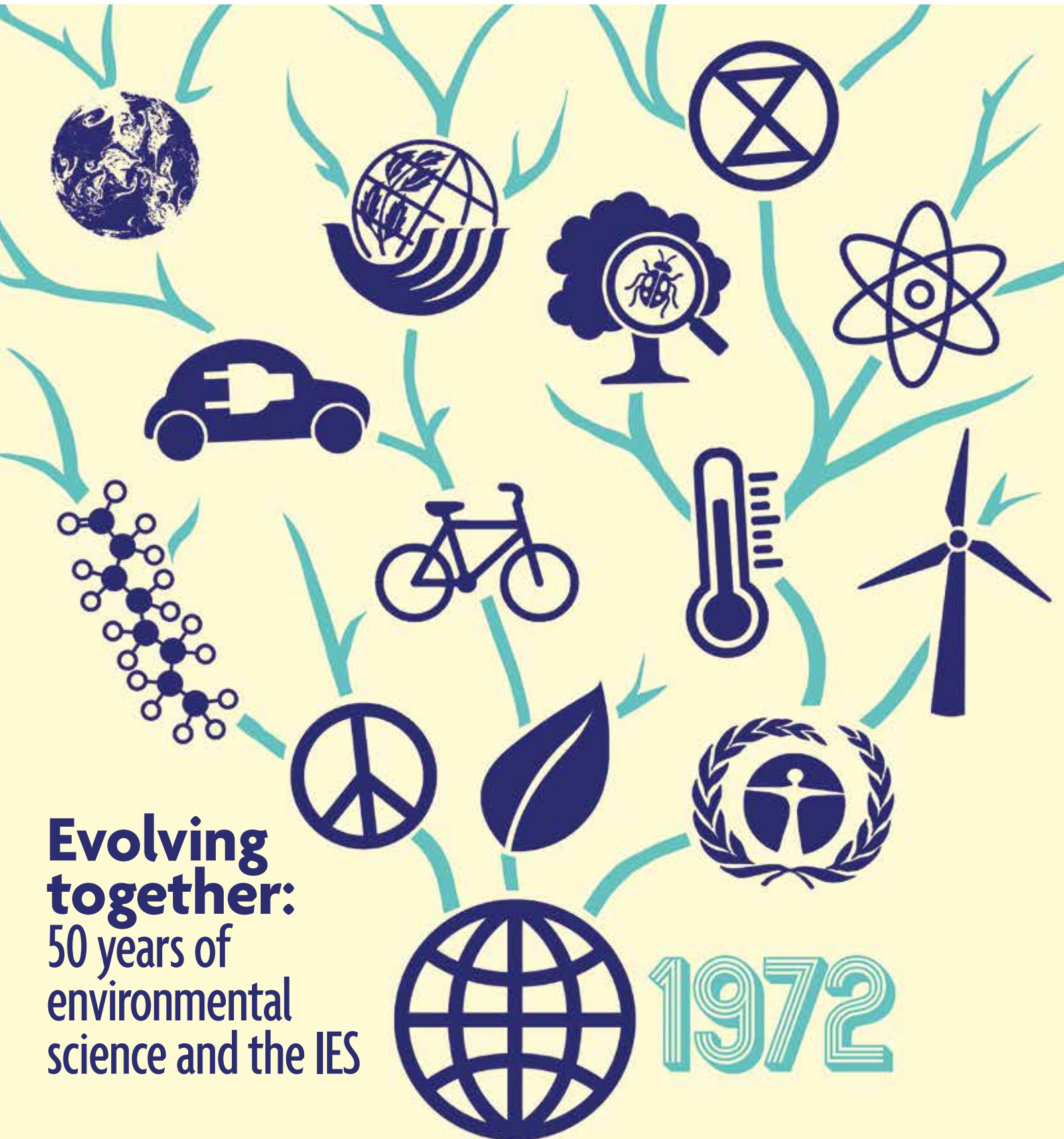


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The accelerating pace of environmental change

Fifty years is nothing when measured against the origination of *Homo sapiens* in Africa 200,000 years ago. It is even more insignificant when compared with the age of the remains of the first stone tools used by hominins dated to some 3.3 million years ago. It is roughly half a per cent of the span of the Neolithic era, and only one per cent of history since the earliest known human writing systems around 5,000 years ago.

Now half a century ago, 1972 represents a watershed moment in human history when we recognised that our activities were not only impacting ecosystems but also feeding back directly into human wellbeing and future prospects. In 1972 – a decade on from the publication of Rachel Carson's seminal book *Silent Spring*¹ and in the wake of the dreadful Minamata Bay mercury poisoning in Japan – there was still not one government department in the world with environmental responsibility.

Yet 1972 really was a momentous year in raising the political and public consciousness of environmental issues. Famously, this included the 1972 United Nations (UN) Conference on the Human Environment, held in Stockholm and instigating decadal cycles of UN conferences seeking global consensus and action around what we now term sustainable development. This pivotal year also saw the publication of the influential Club of Rome report *The Limits to Growth*,² which modelled how growth must necessarily be finite if we exploit resources beyond their rates of renewal. That year also saw the founding of the UN Environment Programme, designed to coordinate action at intergovernmental level. Greenpeace and Friends of the Earth were slightly ahead of the curve, both having been founded a year earlier, in 1971.

The founding of the IES in 1972 was also very much part of the birth of modern environmentalism. The Institution's founding members foresaw that a professional association was needed to support both academics teaching the emerging discipline of environmental science and the new scientific profession that would grow across government and industry to support this rising tide of environmental concern and consciousness. And therefore, when we look back on the history of the IES in this, our 50th anniversary year, it is fitting to consider our evolving role in relation to development of the environmental sector.

Today, we take it for granted that all governments have departments with environmental responsibilities and that the language of sustainable development is embedded across society. Business recognises its social and environmental responsibilities: leaders through proactive recognition of the benefits of so doing, and laggards by sometimes grudging *de minimus* compliance with a regulatory system that was largely absent 50 years ago. In that regard, the world is profoundly changed, albeit imperfectly, recognising the interconnected environmental and social ramifications of human activities.

Other perspectives of the world in 2022 compared to 1972 are less cheerful. The global human population over that time has doubled from around 3.8 to 7.9 billion people, with the urban proportion rising from 37 per cent to 54 per cent. Per capita meat consumption has soared by nearly 60 per cent and the number of cars on the world's roads has grown to 1.2 billion, both indicators of intensifying pressures on ecosystems. It is no surprise that global forest cover, fishery viability, climate stability and biodiversity are on steeply downward trajectories. Alarming, growing knowledge and increasingly comprehensive legislation still correlate with declining environmental health, resilience and supportive capacities.

And so 2022 is a moment in history; a chance to celebrate the substantial societal changes in environmental and social awareness witnessed since 1972. Yet, viewed as a midpoint in a century-long process of cultural transformation, we clearly have so much more to do. We hope that readers of this edition can join us in celebrating our collective achievements but also redouble efforts to achieve a sustainable accommodation with the ecosystems upon which we are wholly reliant.

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The 1970s and all that...

Mark Everard reviews how a growing environmental awareness has shaped our world.

I make no apology for speaking about lived experiences in addition to scientific and policy advancements made in those distant days of the 1970s. The decade was formative for the establishment of environmental science but also for giving voice to emerging and often partly formed concerns about what we were doing to the natural world, and by implication to ourselves. This has all had significant cumulative influence on the policy world.

In reality, passion, science and policy were, and remain, intimately interlinked in the founding of societal movements. Our burning passion back in those heady days – our sense of injustice about a future being destroyed before our eyes – informed the newly evolving interdisciplinary environmental sciences and drove the issues we needed to investigate. These interconnected social and knowledge-based forces in turn shaped policy priorities, including what strands of science would be funded. To describe the 1970s in desiccated ‘scientific’ terms is to lose the essence of what it was like to live through those times and the constellation of angst, rage, knowledge acquisition, protest and advocacy that combined to foment a revolution in environmental consciousness.

For all that the period around 1972 was axial, it did not arrive out of nowhere. Reflecting again into lived experience, I still recall with some distress the live broadcasting of the grounding of the oil tanker SS Torrey Canyon off the western coast of Cornwall, England, in March 1967, releasing most of her cargo of 110,000 tonnes of crude oil with devastating impacts on sea birds and other wildlife. Perhaps heightened by my part-Japanese heritage, I was also starkly aware, even as a youngster, of the horrific human toll of Minamata disease: severe neurological damage from bioaccumulation of mercury released by a chemical factory into Minamata Bay, a practice that had been occurring for three decades and did not end until 1968.

These and other environmental shocks unsettled the almost uniformly optimistic perception of technological progress instilled in those of us who stayed up into the small hours in July 1969 to watch live video feed from the Apollo 11 lunar mission as Neil Armstrong made his ‘giant leap for mankind’, and watched news of the everyday miracles of breakthroughs in feeding the world and irrigating former deserts. I also clearly



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recall how visceral my reactions were when seeing a much-loved microcosm of rough ground, home to bugs and beasts that could keep me enthralled for hours, expunged by a single scoop of a digger. So too, the elimination of a favourite pond and woodland to make way for a road bypass, and the disconnection of a beloved reach of river bypassed by a flood relief channel accelerating flows to sea (and accidentally flooding downstream towns instead).

Of the ground-breaking 1972 Club of Rome report *The Limits to Growth*,¹ I was more a passenger than a direct reader. But one inspired geography teacher, based on his reading of the report, set aside rote learning of the principal crops and economic output of Chile – facts deemed necessary to pass exams – to quiz us mid-teenagers on our feelings about the way we were burning up finite oil reserves when we might need them in future for durable construction and infrastructure materials, or the prospect that by the year 2000 (remember that!) a family might only have access to sufficient power to run a 15-watt bulb into the dark evenings.

My more direct perceptions of the time were, as often happens in my life, shaped by fish. If you recall, this was also the era of successive waves of ‘cod wars’ as the UK and Iceland battled out territorial rights to

exploit or protect dwindling sea fish stocks. It was also a time when bright red tins of pilchards packed in tomato sauce, a cheap staple of us less financially advantaged folks, suddenly became unavailable when sardine stocks crashed. In British fresh waters, the decline of the burbot (last confirmed capture in 1969 and since declared extinct in our shores) also signalled how technological progress, particularly in land use, could drive a species over the brink. (Loss of burbot in Britain is often claimed through lazy assumptions based on life cycles of quite different genetic ice lake strains to result from climate change but, as detailed in *Burbot: Conserving the Enigmatic Freshwater Codfish*,² it was the drainage and eradication of lowland floodplain habitat inundated for months during midwinter that dealt the killer blow.)

These strands of awareness and mounting societal, and ultimately political, concern drove innovation in technological advancements, the founding of non-governmental organisations (NGO) to harness that societal concern, and of initiatives such as the UK-wide Breeding Birds Survey led by the British Trust for Ornithology. The 1972 Stockholm Conference – the United Nations Conference on the Human Environment – and also the instigation of the UN Environment Programme to coordinate action at intergovernmental level and the founding of professional associations

such as the IES to promote extension and uptake of environmental science, were all to flow from that potent mix of passion, science and politics, disrupting many former ‘safe’ norms and assumptions, and setting us instead on a pathway to where we stand today with all its frustrating imperfections and successes.

There is often an expectation that environmental and other scientists should be dispassionate. Yet environmental science exists precisely because enough people were passionate about chasing down causes, consequences and solutions spanning traditional firewalls between scientific and other disciplines, and eager to petition for educational and policy change while recognising the importance of integrating social, economic and biophysical sciences, founding courses and agitating for research funding streams. A key lesson I take from reflecting on those exhilarating days of the 1970s is that, while environmental science itself must aspire to robustness and objectivity, the passion, purpose and policy contexts that feed it and that it in turn informs must never be lost if it is to continue to drive forward desperately needed societal change.

It is for this reason that I welcome (if not sanction every strategy of) the new wave of activism, as young people once again mobilise to foment change, realising that promises from unbridled capitalism alone are a chimera

and can only continue to fail to offer them security and fulfilment while foundational ecosystem resources dwindle. It is good to see these concerned people turning to the environmental sciences to inform their disquiet, actions and campaigning, rejecting the threadbare and often token action around environmental protection and sustainable development, and asking for more of the science base to further inform solutions.

Viewing today as the midpoint in a century-long journey, we are again where we were in the early 1970s. There are new and robustly evidenced revelations about the dire implications of climate instability and the biodiversity crises, including a precipitous decline of insect populations and functionally important global habitat types. This, combined with the spiralling demands of a human population that is not only booming but increasingly living middle-class lifestyles, with the associated increased demands this brings, and compounded by widening disparities between rich and poor, sets a new baseline of concern and search for solutions. The underlying principle remains undimmed – that we are destroying the roots of the tree of life upon which we utterly depend – but with a human population that is 46 per cent higher (with an urbanised proportion rising from 37 per cent to 57 per cent) and massive declines in biodiversity, wild biomass and ecosystem resilience.

If ever there was a time to redouble our commitment to informative and policy-relevant research and its promulgation in the reshaping of a more secure society by the 2070s, it is now while there is still at least a prospect of averting runaway apocalyptic prognoses and instead shaping a more secure future of opportunity for human fulfilment and equity. This special edition brings together academic, consultancy, green politics, NGO, youth activism and other voices to explore the legacy of the past half-century and to glimpse the priorities of the next half of this century-long journey of societal transformation.

Sara Parkin kicks off this edition by asking, ‘What does good look like?’ and outlining the lessons learnt from the past 50 years as well as looking to the future. Representing the Club of Rome, Carlos Alvarez Pereira then harks back to the 1972 *The Limits to Growth* report. Importantly, he also projects forward to consider the importance of the ‘fifth element’: re-learning what we have known for 50 years but putting it into human-centred rather than narrower technical framings.

Emanuela Orlando provides us with an illuminating political and legal history, with a principal focus on the evolution of international environmental law. The growth of the environmental industry is then addressed by Eleni Antoniadou Snell, recognising that this industry simply did not exist half a century ago but now covers numerous specialities and career paths. One such growth sector is education, and Jim Longhurst reviews the changing landscape of environmental science taught provision over the past 50 years.

There is an overriding need to move from historic, narrow disciplinary thinking if we are to make real progress with sustainable development, and Richard Blume and Stanley Nyoni tackle this in their contribution on sustainable decision-making for systems change. There are also significant questions about how far and fast society would have moved without the involvement of NGOs, a topic tackled by Paul Johnston, David Santillo and Simon Black.

Another discipline and career path that did not exist 50 years ago was that of environmental economics, the two disciplines formerly seen as opposites. Bill Watts brings his professional lifetime to bear on the development and mainstreaming of this with practical examples to demonstrate the evolution of environmental economics in English public policy. The emergence of green politics in the UK is a further valuable contribution from Sandy Irvine, documenting the shifting landscape and influence of this emergent sphere of political concern.

This special edition concludes with the voices of the rising generation, those who will inhabit the future to



2070 and beyond and who have the passion to shape it into a more sustainable and habitable form. The concluding article on our legacy and the next generation’s hopes for the future includes contributions from Mya-Rose Craig, Charlie Murphy and Phoebe Hanson. It is only right that we close with voices from youth activism, of those that will inherit that distant future and shape the pathway towards it. This rising generation has in large measure seen through the baseless promises of material prosperity and security promulgated by unconstrained capitalism mining a degraded and fast-disintegrating base of natural resources. This generation knows it has nothing to lose, emboldening it to petition and innovate for a different trajectory shaped by eventual achievement of a sustainable resolution between humanity and supportive ecosystems. This generation may at last resurrect the bold if largely now submerged intergenerational commitment explicit in the Brundtland Commission’s definition of sustainable development, advocating us now to develop in ways that meet ‘the needs of the present without compromising the ability of future generations to meet their own needs’.³ What legacy have we fashioned into society’s journey from 1972, and what must we yet achieve by 2072? **ES**

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What does good look like?

Sara Parkin examines how much progress we have made in meeting the world's environmental challenges.

INTRODUCTION

Coinciding with the 50th birthday of the IES, this year is also the 50th anniversary of the first United Nations (UN) Earth Summit, making it a good moment to reflect on what has been achieved in those 50 years and what lessons this holds for the next 50.

WHAT HAPPENED TO THE REVOLUTION?

Sir Peter Scott asked the question the 1972 UN Conference on the Human Environment in Stockholm (the first Earth Summit) set out to answer:

'Do we want to live on an overcrowded and polluted earth, or are we sensible enough to take the long view about our environment and take the necessary steps to improve the quality of human life all over the world?'¹

'No,' came the reply, 'we do not want to live like that.' Though Scott's necessary steps were thought by Max Nicholson to need an 'Environmental Revolution on the scale of the Reformation or Industrial Revolution', neither a revolution nor any substantial policy intervention by world leaders ever materialised.²

Consequently, here we are, 50 years on, facing the same challenge made immeasurably greater because of a lack of meaningful progress. Although scientific understanding has deepened, it has not been translated into political or practical actions of any sufficient magnitude. Why, for example, do we fixate on recycling waste after it has been produced instead of avoiding its creation in the first place? Read the latest reports from the Intergovernmental Panel on Climate Change³ and you would be forgiven for thinking humans are concerned only with minutely monitoring our own extinction. In fact, not one significant negative trend amongst the deadly trinity of population, resource depletion and pollution¹ has been slowed, let alone halted or reversed.

“Read the latest reports from the Intergovernmental Panel on Climate Change and you would be forgiven for thinking humans are concerned only with minutely monitoring our own extinction.”

Population. Our species has nearly doubled in number to nearly 8 billion.⁴ Only human beings and crabeater seals (which number a few million at best) have broken the ecological rule that large, aggressive mammals are rare.⁵ The extinction-monitoring industry estimates that humans and their domesticated animals make up 96 per cent of the total global mammal biomass while wild mammals account for only 4 per cent.

Resources. Our material resource extraction and electricity use have soared from 7 to nearly 12 tonnes⁶ and from 1,273 to 3,000 kWh⁷ respectively, per person, per year. As Vaclav Smil explains, we are overharvesting the biosphere.⁸

Pollution. Volumes of all kinds of pollutants – emissions of the linear, technology-driven economic model used by our species – have reached extraordinary levels in air, water and land, as well as in the bodies of animals, including ours. We have disrupted climate-regulating systems at a global level.

So where is the revolution? According to the press, passionate frontwoman of the Friday School Strikes (see **Figure 1**), Greta Thunberg, is spearheading a revolution of the young generation of the 2020s. But have the efforts of Thunberg's co-campaigners made

any difference since she started in 2018? Well, no. She was a sideshow at the November 2021 26th Conference of the Parties (COP26) meeting to discuss progress (or lack thereof) on halting emissions of climate-damaging gases and berated the event for being a ‘two-week-long celebration of business as usual and blah, blah, blah’.⁹

Moreover, Thunberg belongs to the third (hailed yet failed?) youthful revolution on behalf of the environment. I was part of the first in the run-up to 1972’s Earth Summit, convinced by Rachael Carson’s *Silent Spring* and Meadows *et al.’s The Limits to Growth*.^{10,11} Older but still as ardent, I was also very involved with the youthful and rapidly growing green political movement in the decade before the 1992 Earth Summit.

So, how is it that three promising future-generation-inspired environmental revolutions have failed to galvanise anything like the changes needed to overcome the deadly trinity?

HAVE WE UNDERESTIMATED THE OPPOSITION?

IES founders will remember the time of great optimism in the 1970s when the UN set up an Environment Programme and governments around the globe created their own environmental departments. ‘Home and dry,’ we thought, ‘that is the environment firmly on the political agenda!’ The reality, however, was that by splitting off environmental matters from social and economic policy, business as usual did not break a step. And we fell for it; many readers will remember how environmental impact assessments and corporate

responsibility statements kept environmentalists busy and at a safe distance from the main stage – of social and economic change – for years.

And remember Agenda 21, launched at the 1992 Earth Summit, which did engage schools and young people in local action, until it was replaced (because it was working?) by eight reasonable-sounding millennium development goals (MDG) in 2000?¹² Had a serious effort been made around those goals instead of letting them fizzle to failure amid manipulated targets and statistics, might things have been different? Maybe. Instead, the MDGs were uncritically dumped to be replaced in 2015 by 17 sustainable development goals (SDG) with 169 associated targets.¹³

Before Thunberg took up her placards, I could see the SDGs were a sleight of hand to keep the green and social justice movements off the backs of the business-as-usual brigade (politicians, financial markets and big businesses). Which they did. Comfortable that SDG 8 – to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all – would provide a cover for business as usual, the SDGs invited ‘all of us’ to engage with them on a pick ‘n’ mix basis.¹⁴ Once again, we environmentalists got on board uncritically.

