

Can nature be our lifeline in times of crisis?

Esther Oliver

Fragmented intelligence destroys any possibility of understanding and reflection. Unable to grasp the context and the planetary complex, blind intelligence becomes unconscious and irresponsible. It has become deadly.

—The Challenge of Globality, Edgar Morin, 1993

Decades ago, we began to understand how plants react in a world with higher CO₂ levels.

Scientists such as Harvard University professor Fakhri Bazzaz had already been investigating the potential implications in the 1970s. In 1992, he obtained his PhD with a thesis that refuted the optimism of those who championed the so-called ‘CO₂ fertilisation effect’. Bazzaz not only warned that the potential benefits had been exaggerated, but also that there were reasons to question the idea that plants could become carbon dioxide sinks. He feared the response of ecosystems to a changing environment. Worse still, he was concerned that such an atmosphere might

“induce climatic variations capable of undermining the integrity of the biological systems on which Homo sapiens depends”. He was crystal clear on this when he urged society to “limit the rate of anthropogenic emissions to avert the risk associated with rising CO₂ levels”.



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Learning the theory has been of little use to us. Now, not only is it essential to drastically reduce greenhouse gas emissions, but we must also significantly increase non-technological carbon capture. Take note: miracles do not exist!! [Carbon capture and sequestration through technology](#) will do little to mitigate the problem and will come too late. Even those who favour geoengineering ultimately acknowledge that the best course of action is to cut emissions now. Only nature could save us, but we have made its situation much worse in recent years.

Let us not underestimate the complexity

Since our [last article on climate change](#), climatologist James Hansen has published several reports. In these, he continues to warn that the IPCC's projections have fallen short due to excessive reliance on climate models, underestimation of aerosol effects, and neglect of palaeoclimatology. In fact, taking these three factors into account, for a doubling of CO₂ concentrations relative to pre-industrial levels, the increase would be 4.5 °C ± 1 °C (95% 2σ precision level), not just 3 °C ± 1 °C (with a 50% probability) as estimated by the IPCC. Hansen also warns us that for this UN body, discussing the danger of crossing the climate tipping point is a taboo subject. This reluctance is cause for concern, given evidence that some of its models do not reflect reality today.

We were concerned about the concentration of CO₂ in the atmosphere, as if it were an isolated ecosystem. However, Hansen reminds us that 90% of the excess heat released into the atmosphere is accumulating in the ocean. Because everything in the biosphere is interconnected, we will encounter various unpredictable behaviours, such as feedback loops and cascading effects. For example, [a study published this summer warns of ocean acidification](#). It highlights that since 2020, we have been approaching the tipping point globally, and in some areas, it has already been exceeded. Researchers warn us that the deeper we go, the worse the results: below 200 metres, more than 60% of the water has already exceeded the safety threshold. Furthermore, [it has just been discovered](#) that the smallest and most abundant photosynthetic organism in the sea — a cyanobacterium belonging to the genus Prochlorococcus, which plays a crucial role in global oxygen production and the food chain — is also vulnerable to rising ocean temperatures, which alter its biomass and productivity.

And now let us take a deep breath and have another quick look at what is happening on land. I am sure you have read more than one article on the degradation of terrestrial ecosystems, whose [capacity as carbon sinks is weakening](#), but you may not be aware of recent publications on the behaviour of organic matter. Are you familiar with hummus? Until recently, it has been the cornerstone of soil science, our blind hope.

However, in 2015, the specialist Johannes Lehmann put forward the hypothesis that, thanks to new microscopes, nuclear magnetic resonance, and X-ray spectroscopy, we cannot assume, in principle, that any carbon in the soil cannot eventually be broken down by microorganisms and released into the atmosphere. He even doubted the existence of persistent humic substances with large molecular sizes that store carbon indefinitely. The scientist urged us to “replace the old dichotomy of stable and unstable carbon with a continuous model of soil undergoing progressive stages of decomposition”.

Since then, studies of carbon isotopes have shown that a great deal of carbon can remain in the soil for a long time. If humus is not responsible for



Photo: Sergi Caballero.

stabilisation, perhaps it is minerals or aggregates. For his part, [Lehmann has continued](#), with his research team, to seek the best way to understand and stabilise organic matter. Let us keep our fingers crossed that he does not end up on the dark side of biotechnology.

Faced with a hyper-complex biosphere and a destabilised, incomprehensible global climate, the main climate models presented by the IPCC continue to be based on this outdated understanding of soil, downplaying the fundamental role of microorganisms. For now, we know that [climate change is affecting the composition and physiology of microbial communities](#). What we still do not know is the scale and repercussions of these changes. We are walking on quicksand.

