The Geographer

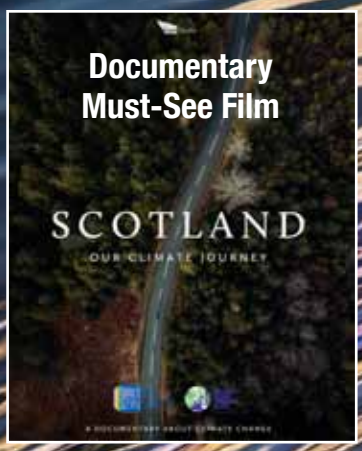
Special Edition 2021

The newsletter of the Royal Scottish Geographical Society

Glasgow COP26

Scotland's Climate Journey to a Net Zero World

Royal Scottish Geographical Society



"We have come to recognise that solving climate change is not only essential, but it may be our best hope to come together as a global community and truly change our world for the better."

Mike Robinson, Chief Executive, RSGS

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COP26 and the need for climate solutions

Mike Robinson, Chief Executive, RSGS; **Steve Demetriou**, Chair and CEO, Jacobs

When RSGS was founded in 1884, atmospheric CO_2 sat at around 292 parts per million (ppm). At the time, it was the highest concentration of atmospheric CO_2 in human experience. It has risen steadily ever since. When Jacobs was founded in 1947, it was around 310ppm. And as the world looks to the UN Climate Change COP26 in Glasgow, it is over 415ppm and rising. Every time this ppm number goes up, the probability of runaway climate change becomes more likely. The consequences are well documented, and we are already seeing some obvious and awful impacts the world over. We are in essence playing a massive game of risk with our planet.

The science is not new. We have known for nearly a century that adding carbon dioxide to the atmosphere can affect the climate. Scientists first raised the alarm in the late 1970s, and we have left it perilously late to respond. We urgently need to embrace the solutions to this issue and enact them at pace. There is great scope for ingenuity and a clear path of opportunity, but we need an injection of optimism, energy and innovation to create a hopeful space for all of us to work together.

"A shared understanding of the relevance, urgency and critical solutions to climate change within all those in management and authority, is essential."

Every country in the world is under pressure to make commitments to tackle the climate crisis, and more importantly to honour those commitments and keep adding to them. With every year that passes these will get more stringent for commerce and industry, as the effects of climate change become more evident, impacting on resources and shaping staff and consumer demands. We are – every one of us – on a journey towards net zero (and beyond).

Governments cannot achieve net zero on their own. If we, as a society, are going to tackle this all-encompassing issue, we need to create the political agenda and environment for change. We all need to start pulling together, and in the same direction; otherwise, we will simply pull ourselves apart. A shared understanding of the relevance, urgency and critical solutions to climate change within all those in management and authority, is essential. Not just to ensure we respond appropriately and act effectively, but for any organisation that wants to remain relevant and resilient over this next critical decade.

That is why RSGS, working with the University of Stirling's Management School, the University of Edinburgh's Climate Change Institute and the Institute of Directors, produced Climate Solutions, an online course for managers. And that is why Jacobs became the first major company to adopt this for all their staff globally. We are delighted that many more organisations are beginning to do the same, and that demand continues to grow for this essential learning.

No one country or organisation has done enough to stop climate change, and some have barely started. Unfortunately, the clock is ticking relentlessly. This next decade will prove critical in whether we respond in time, and how. Every organisation and business must realign itself to delivering real emissions reductions. While each of us can do more, we *all* need to take the same journey towards sustainability. Acknowledging that we are all at different stages of that journey is vital, as we need to be working ever more collaboratively to shift course.

We need to learn from each other. We need to share good news and success. We need to explain failures and unexpected obstacles. We need to work across sectors, seek new alliances and get better at joined-up thinking. We need to value more than just the bottom line. We need to inject scale and ambition into our actions. And to do all of that we need to inspire those around us about what is possible. We need to celebrate and reward progress. We need to properly fund transformation, and massively accelerate the pace of our response. And through these efforts we can start to make real inroads into this complex global issue, and inject hope and optimism into the future we all need to build.

COP26 really matters. It comes, already delayed, at the start of the last decade in which we can meaningfully prevent runaway climate change and set the ambition for the rest of the 2020s. Every country needs to go beyond their 2015 Paris commitments, which were a step in the right direction, but were insufficient and purely voluntary. Now we need to see urgent action to work together to deliver solutions at pace and scale.

It's time to get serious about climate change – before climate change gets really serious.

Climate Solutions

This online course, available in full Professional and shorter Accelerator versions, offers up-to-date expert guidance to help managers prepare for change in their organisations. Open to everyone, it highlights where change is most needed and where opportunities lie. See www.climatesolutionsnetwork.com for details.

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Cover image: *BR-319 Highway to The Tipping Point*: Erika looks out for pink Amazon river dolphins, while oil leaks from a nearby boat. © Evgeny Makarov
Masthead image: *Climate Stripes*: global temperature change, 1850-2020.
© Professor Ed Hawkins, University of Reading (**www.showyourstripes.info**)

We are grateful to Jacobs for sponsoring this special edition of *The Geographer*.

Jacobs

"Many Africans are losing their lives, while countless more are losing their livelihoods."

Vanessa Nakate, climate justice activist

"The fact is that no species has ever had such wholesale control over anything on Earth, living or dead, as we now have. That lays upon us, whether we like it or not, an awesome responsibility."

Sir David Attenborough, RSGS Scottish Geographical Medallist

"The latest IPCC report identifies that the opportunity to limit global temperature rise to 1.5°C is very slim, but still scientifically possible. The exigency of this situation must not lead us to despair; rather it should propel us into action."

Mary Robinson, former President of Ireland, Chair of The Elders, RSGS Livingstone Medallist

"Our ability to stabilise Earth's climate is quickly slipping away, and COP26 at Glasgow represents our last, best chance to change course and secure a stable future for humanity. I hope that hitherto reluctant countries like Australia will make meaningful contributions to reducing emissions that are in line with the science."

Tim Flannery, RSGS Geddes Environment Medallist

"What happens in the next eight years is so critical. We only have this window of opportunity and it's narrowing. If we don't accelerate, we will lose our chance."

Andrea Meza Murillo, Minister of Environment and Energy, Costa Rica

"We know what the solutions are and those solutions are getting cheaper and more accessible. With the right kind of post-pandemic investment, we can tilt the economy towards a green recovery, create jobs, and bring us back to a path of climate safety."

Riccardo Lagos, former President of Chile, member of The Elders

"The climate crisis has already been solved. We already have the facts and solutions. All we have to do is wake up and change."

Greta Thunberg, RSGS Geddes Environment Medallist

"We cannot afford the luxury of cynicism or even pessimism in our reaction to climate change. The situation is too serious. We must tackle it head on – and immediately."

Lewis Pugh, RSGS Mungo Park Medallist

"As the scientific evidence mounts, so too does the need to address the concerns vulnerable countries are raising around loss and damage, and adaptation finance. The science is robust; the response to this environmental and human rights emergency needs to be just as solid."

Ellen Johnson Sirleaf, former President of Liberia, member of The Elders

Inspired by nature's genius

Steve Demetriou, Chair and CEO, Jacobs

Climate change, biodiversity loss and social inequality are among the biggest global crises today. How we respond to them requires all of us to work together – governments, businesses, communities and individuals. At Jacobs, we are fully committed and have a pivotal role to play – both in how we operate our business and in the climate action, decarbonization and sustainability solutions we implement in partnership with our clients to benefit people and the planet. We see every day as an opportunity to create a more connected, sustainable world.

Society is becoming increasingly aware of the environmental impact of the choices we make, including the items we buy and use. Our clients are talking to us every day about how to decarbonize their operations to achieve net zero commitments and carbon positive results wherever possible, and to build purposeful sustainable strategies. And our employees share that passion and commitment to innovate and drive action for change.

Securing long-term, equitable prosperity and wellbeing relies on society understanding and mitigating impact on our planet and rebalancing our demand for nature's resources. Education and shared learning are vital on this journey and that's why we value our collaboration with the Royal Scottish Geographical Society in helping empower and inspire change.

With the 26th UN Climate Change Conference (COP26) being the first COP since the Covid pandemic, we anticipate a renewed focus on society's relationship with the natural environment and how we can collectively reach net zero targets as soon as possible. Climate change is undoubtedly contributing to biodiversity loss across all global ecosystems. The vital role of our natural world in carbon sequestration and storage makes this loss more acute; we have seen this in stark focus with the degradation of peatland environments.

Alongside COP26, the inaugural World Biodiversity Summit is expected to focus on the actionable leadership, key mechanisms and collaborative innovation needed to enable all areas of society to tackle the biodiversity crisis – improving the health and wellbeing of ecosystems and the communities that depend on them. Nature-based solutions can and should become an integral component of decarbonization efforts in our drive to achieve net zero.

Nature-inspired designs and nature-based solutions are rapidly coming to the forefront of alternative project delivery strategies. And the role that natural capital approaches play in supporting the delivery of some of the most challenging environmental targets is becoming increasingly accepted.

While challenges with moving beyond nature-based strategies to nature-based delivery remain, it is promising to see the number of successful examples of conservation, restoration and improved land management actions growing in recent years. The natural world provides an abundant source of inspiration and novel ways that can help us think differently and reimagine these solutions. Designing 'for nature, by nature' can also help create greater equity among communities, particularly those most vulnerable to climate change impacts, through the incorporation of green and blue infrastructure in urban areas that enhance public health and well-being.

At Jacobs we recently created a unique collaboration with Biomimicry 3.8 (B3.8), a global consulting and innovation firm specializing in nature-based solutions and nature-inspired designs to offer Positive Performance. This assessment and innovation methodology helps clients to develop and integrate regenerative best practices and incorporate nature's time-tested strategies into products, organizations and services. Informed by 3.8 billion years of natural evolution, biomimicry provides a unique platform for the development of sustainable and regenerative designs.

> *"Education and shared learning are vital on this journey and that's why we value our collaboration with the RSGS in helping empower and inspire change."*

The methodology helps engineers, architects, landscape architects and planners to understand, emulate and enable ecosystem services – the multi-faceted benefits that natural ecosystems provide to humanity (such as air quality, carbon sequestration, water cycle management, aesthetics and renewable energy), in order to deliver health and wellness benefits through their designs.

Since 2020, Jacobs and B3.8 have collaborated on the Positive Design methodology with a range of organizations at the forefront of global sustainability including Ford Motor Company, University of California at Davis, a US Federal Laboratory and a confidential global software company. Encompassing industrial facilities, research labs, hospitals and data centres, Jacobs and B3.8 are helping clients move beyond sustainable and aim for Positive Performance and regenerative impact.

Red squirrel. © Lorne Gill

Rising to the challenge, we are seeing a committed generation of sustainability leaders creating a positive flow of ecosystem solutions in their designs for infrastructure schemes. For example, protecting and restoring natural habitats along coasts or rivers can protect communities and infrastructure from flooding and erosion, while also increasing carbon storage and enhancing biodiversity. England's Broadland Flood Alleviation Project is a unique 20-year programme to improve and maintain 149 miles of flood defences within the Norfolk Broads, one of Europe's most important wetland areas. In addition to improved flood defences to protect homes and farmland, significant environmental improvements, enhancements to recreational facilities for communities, and protection of habitat for rare and endangered species have been realized as well.

Carbon captured by coastal ecosystems such as saltmarshes, referred to as 'blue carbon', provides a natural way of reducing the impact of greenhouse gases on our atmosphere. Jacobs, in partnership with scientists, charities and financial experts, is developing the UK's carbon code for saltmarshes, which will enable investment in the restoration of these important habitats. Projects that sequester carbon, regulate floods, cool urban temperatures, and purify the air while providing biodiverse habitat, healthy food and clean water show what is possible when we emulate nature to create conditions conducive to all life.

Generous, climate-smart, nature-positive communities are inherently healthier and more enriching places to live. The World Biodiversity Summit provides a crucial opportunity to help accelerate action for the transformative change needed. It is only by garnering and driving a collective response that we can ensure our society and our natural environment survives and thrives for generations to come.

Norfolk fields. © Jeremy Halls

Ptarmigan. © Desmond Dugan

Saltmarsh. © Jeremy Halls

An interview with Christiana Figueres FRSGS

Mike Robinson, Chief Executive, RSGS

Christiana Figueres is an internationally recognised leader on global climate change. She was Executive Secretary of the United Nations Framework Convention on Climate Change (UNFCCC) 2010-2016, and was a key architect of the 2015 Paris Agreement. Ms Figueres is co-founder of Global Optimism and co-author of the bestselling book *The Future We Choose*. I was delighted to speak with her in September about her current work.

It is nearly four years to the day since we last met, when we had the honour of presenting our Shackleton Medal to you in Edinburgh Castle. Are you still a 'stubborn optimist' on climate?

Well, I would first like to recognise the very painful context in which we are working. We have brought unprecedented levels of damage to infrastructure and to economic value, and above all we have caused untold human misery already. If we don't do the job that we're meant to do, we will only increase the intensity and the frequency of that destruction, and that misery. So, I fully understand, and I partake of the anger, the fear, the grief, the anguish that is being felt by so many people around the world. From my perspective, we can't afford to roll up in a ball and be overwhelmed by the challenge that is ahead. We have a very, very sick planet, threatening the quality of life of all human beings. We actually have the responsibility to stand up now more than ever before, and to dig into our deep conviction that not individually, but collectively we have everything that it takes to face this challenge square on. That is what I mean by optimism: a very serious, courageous choice that we have to make to stand up to the challenges that we are facing, and the confidence that we as a human race have what it takes. Because it is all about decisions to actually face the challenges that we have on hand right now.

Do you think Glasgow has the opportunity to come back and deliver and build on what happened in Paris?

Absolutely, it has that opportunity. Moreover, that is the responsibility of COP26. Every five years, countries have to come together to report to each other what they have done and, more importantly, what more they are going to do over the next five to ten years. This is a legal requirement under the Paris Agreement. In addition, it comes in a much clearer scientific context: the two IPCC Scientific Reports which make it abundantly clear that 1.5°C as a temperature increase has got to be the ceiling. We cannot allow for the temperature increase to go beyond 1.5°C if we want to be prudent and stay within the bounds of impacts that the human race can actually adapt to. So we have to be at 50% of current greenhouse gas emission levels by 2030 – a 50% cut over this decade. COP26 needs to make sure that we're on track for that immediate-term goal.

As host to COP26, there is a huge excitement and willingness in Scotland to see progress and play a part in this necessary transition. Do you think it is helpful to share that journey with other nations?

Well, absolutely, Scotland and every other country that is actually quite committed to doing the responsible thing definitely has a double responsibility: to do it domestically but also to act as a role model for other countries to follow suit. Because, let's understand that we've never done this before. We've never decarbonised the global economy. And so we're moving into uncharted, unknown territory. So the more that those countries that are at the forefront share their experiences, their lessons learned, the mistakes that they made, the achievements that they were able to gather, the more that makes it easier for those that are coming behind to follow suit.

Solar Portrait: small, inexpensive photovoltaic power systems can provide households with 12 hours of light during the night, allowing people to do more with their waking hours. © Rubén Salgado Escudero

In conversations I have with businesses especially, there is a sense that they are unwilling to share their actions for fear of being attacked for what they haven't done. How do we empower them and overcome this focus on criticism and a narrative that 'nothing's good enough' without slipping into greenwash?

That, I think, is precisely the challenge that we're facing right now. So, from my perspective, perfect is the enemy of the good. The fact is that we're all coming from a very deeply rooted high-carbon economy and society, and we know that it is urgent to move past that. But we also know that it's not simple and that we're going to fall and make mistakes along the way. My approach here is actually to applaud and encourage progress as fast as possible, and the deepening of the decarbonisation across all value chains, without expecting perfection. Because the world doesn't have perfect human beings, it doesn't have perfect corporations, or perfect governments, and we simply have to work with imperfection because that's the reality of life. That doesn't mean that we tolerate irresponsibility. Those are two very different things. As long as that imperfection is being recognised, and as long as there is a true sincere commitment to take a look at what is not working yet, that is the kind of movement forward, the kind of progress that I think is realistic and effective.

It has been more than 40 years since the first global climate conference, and 26 since the first COP in Berlin. Is there anything we can do to accelerate the pace of response, the pace of action, and the pace of commitment?

These yearly conferences are merely a reflection of where we are in society in our commitment to decarbonise, and what they do, in the case of the Paris meeting, is to set a path forward that then becomes legally binding. That is the equivalent of having a map, but having a map just shows the way; we actually have to use that map. Many analyses have now recognised what they call the 'Paris effect', which is the proliferation of decisions being taken by investors, companies, governments, and cities, to actually start a rapid decarbonisation process. What we're seeing is far deeper and swifter action on that path thanks to the adoption of the Paris Agreement than we otherwise would have. So I am grateful for that, although my concern continues to be that we're not doing it at the pace or scale required by science yet. That is the challenge for the rest of this decade.

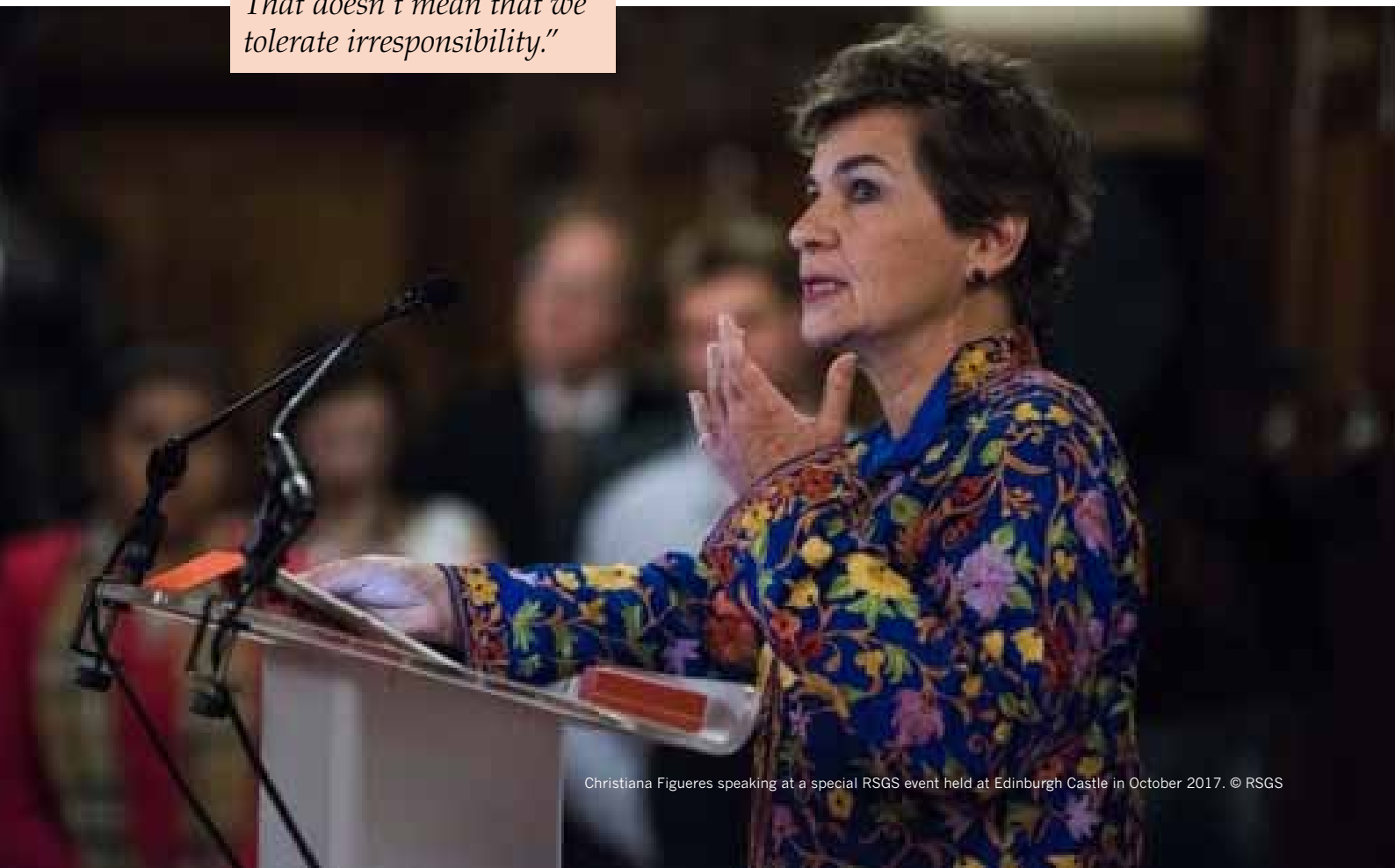
> *"We simply have to work with imperfection because that's the reality of life. That doesn't mean that we tolerate irresponsibility."*

And thinking now particularly of poorer nations, Indigenous peoples, and others disproportionately affected by the crisis, what can we learn from these traditionally marginalised voices? And how powerful is the voice of young people at COP26, and what is their role?

Well, they always have a space at COP and I made sure that that space was open. We have to understand that the COP is actually made out of two spaces. One is occupied by national governments, because as legal parties they have the responsibility to put down the legal texts that they will then agree to. The other space at COP is for everyone else who is concerned about what the future is going to be and everyone who can actually contribute. From Indigenous communities we still have a lot to learn, especially on responsible use of land; we have been over-producing, over-extracting from our land. I am also very grateful that young people hold us to account. We have to swallow a very bitter pill here, that those of us who are adults right now have the responsibility to, at least, change the course of the global economy. We will not see the end result of our efforts, because that will come toward the end of the century, but we do have the responsibility to change the course, the pathway of emissions and emission reductions right now, and that has to be done before 2030. I'm very grateful that young people are standing there, holding us to account, and reminding us of our responsibility.

And your hope for COP26?

My hope for COP26 is for all of us to leave knowing that 1.5°C, as a maximum temperature rise, is still alive. That is my one hope.



Christiana Figueres speaking at a special RSGS event held at Edinburgh Castle in October 2017. © RSGS

Climate change and the financial sector

Mark Carney OC FRSGS

Let's start from the beginning. The objective of Scotland is to get to a net zero carbon economy by 2045. The objective of the United Kingdom is a little later; a net zero carbon economy by 2050. The objective of the world is to stabilise temperatures below two degrees. Those are huge undertakings, vital undertakings, but if our economy is going to move in that direction, it means that virtually every business is going to need to adjust. For some businesses, it's going to require pretty substantial reductions in their carbon footprint: changes to industrial processes, changes to their products, their services and perhaps their customer base. For others, it's going to bring great opportunities.