Last November’s COP26 meeting hosted another coup by business as usual. The shocking political failure to agree (and take real action) to reduce emissions of greenhouse gases was shrouded by a dramatic announcement by the Glasgow Financial Alliance for Net Zero (over 450 firms

across 45 countries) that promised mobilisation of US\$130 trillion in assets to avoid dangerous climate change. Once again, popular (and political?) momentum was diverted while private financial institutions and central banks colonised the agenda. Sheepishly, the official meeting participants could only agree to reconvene the following year (i.e. November 2022), unable even to meet their own prior commitment to transferring \$100 billion a year to developing countries. UN Secretary-General, António Guterres, agreed with Thunberg about the outcome: ‘The approved texts are a compromise. They reflect the interests, the conditions, the contradictions, and the state of political will in the world today.’¹⁵

By way of a summary critique of the efforts of 50 years’ worth of Earth summits, 34 years’ worth of the IPCC and 12 years of MDGs and SDGs in bringing our species to its senses, I cannot better the IES’s comment on the IPCC’s Impacts, Adaption and Vulnerability Report:³

‘Presenting a formidable collection of evidence, the report confirms a familiar story: climate change is creating serious and significant vulnerabilities for human society and the natural world, with consequences already being felt across the globe at a greater scale than previously anticipated, and which will only get more severe in the future if we continue with business as usual.’¹⁶

LESSONS FROM THE PAST 50 YEARS

So where did the environmental movement get it wrong? Reflecting on 50 years of campaigning, I would highlight three things:

First, our species has lost that deep understanding of how we are *inextricably* part of nature and its grand project: evolution. Not just in the way modern education systems have marginalised the topic, but also because we ignore the hard-gained wisdom of our ancestors about how to live successfully with the rest of nature.

Second, we have been naive, too, about how (political) power works. In a world where transnational billionaires are richer than some states, crises and campaigns will have limited impact on their own. Follow-through with political and institutional changes is crucial, as is the courage to experiment, share learning, and endlessly discuss what we are trying to achieve.

Most of all, we have been criminally negligent by not having a positive, inspiring, people-centred and logical narrative about how good it would be to live well with nature and each other. Did Martin Luther King try to rally support (as we did about CO₂ emissions) by saying that we shall reduce racism by 17 per cent from 2005 levels by 2020? No. He had an inspiring, memorable, mobilising dream.

▼ **Figure 1. Climate protesters gather at a School Strike 4 Climate march in Sydney, Australia. The international movement, also known as Fridays for Future, was founded by Greta Thunberg. (© School Strike 4 Climate)**



THE GREEN DREAM

In my green dream we would consider progress and success those things that contribute to people feeling good about themselves, their relationships, and the place where they live. That is what makes us happiest, we say. We would have new economic logic based on fewer people consuming less stuff, in which we make our living doing things that restore ecosystems, beautify our built environment and expand our personal and social capabilities. Our financial and technological systems would serve that dream. Instead of dragging us towards ecological disaster and forcing the sick and frail into the care of robots, we would ensure these systems work in support of our instinctive preference for fairness and kindness.

Could we create momentum around bringing the green dream to life. How would you tell the story?

JUST DOING IT

As I write, the UK Government has agreed to the introduction of a GCSE (a secondary education qualification taken by pupils in England, Northern Ireland and Wales) in natural history. The campaign took four years, although we need to retrofit entire populations in less than half that time. Can we grasp

the initiative and realise our green dream by starting to live it now?

One of my heroes is Nelson Mandela. He created and sustained an irresistible momentum around a single unwavering goal: the total end to apartheid. His strategy had education at its heart, and he celebrated every step in the direction of this singular goal. He believed in striving for the best life one could have and not settle for anything less.

Imagine if we did the same for the green dream – neither left nor right but towards sustainability: one goal, many pathways!

Another hero is Vaclav Havel. A Czechoslovakian playwright and dissident during the 1970s and 1980s, he showed the power of ‘living in truth’. The then-communist state did not allow people to meet, speak or write freely. Havel lived as if it were normal to do that. Regularly jailed, he persistently asked his jailors, his interrogators and, eventually, leaders of the crumbling regime why he could not meet friends freely and publish his plays. When the country’s communist government fell, the people installed Havel as their president. As a truth-teller, he was trusted.

Just imagine if we learned from Mandela and Havel. If we were not distracted from our goal and instead lived ‘in truth’ and as if sustainability – the green dream – was normal. We could ask politicians, journalists, anyone and everyone:

‘Why? What is stopping us insulating our homes, farming with rather than against nature, making sustainability literacy mandatory in all publicly funded schools and colleges, ending extremes of poverty and discrimination, replacing an economic logic that is socially and ecologically destructive?’

And so on, with equivalent questions at neighbourhood, organisational and international levels. Learning from Mandela and Havel and organising ourselves now to live sustainably and enjoyably with nature and each other we would be campaigning from the front foot – asking why from a positive place. An attractive place to others looking for hope in these anxious times. A good place for building momentum for change.

‘Hope is definitely not the same thing as optimism. It’s not the conviction that something will turn out well, but the certainty that something makes sense, regardless of how it turns out. It is this hope, above all, that gives

us strength to live and to continually try new things, even in conditions that seem as hopeless as ours do, here and now. In the face of this absurdity, life is too precious a thing to permit its devaluation by living pointlessly, emptily, without meaning, without love, and finally, without hope.’¹⁷

ES

Sara Parkin is Principal Associate at the Sustainability Literacy Project and is currently working on her fifth book, provisionally titled *What Does Good Look Like: An Antidote to Anxiety*. A longtime campaigner, Sara played leadership roles in the UK Green party and in European green politics and was a co-founder of Forum for the Future with Jonathon Porritt and Paul Ekins. There, she designed and ran a master’s degree in leadership for sustainable development. Her 2010 book based on the course, *The Positive Deviant*, is still used by colleges around the world. An honorary fellow of the IES, she gave the Fourth Burntwood Memorial Lecture in 1997.

The views expressed in this article are those of the author and do not necessarily reflect the views of the IES or other organisations or individuals mentioned.



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The Fifth Element

Carlos Alvarez Pereira outlines a new approach to finally learning what we knew 50 years ago.

GRIDLOCKED AT HIGH SPEED

How do we open the space of possibilities for humanity to decide on its course? This was the main question addressed by the 1972 *The Limits to Growth* report to the Club of Rome.¹ For the first time, a team of researchers led by Donella and Dennis Meadows created a computerised simulation of multiple scenarios for the future based on the global evolution of population, natural resources, food production, industrial output and pollution. Most though not all the scenarios showed a high probability of a collapse of human civilisations during the first half of the 21st century.

This result shocked the world and while millions of copies of the book were sold, the underlying message was not heard. The existence of scenarios in which human development would be redefined to fit within the boundaries of a finite planet was ignored. Even when the concept of sustainable development was coined in 1987, it did not depart from the logic of tying human development to the unlimited growth in consumption of energy and material resources. The negative effects of development are to this day considered by many as collateral issues to be addressed by more development of the same kind.

Fifty years later, are we navigating an appropriate course? United Nations (UN) Secretary General, António Guterres, said in 2020 that: 'Humanity is waging war on nature. This is suicidal.'² In 2022, we seem to be in worse trouble than anyone related to *The Limits to Growth* would have liked to see. The 2008 financial crisis, the Covid-19 pandemic since 2020 and the many ongoing conflicts including the 2022 war in Ukraine are brutal signals that everyone understands. These crises emerge from a wider background of unfolding existential threats. Inequity and fractures within and between nations



do nothing but grow; climate warming unfolds on a huge scale; the destruction of ecosystems and species is ongoing; and most of the uses of finance and technology increase the segregation and polarisation of people, hence accelerating the possibility of dystopian futures with deeper divisions between winners and losers.

At the same time, women are emancipating themselves everywhere and the whole of humanity is, slowly but surely, becoming more literate. In many places people are overcoming the helplessness derived from colonial and neo-colonial rules and mindsets. Young generations are more aware of the failures of economic and political systems that are restricting their options for the future. Achievements in science and technology also increase our knowledge and capacity to act. Change is all around, and it comes at high speed and in unexpected ways.

All in all, it seems that humanity is thriving and committing suicide at the same time. We could be living in the brightest moment of humanity and simultaneously be closest to the abyss of our self-induced extinction.

How can we deal with this fundamental contradiction? We seem to be stuck, gridlocked in a high-speed turmoil leading to nowhere. How can we overcome that?

A DIFFERENT APPROACH

The Club of Rome was founded in 1968 by Aurelio Peccei as a space for open debate among personalities from business, science, politics and civil society equally committed to inquiring about the future of humanity with a systemic, long-term, global lens. At the time no other organisation dared ask some essential questions,

among them one which is critical: can we achieve equitable wellbeing for all within a healthy planet? That was the key motivation for commissioning *The Limits to Growth* report, and the Club of Rome took note of the ambiguity of its success – widely known, it did not change our course.

This led Peccei to examine the existence of a ‘human gap’: the difference between our capacity to act and our ability to understand the consequences of our actions. At the same time Gregory Bateson was saying that: ‘The major problems in the world are the result of the difference between how nature works and the way people think.’³ Bridging the Human Gap was the subtitle and purpose of *No Limits to Learning*,⁴ another report to the Club of Rome. In its foreword, Peccei formulated our challenge as a riddle: ‘What we all need at this point in human evolution is to learn what it takes to learn what we should learn – and learn it.’ In a later work he even claimed the need of a human revolution to address the human gap.⁵

One strategy for dealing with the cracks in today’s society is to apply the analyses we already have to redirect public policies and human behaviours towards a more intentional goal. The path followed by the UN’s sustainable development goals agenda pertains to that kind of strategic top-down perspective. While comprehensive in its formulation, it is also reductionistic in its way of splitting a whole into many goals and a myriad indicators yet barely addressing the interdependencies between them. It can easily lead to piecemeal solutions, which do not necessarily compose a systemic response to the challenges we face.

A different approach considers that the issues we are dealing with are linked to the limitations of our ways of thinking and understanding our place in the world. Today’s existential challenges are signs of a growing divorce between human logic and the dynamic balance and richness of how Life (with a capital L) works. We humans do not have an objective access to reality; instead, we give meaning to our perceptions through frameworks of interpretation that are always present and most of the time subconsciously. The dominant frameworks of Modernity – which originated in the scientific, industrial and geopolitical revolutions of the 17th–19th centuries – ignore most of what we already know about how Life works. It is more than time to learn it. And learning is not the conscious understanding of something; it is the change in our patterns of behaviour that are necessary to deal with the consequences of what we know.

Living systems (individuals, organisations, ecosystems) do not change their course under the injunction of purposeful and straightforward planning. Or to be more precise, intentional change in a certain direction always brings unexpected responses and small and large feedback loops. Living systems evolve all the time and occasionally enter critical zones from which they might emerge having learnt new patterns that replace older ones. But *might* is not the same as *will*. At those critical points, the future is truly unknown. Jorge Luis Borges claimed that: ‘Time forks perpetually towards innumerable futures.’ Erich Jantsch (co-founder of the Club of Rome) and Ilya Prigogine (member of the Club in the 1970s and Nobel laureate)

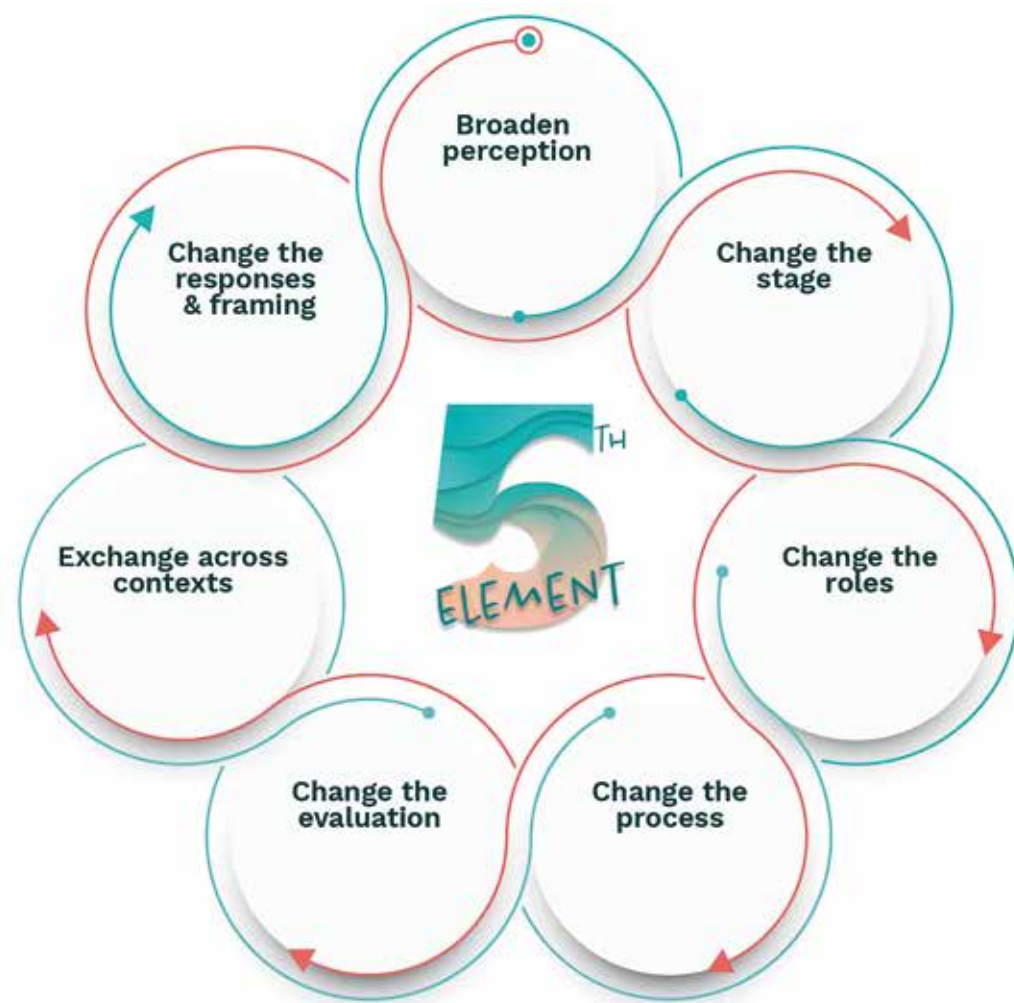
would have agreed with Borges’s insight, so well aligned with their own investigations on the self-organising nature of the universe.⁶

Criticality might lead to emergence, but the process cannot be planned beforehand, and natural creativity plays the leading role in giving birth to new harmonies within the larger web of Life. This is where the expansion of the space of possibilities comes in. *The Limits to Growth* disrupted the conviction that conventional development, as a programme of modernisation under western hegemony, was necessary and legitimate for the sake of humanity. But the book was also an optimistic bet on collective intelligence’s ability to learn from the exploration of possible futures. Nowadays, the situation is even more critical. Humanity is at a threshold, fluctuating dangerously between self-destruction and new pathways of wellbeing in the biosphere. Like little Alice, we do not know what will happen when we go through the looking glass. And the unknown cannot be taught; it requires exploration.

THE FIFTH ELEMENT

In the face of the magnitude, scale and extreme complexity of the challenges we face, we are all learners in need of better ways to address the questions that will unveil our blind spots and co-create new responses in endless, iterative processes. This requires new attitudes, skills and knowledge to take leaps in sense-making and practise collaborative design towards human wellbeing within a healthy biosphere. Our relationships with





▲ Figure 1. The cycle of T5E transformative exploration. (© Carlos Alvarez Pereira)

others, with nature and with time are at stake here. The path forward does not consist of the implementation of existing piecemeal solutions and leaving unchanged the fundamentals of our culture, so many of them built on separation, competition and exploitation. We need to understand what we already know and explore what we do not. And in order to do that, we need to bet on the humanity and capacity of everybody to create the conditions for a collective emergence from emergency.

In the process, all kinds of capacities and sources of knowledge – individual and collective, traditional and modern, artistic and scientific, verbal and embodied – are required to ‘dance with systems’⁷ and face the challenges in contextual settings, often in communities where belonging can be revitalised. For all those sources to be useful, they need to be brought together in a manner transcending the separation and hierarchy of disciplines. This also means that we need to be engaged as whole humans, not only as experts and stakeholders. In the end it means that the transformations towards equitable wellbeing within a healthy biosphere would be the

outcome of a challenging (and exciting) journey into uncharted territories to remember old wisdom and learn new ways of becoming human.⁸

This is why the Emerging New Civilisation(s) Initiative (ENCI) of the Club of Rome is launching the concept of The Fifth Element (T5E). It is an open invitation to all individuals and organisations to share the excitement of such a learning adventure, for our own sake and for that of generations to come. The name is a tribute to ancient traditions in which the four elements of matter – air, water, earth and fire – are combined to create life, but only together with the quintessential fifth element, the life force, ‘aether’, ‘spirit’ or ‘prana’, itself very close to the Chinese concept of Qi. It is a call to weave together the central value of interdependency, so present in Ubuntu, Tao and many other cultures, with an abundance of traditional ecological knowledge being rediscovered and with the best of contemporary science and culture. Ecology, epistemology, complexity thinking, evolutionary biology, cybernetics, and others already provide decisive contributions for us to explore.

BOX 1. THE FIFTH ELEMENT INITIATIVE

Life (the fifth element) inspires both a better understanding of today's complex challenges and the competences people need to act on them. The T5E initiative intends to enable people of all ages and under any conditions to learn and act by themselves, in their own contexts. It does so by facilitating the engagement of learners, wherever they are, in collaborative inquiries and mutual processes relevant to their contexts, and by co-creating the most supportive methods and tools. Through this approach, T5E aspires to accelerate the change of perceptions and cultural transformations required to meet the challenges described in the UN's Agenda 2030. The ultimate goal is to promote the right conditions for the emergence of new balances of equitable human wellbeing within a healthy biosphere through an infinite richness of pathways specific to local contexts.

T5E bets on everyone's capacity to learn in the exploratory and pattern-changing sense mentioned above. People anywhere can experience the knowledge relevant to the challenges they face in their everyday lives. Most importantly, if allowed to do so, they can collectively build new responses to those challenges and start developing new pathways to a sustainable way of living in their own contexts. New questions can lead to new responses, in turn leading to fresh questions in an endless process of learning more attuned to how Life works.

THE DYNAMICS OF TRANSFORMATIVE EXPLORATION

The logic followed by T5E to create a transformative process is represented here (see Figure 1). It starts by changing the questions addressed by learning processes and the ways in which they are addressed to complete a whole cycle of self-reinforcing transformations. This ultimately leads to a greater capacity for people to reflect on existential challenges like climate change and, in particular, to act on them in their own contexts.

This representation emphasises the cyclical nature of the dynamics found in all living systems. The different elements in each cycle should not be interpreted as steps in a straight path forward, but rather as elements whose presence is required to open the space of possibilities. Asking new questions is often the starting point and a powerful catalyst to engage in new levels of learning. For instance, energy transition can be considered solely from a technical and economic point of view, without questioning why we need to consume energy and, ultimately, what drives human health and wellbeing. Both ancient knowledge and modern science respond that the quality of our relationships to other humans and to nature is critical.⁹ This enables completely different ways of addressing the topic of energy transition, by which a dramatic reduction in consumption could be made compatible with high levels of wellbeing.

The T5E approach is based on leading-edge research on learning competences and initiatives of ongoing

reflection and practice, especially in the domain of innovative pedagogies, and is designed to face the challenges of sustainability. It does not pretend to replace what others already do, but instead give them visibility and support and hopefully catalyse the emergence of a human revolution, one in which we make peace with the Earth, and with ourselves.

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🔗 <https://www.clubofrome.org/impact-hubs/emerging-new-civilization>

FURTHER READING

To find out more about what we have learnt 50 years on from *The Limits to Growth* and what's next, please see:

Bardi, U. and Alvarez Pereira, C. (Eds.) (2022) *Limits and Beyond: 50 years on from The Limits to Growth, what did we learn and what's next?* A Report to the Club of Rome. Exapt Press.

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International environmental law: legal and political history

Emanuela Orlando traces the origins of international environmental law and considers its future role.

THE ORIGIN OF ENVIRONMENTAL LAW

Fifty years ago, the 1972 United Nations (UN) Conference on the Human Environment, held in Stockholm, represented a historic moment in officially marking the international community's growing concern for the adverse environmental impacts of human activities and the need to take action to protect the environment. The conference, proposed by Sweden and convened by the UN General Assembly, was the first 'global gathering on environmental issues'.¹ It brought together delegates from more than a hundred states as well as representatives of major intergovernmental organisations and non-governmental observers.²

The conference led to three main outcomes:

- The establishment of the United Nations Environmental Programme (UNEP), the first intergovernmental body focused on environmental protection;
- A non-binding action plan on the human environment; and
- The adoption of a Declaration of Principles on the Human Environment.

