cannot be so wasteful all the time anymore. It is well known now that just 100 companies are responsible for 71% of global greenhouse gas emissions. It is daunting to consider the enormity of this fact, but as individuals we can still make changes to be more sustainable. Local authorities can encourage citizens and residents to take simple actions like separating their waste, an essential step to enable high quality recycling. National governments can pass legislation to ensure companies respect environmental standards and take more responsibility for the products entering their markets, while supra-national entities can regulate the system to make sure that the standards are more homogenized across countries.

Cities and regions have a primordial role to play as the world is rapidly urbanizing, resulting in ever-increasing resource requirements and pollution flows. It is now estimated that cities are responsible for 80% of global energy consumption, and that more than 40 billion tons per year of materials are extracted-transformed-transported by urban technical networks. As a consequence of this mobilization of matter and energy, cities are also responsible for 65% of global atmospheric emissions.

People are starting to seriously rethink urban systems and how our cities operate, logistically and with the environment and efficiency in mind. Moreover, the way we live, and the amounts we consume, are alarming: per capita waste by consumers is between 95-115 kg a year in Europe and North America, while consumers in sub-Saharan Africa and South-East Asia throw away only 6-11 kg a year. As around half of our waste is organic materials, this is where the urban bioeconomy comes into play by looking at how cities and regions can recover valuable resources from our

food waste (leftovers from meals and unsold produce) and our wastewater (from household washing and cleaning). What happens to our food leftovers when they are collected by trash trucks? What happens to the shower water after it goes down the drain? Where does it go? Increasingly, wastewater and food waste are going towards processes that can extract the resources to make new products for industries such as agriculture: food waste can be broken down and processed into bio-fertilizers that are more natural and better for the environment.

Spearheading Circular Bioeconomy Systems

The 2018 EU Bioeconomy Strategy anticipates cities becoming major circular bioeconomy hubs, where biowaste is a feedstock for safe and sustainable bio-based products. As well as the aforementioned moral and environmental imperative to reuse and recycle materials, the strategy also puts forward the economic case, highlighting Amsterdam where they estimate that better use of organic residue streams in the city could generate 150 million euros per year and create 1,200 new jobs.

To help make this a reality across the continent the European Commission has allocated a sizeable chunk of research and innovation funding to the topic over the past decade. Numerous EU-funded Horizon 2020 projects have focused on developing the innovative processes that will be needed to transform biowaste into more valuable products. SCALIBUR, ValueWaste and WaysTUP!, to name but a few, are bringing technologies out of the lab and closer to commercial deployment. And who knew so many products can be made from biowaste? Bioplastics from food scraps, chemicals from coffee grounds, using insects to create protein rich animal feed... the possibilities are endless.

We are now at a crucial juncture though. Proving these technologies work is one thing, seeing them widely deployed presents a whole new set of challenges. Being an early adopter of any innovative technology – being the first to try something new - always carries a certain level of risk. And this risk can be hard to justify for the, mostly public, organizations that manage our waste. That's where HOOP comes in. The HOOP project is giving project development assistance (PDA) to eight lighthouse cities and regions, supporting them to prepare large-scale investments in innovative solutions for biowaste valorization. This tailored guidance will help unlock over 50 million euros of investment, and hopefully pave the way for others to follow.

The PDA has many elements, starting by understanding the local context and 'urban metabolism' of the territory. The HOOP lighthouses also receive support with technological and environmental assessments, circular business models, and innovative financial engineering & procurement. An additional important element is the stakeholder engagement actions, which bring together all local actors to ensure that any future investment is in the interests of the wider community.

