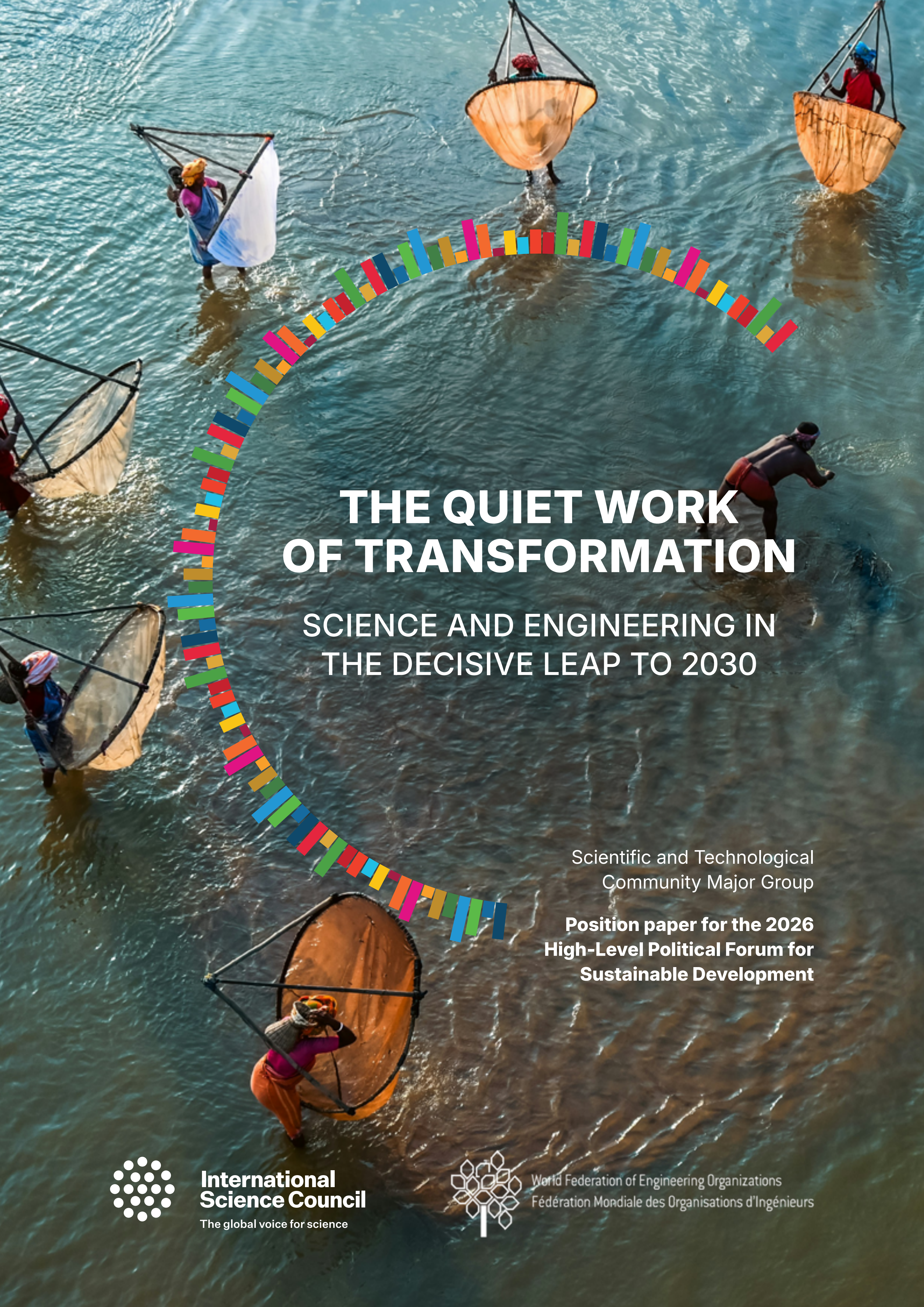

THE QUIET WORK OF TRANSFORMATION

SCIENCE AND ENGINEERING IN THE DECISIVE LEAP TO 2030

Scientific and Technological Community Major Group

Position paper for the 2026 High-Level Political Forum for Sustainable Development

International Science Council
The global voice for science

World Federation of Engineering Organizations
Fédération Mondiale des Organisations d'Ingénieurs

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About the International Science Council
The International Science Council works at the global level to catalyse and convene scientific expertise, advice and influence on issues of major concern to both science and society. The International Science Council is a non-governmental organization with a unique global membership that brings together more than 260 international scientific unions and associations, national and regional scientific organizations including academies and research councils, international federations and societies, and young academies and associations.