The latter was perhaps the most symbolically significant outcome, as it was the first international document officially endorsing a set of principles aimed at stimulating public awareness of environmental issues and providing guidelines on future action. The

human rights perspective enshrined in Principle 1 was particularly innovative at the time in highlighting the inextricable link between environmental protection and the enjoyment of fundamental human rights. Of special relevance also is Principle 21, affirming the responsibility of states to ensure that activities within their jurisdiction or control do not cause damage in another state or beyond their national jurisdiction. This principle has since become one of the overarching rules in international environmental law.³

While the Stockholm Conference is usually regarded as the starting point of modern international environmental law, the early precedents in the international regulation of natural resources can be traced back to the late 19th and early the 20th centuries. In this period, it is possible to find a few treaties, mostly of a bilateral or regional nature, aimed at regulating fisheries and protecting wildlife and species of commercial value against overexploitation.⁴ For example, the International Convention for the Regulation of Whaling was adopted in 1946.⁵ These first international environmental treaties, however, were ad hoc, sporadic and limited in scope.² Moreover, these initial developments in international environmental regulation reflected a narrow approach to the environment and to environmental problems, which were primarily conceptualised through the lenses of state sovereignty over natural resources and mainly conceived as neighbouring issues. A few influential

cases were decided in this period, but these mostly addressed issues of ownership and uses of shared natural resources, shared watercourses and transboundary environmental interferences.^{6,7}

Against this background, the process leading to the Stockholm Conference and subsequent developments had the undeniable merit of drawing attention to the need to protect the environment itself and of shifting the focus of international regulation from a ‘conservation- or resource-oriented logic to a more comprehensive’ and holistic perspective.⁸ From a law-making and policy perspective, Stockholm also introduced two features that still characterise contemporary international environmental law. First, it prefigured the presence of non-governmental organisations (NGO) and, to a lesser extent, other non-state actors and civil society in advancing international environmental discussions and the development of international environmental regulation. It was indeed ‘the pressure of NGOs, especially in the US, that led to the convening of the Stockholm Conference’.⁹ Nowadays NGOs are major political participants in international environmental law-making and play a significant role in influencing legal developments and standard setting, either formally through their observer status in the context of several multilateral environmental agreements, or through more informal channels.^{9,10} Secondly, the Stockholm Declaration anticipated the increasingly prominent role of soft-law instruments and non-binding declarations of principles in shaping the normative architecture and the further development of international environmental law.¹¹

Overall, the 1972 conference had a remarkable impact in catalysing attention on environmental problems and laying the groundwork for the definition and recognition of environmental law as a distinct legal discipline, not only internationally but also regionally and in several domestic legal systems. The following years saw the negotiation and adoption of a growing number of multilateral environmental agreements (MEA) addressing a wide range of environmental problems. These include some landmark international conventions, including the:

- 1972 Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matters;
- 1972 Convention concerning the Protection of World Natural and Cultural Heritage;
- 1973 Convention on International Trade in Endangered Species; and
- 1985 Vienna Convention on the Protection of the Ozone Layer and subsequent 1987 Montreal Protocol.

Significantly, these developments in environmental treaty-making also reveal a progressive move from visible and more discrete environmental problems – such

as marine pollution and protection, and conservation of certain species and natural areas – to more complex and global environmental challenges. In terms of processes, international treaty-making starts to reveal more dynamic patterns compared to agreements in other areas of international law in order to account for uncertainties in scientific knowledge, the emergence of new information and the changing understanding of environmental problems.^{4,12} Since the 1980s, global environmental agreements have often been articulated in the form of framework conventions – setting out the basic principles and system of governance for a certain issue – and subsequent protocols or annexes setting out standards or addressing specific aspects.¹²

Alongside developments at the law-making level, the 1980s are also characterised by some important initiatives that had a significant influence in shaping and informing contemporary debates in international environmental law. Of special relevance are the 1982 World Charter for Nature – perhaps one of the first international documents outlining an ecological approach to environmental problems and emphasising ‘the protection of nature as an end in itself’² – and the work of the World Commission on Environment and Development (also known as the Brundtland Commission). Established in 1983, the Commission presented its influential report entitled *Our Common Future* in 1987 in which it explicitly introduced the concept of sustainable development.¹³ In fact, the tension between environmental protection and economic and social development, and the concomitant north-south divide between different perceptions of environmental problems, already underlined the process leading up to the Stockholm Conference¹ and still remains one of the central challenges facing global environmental governance.⁸

BEYOND RIO: MATURITY AND REFLECTION

If the two decades following the Stockholm Conference laid the foundations for the future development of international environmental law and its consolidation as a distinct discipline, the 1992 Rio Conference on Environment and Development marked the beginning of a new phase of maturity for the discipline. Like Stockholm, one of the main outcomes of the Rio Earth Summit is a Declaration of 27 principles, which has since remained the most comprehensive and influential manifesto for the legal concept of sustainable development. The Declaration also sets out the main international environmental principles underpinning the negotiation and design of environmental treaties and the formulation of domestic legislation and policy, as well as a substantial body of domestic and international case law.¹⁴ Indeed, some of the key principles that have informed future developments, implementation and application of environmental law, both internationally and domestically – such as the Precautionary Principle and the Polluter Pays Principle, the notion of common

but differentiated responsibilities, sustainable consumption, and other principles of cooperation and public participation in environmental governance – find their formulation in the Rio Declaration.

The Rio Summit also led to the adoption of two landmark conventions addressing climate change: the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and the 1992 Convention on Biological Biodiversity. Notably, the treaties established through these conventions designate the preservation of biodiversity and the prevention of climate change as concepts of ‘common concern of mankind’ and in so doing seemingly open a new phase in international environmental regulation. Without detracting from the fundamental principle of a state’s sovereignty over its natural resources, the concept of common concern reflects the existence of a general interest of the international community with respect to particular environmental issues.¹⁵

From the point of view of the evolution of international environmental law, if Stockholm heralded a time of enthusiasm and new energy, the years following Rio were a period for pause and reflection in the realisation that, despite the legislative and normative progress, the environment had continued to deteriorate. This led to a shift in attention from legislative development to questions of implementation and compliance with international environmental law, as well as on the need to ensure better coordination among the various international environmental agreements.⁴ Together with a focus on compliance, there was also a renewed interest in the topics of international responsibility and liability, as illustrated by the negotiation and adoption of several liability regimes as protocols or annexes to MEAs.¹⁶

The decades following the Rio Summit also made increasingly evident the need to better understand the linkages between environmental law and other branches of international law, such as trade, investments and human rights. It became clear that environmental problems cannot be considered in isolation and that international environmental law must no longer be regarded as ‘a mere “branch” of international law’, but rather as ‘a “dimension” inherent to each internationally regulated human activity’.¹⁷ A corollary of this has been the gradual inclusion of references to environmental protection in the context of major environmental treaties, including the Marrakech Agreement, which created the World Trade Organization. Express references to the protection of the environment and to sustainable development began to appear also in the jurisprudence of international courts and tribunals.^{18,19,20}

THE SUSTAINABLE DEVELOPMENT PARADIGM

Overall, the processes leading to the Rio Conference and its follow-up had been anticipating some of the themes



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informing current debates in international environmental law. Sustainable development has since remained the leading paradigm for international environmental law and policy. Both the 2002 Johannesburg World Summit and the Rio+20 Conference in 2012 revolved around the definition and implementation of this concept.

More clearly than the 1992 Rio principles, the declaration outcomes of these conferences provided greater visibility to the three-dimensional nature of sustainable development, with perhaps less attention placed on the need to respect planetary boundaries and ecological limits even at the expense of developmental considerations.²¹ The 2002 World Summit on Sustainable Development Declaration presented economic development, social development and environmental protection as the three ‘interdependent and mutually reinforcing pillars of sustainable development’,²² while the 2012 The Future We Want Declaration emphasised the idea of integration among the three dimensions of sustainability. Moreover, with the 2012 UN Conference on Sustainable Development taking place in a political context heavily influenced by the global financial crisis and ensuing economic recession – which particularly affected industrialised countries in the global north⁹ – sustainable development was addressed in close

conjunction with a green economy, an idea put forward under the input of major international institutions as a suitable framework to address the as yet unresolved divide between economic development and growth and environmental protection.

Currently, the adoption in 2015 of the sustainable development goals (SDG) and the accompanying 2030 Agenda for Sustainable Development represent the most comprehensive framework for the implementation of sustainable development. But while the focus of these international frameworks revolves around economic and social development, with poverty reduction featuring among the preeminent objectives, a new wave of environmental legal scholarship is advocating for a ‘strong’ version of sustainability in which the pursuit of developmental concerns and objectives find their outer limit in the ‘ecological carrying capacity of the earth’.^{23,24}

Alongside the definition of sustainable development, contemporary international environmental law debates have also shed light on the wider range of actors and participants in international environmental governance. Particularly relevant in that respect is the explicit acknowledgement – in the Johannesburg Declaration and Plan of Implementation, but perhaps

more vigorously in the 2030 Agenda and the SDGs – of the need to involve the private sector (i.e. businesses but also civil society more broadly) in addressing environmental problems and operationalising the sustainable development agenda.

At the same time, the question of implementation and effectiveness of international environmental law remains high on the agenda, prompting some to wonder about the appropriateness and desirability of reforming the current institutional structures – for example by further strengthening UNEP and transforming it into a fully fledged UN agency,²⁵ or through the creation of a dedicated World Environmental Organization.²⁶ Besides the insufficiency in the institutional scenario, scholars have also pointed to the lack of proper mechanisms for monitoring compliance and ensuring the enforcement of international environmental norms as a further weakness of current international environmental law.²⁷ Finally, this law discipline is also lacking an overarching general normative framework; that is, a comprehensive codification of the main rules and principles applicable to international environmental regulation, which may serve as a sort of Environment Bill of Rights and which could bring coherence and coordination across a variety of sectoral instruments.

On this last point, however, some progress may be made through the movement supporting the idea of a Global Pact of the Environment. Originated by a group of environmental experts, in close collaboration with the International Union for Conservation of Nature, World Commission on Environmental Law and the French thinktank Club des Juristes, the Pact is a text encompassing a set of internationally recognised principles of international environmental law with the ambitious objective of it eventually translating into a legally binding international treaty.²⁸ The Pact started as a civil society initiative, and the idea is currently supported and promoted by a large coalition of NGOs, activists, academics, citizens, lawyers and scientists. In 2018, the idea of an overarching environmental treaty was addressed in a UN General Assembly Resolution,²⁹ which established an ad hoc working group with the task of considering and assessing possible gaps in international environmental law and preparing the ground for discussion on the appropriateness of international instruments as a means to address them.

LOOKING BACK AND FUTURE PROSPECTS

The history and evolution of international environmental law need to be properly situated, analysed and understood within the framework of developments and



changes in the geopolitical context that have shaped the international legal order over the last two centuries. At the normative level, one of the main challenges encountered by sustained efforts to advance the development of international environmental regulation is the difficulty of achieving consensus in a deeply divided, multicultural world. The need to protect the global environment and address the common concern posed by increasingly transnational environmental challenges, required flexibility in law-making endeavours and a greater recourse to principles, soft law and other normative techniques capable of better accommodating the diversity of national interests and political priorities. The UNFCCC's Paris Agreement is indeed an illustrative example of the latter.

In light of this, the wide traction and popularity of sustainable development should not be surprising. Widely criticised as being too vague and elusive, sustainable development captures the difficult attempt to reconcile, balance and even integrate the competing interests encapsulated in its three pillars of environmental protection, social and economic development, and to mediate among different positions and perceptions of environmental problems. While the term was not explicitly used during the Stockholm Conference, the profound tension between environment and development was a major underpinning theme reflecting the already emerging divide between the industrialised and developed economies in the global north and the global south. As illustrated here, this tension and oscillation

between development and the environment, often combined with the north-south divide, have from the outset permeated the development and evolution of international environmental law and policy.

Looking to the future, what are the perspectives and opportunities? Both the 2019 UNEP Global Environment Report³⁰ and the last Assessment Report by the Intergovernmental Panel on Climate Change³¹ portray a rather grim picture of the state of our planet, stressing that while the global environment is deteriorating, the window for action is closing. It is time, therefore, to finally switch the direction of travel by defining new priorities, transforming our economic and financial systems to take into account ecological and planetary boundaries, and addressing the north-south divide though an approach based on cooperation and solidarity among nations. This may be our last opportunity to save our planet and to preserve the rights of our children and of future generations. Whether this is achievable depends primarily on the existence of enough political will to embark on this new trajectory; sadly, the existence of such political will is far from certain.

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The 50-year evolution of the environmental industry

Eleni Antoniadou Snell traces the growth of the environmental industry over the past 50 years.

INTRODUCTION

As we celebrate our key milestone of the 50-year anniversary of the IES, we are provided with a perfect opportunity to reflect on the evolution of the environmental industry over the last 50 years.

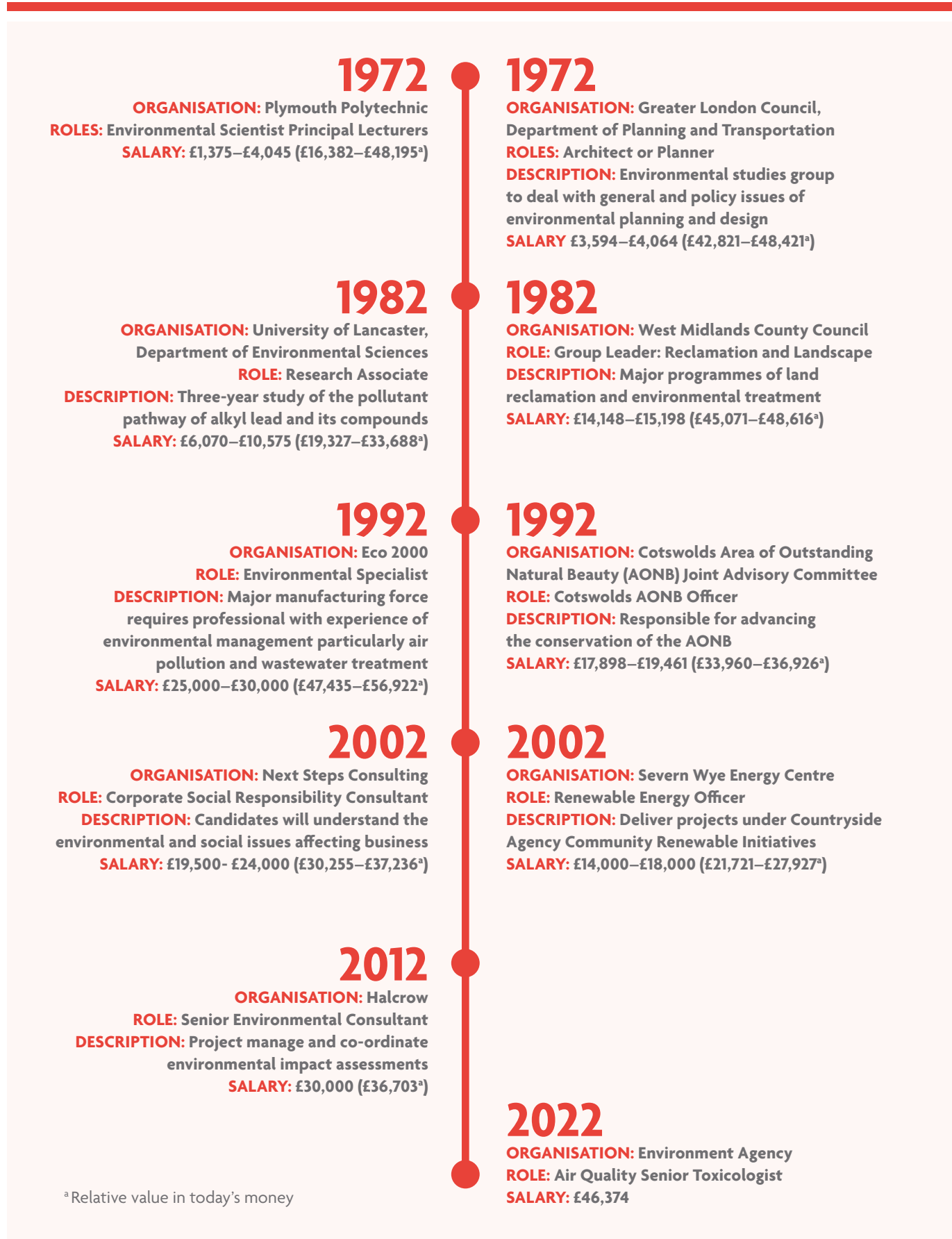
During this period, environmental issues have been identified, addressed and managed. New evidence, research, data and legislation have emerged at a rate

that requires constant adaptation of working practices and the ways in which the industry is set up.

How has the environmental industry evolved between 1972 and 2022? What have been the key drivers and instigators of change? Does an environmental professional's career trajectory vary depending on when they joined the workforce?

▼ **Wolf's Fang Runway, Antarctica. An Initial Environmental Evaluation for the project was undertaken by Eleni Antoniadou Environmental Ltd in 2020. (© White Desert)**





▲ Figure 1. A snapshot of the evolution of jobs and salaries in the environmental sector between 1972 and 2022^{1,2}

I set out to answer these questions through in-depth interviews with environmental professionals who started their career during each of the past five decades. I chose environmental professionals from a range of environmental industry backgrounds and experience in order to capture a snapshot of each decade.

Extracts from published job adverts from the past 50 years (see **Figure 1**) provide a fascinating timeline of typical job opportunities in the environmental sector in each decade, as well as an indication of salaries and the equivalent in today's money. Since 1972, salaries in the sector have either decreased or remained the same.

1970s: STOCKHOLM 1972

As well as being the foundation year of the IES, 1972 was also the year of the Stockholm Conference, where the United Nations Environment Programme was founded. In 1970, the Royal Commission on Environmental Pollution in the UK was created under Royal Warrant to advise the Queen, Government, Houses of Parliament and the public on environmental issues. Four years later, the Control of Pollution Act 1974 was introduced in the UK. These were the key drivers that gave the decade a significant kick-start in terms of environmental awareness.

CAREERS IN THE 1970s

Environmental science degrees were already being delivered across a number of universities and polytechnics at this time, and in academia there were opportunities to lecture in environmental science.

Within engineering, environmental planning of transport projects had commenced to a certain extent. The Greater London Council's Department of Transportation had begun to set up an environmental studies team to consider environmental planning of projects. At this time, environmental assessment sat within town and transportation planning departments.

See **Box 1** for a snapshot of an environmental career in the 1970s.

1980s: 1985 EIA DIRECTIVE

In 1985, the European Directive on environmental assessment formalised the requirement to carry out environmental assessments of transport projects. It was not until 1988 when environmental impact assessment (EIA) was formally introduced in the UK through the Town and Country Planning (Assessment of Environmental Effects) Regulations in England and Wales and Environmental Assessment Regulations in Scotland and Northern Ireland. Therefore, in the early 1980s there were not as yet many opportunities to work in environmental assessment.

BOX 1. INTERVIEW WITH FIONA BROWN

Fiona Brown, a retired Environmental Planner, graduated with an MSc in Transport Planning and Traffic Engineering in 1977. She began her career in the late 1970s as a Traffic and Town Planner at Sir Alexander Gibb and Partners. This role provided her with the opportunity to become one of the first environmental assessors of transport projects in the UK, with further work overseas. International projects included transport planning and economic assignments of infrastructure projects, such as the Port Louis motorway in Mauritius and aircraft and passenger forecasting at Tripoli airport in Libya. This led to Brown becoming Environmental Planner for the A36/A46 Bath-easton Bypass, east of Bath, using the Manual of Environmental Appraisal (MEA) in the early 1980s.

'In transport, 1983 was the key date when the Department for Transport published the MEA and required all road projects to follow this. My involvement started a bit earlier, as I piloted the MEA on the Bath-easton Bypass in Bath.'

At this time, an environmental assessment would be carried out by a single professional, requiring knowledge across all environmental topics.

CAREERS IN THE 1980s

However, at the same time, the sector turned its attention to the understanding and control of pollution of land and water by industry. Waste regulation at this point was being carried out by county councils, while Her Majesty's Inspectorate of Pollution dealt with major industrial permitting. At universities, research was being carried out to understand the impacts of pollutants on the environment.

See **Box 2** for a snapshot of an environmental career in the 1980s.

BOX 2. INTERVIEW WITH JONATHAN ATKINSON

Jonathan Atkinson, Environmental Scientist at the Environment Agency, graduated with a degree in environmental science from the University of Plymouth in 1979 and went on to gain a postgraduate diploma in soil and water engineering.

Environmental job opportunities in the early 1980s were limited and an ambition to work internationally led to Atkinson joining the Voluntary Service Overseas to work in the Philippines, and to undertake soil research projects in Papua New Guinea and Burkina Faso.

The growth of the pollution control sector in the late 1980s provided the opportunity to work back in the UK, where he joined the pollution control section of Kent County Council's Waste Disposal Department in 1987. These county council departments were later subsumed into the Environment Agency, where he still works today leading on contaminated land projects, risk assessment of historical landfill sites and environmental enforcement on permitted sites.

Atkinson also served on the IES Council between 2016 and 2022, working with the Land Condition Community. Through his foundation in soil science, he has contributed to the wider contamination community, working with key organisations such as CIRIA and CL:AIRE.



▲ Meltwater streams in Schirmacher Oasis, Antarctica. An Initial Environmental Evaluation for Antarctic tourism and logistics operations was undertaken by Eleni Antoniadou Environmental Ltd in 2020. (© White Desert)

1990s: ENVIRONMENT PROTECTION ACT 1990
In the 1990s, new environmental legislation focused on air pollution and controlling its sources. The Environmental Protection Act 1990 controlled industrial emissions and the Clean Air Act 1993 controlled smoke. The Environment Act 1995 was the first piece of primary legislation in the UK to incorporate ambient air quality standards.³

It was during the middle of this decade that another pivotal development took place, with the 1996 formation of the Environment Agency. The Environment Agency absorbed the services from county council waste departments, Her Majesty’s Inspectorate of Pollution and the National Rivers Authority, along with the police’s role of issuing flood warnings.