5. Compost heap. Photo: Edward Howell

6. Separately collected food waste in Bergen, Norway. Photo: BIR



5



6

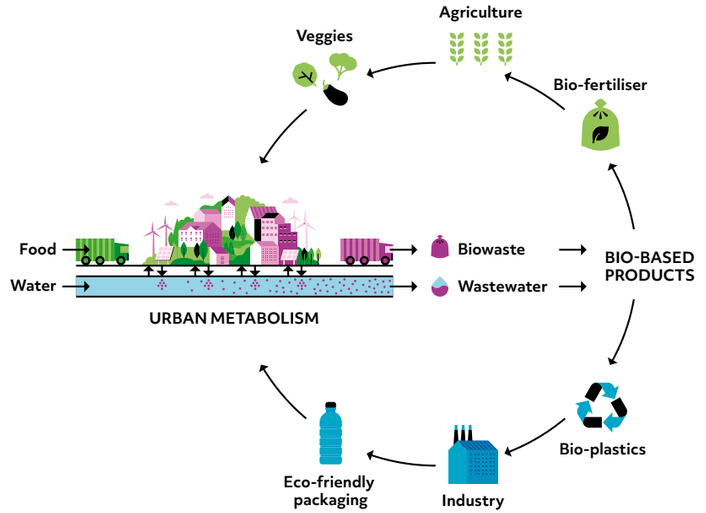
Alongside the work in the eight pioneering cities and regions, HOOP aims to have a pan-European reach and impact. The HOOP Circular Investors Board brings together leading investors in sustainable finance – ranging from small asset managers to the lending arm of the European Union, the European Investment Bank (EIB) – to help mainstream sustainable investments towards the urban circular bioeconomy. And to exchange knowledge among territories across Europe, partners have created the HOOP Network of Cities and Regions. The network is open to all organizations that plan, organize, or operate municipal waste management or wastewater treatment, for instance local or regional authorities or waste management companies. By joining, cities and regions gain access to information about innovative urban bioeconomy solutions and are engaged in knowledge sharing events and study tours.

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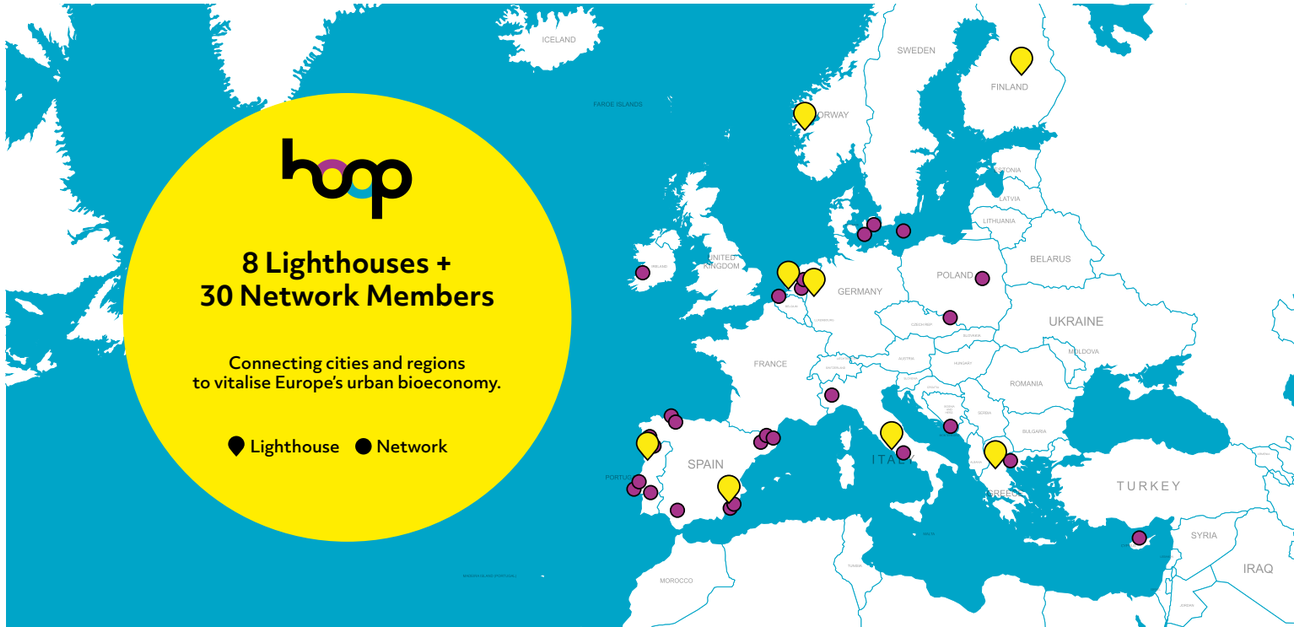
The circular bioeconomy is an enticing prospect, one which can help alleviate a range of societal challenges – reducing our reliance on imported fossil-based materials, giving Europe greater energy independence, and limiting greenhouse gas emissions – while also creating diverse green jobs across the Continent. Thanks to some pioneering cites and regions it could be coming to a town near you very soon!

7. The HOOP Project Concept Visual: A circular bioeconomy system in the making that includes the full value chain of food and water pathways going through the urban metabolism to go out as biowaste and wastewater that is processed and used to make bio-based products for agriculture and industry. Source: REVOLVE.