About the World Federation of Engineering Organizations
The World Federation of Engineering Organizations is the international organization for the engineering profession. Founded in 1968, under the auspices of UNESCO, the World Federation of Engineering Organizations brings together national engineering institutions from some 100 nations and represents more than 30 million engineers.

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FOREWORD

With fewer than four years remaining until 2030, the world is currently off track to achieve the Sustainable Development Goals. It is also increasingly uncertain whether transformation at the scale required can still be achieved in time. Climate impacts are intensifying, biodiversity continues to decline, pollution is spreading, inequalities are widening, and geopolitical tensions are straining the international cooperation on which the 2030 Agenda depends.

At the same time, expectations placed on science and engineering continue to grow. New technologies, tools and discoveries remain essential. Yet the past decade has also revealed a more difficult truth: transformation rarely arrives as a single disruptive breakthrough. More often, it emerges through sustained institutional work – through public systems strengthened over time, communities building resilience gradually, and partnerships that endure beyond political cycles.

This quieter work of transformation is less visible than headline announcements or technological promises, yet it is indispensable to the decisive leap now required.

Around the world, scientific and engineering communities are already contributing to this effort in practical and deeply embedded ways. They are helping strengthen food and health systems, restore ecosystems, improve infrastructure planning and support more resilient forms of governance. Their role is not to replace political decision-making, but to help societies navigate complexity, uncertainty and long-term change more effectively.

This perspective is reflected in the theme of the 2026 High-level Political Forum on Sustainable Development: "Transformative, equitable, innovative and coordinated actions for the 2030 Agenda for Sustainable Development and its Sustainable Development Goals for a sustainable future for all". Achieving such transformation will require more than acceleration alone. It will depend on society's ability to sustain cooperation, maintain trust and translate knowledge into long-term collective action.

This is the message that the International Science Council and the World Federation of Engineering Organizations, as co-organizing partners of the Scientific and Technological Community Major Group, bring to the 2026 Forum.

The experiences presented in this paper span diverse regions, sectors and scales. What connects them is not a single model of transformation, but a shared recognition that sustainable development advances through cumulative progress – through long-term investment, institutional learning, public participation and sustained collaboration between researchers, policy-makers, practitioners and communities.

The decisive leap to 2030 will not be achieved through ambition alone. It will depend on the patient, collective and often uncelebrated work of translating knowledge into action.

That work is already underway.

Salvatore Aricò
Chief Executive Officer
International Science Council

Moez Chakchouk
Executive Director
World Federation of
Engineering Organizations

INTRODUCTION

The 2026 High-level Political Forum on Sustainable Development convenes at a critical stage for the 2030 Agenda. The Sustainable Development Goals (SDGs) under review this year, SDGs 6 (Clean Water and Sanitation), 7 (Affordable and Clean Energy), 9 (Industry, Innovation, and Infrastructure), 11 (Sustainable Cities and Communities) and 17 (Partnerships for the Goals), are closely linked to broader transformations in energy systems, urban development, infrastructure, environmental governance and international cooperation.

This position paper was prepared by the International Science Council and the World Federation of Engineering Organizations as co-organizing partners of the Scientific and Technological Community Major Group at the United Nations. It examines how science and engineering are contributing to implementation across the six transformation entry points identified in the 2023 Global Sustainable Development Report: Human Wellbeing and Capabilities; Sustainable and Just Economies; Sustainable Food Systems and Healthy Nutrition Patterns; Energy Decarbonization with Universal Access; Urban and Peri-Urban Development; and the Global Environmental Commons.

The paper draws on case studies submitted through an open global call[1] launched by the International Science Council and the World Federation of Engineering Organizations in early 2026. The call sought concrete examples showing how science and engineering informed policy and investment decisions, supported the transition from research to real-world adoption, strengthened governance and institutional capacity, and enabled implementation, scaling and replication across different contexts.

The selected case studies and practice snapshots span diverse geographies, sectors and scales. Together, they demonstrate that implementation depends on context-specific combinations of scientific knowledge, institutional capacity, financing, infrastructure, public participation and long-term coordination.

Each section combines a case study with shorter practice snapshots highlighting complementary approaches, governance models and regional experiences. Together, these examples aim to show not only what transformations are needed but how science and engineering can help societies undertake the practical work of implementing them.

By presenting grounded experiences from across the Scientific and Technological Community, this paper seeks to support delegates to the 2026 High-level Political Forum on Sustainable Development and the wider sustainable development community in identifying practical pathways for accelerating integrated SDG implementation during the decisive years leading to 2030.