CAREERS IN THE 1990s
These changes in environmental legislation provided a broader range of environmental career options. These included opportunities to work in the environmental protection of the countryside through the Countryside Commission. As well as the environmental management

of land and water, there were also new opportunities to work in the modelling of air pollution.

See **Box 3** for a snapshot of an environmental career in the 1990s.

BOX 3. INTERVIEW WITH DR NOEL NELSON

Dr Noel Nelson, Dispersion Scientist and Modeller, joined the Meteorological Office in 1991 to work on the development of dispersion models.

After obtaining a degree in physics he had an interest in astronomy, though took advice to join the environmental movement. His MSc in Environmental Technology in the late 1980s was focused on water quality but his key interest remained above ground, in the atmosphere. He then joined the University of Essex, investigating atmospheric loading to the North Sea, before joining the Meteorological Office, where he has spent most of his career. Here, he developed expertise in short- and long-range atmospheric dispersion modelling. In the late 1990s, he teamed up with the National Health Service and developed the weather and health initiative Forecasting the Nation’s Health.

2000s: WATER FRAMEWORK DIRECTIVE 2000
In 2000, the EU’s Water Framework Directive set the requirement for Member States to achieve good water quality status in all water bodies: surface water, groundwater and marine waters up to one nautical mile from shore.

In 2004, the Environmental Assessment of Plans and Programmes Regulations led to the requirement for strategic environmental assessment of plans and policies. At the same time, the application of the EIA Regulations was reinforced for projects being delivered under the Transport and Works Act.⁴ To ensure the correct application of EIA, the Department of the Environment, Transport and the Regions revised its guidance document *Environmental Impact Assessment: A Guide to Procedures*.⁵ In addition, procedures were developed to apply EIA to offshore windfarm projects and new regulations came into force to apply EIA to existing sites used for mineral working.⁴

CAREERS IN THE 2000s
The reinforced application of EIA resulted in an increase in the number of projects and plans that were required to undergo the EIA process. This was accompanied by career opportunities to work in the EIA field.

By 2008, the Environment Agency had grown to 12,500 members of staff, providing opportunities for environmental professionals to work in land and water pollution, waste permitting and flood risk.⁶

See **Box 4** for a snapshot of an environmental career in the 2000s.

BOX 4. ELENI ANTONIADES

I graduated in 2002 with an MSc in Environmental Technology specialising in environmental assessment from Imperial College, following a Bachelor’s in Environmental Science from the University of Sussex. I joined a multidisciplinary consultancy as an EIA co-ordinator of highway schemes in the UK. At that point, the team was being rapidly expanded with specialists and EIA co-ordinators. As I wanted to use my environmental science skills, and the team was still growing, I also worked in contaminated land investigations and became involved with all scientific aspects of construction pollution monitoring and management. This broad experience with all stages of infrastructure projects, combined with a passion for working on overseas projects, provided a foundation to become an independent Project Environmental Lead. Today, I am the environmental lead on projects in Antarctica, Greece, Cyprus and the UK, solving emerging environmental issues in high-risk environments.

2010s: NET ZERO 2050
Following the 2015 Paris Agreement, in 2019 the UK Government committed to achieving net zero greenhouse gas emissions by 2050. This was not a new commitment, as under the Climate Change Act in 2008

the Government had already committed to reducing emissions by 80 per cent and in 1992 had published the paper *Climate Change: Our National Programme for CO₂*,⁷ following the 1992 Rio Conference.

Given that the legal framework to reduce greenhouse gas emissions has existed in the UK since 1992, this point in time represented a tipping point, a shifting landscape in how climate change was being addressed. This commitment also had implications for UK infrastructure projects, both existing and in the pipeline.

Discussions around climate change became declarations of a climate emergency. A climate emergency was declared not only by local councils and government departments but also by private organisations. Several bills which would declare a climate emergency were proposed in the UK Parliament.

At the same time, David Attenborough’s 2018 *Blue Planet II* documentary series seemed to catapult plastic pollution into the mainstream media and cause a rapid increase in environmental awareness.

CAREERS IN THE 2010s
This increase in environmental awareness also led to increased consumer awareness and demands for greener products. During this decade, environmental career opportunities crossed into a broader range of industries. By the end of the decade, it seemed that there were opportunities in every sector – from tourism and motorsports to retail, as well as the staple infrastructure projects.

It also resulted in increased awareness of the links between fuel and energy use and carbon emissions, resulting in a growing sector in carbon accounting, energy efficiency of buildings and renewable energy.

See **Box 5** for a snapshot of an environmental career in the 2010s.

BOX 5. INTERVIEW WITH NOPI EXIZIDOU

Nopi Exizidou, Net Zero Transition Lead at the British Antarctic Survey (BAS), began her career in the 2010s looking at the energy performance of buildings and undertaking thermal modelling. She had gained a MSc in Production Engineering and Management from the Technical University of Crete and had worked on research projects for buildings, such as cooling and passive ventilation systems in Cyprus.

Exizidou used this knowledge when she joined BAS in 2017 as an Energy and Carbon Reduction Manager, carrying out energy audits of BAS buildings in Cambridge and Antarctica. Following the preparation of a carbon management plan, by the end of the decade her role had changed to that of Net Zero Transition Lead – a clear shift from energy management to carbon reduction and net zero. She continues to work in this area.



▲ Eleni Antoniadis Snell acted as environmental lead for the runway refurbishment at RAF Akrotiri, Cyprus, in 2016. The photo shows the batching plant area. (© Leo Hillier/Lagan Construction)

2020s AND THE FUTURE

The current decade kicked off with COP26, which gained a huge following in mainstream media as well as within the industry. The Government also committed to protecting 30 per cent of the UK's land by 2030. So, what can we expect from the 2020s and the future of our industry?

During the interviews, I found a number of common threads weaving through the decades.

The first is recognition that environmental regulation is an instigator for change. A number of key environmental regulations have stimulated periods of growth and reorganisation within the environmental industry. In each decade, the industry has adapted to meet the new regulatory landscape as well as the rapidly changing environmental conditions. The trajectory of an environmental professional's career, the skills they hold and the career opportunities available to

them will vary depending on when they started their career.

The second thread is that while environmental professionals have become progressively more specialised in environmental fields over the decades and career opportunities have changed accordingly, the underlying need for professionals to understand environmental science as a whole remains. Expressions such as 'understanding the broader picture', 'having an interdisciplinary approach', 'understanding interactions', 'not working in silos', were used in all the interviews. For myself, the IES presents the perfect platform for this interaction to take place.

In terms of where the current decade will take our industry, the third common thread – and the most important, in my view – is the true passion everyone

showed and the recognition that a career in the environment is a well-chosen career path and a truly rewarding one. What a great honour to be here. **ES**

Eleni Antoniadis Snell CEnv is an environmental scientist and Vice Chair of the IES, first elected to the board in 2016, when she founded the organisation's EIA Community. With over 20 years' experience in EIA and construction environmental management, Eleni is the Project Environmental Lead for aviation and infrastructure projects, leading on projects in Antarctica, the UK, Cyprus and Greece. She leads and manages all environmental aspects of projects from carbon reduction materials recycling to contamination and remediation issues on behalf of clients working in unique and challenging environments. She enjoys making a significant and tangible difference to the environment. She has won three environmental industry awards for recent projects.
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With thanks to all interviewees for their time in sharing their experiences and insight: Fiona Brown, Jonathan Atkinson, Noel Nelson, Nopi Exizidou and Ethny Childs.

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▲ Eleni Antoniadis Snell and colleague conduct a ground investigation during a construction project. (© Galliford Try Lagan Construction JV)

Fifty years of environmental science taught provision: a changing landscape

Jim Longhurst reviews how environmental science as a discipline has grown and developed.

INTRODUCTION

From its formation in 1972, the IES has seen its role as encompassing both the professional practice of environmental science and the development of knowledge, skills and attributes (characteristics developed by a student during a period of study) by environmental students to enable them to become professionals in the discipline. To encourage and support the development and nature of curriculum provision – a portfolio of undergraduate and taught postgraduate courses offered by a higher education institution – from the early 1990s onwards the IES developed an accreditation scheme, supplemented by the Committee of Heads of Environmental Sciences (CHES). In 2012, after some 20 years of close working, the IES and CHES merged, with CHES effectively becoming the IES's education committee.

THE GROWTH OF ENVIRONMENTAL SCIENCE

Environmental science as a discipline began in UK universities and polytechnics in the late 1960s. A number of institutions were early providers of environmental science or similar degrees, including East Anglia, Hertfordshire, Lancaster, Plymouth, Southampton, Stirling and Sunderland.^{1,2} The content of these early programmes of study was developed from existing provision in natural sciences and elements of social sciences, blending ideas, concepts and techniques from geography, economics, geology, biology, chemistry and physics. This blend created provision that addressed environmental concerns, such as population growth, nature conservation, natural resource management, limits to growth and resource scarcity, air and water pollution, land contamination, and energy supply and demand, and did so in a quantitative, integrated and increasingly interdisciplinary manner. Understanding the function of natural systems and the perturbations caused by human actions was central to this developing provision. The increase in provision also led to many new undergraduate textbooks such as *Ecoscience*.³

Environmental science provision grew in size as did student interest throughout the 1970s, no doubt in part stimulated by the 1972 United Nations (UN) Conference on the Human Environment⁴ and popular texts such as *The Doomsday Book*.⁵ New providers offering their interpretation of environmental science led the discipline to a peak of student demand and course providers in the late 1980s and early 1990s.^{1,2} The 1992 UN Environment and Development Conference,⁶ also known as the Rio Earth Summit, acted as a further stimulus for student interest as did environmental crises such as acid rain, the ozone hole and nuclear accidents, first at Three Mile Island and later at Chernobyl. During the late 1980s and early 1990s, UK higher education policy changes alongside growing awareness of environmental issues led to a period of expansion in student numbers across providers.

Throughout this period, the IES continued to support the development of environmental science as a discipline, contributing to academic conferences such as Nature and Teaching of Environmental Science and Studies in Higher Education, held at Sunderland Polytechnic, with notable contributions exploring the nature of the discipline and its approach to scholarship.⁷ The IES also sought to ensure that environmental science graduates were aware of professional career opportunities, organising workshops and developing an Environmental Careers Handbook⁸ to provide guidance for students and new graduates. The IES handbook provided an interesting snapshot of higher education's environmental provision in the mid-1990s, with 79 institutions listed as providing undergraduate degrees and 56 providing postgraduate taught provision. This demand for environmental science provision also led to a burst of textbook publications for undergraduate programmes, particularly in the late 1980s, such as that by Jorgensen and Johnsen.⁹

Student demand for environmental science provision declined from the mid to late 1990s, resulting in the closure of some undergraduate provision and the merger or closure of some academic departments. The development of modularisation or unitisation across higher education enabled economies of scale to be achieved by sharing curricula across cognate academic departments, also providing greater choice. In time, this led to further mergers, the development of larger departments and schools, and the concentration of provision in a smaller number of institutions.

DEFINING THE CONTENT

In the late 1990s and early 2000s, the Quality Assurance Agency (QAA) began a programme of activity to develop subject benchmark statements describing the nature of study and the academic standards expected for graduates in specific subject areas. The statements define what graduates might reasonably be expected to know, do and understand following a programme of study. Environmental sciences was included in a benchmark statement alongside earth sciences and environmental studies – referred to as ES3.¹⁰ The IES and CHES were central to the development of the first benchmark statement in 2000, with Professor David Eastwood, Chair of CHES, chairing the review panel.

This first ES3 benchmark identified environmental science degree programmes as typically involving:

- A systems approach to understanding the present and past interactions between the processes operating in the lithosphere, cryosphere, hydrosphere, atmosphere and biosphere, and the perturbations of these systems by extraterrestrial influences;

- The scientific study of surface and near-surface physical, chemical, biological and anthropogenic processes operating on Earth;
- The Earth's history in the context of the period of human occupancy; and
- The monitoring and management of natural and human-induced environmental changes.

The statement noted that provision within the scope of the ES3 benchmark shared common features including:

- The focus on understanding of the Earth's systems in order to learn from the past, understand the present and influence the future;
- An emphasis on field-based investigation integrated with experimental and theoretical investigations;
- The multidisciplinary and interdisciplinary nature of approaches;
- Use of qualitative and quantitative approaches to acquiring and interpreting data;
- The range of spatial and temporal scales covered; and
- The development of graduates capable of using their powers of observation analysis and imagination to make decisions in light of uncertainty.

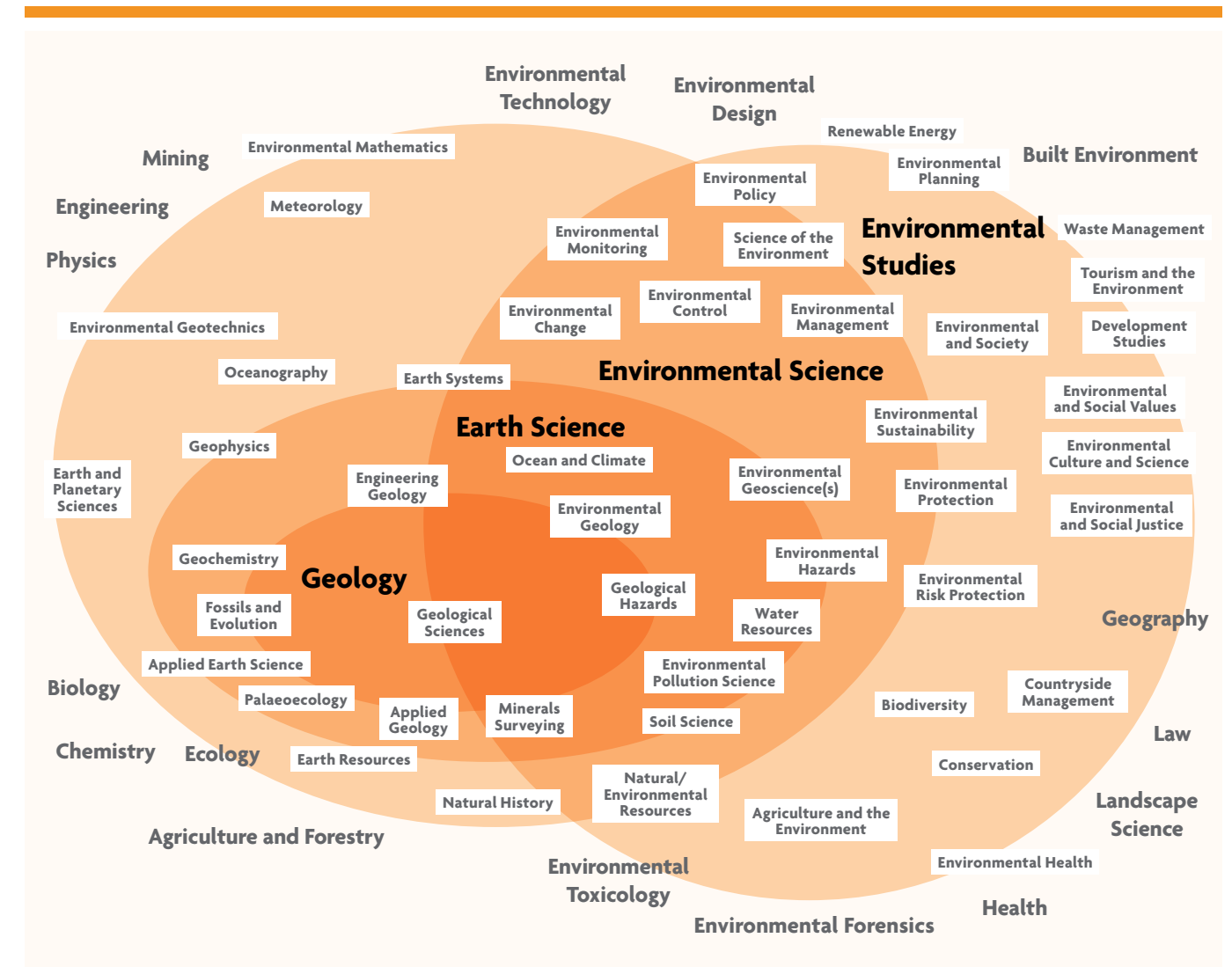
The benchmark statement provided an outline of subject knowledge in environmental sciences, which providers were expected to use as a reference point to design and review their provision. The ES3 benchmark statement was reviewed and updated in 2007, with the IES and CHES again being well represented on the review team.¹¹ The revised 2007 benchmark updated the expected scope of an environmental science undergraduate degree and now described such degrees as additionally providing:

- Modelling environmental phenomena;
- Problem solving related to environmental phenomena; and
- Scientific examination of the implications of sustainability and sustainable development.

This 2007 benchmark statement¹² also provided a Venn diagram representation of the major programme areas covered, which should be considered as heuristic rather than definitive (see **Figure 1**).

In 2007, the IES and CHES, together with the Geography Earth and Environmental Sciences Subject Centre, published a report mapping the landscape of environmental science.¹ The report covered the changing nature of recruitment in the discipline, the departmental structure in universities, the skills developed by students, and the employability of graduates before considering the trends in course provision and the increasingly important role of education for sustainable development.

The benchmark statement was further reviewed and updated in 2014.¹² This version included greater



▲ **Figure 1. Programme areas covered by the 2007 ES3 benchmark statement. (Source: QAA¹²)**

emphasis on sustainability, employability, links to professional bodies, and the importance of practical skill development, especially in field situations. It was revised again in 2019, with some minor alterations to align the content with the revised UK Quality Code for Higher Education.¹³

The benchmark statement was most recently revised and updated in 2022. Notable changes include a revised statement structure and the introduction of the cross-cutting themes of equality, diversity and inclusion; education for sustainable development; and employability, entrepreneurship and enterprise. This review refined the definition of an ES3 degree, which is now characterised by common skills and knowledge including:

- A focus on understanding physical, chemical and biological Earth systems in order to learn from the past, understand the present and influence the future;
- An appreciation of societal contribution and context;

- An emphasis on practical investigation;
- Multidisciplinary and interdisciplinary approaches;
- The ability to work across a range of spatial and temporal scales;
- The development of skills in observation and analysis to support decision-making in light of uncertainty;
- The ability to recognise and understand complex relationships through systems thinking;
- The development of professional skills and competencies that enhance employability; and
- An understanding of the contribution the subject knowledge, skills and behaviours can make towards a sustainable future.¹⁴

The 2022 benchmark statement presents a joint content structure for environmental science and environmental studies, noting that each honours degree will have its own rationale for its content, nature and organisation and that programmes will vary in the depth and specificity to which they treat certain subject areas.¹⁵ The content of such degrees is now expected to allow

BOX 1. GENERAL ENVIRONMENTAL DEGREE CONTENT

- **The concepts and applications of sustainable development and systems thinking.^a**
 - A holistic approach to the study of the complexity and interconnections of the Earth's systems and processes.
- **The principles of sustainability and the use of sustainable approaches to manage natural and human-induced cycles of resource use.**
 - The importance of timescales (geological, present, short term, long term and future) on the impacts of natural and human-induced activities on ecosystems.
 - The spatial scale, from global to local, of human impacts on the environment and responses to environmental change.
 - The interconnections and interdependencies of all organisms within natural and managed ecosystems.
 - The positive and negative impacts of development on the environment and management tools to address them.
 - The impacts of environmental change on humans, non-humans and infrastructure.
- Monitoring, modelling and managing natural and human-induced environmental changes and behaviour.
- Understanding how to predict, mitigate and manage risks presented by a changing environment and human pressures.
- Understanding uncertainty and how it applies to current and future decision-making.
- The role of institutions, organisations, governance structures and other stakeholders in managing and regulating human impacts on the environment.
- The importance of environmental sciences and studies in resource management and the mitigation of, and adaptation to, environmental hazards, including climate change.
- Observation and interpretation of field-based data (in situ and virtual) from first principles.
- The use of qualitative and quantitative data, an understanding of using data sets and an appreciation of how to assess data quality and uncertainty.
- Developing relevant and appropriate digital skills and technology.
- An awareness that the understanding and knowledge gained from the subject and its application are considered within a wider socio-economic and environmental context.
- **Understanding the ethical issues surrounding the legacy and uses of the discipline, engagement in contemporary debates and appreciation of the need for decolonisation.^b**
- **The importance of equality, diversity and inclusivity practices.**
 - An awareness of field work codes of practice and ability to confidently complete health and safety risk assessments.

Notes:

^a Issues shown in **bold** are new or substantially different from those identified in the 2000 benchmark statement.

^b Decolonisation of the curriculum refers to enabling greater inclusivity, openness and debate around provision.



consideration of a wider range of issues (see **Box 1**). There are changes to terminology, language and the ordering of items, but otherwise it is similar to the intent of the original specification.

In addition, the 2022 benchmark statement notes specific content that an environmental science degree should cover (see **Box 2**). Again, this is broadly the same as the original benchmark statement with minor changes to order or terminology.