Let us not forget that more than 118 countries rely on the IPCC's predictions for their climate targets, and we may be overestimating the amount of carbon stored in the soil and underestimating how much CO₂ it emits. [The experts' words](#) should give us pause for thought:

Johan Rockström: We are seeing cracks appearing in the resilience of the planet's ecosystems (...) Nature has been compensating for our excesses, but this is coming to an end.

Andrew J. Watson: Generally speaking, [climate] models agree that carbon sinks will decline in the future as a result of climate change. The problem is that they expect this to happen slowly over the next hundred years, although it may happen more quickly. Climate scientists are concerned not so much about what is included in the models, but about what is not included (...) We have taken it for granted that nature will always be on our side, and the truth is that we do not understand it. What will happen if it stops working one day because the climate is changing?

It seems we might conclude that climate policies are based on flawed models that largely fail to consider the behaviour of complex dynamic systems or sudden multi-ecosystem collapse; in other words, we are heading for the precipice with no one at the wheel. However, there are a couple of conclusions on which the scientific community agrees: the only way to deal with ecological collapse is to stop emitting greenhouse gases. Furthermore, we are running very late, and what we do or fail to do now determines our future.

We have to admit that we do not understand complexity, and we are destroying it. The only solution to the ecological disaster, which may already be irreversible, is to stop destroying and reconnect with nature. Every potential option has its pros and cons. However, the situation has reached a critical point that requires us to think big, but with the utmost care, as not everything is acceptable. Here are some proposals that should be implemented urgently and simultaneously:

Let us maximise the preservation of wildlands

Although it may sound utopian, a planetary scale should be our primary benchmark for objectives. Biologist Edward O. Wilson proposes a solution in his book *Half a Planet: The Fight for Wildlands in the Age of the Sixth Extinction*, urging us to implement a solution commensurate with the scale of the problem. He encourages us to “return to pre-Anthropocene extinction levels, increasing the area of inviolable nature reserves until they cover at least half the planet's surface”. Furthermore, and no less importantly, he emphasises the need for a profound change in our relationship with nature.

Wilson is not opposed to the restoration of wild ecosystems (rewilding). However, this would be Plan B, and only under specific conditions, since, as we have noted, the biosphere is more complex than we imagine. In reality, we remain

largely ignorant of the structure and functioning of ecosystems, where interactions are essential. Each species has co-evolved with specific other species. By altering nature, we are destroying that network of intimate relationships, modifying ecosystems in ways that are as yet unpredictable. Plan B would consist of restoring a state as close as possible to those original conditions: eliminating invasive species, reintroducing key species and, if the situation is severely degraded, restoring from the ground up. Thus, the generalist approach of planting non-native species, believing that we are reforesting and creating thriving, healthy forests... when in reality we are damaging the invisible ecosystems that keep them alive, is of no use. This is the warning from [an article published last summer](#) about the danger posed by the fact that science is unaware of 83% of ectomycorrhizal fungi — distinct from the well-known endomycorrhizae — which typically live in symbiosis with the roots of trees and shrubs in forest areas.

Although we knew that fungal spores can play a key role in restoring endangered ecosystems, a [recent study](#) found that using commercial inoculants of imported mycorrhizae may not only be unwelcome but also fail to solve the problem. It may even make it worse by stimulating the growth of invasive species. We are only mentioning a few fungi here, but let us not forget the role of the countless microorganisms in the soil, such as bacteria, [protozoa](#), and larger organisms like nematodes, microarthropods, and earthworms... all of which are fundamental to sustaining life in the soil.

Returning briefly to Wilson's message, despite not knowing how much biodiversity we have left — we do not even know the number of existing species — and despite not understanding the accelerated synergistic effect of the combination of causes driving the sixth mass extinction (HIPPO, an acronym for: habitat destruction, invasive species, pollution, population growth and intensive hunting & fishing), we are aware of our vulnerability and dependence, and we know — though we may find it hard to admit — that we have only two options: to continue down the anthropocentric path and reach the tipping point for ecosystems sooner rather than later, or to cling to the precautionary principle and preserve as large a percentage of wilderness as possible. Wilson himself reminds us that we humans are not afraid of grand goals with universal benefits.

Given this scenario, the conservationist stance seems the most sensible. However, how do we transition from a convoluted industrial civilisation to a simple and functional one? The answer lies in permaculture.