"Climate change is one of the biggest structural shifts in the economy."

This is one of the biggest structural changes that any of us will see in our professional lifetimes. It's not only important; it is all-encompassing. And so every business is going to have to ask themselves, and should be asking themselves, how will climate change affect my business today, tomorrow, in the decades ahead, and what am I doing about it? What am I doing to adjust? Not only to the physical effects of climate change, but most importantly, and most positively, how am I adjusting to be a part of this solution which is to move the Scottish economy, the UK economy and, with time, the global economy to net zero?

We think at the Bank of England that virtually every financial asset will be affected by climate change, and it's important, when thinking about that, to differentiate between the types of impacts of climate change. There are, of course, physical effects, physical risks from climate change: think of extreme weather events, extreme flooding, storms, fires, other aspects, that can damage property, can disrupt supply chains, can affect business and trading conditions.

Mark Carney received RSGS Honorary Fellowship in November 2019.

One of the things that we do at the Bank of England, which some don't realise, is we oversee the insurance sector in the United Kingdom, which is one of the largest and most sophisticated in the world. And what the sector has seen on the property and casualty side has been that extreme weather events have gone up three times over the course of the last few decades, and the insured cost of those extreme weather events has gone up fivefold. So those physical risks are coming here today and they are going to be, unfortunately, much more prevalent in the decades ahead.

But that's just the physical risks. The other types of risks – and, I would underscore, opportunities – that come from climate change, are part of this transition to a net zero economy. That transition is going to require changes in carbon prices, changes in government regulation, government grants and subsidies for greener activities, but also regulation of 'browner' activities. And it also will involve some pretty exciting technological developments. All of these will change the economics of business activities, whether you're in the goods sector, in the service sector, in agriculture, technology and beyond. And so every business will want to think about where they fit in in that transition to net zero, and how it is going to affect them.

The financial market is increasingly taking these effects into account, thinking about what is called the strategic resilience of businesses. So if I'm lending to a business today in a sector that's particularly affected by either physical risks from climate change or future climate regulation, how long should that loan be? Or how should I price that loan? Or should I make an investment in an exciting new technology that potentially will have much higher returns under a low-carbon economy than it would in today's economy? These are the types of considerations that are coming into the financial markets which means three things for the markets: better disclosure, better risk management, and a much more comprehensive sense of what returns there are that take into account climate risk and opportunities.

Climate change is one of the biggest structural shifts in the economy. It ranks up with everything else put together as part of the so-called fourth industrial revolution. So each business is going to need a strategy on how it's going to respond, how it's going to contribute to this transition to a net zero carbon economy, and how it's going to take advantage of the opportunities created.

In November 2019, we were delighted to have the opportunity to ask Mark Carney, then Governor of the Bank of England, for his thoughts about the risks and opportunities that climate change presents to businesses and the economy. A longer version of this article is available in the spring 2020 edition of *The Geographer* at **www.rsgs.org/the-geographer**.

Still time to prevent the worst impacts

Ban Ki-moon FRSGS, former UN Secretary-General, Elder, RSGS Livingstone Medallist

COP26 is a defining moment in the fight to prevent the most devastating effects of climate change. Although we have for decades been warned about the perils of climate change, these perils are no longer a threat of the future. They are staring us in the face.

Six years after the 2015 Paris Agreement – a turning point in global efforts to tackle climate change – we are at another crossroads. According to the World Meteorological Organisation, the average global temperature in 2020 was 1.2°C higher than pre-industrial levels, dangerously close to the Paris Agreement goal of limiting warming to a 1.5°C increase. COP26 could be the last best chance for governments and the world at large to deliver on climate commitments before tipping points are reached.

I welcome the shift in the debate that I have seen since the COVID-19 outbreak in early 2020. The pandemic has exacerbated existing inequalities and opened the eyes of many as to how the different strands of injustice are interrelated. Race, gender and wealth all play a role in determining who bears the brunt of climate change.

The climate crisis mirrors the entrenched systemic inequality and injustice in the world as those who have done the least to put the planet in this precarious position suffer disproportionately from it.

Ban Ki-moon received the RSGS Livingstone Medal in June 2021.

A fair response to the climate crisis is not only morally sound, but also our best chance of achieving the right outcomes at COP26. Without the trust and support of the most climate-vulnerable countries, climate negotiations are doomed to fail.

While important progress has been made to mitigate climate change, develop low-carbon solutions and lower global emissions, it is not nearly enough. Nor is it the whole story. We must pay more attention to how we will adapt to climate change and its impacts. Today, many already live through the devastating effects of climate change, such as more extreme weather events, food insecurity due to failed harvests, and climate-induced migration.

A report by the Global Commission on Adaptation found that investments in adaptation can deliver significant economic returns: the overall rate of return on investments in improved resilience is high, with benefit-cost ratios ranging from 2:1 to 10:1, and in some cases even higher. These include early warning and evacuation systems for cyclones, floods and other disasters; cooling systems during the most intense heatwaves; planting mangroves to protect against floods and storm surges from rising seas; and developing drought-resistant crops. These are urgently needed in many parts of the world, often in regions already vulnerable to conflict and poverty.

But there are stories of hope from countries that, against the odds, are finding ways to adapt to climate change. Bangladesh – a nation plagued by both extreme weather events and poverty – has encountered some of the worst cyclone disasters on record, but has managed to build a remarkable preparedness system. Ahead of last year's super cyclone Amphan, more than three million people were successfully warned and evacuated because Bangladesh developed one of the world's best early-warning systems.

> *"There are few issues where the need for international cooperation, efficient multilateralism and ethical leadership is as clear as when addressing the climate emergency."*

Bangladesh is only one among many encouraging examples of how investing in climate adaptation saves lives. Although Bangladesh already spends about $5 billion, or 2.5% of its GDP, every year on coping with climate impacts, its people still experience huge loss and damage, and far more investment is needed. For example, after cyclone Amphan thousands of people saw their homes and livelihoods destroyed. The scale of the challenge is such that Bangladesh should not be left alone to cope with a climate crisis they did little to cause. This is why international support and climate financing is paramount.

Delivering the promised climate financing for developing countries must be a key priority for leaders at COP26, after the disappointing failure of most of the G7 leaders to take action at their June summit in Cornwall. More than a decade ago at the 2009 COP15 in Copenhagen, wealthy countries committed to $100 billion annually to support developing nations, but they still fall far short in terms of actual funds supplied, and a much larger share must be directed to climate adaptation. Funding for climate adaptation will allow developing countries to rebuild their economies in the ongoing pandemic, and make them more resilient to future threats, wherever they may come.

Supporting less privileged countries in adapting to the changing climate as well as reducing their carbon footprint goes beyond our moral responsibility. Just as with COVID-19, the consequences of the climate crisis will be felt across the world. No one is immune to climate change. There are few issues where the need for international cooperation, efficient multilateralism and ethical leadership is as clear as when addressing the climate emergency.

COP26 must deliver for climate-vulnerable communities and set the tone for climate action going forward. Today's climate crisis is a result of decades of failure and missed opportunities, and this failure is symptomatic of the wider lack of leadership and solidarity we have seen in the multilateral system in recent years.

We are now at a critical juncture where we must collectively choose the path towards a climate-friendly, sustainable and safe future defined by solidarity. We do not yet know where the other path leads, but my sincere hope is that we will not have to find out.

Glasgow and COP26: code red in the dear green place

Alison Johnstone MSP, Presiding Officer, Scottish Parliament

The coat of arms of Glasgow, Scotland's largest city – and known as the dear green place – contains a tree, a bird, a fish and a bell. These are often reflected in rhyme:

There's the tree that never grew,
There's the bird that never flew,
There's the fish that never swam,
There's the bell that never rang.

Whilst the symbolism relates to St Mungo, the patron saint of Glasgow, the representation could not be more pertinent to the challenge facing world leaders as they gather for COP26 in October and November 2021.

If ever the 'bell' represented both a warning, and a call to action, it is now. The United Nations 'code red' for humanity, issued in August 2021, could not be starker. This, the most up-to-date and comprehensive scientific analysis ever carried out on climate change, concludes that it is widespread, rapid and intensifying. Directly related, many of the global indicators on biodiversity are pointing in the wrong direction – including on trees, on birds and on fish.

Action, or inaction, on climate change and biodiversity will dictate whether we meet the globally agreed UN Sustainable Development Goals, which cover social, environmental and economic outcomes. The next best chance for action is in Glasgow at COP26, and at the imminent other global gatherings on biodiversity and desertification.

As the new Presiding Officer of the Scottish Parliament I am acutely aware of the unique role for parliaments in the climate and biodiversity crises. Holding governments to account, ensuring the law is as good as it can be, and ensuring budgets follow policy are fundamental roles for parliaments and legislatures the world over.

At the opening of the Scottish Parliament in July 1999, our then First Minister, Donald Dewar, stated, "In the quiet moments today, we might hear some echoes from the past: the shout of the welder in the din of the great Clyde shipyards." The location for COP26 is on the site of some of those very shipyards which first brought Glasgow to the world – and the world to Glasgow. Many of the shipyards are no more but, as COP26 delegates will see, at least parts of this post-industrial landscape have been reinvented; transition at scale is possible.

Parliamentarians will be represented on some national delegations at COP26, and we will have some Scottish Parliament involvement in Glasgow, but as a devolved legislature, we have carved out our own role. Our annual Festival of Politics, an open online forum, is themed around the UN Sustainable Development Goals, and then on 5th and 6th November we host a global Legislators' Summit.

Photo by Chris Arthur-Collins on Unsplash

As an institution in the global North we recognise that the Summit needs fair and equitable representation. Our state-of-the-art facilities will deliver that through a hybrid in-person, online, and translated, event. The virtual Summit will be open to others as observers. We will engage parliamentarians in their hundreds and thousands; demonstrating leadership, learning from each other, and sharing best practice.

The Summit is delivered in partnership with Globe International. Founded by then senators Al Gore and John Kerry, and their counterparts in the European Parliament, Russian Duma and Japanese Diet, Globe is a cross-party network of parliamentarians dedicated to improving governance for sustainable development.

In advance of the Summit, 'The Moment' is an opportunity for children and young people to share their climate hopes directly with their elected representatives. These views will be shared directly at the Legislators' Summit too.

We will share our own learning: about how cross-committee scrutiny has changed Scottish Government climate change law and policy, and on our own impact assessment tool on sustainable development. Equally we will share challenges: how best to scrutinise complex systems, and how to improve participation in such issues.

> *"I am acutely aware of the unique role for parliaments in the climate and biodiversity crises."*

The Parliament must be an exemplar. How the institution carries itself, and how we manage our own estate, presents another opportunity for leadership. This now includes rollout of the RSGS Climate Solutions Accelerator training, but there is much more to do. As I lead the Parliament into its Sixth Session, this will be a key focus of my time as Presiding Officer.

Image by Charlie Irvine from Pixabay

Scottish Government's role in tackling the climate crisis

Michael Matheson, Cabinet Secretary for Net Zero, Energy and Transport

COP26 in Glasgow represents the world's best chance of limiting global warming to 1.5°C. It therefore promises to be one of the most important gatherings of the century so far.

Ambition must be high on all sides. The people around the negotiating table in Glasgow have been entrusted with great responsibility, and many millions of people across the world will be watching – and waiting. A lot needs to be done to make sure the negotiations are successful.

Rich and wealthy countries must dig deep and find the financial resources to support developing countries adapt to climate change and transition to net zero.

Scotland already tries to lead through the power of our example. We have more than halved our emissions from 1990 levels, and over the decade to 2030 we aim to halve them again. By 2045, we are committed to achieving net zero.

Every one of us has a role to play in delivering the transition to net zero in Scotland, and our voices can help spur UN member states to raise their ambitions. COP26 will also be vitally important in securing a just transition – one that protects the vulnerable, builds resilience around the world, and ensures no communities are left behind.

That means giving people the skills, training and education to secure good, high-value jobs in green industries like low-carbon manufacturing, renewables, and tech. It means job security for those in industries that will play the biggest part in the transition, at every level and in every part of the country.

But a just transition also means making sure the costs do not burden those least able to pay. The benefits of our transition must be felt equally regardless of where you live, who you are, and what you do.

Earlier this year, we became the first country in the world to commit to a Just Transition Planning Framework. This sets out a consistent, ambitious approach to just transition planning with the first specific plan addressing the energy sector. We have also announced the establishment of a new Just Transition Commission, to help ensure Scotland's journey to net zero is fair for everyone.

To play our full role in supporting the aims of the Paris Agreement, we must be an ally to the nations most urgently impacted by climate change. Starting next year, our Climate Justice Fund will increase to £6m per year, providing £24m across this Parliament.

By doubling our funding for countries in the global south, we will provide much-needed support for those that, while making up only a fraction of the world's emissions, are already feeling the effects severely.

> *"By 2045, we are committed to achieving net zero."*

Scotland is funding and hosting the 16th Conference of Youth (COY16), the UN's official youth event for COP26. In recent years, young people have been among the strongest voices calling for urgent global action to address climate change and I am proud that the Scottish Government will ensure those young people's voices are heard in the climate negotiations.

The actions we must take now will transform our society and economy beyond anything we have seen since the industrial revolution. It may seem difficult, but it can be done.

Over the past two years during the Covid pandemic, actions which previously seemed impossible suddenly became achievable. People changed their behaviour drastically to protect themselves and each other. New testing infrastructures were created from scratch. Vaccines have been developed at record speed because governments, businesses and research institutes poured money into their development.

We now need to summon the same urgency we have shown in the face of a pandemic to tackle the climate crisis.

Glasgow is a very fitting venue for COP26. In the 18th and 19th centuries it was famously a birthplace of the industrial age. In years to come, I hope we will speak of it as a place where the world made a decisive step towards the net zero age and reached a turning point in the fight against climate change.

Scottish Parliament Debating Chamber. © 2010 Scottish Parliamentary Corporate Body

Acting for future generations

Sophie Howe, Future Generations Commissioner for Wales

Wales is a small but progressive nation, much the same as Scotland. We are, however, the only country in the world who have legislated to protect the interests of future generations, through our groundbreaking *Well-being of Future Generations Act*, and we have appointed someone independently to oversee the implementation of that Act.

Why do we need this? Well, for too long we have made short-term decisions and used short-term metrics to measure performance, and that has impacted on the ability of future generations to meet their own needs. We only have to look at the climate catastrophe that we are heading towards, to understand how policymakers of the past and present have not taken the decisions that need to be taken to protect the interests of future generations. So our law requires all of our public institutions, local authorities, health boards and, significantly, the Welsh Government itself to demonstrate how they are taking decisions in a way which meets today's needs without compromising the ability of future generations to meet their own needs.

The minister who took our law through described it as the 'common-sense act' because it requires our public bodies to demonstrate how they are thinking and planning and acting for the long term, how they are preventing problems from occurring or getting worse. Because for too long we have parked our ambulance at the bottom of a cliff and just waited for people to fall off, then fixed them when they were broken. It requires us to integrate our thinking, to recognise the connection between different issues, to collaborate with each other across the public, private sector and third sectors, and to involve citizens.

I want to share with you the learning that we have taken from that.

First of all, you must involve people in setting long-term goals. So we held a national conversation with the citizens of Wales asking them, "what is the Wales you want to leave behind to your children and grandchildren?" And they told us they wanted a low-carbon Wales where, no matter what your background was, you had the ability to thrive. They wanted communities that were connected, resources to be used more efficiently, a thriving culture and vibrant Welsh language. And so the government set out, through our legislation, seven long-term national well-being goals, and they placed duties on the 44 institutions covered by the Act to demonstrate how they are meeting those goals – legal duties to ensure that organisations act beyond their immediate remit.

We are starting to see the connections. We have hospitals in Wales which are working with the National Botanic Garden to provide sites for nature on their estate, working towards meeting our goal of a more resilient Wales which focuses on ecological resilience and enhances and maintains biodiversity. We have officers in our environmental agency, Natural Resources Wales, who are working with partners on what their role could be in tackling childhood adversities. We have arts and culture in our hospitals, recognising that the softer things make a significant difference to people's well-being – to their rehabilitation if they are ill, or even keeping them well in the first place.

You have to talk often about these connections. You have to be thinking about doing the things that are going to maximise your contribution to all of the goals. And you have to make well-being your metrics. For too long we focused on short-term measures around economic growth, resulting in catastrophic damage to our planet, in the rich getting richer and the poor getting poorer, and not focusing on the things that matter to people and make life worthwhile.

So what does that look like in practice in Wales? Well, when the government thought it was a good idea to spend £1.5 billion building a new stretch of motorway in Wales, my challenge to them was that a simple application of those statutory requirements around our well-being goals would tell you it was a really bad idea. And so the government changed their minds on the basis of those principles that they had set out in the Act.

We must measure all of our choices by well-being metrics. We must maximise our contribution to all of the well-being goals. We must think holistically, and think about the art of the possible. We can meet an aspiration to build 20,000 new affordable homes, and we could build those homes with bricks and mortar and people could live in them, but we could do that differently and better. We could make sure that every one of those homes is built to *Passivhaus* standards, reducing our carbon emissions and helping to take people out of fuel poverty. We could make sure that we are using local industries and businesses and having requirements around the upskilling of local people to build those new homes. We could make sure that we have linked the plans for those new homes into public transport infrastructure. And what that will mean to the sorts of homes that we need to build. We need to think broadly about how we can maximise our contribution to well-being in everything that we do.

> *"We need to think broadly about how we can maximise our contribution to well-being in everything that we do."*

In Cardiff we have some of the same challenges as many cities across the world: high levels of air pollution, congested roads, long commutes and so on. Our Act establishes Public Services Boards, involving all of our key public services in each local authority area, and representatives from the private sector, third sector and so on. The Cardiff Public Services Board came together to work out how collectively they could tackle this problem with congestion in a way which maximised broader benefits around health inequalities, sustainable and resilient infrastructure, and socio-economic disadvantage.

First, a public health consultant was seconded to the council to lead on the development of the transportation strategy. And when you apply a public health lens to a transport problem you start to get a completely different set of solutions. Our Act permeates everything that the public body does: it is not just about the services they deliver or the policies they devise; it is about what they do as employers, how they spend their money, how they do risk management, how they think about managing their estates. They worked out that between them they were employing 35,000 people across the city, most of whom were travelling in private cars. Focusing on their own workforce first, they put in incentives

around sustainable travel, they set targets for modal shift, they put in bikes for hire by staff outside all of the main public buildings, they put on shuttle buses between different offices and sites. And we are starting to see a change in the way staff travel.

> *"When you apply a public health lens to a transport problem you start to get a completely different set of solutions."*

Taking that public health lens, they then worked out that we need to disinvest from roads, close off some roads, and encourage and incentivise active travel. They have seen a tenfold investment in active travel, particularly through cycle super-highways connecting different parts of the city. And they've targeted those super-highways at the areas of Cardiff to the south of the city where residents are likely to die ten years younger than those in the north of the city, due to high air pollution, long-term chronic health conditions and reduced physical activity. In building these super-highways, they have worked with our water company to build in Sustainable Urban Drainage, so they are cleaning and greening our communities in our award-winning Greener Grangetown programme. They are taking thousands of tons of water away from our disused and decrepit sewerage system, using and getting rid of it through nature-based solutions. In the process they are improving communities: if you take a cycle route from one of those communities to our city centre you will be met with the splendour of our medieval castle and a road closed off to traffic, where the council has worked with local creatives to make it a pleasant place for businesses to trade. So through applying that lens, thinking holistically, they are meeting our goals of improving prosperity, making a more resilient Cardiff, reducing socio-economic disadvantage and tackling long-term health inequalities, cleaning and greening and creating space for nature and biodiversity, and working with culture to embed that in the way we deliver public services.

Critically, we must think about doing the things that have benefits to both future and current generations. If we invest in improving the quality of our homes, for example, we can be improving energy efficiency, taking people out of fuel poverty, keeping older people out of hospital during the winter months, building on local skills and training, and so on. Think about doing those things that have multiple benefits to both current and future generations, and target and prioritise those things first.

There is a massively significant opportunity for small cities, states and regions across Europe to be working together to really lead the charge, and we have seen that across the world. When Donald Trump pulled out of the climate change agreement it was the states, the mayors, who said, "no, we are going to keep doing the things that we can do locally – the really important things like transport, housing, energy – and we are going to keep doing those things because they are right for our city and for our states." Small regions, cities, states really hold the key to whether we meet our United Nations Sustainable Development Goals, whether we can genuinely say that we are acting in the interests of future generations.

Photo by Callum Shaw on Unsplash

This article is extracted with permission from a speech that Sophie Howe gave to the Perth sustainability conference in December 2020.

Why time is short

Professor Iain Stewart, President, RSGS

If you are wondering why people are growing so increasingly concerned about climate change and saying that time is running out, here is a quick recap on how we got to where we are today.

We have known since the 1930s that adding carbon dioxide (CO_2) to the atmosphere could influence global temperatures. In the 1950s Charles Keeling began close monitoring of atmospheric levels of CO_2 at Mauna Loa. Scientists started properly sounding the alarm in the 1970s – at the Earth Summit in Stockholm in 1972, and more loudly at the first World Climate Conference in 1979. Despite speaking about climate change ('global warming') as a concern, political leadership throughout the 1980s and 90s chose not just to ignore it but to do the opposite of what was needed, cheered on by a well-funded campaign of denial by the major polluters. It wasn't until 1988 that the IPCC was formed, kick-starting the process of distilling all the peer-reviewed science into a single report published in 1990, an unprecedented global summary. Still few reacted, despite the serious warnings, and despite governments agreeing the contents. It was another five years before the first UN Climate Change Conference of the Parties (COP), in Berlin in 1995.

As scientists sounded louder and louder alarms, partly in frustration at the lack of political and societal response, the NGO community started to properly pick up the issue in the late 1990s, but it was confronted by angry and coordinated denial; it was an uncomfortable time for activists, who felt overwhelmingly outnumbered and mostly ignored. The fear was that by the time society saw the results of climate change and experienced them first-hand, we would have left it too late to tackle the worst of it; but still the issue struggled for the media it merited, and the media it did get was often misleading and imbalanced.