8. The HOOP Network of Cities and Regions



7



8

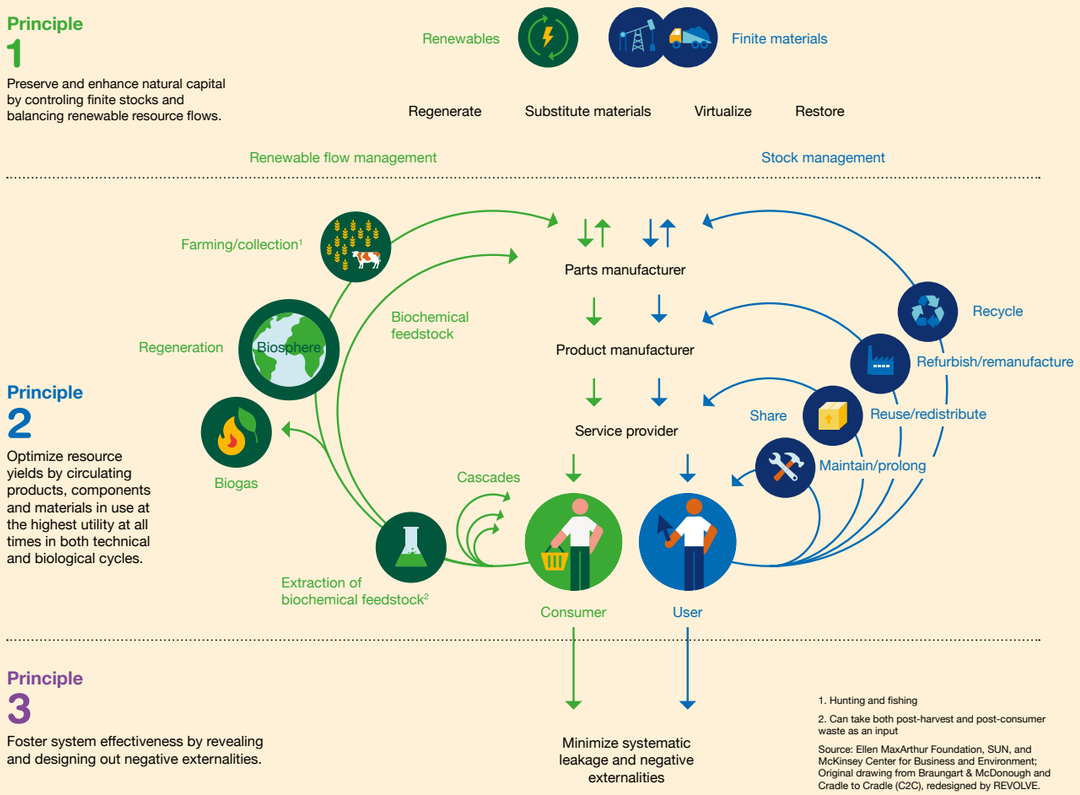
What is Urban Metabolism?

Urban Metabolism (UM) is an interdisciplinary concept that studies how cities interact with the environment and more specifically how they use resources and emit pollution flows as well as the associated societal, economic and environmental challenges around these flows. UM research thus attempts to better understand the functioning of cities by characterizing and understanding all socio-technical and socio-ecological processes by which flows of materials, energy and water are consumed, transformed and rejected in different forms by cities.

Christopher Kennedy and fellow researchers produced a clear definition in their paper *The Changing Metabolism of Cities* (2007) claiming that urban metabolism is "the sum total of the technical and socio-economic process that occur in cities, resulting in growth, production of energy and elimination of waste." With the growing concern of climate change and atmospheric degradation, the use of the urban metabolism model has become a key element in determining and maintaining levels of sustainability and health in cities around the world. Urban metabolism provides a unified or holistic viewpoint to encompass all of the activities of a city in a single model.

Urban metabolism collects important and very useful information about energy efficiency, material cycling, waste management and infrastructure in urban environments. The urban metabolism model records and analyzes environmental conditions and trends which are easily understood for policy makers and consequently comparable over time making it easier to find unhealthy patterns and develop a plan of action to better the level of sustainability.

Outline of a circular economy



1. Hunting and fishing

2. Can take both post-harvest and post-consumer waste as an input

Source: Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment; Original drawing from Braungart & McDonough and Cradle to Cradle (C2C), redesigned by REVOLVE.

Visualization of territorial space in urban metabolism



Political space

Territorial economic space

Socio-ecological space

Space for infrastructures planning

1 Space of flows

1. Commodities and secondary materials
2. Agricultural products and organic waste
3. Energy imports and exports
4. Construction materials and bulk waste
5. Manufactured procucts and equipment waste
6. Wood and wood waste

Original drawing from Bahers 2021, redesigned by REVOLVE

Source: Wikipedia / Metabolism of Cities

Ref: Kennedy, C., Cuddihy, J., & Engel-Yan, J. (2007). The changing metabolism of cities. Journal of Industrial Ecology, 11(2), 43-59.