BOX 2. ENVIRONMENTAL SCIENCE DEGREE CONTENT

The following outlines the content specific to environmental science degrees:

- Observation and interpretation of field-based data (in situ and virtual) from first principles.
- The scientific study of physical, chemical, biological and anthropogenic processes operating on ecosystems.
- Major environmental processes on scales from global to organismal and, where appropriate, at the molecular and atomic levels of organisation.
- A scientific and multidisciplinary approach to identifying, understanding and managing the Earth's structure, processes and ecosystems.
- The use of scientific and technological information and tools to inform decision-making processes and environmental management.
- Surveying and measurement, both in the field and laboratory, using quantitative and instrumental techniques.

Although there have been changes in the content of the benchmark statements over time, it is clear that much of the original thinking present in the 2000 and 2007 versions continues to find expression in later revisions, albeit with updated language and incorporation of more contemporary concerns reflecting the changing nature of higher education and wider society. In this ongoing process of review, the IES and CHES have played an important role in the benchmarking process, chairing the 2000, 2007 and 2014 panels, approving the changes to the 2019 statement and participating in the 2022 panel.

COURSES TODAY AND IES/CHES ACCREDITATION

In the 21st century, environmental science undergraduate student numbers have stabilised, accompanied by a substantial increase in postgraduate taught provision. The IES/CHES accreditation scheme covers both undergraduate and postgraduate courses (see **Table 1** for a full listing).

The IES/CHES accreditation scheme is thought to be the largest of its kind worldwide for environmental degree programmes, having evolved over the decades. The scheme's current iteration seeks two broad areas of information through which an accreditation decision can be made. The first covers information on the nature of the provision by way of an evaluation of the overall aims

▼ Table 1. Institutions with IES/CHES-accredited programmes

| UK | University of Northampton |
|---|--|
| Abertay University* | University of Nottingham* |
| Bangor University* | Nottingham Trent University |
| University of Birmingham* | The Open University* |
| Bournemouth University | University of Plymouth |
| University of Brighton | University of Portsmouth* |
| Brunel University London* | University of Reading* |
| University of Central Lancashire | Scotland's Rural College (SRUC) |
| University of Derby* | University of Sheffield* |
| University of Dundee | University of Southampton* |
| University of East Anglia (UEA)* | South West College |
| University of Exeter* | University of St Andrews |
| University of Glasgow* | University of Stirling* |
| University of Gloucestershire* | University of Surrey |
| University of Hertfordshire | Ulster University* |
| University of Huddersfield | University of the West of England Bristol* |
| University of Hull | University of Worcester |
| Keele University | University of York* |
| University of Leeds | International |
| University of Liverpool | Arabian Gulf University |
| Liverpool John Moores University | Qatar University* |
| Loughborough University | Sultan Qaboos University |
| University of Manchester* | Universiti Putra Malaysia* |
| Manchester Metropolitan University | Zayed University |
| Middlesex University London* | |
| Note: * Both undergraduate and postgraduate programmes accredited. (List is correct as of April 2022.) | |

and the learning and teaching approach adopted and how this enables students to acquire skills, knowledge and understanding relevant to a professional career in the environmental sector. The second is concerned with the ways in which the programme prepares students for professional practice.

“Employment opportunities will continue to grow as the UK and global economies continue their slow transition to a net zero future, a future in which the skills, knowledge and attributes of environmental science graduates will increasingly be prized by employers.”

Postgraduate taught provision in general has become increasingly important in UK higher education, and environmental science is no different. However, while it is well established in the UK, environmental science taught provision is small relative to many other disciplines. The consolidation trend into fewer and larger providers is likely to continue, with provision of postgraduate courses becoming at least as important as undergraduate provision in terms of overall numbers. Employment opportunities will continue to grow as the UK and global economies continue their slow transition to a net zero future, a future in which the skills, knowledge and attributes of environmental science graduates will increasingly be prized by employers.

CONCLUDING THOUGHT

Over the last 50 years, environmental science has been established as an important discipline in higher education, one that is central both to understanding the causes and impacts of environmental challenges and, equally importantly, one that creates solutions for local and global problems.

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Sustainability decision-making and collaboration are key to systems change

Richard Blume and **Stanley Nyoni** put out a call for greater commitment and accountability to help us achieve real change.

INTRODUCTION

Reflecting on 50 years of global action on sustainable development, things are not looking good. Despite all efforts to mainstream the agenda, without more effective decision-making, leadership, speed and collaboration, our common future is still at risk. The good news is that there is greater awareness of the need for real systems change, sufficient knowledge about the scientific requirements for sustainability, and growing interest in systems-based frameworks and tools for sustainability decision-making.

This year marks the 50th anniversary of the first United Nations (UN) Conference on the Human Environment, held in Stockholm, and the publication of the influential study by the Club of Rome *The Limits to Growth*.¹ At the conference it was stated that there is a 'need for a common outlook and for common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment'.²



Today, sustainability has become a strategic concern for many decision-makers around the world. This is manifested in different ways among policy-makers, businesses and civil society. Examples include international agreements such as the UN sustainable development goals (SDG) and Paris Climate Accord, efforts to mandate disclosure of climate-related financial risks, and the introduction of a new Green Deal and taxonomy on sustainable finance in Europe.

In the corporate world, sustainability reporting has become mainstream, while environmental, social and governance due diligence is spreading in the investment community. Pre-competitive collaboration, coalitions and industry alliances have become more common, and global brands are making bold commitments, pacts and pledges to become '100 per cent circular' or 'net zero' etc.

Meanwhile, youth-driven movements like Fridays for Future are demanding leadership from politicians

and businesses, and sustainability is becoming a differentiator for conscious consumers, who are slowly reshaping markets.

HOW FAR HAVE WE REALLY COME?

With all this effort, we can wonder how far we have come. To be blunt, in terms of systems outcomes we have not come far enough. The more important questions are: how much further must we go, and will we get there in time?

In 2022, the sustainability deficit is greater than ever as we face a climate emergency; a ticking time bomb on chemical pollution; a sixth wave of mass extinction; escalating geopolitical conflict; declining trust in institutions such as the media; extremism; refugee, hunger and obesity crises; a lingering global pandemic; and an economy that no longer equitably serves people's needs.

So, do we have a common outlook and principles to guide us in the right direction? We comment on this as sustainability

strategists, facilitators and coaches who get a front-row seat to see how deeply the concept of sustainability is understood and implemented in various settings.

We can see that denialism has been replaced by a rush of organisations wanting or claiming to be sustainable. Frustratingly, we also still hear views that sustainability is a buzz word without any clear scope or concrete definition beyond the laudable aspirations of sustainable development.

OPERATIONALISING SUSTAINABILITY

Many decision-makers struggle with how to implement sustainability. Some consider it open to interpretation and therefore deem it acceptable to create their own definition to suit their purpose. This is a recurring theme that has been noted in the past.³ A recent study of over 50 companies from 12 European countries across multiple industries indicated that only 40 per cent have a shared definition of sustainability within their organisation and only 8 per cent incorporate science-based concepts and principles into their strategy.⁴

The 17 UN SDGs are a tremendous step forward in getting all nations to agree on global social, environmental and economic priorities and make them visible to broader audiences. Some view the SDGs as providing a clear compass, though we still see organisations chasing 'circularity' or 'climate' goals while ignoring others.

At the other end of the spectrum, those pursuing deep sustainability view the SDGs as a step towards

a regenerative society – one built on cyclic processes, where a life-centric world view prevails, and human needs are satisfied in fundamentally new ways.

ENTER THE JUNGLE OF TOOLS AND CONCEPTS

Over the past five decades, there has been a proliferation of tools, concepts and approaches addressing different aspects of sustainability (see **Figure 1**). Examples include the planetary boundaries concept, The Natural Step sustainability principles, Doughnut Economics, the circular economy, Green (or sustainable) Chemistry, biomimicry, Five Capitals, ecosystem services, Global Compact, the Global Reporting Initiative and Integrated Reporting standards, green building schemes, benchmarks such as the Dow Jones Sustainability Index, global corruption and slavery rankings, the Principles for Responsible Investment, environmental management systems like ISO 14000, ecological footprint and social hotspot methodologies, Life Cycle Assessment, Environmental Product Declarations, and voluntary ecolabels such as Cradle to Cradle certification or the Nordic Swan.

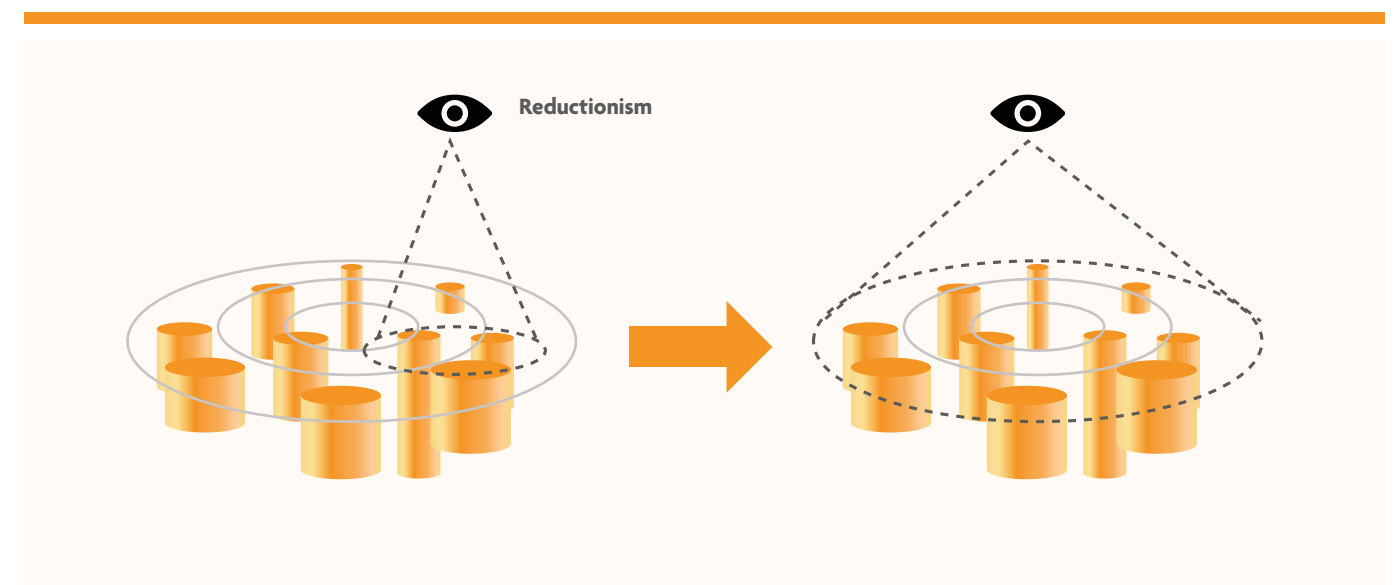
In many respects this is a sign of increasing specialisation in the sustainability movement. However, not all approaches are created equal, nor are they developed with the same understanding of sustainability or even the same mindset and intentions. Some approaches are grounded in science, some are stakeholder driven, while others still are political compromises, and they all tend to have different aims, audiences, scope and criteria.



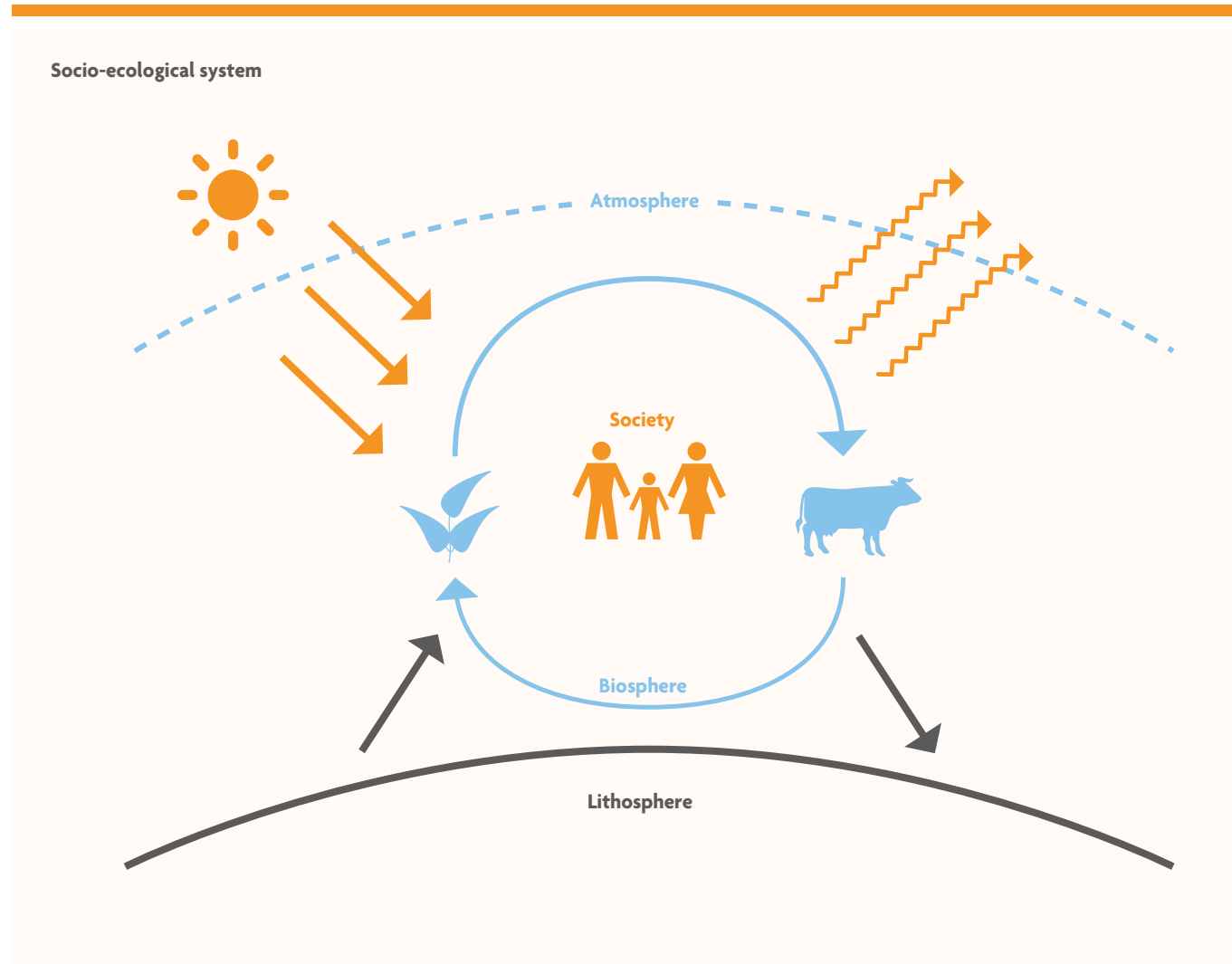
▲ **Figure 1. The plethora of tools, concepts and approaches related to sustainability and their abbreviations highlight the complexity of terminologies used.**

^a GRI = Global Reporting Initiative, ^b IR = Integrated Reporting, ^c DJSI = Dow Jones Sustainability Index,

^d PRI = Principles for Responsible Investment, ^e LCA = Life Cycle Assessment, ^f EPD = Environmental Product Declarations, ^g C2C = Cradle to Cradle



▲ **Figure 2. Seeing the whole system. Siloed knowledge domains and tools focusing on particular issues or topics can make it challenging to see the connections to other topics or the bigger picture. To collaborate on complex systems challenges, we need to take a bird's-eye view and build consensus on higher-order principles rather than details.**



▲ **Figure 3. Seeing the bigger picture.** Most of us can agree our economy and all human activity need to respect the laws of nature. A better understanding of living systems can help us design solutions for a truly circular economy. An understanding of social systems and fundamental human needs can help us build resilience and trust in society.

BUILDING A SHARED UNDERSTANDING

With all these different tools, terminologies and approaches, it is no wonder that today's decision-makers find it difficult to see the forest for the trees. In fact, one of the key challenges faced is keeping a bird's-eye perspective without getting lost in the leaves.⁵

The lesson in this is that while more people are aware of the sustainability imperative and the movement has grown considerably, we are still not entirely aligned within this broad church. It is difficult to create shared understanding and alignment around the common principles and outlook for sustainable development, first called for in Stockholm in 1972, when tools and concepts are not sufficiently structured or connected to the same understanding of the bigger picture (see **Figures 2 and 3**).

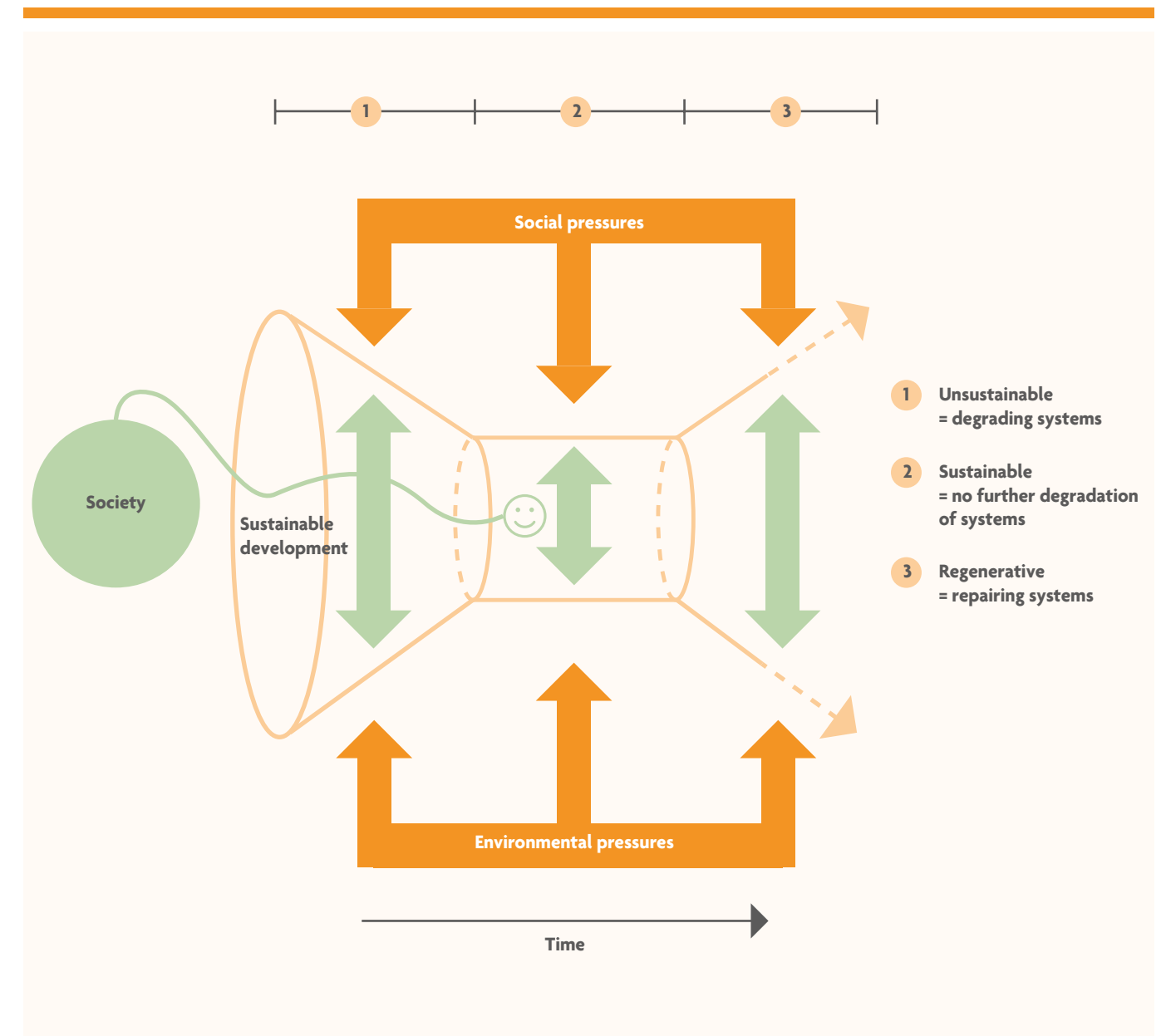
It is also clear that we are all on a learning journey with different insights into the systems-level transformation we need to see. This is precisely why there is growing interest in yet another set of goals – the Inner Development Goals – because ‘we lack the inner capacity to deal with our increasingly complex environment and challenges’.⁶

DECISION-MAKING IN TIMES OF COMPLEXITY

Decision-making for sustainability is clearly a complex matter in need of simplification. The good news is that while the landscape of sustainability issues, concepts, tools and approaches has expanded, the fundamentals of robust sustainability decision-making remain clear. Since the late 1980s, efforts have been underway to define the rules of the game for sustainability as a set of principles and to codify their use in a method known as the Framework for Strategic Sustainable Development (FSSD).⁷

The learning from this method is that robust sustainability decision-making first requires a shift in mindset (see **Figure 4**): from climate change to systems change;⁸ from targeting symptoms to tackling the root causes; from measuring the size of the problem to measuring distance to target; from following best practice to going beyond required practice informed by science; and from addressing issues in isolation and after the fact to designing integrated system-wide solutions with co-benefits rather than trade-offs.