In the early 2000s, NGOs were becoming more concerned and, as so often, as the heart and soul of our societies, began to talk about it more, though early attempts were tentative. The bigger environmental NGOs were successful in getting commitments into many of the political manifestos of this period. Politicians were waking up to the latent public concern and realised they needed to be seen to back some action. It was 2006 before Scotland really began to step up. Drawing from the NGO concern, we constructed a coalition of environmental and humanitarian bodies, Stop Climate Chaos Scotland, which had a strong hand in pushing for the Climate Change (Scotland) Act 2009 – at the time the most stringent legislation on climate in the world.

The 2009 Act was significant. Scotland had stuck its neck out. We all knew we had simply fought to get to the start line, but here was some legislation which for now, and on paper, at least seemed to match the need for action. We now had to turn our attention to delivery, as legislation doesn't simply enact itself. But with the G20 Finance Ministers Meeting in St Andrews in October 2009, and the much-vaunted UN Climate COP15 in Copenhagen that December, it felt like there was an opportunity to share Scotland's ambition and hopefully encourage other countries to step up their commitments.

Copenhagen was meant to be a big moment. The eyes of the world were for once focused on climate change and not distracted by wars or terrorism or other global concerns. The opportunity felt palpable. It was easy to hope for too much, but the lack of a significant agreement led to a deep and painful sense of disappointment. Everyone involved in climate change was rocked by the lack of progress.

It took several years for the international community to regather its momentum, for climate to find its way back to centre stage, and for diplomats working tirelessly behind the scenes to get the world's governments to commit to do more. At the Paris COP in 2015 we finally witnessed a meaningful Agreement, which focused attention on the need to restrict temperature increases to 1.5°C if we wanted to avoid the worst impacts. This felt like a significant step. But as well as being voluntary, the commitments made by almost every nation did not go far enough to contain likely temperature rises to less than an extra 3.7°C.

And so, delayed by Covid, and 26 years after COP1 in Berlin set out to solve this problem, the world is coming to Glasgow for COP26. Every nation is meant to bring newer, better, more stringent commitments. More ambition, real effort and significant resources. More willingness to fund those most impacted by current climate change. More pace, scale and urgency. We have run out of time for further delay or obfuscation. Glasgow needs to be a significant step up from the 2015 Paris Agreement. It cannot afford to be another disappointment like Copenhagen in 2009. Scotland has a right to claim some leadership on this issue, and Scotland and Glasgow are determined not to miss this opportunity. So what can we expect? The stakes are high and the clock is ticking ever louder. Glasgow COP26 represents a chance to launch the most optimistic decade ever, or risks forsaking a generation.

"Scientists started properly sounding the alarm in the 1970s."

Photo by Karsten Würth on Unsplash

The Butterfly Effect: calling all young change-makers!

Sarah Shanahan, Senior Portfolio Operations Lead, Jacobs

Every day we make decisions; about what to eat, what to wear, how to travel and where to go. With a current global population of almost eight billion people, set to rise to over eight and a half billion by 2030, these choices have a real and lasting effect on us and our planet.

We are each responsible for refining our own behaviour in a climate positive direction, while also inspiring and educating the next generation. And many of our young people are keen for action. Global movements like last year's Mock COP26, uniting young people from over 140 countries, and this year's COP26 Youth Summit are vital in giving young people the means to express themselves on climate change and how we preserve our planet.

The Butterfly Effect. © Jacobs

As a geology graduate from the University of Glasgow, I've loved working in a Science, Technology, Engineering, Arts and Mathematics (STEAM) career, delivering our portfolio of projects through a social impact lens to support what's right for society and the environment. As a STEAM Ambassador, I'm passionate about inspiring young people about STEAM careers and have spent several years helping to create beneficial social impact and a lasting legacy through a community education programme for a major Scottish infrastructure scheme. I've learned that if we want to create a long-term and sustainable behavioural shift toward climate change and our environment, we need to engage, educate and embed those traits early in our future generation, so they are inspired to do things better.

At Jacobs, we've developed The Butterfly Effect, our Climate Change Education Programme, to enthuse and inform primary school pupils to make smart choices, so that the ripple effects of their actions will impact positively on climate change. Working hand-in-hand with teachers, our programme works with young people under 12 years old, for eight weeks, every year for seven years, giving them the information, knowledge and understanding they need to consider sustainability in every decision they make.

The Butterfly Effect covers eight themes aligned with the United Nations Sustainable Development Goals: Water, Plastics, Waste, Carbon, Biodiversity, Food, Human Rights and Lives, and Jobs of the Future. The topics are teacher-led and can be adapted to the needs of each class. Activities are differentiated by age group and are flexible enough to last anywhere from 15 to 90 minutes. We provide a mentor to work with the teachers throughout the topics and they provide insight into their experience working in STEAM.

Using this 'little and often' approach, the online programme covers all areas of the curriculum and is intended to be delivered throughout the school summer term. Easy to follow, themed and fully virtual activity sheets encourage fun learning, and teachers can tailor activities to suit different pupil needs.

"We've developed The Butterfly Effect to enthuse and inform primary school pupils to make smart choices, so that the ripple effects of their actions will impact positively on climate change."

We involve the whole school community – engaging parents through homework extension activities and supporting teachers with the latest information and resources. We deliberately drive inclusion into The Butterfly Effect by pairing schools from diverse geographies and backgrounds. In the module focused on Human Rights and Lives, for example, we help schools to partner and exchange knowledge, so they can build connections for the long term.

The classroom gains real-life context and relevance, while upskilling teachers in STEAM subjects and climate change topics. Critically, we know that by taking eight weeks in each of the seven years to reinforce the learning from this programme we have a real opportunity to embed knowledge and decision-making which will last a lifetime.

Our programme audience is a global community of 6-12 years old pupils, their teachers and our scientists. In the initial programme roll-out, we have primary schools participating from diverse urban and rural areas, ranging from one class of five pupils across the entire school, to 600+ pupil schools based in metropolitan areas, including Glasgow. Following COP26, The Butterfly Effect becomes Jacobs' primary core STEAM activity, available as a resource for Jacobs' growing team of STEAM ambassadors globally – encompassing a wider and varied geography, ensuring that voices and ideas are heard and shared at a local, regional, national and international level. If you're connected with a school who may be interested in The Butterfly Effect, please contact us at **GlobalSTEAM@jacobs.com** for more information.

Best century yet: what would success look like?

Professor Joe Smith FRSGS, Director, Royal Geographical Society (with the Institute of British Geographers)

Our global debates about climate change knowledge and action are crammed full of acronyms. IPCC; UNFCCC; IAMs; NICs. Just four of the institutions and approaches summarised in 46 syllables represented by 16 initials. Perhaps we shouldn't be surprised that many people struggle to keep up with the plot, let alone keep in mind an idea of 'what success would look like' on climate change.

Awareness of humanity's huge environmental impacts has been spreading with astonishing speed. This is unlocking feelings of anxiety and anger, but also a great tide of determination and innovation. Yet there is good cause to believe that at this very moment when our societies face the greatest jeopardies we also have the knowledge to make this humanity's best century yet. There is plenty we don't know about the future, but one of the clear messages coming out of the latest IPCC update on the science is that purposeful actions now can slash the risks that come with climate change. Many of those actions generate other substantial environmental and social benefits. Purposeful action to my mind means taking on board five interconnecting ideas and principles.

First it is essential to establish and nourish a stable political consensus on key policies and principles that can be sustained, in democratic systems, through three or four election cycles. Ideas for action on climate change must be palatable across the political spectrum and a range of philosophies. Some people respond to the idea of conservation of treasured things; others are motivated by the fair-sharing of resources and opportunities. Our political consensus needs to be comfortable with this range of motivations if we are to ensure that parties can only win majorities in democratic systems by recognising the simple wisdom that economic systems are underpinned by ecological systems.

"Economic systems are underpinned by ecological systems."

That political consensus is going to need to be founded upon policies that are designed around recognition of responsibility, and protection against vulnerability. However, a key feature of climate change politics is that responsibility and vulnerability tend to be unevenly distributed. Notably, the countries most vulnerable to the impacts of global environmental problems are, in historical terms, those least responsible for generating them. Furthermore, clumsily designed policies aimed at cutting emissions in richer countries can affect the poorest within those countries the most. Hence climate justice is the second fundamental foundation of a sustainable future.

A third principle must be to ensure that all goods and services embed our best guess at the full social and environmental costs of all products and services. This third element will prominently include an end to fossil fuel subsidy and is likely to result in impactful forms of carbon taxation and/or pricing. Putting the right price on carbon holds the potential to reward good decisions and punish bad ones in a consistent and quickly scalable way. Such approaches, if well designed, can be transparent, intuitive, efficient, and reach into every decision that relates to energy supply and demand.

These ideas don't require a completely new economic and political system, but rather a redraft of some of the information that shapes everyone's priorities. Furthermore, we now have plentiful evidence that we do have the capacity to strip a lot of carbon, most of it in the form of wasted energy, out of our economy and daily lives, particularly amongst the highest-consuming people and economies.

Increasing or introducing some taxes and pricing tools opens up space to reduce others. Ecological or green tax reform is the fourth key element in this argument. Environmental historians describe the century or so of explosive fossil-fuelled economic growth from the late 19th century onwards as 'the Great Acceleration'. Throughout this period fossil fuels have been relatively cheap, and employment and successful innovation has been increasingly taxed. 'Carbon funded tax reductions' is the smart reframing offered by one US Republican politician to explain how resource taxation might be increased while other taxes are cut.

Timing might be everything here. We are at a point, intensified by Covid, where every country in the UN system has agreed on the need to decarbonise economies fast, and at the same time they all want to revive jobs and energise commerce. These conditions can make space for radical revisions in some of the economy's key signals. Reformed tax systems could attach increased cost to the 'bads' of climate-harm and pollution, and contain the tax burden on widely valued things, such as take-home income, and innovation and entrepreneurship. This new price information, seeping into every decision made, will further nourish an increasing awareness that low carbon cities, towns, and rural areas can deliver a much higher quality of life and health for everyone. To decide to transform the places we live and work and our daily lives in ways that make them environmentally and socially sustainable within three decades is to decide to embark on one of the most exhilarating periods of positive change in our collective human history.

Which brings us to the fifth and final element: that is, to ensure that we support experiment and reward successful innovation. Not everything we try in our response to climate change is going to work, and we need to be ready for that. We need many and varied ways of incentivising and rewarding ambition and experiment. The rethink of our tax system will do some of that, but we also need to invest in ambitious experiments in many spheres: not just technological, but also cultural and societal.

A good portion of achieving a more sustainable world will be a case of learning by doing; of challenging and encouraging each other. The education, research, policy communities and all scales and layers of business and government need to roll up their sleeves and try things. They then need to share news about successes and failures. The UN COP processes are one

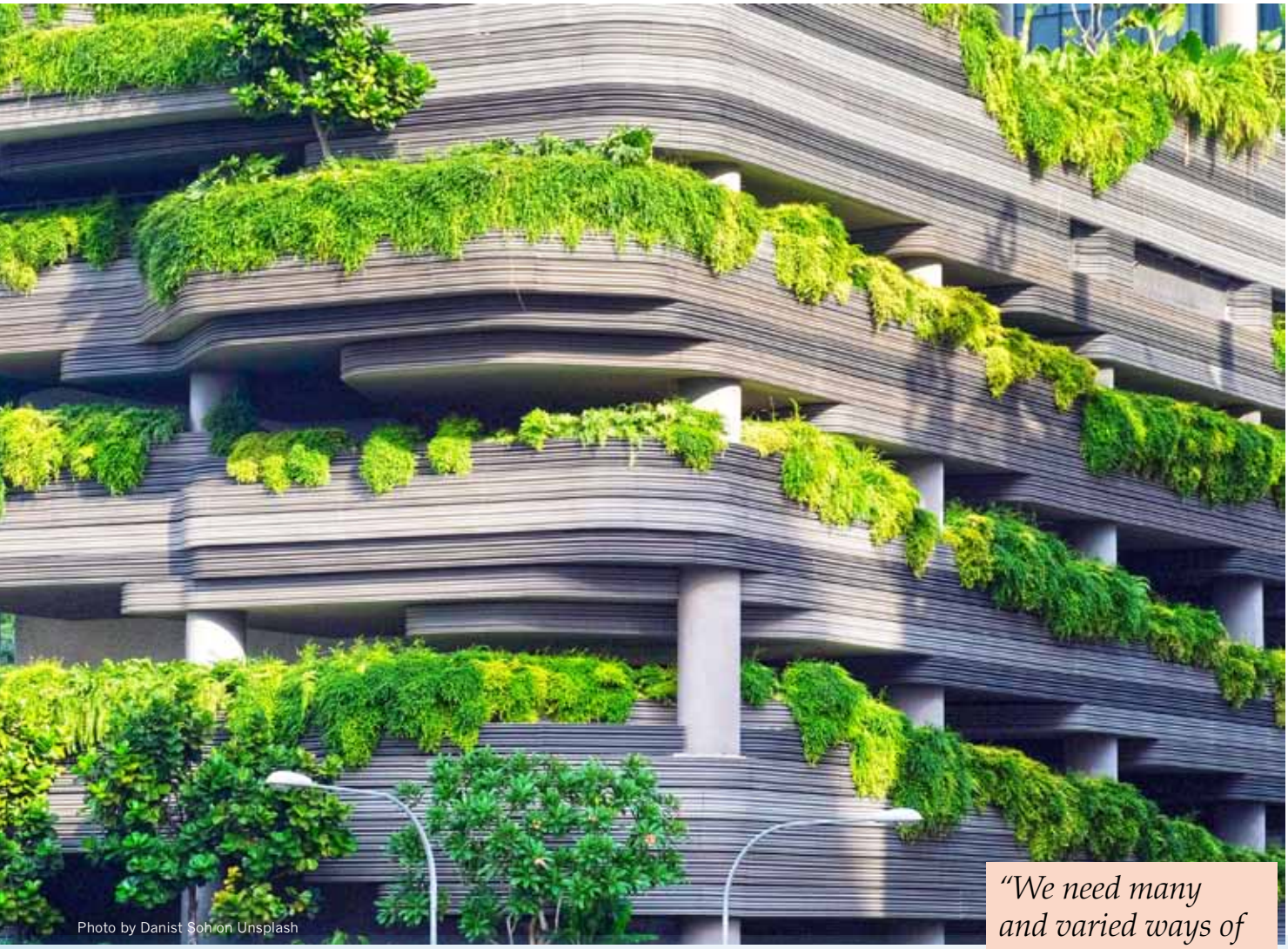


Photo by Danist Soh on Unsplash

expression of organised and open self-challenge at the scale of nation states. But this can and should be a conversation as households and corporate boards gather around the table. Geographical societies are no exception, and we need to be bold in our ambitions, and to challenge ourselves and each other, and to share and support our learning. This year's gathering of the world's geographical bodies, convened by the RSGS, in partnership with the RGS-IBG and the International Geographical Union, and the joint statement that came out of it, is just one step in that process.

It is a cliché in policy and management worlds to start any new venture by asking 'what would success look like?' It is an interesting and not much discussed feature of climate change policy that the whole conversation has been driven for decades by pointing to what failure would look like. I think geographers are well-placed to turn this on its head, and instead ask what the fastest route is to better homes, journeys, towns, cities and work might be? How do we give everyone security in terms of health, food and shelter wherever they are? How do we treasure and take pleasure in every part of our planetary home? Many of the best answers to those questions can lead us to care better for our climate too. Geography as both a subject and a practice, and geographical institutions, have both opportunity and responsibility to help accelerate action in all these spheres.

"We need many and varied ways of incentivising and rewarding ambition and experiment."

Photo by Grant Ritchie on Unsplash

Nature-based solutions and the future we want

Dr Deborah Long FRSGS, Chief Officer, Scottish Environment LINK

Climate warming and biodiversity loss are gathering speed and impacting increasingly large areas of the world. While tackling climate emissions is crucial, doing this in isolation from action to halt the loss of biodiversity, reconnect nature and restore damaged ecosystems is pointless. Addressing these issues together requires new approaches and the involvement of us all. We are going to need to adjust how we live, what our aspirations are, if we are to avoid an increasingly unstable environment that is unable to support us. We need a new approach.

The very recent Scottish Government commitment to nature targets is extremely welcome. Targets will now help drive action on nature loss as well as on greenhouse gas emissions. Once we know our target, it's easier to map the direction towards it.

"The risk of loss through inaction or inattention is greater than ever before."

IPBES and IPCC (*Co-sponsored Workshop Report*, June 2021) describe the future we want as a habitable climate, self-sustaining biodiversity and good quality of life for all. The question is, how do we get there, quickly?

The need for enhanced and well-targeted conservation effort has never been more important. What's more, the risk of loss through inaction or inattention is greater than ever before.

Part of our journey involves 'nature-based solutions', which can reduce the impact of climate change by making ecosystems more resilient to external changes. Higher genetic, species and ecosystem diversity makes ecosystems more resilient and able to maintain ecosystem services longer into the future.

Protected areas are one such solution. Today, these represent the reserves of biodiversity we have left. But protecting a static and unconnected reserve, in the middle of a changing landscape, is no longer sufficient. Protected areas today need to function as part of the wider landscape. The area of intact and effectively protected areas on land and at sea is too small to meet the three objectives of the new future.

Nature networks, another nature-based solution, are key to this by offering ecosystem resilience to change: linking together protected areas, providing routes through a landscape for species, including plants, fungi, insects, birds and mammals, so they can move as conditions change.

Restoration is of course another key nature-based solution. High-carbon habitats including forests, peatlands, salt marshes and kelp forests all maintain biodiversity and limit carbon loss. Halting the loss and degradation and restoring the extent of these habitats is a win-win: it saves money, retains ecosystem services, and is the start of networks that build future ecological resilience.

Investing in sustainable agricultural practices is another win-win. Supporting all farmers across Scotland to build carbon-holding soil and habitats, and build biodiversity levels to retain ecosystem services including pollination and flood management, brings benefits of more stable and productive farmland to the farmer, benefits of stable landscapes to the local communities, and benefits of locally produced, sustainable food to wider society.

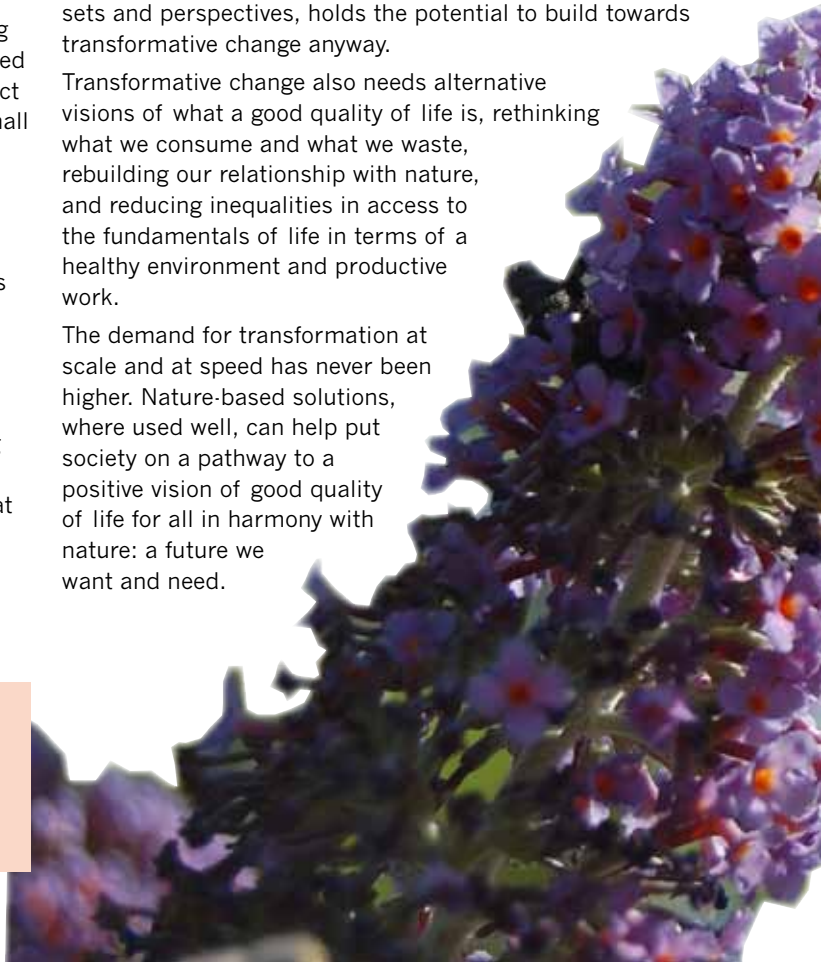
These win-wins are not just for Scotland's rural communities. In our urban areas, greening initiatives, including green roofs, urban trees, biodiversity-rich parks and urban gardens, reduce summer heat, break up winter wind and storms, provide pollinators to increase urban food productivity, and provide an environment that supports better mental and physical health.

However, nature-based solutions do not always provide a win-win. Action on climate and biodiversity has impacts on nature, climate and communities: ignoring any of these impacts can create unintended consequences that may be difficult to resolve given the lower resilience levels we are now facing in an unstable natural world.

What this means is that tipping points can be easily reached, with extreme consequences for people, biodiversity and climate. For example, tree planting with species that sequester carbon with no regard for species diversity or habitat stability can increase the likelihood of soil loss or flooding. Conversely, the rapid spread of changed behaviours and social norms can lead to positive tipping points. Examples include urban gardens, community-owned renewable energy generation, and local community involvement in creating and implementing plans that build local biodiversity. Engaging more people, with wider skills sets and perspectives, holds the potential to build towards transformative change anyway.

Transformative change also needs alternative visions of what a good quality of life is, rethinking what we consume and what we waste, rebuilding our relationship with nature, and reducing inequalities in access to the fundamentals of life in terms of a healthy environment and productive work.

The demand for transformation at scale and at speed has never been higher. Nature-based solutions, where used well, can help put society on a pathway to a positive vision of good quality of life for all in harmony with nature: a future we want and need.