Ref: The place of space in urban metabolism research: Towards a spatial turn? A review and future agenda

Jean-Baptiste Bahers, Aristide Athanassiadis, Daniela Perrotti, Stephan Kampelmann

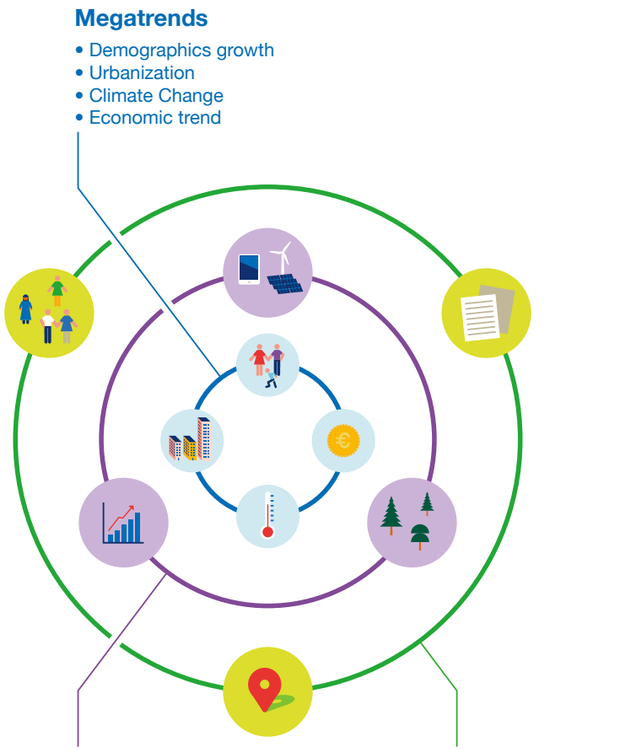
Roughly one-third of the food produced in the world for human consumption every year – approximately 1.3 billion tonnes – gets lost or wasted.

Source: UNEP

Resources suggested by REVOLVE:

Dig deeper, discover more:

- The European Commission: Circular economy in cities: **https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/priority-themes-eu-cities/circular-economy-cities_en**
- The European Circular Economy Stakeholders Platform: **https://circulareconomy.europa.eu/platform**
- EIB: The Circular City Centre: **https://eiah.eib.org/about/circular-city-centre.htm**
- Circular City Funding Guide: **https://www.circularcityfundingguide.eu**
- Ellen MacArthur Foundation: Cities and a circular economy: **https://ellenmacarthurfoundation.org/topics/cities/overview**
- OECD: The Circular Economy in Cities and Regions: **https://www.oecd.org/regional/cities/circular-economy-cities.htm**



A conceptual framework for circular economy in cities and regions

Source/OECD, redesigned by REVOLVE

Vitalise Europe's Urban Bioeconomy

The **HOOP project** supports **8 lighthouse cities and regions** in developing large-scale urban circular bioeconomy initiatives that will focus on making bio-based products from urban biowaste and wastewater.

www.hoopproject.eu

Consortium Partners

The HOOP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101000836.



1

Romania Lags Far Behind EU Water Standards

WRITER: **ANDA SEBESI**

The European Commission has given Romania the green light on over €28 billion in grants and loans through its national resilience plan, but the country has a large gap to close to meet EU water supply and sanitation standards.

Since joining the European Union back in 2007, Romania has made significant progress towards a modern economy. Most recent estimations by the European Commission show its GDP per capita has grown from around €2,000 in 2007 to €11,860 in 2021.

Yet, despite having attracted significant foreign direct investments (FDI) and billions in EU funding, Romania's public infrastructure remains underdeveloped and in need of further major investment.

The country has also been lagging behind in terms of compliance with the Urban Waste Water Treatment Directive (UWWTD) compared to its European peers, meaning it is crucial for authorities to improve water and sanitation access in rural areas. One reason for this has been that regional operators face barriers when it comes to absorbing investments and implementing projects in the sector.

Closely linked to these primary challenges are issues around the water and sanitation reform process in the country and affordability and efficiency. Finally, the impacts of climate change as well as the maintenance backlog of aging existing infrastructure compounds the water sector's difficulties.

Prioritising effective investments

With a population of nearly 18 million, European Commission data show that in terms of drinking water, a staggering 57% of Romanians were not connected to the public water supply in 2019. Romania's estimated annual average expenditure per capita on water supply and sanitation was €56 between 2011 and 2015, according to Eurostat estimations – around a quarter of the average expenditure per capita in Belgium.

Although progress has been made in recent years, Romania still ranks last in the EU for sanitation access with most rural households having no access despite EU money being made available for sanitation and clean water networks.