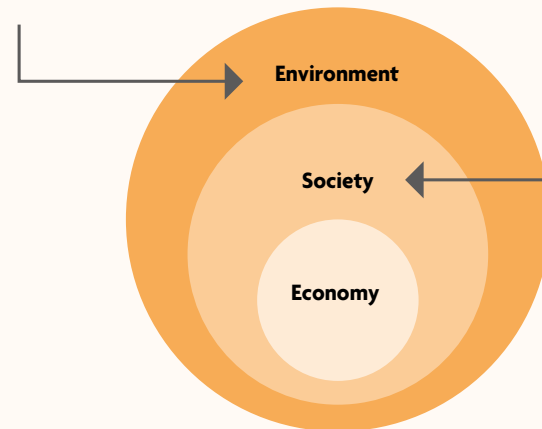
As business as usual is no longer an option, leaders are required to actively choose to stretch themselves with a transformative agenda. To do this, the technique of backcasting can be used. Instead of forecasting today's assumptions into the future, we must boldly envision the future we want to create. From this position we can prioritise the steps that are necessary to close the gap between the present and the desired future. Stakeholders need to be mobilised in the process, so it is essential to build a shared language for understanding the goal and managing the process to get there.



▲ **Figure 4. Shifting paradigms.** The metaphor of a funnel aids in visualising the systematically increasing pressures on society and the environment from unsustainable activities as well as the system-wide shift we need to make towards those activities that are sustainable and regenerative.

In a sustainable society, nature is not subject to systematically increasing:

- Concentrations of substances extracted from the earth's crust;
- Concentrations of substances produced by society; and
- Degradation by physical means.



And in that society, there are no structural obstacles to people's:

- Health;
- Influence;
- Competence;
- Impartiality; and
- Meaning-making.

▲ **Figure 5. Common principles to guide us.** Basic principles for socio-ecological sustainability provide a science-based compass. By acting as boundary conditions for a sustainable society, all manner of solutions can be imagined without restricting creativity or being limited to assumptions about technology. While there may be different ways to define the goal, these principles are designed specifically to aid decision-making by meeting certain criteria. These criteria are considered 1) Necessary, i.e. covering everything essential for sustainability; 2) Enough, i.e. sufficient to avoid falling short; 3) General, i.e. so they can be used in any context; 4) Concrete, i.e. so they can guide action targeted at root causes; and 5) Non-overlapping, i.e. so that different aspects of sustainability can be measured.

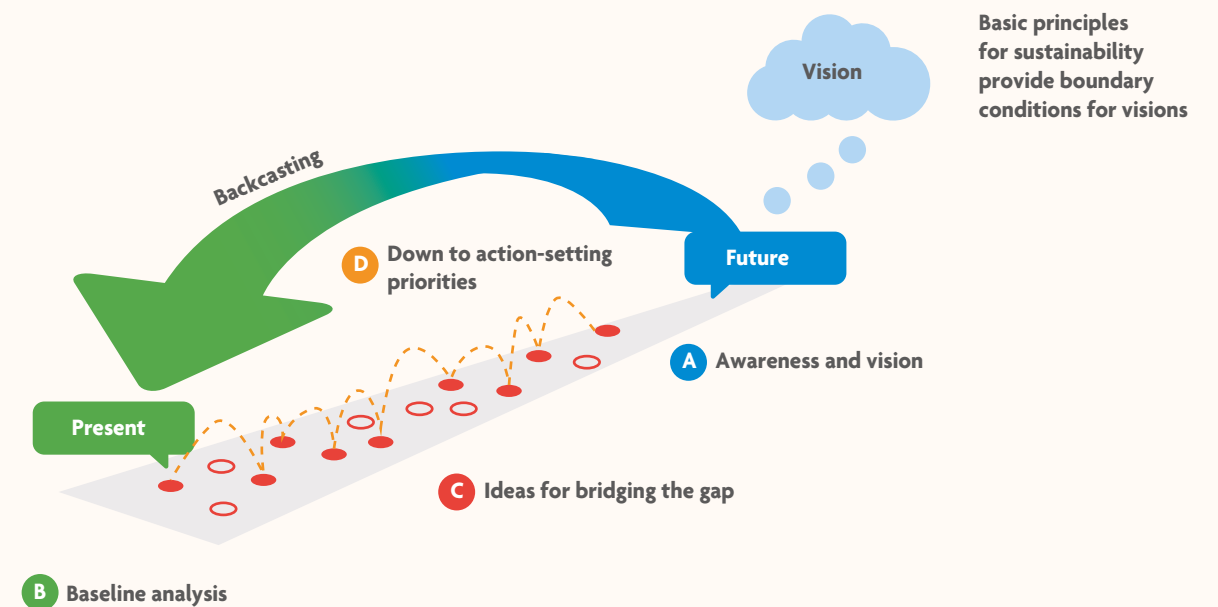
BOX 1. STEPWISE SUSTAINABILITY DECISION-MAKING

In the late 1980s, Swedish oncologist Dr Karl-Henrik Robèrt led a process asking scientists from different fields if they could come to a consensus on the root causes of unsustainability. This was the birth of The Natural Step, now a network organisation of 10 member offices with affiliated partners, associates and a wider network of over 1,000 trained sustainability practitioners working to accelerate transformation towards a sustainable society. Together with scientists, business leaders, policy-makers and practitioners The Natural Step works to develop, apply and promote a whole-systems framework for sustainability-driven innovation.

Openly published as the FSSD, this approach facilitates systems-based dialogue and action by building shared understanding, establishing bold visions framed by sustainability principles, assessing the current reality, and identifying solutions and prioritising them into strategic, business-oriented transition roadmaps and action plans to close the sustainability gap. As a generic decision-making and planning method, it is not a replacement for other approaches but a way to organise and orchestrate their use more effectively.

Core elements of the framework include:

- A pedagogical toolkit to explain the scientific fundamentals of economy, environment and society as interconnected systems;
- A well-tested scientific consensus on key mechanisms or root causes that are undermining healthy socio-ecological systems;
- A set of eight peer-reviewed, science-based principles for socio-ecological sustainability that address root causes. These provide a robust definition of the essential requirements for a sustainable society and serve as a compass;
- A simple step-by-step decision-making process to implement the technique of backcasting, using sustainability principles as boundary conditions for imagining a sustainable future;
- A set of key transitions to address each sustainability principle and mechanism of unsustainability, serving as guidance;
- A five-level model for planning in complexity used as a structure to make the best use of many different tools and concepts for sustainability; and
- A growing number of tailored applications. Examples include the Future-Fit Business Benchmark, integrated visioning, integrated municipal sustainability planning, sustainability impact analysis tools and strategic Life Cycle Assessment.



▲ **Figure 6. Backcasting from principles for socio-ecological sustainability.** The four A-B-C-D steps provide a clear and simple shared process for sustainability decision-making, first beginning with awareness and establishing visions framed by sustainability principles, then assessing the gap or present-day baseline, exploring solutions and prioritising action. Prioritisation criteria are used to evaluate actions against the sustainability principles and vision, promoting stepping stones with a clear business case for each action.

CREATING A SHARED LANGUAGE

Research has also shown that in situations of complexity we should be seeking consensus on high-level principles rather than details (see **Figure 5**). No one really knows what a sustainable society will look like, so how can we aim for it in a more universal sense?

The trick is to define the boundary conditions for success using a set of science-based sustainability principles grounded in the laws of thermodynamics and best available knowledge of social systems. The FSSD has helped thousands of organisations create a shared language to approach sustainability strategically, step by step, by operationalising the process of backcasting from principles of socio-ecological sustainability.⁷

Our own experience of using this approach is that it is non-prescriptive, encourages out-of-the-box thinking and provides clarity on the destination we need to aim for, regardless of how it is formulated. By focusing on the root causes rather than the consequences of an unsustainable activity it becomes possible to retain the systems perspective, creating simplicity without reduction.⁹ The same principles apply at different

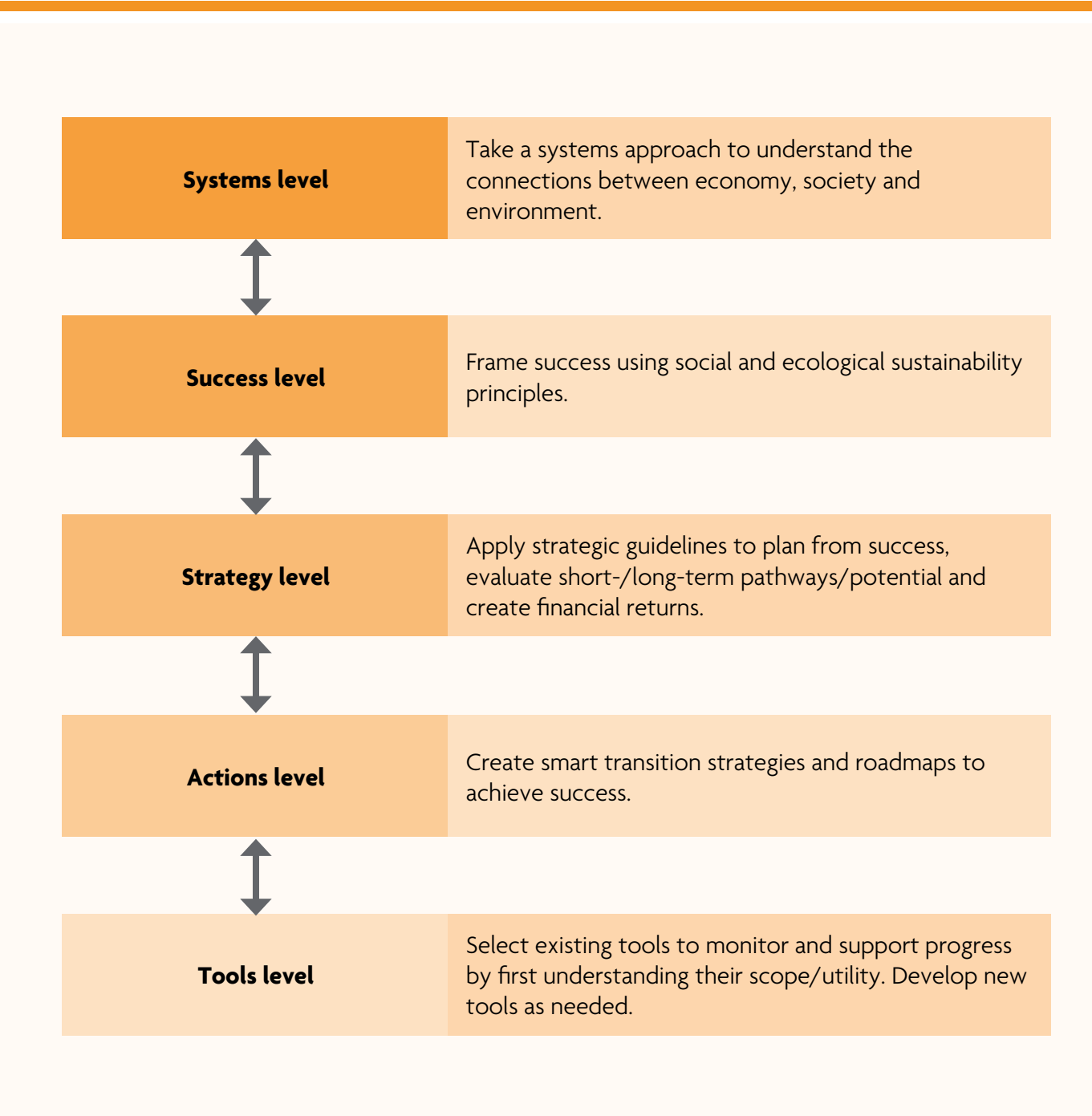
scales and depths – from molecular to macro level – meaning they can truly act as common principles to guide us all.

When we operate from a strategic framework and target root causes we also stay focused on what fundamentally needs to be changed, creating a frame for a stepwise redesign but without specifying the solutions or which concept or tool to use (see **Figure 7**). Different approaches, tools and concepts can then be selected and applied strategically to close the sustainability gap.

Over the years, many pioneering tools and concepts have been analysed through the lens of this decision-making framework,¹⁰ so that a clear map of connections has been built. For example, using sustainability principles provides a preventative approach to avoid tipping planetary boundaries,¹¹ a scientific basis for understanding the circular economy, or even a way to help businesses avoid SDG washing.¹²

ORCHESTRATING COLLABORATION FOR SYSTEMS CHANGE

There is a long way to go to achieve the systems change we need. But there is also a growing recognition that we



▲ **Figure 7. Making sense of tools and concepts for sustainability. The five levels of the Framework for Strategic Sustainable Development allow for selection, design and synergy from applied tools.**

must take a more holistic and science-based approach to sustainability. We have enough tools, knowledge and experience using proven methods for sustainability decision-making; these all now need to be spread out and applied together to accelerate progress. To facilitate this, a new pledge promoting systems-based sustainability decision-making is being launched to coincide with the Stockholm+50 UN conference on the environment in June 2022. Reach out to us if you would like to learn more or to collaborate on charting a new path for human development and prosperity guided by common principles.

ES

Richard Blume is a senior sustainability strategist and a long-time representative of The Natural Step. He is a co-founder of the Sustainability Collaborative, a hub for sustainability practitioners to drive systems-change initiatives together using proven methods for sustainability-driven innovation. With 20 years' experience of supporting small and medium-sized enterprises and multinationals to integrate sustainability principles into strategy and operations, Richard is versatile trainer, strategist, project manager and analyst who likes to connect the dots between detail and the big picture. Richard holds a Master's in Strategic Leadership towards Sustainability from Sweden's Blekinge Institute of Technology and a combined Bachelor's in Engineering (civil and environmental) and International Studies from the University of Technology, Sydney, Australia.

Stanley Nyoni is co-founder of the Sustainability Collaborative, Leading from Love and Diamond Leadership Academy. He has been on the board of The Natural Step Switzerland, the Barcelona Bio Economy Forum, Legacy17 and others. He has over 20 years of experience supporting company executives in Europe, Asia and Africa to design and implement processes for participatory leadership and team synergy as well as integrate sustainability into their core business. Stanley specialises in cultural and personal development using methods and approaches at the interface of science and spirituality that develop self-awareness and lead to trusting relationships, which are essential for high-performing teams and overall sustainability. Stanley holds a Master's in Environmental Engineering and Sustainable Infrastructure from Sweden's KTH Royal Institute of Technology and a Bachelor's in Civil Engineering from the University of Zimbabwe.

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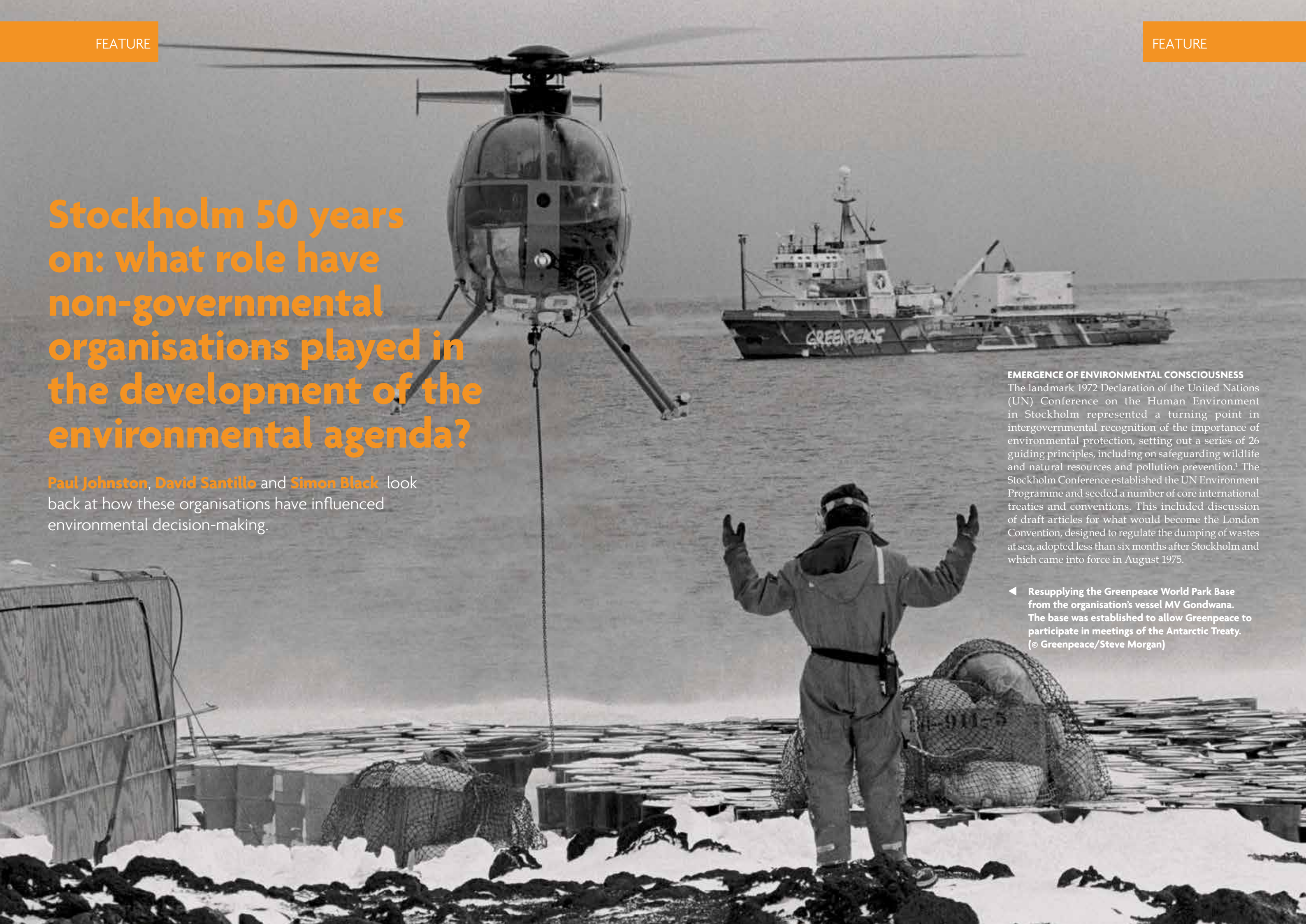
Stockholm 50 years on: what role have non-governmental organisations played in the development of the environmental agenda?

Paul Johnston, David Santillo and **Simon Black** look back at how these organisations have influenced environmental decision-making.

EMERGENCE OF ENVIRONMENTAL CONSCIOUSNESS

The landmark 1972 Declaration of the United Nations (UN) Conference on the Human Environment in Stockholm represented a turning point in intergovernmental recognition of the importance of environmental protection, setting out a series of 26 guiding principles, including on safeguarding wildlife and natural resources and pollution prevention.¹ The Stockholm Conference established the UN Environment Programme and seeded a number of core international treaties and conventions. This included discussion of draft articles for what would become the London Convention, designed to regulate the dumping of wastes at sea, adopted less than six months after Stockholm and which came into force in August 1975.

◀ **Resupplying the Greenpeace World Park Base from the organisation's vessel MV Gondwana. The base was established to allow Greenpeace to participate in meetings of the Antarctic Treaty.**
(© Greenpeace/Steve Morgan)



Stockholm also laid the groundwork for a series of further UN environment conferences, including the one which gave rise to the Rio Declaration of 1992 (Rio Summit) and was subsequently elaborated into the comprehensive provisions of Agenda 21.² The Rio Summit also served as the meeting where the Convention on Biological Diversity and the UN Framework Convention on Climate Change were opened for signature and at which the Rio Principles of Forest Management were agreed. It was also where the precautionary approach received its widest international recognition as a tool for environmental protection in the face of uncertainties (under Principle 15), though its value had already been acknowledged in other fora.

Subsequent UN environment conferences have built on these foundations, yielding *inter alia* the millennium development goals, the Rio+20 Declaration and ultimately the 17 current sustainable development goals, established in 2015 under the 2030 Agenda for Sustainable Development with the stated intention of ‘transforming our world’.³ Nonetheless, in practical terms, progress along the Agenda 21 sustainability pathway and towards fulfilment of these various goals has been far slower than was initially hoped.

▼ **Greenpeace protests the dumping of low-level radioactive waste at sea, an issue that it pursued through the London Convention until the practice was banned along with the dumping of other wastes at sea. (© Greenpeace/Pierre Gleizes)**



RISE OF NON-GOVERNMENTAL ORGANISATIONS

At around the same time as the Stockholm Conference was being planned, growing public awareness of and concerns about environmental issues were leading to the formation of a number of non-governmental organisations (NGO), which aimed to draw attention to threats posed by unsustainable human activities. One such NGO was Greenpeace, formed in 1971 initially to protest against nuclear weapons testing in the Aleutian Islands. Since then, the organisation has evolved over the past 50 years to address a plethora of other environmental issues through its core values of bearing witness and non-violent direct action.