KEY MESSAGES

1. **The challenge is no longer identifying what transformations are needed, but how to implement them:** The transformations required to achieve the SDGs are now well established, including through the six transformation entry points identified in the 2023 Global Sustainable Development Report. Yet progress remains constrained by fragmented implementation systems that struggle to connect evidence, financing, governance and long-term coordination.

2. **Science and engineering help make complex transitions more governable**: Across sectors including health, food systems, energy, infrastructure and environmental governance, scientific and engineering expertise supports implementation by helping decision-makers anticipate trade-offs, strengthen planning, improve coordination and adapt policies under changing conditions.

3. **Strong institutions are the foundation of lasting transformation**: The cases presented in this paper show that lasting progress rarely emerges from isolated innovations alone. Successful implementation depends on public institutions, technical capacity, sustained investment and governance systems capable of coordinating action across sectors and over time.

4. **Participation and cooperation strengthen resilience and implementation**: Many of the strongest examples combined scientific expertise with local knowledge, community participation and cross-sector collaboration. International scientific cooperation, inclusive governance and trust in evidence remain essential foundations for collective action across the SDGs.

5. **The foundations for transformation exist and must be sustained and scaled**: The experiences presented throughout this paper demonstrate that practical pathways towards more resilient, equitable and sustainable futures are already being built across diverse contexts. The decisive challenge for the years leading to 2030 is whether these efforts can be supported through stronger institutions, financing systems and long-term political commitment.

THEME 1: HUMAN WELLBEING AND CAPABILITIES

In 2022, three in four people among the world's poorest faced financial hardship from health costs alone – paying out of pocket for care that pushed them into, or deeper into, poverty. Globally, 2.1 billion people face some form of financial hardship in accessing essential health services, while 4.6 billion still cannot access basic care at all[2]. Preventable disease, financial insecurity, exclusion from essential services and declining trust in public institutions remain among the most persistent barriers to sustainable development, and they rarely emerge in isolation. These challenges tend to cluster, reinforce one another and resist solutions designed for any one of them in silo.

This is largely a consequence of how systems are built. When public health systems operate separately from social protection, a household facing illness is simultaneously exposed to medical costs it cannot absorb and income disruption it has no buffer against – a compounding vulnerability neither system alone is designed to address. When financial hardship is treated as an individual problem rather than a systemic one, and when short-term interventions substitute for long-term institutional capacity, the gaps between sectors are where vulnerability deepens. **Durable resilience depends not only on expanding access to services, but on building institutions capable of learning, adapting and maintaining public trust under pressure across sectors and over time.**

Science and engineering help reveal the connections that are easily hidden within complex systems. Epidemiological research, social policy experimentation, digital service delivery and financial capability tools, among others, can reveal vulnerabilities before they become crises, improve coordination across sectors and strengthen public systems from within. Their contribution is not evidence alone, but the capacity to help institutions diagnose risks they often cannot anticipate on their own and respond more effectively when they emerge.

The cases in this section ground that argument in experience across contrasting scales and contexts. In Brazil, decades of scientific investment and institutional commitment helped construct one of the world's largest universal public health systems – a reminder that transformation of this kind is built, not discovered. In China, community-based financial services strengthened urban resilience and inclusion at the local level, while experimental social policy research on children's savings programmes in the United States has shaped policy thinking internationally. Across these experiences, a common thread emerges: durable improvements in human wellbeing depend not on isolated interventions alone, but on sustained efforts to connect evidence, public systems and social participation over time.

CASE STUDY 1

Brazil - Science-informed public health governance strengthens equitable health systems

Prof. Mauricio Lima Barreto, *Oswaldo Cruz Foundation (Fiocruz); Brazilian Academy of Sciences, Brazil*

GEOGRAPHICAL SCOPE: Brazil (national implementation across federal, state and municipal levels).

SUMMARY: Brazil's Unified Health System (SUS) demonstrates how scientific evidence can be embedded into public governance at the national scale. Since its establishment following the 1988 Constitution, SUS has progressively integrated epidemiological surveillance, health information systems, biomedical research and health technology assessment into routine public decision-making. Scientific evidence has informed vaccination strategies, disease-control programmes, healthcare planning and technology adoption across all levels of government. Today, approximately 162 million Brazilians depend directly on SUS, making it one of the world's largest examples of sustained science-informed implementation of public healthcare.

The challenge

Delivering universal healthcare in Brazil meant operating across a vast territory marked by major social inequalities, uneven institutional capacity and diverse public health risks. Expanding healthcare access alone was insufficient. Public authorities also needed the ability to continuously generate, interpret and apply scientific evidence across a highly decentralized governance system.

The challenge was therefore not only medical or financial – it was institutional. How could scientific knowledge become part of everyday public administration rather than remaining confined to research institutions or temporary advisory processes?