Although the local authorities are aware of the poor state of the water and sanitation infrastructure, the water supply and sanitation upgrades required to achieve European Union standards might be too expensive. There are also doubts about the country's ability to afford the maintenance costs of such a complex system, according to a World Bank's Beyond the Gap report, which argues that affordability matters. The EU–subsidized upgrade to bring Romania's water and sanitation systems in line with EU standards will cost the equivalent of 16% of GDP.

By exploring thousands of scenarios, the World Bank report finds that new infrastructure could cost low- and middle-income countries (LMICs), a category where Romania is included, anywhere between 2-to-8% of GDP per year by 2030, depending on the quality and quantity of service targeted and the spending efficiency achieved in reaching this goal.

The most recent estimations of the European Commission say that Romania will post an economic growth of 7% this year, reaching €235 billion. This means that it should invest between €4.7 billion and €18.8 billion in the coming years to improve its water and sanitation infrastructure – yet even these numbers could be misleading.

"Investing in infrastructure is not enough; maintaining it matters. Improving services requires much more than capital expenditure. Ensuring a steady flow of resources for operations and maintenance is a necessary condition for success," the World Bank report states. In addition, good maintenance also generates substantial savings, reducing the total life-cycle cost of transport and water and sanitation infrastructure by more than 50%.

Local authorities have said that Romania should double or increase threefold its capacity to invest in water and sanitation as well as in monitoring the quality of the drinking water. Yet, this is a big logistic, financial, economic and administrative challenge. For that to happen there is a need for significant and effective reforms in order to create a more favorable environment for further investments, to accelerate the absorption of European funds and to manage the infringement risk.



3



2

Investment in infrastructure is not enough; maintaining it matters.

1. Abandoned water treatment plant.
Photo: Darkday / Flickr

2. Validation conference for the Evaluation of the Urban Waste Water Treatment Directive. Belgium, Nov. 2018.
Photo: European Union / Giedre Daugelaite / Flickr

3. Bucharest, Romania. Photo: Christina Kirschnerova / Unsplash

Financial opportunities on the horizon

Despite the fact that the situation is far from ideal and out of line with the EU water and sanitation standards, there is also good news coming from the European Commission.

In May 2021, Romania submitted its official recovery and resilience plan (PNRR) which sets out the reforms and public investment projects that it plans to implement with the support of the EU's Recovery and Resilience Facility (RRF) – a temporary recovery instrument aiming to mitigate the economic and social impact of the coronavirus pandemic and to make European economies and societies more sustainable. Romania has requested €14.3 billion in grants and €15 billion in loans under the RRF and it plans to use the money in six areas of what it calls the 'green transition' pillar: (i) digital transformation, (ii) smart growth, (iii) social cohesion, (iv) territorial cohesion, (v) health and resilience, and (vi) policies for the next generation.

Future upgrades to its water and sanitation system are included in the 'green

transition' pillar of PNRR. The Romanian Government plans to use the money coming from the European Commission via the PNRR to implement a specific program for building new water supply and sanitation systems following an investment of €1.88 billion. As a result, some 80,000 rural households will gain access to drinking water and sanitation. In 2019, around 6% of Romania's population were living in communities with less than 2,000 inhabitants, representing a million people not connected to the sanitation system.

Towards sustainable water management

According to a document of the Organisation for Economic co-operation and Development (OECD) released back in 2019, in order for Romania to close the financial gap and manage the transition towards sustainable water management, it needs to focus on projects and reforms that deliver actual progress towards compliance and benefit to communities on the ground. Such projects don't need to be grandiose or operate on a large scale, but demonstrate the capacity to make valuable use of available finance, and garner support for further action.

Developing a mid- and long-term sustainable financing strategy in cooperation with national and local authorities in order to comply with the existing Urban Waste Water Treatment Directive is one of the OECD recommendations for Romania.

Prioritization of investment in terms of policy objectives as well as geographic areas and environmental protection is another important aspect that the Romanian authorities must consider. Romania should invest first in projects that trigger tangible benefits for communities on the ground now and deliver on compliance with EU regulations. In addition, investment planning should factor in demographic trends, including depopulation of rural areas and smaller towns to avoid over-investment in outsized infrastructure that will be costly to operate and maintain in the future.



4

Romania should also establish targeted social measures to address affordability constraints and solidarity mechanisms to help cover investment costs in communities where financing capacities are especially limited for water and sanitation systems. For that to happen, Romania could examine models used in other countries such as Spain, Portugal, France, or Greece, with options including rebates or targeted subsidies for connection to public networks. Especially in rural areas, affordability issues are likely larger than those captured in official statistics, as a large portion of the most vulnerable people do not have access to piped drinking water, and even less have access to waste water services. Affordability issues discourage many households from connecting to newly installed water or waste water networks. In such a context, decentralized technology - eventually publicly operated – may be appropriate, if performance and compliance are duly monitored and enforced.