FURTHER READING

IPBES-IPCC (June 2021) *Co-sponsored Workshop on Biodiversity and Climate Change: Scientific Outcome* (doi.org/10.5281/zenodo.4659158) and *Workshop Report* (doi.org/10.5281/zenodo.4782538)

Renewing society's relationship with nature

Penny Borton, Associate Director of Sustainability (Natural Capital), Jacobs; **Darren Grafius**, Sustainability Consultant in Natural Capital Approaches, Jacobs

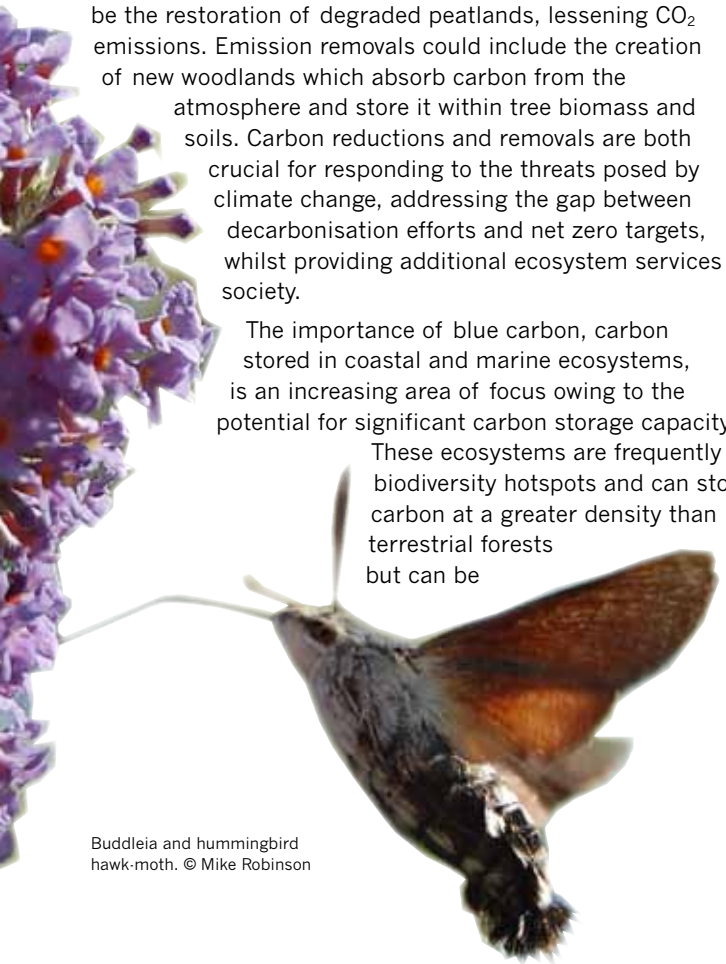
It is now widely accepted that humanity faces a climate emergency. The latest report from the Intergovernmental Panel on Climate Change (IPCC) has heightened current awareness of the severity of the threat and the ever-worsening consequences of insufficient action.

Since the pre-industrial period, the average surface temperature of the Earth has risen by 1°C and atmospheric CO_2 levels by 50%. Concurrent with this is an associated ecological crisis. In the UK alone, a quarter of mammal species are under threat of extinction. Yet in our well-intended response, our handling of one crisis may neglect another. For example, climate change mitigation efforts may focus on the protection of high-carbon ecosystems whilst overlooking biodiversity value. As such, biodiversity and climate objectives may be in poor agreement or even conflict. Increasingly, our planet is in desperate need of solutions with co-benefits for climate mitigation, biodiversity and wider natural capital gains.

Working with natural systems to address societal challenges and provide benefits for both human well-being and biodiversity, nature-based solutions can provide cost-effective approaches to mitigating and adapting to climate change. They offer the possibility of 'win-win' scenarios that address climate goals while preserving or enhancing biodiversity. Biodiversity underpins the value we gain from the natural environment, including carbon storage and sequestration, so effective management is essential, and nature-based solutions can play a major role in achieving net zero targets. Reaching net zero is a matter of both emission reduction and removals.

An example of nature-based emissions reductions could be the restoration of degraded peatlands, lessening CO_2 emissions. Emission removals could include the creation of new woodlands which absorb carbon from the atmosphere and store it within tree biomass and soils. Carbon reductions and removals are both crucial for responding to the threats posed by climate change, addressing the gap between decarbonisation efforts and net zero targets, whilst providing additional ecosystem services to society.

The importance of blue carbon, carbon stored in coastal and marine ecosystems, is an increasing area of focus owing to the potential for significant carbon storage capacity. These ecosystems are frequently biodiversity hotspots and can store carbon at a greater density than terrestrial forests but can be fragile and easily degraded. As such, they represent important mechanisms for the management of both the climate and ecological crises, whilst also providing wider societal benefits.



Buddleia and hummingbird hawk-moth. © Mike Robinson

At the centre of many projects harnessing nature-based solutions to meet net zero targets is the question of how to practically identify opportunities. England's Environment Agency (EA) has committed to a 2030 net zero carbon target consisting of a 45% reduction in emissions, with remaining emissions to be addressed by carbon offsetting. To identify the most effective and practical nature-based offsetting methods, Jacobs has been working with the Environment Agency in North West England to develop a robust site-selection model to find suitable sites for habitat restoration and creation which provide carbon offset benefits. Together we are working with stakeholders to identify partnership working opportunities and prioritise them based on a multi-criteria analysis, to derive the greatest social value.

David Brown, Senior Flood Risk Management Advisor with the EA, said, "The EA's flood defence programme is a fantastic example of adaptation in action and can be seen by those attending the COP26 climate talks in Glasgow. Using nature-based solutions, in combination with other measures such as traditional engineered flood and coastal defences, is one way we are driving down flood risk, and reducing our carbon footprint. The multiple benefits we see from nature-based solutions are an important part of the long-term vision set out in our Flood and Coastal Risk Management Strategy – ensuring today's growth and infrastructure is resilient to tomorrow's climate."

"Our planet is in desperate need of solutions with co-benefits for climate mitigation, biodiversity and wider natural capital gains."

Nature-based solutions are a relatively new approach, and so face several challenges to adoption, including reliability and cost-effectiveness. However, recent research has indicated that diverse benefits far outweigh implementation and management costs. Current evidence also shows a tendency to underestimate ecosystem service benefits.

Additionally, the interdisciplinary character of nature-based solutions and the equitable sharing of benefits between multiple stakeholders can raise questions of ownership. While proven examples are limited, this highlights the novelty of nature-based solutions and makes this the right time to explore them and reap the benefits.

As COP26 approaches there must be a renewed and active focus on society's relationship with nature. Faced with the need to meet net zero targets and preserve an ecologically threatened world, it is upon us all to commit to solutions that offer a sustainable path toward achieving both.

FURTHER READING

IPCC (August 2021) *Sixth Assessment Report: Physical Science Basis* (**www.ipcc.ch/report/ar6/wg1**)

Carbon Brief (**www.carbonbrief.org**)

Ecocide law: the missing climate solution?

Jojo Mehta, Co-Founder & Executive Director, Stop Ecocide International (**www.stopecocide.earth**)

Members of the Scottish Parliament were recently briefed on a legal concept that is rapidly gaining traction on the international stage: an international crime of 'ecocide'.

It is widely recognised that humanity stands at a crossroads. As underlined in the IPCC's *Sixth Assessment Report* (August 2021), the scientific evidence points to the conclusion that the emission of greenhouse gases and the destruction of ecosystems at current rates will have catastrophic consequences for our common environment.

Our briefing of MSPs, one of many political briefings we've been requested to provide lately, asserted that international law may have a seminal role to play in transforming our relationship with the natural world, shifting that relationship from one of harm to one of harmony. This is because, despite significant progress, existing laws and treaties are proving inadequate to supply the strong guardrail needed to prevent the root causes of the global climate and ecological crisis.

"Existing laws and treaties are proving inadequate."

What is required is nothing short of a new taboo. We all know one cannot request a licence to kill people in pursuit of a new infrastructure project. Indeed, it wouldn't even cross our minds to do so. But we don't yet recoil in the same way from destruction of ecosystems, and it is becoming ever more apparent that we must. We believe an international crime of ecocide has the potential to begin to create this much-needed shift in perspective.

History and recent progress

The word ecocide was coined in 1970 to describe the damage caused by defoliant Agent Orange in Vietnam, and in 1972, at the UN Conference on the Human Environment, Swedish Prime Minister Olof Palme evoked the idea of ecocide as an international crime. The idea was then taken forward by others, including Richard Falk (1973) and Benjamin Whitaker (1985); there have also been more recent efforts, notably from Scottish barrister the late Polly Higgins (1968-2019) whose legacy is being expanded upon by a growing collaborative movement. Our work sits at the heart of this expanding global network.

In November 2019, Pope Francis, addressing the International Association of Penal Law, suggested that ecocide should be considered a fifth category of crimes against peace, and in December 2019 climate-vulnerable island states Vanuatu and the Maldives officially called on member states of the International Criminal Court (ICC) to consider amending the Rome Statute to include ecocide alongside the four existing international crimes.

Ecocide campaigner Polly Higgins, with the RSGS Shackleton Medal that she received in September 2018.

Since that time, a further 14 member states of the ICC have a record of discussion of this crime either at parliamentary or government level: Bangladesh, Brazil, Belgium, Canada, Chile, Finland, France, Luxembourg, Mexico, the Netherlands, Portugal, Spain, Sweden, and the UK. The EU Parliament has voted in support of ecocide crime in the contexts of foreign affairs, legal affairs and biodiversity strategy, and support was virtually unanimous at the Inter-Parliamentary Union. Closer to home, a motion put forward by Monica Lennon MSP in support of the recently launched legal definition of the crime has gained broad cross-party support in Scotland.

Legal definition of ecocide

Momentum around this new crime has gathered significantly since consensus was reached on the core text of a definition of ecocide as an international crime by an Independent Expert Panel for the Legal Definition of Ecocide. This panel, comprising 12 lawyers from around the world, with a balance of backgrounds, and expertise in criminal, environmental, humanitarian and climate law, was convened by the Stop Ecocide Foundation and co-chaired by British-French barrister Professor Philippe Sands QC and Senegalese jurist Dior Fall Sow. The group was assisted by outside experts and a public consultation that brought together hundreds of ideas from legal, economic, political, youth, faith and indigenous perspectives from around the globe. The definition, launched in June 2021, is clear and concise:
"ecocide" means unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and either widespread or long-term damage to the environment being caused by those acts.

This definition is already being considered by a number of governments and it strikes a balance between protection from the most egregious harms and acceptability to governments with varying national legal provision in place.

Political opportunity

COP26 presents Scotland, and more broadly the UK, with a requirement for global leadership on the climate and ecological crisis; support for an international crime of ecocide is an opportunity to show this strongly. Amending the Rome Statute will take some time (an estimated four to five years) and requires broad global support from 80+ states. It does not therefore constitute an immediate political and economic risk, but nonetheless strongly encourages the necessary transition policies and compliance pathways towards sustainable and genuinely eco-effective practices.

Ethical and practical obligation

The UK is the seat of the industrial revolution, and is also at the origin of the present global legal system which focuses heavily on private ownership; both have brought prosperity to many but also, as we are at last acknowledging, relentless destruction to our planetary home ('ecocide' means, etymologically, 'killing one's home'). With a centuries-established history of innovation and pioneership, it would be both just and fitting for Scotland and the UK to lead the world in respect of this new international law to protect ecosystems and future generations of all species, helping in this way to engineer a new and desperately needed global ecological responsibility.

We simply cannot allow ecocide to continue with impunity. Certain moments in history demand not only practical but also deeply moral leadership. This is such a moment, and support for an international crime of ecocide offers both.

"'Ecocide' means unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and either widespread or long-term damage to the environment being caused by those acts."

Photo by Dominik Vanyi on Unsplash

FURTHER READING

Intergovernmental Panel on Climate Change (August 2021) *Sixth Assessment Report* (**www.ipcc.ch/assessment-report/ar6**)

Scotland's climate journey

Mike Robinson, Chief Executive RSGS, and former Chair, Stop Climate Chaos Scotland

It may not feel like it, but the UK has long been the most climate-ambitious of the G7 countries and a strong advocate within the EU. In 2008 Westminster created some of the first legislation, to establish a 2020 target of a 34% reduction in emissions. In 2009 Scotland took this further, after lobbying from the largest civil society coalition ever formed – Stop Climate Chaos Scotland (SCCS).

I was asked to Chair and help establish this coalition in 2006. Working as a volunteer alongside our only staff member, Ruth Cameron, we spent the following three years doing everything we could to recruit the biggest membership organisations and the broadest representative group possible. We presented to countless charity boards, businesses, communities, church groups, academics, public bodies and unions, and ran a public information programme with talks by leading thinkers. By 2009 we could boast more than 60 member organisations, who in turn had around two million supporters. In a country of five million this was a force to be reckoned with.

Image by Emphyrio from Pixabay

We broke records for consultation responses, political engagement, marches and rallies; we ran events in every community we could reach, with climate cafés and public talks in almost every corner of Scotland; and we ran a concerted media and advocacy campaign throughout. One of the most important aspects of this campaign was ensuring it had cross-party support, without which any commitment would risk being overturned by whoever next took office. In 2009, after a herculean effort from the third sector, the Government finally conceded (almost literally at the eleventh hour) and the Parliament unanimously passed the Climate Change (Scotland) Act 2009, with a headline 42% target reduction in emissions from 1990 levels by 2020, along with many other exemplary amendments – at the time the most stringent climate legislation in the world, albeit 30 years after the first alarm bells were sounded.

There was much to celebrate in the Act – public body responsibilities, carbon impact of the budget, inclusion of aviation and shipping emissions, etc – but it was the 42% target which set the tone for urgency, and caused palpitations amongst civil servants for being 'seemingly impossible'. The Minister for Finance and Infrastructure, John Swinney MSP, said after the Stage 3 Debate: "Many of the NGOs... have worked together under the Stop Climate Chaos banner to send to Parliament and the people of this country a coherent and coordinated message that we should consider and, frankly, be inspired by... we can rightly and justifiably claim that the Scottish Parliament will today pass world-leading legislation on climate change."

> *"There was much to celebrate in the Act, but it was the 42% target which set the tone for urgency."*

Without the science none of this would have happened, but it was not enough to spark action on its own. It then took a huge effort to secure ambitious targets, but targets alone are also not enough. Despite the immense effort across civil society, business and academia to get targets agreed, we realised we had only fought to get to the start line. The real work was still to come.

Because of the 2009 Act, day-to-day commitments cascaded through to many in the public and private sectors. The legislation helped empower people within many organisations to act. After COP15 in Copenhagen we focused on trying to embed the legislation and ensure it was enacted, finalising some of the finer details, and kick-starting some of the policy.

SCCS's focus also moved to other aspects of climate that we were concerned with; in particular, with the strong religious and humanitarian membership we had, a desire to help those most affected by climate change in other parts of the world. In 2013, Mary Robinson helped the Scottish Government launch the world's first climate justice fund, a modest £3m per year targeted at Malawi and one or two other countries, aiming to help them adapt and build resilience against the worst impacts.

After the Act, some sectors responded immediately; the power companies particularly stepped up, with a huge push on renewables and the eradication of coal-fired power. The waste sector saw big inroads too. Government, working closely with scientists and NGOs, wrote its first plan of how to begin to deliver against the targets. And businesses gathered under the banner of the 2020 Climate Group to form a forum for industry to work with government to accelerate their adoption of emissions reduction measures. Whilst the Group led to some renewed industry commitment, it also highlighted the lack of clear action, readiness and understanding at Board and management level of this all-encompassing issue.

Despite fears in 2009 that a 42% emissions reduction target was impossible, Scotland actually achieved it six years early. However, because civil society knew it was partly because of a change in the baseline data, the Government was under renewed pressure to tighten the targets. With their early achievement and with COP21 in Paris asserting the need to aim for 1.5°C (not 2°C as before), there was a context for pushing the national targets further and committing to new post-2020 targets.

It took until 2019 for these to come to fruition, undoubtedly made easier by the massive outpouring of public concern from young people. I had stumbled across the first of the school climate strikers, inspired by Greta Thunberg's example, outside the Scottish Parliament in January 2019, and sat with the two children to find out what they were protesting about. By May 2019, there were closer to 6,000 young people amassed outside the Parliament, and by September 15,000 marched on Parliament, with corresponding protests in every major city and many towns across the country, and indeed around the world.

In response to the Paris COP21, and encouraged by the school strikes, Scotland set new targets of 75% reductions by 2030 and net zero by 2045. Cities like Glasgow, host of COP26, have gone further with a target of net zero by 2030.

"Having targets is fine, but we actually need to deliver them too."

If this implies that Scotland is doing everything it could – it isn't. Having targets is fine, but we actually need to deliver them too, and this requires everyone and every organisation to play some role.

Scotland still has a long way to go, but it's further along that journey than most and we're keen to share our learning. We have some of the strongest targets and comprehensive legislation of any country in the world – backed by all political parties. We hit our 2020 emissions reduction six years early, albeit after a change to the baseline, then missed our next three annual targets. We have a new national target of net zero by 2045, and cities and organisations queuing up to be more ambitious, despite often not really understanding how to deliver. We have seen huge growth in sectors like renewables and waste reduction, but our transport and agricultural sectors haven't shown any real emissions reductions for a decade. And we are still building poorly insulated homes and even more roads, instead of properly rethinking and reimagining the way we live and move about. We have cut production emissions by more than half, but still only made a dent in consumption emissions. We launched the world's first climate justice fund, and closed our coal-fired power stations, but continue to drill for oil and gas. And we are still getting mixed signals, with governments flip-flopping on commitments, and not making sufficient funding available for the necessary transition.

This inconsistent story exemplifies the complexity of the struggle to bring about change, as sectors dig in, and traditional sectors and individuals resist that change. Nobody said it was easy. The momentum is there, and the commitments have been made, but it is not linear progress; it is two steps forward and one step back. But progress it is. And whilst Scotland can in no way claim to have done enough – nobody has – it can justifiably claim some leadership.

We still have so much to do, and the clock is ticking, but as governments the world over begin to take more purposeful and necessary steps, Scotland is keen to share its experience, good and bad, and its academic, policy and business expertise. And by doing so, we hope that others may draw some inspiration from our climate journey to date.

"[Scotland] has been for many, many years a leading country with efforts... very specifically on climate – and just because it is a small country doesn't mean the impact is small."

Christiana Figueres FRSGS, Founding Partner of Global Optimism, and former Executive Secretary of UNFCCC

Climate march in Glasgow, September 2019. © Mike Robinson

Earth Photo

Earth Photo, an international photographic competition and exhibition created by Forestry England and the Royal Geographical Society (with IBG), showcases the very best in environmental and geographical storytelling. A selection of shortlisted photos from 2021's competition will be shown in Forestry England sites until 24th April 2022. For details see www.earthphoto.world.

1. ***Sands of Time***: once rich and opulent, Kolmanskop is now a ghost town invaded by sand and lost in the middle of the Namibian desert. © Romain Veillon | 2. ***A Right to An Education***: Selamaw, daughter of Ethiopian subsistence farmers, is the first person in her family to stay on at school past primary age. © Rosie Hallam | 3. ***Slapping Water to Net Fish***: Inle Lake fishermen slap the water with oars to drive the fish into nets. © Ju Shen Lee | 4. ***Balancing Act All Day Long***: Inle Lake fishermen use a one-leg rowing technique, keeping their hands free to thrust baskets into the water. © Ju Shen Lee | 5. ***The Sea Moves Us, The Sea Moves***: communities like Fuvemeh in Ghana are being lost to coastal erosion and rising sea levels. © Antonio Pérez | 6. ***Contestants in Waste Plastic Costumes Await the Judges' Verdict***: the Maeng people's Eco-Modelo pageant blends ancient customs with modern traditions in the Philippines. © Ivan Rupes | 7. **Arrest**: in 2019, more than 1,000 arrests were made at Extinction Rebellion protests across the UK. © Chris Jerrey

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Scotland's Climate Assembly

Ruth Harvey, Co-convener, Scotland's Climate Assembly

World leaders will arrive in Glasgow this November for the UN Climate Change Conference with the words of the latest report by the Intergovernmental Panel on Climate Change report ringing in their ears. We have officially reached "code red for humanity."

As the world's attention turns towards Scotland, the question comes into sharp focus: what actions will we in Scotland take to make sure we live up to our rhetoric of climate leadership? Our friends around the world are raising the bar through bold initiatives, backed by serious resources, to cut carbon and achieve a range of social and economic benefits. We now need to go much further and faster.

"Big changes can happen quickly, if there is sufficient urgency and political will."

The report of Scotland's Climate Assembly could scarcely have come at a better moment. Independent of government and grounded in the Scottish Parliament's Climate Change Act (2019), the Assembly's remit was to respond to the question, "How should Scotland change to tackle the climate emergency in an effective and fair way?"

The Assembly's report establishes 81 recommendations from ordinary citizens to achieve 16 key goals, all of which were agreed by overwhelming consensus. The recommendations address a wide range of issues, including environmental impact in public procurement, domestic heating, agriculture and land use, transport (including air travel), taxation and the economy.

The Assembly is made up of a 'mini-Scotland' with over 100 members broadly representative of the country in terms of age, gender, household income, ethnicity, geography, rurality, disability, and attitudes towards climate change. Members took evidence from over 100 expert speakers.

The Assembly's Statement of Ambition, agreed by all members, is a bold declaration aimed at the whole of Scottish society, from government to businesses, communities and individuals. "As a nation we have the opportunity to be pioneers, by taking immediate action to empower our next generations to lead sustainable lives by setting up the framework now," Assembly members write. "If we fail to act now, we will fail our current and future generations, in Scotland and across the world."

The recommendations are ambitious and innovative. They are also realistic and achievable, as long as they are backed by political will from policymakers.

For example, the Assembly calls for the creation of a National Nature Service aimed at creating jobs in rewilding and environmental protection, a programme of public education on climate issues, food carbon labelling to show real and total carbon content, and a single 'oyster card' for Scotland that would help integrate the country's transport system alongside measures to implement major reductions in the cost of public transport. Another recommendation is to retrofit all existing homes by 2030, with all new buildings to be required to meet highly energy efficient *Passivhaus* standards.

Other proposals include a climate change business bill, a food carbon tax and subsidy regime, programmes to maximise the carbon sequestration potential of woodland, peatland and the marine environment, as well as large-scale green training and apprenticeship schemes. On farming, the Assembly recommends that the successor subsidy regime to the Common Agricultural Policy should put a premium on incentivising sustainable land management practices.

We expect a thorough response from Government as to how the Assembly's report will be acted upon. The experience of meeting online during a period of major crisis and decisive government action has shown that big changes can happen quickly, if there is sufficient urgency and political will.

Scotland's Climate Assembly established a world first among such citizen bodies by involving children in the Assembly's work, with over 100 children across the country taking part. They brought a unique sense of urgency to the issues before the Assembly. As ten-year-old Maya, a climate investigator with the Children's Parliament from the Highlands, tells us: "I've never known a time when the climate emergency didn't threaten my future. I can't see a world without it. It's something me and my friends are growing up with."