From the very start of the developments on environmental governance in Stockholm, the role of civil society – including NGOs – in formulating and driving forward measures for environmental protection has been explicitly recognised. Principle 25 of the Stockholm Declaration says that: ‘States shall ensure that international organizations play a co-ordinated, efficient and dynamic role for the protection and improvement of the environment.’ Chapter 1.7 of the same document notes that: ‘Individuals in all walks of life as well as organizations in many fields, by their

values and the sum of their actions, will shape the world environment of the future.’¹

Under Agenda 21, the role of NGOs became even more clearly described and explicit:

‘Non-governmental organizations play a vital role in the shaping and implementation of participatory democracy. Their credibility lies in the responsible and constructive role they play in society. Formal and informal organizations, as well as grass-roots movements, should be recognized as partners in the implementation of Agenda 21.’²

The combined effect of the progressive efforts to codify environmental protections through a growing body of international treaties and conventions, the growth of increasingly loud voices of a public standing up for the environment, and the ability (at least theoretically) to have those voices heard as part of the discussion has proven to be a powerful mix. Following the protest at the Aleutian island of Amchitka, Greenpeace had gone on to campaign against commercial whaling and then against the dumping of industrial and radioactive waste at sea and the discharge of toxic chemicals, making use of a small fleet of vessels to bring such activities squarely into public view. In turn, the information that Greenpeace was able to bring to light through its investigations provided the justification to request observer or consultative status, a seat at the table in other words, in various debates and processes. Over time, Greenpeace became one of a number of international organisations that took up opportunities presented under the evolving UN initiatives to participate in meetings, charged with the development of global environmental protections.

AN OPEN DOOR?

Even so, participation by NGOs in the various processes, as encouraged or even mandated in the various declarations and preambles including participation in their specialist subgroups (e.g. scientific and technical groups), was by no means a case of pushing at an open door but, time and again, more one of sticking a foot in to prevent the door from closing. Some doors remain firmly shut to such participation, such as the Legal and Technical Commission established under the International Seabed Authority, even as it works to finalise rules that will enable commercial mining of the seabed in areas beyond national jurisdiction for the first time⁴ – an activity likely to cause widespread and irreversible damage to vulnerable marine ecosystems in locations in which independent scrutiny will remain extremely difficult, if not impossible.⁵

Parmentier describes the journey taken through the London and the Oslo and Paris (OSPAR) Conventions on the North-East Atlantic from the 1970s through to

the late 1990s, as Greenpeace sought to cut off dumping at sea as an option for radioactive and industrial waste (including redundant oil installations) and to stop incineration at sea. He observes governments and industry acting in bad faith in this landscape of partial actors:

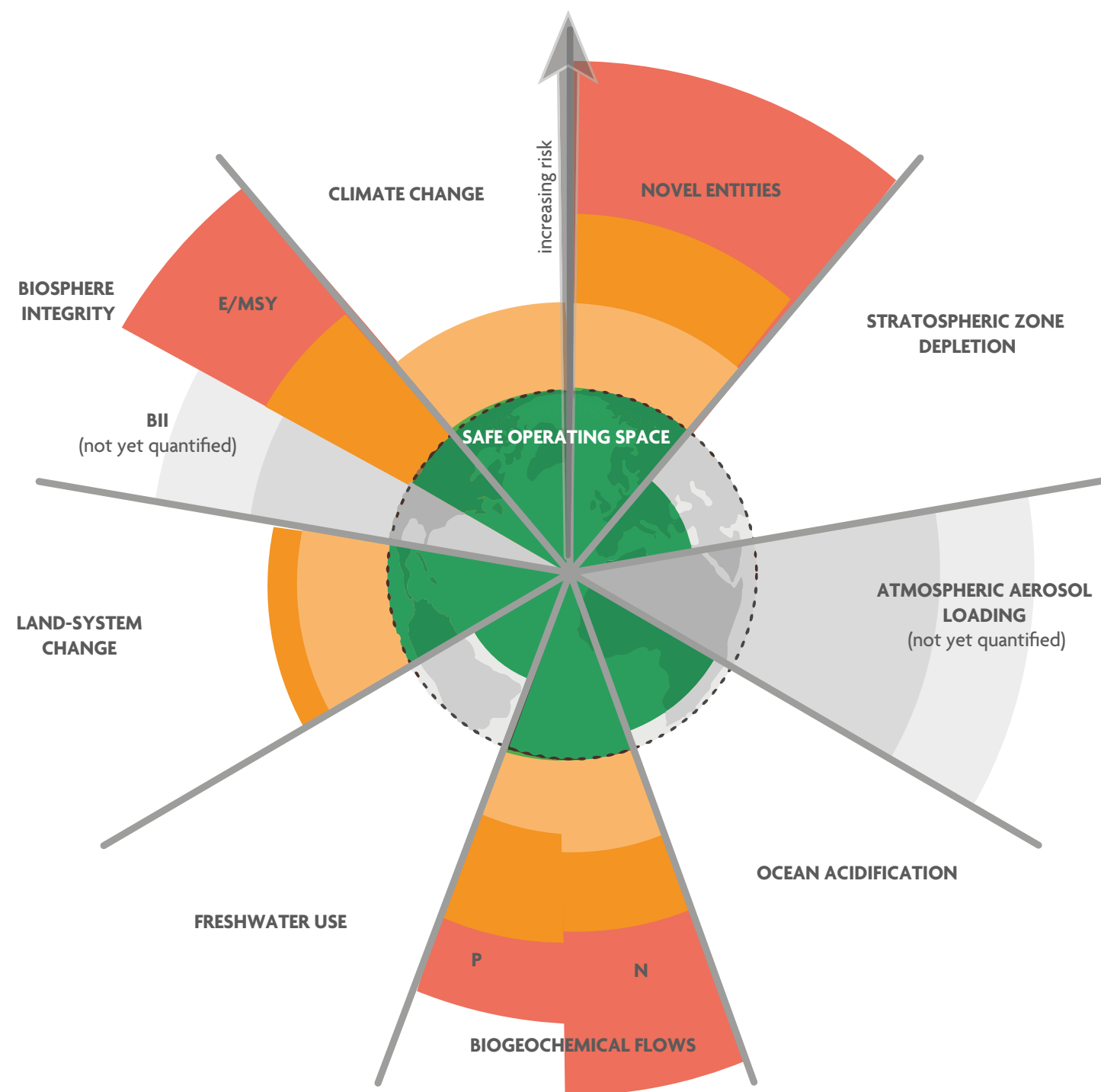
‘When this saga started in the late 1970s, inevitably, the “competent authorities” (governments, industry as well as intergovernmental organisations) treated Greenpeace at best in a rather paternalistic manner and, too often, rather rudely. Not only were Greenpeace ships arrested (or rammed, or tear gassed, or – on one occasion – sunk) in virtually every country, but determined efforts were also necessary for Greenpeace to gain the right to attend the meetings of intergovernmental organisations.’⁶

The arrests continue to the present day, a testament to the effectiveness of bearing witness and of non-violent direct action in drawing such issues into the public gaze and challenging the ‘ignorance or indifference’ that the Stockholm Declaration warned would otherwise lead to irreversible harm.¹ Meetings of intergovernmental organisations have proliferated to an extent perhaps unimaginable when Parmentier observed that organisations with limited resources could not be present everywhere and at all times, and on which basis he suggested the need for a balance with respect to the participation afforded to, for instance, industrial-sector umbrella organisations.⁶ Nonetheless, NGOs have continued to invest time and expertise to ensure continuity and effectiveness of participation in as many of the most relevant processes as possible.

BRINGING SOMETHING TO THE TABLE

As NGOs increasingly participated in debates, it became clear to many governments that they brought valuable information to the table as well as concepts that could facilitate meaningful environmental protections. The corollary was that NGOs had a responsibility to ensure that the information and concepts they tabled were accurate and defensible in order to maintain credibility and influence. For example, as the impacts of chemical pollution moved steadily up the agenda from the mid-1980s, the precautionary principle emerged as a more recognised element in the regulation of chemicals entering the environment. The prevalent, permissive approach where toxic chemicals could be discharged in the absence of apparent harm, or more usually allowing for ‘acceptable’ harm, was addressed head-on by Greenpeace, in part by setting up analytical facilities and embarking upon a programme of methods development and analysis.

What this early work revealed was that a far larger number of chemicals was being discharged than was being formally regulated. Moreover, it proved impossible to identify many of the chemicals present



▲ **Figure 1. Visualisation of the planetary boundaries concept developed by the Stockholm Resilience Centre showing that humanity is now operating outside safe limits for five of the nine boundaries. Exceeding these limits may result in rapid and unpredictable ecosystem changes. (© Azote for Stockholm Resilience Centre)**

in discharges to rivers and seas, even when using sophisticated analytical techniques. It was not hard to conclude that if a chemical could not be identified, it was impossible to assert that discharging it was safe. Furthermore, on a precautionary basis, this should justify cessation of the discharge. The Greenpeace

Research Laboratories at Exeter University have expanded their remit somewhat since these early days, but the ambition to provide decision-makers, including those in Greenpeace, with high-quality scientific and technical information remains at the core of its mission across a variety of issues.



▲ **Greenpeace activists blocking a combined discharge sewer operated by the Industrial Development Authority in Cork Harbour in protest at the government system of licensing toxic pollution. (© Greenpeace/Steve Morgan)**

Principle 15 of the 1992 Rio Declaration states that:

‘In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.’²

In the same year, the precautionary principle was formally adopted in the Maastricht Treaty as one of the main principles underpinning environmental protection in the EU and supporting the 2007 EU REACH legislation regulating chemicals,⁷ itself the product of intense negotiation and controversial debate. Despite these developments, the precautionary principle has never been an entirely popular concept outside of the NGO community, which vigorously supported it from the outset, and over the years precaution has been widely represented as impractical, unscientific or even an obstacle to progress. This dislike has been exemplified most recently in calls from industry bodies in Europe for a so-called ‘innovation principle’ to be inserted into EU law, explicitly to act as a counterweight to excessive precaution in decision-making. The debate is likely to run for some time, but outputs from a stakeholder dialogue – to which several NGOs, including Greenpeace, contributed – commissioned at the EU level to examine these proposals conclude

that precaution should not be viewed as a barrier to innovation but rather as both a legal safeguard (to justify early policy or regulatory action) and a compass to guide research and innovation, including ‘triggering upstream debates about and research on emerging technologies’.⁸ If adopted, this would be a welcome clarification.

MAKING A DIFFERENCE?

Through NGOs contributing to the various debates in diverse ways over many decades, influence has been brought to bear on the development of much environmental legislation and in changes to numerous damaging or destructive practices, as described by McCarthy in a popular press article.⁹ It would be wrong to characterise all of these clear victories simply as individual, tactical wins. Rather, they should be regarded as comprising something much greater than the simple sum of their parts. Each victory has contributed to the creation of a body of significant environmental regulation, which in turn has led to inserting the idea of the environment into the heart of public consciousness. The importance of both should not be understated.

That said, it is also clear that the world’s environmental problems have not gone away. Instead, many still seem to be heading in the wrong direction. This is exemplified in the continued struggle to control climate change and keep it within boundaries such that the worst (though not all) impacts can be avoided. The scale of the overall

problem facing humanity is illustrated by the state of the nine planetary boundaries described by the Stockholm Resilience Centre (see **Figure 1**).¹⁰ Recent reassessment indicates that no fewer than five of the nine have now been crossed, with uncertain and unpredictable consequences for humanity.¹¹ Significantly, declaration of the latest boundary to be crossed – chemical pollution and the release of novel entities – seems a somewhat inevitable, if depressing, end to the work by Greenpeace to highlight chemical discharges that began in the 1980s and the more recent contributions to the huge body of work on plastics in the environment. Both are problems long recognised but not acted on in a timely manner, epitomising the late lessons from early warnings highlighted by the European Environment Agency.^{12,13}

So the question must be asked: have the environmental NGOs collectively squandered their opportunity to help put the world on a sustainable footing by being able to participate in the processes and debates? To answer in the affirmative would be to disrespect the huge amount of high-quality work done by NGOs over the years and the significant achievements that have been made in creating understanding. This understanding has involved an ever-widening spectrum of participants and diversity of thinking in the discussions. Yet something has clearly impeded progress.

A clue to what went wrong perhaps lies in Parmentier’s observation of the need for a balance in the representation of interests, which in retrospect looks curiously prescient.⁷ The negotiations on the ban on dumping waste at sea were dogged by the partiality of some actors and overrepresentation from industry. Indeed, this dynamic will be familiar to many from the NGO community who have been participants in treaty negotiations. Perhaps the most familiar example is that of the corrosive impact of the climate change deniers, representing diverse vested interests, in their repeated questioning of the science behind the consensus developed by the Intergovernmental Panel on Climate Change, which has undoubtedly influenced political thinking and, to a lesser extent, public opinion.

SHAPING THE FUTURE WORLD ENVIRONMENT

Paradoxically, NGOs, in the broadest possible sense, are arguably collectively better informed and more knowledgeable than they have ever been. They have never had more to contribute to the development of measures to protect the natural environment and to move the world progressively and quickly on to a sustainable footing than they currently do.

Nevertheless, to continue to make their valuable contribution to the ‘fuller knowledge and wiser

action’ recognised as necessities in the 1972 Stockholm Declaration,¹ NGOs must continue to navigate their cargo of knowledge between the Scylla of conspiracy theories and the Charybdis represented by the raptorial embrace of libertarian right-leaning politics. It is not an easy course to steer, the distance between these two obstacles to safe navigation being variable and oftentimes vanishingly small.

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▲ The Greenpeace ship MY Rainbow Warrior sailing in the Adriatic Sea in Italy. (© Lorenzo Moscia/Greenpeace)

Environmental economics in English public policy: a personal perspective

Bill Watts traces the birth, growth and acceptance of environmental economics.

THE BIRTH OF ENVIRONMENTAL ECONOMICS

In 1977, Aberdeen University offered the UK's only postgraduate course in environmental economics. At the time, linking environment and economics was generally an anathema. To the extent that people took account of the environment, it was as a matter of personal interest and lifestyle and the term environment referred to human-made or immediately proximate surroundings rather than the wider ecosystem.

Environmental economics grew out of welfare economics, and assumed environmental damage was the result of market failure – an inefficient distribution of goods and a mismatch between individual behaviours and group outcomes.¹



THE ECONOMICS OF WATER PRICING

I developed an interest in environmental economics while an undergraduate at the University of East Anglia where I wrote a thesis on water pricing and the underlying cost model.

I had assumed that water pricing was efficient, reflecting the marginal cost of production. In truth, most water was supplied unmetered and, if there was a pricing rationale, it was cost recovery. Despite East Anglia being an area of water scarcity, the Anglian Water Authority was uninterested in efficient pricing. The organisation's indifference to leakage from its system was a surprise. Since 2010, Anglian Water has reduced leakage by 20 per cent.² Prior to the prioritisation of leakage management, about 40 per cent of the delivered water was lost through leakage. Not only was water scarce, but each gallon distributed embodied energy and other resources that were also wasted. As for the delivered water, customers had no reason to conserve. Product pricing was lazy, uninformed, perverse and inefficient. There was no incentive to conserve this natural resource.

This environmental problem of water scarcity was also an economic problem. Consumers were not even paying a commercially efficient price for water, let alone one reflecting the scarcity value of the abstracted water. This environmental cost was evidenced by parched watercourses, dead fish and collapsed ecosystems.

A similar story could also be told for the wastewater operations of the water industry in the 1970s. The natural environment was implicitly assumed to have no value, did not enter the industry's cost calculus and was heedlessly dumped into.

Following a postgraduate course in natural resource economics at Aberdeen University, I held various economic planning positions but it was not until the late 1980s that I found an environment-related job. I began working as a Principal Economist in the Northern Ireland Department of Finance and Personnel, advising the Department of the Environment (Northern Ireland). The focus of the job was the built environment, coinciding with the inception of a regeneration process that led to the Harbour and Laganside developments, now vibrant parts of Belfast.

THE CHANGING STATE OF THE WATER INDUSTRY

Things slowly began to change. Privatisation of the water industry in the late 1980s was a gold rush for industry managers and the £10,000-a-day merchant bankers, lawyers and management consultants involved in the process. Nevertheless, there was a benefit. Privatisation entailed a process of discovery. This documented, often for the first time, the industry's asset base and brought to light the industry's use of the environment as both a water source and waste sink. It was unfortunate but inevitable, given the moral compass of the time, that companies were able to maintain their historic levels of

water abstraction post privatisation, grounded as they were on massive leakage, zero environmental valuation and inefficient pricing. Despite this, the pricing formula for the newly privatised industry provided a funding mechanism for the investments necessary to meet the various European wastewater directives.

European environmental legislation was of course a driver for water industry clean-up before privatisation. For example, since the 19th century, the Divis, a Belfast-built coal-burning ship, had hauled sewage residue (water settled out and removed) from the Duncrue Street works into Belfast Harbour and dumped it into the Irish Sea. New European regulations meant sewage residue could no longer be disposed of at sea and the whole plant was replaced. The replacement was (over) sized on the assumption of water remaining unpriced. In particular, disposal of dirty industrial effluent with a high biochemical oxygen demand, such as from local meat packers, would remain a free, or highly subsidised, service.

ENVIRONMENTAL ECONOMICS AND POLICY

By the early 1990s, I was back in London working as one of four economic advisers at the Department of the Environment (DoE), busy developing environmental economics policy and setting the government agenda for the following 30 years. We had commissioned a report, which was published as the *Blueprint for a Green Economy*.³ This was a landmark text in the

development of environmental economics as a practical, applied subject, signified by sales of over a million copies. The book demonstrated that economics had something useful to say on the environment and considered a variety of issues, including sustainable development, environmental valuation of assets and liabilities, and the use of economic instruments to affect policy outcomes – for example, for carbon and sulphur pricing.

The book sought to operationalise the concept of sustainable development, around since the 1970s and given form by the 1987 Brundtland Commission Report.⁴ The Blueprint's authors argued that economics was a subsystem of the environment and that economic development had to be integrated within the wider environment. This might now seem common sense, but many at the time did not see it that way – including the UK Treasury, which treated the environment as an adjunct to the economic system, emphasising the use of technology as a way to overcome environmental problems and enable economic development.

Environmental valuation was central to a sustainable development future. It was not about commoditising the environment but about demonstrating that, if environmental assets and liabilities are not valued, the default valuation is zero. As in the UK water industry, this implicit zero valuation led to over-abstraction and the thoughtless use of the environment as a waste sink.



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THE ECONOMICS OF AIR POLLUTION

In the environmental economics division of the DoE, the concepts of environmental valuation had real, operational significance. For example, in the 1980s, acid rain was a live issue. Emissions of sulphur and the various oxides of nitrogen, their transport and eventual deposition were tracked through the European Monitoring and Evaluation Programme. The resulting deposition contributed to soil maps and was used to build up a picture of critical-load exceedances. It was asserted that soils and buildings had a certain critical load, which when surpassed would lead to ecosystem and building damage.

Damaging exceedances were traced back to source and abated through various protocols made under international agreement: the United Nations Economic Commission for Europe's (UNECE) Convention on Long-range Transboundary Air Pollution (CLRTAP). Since coming into effect in 1983, CLRTAP has been instrumental in substantially reducing some of Europe and North America's harmful transboundary pollutants.

The critical loads idea was premised on the presence or absence of marker species such as brown trout, certain plant assemblages, and mosses and lichens.⁵ High levels of some pollutants in rain also damaged the built environment, mainly limestone buildings. However, evidence of this was sparse, and an extensive US Environmental Protection Agency study found little evidence at relevant levels of deposition.⁶

I thought the concentration on critical loads a classic case of measuring the measurable and ignoring what mattered: human health. There was published evidence showing that air quality affected human health.⁷ I told the UK's UNECE negotiating team that ignoring health effects in the evaluation process meant more people had died and suffered ill health than necessary. I argued the health benefits of air quality abatement were substantial when valued, providing additional evidence in favour of emissions abatement; however, my advice was not accepted.

Of course, health effects came to the fore as time elapsed; evidence eventually matters, however inconvenient. Later, when in Brussels as Principal Administrator in the Economics and Financial Affairs Directorate of the European Commission and acting as its adviser on environmental economics issues, I was asked to give a briefing on the forthcoming Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide, oxides of nitrogen, particulate matter and lead in ambient air. The totality of the case rested on health effects. The fact the evidence was expressed in monetary terms provided a more effective counter to Member States'

special-case pleadings than something expressed solely in physical terms.

ECONOMIC INSTRUMENTS FOR THE ENVIRONMENT

The issue of economic instruments exercised the economic adviser team in the DoE team mightily, too. In 1992, I was involved in managing the DoE's research report *The Potential Role of Market Mechanisms in the Control of Acid Rain*.⁸ The study used a game theory framework to simulate the efficacy of sulphur abatement strategies and was based on a dispatch model of the UK electricity sector and the University of Sussex's Science Policy Review Unit database of large combustion plants. The model showed the benefits of a market-based instrument approach to sulphur control, but also identified the dangers of grandfathering sulphur permits in a non-competitive market. The idea of sulphur trading – giving polluters with high abatement costs the option to buy permits from those with lower costs, thus delivering reductions for less – was first developed in the USA and was now being applied to the UK market.

The report sold out in a day. The irony is that when the government removed the prohibition on gas for electricity production, this, combined with the deployment of combined cycle gas turbine plants, led the shadow price of sulphur dioxide to drop from around £200 per tonne to zero. Incidentally, our policy colleagues hated this report too, and tried to block publication.

We also examined the use of market-based instruments for waste management. The recycling credits scheme subsidised recycling of material diverted from the waste stream using funds that would have otherwise been spent on landfill and incineration. This concept of credits first appeared in the Environmental Protection Act 1990 and was later developed into the Landfill Tax, which is still in place today.