Only strong cooperation between the local authorities and all the players involved and interested in improving the water and sanitation infrastructure could lead to significant progress in this sector. The Romanian state must make effective investments based on the actual needs of the local communities where there is a lack of access to safe drinking water and sanitation. ●



5

4. Union Square, Bucharest, Romania. Photo: Stefan Jurca / Flickr

5. Worker at waster water treatment facility. Photo: Danilo Pinzon / World Bank / Flickr



1

From Sustainable to Circular: A Clothing Company's Journey

WRITER: **SÖREN BAUER**

There are a broad variety of guidelines and standards when it comes to ensuring that companies are sustainable. The German corporate wear company, HAKRO, meets all the key environmental and social sustainability standards, taking care to even certify its supply chain. But when confronted with questions on circular economy and the end-of-life of their clothes, HAKRO had to start rethinking its products and product design.

HAKRO has been climate-neutral since January 2022. The company, based in Schrozberg, Germany, has over 180 staff members and sells 8-10 million items of corporate clothing each year. HAKRO reduces its global carbon footprint, their website claiming they compensate for CO2 emissions "wherever they cannot be avoided or reduced yet" and have even extended their responsible corporate behavior into a complete management approach for sustainability.

HAKRO's first annual sustainability report was published in 2016, but today things are changing. Jochen Schmidt, Head of Quality, Values and Sustainability, states "This year we are moving to the next step – Integrated Reporting. We will no longer keep the financial and non-financial reporting separate but integrate everything in one big report, following the standards of the Global Reporting Initiative ."

Schmidt joined HAKRO in 2015 to head the team in charge of all things sustainability – from implementing multiple certification processes, to monitoring and managing the close partnerships with HAKRO's suppliers in Bangladesh and Turkey. Most recently, the team managed a two-year internal transformation process resulting in the definition of HAKRO's four new main areas of impact: management and communication, supply chains and products, team and diversity, and location and resources. Under these four main areas, HAKRO has identified 144 goals and matched them against the UN Sustainable Development Goals (SDGs), which like the UN, they are aiming to achieve by 2030.

Yet at the end of 2020, the circular economy appeared on the organization's radar, thanks to HAKRO's internal transformation process.

"Some staff at our headquarters in Germany asked, 'what happens to our clothes at the end of their life cycle?' as many of them had images and videos of clothes ending up in the Atacama Desert in Chile and wanted to know about HAKRO's approach to the recycling of our corporate wear."

That is when HAKRO' journey towards circularity started. "We realized that the 'out of sight, out of mind' approach to our 8-10 million pieces of clothes per year was not in line with our values, and that we needed to do something beyond the point of sale."

Sustainability and circularity are far from the same

HAKRO is not the only company with high standards of social and environmental sustainability who have been confronted with the circularity challenge. Erik Roos Lindgren, PhD researcher at the University of Messina in Italy, has conducted research on methods and tools to measure sustainability and circular economy at

the company level in the framework of the EU-funded CRESTING project. He explains that “Both in scientific literature as well as among companies, various interpretations of the connections between circular economy and sustainability exist. To address the apparent need for clarity on the circular economy assessment, we designed a new assessment framework. A fundamental question was what do we need to measure? And what should the outcome of CE strategies be for the concept to be valuable?”

From literature and practice, Lindgren knew that circular economy strategies do not always lead to more sustainable outcomes. Thus, the research did not focus on resource efficiency, but on the sustainability impacts of such strategies. As a first assessment step, Lindgren mapped the system’s resource flows. Second, the related impacts on the three sustainability dimensions – environmental, social, economic - were assessed. So-called Life Cycle Assessment (LCA) plays a role here since it has been used to evaluate the environmental impact of products and services.

Lindgren explained how despite many companies applying LCAs, challenges surrounding their complexity and costs still exist, leading to tension between the feasibility for companies to carry out these assessments and I ensuring their methods are accurate.



2

What happens to corporate wear beyond the point of sale?

Back at HAKRO, some such approaches are considered in its 144 goals, some are being discussed in new collaborations with external consultants, non-profits or existing clients. At the end of 2020, HAKRO had no idea what was happening to their clothes after they sold them. “We had never even asked ourselves the question of what happens to our products after the point-of-sale,” Schmidt explains. “While we had indeed taken care of our supply chain, our sourcing, the labor conditions at our production partners’ facilities – and proudly promoted our company values and our sustainable production – we did not know anything about the recyclability of our products or further possible uses in a second life cycle.”