Scotland's Climate Assembly has shown that ordinary citizens must be at the heart of shaping the big changes that lie ahead in response to the climate emergency. This is the only way to ensure a just transition. "As a society we will need to change and adapt to meet the challenges, and recognise that there will be costs," members write. "But failure to act now will mean greater expense, and more difficult changes in the future, in order to avoid catastrophic costs to the planet."

FURTHER READING

Scotland's Climate Assembly (2021) *Recommendations for Action Report* (**www.climateassembly.scot/full-report**)

2030 net zero

Councillor Susan Aitken, Glasgow City Council

Across 12 days in November, presidents, prime ministers, mayors, CEOs, climate scientists and activists will converge here in Glasgow for the COP26 climate negotiations. Their collective goal: to build on the legacy of the 2015 Paris Climate Agreement, tackle the global climate crisis, and create a safer and more equitable future. COP can be the pivotal moment for our planet – as it can for its host city.

Few terms have come to define our era like 'transition'. But transition has defined Glasgow for several generations. How we have sought to move on from our high-carbon past has been, and continues to be, Glasgow's economic and social context for the best part of half a century.

A cradle of the Industrial Revolution, our geography and proximity to natural resources turned a small port city on the banks of the River Clyde into the workshop of the world, building the ships and machinery which enabled an empire.

The demise of our shipyards and factories in the last century heralded a turbulent period of our history. The failure to plan by putting in place new industries when the old collapsed contributed to generational unemployment, economic inactivity, and a sense of Glasgow's near abandonment.

We re-emerged though as a vibrant, outward-looking, diverse and dynamic city, one ever ready to play again its part on the international stage. The Glasgow of the 21st century is once more a centre of innovation and invention.

But even today, Glasgow still lives with its post-industrial legacy. Too many communities remain blighted by the impact of vacant and derelict land, poor air quality, and economic, social and health inequalities. In Glasgow, the past is a very current social justice issue.

Our story lends a historic pertinence to our host status, but it is the typicality of our challenges and imperfections which make us the ideal COP26 city. Like many of our peers across the planet we are a city experiencing transition. And it is cities just like Glasgow where the solutions to the global challenges of sustainability have to be found.

In November, success has to be measured not by promises and policies but by the practical solutions to the climate emergency, actions that have to be delivered by and with the world's cities. At COP our host status thrusts on us a responsibility to our peer cities that their voices are heard amidst the international focus on nation states. We also have a responsibility to our own citizens that we can translate the profile of COP into a platform for a fair and just transition, one which delivers for the social and economic well-being of Glasgow.

In advance of COP, Glasgow has unveiled its Greenprint For Investment, a £30bn portfolio of projects which address long-standing challenges whilst meeting our climate targets. From an entire new transport system better connecting citizens to opportunities, to generating renewable energy from the River Clyde, and upgrading hundreds of thousands of homes across our city region, the Greenprint projects will deliver the infrastructure necessary for a low-carbon, climate-resilient future.

"Success has to be measured not by promises and policies but by the practical solutions to the climate emergency."

This will require levels of investment never seen before in local government, and begs the question around who pays. It's already apparent that one of the most significant agendas confronting world cities is the financing of transition.

In the immediate term, cities have to begin creating robust business cases and business models at scale to unlock the finance seeking to invest in transition. Finance is not a blockage in itself. Accessing it with investable proposition is. By the time we reach COP, Glasgow and our peers will be in a position to detail the challenges and opportunities for investment.

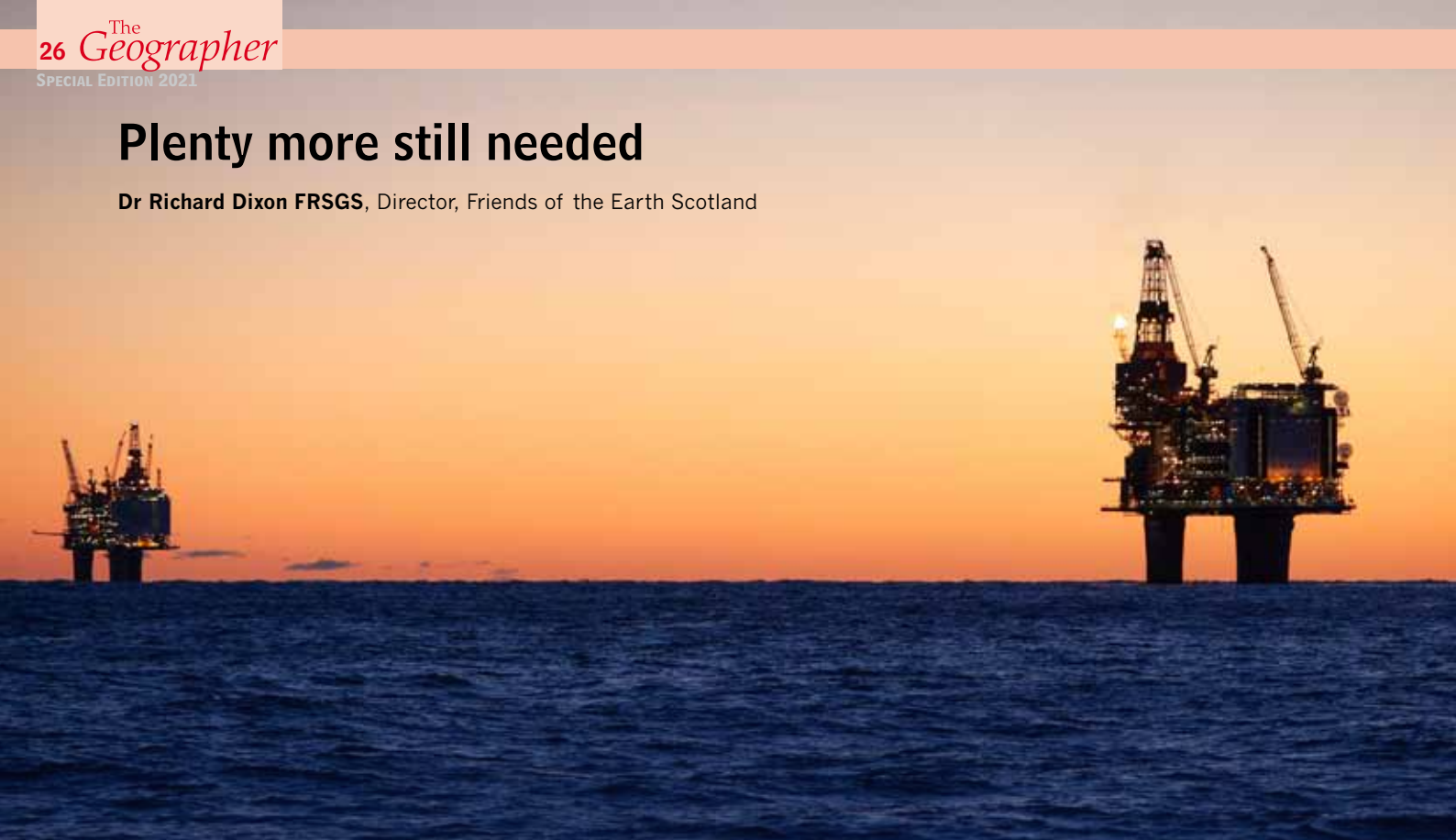
Two things are immediately clear though. The cost of not adapting, and failing to put in place infrastructure for a modern city, dwarves any outlay over the next decade. And the cost of transition cannot impact unfairly on the lives and well-being of our most vulnerable citizens, those who contribute least to climate change but are most at risk from it. Throughout our journey to COP26, I have stressed that climate action must be relevant to the life chances of our citizens, to their communities and their cities. It cannot be to their detriment. And we must learn from the mistakes of the past by this time planning for our transition by providing not only opportunities but the skills required to take them up.

We 'sprint to Glasgow' with renewed hope and optimism that the world can again coalesce around agreement on climate action. Cities likes ours are where the Race To Zero is won. Nation states pledge. But cities like Glasgow deliver.

Photo by Craig McKay on Unsplash

Plenty more still needed

Dr Richard Dixon FRSGS, Director, Friends of the Earth Scotland



The Scottish Government's plans on climate change sound impressive. From the commitment to reduce car travel by 20% by 2030 to the plan to double the amount of onshore wind capacity, and from half a billion pounds to fund transition in the oil-dependent north-east of Scotland to the plan to phase out gas heating completely, there is much to welcome, some of it because of the cooperation deal between the Scottish National Party and the Scottish Green Party.

"There is a huge contradiction in Scotland's approach."

But is it enough? We have some of the toughest climate targets in the world, with a target of net zero emissions by 2045, and even more importantly a need to cut today's emissions in half by 2030. We have a plan to deliver these targets, but four committees of the Scottish Parliament raised serious concerns about whether it is credible. Conveniently, an election this spring saved the government from having to respond properly to these criticisms.

Greta Thunberg recently said that Scotland is not a climate leader, as the government here likes to say it is, and that no industrialised country is doing enough. Several international studies tell us that even Scotland's targets are not good enough, not delivering our fair share to keep the world well below 2°C and certainly not to keep us below 1.5°C.

We need to do more, more quickly, on transport, agriculture, insulating people's homes and using materials more efficiently. Many of these actions would have multiple benefits; for instance, making people's homes more efficient reduces bills as well as climate emissions and means people live healthier lives, free from fuel poverty. Making public transport free would increase job opportunities for marginalised people, as well as taking many cars off the road, thereby reducing air pollution.

Even if the targets were tougher and the positive plans were more believable, there is a huge contradiction in Scotland's approach. While we say we are serious about climate change, we are also serious about keeping the oil and gas flowing for decades to come.

The cooperation deal between the SNP and the Greens commits to a programme of work to look at energy needs and the role of oil and gas in a world where we are taking our climate targets seriously. This work is to happen over the next year but it is not yet clear who will undertake this review and how independent evidence will be included. In a sensible world it would start from the International Energy Agency's recent conclusion that we've got enough fossil fuel production already and no new developments should even be considered. If the right remit is agreed and the right experts contribute, Scotland's review cannot fail to conclude that we need to phase out oil and gas extraction in short order. But, at best, it still puts any big decisions a year away.

Meanwhile the oil industry is spinning the myth that carbon capture and hydrogen from gas mean they can just keep on going as usual into the 2050s. Myths that both UK and Scottish Governments are happy to go along with if it saves them facing the harsh reality that fossil fuels have got to go and soon.

The Scottish Government has said many fine words on the need for a Just Transition; they've had a two-year commission on it and now serious money is to go into Aberdeen and surrounding areas. The point of planning a Just Transition is to make sure workers in fossil fuel jobs can move to jobs in clean energy, and communities are cushioned from structural changes to the economy. This is the opposite of the catastrophic transition that hit coal mining communities and workers in the 1980s. A complex set of initiatives have to bear fruit at the same time, but you can't drive a real transition if you are still in denial about the timescales.

Being one of the best isn't good enough if you're still well short of 'good enough'. Scotland talks a good game on climate change, and there are many things happening or planned here which make a really useful contribution in other countries, but the scale and urgency of the climate challenge is such that we need more, faster, in every area of life, if life is to continue.

Renewables growth in Scotland

Claire Mack, Chief Executive, Scottish Renewables

Since September 2019, when it was announced that Glasgow would host COP26, we've known that the international conference dubbed 'our last hope' of limiting climate change would focus the world's gaze on Scotland. Now is the time to tell the story of how we've decarbonised a whole country's electricity system while maintaining economic growth. And what a story it is.

Scotland has more than tripled its renewable energy capacity in the past decade, with renewable technologies like wind, hydro and solar now providing the equivalent of 97.4% of Scotland's electricity consumption. In fact, Scotland has decarbonised more quickly than any G20 economy since 2008 – a huge achievement.

As the industry body for renewable energy in Scotland, our members have been at the forefront of that decarbonisation for more than 25 years. Scotland has played a world-class role in developing onshore wind and hydropower, at all scales, with two-thirds of the UK's onshore wind power and 85% of the UK's hydro operating here in Scotland. Those technologies provide us with a sound footing from which to move forward – and moving forward we are.

Offshore wind provides Scotland with a tremendous opportunity: clean electrons from a predictable, powerful natural resource. Billions in inward investment. High-skilled, green jobs of the future. And, of course, a chance to end carbon emissions from our energy sector.

To date, offshore wind in Scotland has lagged behind the rest of the UK. But with a new leasing round, run by Crown Estate Scotland, that's all set to change. A new ambition, that 11GW of offshore wind is possible in Scottish waters by 2030 (we have less than 1GW right now), means big changes are afoot in the seas off our coasts, as well as in the supply chain which has historically serviced Scotland's thirst for offshore energy of a different kind.

But we need to do a lot more, and faster.

As we move away from burning the fossil fuels which are causing climate change, we will lean on clean electricity more and more, for electric vehicles and for electric heating.

"Offshore wind provides Scotland with a tremendous opportunity."

That clean power must come from renewables like wind power and large-scale solar, which are the lowest-cost forms of any new energy generation.

Building that renewable generation capacity will mean streamlining the processes which make development happen: the planning system, both on and offshore, as well as the ways in which the electricity network is managed, regulated and paid for.

If industry, regulators and governments can work together to do that, then our 2030 goal – that half of all energy will come from renewables – remains an ambitious but achievable stepping stone on the way to Scotland's 2045 net zero target.

COP affords our industry leaders the chance to spotlight our success and light up the path to the ultimate goal of achieving net zero. This year has allowed us to tell our story and use our leadership capabilities to take the real issues to governments in Edinburgh and Westminster, including both the barriers and the enabling activity required by them and us as a sector that will see us play directly into a global leadership position.

At Scottish Renewables, we're serious about our role in telling that story. We're taking a Renewable Energy Roadshow to locations around the Highlands and south of Scotland to speak to the public face-to-face at local events about the benefits renewable energy brings to their area and answer any questions they may have about COP or climate change in general.

We're also holding networking receptions to bring together the renewable energy industry and those who have an interest in its future success. At those events we're speaking to local politicians, community groups, housing associations, local authorities and more, about the changes they are going to need to make as our decarbonisation journey continues, and the benefits that will come from doing so.

All that is part of trying to ensure everyone in Scotland realises the benefits renewable energy brings to communities from the Borders to the islands. After all, we'll need their support if we're to meet net zero by 2045 and secure the economic and environmental benefits which come from doing so.

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Cutting consumption

Iain Gulland, Chief Executive, Zero Waste Scotland

As we approach COP26 the commitments from world leaders to achieve net zero appear to be holding firm. The pandemic has been a largely unforeseen global event that the world has had to react to rapidly. The climate emergency has been predicted for years, and evidence appears to suggest its impact is already upon us as the world experiences a sharp increase in severe weather events, therefore our focus must continue in cutting emissions and reducing consumption but at a much faster rate than before.

However, Zero Waste Scotland thinks there's a vital conversation missing in the climate crisis discussion. It's an important topic that's noticeably absent from the COP26 agenda, too. We believe that to truly end our contribution to the climate crisis, we need to rethink how we consume in Scotland and around the world.

Around four-fifths of Scotland's footprint comes from the products and materials we manufacture, use, and throw away. In fact, the average Scot consumes 18.4 tonnes of materials every year; that's the equivalent of 50kg per week on average. Academics agree that a sustainable level of material use, which would still allow for a high quality of life, is about eight tonnes per person per year.

The evidence is clear: consumption in Scotland is unsustainably high. And this, no doubt, is a similar picture in other countries around the world.

The rate at which society is burning through resources, both figuratively and literally, means our current way of living is unsustainable. The UN's Intergovernmental Panel on Climate Change's landmark study this summer has been described as a 'code red for humanity'. The cost of not changing the way we live will ultimately be far, far higher than the cost of making the essential changes we require.

The magnitude is, in part, due to the quantity of things we buy. Therefore, we need a system-wide change that enables us all to choose more sustainable ways to live, use the things we need, and share resources. Our precious resources are running out; and our mass consumption habit is literally costing the Earth.

The good news is that more and more people want to do their bit to end the climate crisis. It's not always clear how to go about it. Flying less, electric vehicles instead of petrol or diesel, and switching from oil and gas power to wind and other renewables all will help. But it doesn't deal with the fact that most of the damage we're doing is caused by everything we consume and throw out. Whenever we buy something new, we use up more of our limited virgin materials to produce and deliver it.

"Our mass consumption habit is literally costing the Earth."

The circular economy offers a sustainable solution to managing our resources, but a clear pathway to this transition is needed. We have seen, with the recent material shortages facing the construction sector, the impact of not having an endless supply of virgin materials can have on our economy.

We know a circular economy is a vital part of the solution in tackling climate change. Through it, we can maximise value from the goods we already have in circulation, while relieving pressure on finite natural materials like oil and precious metals.

Implementing the principles of the circular economy at a scale needed to tackle climate change and global resource scarcity will not happen overnight. Given the systems and financial mechanisms that have evolved to support the linear economy, dislodging it will require a joint effort from all sectors – from individuals to designers, industry, and governments – but by doing so we will build back better, and generate new opportunities for Scotland from inward investment to new 'green' jobs.

For many years, Zero Waste Scotland has been working with businesses and leaders across Scotland to implement circular strategies, taking learnings from Europe and further afield. But we need to do more to expand our reach further; to help everyone understand how they can play their own, vital, part in a circular economy.

The recent appointment of the first Circular Economy Minister in Scotland puts the issue at the heart of Government and we have a huge opportunity to accelerate our circularity, change Scotland for the better, and become an example for the rest of the world.

Photo by the blowup on Unsplash

Circular economy in the Scottish water sector

Matthew Pryor, Senior Associate Director, Water & Environment, Jacobs; **Tamsyn Kennedy**, Circular Economy Lead, Research & Innovation, Business Excellence, Scottish Water

As nations gather at the 26th UN Climate Change Conference (COP26) to take decisive action together on climate change, it is timely to reflect on progress against the Sustainable Development Goals (SDGs) since their 2015 adoption, particularly in Scotland with Glasgow playing conference host. If we look closer at SDG12, Responsible Consumption and Production, a key goal for a circular economy, has progress been made and is there more we can be doing?

In terms of action, the Scottish Government has shown leadership not least from *Making Things Last*, a circular economy strategy for Scotland. The Scottish Environment Protection Agency (SEPA) also published *One Planet Prosperity*, its strategy for delivering environmental protection. Through the expertise of programmes provided by Zero Waste Scotland and Scottish Enterprise, businesses have been supported across the Scottish food and drink, manufacturing, construction and energy infrastructure sectors. There are businesses looking at recovery of copper from whisky lees (a by-product of distillation), use of spent coffee grounds to create commercial bio-oils, mattress recovery and deconstruction, modular lighting solutions for warehouses, and an appliance and furniture partnership working with housing associations to re-use goods from house clearances.

Significant progress has been made, from a start-up business level to innovation and rethinking of resource use across priority economy areas. Globally, however, the challenges remain stark. As recently as last year, the *Circularity Gap* report indicated that globally just under 9% of available resources consumed are recirculated (and new Scottish material flow analysis in 2021 indicates similar material intensive economy) highlighting that we remain firmly a linear economy with its links to emissions of greenhouse gases.

So, what further approaches are required? Action by all sectors of the Scottish economy is needed but will be challenging. Moving from a linear to a circular economy requires transformative change in how businesses operate and deliver services. One sector recognising the challenge is the UK's water industry, which has adopted an ambitious target for zero waste by 2050 and understands that a circular economy offers a key pathway towards net zero waste. Treatment of wastewater requires water, energy and chemicals to replenish water, and the process generates materials and by-products that continue to require treatment and disposal under a linear model. Through transition to a circular economy, water companies can retain and regenerate the value of materials, avoid unnecessary environmental impact and keep materials in local beneficial loops and, in doing so, deliver climate action and greater value to customers and the wider economy.

"Moving from a linear to a circular economy requires transformative change in how businesses operate and deliver services."

Work undertaken this year by UK Water Industry Research (UKWIR) has demonstrated that a circular water sector requires a systems approach where innovation is prioritised and opportunities are analysed by a six capitals model, encompassing natural, financial, intellectual, social, human and manufactured capital. It also requires companies to be cooperative, collaborative and commit to transparent reporting on progress to communicate success and areas for improvement. Equally, individual innovations are needed to tackle individual use of materials, energy and water, and this is at the heart of a circular economy sector approach. Scottish Water has been heavily involved in both a circular systems approach and material innovation. Working in collaboration with Jacobs, Zero Waste Scotland and SEPA, Scottish Water Research & Innovation saw an opportunity to recover wastewater treatment grit and sand and process it into a secondary construction material. While there is no recognised market demand yet for the material, this innovative process offers the first step to implementing a full-scale circular solution.

Scottish Water has demonstrated the feasibility of recovery of the grit, through laboratory analysis and a trial in a reprocessing facility. The project engaged the Scottish secondary aggregate market to establish demand and identify recycled aggregate SME suppliers interested in taking the material to sell as a construction product. Meaningful dialogue with SEPA established how grit could be reclassed as a usable material and not a waste. Recovery of the grit material will keep it in valuable use and offers cost savings and reduced carbon emissions compared to its disposal. It will also offer opportunities for small and medium-sized business engagement in the Scottish Water supply chain.

It has taken more than two years to take one material through this process, so the pace of progress remains a challenge. However, the UKWIR work has highlighted potential that more systematic targeting of materials is possible. The foundations for this transition are being put in place; however, there is no time to spare in ramping up systems thinking and material innovations across all parts of the Scottish economy. Only by working together can we accelerate progress and turn our ambitions into faster action.

FURTHER READING

Scottish Government (2016) *Making Things Last* (**www.gov.scot/publications/making-things-last-circular-economy-strategy-scotland**)

SEPA (2016) *One Planet Prosperity* (**www.sepa.org.uk/one-planet-prosperity**)

Circle Economy (2021) *The Circularity Gap Report* (**www.circularity-gap.world/2021**)

Food at COP26

Pete Ritchie, Executive Director, Nourish Scotland

Given that food systems account for around a third of total greenhouse gas emissions, it's surprising that they don't feature on the main agenda for COP26. Coal, cash, cars and trees are all good, but you can't eat any of them. Sooner or later the world has to figure out eating without heating. But it's a more contested issue in many ways. Solar and wind power, electric cars, heat pumps, planes using hydrogen – what's not to like? We have the technology. The question is how to fund and manage transition across both high- and low-income countries.