Let us take inspiration from permaculture

In 2021, collapse theorist Pablo Servigne interviewed David Holmgren, one of the founding fathers of permaculture, who, together with his teacher Bill Mollison, proposed in 1976 a simple, sustainable way of life based on principles drawn from the natural world and indigenous cultures. Later, Rob Hopkins introduced large-scale permaculture, featuring a kind of edible landscape, intending to prepare communities for the twin threats of peak oil and climate change, which would eventually give rise to the Transition Towns movement.

Returning to the 1970s, following the 'Limits to Growth' report and

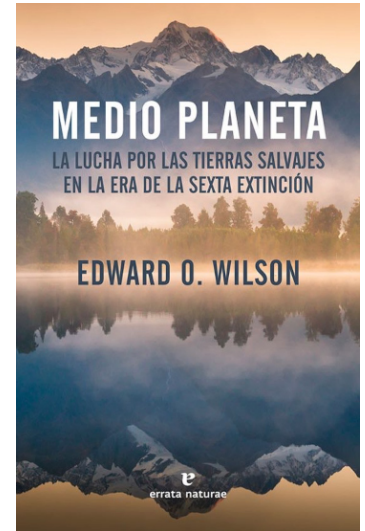


Photo: Ángel Salvador.

the oil crisis, talk began of a collapse of industrial society in the 21st century. This spurred a section of the population to become more self-sufficient and gave rise to a countercultural *'Back to the Land'* movement. Holmgren tells us that in 1978, Mollison and he wrote *Permaculture One: A Perennial Agriculture for Human Settlements*, and 15 publishers were interested in publishing it, even though they were a pair of unknowns. More than half a century has passed since then, and circumstances have worsened; we remain disconnected from our sources of subsistence and dependent on fossil fuels, which is why permaculture remains a necessary compass. Holmgren, like [Ted Trainer](#), invites us, in his famous article **Crash on Demand**, to consider voluntarily disconnecting from the system by living in resilient local communities in rural areas, based on permaculture, agroecology, and the preservation of a certain degree of local democratic control. This author also believes that once we stop believing in the possibility of sustaining industrial civilisation, we will work to create something radically different. Ideally, this would have been a planned, global and gradual process of moving away from complexity, but we no longer have the time.

The first two basic ideas would be: replacing monoculture with polyculture and annual plants (such as wheat) with perennials, particularly trees. Fortunately, on the Iberian Peninsula, we can count on the hard work of those involved in organic agri-food cooperatives. For example, the Más les Vinyes cooperative in Catalonia, where Sergi Caballero and his colleagues have been running a farm certified in permaculture and regenerative agriculture by the European Alliance for Regenerative Agriculture (EARA) since 2013, is [the first in Spain to achieve this certification](#). There, they produce healthy food and share their community-based lifestyle and knowledge through courses, farm visits, and advice on a wide range of topics: efficient farm design, energy management, holistic animal husbandry, extensive farming, biointensive gardening... They encourage everyone to learn permaculture.

Given that agriculture is the most essential activity, the one that requires the largest proportion of land, and the one most adversely affected when it is industrialised, we have no choice but to change our approach.

Empower regenerative agriculture and livestock farming

As we mentioned, the crux of the matter lies in shifting from a global, intensive approach to a local, extensive one. If this seems difficult, it is even more so in a context of dwindling fossil fuels and climate instability, given the challenge of restoring life to the soil. When soil contains less than 1.5% organic matter, it cannot regenerate; its life cycles are broken; it is dead soil. This is what David González, co-founder of the [Sustraiak Habitat Design](#) cooperative, told us in [an article in this very magazine](#) about the need to move towards agroecological food systems rooted in the local area. He told us then that in rain-fed farming areas of the Iberian Peninsula, it is common to find soils with organic matter content below 1% and that, as if that were not enough, they also contain a high concentration of chemical pollutants.

In the Basque Country, this cooperative is dedicated to the restoration of degraded soils, climate change mitigation and adaptation, and the agroecological transition. They propose restoring agrosilvopastoral systems (reviving agroforestry); organic-regenerative agricultural practices (no-till farming, polyculture, small-scale intensive systems...); the capture, retention and restoration of functional water systems; rotational grazing sequences in regenerative pastures; the increase in organic carbon using biological methods (composting, mulching, fungi, earthworms, native forest microorganisms...); etc. We are invited to relocalise our agri-food system, to plan the agroecological transition, to build viable local agri-food models... whilst we still have energy available.

González reminds us that “the processes of restoring soil fertility are very slow and in many cases it can take up to four or five years to reach levels of two or three per cent organic matter — the minimum required to restore some fertility in an average dryland area. And that’s even with tractors and machinery”. He acknowledges that “there are times when, whilst you’re out in the field, you find yourself thinking about the thousands of hectares surrounding you that are still being farmed with chemicals, about the immense amount of work and the time it will take to restore even a minimal degree of fertility (...) At such moments, you’re bombarded with questions to which you have no answers”.