To address this, one of the first things HAKRO did was to hire external expertise, Berlin-based consulting company circular.fashion. But despite the external advice, circular solutions are not always practical when it comes to maintaining the quality of an organization’s product. “We sent them a few pieces of each of our products and they checked the material. We found out about the recyclability of our products which was very interesting albeit hypothetical. One of the key challenges for us is that we solely use yarn with long staple length to guarantee the high quality, durability and longevity of our corporate wear. This will become a big issue when we have to use recycled yarns with short staple length as it would not meet the quality standards, and might therefore not be feasible.”



3

Towards circular business models

Tomas Santa Maria at the University of Graz in Austria is another PhD researcher from the CRESTING project who has investigated circular business models. He explored how incumbent firms transformed or diversified their business models towards the circular economy.

When asked about the interdependence and overlaps between sustainability and circularity, he confirmed that most firms see the circular economy as a pathway to a more sustainable system, one that could offer economic returns while reducing environmental impacts.

1. In Cambodia, the social mission project called ‘Clothing the Loop’, unrelated to HAKRO, sorts through hundreds of tons of clothing in an abandoned factory. The project aims to raise awareness about the devastation that fashion habits are causing to nature.” Cambodia, 2020 Photo: Francois Le Nguyen / Unsplash.

2. Jochen Schmidt leads HAKRO’s activities on Quality, Values and Sustainability together with his colleague Anna Rüchardt. Photo: HAKRO

3. ‘HAKRO enters and maintains long-term relationships with its suppliers in Bangladesh where they currently work on a Cradle-to-Cradle certification for all garments.’ Photo: HAKRO

“For them, the low-hanging fruits of circular economy, such as increased recycling, could be entry points to more radical sustainability-oriented changes.” However, he found that in some cases companies were doing something “circular” only because it made logical or business sense, not necessarily following a sustainability strategy and not measuring the impact. “For the few cases that had a clear and strong sustainability vision, circular practices were one of the many solutions employed towards a more sustainable system,” he explained.

Santa Maria identified 26 practices for firms interested in innovating their business models for the circular economy; the most important ones being that firms should adopt a lifecycle and a system perspective for understanding their business and identifying circular economy-oriented opportunities. Employing sustainability-oriented instruments – such as life cycle analysis or sustainability reporting – will also help.

Other practices to be considered include imagining and developing value propositions with positive environmental or social impacts, articulating and developing an ambitious sustainability vision, strategy and company culture, and engaging, coordinating and collaborating with strategic partners and stakeholders along the value chain and business ecosystem.

Exploring Cradle-to-Cradle and more

At HAKRO, many of these practices already exist while the company’s drive towards circularity is gaining speed . “Clearly, our circular journey started at the end of the value chain with questions around the recycling of our products. In the meantime, we have learned that the implications might, and need to, be much bigger – up to redesigning some of our corporate wear for a second lifecycle, for example.”

The firm is testing different kinds of approaches and partnerships – from start-up consultancies to non-profit organizations and others. One of the newest processes is the Cradle-to-Cradle certification for all garments s produced by one of its suppliers in Bangladesh. According to Schmidt, “This Cradle-to-Cradle certification is very demanding, and we are learning a lot. At the same time, the financial implications are quite high, and we wonder how many firms can afford this.”

Many organizations are working hard to become more sustainable, and a circular business model may often be a piece of the sustainability puzzle. While traditional approaches and existing standards for sustainability management often stop at the point-of-sale, they include strong social elements; combining these with the circular economy’s focus on resource efficiency, is a good way forward. Companies like HAKRO are already doing it, and many others are likely to follow.

Reflections on Sustainable Development and Circular Economy

WRITER: **SÖREN BAUER**

The UN 2030 Agenda for Sustainable Development, renowned for its 17 Sustainable Development Goals, fails to make explicit reference to the words 'circular' or 'economy'. Is it no surprise then, that SDG 12 on Responsible Consumption and Production, appears as far away as ever?

The words 'sustainable development' are far more common in the UN resolution adopted by 193 countries in September 2015. And while sustainable development and circularity are often mentioned in the same breath, they are in fact very different – something reflected in the world's progress towards the SDGs.

Incidentally in May 2015, before the adoption of the UN resolution, Pope Francis presented his second Encyclical Letter Laudato Si' entitled 'On care for our common home.' Unlike the UN resolution, he did in fact mention circular concepts. Upon reflecting on the cyclical workings of nature, he concludes that "Our industrial system, at the end of its cycle of production and consumption, has not developed the capacity to absorb and reuse waste and by-products. We have not yet managed to adopt a circular model of production capable of preserving resources for present and future generations, while limiting as much as possible the use of non-renewable resources, moderating their consumption, maximizing their efficient use, reusing and recycling them."