Just transition in the food system isn't just about technology change. The current food system is failing half the world's population who can't afford the healthy sustainable diet we all need. Ten percent of the world can't afford enough calories, while overconsumption of processed foods drives a pandemic of diet-linked disease. The food system is also the major cause of nature loss on land and sea, with more than half of all terrestrial and marine life lost in the last two human generations. The UN Food Systems Summit (UNFSS) science group estimated that the damage to health and the environment from the food system is more than twice the value of the food.

"Damage to health and the environment from the food system is more than twice the value of the food."

And of course the livestock question is never far from the surface. A third of the global cereal harvest goes to feed animals before it feeds humans, wasting most of the protein and calories along the way. Cattle and sheep produce methane in their rumen, and globally this accounts for around 6% of total emissions – three times more than air travel.

The livestock industry has powerful defenders, and September's UNFSS was unable to secure an agreement on sustainable livestock consumption. The IPCC science report released ahead of COP focused more on methane than previous reports. Because methane cycles quickly in the atmosphere, reducing methane emissions has an immediate impact on slowing warming, buying much-needed time.

The EU and US committed to a global pledge to reduce methane emissions by 30% by 2030, and other countries including the UK have already signed up. For some countries there is plenty of low-hanging fruit: reducing emissions from landfill and plugging oil and gas leaks. But for the EU and the UK this will have to include reducing emissions from ruminants, through either technical improvements or reduced numbers or both.

This is contentious in Scotland too. Most of our farmland is better suited to pasture than crops, and we produce a lot more beef and lamb than we consume. But this goes on our tab, just like the manufactured goods we get from China go on China's tab, so if Scotland is going to reach net zero by 2045, farming has to change.

This is why Nourish Scotland and the National Farmers Union, Scotland set up the Farming for 1.5°C inquiry. The panel of working farmers, scientists and environmentalists met over 18 months, sharing knowledge, interrogating the scientific research, learning about system change, and hammering out a consensus report. The report sees a continued place for cattle and sheep in a net zero Scotland, as 'low opportunity cost livestock' eating grass and waste products we can't eat, but calls for an immediate cap on methane and a rapid reduction by 2030. This will come in two ways: a rapid uptake of best practice, low methane breeding and feed additives, along with a 'less is more' approach where farms reduce inputs and stocking while increasing farm woodland and agroforestry.

But this is just one part of the food system puzzle. Food loss and waste contribute even more to greenhouse gas emissions than methane from livestock, and fell during the pandemic only to start rising again. Should decisions about land use be left to the market and the owners of land, or should we have a plan based on public good? Should meat and milk substitutes simply sweep away livestock farming? Is a healthy diet a

Image by Ulrike Leone from Pixabay


Image by Republica from Pixabay

matter of education, of the food environment, or simply of income? Why in a world and a country awash with food are so many of us food insecure? And why are so many jobs in food so poorly paid and so precarious?

Solving this puzzle needs integrated food policies at every level from local to global. The Glasgow Food and Climate Declaration (**www.glasgowdeclaration.org**) commits 100 signatories, including Scotland and many Scottish local authorities as well as cities and regions round the world, to implementing integrated food policies to tackle climate change. Local governments tend to lead the way on food system reform, and the Declaration calls on national governments to support and build on these efforts.

Scotland's forthcoming Good Food Nation Bill will join up food policy across multiple government departments and put targets and metrics in place to help make progress across the board. In 2023 the EU will put in place a 'sustainable food law' along similar lines.

Food isn't high enough up on the menu at COP26, and the same is likely to be true at the biodiversity COP. But we can't tackle the nature and climate emergencies without fixing the food system. Food system transformation can help us restore a world teeming with nature above and below ground and in our oceans; can keep us on track for 1.5°C; can ensure adequate and healthy diets for all, and maintain sustainable livelihoods for hundreds of millions of farmers and fishers.

The road from Paris to Glasgow, and on to Kunming, goes through the farm gate.

FURTHER READING

UNFSS (2011) *The True Cost and True Price of Food* (**sc-fss2021.org/wp-content/uploads/2021/06/UNFSS_true_cost_of_food.pdf**)

Farming for 1.5°C reports (**www.farming1point5.org/reports**)

Key principles of the Farming for 1.5°C inquiry team's findings

1 Everyone needs to play their part, including all farmers, land managers and rural businesses, agricultural suppliers and buyers. Scottish farmers have the opportunity to be the champions and not the victims of climate change. As an industry, agriculture needs to be ambitious in its aims to meet net zero milestones.

2 This wholescale change should be supported with the creation of a Transformation Steering Group, with high-level representation from across government departments, key stakeholders, including working farmers, and scientists.

3 A new approach to knowledge sharing and technical support is a key priority.

4 Identifying and enthusing industry leaders, influencers, and innovators coupled with a communication strategy to reach all farmers will speed up change.

5 There needs to be political and technical clarity about what is expected of Scotland's agricultural land and businesses outside of agriculture's own need to reach net zero.

6 Emissions should be reduced through improving agricultural and carbon efficiency with better soil management at its core, coupled with national capping and on-farm reduction targets for each of the three key greenhouse gases.

7 An immediate ceiling on agricultural biogenic methane emissions should be set, with decreasing targets with an aim of at least 30% reduction by 2045 compared to today.

8 Better nitrogen management is key in tackling excess nitrogen which is producing greenhouse gases, harming ecosystems and costing farmers money. Nitrogen use efficiency must be more heavily weighted in determining both crop requirements and application strategies.

9 Integrating renewable energy with developing technologies to reduce fossil fuel use needs to be supported by rural infrastructure improvements in energy and communications such as broadband and mobile data coverage.

10 Rural policy (including subsidies), advice and regulation need urgent reform to prioritise (re)building biodiversity, alongside targeting greenhouse gas reductions and sequestration, taking account of regional habitat priorities. Better soil carbon management will drive biological activity creating a foundation for biodiversity above ground, supporting climate and biodiversity targets.

11 A whole farm approach should be adopted to provide a realistic pathway for change and to incentivise the adoption of best practice in production systems, soil carbon management, land use and renewable energy technology.

12 The change pathway should provide positive system options for all farmers, crofters and land managers and safeguard rural communities and the food economy.

13 Innovative approaches to multifunctional land use such as agroforestry will add value across a range of priorities.

14 Land use change and sequestration should reflect soil type, topography and both production and biodiversity priorities for the farmer, the locality and for Scotland. Regional Land Use Partnerships will have a core role to play in ensuring this. As such their membership must reflect the local community including land managers, farmers and crofters, and have roots in community activities.

15 We need adoption, practical demonstrations, and pilots established as soon as possible to test and explore each of these key principles.

Siku (sea ice), sacred spaces and Inuit

Lisa Koperqualuk, Vice-President International Affairs, Inuit Circumpolar Council (Canada)

As many people know, Arctic sea ice has been transforming rapidly over the past decades, and ice thickness and stability is forecasted to change even more. The ice is shrinking and thinning, growing later in the season and melting earlier. This is probably the single biggest impact of climate change on Inuit lives and livelihoods. We are an Indigenous people who live mostly in coastal communities across the Arctic from the northeast of Russia to the east coast of Greenland.

Our livelihoods and well-being remain closely tied to the sea ice. Our people travel on the sea ice to support their families and community with locally harvested fresh foods that are essential to our health and our culture. In my community of Puvirnituq in Nunavik (Northern Quebec in Canada) we used to go out on the ice by the end of October, or early November at the latest. Now our hunters and fishers are left waiting later into the year for safe conditions. As time passes and they wait to get out on the ice, not only does this mean less food but also fewer opportunities to pass on their knowledge to our youth. With fewer opportunities for our young hunters to learn specialized Arctic survival skills, the risks for them going out on the land are greater than ever before.

Finally, when the ice has formed and people do go out, the travel is more dangerous because our ice is forming in a different way now. We are seeing and hearing more and more about hunters falling through the ice, risking their lives to go out hunting. Hunting has always been risky, but it is even riskier today; families watch their hunters go out to provide food not knowing if or when they will be back.

"Being out on the ice is important for our culture and our communities."

Being out on the ice is important for our culture and our communities. Young men learn the discipline needed to be out on the land. As *maqaittiit* (hunters) they learn how to find their way without instruments, how to build an igloo, they learn animal movements, and how to fish. Inuit have an intimate relationship with our Arctic environment and a deep knowledge of our land, especially our ice and how it forms, grows, and decays. The cultural relevance cannot be overlooked as Inuit men's identities are built not only on being holders of such knowledge but also on being able to provide for their families and communities, which is a source of pleasure and pride. In turn, a whole community of Inuit women, elders and children are a source of enthusiastic support while their men retain their role as providers.

Arctic char drying in the sun at Lisa's family's camp on Hudson Bay. © Lisa Koperqualuk

Climate change is not only eroding our safety on the ice, our knowledge of the ice, and a pivotal part of our identity; it is also changing the ecology around us. New species are arriving and their effect on existing species is still unknown. Salmon are coming into some of our rivers that have always been Arctic char runs. Arctic char is one my favourite foods. I always look forward to the springtime when I know I'll be able to have a fresh Arctic char on the table. If the char are displaced by salmon, we'll still have fish, but it won't be the same.

Inuit are a very adaptable and resilient people. We are learning to live with ever-changing conditions and adapting to the immense and constant change that is transforming our land, our home. Inuit are designing and developing practical measures to assist in keeping our communities safe. For instance, there is an initiative in one of our communities where anyone who goes out on the land can use an app to report on ice and other environmental features. If a hunter comes across unsafe ice conditions, they can log it on the app and warn others who may pass that way. This project is called SIKU and is one of many examples of Inuit innovation and adaptability in the face of change.

Successfully adapting to change also relies on global action because climate change is a global problem. Inuit live in very remote communities that often do not feel linked to the outside world. However, more and more we are feeling outside impacts. For example, we see bigger and more frequent ships from far-away places passing through our waters, disrupting our marine life and threatening our environment. This is when outside links become concerning to us.

The rules that affect international shipping are not made by people who live in the Arctic; in fact these policymakers have often never even seen the Arctic. The rules are made through an organization far away from Inuit Nunaat, the International Maritime Organization (IMO). Inuit need to have a voice at the IMO and influence policy and rules about routing, fuels, speeds, and cargoes of ships passing through our waters. We are particularly concerned about things like black carbon from shipping fuel that gets deposited on sea ice and glaciers, speeding the melting of that ice. We are also concerned about the chance of spills from heavy fuel oils, and the impacts of heavier shipping traffic on whales and seals.

"We need to be part of global decision-making."

We need to have a voice; we need to influence policy. We need to tell people who we are, and how the policies they enact affect us. I was in my home community of Puvirnituq in August, and spent some time camping on the shores of Hudson Bay where my family used to camp when I was a girl. Being there brought me such peace. Our ancestral lands are a sacred space.

It is important for us to protect that, not only for ourselves but also because our lands and waters are integrated with the rest of the world. We need to be part of global decision-making, helping people to understand how their decisions affect our lives and our land and how, in turn, these Arctic changes will have an impact globally. To do that, we need a place in those discussions. I look forward to joining the Inuit delegation at COP26 and hope that space is made at the table and we are welcomed as partners. In global discussions, both in Glasgow and elsewhere, we need be heard, understood, and involved.

Photo by Visit Greenland on Unsplash

Follow the Inuit Circumpolar Council's activities at COP26 and beyond through their website **www.inuitcircumpolar.com**, podcast *Circumpolar Waves*, and social media: Twitter **@ICC_Canada**, Facebook **@CanadaICC** and Instagram **@icc_canada**.

Climate change: who is really taking action?

Jocelyn Timperley, freelance climate journalist

It is often tricky to gauge where countries are with climate action, and where we can look to for examples to learn from. Leaders in one area can lag far behind in other areas, while sometimes countries with strong rhetoric don't bear up to scrutiny when you dig down into their policies and on-the-ground changes.

Every country is different, but by looking at the areas where countries are struggling, or progressing, we can learn lessons. Here we dig down into a few of these areas.

The net zero leaders

The net zero emissions concept has proven amazingly powerful over the past five or so years since it hit the mainstream. The idea has its detractors, who argue it can be a gateway for countries and companies to avoid emissions cuts using unreliable offsets, but its flexibility has also allowed countries to sign up to long-term, ambitious targets.

The Energy and Climate Intelligence Unit (ECIU) has a useful tracker of country net zero pledges and what stage they are at. Just two countries have achieved net zero so far, it says: Suriname and Bhutan. Thirteen countries (including the EU) have a net zero target, for either 2045 (Germany and Sweden) or 2050 (mainly EU countries and the UK, alongside Japan, Canada, New Zealand and South Korea). Three more have proposed net zero legislation (Chile, Ireland and Fiji). Not mentioned on the tracker is Scotland's net zero target, which is set in law for 2045.

The majority of countries who have discussed net zero targets have not yet committed these in law. Thirty-seven countries have committed to net zero in policy documents, including China and Indonesia (albeit both with 2060 targets), the US, South Africa, Brazil and Argentina. It's worth noting that California, which can be seen as the world's fifth biggest economy, also has a net zero target for 2045 set out in an executive order from its governor. Some 79 further countries are discussing a net zero target, including Mexico, the Netherlands and Greece.

The policy leaders

But these targets, of course, are not enough. Climate action requires policies, and especially near-term policies. And one of the best ways to ensure these policies go ahead over time is requiring them by law.

The UK's 2008 Climate Change Act really did break ground here and has served as a model for the climate laws now coming into being in several other countries. It's worth noting that the UK is the only developed country rated by Climate Action Tracker (CAT), a non-profit group which tracks country climate pledges, as overall being 'almost sufficient' on its climate action, noting that if the UK achieves its 2030 and 2035 climate targets it will be on a 1.5°C compatible trajectory for its domestic emissions.

The question, as ever, is whether policies to keep on track with targets will materialise. Climate laws seldom if ever have actual punitive measures for governments missing set targets, and the UK government has dragged its feet for years in heat policy, building retrofits and agriculture emissions.

Denmark, which last year passed its own climate law targeting a 70% reduction in 2030 compared to 1990 and climate neutrality by 2050, has made some progress here by setting up more stringent requirements on the government, such as requiring it to find a majority parliamentary approval of its global and national climate strategies.

> *"Just two countries have achieved net zero so far: Suriname and Bhutan."*

The uphill struggle on transport

Transport emissions continue to rise worldwide, and even countries doing well on greening their electricity supply are struggling to get a similar foothold in the transport sector. New roads continue to be built at breakneck speed, and sport-utility vehicles (SUVs) are capturing more market share than ever (in fact, SUVs were the only sector which saw its carbon emissions increase in 2020, according to the International Energy Agency).

Costa Rica, where I currently live, shows up the problem especially well if only because of its success in other policy areas relevant to climate. Its forest protection and payment-for-ecosystem services schemes have made it a leader in halting deforestation, while its historic reliance on hydro and growing wind and geothermal power mean its electricity supply is almost fully renewable. But on transport, it's another story. It is often plagued by traffic jams, and the chaotic network of buses in its central valley means few use public transport who can afford not to. It does have one of the strongest electric car charging networks in Latin America, and its climate-progressive government has set out a vision for cleaner transport including plans for an electric train, but it remains to be seen whether this will come to fruition.

It's a story repeated across countless cities in the developing world, but transport emissions are also a huge headache in the highest income countries. Transport has been the largest emitting sector in the US since 2016, when it surpassed the electric power industry.

On electric vehicles, Norway is the clear leader. More battery-electric cars were bought than non-electric ones in 2020, in large part due to the government policy of reducing taxes on electric cars while simultaneously raising them on transitional cars. Chile and China are notable for their pushes on electric buses, while

Luxembourg has made all public transport free. Meanwhile, Bogotá's effort to create public space and promote walkability, such as by closing off some streets to cars every Sunday, is paying off.

The beef with agriculture

Agriculture and land use contributes around a fifth of global emissions, but even the most progressive climate countries have tended to see the sector as hard to decarbonise and politically contentious, and have often avoided implementing policies to cut emissions.

New Zealand is a case in point. It has a net zero target for 2050 set in law, but this doesn't include methane released from the agriculture and waste sectors, a big deal considering these make up over 40% of its emissions, largely from its huge dairy industry. A separate target for these sectors only aims for a 24-47% reduction below 2017 levels by 2050. Despite New Zealand's rhetoric, CAT rates its current climate action as 'highly insufficient' and has criticised it for an over-reliance on forestry offsets rather than reducing emissions from high emitting sectors.

Ireland is another country struggling to tackle its methane emissions from its large numbers of cattle held in small family-run farms protective of their culture. The government has tried to incentivise farmers to join tree-planting programmes to remove carbon from the atmosphere, but the scheme has been hindered by difficulties in administration.

Green recovery

When the pandemic hit and it became obvious that huge financial support would be needed in many areas of the economy, climate advocates quickly realised this could end up being either a huge win for the environment, streamlining money into policies which have long since needed it, or a huge miss, locking societies yet further into polluting infrastructure.

Photo by Mathias P R Reding on Unsplash

Several organisations have been tracking progress on how green country recoveries have been so far. Vivid Economics, which is tracking the greenness of stimulus in 30 countries, found that only the European Union, some European countries and Canada have oriented their stimulus in a way that significantly shifts their trajectory to a greener focus, with Denmark highlighted as the leader.

Russia, Turkey, Singapore, the Philippines, Indonesia and Saudi Arabia are among the lowest rated countries. All have large 'negative' stimuli in areas related to the environment. China, Norway, India and the US were all rated as having more of a negative than a positive contribution.

The climate laggards

Notably absent from the ECIU net zero target list in any form are India, Russia, Iran, Saudi Arabia and, of course, the United States.

India, the world's third biggest emitter after the US and China, has so far resisted pressure to set a net zero pledge, asserting the developing world's right to growth and pointing out its tiny per capita carbon footprint compared to other major emitters. India continues to expand its coal power plants, but it is also investing billions in expanding renewables and battery development, and CAT rates its actual policies and action as 'almost sufficient' to be in line with a 1.5°C world.

The same cannot be said for Russia, Iran and Saudi Arabia which, along with Thailand and Singapore, are the countries which CAT rates as 'critically insufficient' on climate action. Iran has not even ratified the Paris Agreement and its current climate pledge would lead its emissions to more than double between 2010 and 2030. Russia plans to continue its consumption of fossil fuels and to sell oil, coal, and gas to the rest of the world beyond the next decade. Meanwhile, Saudi Arabia has put few climate policies in place, and moves to diversify away from an oil-based economy have been slow, says CAT.

"Even the most progressive climate countries have tended to see the [agriculture and land use] sector as hard to decarbonise."

Each year, the Climate Change Performance Index (CCPI) publishes an analysis of the climate protection performance of 57 'countries'. In last year's index, Sweden came out top, followed by the UK, Denmark, Morocco and Norway, although no country was given the top ranking since CCPI says no country is doing enough on climate. Chile, India and the EU were all placed highly too, while Poland, the US, Saudi Arabia, Iran, Russia, Australia and Canada were in the bottom ranking.

Many of the countries leading this index are already forming alliances, such as the Beyond Oil and Gas Alliance (BOGA) being created by Costa Rica and Denmark ahead of COP26, or the Climate Ambition Alliance launched by Chile and the UK. But we need far more of these progressive groups of countries prodding each other, covering more countries, with far more ambitious and concrete pledges. One clear avenue for Scotland and the UK is to seek new alliances with these other climate progressive nations. At the same time, we need to wield our influence and support where we can to encourage those who are lagging behind – especially countries like Australia or the US where we have strong historic and current ties.

Changing Malawi

Juliet Suliwa, Climate Justice Programme Advisor, Oxfam GB, based in Malawi

As a young girl, I spent my school summer holidays in a warm, sunny village, Misongwe, in the south of Malawi. I have vivid, happy memories of the vibrance and abundance of the village; brimming with fresh fruit, produce and livestock.

It's a place I barely recognise now, more than 20 years on. My holiday oasis has been blighted by climate change: the rivers have dried up and the sun-scorched earth has become impossible to farm. And when it rains, it pours, with flash floods destroying everything in their wake.

This village's story is not unique in Malawi. In recent years, rising temperatures and intense rain have led to drought and flooding, causing shorter growing seasons, poor crop yields, food shortages, hunger and the spread of disease in a country where most people already live in extreme poverty.

The climate crisis is affecting us all, but it's the poorest people in countries like mine who are suffering the most. Not everyone can turn on a tap during a drought or rely on home insurance to rebuild if their house is damaged during an extreme storm.

Every day, I hear the stories of people whose lives are being destroyed by climate change; and every day, I read the news which tells me that the levels in Lake Malawi are now at their highest in nearly a decade.

Of course, we're taking action here in Malawi to adapt our lives to the changing climate; building on our indigenous knowledge and also with the help of our friends like Scotland in the international community. We're changing our farming practices to increase our chances of being able to harvest when the ground is dry, and we're using solar power to irrigate our crops.


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But it's not enough.

The climate is changing so drastically and so rapidly, and so many people just don't have access to the resources they need to adapt. And sometimes it's simply not possible to just adapt. Some communities face being entirely wiped off the map due to climate change: an existential threat to their very existence.

Scotland has always been one of Malawi's closest friends, and right now, we need our friends more than ever. Very soon, Glasgow will host crunch global climate talks, known as COP26. There's a lot on the line: our lives, our livelihoods and our futures.

As home to the host city for COP26, Scotland will never have a better chance to inspire global climate action. We all know what world leaders need to do: slash their emissions deeply, quickly and fairly, while significantly increasing the finance provided to countries like Malawi to help people survive and thrive despite the changing climate.

We can't repeat the mistakes of the past – this is the 26th COP after all – and we've all seen low-income countries' key demands and needs go unanswered by other nations too many times. Time is running out to get this right: experts estimate that we have just nine years left to prevent global warming from becoming a global catastrophe.


A five-year-old helps her family strip maize from the cobs of a small part of their harvest that they managed to salvage from the flood waters caused by Cyclone Idai, in the village of Malambwe, southern Malawi. © Philip Hatcher-Moore | Oxfam

"We're changing our farming practices to increase our chances of being able to harvest when the ground is dry."

Scotland may be small, but the message of climate hope it can send to the world ahead of COP26 is significant. The Scottish Government must live up to its own ambitious climate promises while using its voice to speak up for those whose own voices too often go unheard.

Many of us know first-hand that our planet is a ticking bomb. But the good news is that it can still be safely deactivated if we stand together and act now.