Let us also start familiarising ourselves with edible wild plants. The sooner we start, the better.

We should have in our library some guides on wild foods from our area. Without looking any further, in the book [Blessed be the weed, for it will save your head](#), the Galician biologist and permaculturist César Lema and his collaborators advocate the idea of “not only implementing less aggressive agriculture, but returning to the gathering stage of human history to make use of weeds as an important and regular part of the diet”. They discuss the indoctrination we have undergone to abandon the use of wild plants and fruits, including medicinal plants from which, paradoxically, the pharmaceutical industry isolates most of its active ingredients. We are made to fear poisoning ourselves with wild plants, yet there is no concern about the cocktail of toxic synthetic chemicals imposed on us by agribusiness.



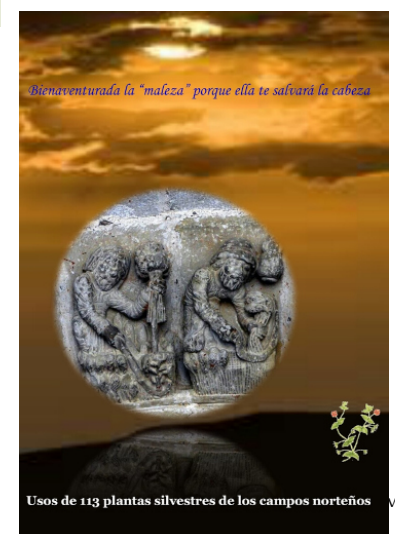
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Let us change the way we eat

Let us be aware, right from the start, that we will have to change our diet and that it will be primarily plant-based. Friends of the Earth has just published a report, [Guide to a Climate-Friendly Diet: Analysis and Recommendations Based on the Research in 'The Urgency of the Agroecological Transition in Spain](#), in which they go into great detail about the necessary changes. In short, they propose doubling vegetable consumption, tripling that of pulses, halving sugar intake and, as regards animal-sourced foods, adapting to local resources, excluding animal feed and animal products.

On the other hand, there is a long-standing and monumental British project, [Plants for a Future](#) (PFAF), which aims to identify all kinds of edible and medicinal plants (they already have a database of over 8,000). In her study, [Plants to Save the Planet](#), Christine Marsh suggests a utopian solution — she, too, believes we must keep an open mind, given the nightmare we face — to have edible forests everywhere and at every level. Marsh urges us to live within the forest, gathering from it, guarding it, caring for it and protecting it from fire. We must not forget that when attempting regeneration, it is advisable to use only native plants. You can check the PFAF database to see which plants are native to our area, as well as the many flora catalogues available for each bioregion.

Inaction should not be excused by a lack of information, as there are plenty of useful and interesting books that encourage us to vary our diet. Even the Ministry of Agriculture, Fisheries and Food has published the article titled [Wild foods: the most natural and nutritious pantry](#). However, it must be read with great care, as the



approach complements the current diet rather than serving as an alternative.

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Let us reconnect with nature

Finally, we would like to mention one more task that lies ahead of us. The proposed strategies would be of little use if we remain disconnected from nature. According to a recent scientific study published in the journal *Earth*, [humans' connection to nature has fallen by 60% over the last two centuries](#), and this trend will likely continue unless we do something about it. The end of fossil fuels, however, points to a forced reconnection, for better or for worse. Intergenerational transmission is essential, so it falls to us to undertake additional educational work with the younger generation, particularly those living in the Global North.

Let us draw on Jorge Riechmann's clear and concise message regarding the possibility of '*indigenisation*'. In this text, he ingeniously uses the neologism '*indigenisation*' as a counterpoint to '*colonisation*'. He tells us how, throughout history, when faced with a resource crisis, humans have always had a couple of options: to 'indigenise' ourselves and adapt population size and consumption patterns to a level that existing resources could sustain, or to colonise and seize the resources of others, or invent ways to access resources that were previously inaccessible. As waiting for the permafrost to thaw in order to search for fossil fuels is not a good idea and there is not much left to appropriate, the wisest course is to accept Riechmann's invitation to live in balance with the rest of nature: "to become part of the vast and magnificent web that all living beings constitute. To become terrestrial once more".



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❖ **About the author: Esther Oliver** is a biologist, environmental educator and proofreader. Her time with Ecologistas en Acción and her introduction to social ecology changed the way she views life.



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