In Laudato Si' the Pope not only laments environmental degradation and critiques consumerism but also the alliance between the economy and technology which "ends up sidelining anything unrelated to its immediate interests." When referring to various kinds of pollution and how to address them, he condemns the fact that technology is all too often linked to business interests and "proves incapable of seeing the mysterious network of relations between things and so sometimes solves one problem only to create others."

Perhaps these reflections can go some way to explain why, to date, the least progress towards all SDGs has been made on SDG 12 on responsible consumption and production – which for example calls especially upon large and transnational companies, to "adopt sustainable practices" or to achieve, by 2030," sustainable management and efficient use of natural resources." The question is: will this change in the eight remaining years towards 2030, and what more can be done?

EU ambiguity delays progress

While acknowledgement of circular concepts is a start, it is only a first step towards progress and requires clear and concise planning and action. Despite acting as one of the leaders in promoting the circular economy with policies existing as early as 2015, PhD researcher from the CRESTING project, Martin Calisto-Friant, explains that the EU's approach to the circular economy is rather ambiguous:

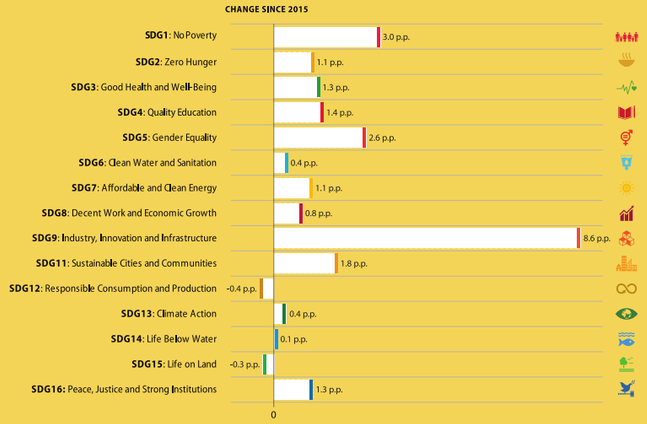
"While the EU's circular economy policies are currently more ambitious than what other key powers like the US, Canada and Australia are doing, they are still far from being transformative from a sustainability and circular society perspective."

His research on the discourses and policies of the circular economy in the EU has identified that the European Commission's directives and regulations on circular economy remain focused on improving resource efficiency rather than reducing resource use and negative socio-ecological impacts.

New recycling targets, restrictions on some problematic single-use plastics, and repairability and recyclability requirements for large electronic appliances are steps in the right direction, while these policies are focused on technological change and innovation rather than transforming the significant overconsumption and overproduction of goods and services in the EU.

"On average, Europeans overshoot planetary resource use and greenhouse gas emissions by about 5 times their fair share', says Calisto-Friant, "the technocentric policies of the EU will thus do more towards improving European economic competitiveness in the recycling and recovery industry than actually reducing the resource use and ecological footprint of the European economy."

Progress in the world for each SDG since 2015 in percentage points



Note: Population-weighted averages. Insufficient data for SDG 10 (Reduced Inequalities) and SDG 17 (Partnerships for the Goals). Time series data for SDG 12 (Responsible Consumption and Production) is only based on the indicator "Electronic waste (kg/capita)".
Source: Authors' analysis

Source: The Decade of Action for the Sustainable Development Goals: Sustainable Development Report 2021. Sachs, J., Kroll, C., Lafortune, G., Fuller, G., Woelm, F. (2021). Cambridge: Cambridge University Press

Overconsumption, and overproduction: the elephants in the room?

On a global level, similar analyses are presented. In April 2020, UN Secretary-General Antonio Gutierrez referred to consumption and production as "a driving force of the global economy" while they also "… rely on the use of the natural environment and resources in a model that continues to lead to destructive impacts on the planet." His official UN Report, 'Progress towards the Sustainable Development Goals' states that "domestic material consumption per capita in Europe and Northern America is still 40% higher than the global average, indicating the need to enhance resource efficiency and [other] practices to reduce consumption in the future …"

While data clearly shows the need to shift from a linear economy to one of less resource use and increased circularity, such statements from the UN indicate the ongoing friction between a growth-dependent global economy and the need, as many believe, for less consumption and less resource-use. The question now is whether this is just friction or simply incompatibility – either way a significant shift in mindset is required for all the SDGs to be achieved.

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