Political opposition stopped us from promoting efficient and environmentally worthwhile levies on aggregate quarrying and deposit refund schemes for toxic waste such as vehicle tyres, end-of-life vehicles, issues causing public nuisance such as litter, and plastic waste items such as food and drink packaging.

INVESTMENT APPRAISAL

On the face of it, the investment appraisal part of the *Blueprint for a Green Economy* should have been easy. The idea of investment appraisal was embedded in the Green Book – HM Treasury's guidance on appraising projects, programmes and policies – as good practice. However, there were few examples of cost-benefit analysis in the government sector, with the exception of the Department for Transport.



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We did a lot of investment appraisal outreach in the DoE. Acceptance and uptake of this work were generally dismal; most other government departments were worse, even those spending huge amounts of money, such as those for agriculture, defence and the Home Office. We found considerable resistance to the idea of environmental valuation. Our argument that no valuation was tantamount to a zero value was heard but not appreciated. We also had a problem with the state of environmental valuation methods, which were fragmented and yielded outputs that were often less than persuasive for decision-makers.

At the time, we could elicit people's valuations about a change in environmental state and, if a marketed output was at stake, that could be valued at market prices. For instance, I promoted a study correlating fish landings with the presence (or absence) of intertidal habitat. This worked for Scotland, where most of the fish was landed locally, but not for England where the fish was sold far from home.

There were also bridging techniques, such as hedonic pricing – determining the price of something based on both internal characteristics and external factors⁹ – which was used by Walters to value the effect of noise pollution around Heathrow airport.¹⁰ This approach was premised on the existence of a market, in this case the housing market, which could be observed and correlated with housing attributes such as the number of bedrooms, central heating, garaging and, crucially, position on a noise contour. When we started

to look at environmental effects, which appeared to have no market counterpart, there was a credibility problem. There was resistance from colleagues when damage valuations were cited and elicited from wider societal stakeholders who were not necessarily directly affected by the environmental decisions. For example, valuations of keystone species were often not premised upon an understanding of the animal's place in habitat functioning. Valuations for charismatic species like salmon were generally higher than less charismatic ones such as sand gobies, despite the latter being a crucial link in the food chain.

THE ECOSYSTEM VALUATION APPROACH

It was not until development of the ecosystem valuation approach in the 2010s that we saw a way of deconstructing the problem convincingly. Nevertheless, as the person responsible for introducing the ecosystem valuation approach to flood risk management in the Environment Agency, I know it was not an easy sell. The valuation approach is subtle and information-hungry, and those who manage appraisals are often uninterested, as their professional expertise lies elsewhere.

Moreover, the flood risk management options that were most beneficial in ecosystem terms are often seen as riskier for those managing the process. There is a presumption in favour of hard-engineering solutions. Failure was penalised and success not always rewarded. Solutions with hard, often concrete edges – driven by intense political lobbying – were favoured above management approaches with soft, reeded fringes,

though they often in practice merely displaced flooding problems further downstream. The system did not favour catchment-optimal soft solutions, even though these were typically low cost.

MUCH MORE COULD BE SAID

Environmental economics has now become an intrinsic part of good government and public sector practice, and increasingly private sector decision-making through environmental accounting. It is a marked contrast to the offbeat disciplinary ghetto of my early career. It brings to mind the quotation from John Maynard Keynes that:

'Practical men who believe themselves to be quite exempt from any intellectual influence, are usually the slaves of some defunct economist. Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back'.¹¹

ES

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The emergence of green politics in the UK

Sandy Irvine traces the roots of today's Green party and highlights some of the problems it has faced.

1 1972 was a watershed year. The unsustainability of human society was made clear by the publication of *The Limits to Growth* report¹ and *A Blueprint for Survival*.² The phrase 'only one Earth' also reflected the growing appreciation of the need to safeguard the oasis of life called Earth from a series of interacting and growing threats.³ The Earthrise photograph taken from the Apollo 8 spacecraft reinforced such imagery.⁴

Those dangers also triggered the emergence of a new political force – what became known as green politics.

The organisations that emerged in that period chose different nomenclature: Friends of the Earth (USA, 1969), Popular Movement for the Environment (Switzerland, 1971), United Tasmania Group (UTG) (Tasmania, 1972), Values Party (New Zealand, 1972), Movement for Survival (UK, 1972), PEOPLE (UK, 1973) and Ecologie et Suivie (France, 1973).

There had also been a plea to 'think globally, act locally'.⁵ Already, the metaphor of Spaceship Earth had emerged.^{6,7} It stressed not just the limited carrying capacity of the planet, one with limited supplies, but also its vital life-support systems that could be stressed to breaking point. Moreover, it suggested that the long-term survival of the spaceship's crew (i.e. all life on Earth) would be best achieved by working together.





▲ Figure 1. Teddy Goldsmith campaigned with a camel in the 1974 general election to spotlight how industrialised agriculture was desertifying the countryside. (© UK Green History)

This worldview was very much at odds with positive perceptions, dominant in society, of the feasibility and desirability of open-ended economic growth, ever more powerful technology, 'giantism' in organisations and, most fundamentally, of the planet as a mere resource, there to satisfy indiscriminate human wants.^{8,9} Such thinking, in fact, long predates 1972.¹⁰

The terms 'united' and 'values' might sound nondescript, yet here was a radical critique of society. The UTG leader, for example, argued that its politics were 'neither left nor right but in front'.¹¹ The Values Party focused on the issues of 'zero population growth, zero economic growth, technology control' in the words of its founder.¹² Existing parties (and society at large) were beset, it was felt, by 'growthmania', a term used by steady-state economist Herman Daly.¹³ In recent years, the scale of degrowth needed to put society on a sustainable footing (and sustain other species) has become starkly clear.^{14,15,16,17,18}

PARTY TIME

It is not easy to date the formation of the first green political party. Judgement depends on the definition of what is politics and a party. The Green party in Britain has two sets of roots: the Movement for Survival (MfS), announced in the January 1972 edition of *The Ecologist*,¹⁹ and PEOPLE. (Capitals were used to stress its difference

from other parties.) Both fed into the Ecology party, which, in turn, became the Green party.

The purpose of the MfS was to promote *A Blueprint for Survival*. Some 750,000 copies were sold, and it was debated in the House of Commons. Local groups emerged in response to its message, but the MfS team did not have the capacity to create a national organisation and the responsibility fell to PEOPLE to pick up the reins. Eventually, PEOPLE merged with the MfS in February 1974.

PEOPLE was founded in Coventry by Michael Benfield, Freda Sanders, and Lesley and Tony Whittaker. There was a strong feeling in PEOPLE that the challenge was to nurture a movement rather than build a party per se, which might offer the possibility of a wider scope and bring together forces that might have otherwise shied away from party politics. That said, in the 1974 general election, PEOPLE did contest six seats, garnering 1.6 per cent of the vote. Given the puny resources to hand, perhaps that result was inevitable, although it might also be concluded that the limits message had not percolated through, let alone persuaded, large sections of the public.

The name change to the Ecology party took place in 1975. It was felt that PEOPLE did not encapsulate the organisation's central theme, and the new name was

successfully proposed by Teddy Goldsmith.²⁰ That year saw the first iteration of what was to become the party's policy bible, the *Manifesto for a Sustainable Society*, now known as the Policies for a Sustainable Society.²¹ Otherwise, the organisation itself was struggling to survive, never mind flourish.

In the late 1970s, however, fresh blood began to pump more life into the party. Some of these individuals were to become nationally recognised, not least Jonathon Porritt and Sara Parkin. The Ecology party produced a comprehensive manifesto for the 1979 general election.^{22,23} By the start of the 1980s, membership had surpassed 5,000. In 1985, attempting to capitalise on the success of Germany's Die Grünen (The Greens) and drop a name that might be deemed too scientific for the general public, the Green party name was finally adopted.

FIFTY SHADES OF GREEN?

The term 'green' has a wide range of meanings, of course. That said, the word had first been used with its modern connotations just after the First World War. Leberecht

Migge's *Das Grüne Manifest*, published in Germany in 1919, had used the term with its modern connotations, such as biotechnic design, recycling, renewable energy, localisation and self-reliance.²⁴ More recently, at the start of the 1970s, there had been green ban movements in Australia – a form of protective action.²⁵ In 1971, the terms green and peace were linked when the Don't Make a Wave Committee launched Greenpeace.²⁶

The subsequent history of the Green party was to show that its members had very different and indeed opposing ideas about what green might really mean. There were to be debilitating disputes over a whole range of issues: organisation, strategy, policy, issues to prioritise, analysis of the world and its woes, and even core values.

In terms of organisation, few things were more contentious than the decision to have leader(s) and a national executive along the same lines as mainstream political parties. There were also divisions over strategy, such as the putative progressive alliance, an idea predicated on the assumption that the key division was



▲ Figure 2. Launch of Green party candidates in North East England for the 2019 general election. (© North East Green party)

left versus right on the conventional political spectrum. At its core would be electoral deals with the Labour party, Liberal Democrats, Plaid Cymru and Scottish Nationalist party to defeat incumbent Conservative party MPs. Some saw it as an unproductive compromise of core Green party goals and policies.^{27,28} In the event, the strategy was undermined by the refusal of the Labour party and Liberal Democrats to co-operate.²⁹

Ideology proved just as divisive. For example, an article by Paul Ehrlich about the threat of overpopulation had helped to motivate the formation of PEOPLE, yet there were to be repeated attempts to water down the Green party’s stance on the issue.^{30,31} The slogan ‘neither left nor right’ notwithstanding, there was an ongoing battle to redden the Green party, firmly positioning it on the left on the old political spectrum. The bitterest dispute, however, is also the most recent: that between transgender activists and gender-critical Greens, and led to one party leader resigning.³² Such internal discord might of course be a factor in the Green party’s lack of significant progress.

SUCCESS OR FAILURE?

In the 1989 European parliamentary elections, the Green party got nearly 15 per cent of the vote – its highest ever share and not repeated since. Today, the party has only one MP (Caroline Lucas), though it has made more progress at a council level. It has over 400 principal authority councillors across England and Wales, along with 300 on town and parish councils.³³ The party is currently getting around 8 per cent in opinion polls.³⁴

The obvious question is why it did not benefit, given that many of the dire warnings the party has made in the past have come to pass. This cannot just be blamed on the first-past-the-post election system, one widely held to favour the big parties. That 1989 result was achieved without proportional representation. Even if the Green party has sometimes not helped itself, forces in wider society are the bigger barrier. Essentially, the party advocates a collective approach, one that will involve significant lifestyle changes. That it is something that goes against the grain of the individualistic consumerism that pervades society. It might also not be clear what the party has actually achieved. It is, of course, hard to prove direct cause and effect. Usually, other forces are at work, beyond the activities of any single organisation. Events, be it heat waves, floods or rising prices, have a way of forcing themselves onto the political agenda.

Caroline Lucas MP has proved a forceful presence in parliament as well as on television programmes such as *Question Time*, garnering her much respect.³⁵ Evidence from the Association of Green Councillors suggests that the party-elected representatives ‘punch above their weight’.³³ The pioneering work of Kirklees’ Green party councillor Andrew Cooper on local energy

insulation programmes might be singled out.^{36,37} One might wonder, however, how often success in getting, say, a motion that declares a climate emergency passed leads to commensurate follow-up action.

Yet it seems reasonable to assume that the existence of the Green party and its predecessors has pushed what are now widely called green issues up the agenda, arguably making established parties pay at least some attention. It helped to spread awareness of possible solutions as well, including a switch of taxation from people to resource consumption and pollution, climate reparations, land value taxation, universal basic income and new measures of wellbeing. The party was instrumental in introducing bills in parliament on energy conservation and road traffic reduction – both critical issues. Perhaps most significantly, the party has played an important role in spotlighting just how broad the overall crisis we face is and how we need a comprehensive programme to resolve it. In particular, it has helped to underline how such action must address injustices inside society while making society’s ecological footprint more sustainable.

Overall, the Green party has changed substantially since 1972–3. Whereas *The Limits to Growth* and *A Blueprint for Survival* publications deeply critiqued industrialism, the Green party now condemns neoliberalism. Party messaging routinely foregrounds denunciation of government cutbacks and calls for major new spending on welfare. Compared to the 1972 publications, it takes a stand on far more social issues, ranging from drugs decriminalisation to LGBTQA+ rights.^{38,39}

It remains to be seen whether such changes will improve the party’s prospects. Success in terms of more election victories might, of course, be achieved but it is far from clear whether it would advance the goals articulated in these important publications that led to the development of green politics in the first place.

ES

Sandy Irvine joined the Ecology party at the start of the 1980s. He is a retired further education lecturer.

This article draws heavily on the materials assembled by David Taylor and Roger Creagh-Osborne and posted on the Green History website.⁴⁰ The author also acknowledges the help provided in emails from Michael Benfield, Peter Bunyard, Geoff Holloway, Clive Lord, David Taylor and Lesley Whittaker. Private conversations with Teddy Goldsmith over the years also provided much information.

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What has the current generation learnt from the past 50 years?

Mya-Rose Craig, Phoebe Hanson and Charlie Murphy dream of building a more sustainable future over the next 50 years.

MYA-ROSE CRAIG

I have been birding all my life and was lucky to have been taken to the countryside by my parents. My older sister Ayesha was 16 years old when I was three and was a huge role model to me, keeping me interested in nature. She is the reason why I appreciate the importance of role models and those who inspire young people.

I set up Black2Nature in 2016 after running two nature camps for minority ethnic teenagers and a conference: Race Equality in Nature. The conference examined the barriers to visible minority ethnic communities being able to access nature, what can be done to overcome them, and how we can make the environmental sector



▲ **Mya-Rose Craig staging the world's most northerly climate strike while on a Greenpeace mission to the Arctic in 2020.** (© Greenpeace)



▲ **Young participants pictured at a Black2Nature camp – an organisation set up by Mya-Rose Craig.** (© Mya-Rose Craig)

ethnically diverse so that it can meet the needs of and better involve minority ethnic communities. We cannot expect those who are not engaged with nature and our planet to care about saving it; empowering people to make changes and understand the importance of connecting with nature are key to successfully tackling environmental issues.

Over the last 50 years in the global north, an increasing proportion of the population lives in inner city areas, while remaining patches of natural space have been built on as brownfield sites, resulting in even fewer, even more degraded green spaces. Parents of minority ethnic teenagers feel that it is dangerous for their children to visit parks alone due to the presence of gangs and the police identifying them as troublemakers, leaving few opportunities to engage with nature or understand the need for environmental action. Meanwhile, the message about the need for environmental action and responsibility for greater sustainability is reaching those who are White and affluent, and is leading to sustainable behaviour change in this group. This contrast matters, as we will not be successful in making the changes necessary to save our planet without including everyone.

Looking back to the 1980s, we can see the huge legacy of that era in terms of environmental action – the Campaign for Nuclear Disarmament at Greenham Common and the protests led by Greenpeace and Friends of the Earth are just two examples. The campaigns carried out back then are a critical point of reference for environmental activists today; we would not be where we are today without those that came before us who built the way.

We are at a crisis point in terms of climate change, biodiversity loss and a multitude of other environmental issues, such as plastics and air pollution. The biggest challenge is that we live in a world where big corporations are allowed to take from our planet what is not theirs, and to pollute it as if it were a rubbish dump. Change will not happen without government action. There are many vested interests in today's norms, financial and political, that need to be challenged, as change cannot be sustained without bold governmental action. It is hard to feel hopeful when countries at COP26 agreed to so little, setting distant deadlines for action and implicitly buying themselves more time to carry out as much destruction as possible for as long possible. My hope is that, as things continue to worsen, ordinary people around the world will stand up and say: 'No more'.

PHOEBE HANSON

Every day I wake up feeling eco-anxious. If it is not the apocalyptic nightmares from the night before, it is the news alert telling me that the planet is on fire. My whole life feels like a ticking time bomb, fuelled by the feeling of only living for the next 10 years because that's all that science tells me I have left. I do not stand here alone; recent research surveying 10,000 young people across 10 countries showed that 56 per cent of us feel that humanity is doomed and 70 per cent of us are experiencing eco-anxiety every day.¹ It is incredibly difficult to stay hopeful in the face of what is humanity's biggest modern challenge, and it is near impossible to describe the deep and existential fear we feel, the dread of being part of the climate generation.

Despite this, young people continue to be my beacons of hope through this storm. The ones who are fighting to create a better world: the 14-year-olds banner-blazing in the streets and the young politicians and employees fighting to change the systems from within. Those who have inherited this crisis continue to show up every day in the hope of building a brighter, fairer, kinder future

for both people and our planet. They are the ones who continue to make me feel safe and held, and like I am not in this alone; this is the kind of safety I can only dream of older generations providing me.

People in historic seats of power have become experts at tuning out the science and the young voices screaming that we are hurtling towards a cliff. As young people, we will inherit the worst impacts of the climate crisis, yet we are systematically excluded from the decisions governing our future. Why are we being prevented from participating in the design of our own future? Parents, teachers, politicians, business leaders are making decisions about my future without hearing me. They are playing with my life as though it is an inconvenience, trivialising it to nothing more than a political talking point.

As a young climate activist, I feel I am fighting an uphill battle every single day, and whilst having an army of other young activists alongside me makes the fight easier, I just wish the hill did not exist. Imagine how far we would get without it.



▲ **Phoebe Hanson, right, speaking at The New York Times Climate Hub in 2021 with Force of Nature, the Natural History Museum and Voice for Nature. (© The New York Times)**



▲ **As a young working-class woman, Phoebe's mission has always been in youth empowerment and ensuring the right people are centred in climate decisions. She sees power in understanding your sphere of influence and building communities of change-makers. (© Phoebe Hanson)**

CHARLIE MURPHY

Over the past 50 years, there has been an obvious, stark shift in how humans interact with one another, exemplified by the use of technology. The mobile phone is now commonplace around the world and has brought increased interconnectedness. This paradigm shift has changed how information – including misinformation and disinformation – is shared and can enable people to make informed decisions on their responsibility within society to ensure it remains sustainable for future generations.

If the idea of environmental responsibility and sustainability can continue on this path and become a mainstay in our culture, it could be a positive course change for the future. Increased emphasis on the maintenance of natural systems could see a movement towards living in conjunction with nature and simultaneously try to improve both the human and natural world.

The previous generation of environmental activists has done an extraordinary job. They spread the message and succeeded in making the climate crisis a notable mainstream news topic. They often went against the traditional views of their time and shone a light on vital issues. Conversely, many decision-makers have been slow to act. With the collective knowledge of scientists,

solutions to cut global carbon emissions and solve the destruction of the biosphere and prevent the Earth's systems from spiralling out of control are achievable. The legacy of previous generations in situations of power is unfortunately not a good one, but there needs to be hope; a few changes and actions at the top can still shift the historical negative trajectory.

A lack of awareness across society presents a significant obstacle to the concerted efforts by a few to resolve the problems facing our planet. This applies globally, and not only to those in power but to all sectors of society. Greater awareness of the pertinence of environmental factors to all human interests can help people make better-informed decisions and drive sustainable change.

The interconnected nature of climatic systems means that agreement and subsequent collective or complementary action among parties are imperative for addressing climate change. Disparate views should not stop talks towards the achievement of climate change solutions; only a coherent response can enable recovery of the planetary system.

The new generation of climate activists has a desire to change the world. It is our future that is at stake,



▲ Charlie Murphy, pictured, is always happiest when outside in nature with binoculars around his neck. However, he increasingly feels that the nature he is looking at is being depleted at an alarming rate, a trend he is desperate to reverse. (© Charlie Murphy)

and the consequences of the activities that are taking place as you read this will affect us. Those who should have been paying attention to the scientists for decades should now also pay attention to the younger generation whose futures are being toyed with. These crises are a global problem with global consequences, and not listening to those who know the science behind the solutions and those who feel most threatened by this changing climate shows why some have little hope that we can solve this exponential problem.

The younger generation has been able to find common ground between different walks of life and create campaigns that are strong, powerful and demanding. But the main problem that we face is convincing those in power to pull the trigger and make substantive changes, which often means challenging vested interests and entrenched norms. Such changes are essential for a sustainable future. Without help from the top, it will not be easy to transform the way we work. But, as the generation with the most to lose, we will and must give it our best shot.

ES

Dr Mya-Rose Craig is a 20-year-old British–Bangladeshi environmental and race activist, campaigning for access to nature and saving the Earth. Mya-Rose’s memoir *Birdgirl* is published by Jonathan Cape.² Her first book *We Have a Dream* highlights 30 young global environmentalists of colour.³ She is the youngest Briton to receive an honorary doctorate.

Phoebe Hanson is a climate and social activist, a youth advocate and the Operations Director at Force of Nature, a youth non-profit organisation mobilising mindsets for climate action. Alongside Force of Nature, Phoebe serves as a member of Manchester’s Climate Change Partnership within the youth board and as a curator at the Science and Industry Museum.

Charlie Murphy is an 18-year-old birdwatcher and naturalist from Wiltshire, England, and has been interested in the natural world from a young age. As a Wiltshire Wildlife Trust young ambassador, he aims to engage the younger generation in nature and spread awareness of environmental issues and solutions.

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