Future Uganda

Hilda Flavia Nakabuye, climate activist, founder of Fridays for Future Uganda

I was a little girl when heavy rains and strong winds washed my family's crops away in our village in Uganda, where I'm from. Overnight, we lost our source of income and my parents had to sell our livestock and land.

Back then, I didn't know what climate change was. All I knew was that I had to miss months of school because we could no longer afford the fees. I used to hear my Grandma crying at night because she was worried about how we were going to survive.

It was much later, at university, that I first learned about climate change. It was a lightbulb moment which sparked the fire for me to get involved in climate activism. Greta Thunberg inspired me to do my first climate strike in January 2019. It was a disaster; nobody came.

But I kept striking. I knew I was lucky to have survived as a child, and I wouldn't take my luck for granted. People were and are dying every day due to climate change and I felt a responsibility to act.

Gradually, my friends began to join the strikes and Fridays For Future Uganda was born. We now have over 53,000 members and we're still growing. We've joined young activists from all over the world – including in Scotland – in the fight to protect our future. We are scared but we're also ambitious, united and persistent.

As well as organising climate strikes, I also lead a regular clean-up on the shores of Lake Victoria, Africa's largest lake, picking out plastic that's polluting the lake. But it's not just plastic that's a tell-tale sign of climate change here: earlier this year intense rain swelled Lake Victoria to the highest levels observed in decades. Floodwaters swamped farmland, inundated homes, and displaced tens of thousands of people.

The devastating truth about the climate crisis is that the youngest, poorest and most vulnerable in the world will suffer the most. And we are the people who contributed the least to the current crisis: the carbon emissions of the richest 1% of the world's population were more than double those of the three billion people who made up the poorest half of humanity during a critical 25-year period of unprecedented emissions growth.

Young people like me are the faces of the climate emergency and our voices deserve to be heard. It's not good enough that decisions made about our lives and futures at COP won't meaningfully include us.

World leaders have been negotiating about climate change for longer than I've been alive, but so far they've failed to take the concrete action we need to see. Clearly nothing will change unless our voices are at the table. We're running out of time to get this right.

Concrete climate action requires the whole global community to come together and act, and, as home to Glasgow, the host city for COP26, Scotland must play its part in delivering climate justice. The SNP's election promise to significantly increase financial support to countries on the frontline of the climate emergency was crucial.

But as my friends at Oxfam Scotland note, the detail of where that money comes from is important too; Scotland should be courageous and raise it by taxing the high emitters that are making the climate emergency worse.

It's clear that at COP, ambitious emissions pledges must be accompanied by serious financial support to people in countries like mine who did least to cause climate change, but who are being hit hardest by it.

It's not enough to wish for a better world and future. Governments must act to secure it, and they must act now.

"We are scared but we're also ambitious, united and persistent."

The climate crisis: working together for future generations

US Department of State

Bold action to tackle the climate crisis is more urgent than ever. The record-breaking heat, floods, storms, drought, and wildfires devastating communities around the world underscore the grave risks we already face. Through our actions at home and our leadership abroad, the United States is doing its part to build a zero-carbon future that creates good jobs and ensures a healthy, liveable planet for generations to come.

> *"Climate is not a trading card, it's our future."*
> Antony J Blinken, Secretary of State

No country can solve the climate crisis alone. Everyone must do their part. That is why, shortly after taking office, President Biden called world leaders together and urged them to commit to the steps needed to keep the goal of limiting warming to 1.5°C within reach. Many countries are raising their ambition, but stronger and more urgent efforts are needed to reduce emissions and to help the most vulnerable countries cope with devastating climate impacts.

Glasgow: a pivotal moment

> *"The world needs to cut emissions by at least 45% by 2030 in order to be on a credible path to net zero by 2050. That makes this the decisive decade, and it makes 2021 a decisive year. Most of all, it must make the 26th UN Climate Change Conference of the Parties (COP26) in Glasgow this year a pivotal moment for the world to come together to meet and master the climate challenge."*
> John Kerry, Special Presidential Envoy for Climate

More than 190 countries plan to gather in Glasgow in November 2021 for the 26th annual UN Climate Change Conference (COP26). Countries will work together to deliver on the promise of the Paris Agreement by outlining their plans to address the climate crisis by strengthening their efforts over the coming decade. The United States is urging all countries to come to Glasgow with national commitments in line with the Paris Agreement goal of limiting warming to 1.5°C.

US climate leadership

The United States is leading by the power of example. The Biden-Harris Administration is committed to mobilizing a whole-of-society approach that enlists states, cities, businesses large and small, civil society groups, and others to create a net zero clean energy economy that benefits all.

After rejoining the Paris Agreement, President Biden convened 40 countries in a virtual Leaders Summit on Climate to rally the world in tackling the climate crisis. To meet the challenge head on, the President committed to reduce US emissions by 50-52% in 2030. Along with new commitments announced by other leaders at the Summit, countries representing 55% of global GDP announced commitments to reduce their emissions to levels that would keep the 1.5°C goal within reach. President Biden also pledged to double US support for developing countries, and triple finance for adaptation efforts, by 2024.

To drive down the costs of new technologies and turbocharge the green energy revolution, the United States is launching a series of 'Earth-shots', marshalling the innovative capacities of researchers and entrepreneurs to accelerate clean energy breakthroughs within the decade. Working with the private sector to strengthen climate innovation and investment, the Administration is creating new clean energy jobs and enhancing US global competitiveness by scaling up the production and export of clean goods and services.

In June, the United States and our G7+ allies committed to end direct government support for unabated international thermal coal power generation by the end of 2021 and to provide up to $2 billion to support developing countries in their transition from coal. G7 leaders also outlined strategies to decarbonize industry and pledged to reverse the loss of global biodiversity and conserve at least 30% of global land and marine areas by 2030.

The economic promise of climate action

> *"Within our climate response lies an extraordinary engine of job creation and economic opportunity ready to be fired up."*
> Joseph R Biden, President of the United States

The climate crisis presents an opportunity to create millions of good-paying, middle-class, union jobs. The Biden-Harris Administration has proposed historic investments in

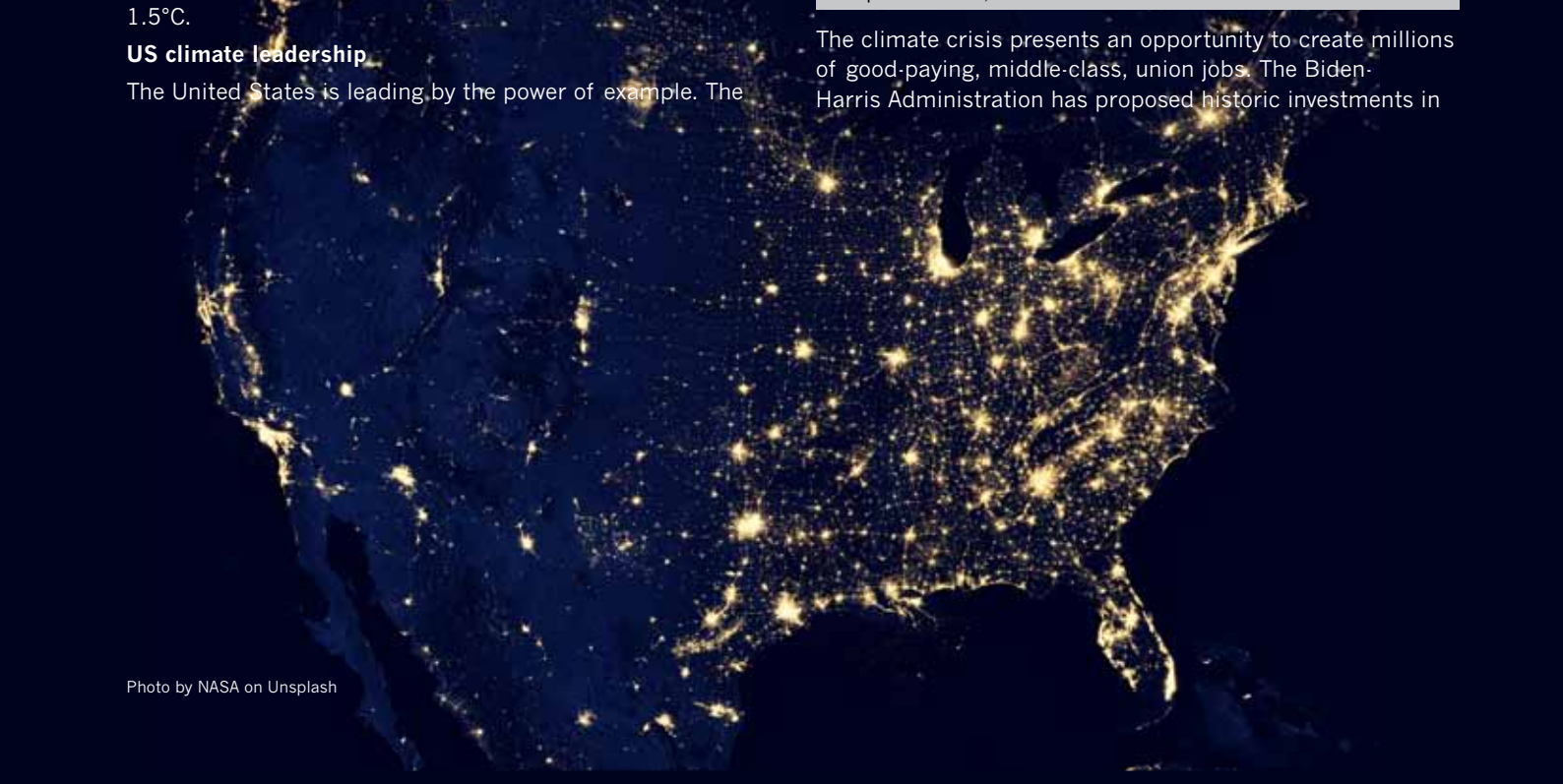


Photo by NASA on Unsplash

American infrastructure and innovation to tap this once-in-a-generation economic opportunity for our workers and our communities, especially those too often left out or left behind.

Reaching global net zero represents the greatest economic opportunity of our time. Today, solar and wind power are the cheapest sources of power generation in countries accounting for 77% of global GDP. The global renewable energy market is projected to be worth $2.15 trillion by 2025. US manufacturers can lead this global market in renewable technologies. The US agricultural sector can cultivate new sources of income by becoming the first in the world to achieve net zero emissions. Small businesses can grow by designing, installing, and innovating energy-conserving technologies and infrastructure.

Smart investments in infrastructure, innovation and US workers can build a zero-carbon economy that gives everybody a fair shot at the American Dream.

World leaders must step up

The United States accounts for less than 15% of global emissions. All countries, especially the world's major economies, must contribute their fair share to the global climate effort. The United States is prepared to work with other countries to help them chart their own pathways to prosperity built on the clean technologies of the future.

The cascading impacts of the climate crisis do not discriminate by nation or borders. Failing to keep the goal of 1.5°C alive will produce more extreme events such as heat waves, floods, storms, wildfires, and droughts; significantly exacerbate global food insecurity; drive global migration; and act as a crisis multiplier that will pose grave national security threats. If the international community fails to address climate change today, the costs of our inaction will be passed down to future generations.

"Reaching global net zero represents the greatest economic opportunity of our time."

"This is a moral imperative, an economic imperative, a moment of peril but also a moment of extraordinary possibilities."
Joseph R Biden, President of the United States

This year, countries must commit to a decisive decade of climate action. By coming together to set bolder emission reduction targets and articulating national roadmaps to achieve those goals, world leaders can help chart a path for a more secure, prosperous, and sustainable future for all.

Photo by Eyoel Kahssay on Unsplash

Contracted workers clean heliostats at the Ivanpah Solar Project in California. © Dennis Schroeder | NREL

This article was extracted with permission from the US Department of State website, **www.state.gov/policy-issues/climate-crisis**.

Mapping the climate crisis

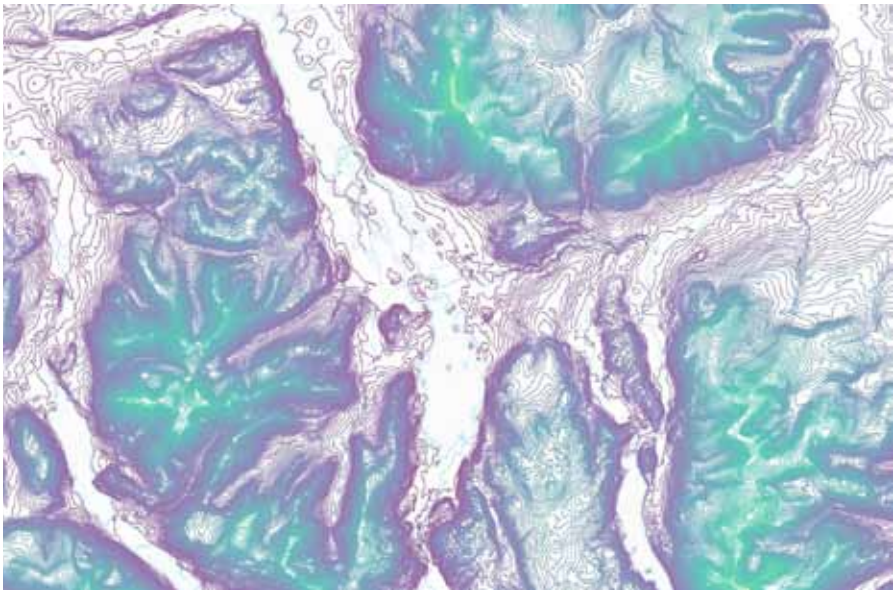
David Henderson FRSGS, Chief Geospatial Officer, Ordnance Survey

Looking back over previous editions of *The Geographer*, we can see that there is regularly a focus on how geospatial data and technologies support global development and global challenges. But on the whole, it has been the preserve of experts and interested audiences. However, over the last few years, the pandemic has raised the profile of location data and know-how more than we could ever have imagined.

A wider audience now sees how location information is foundational to our understanding of the world. It creates social, economic and environmental value for decision makers by telling them about the natural environment and providing invaluable insights to our local communities and the movement of goods and people.

"Location information is foundational to our understanding of the world."

With the acceleration of climate change increasingly affecting the day-to-day lives of citizens across the world, there is a growing demand for timely, detailed and trusted data that helps build our understanding of how changes to our natural and built environments are impacting the ability of governments and businesses to achieve their sustainability goals. In providing a world-leading National Mapping Service for Great Britain, Ordnance Survey has first-hand experience of these demands and is proud to be an ambassador for the British geospatial community, taking our knowledge and insight to communities around the globe and learning from their experiences to improve the quality of our own data.



OS Terrain 5 is a detailed digital terrain model of Great Britain, ideal for 3D visualisations. © Ordnance Survey

The challenge that confronts the geospatial sector is how to bring together this information, recognising that nations have different levels of location data maturity. This can often mean government bodies are working with incomplete or outdated information and, in some cases, may not yet be digitised. Given the speed of change now being witnessed globally, there is a clear need to overcome the digital divide.

In recognition of this, the UN Committee of Experts in Global Geospatial Information Management (UN-GGIM) has developed the Integrated Geospatial Information Framework (IGIF). This is designed to empower countries to develop their capabilities to use geospatial information as a way of achieving sustainable social, economic and environmental development.

There is also an opportunity for national mapping agencies themselves to come together to articulate our joint role in building a sustainable future. One of the ways we do this is through the Cambridge Conference. Dating back to 1928, the Cambridge Conference is a unique forum hosted by Ordnance Survey for senior leaders of National Mapping and Geospatial Agencies from across the world. Meeting every four years, representatives come together to share insights, collaborate on matters of global importance, and problem-solve shared challenges.

The next Conference is scheduled to be held in April 2022, but ahead of COP26 this year, we brought senior geospatial leaders together for a preliminary event, Cambridge Conference in Conversation, to discuss the COP26 Presidency's four goals and agree how geospatial information can be applied to support our national policy measures.

The output of this Conversation is a short statement paper produced collectively through group discussions at the event, which delegates can use in dialogue with their national governments on the COP26 agenda. The brief collective statement will also contribute to the conversation between national governments, international organisations and decision makers about the value of location data. Its purpose will be to assist National Mapping and Geospatial Agencies to make the case for investment in geospatial information infrastructure in their country, using the framework of the COP26 goals as a lens to view socio-economic and environmental forces and trends, and supporting better decision making and implementation of climate change policy.

Cambridge Conference in Conversation also discussed and shared examples of how geography is being used to address the four goals for COP26 and reinforced how location data can be used to understand the impacts of climate change, target investment for resilience, and plan critical measures to push towards net zero.

The statement paper not only sets the scene for Cambridge Conference 2022, but also brings together the views of National Mapping and Geospatial Agencies at a global level to articulate our role in supporting governments and other decision makers as they consider the fundamental changes needed to meet the targets set out in the Paris Agreement. Only through global collaboration can we meet this challenge, and the Cambridge Conference statement paper represents a step change in our collective response.

Ordnance Survey

To find out more about the Cambridge Conference and our international work, please visit the Ordnance Survey website **www.ordnancesurvey.co.uk**.

The role of digital innovation

Adam Liddle, Director of Sustainable Growth & Innovation, Jacobs; **Adrian Pinder**, Incubations & Products Director, Jacobs

The global climate emergency is undoubtedly one of the most pressing global issues of our time, and one that requires a real step change in thinking. With this year's COP26 promising to be action focused, it could be the springboard needed to set a different course and bring to the fore some of the most innovative, global solutions to address the climate challenge.

"It's time to think differently about the future."

Over the past few decades, we've seen renewable energy solutions emerge and play a key role in reducing consumption of fossil fuels, taking the first steps to address climate change. While investment in cleaner, renewable fuels will continue to grow, there's an emerging opportunity for data, technology and innovation to push even further. If 2020 taught us anything, it's that it's time to think differently about the future – about how we prepare for (and respond to) natural, societal and economic risks. The pandemic accelerated trends with new, transformational technologies becoming commonplace within a matter of months. This now needs harnessing to solve our climate issue.

By 2025, it's forecasted that around 75 billion 'Internet of Things' connected devices will be in use. What could be more effective than harnessing increased access to data to drive digital innovation and create the solutions that will mitigate the impacts of climate change?

Technologies such as *Climate Risk Manager* are already putting these data points to good use, identifying and highlighting potential future climate threats for businesses and supply chains in ways we haven't seen before. *Climate Risk Manager* uses global climate data and location intelligence to create virtual risk assessments, forecasting the impacts of climate change. This allows organisations and governments to understand the immediate and long-term implications climate change may bring, and make data-based decisions on how best to invest in guarding against climate risks. As part of our recent company *Climate Risk Assessment*, we analysed nearly 100 major projects and programmes across our markets using the *Climate Risk Manager* tool. Together with our partner CLIMSystems, we developed specific climate models for the locations of the FIFA World Cup Qatar 2022™ and Expo 2020 Dubai.

Similarly, flood simulation tool *Flood Modeller* allows organisations and governments to prepare for the impacts of rising sea levels and increased rainfall on flooding. This is a flood modelling tool that performs the calculations required to predict water levels and flows as a result of rainfall and/or extreme sea levels, hours or days ahead.

Flood Modeller has been used to support flood preventions in Glasgow, the location of this year's COP26. The White Cart Water is a shallow, fast-flowing river in the south of Glasgow, which is prone to flash flooding, with water levels known to rise up to six metres after only 12 hours of rain. Since 1908, more than 20 serious floods have affected properties throughout Glasgow's south side, and in January 1984, more than 500 homes were devastated by flooding.

Flood Modeller was used on the White Cart Water Flood Prevention Scheme to manage its flood risk, ensuring the right preventative measures were implemented to protect 1,750 properties and businesses in south Glasgow from flooding, as well as protecting, complementing and enhancing the natural environment.

Flood Modeller has been used globally, providing benefits in Sydney, Australia. Floodplain modelling was used to simulate fluvial and direct rainfall flooding in a sub-catchment of the Parramatta River ahead of a proposed riverbank regeneration development. The modelling revealed the proposed design could proceed without the risk of increasing flood levels.

Innovative thinking is also being employed to support the energy transition, with technologies like electrolysers and fuel cells being developed, as well as new processes to synthesise hydrogen emerging, creating new products and fuels.

In the UK, hydrogen hubs are in early design stages, fuelled by the demand from energy intensive sectors like transportation. And in mainland Europe, energy parks are being proposed, bringing industry and large commercial properties together to manage distributed energy resources through Power to X (the processes that turn electricity into heat, hydrogen or synthetic fuels) and digital capabilities. While there are significant commercial and technology challenges to energy hubs and parks, the direction of travel and opportunity is clear.

New technology innovations will prove critical to solving the world's climate crisis. We can no longer just create ideas; we now need to test, implement, and drive value through innovation. Organisations and governments all have a role to play in applying digital solutions to create the momentum needed to monitor, manage and address the climate emergency. If we can replicate the speed of technology take-up seen throughout the pandemic, there is real promise in data and technology becoming the key to solving the existing climate crisis, at both a local and a global scale.

Severe storm at Dawlish: two days later, the sea wall collapsed. © Moorefam

FURTHER READING

Climate Risk Manager (**www.jacobs.com/technology/climate-risk-manager**)

Flood Modeller (**www.floodmodeller.com**)

Glasgow Climate Dialogues

Jamie Livingstone, Head of Oxfam Scotland

If COP26 is to deliver climate justice, it must listen to – and act upon – the priorities of those countries, communities, and people who face the escalating consequences of a climate crisis they did little to cause. In short, it must listen to people like Margaret Massudio, a smallholder farmer and activist in Uganda.

Margaret was just one of the Global South experts who participated in the recent Glasgow Climate Dialogues, a discussion series hosted by the Scottish Government and Scotland's civil society climate coalition, Stop Climate Chaos Scotland, in deep collaboration with partners from across the Global South.

"Unless COP26 acts upon the priorities of the Global South, it cannot possibly deliver climate justice."

Margaret described living with, and trying to adapt to, the daily reality of trying to grow enough food when it rains either too much, too little, or not all. Uganda has been hit hard by the consequences of our rapidly changing climate. "It has caused a lot of loss of biodiversity," said Margaret, who described women and children facing food insecurity and malnutrition. She's working with Oxfam to build the resilience of women farmers, including by restoring drought-resilient crops.

Too often, and for too long, those already being impacted by a crisis fuelled by the excessive emissions of the world's richest have felt sidelined and unheard by global climate negotiations which have, so far, failed to meet the scale of the challenge. Reducing this deep and long-lasting power imbalance was a core aim of the Glasgow Climate Dialogues, a series of events exploring key areas for action: Access, Participation and Voice; Adaptation and Resilience; Loss and Damage; and a Just Transition.

Participants included community representatives, governments, non-governmental organisations, charities and universities, from Malawi, Sri Lanka, Rwanda, Tanzania and Bangladesh to Uganda, Colombia, Uruguay and Tonga. The result is a communiqué that seeks to capture their priorities for, and beyond, COP26 in Glasgow.

It should be compulsory reading for every negotiator as they arrive in Glasgow. Why? Because unless COP26 acts upon the priorities of the Global South, it cannot possibly deliver climate justice.

As Gerard Howe, Deputy Director of the Scottish Government's COP26 Team, told the Dialogues, "We know that acting on climate change and its impacts in a fair and in a just way, and in a way that truly leaves no one behind, requires the perspectives and the decision making from colleagues in the Global South to be absolutely centre of all we do."

With Covid super-charging long-standing barriers to the meaningful participation of delegates and activists from the Global South at the UN climate talks, the communiqué flowing from the Glasgow Climate Dialogues takes on particular significance. So too does its cross-cutting call for action to deliver a level playing field in the negotiations, including special efforts to boost youth participation through the introduction of youth delegates within country delegations.

Critically, the communiqué demands an assessment of how the groups most impacted by climate change are heard in the negotiations, which were described by Janine Felson, an advisor to the Alliance of Small Island States and the Caribbean Community, as an historic "point of reckoning" for rich countries.

The warning comes as data shows countries that got rich by burning fossil fuels are failing to meet their promise to mobilise $100 billion a year to support developing countries to adapt to the climate crisis and to reduce their own emissions. Not only are developed countries falling significantly short of that inadequate target, but much too little of the money which is being mobilised is reaching those who need it most and, even when finance does reach them, it is too often in the form of loans rather than grants, deepening countries' debt levels at a time when Covid is applying further pressure.

The communiqué therefore calls for COP26 to agree a stretching new global public finance goal for adaptation for post-2025, along with measures to boost ownership of adaptation projects by local communities, women, and other marginalised groups.

Yet, amid escalating impact, adaptation is proving to be no longer enough to protect all communities on the front lines of the crisis, adding to climate injustice. "We have entered the era of loss and damage," said Professor Saleemul Huq from the International Centre for Climate Change and Development in Bangladesh. "It's going to get worse, not better – every year's going to be worse than the year before. Every day is going to bring something new."

The communiqué calls for COP26 to find ways to address this escalating reality, including the creation of a new solidarity fund that channels support – over and above existing climate finance and Overseas Development Assistance commitments – to those who need it most. It challenges us in Scotland, with government, to convene discussions beginning at COP26 to drive this forward.

Importantly, the communiqué also demands a global just transition with countries doing their fair share to reduce their current emissions and to repay their climate debt, while also protecting the right of countries in the Global South to develop their economies, and ending the plunder of Global South resources. "The climate crisis is inherently unjust," said Dipti Bhatnager from Friends of the Earth International, adding, "those who created the crisis need to step up, take responsibility and do the most to address it."

Acting upon the Global South's clear priorities at COP26 would be a crucial first step towards delivering climate justice.

Glasgow Climate Dialogues
Voices from the Global South
September 2021

Read the Glasgow Climate Dialogues' communiqué at **www.stopclimatechaos.scot/communique**.

RSGS projects around COP26

Mike Robinson, Chief Executive, RSGS

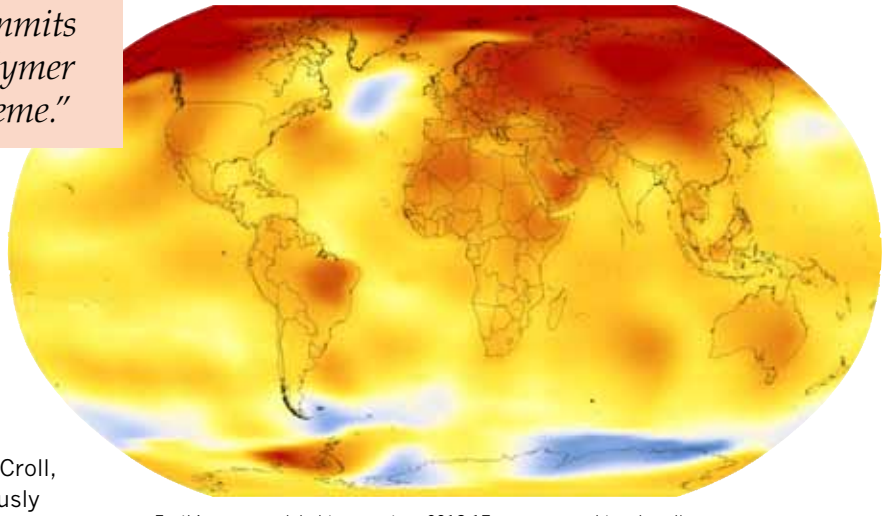
Our new feature-length documentary, *Scotland: Our Climate Journey*, looks at not only where we are now on the journey to net zero emissions, but how far we have come, and where we are going. We are arranging screenings of the film, produced in partnership with Balfour Beatty and Finbar Production, in the hope that it will inspire audiences around the world to understand what Scotland has been trying to achieve and the challenges it still faces. See **www.rsgs.org/scotland-our-climate-journey** for details.

"One exciting outcome from our Climate Emergency Summits is a new geopolymer production scheme."

We are providing a wee 'drop of inspiration' in the form of a net zero 45%-proof 26-year-old single-malt whisky, produced in partnership with Glenfiddich. The whisky is being presented to world leaders and delegations at COP26, in much the same way as I arranged for a 42%-proof whisky, representing Scotland's 42% emissions reduction target, to be distributed at COP15 in Copenhagen in 2009.

A project with special relevance to the Glasgow conference is our publication of a new illustrated children's book on the life and adventures of James Croll, one of the world's first climate scientists, who famously began his studies while working as a janitor at Glasgow's Andersonian college in the 1860s. As 2021 is the bicentenary of his birth, this is the perfect moment to share his story, and the book is already being shared with schools in Glasgow.

One exciting outcome from our Climate Emergency Summits is a new geopolymer production scheme, bringing together researcher Roisin Hyde from Queen's University Belfast, construction firms, water and waste experts, and funders, to help establish the first full demonstration project of low-carbon cement alternatives, due to appear as a constructed feature in Glasgow in November.



Earth's average global temperature 2013-17, as compared to a baseline average 1951-80. Yellows, oranges and reds show regions warmer than the baseline. © NASA's Scientific Visualization Studio

Small states, big ambitions

Mike Robinson, Chief Executive, RSGS; **Sophie Walker**, Projects & Events Officer, RSGS

Scotland's determination to set leading targets on climate reveals an important role for subnational governments as pioneers and influencers in the climate space, capable of raising the bar on climate ambition where larger governments might be slower or more hesitant. But it is not only on the national stage that subnational governments can have an impact. Many smaller administrations are now looking to international cooperation as a means of accelerating climate action on a global scale, and sense opportunity in leading the charge to net zero.

In September, Denmark and Costa Rica made headlines as they announced their intention to forge a new diplomatic alliance based on a mutual commitment to bring an end to an era of fossil fuels. The Beyond Oil and Gas Alliance (BOGA) invites other countries to follow in the example of the two lead states by setting a date to end fossil fuel extraction, compliant with the Paris Agreement goals.

Meanwhile, the Under2 Coalition is an important example of where this kind of diplomacy is working for subnational governments. Co-chaired by the First Minister of Scotland, the Governor of California, the Premier of KwaZulu-Natal, the Governor of South Chungcheong (Chungnam), and the Governor of Querétaro, Under2 is unique in bringing together 260 subnational governments to accelerate climate action worldwide.

"Under2 is unique in bringing together 260 subnational governments to accelerate climate action worldwide."

Its members commit to limiting emissions to 80–95% below 1990 levels, or to below two annual metric tons per capita by 2050, the level of emissions reduction necessary to limit global warming to under 2°C by the end of this century. Although non-binding, it is a powerful and purposeful statement of intent from governments representing 1.75 billion people and 50% of the global economy. Thirty-five members of the Coalition have already committed to reaching net zero emissions by 2050 or earlier, including Scotland which has aimed to reach this target by 2045.

But herein lies the real potential of this kind of international diplomacy. Instead of holding tight to our own achievements and ambitions, we are starting to understand how we need to share and support each other to do better: to raise ambition, yes, but also to share the practical experience, strategic financing, and technical expertise that will enable us to get to where we need to be.

After all, we are all ultimately going to have to make this journey, and we have never done it before. It's only through collaborations like these that we can hope to succeed.

Financing a just transition

Dr Gemma Bone Dodds, Director of Policy and Insights, The Scottish National Investment Bank

In November 2021, world leaders will descend on the banks of the River Clyde as the city of Glasgow hosts COP26. Their aim? To keep the planet under a 1.5°C temperature change by securing ambitious commitments to net zero that protect communities and natural habitats. But how will they do this? Well this year, finance plays a key role in the conference. World leaders understand that, to deliver on their goals, developed countries must mobilise at least $100 billion in climate finance per year, and that public and private institutions have to step up to deliver this.

It is within this broader context that the Scottish National Investment Bank has been established with the explicit mandate to deliver mission impact investment. The Bank believes that, as a development investment bank, it can play a key role in helping to finance businesses and projects that can help us tackle the climate crisis and create good jobs.

The Bank's missions were set to address the identified grand challenges for Scotland. These missions are to deliver investment to support Scotland's transition to net zero, to build communities and promote equality, and to harness innovation to enable our people to flourish. These missions are the initial filter the Bank uses to decide if a project is suitable.

The Bank's missions are ambitious, and delivery will take time. This is reflected in the tenors of the missions set for the Bank which go to 2040 and 2045. The Scottish Government has committed to capitalise the Bank with £2 billion over the next ten years, which, whilst substantial from a public sector spending perspective, is not enough in itself to deliver our missions or address the identified spending required to meet climate change or equality ambitions alone. The Bank is therefore intent on raising additional funds from the private sector to invest alongside its public capital. Initially the Bank will do this on an investment by investment basis, but in the longer term the Bank has the ambition to raise and invest third-party private capital alongside its public capital to enhance and accelerate the delivery of its missions.

Many of the Bank's investments will support more than one of its missions. For example, the Bank's recent investment in IndiNature, a manufacturer of innovative sustainable insulation materials from UK-grown hemp, supports both the provision of sustainable natural building materials and improved energy performance of buildings, aligning with our net zero and innovation missions. In addition, the Bank's investment will support the opening of a new factory in Jedburgh to make IndiNature's sustainable building products, which supports our place mission.

Similarly, the investment in Edinburgh-based Nova Innovation's tidal energy aligns strongly with the Bank's net zero mission, and supports the missions to harness innovation and build communities. Nova's innovative tidal turbines open up a new source of renewable energy generation, suitable for local island-based communities to harness the power of the sea to provide sustainable energy. Nova is already well established in the UK, including an installation in the Shetland Isles, and is exploring opportunities around the world, with turbines due to be installed in its largest project outside the UK, in Nova Scotia, Canada in late 2021.

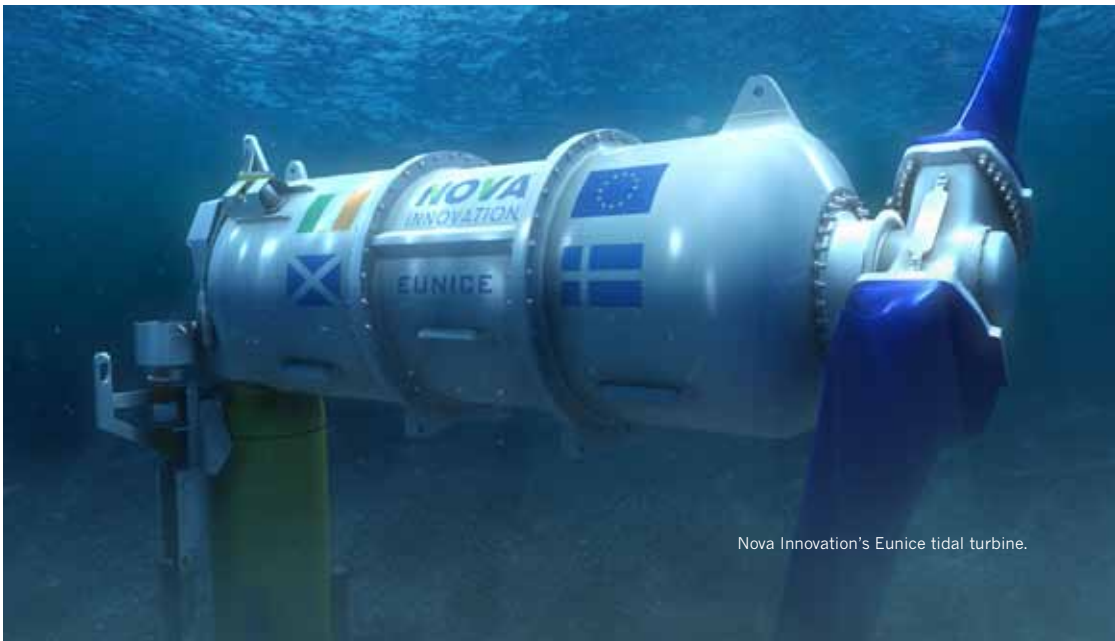
"Developed countries must mobilise at least $100 billion in climate finance per year."

IndiNature insulation batts being installed.

Sunamp thermal storage unit.

The Bank's investment in East Lothian-based thermal technologies company Sunamp will allow the company to scale up production of innovative heat stores which have the potential to make a significant positive impact on domestic and commercial heat generation and energy efficiency.

From this small selection of investments, we are already seeing how the Bank's net zero, place and innovation missions can be made to work in alignment, how we can play a crucial role in enabling a just transition to net zero, and how to use mission investment to support a stronger, fairer, more sustainable economy for Scotland.



Nova Innovation's Eunice tidal turbine.

Geographers' Declaration

Aran O'Carroll, Director of Climate Change & Environment, Royal Canadian Geographical Society

Geographers have unique opportunities and responsibilities in the face of the global biodiversity and climate crises. Geography is a discipline that is uniquely located at the intersection of the social sciences, natural sciences, and humanities. This equips geographers to be adept systems-thinkers and interdisciplinarians. It is furthermore an applied knowledge, focused above all on the state of our planet and our relationships with it. All of this makes the learning, teaching, and practice of geography centrally relevant to the closely-linked challenges of the global climate and biodiversity crises.

"Geographers can do much more than present an analysis of these challenges."

Geographers can do much more than present an analysis of these challenges. They also have a vantage point from which they can point to the kinds of thought and action that can deliver a better tomorrow for every person on Earth.

This coming October and November will see some of the most consequential weeks in terms of humanity's collective relationship with planet Earth. In October the world's governments will come together to confront the continuing dramatic loss of species and their habitats – the biodiversity crisis – compounded as it is by the accumulating impacts of climate change. It is hoped that the meeting will set the stage for ambitious new targets for the global conservation of nature out to 2030.

Around the same time, in Milan, Italy, and then, for two weeks in November, in Glasgow, Scotland, governments will reconvene to confront the existential challenge of climate change. It is widely hoped and expected that the meeting will set enhanced and more urgent reduction targets for greenhouse gas emissions out to 2030, as well as mandating a critical role for nature in climate change mitigation and adaption.

Geographers, whether as students, researchers, educators, writers, explorers, practitioners in business or policy, or as engaged and curious travellers, encourage our leaders to make ambitious commitments to place the protection of nature and a liveable climate at the centre of the world's economics and politics at this critical juncture.

Accordingly, we pledge that our institutions will redouble our efforts to apply the unique attributes that are the hallmark of the learning, teaching, and practice of geography to the global environmental challenges that have drawn together the world's governments to these vital meetings this year. We commit to doing all that we can to apply geography's potent capabilities to the task of making the coming decade one of hope and of positive action.

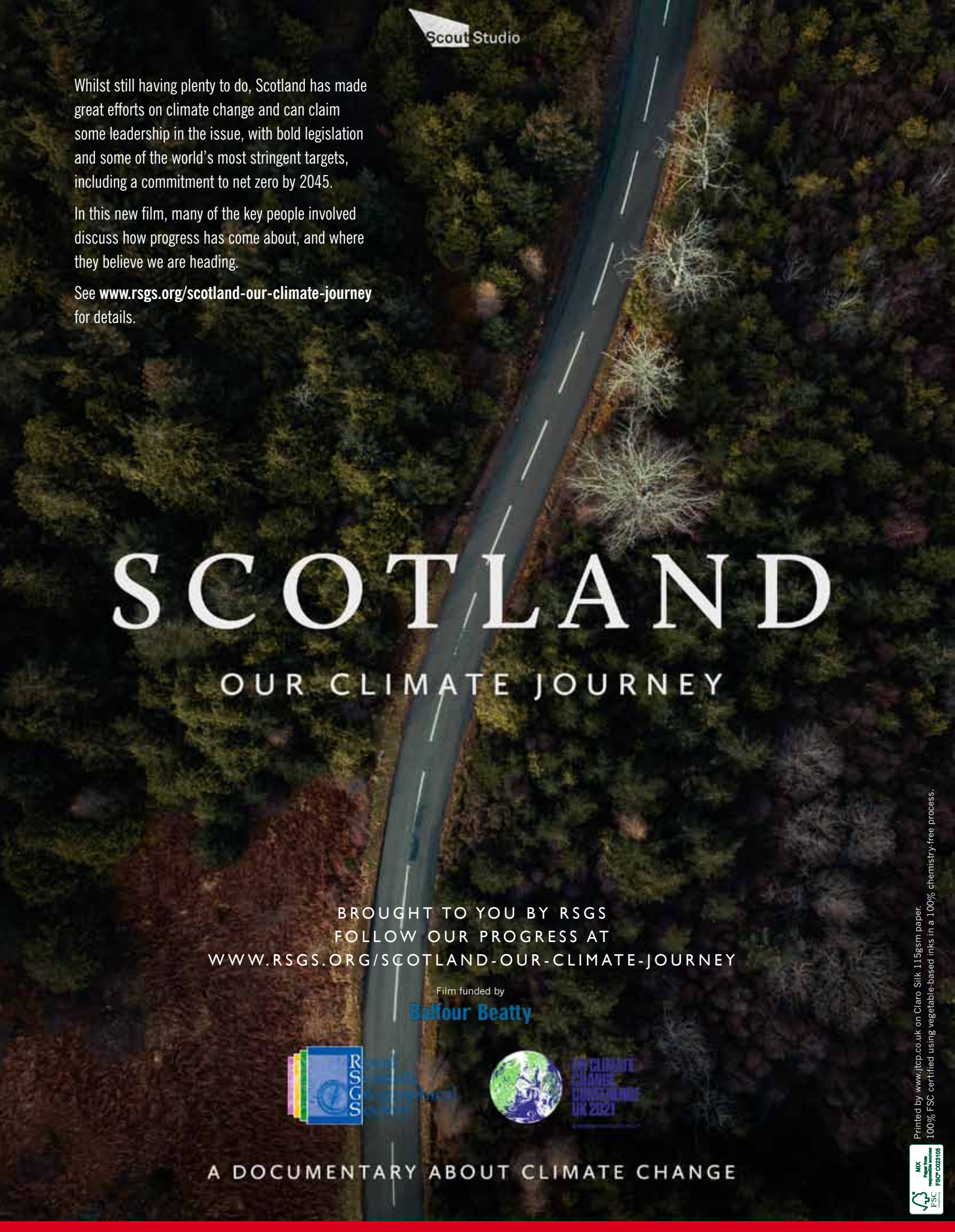
As of 14th September 2021, the Declaration has been signed and endorsed by:

American Geographical Society · Association of Bengal Geographers · Association of Brazilian Geographers · Association of Japanese Geographers · Bangladesh National Geographical Association · Benin Association of Geographers · Colombian National Committee for the IGU · Croatian Geographical Society · Cyprus Geographical Association · Czech Geographical Society · Department of Geography, University of Cambridge · European Association of Geographers (EuroGEO) · Geographic Society of China located in Taipei · Geographical Association (UK) · Geographical Association of Myanmar · Geographical Association of Spain · Geographical Society of China · Geographical Society of Finland · Geographical Society of Georgia · Geographical Society of Ireland · Geographical Society of Madagascar · Geography and Education Research Association of Macau · German Society of Geography · Hong Kong Geographical Association · Human Geography Society of Japan · Hungarian Geographical Society · Indian National Committee for IGU · Indonesian Geographical Association · Institute of Australian Geographers · International Geographical Union · Israeli Geographical Association · Italian Geographical Society · Japan Organization of Geographical Sciences · Korean Geographical Society · Mexican Society of Geography and Statistics · Namibian National Committee for the IGU · National Association of Geographers, India · National Association of Postgraduates and Researchers in Geography (ANPEGE) · National Geographic · National Geographical Society of France · New Zealand Geographical Society · Norwegian Geographical Society · Pakistan Geographical Association · Philippines Geographical Society · Polish Geographical Society · Portuguese Association of Geographers · Queensland Royal Geographical Society · Romanian Geographical Society · Royal Canadian Geographical Society · Royal Dutch Geographical Society · Royal Geographical Society (with IBG) · Royal Geographical Society of Belgium · Royal Scottish Geographical Society · Russian National Committee for International Program 'Future Earth' · Russian National Committee for the IGU · Samoa Association of Geographers · Saudi Geographical Society · Slovak National Committee for the IGU · Slovenian Geographical Association · Society of South African Geographers · Southern African Geography Teachers' Association · Sri Lankan Association of Geographers · Swiss National Committee for the IGU · Turkish Geographical Society · Uganda Geographical Association · Vietnamese Association of Geographers

This joint declaration of the international geographical societies was first mooted by the Royal Canadian Geographical Society at the online gathering hosted by RSGS in collaboration with the International Geographical Union and the Royal Geographical Society (with IBG) in June 2021. For the first time, over 65 geographical societies and institutions from all over the world – old and young, big and small – came together in common purpose to confront what is arguably the greatest challenge of our time.

The declaration comes at a critical moment for the future of our planet, ahead of the two UN conferences which will set the agenda on biodiversity and climate for years to come. It also marks the beginning of an exciting new chapter for the global geographical community.

This historic document asks all of us to pledge to redouble our efforts to apply our unique knowledge, skills, and networks as geographers to these great global challenges of our time.



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