Science in action

Over several decades, SUS progressively embedded science into the operational architecture of the health system. Nationwide epidemiological surveillance systems, integrated health information platforms and health technology assessment mechanisms enabled public authorities to monitor disease trends, evaluate interventions and guide service delivery in real time.

Scientific evidence informed decisions on vaccination strategies, disease-control programmes, incorporation of medicines and medical technologies, and allocation of healthcare resources. Institutions such as Fiocruz, the Butantan Institute and Brazilian universities played a central role in generating evidence and supporting implementation.

A defining feature of SUS was the institutionalization of continuous interaction between researchers, public authorities and healthcare providers. Rather than relying on temporary advisory bodies, Brazil embedded science-policy coordination directly into governance structures and public administration systems. National policy direction was combined with decentralized implementation across states and municipalities, supported by standardized information systems and long-term public investment in scientific and health infrastructure.

The impacts have been substantial. Approximately 76% of the Brazilian population now depends directly on SUS[3]. Since the system's establishment, Brazil has achieved major reductions in infant mortality, increased life expectancy and strengthened immunization and outbreak response capacities. The system also contributed to the development of strong domestic expertise in epidemiology, biomedical research and public health management.

From knowledge to implementation

- Research institutions generated evidence on disease prevention, treatment and system performance.
- National health information systems translated data into operational intelligence.
- Health technology assessment mechanisms informed policy decisions.
- Federal, state and municipal authorities implemented evidence-based programmes at scale.

Lessons for SDG implementation

The SUS experience demonstrates that science-policy interfaces are most effective when they are continuous, institutionalized and linked to long-term public investment. Rather than treating evidence generation as separate from implementation, Brazil integrated research, surveillance and policy-making into the functioning of its health system itself.

The case also illustrates how investments in scientific infrastructure and public data systems can generate reinforcing progress across multiple SDGs.

SDG SYNERGIES:

03	09	10	17
Expanded healthcare access and improved public health outcomes	Strengthened scientific and public health infrastructure	Reduced inequalities in healthcare access	Long-term partnerships between government, science and healthcare institutions

KEY TRADE-OFF: The expansion of Brazil's universal public health system required balancing rapid expansion of healthcare access with fiscal constraints, uneven local institutional capacities and the need to maintain service quality across highly unequal regions. The case also reflected tensions between investment in preventive public health and pressure for more immediate and visible healthcare delivery.

HOW IT WAS MANAGED: Scientific evidence, long-term public investment and decentralized governance arrangements helped strengthen coordination across federal, state and municipal levels. Public health research and adaptive policy learning supported phased implementation while allowing the system to respond to differing regional needs and capacities over time.

Several elements of the SUS model may be transferable to other contexts, particularly integrated surveillance systems, institutionalized coordination between researchers and policy-makers, and evidence-informed resource allocation mechanisms. The experience suggests that strong science-policy systems are not peripheral to sustainable development implementation – they are foundational to effective governance and long-term resilience.

Find out more [4, 5, 6]

Snapshot 1: United States – Experimental evidence informs national children's savings policies

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Researchers and partners used the SEED for Oklahoma Kids experiment, launched in 2007, to test Child Development Accounts through a randomized welfare policy experiment involving around 2,700 newborns. Children in the treatment group received automatically opened college savings accounts with a USD 1,000 seed deposit.

Over 18 years, evidence has shown positive effects on children's social-emotional development, educational expectations, maternal wellbeing and financial inclusion. The findings informed children's savings policies in the United States and internationally, including Singapore, Israel and Kazakhstan, reaching more than 30 million children worldwide.

Key SDGs:

Find out more [7, 8, 9, 10, 11, 12, 13, 14, 15, 16]

Snapshot 2: China – Social worker-led financial capability services strengthen urban community resilience

Authors

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Since 2021, partners in China have adapted the Financial Capability and Asset Building framework into a community-based financial social work model. The initiative trained social workers, volunteers and students to deliver comprehensive financial capability services, including financial education, fraud prevention, consumer protection, and household financial management support through trusted community structures.

By 2025, the model had expanded to 84 communities across 29 cities, reaching more than 428,000 residents. Evaluation results showed improvements in financial capability, fraud identification and household financial management, including a rise in fraud identification accuracy from 56.8% to 75.4%. The case shows how applied social science research can be translated into local service delivery systems that strengthen financial resilience among elderly people, migrants, persons with disabilities and small business owners.

Key SDGs:

- 01 NO POVERTY
- 08 DECENT WORK AND ECONOMIC GROWTH
- 10 REDUCED INEQUALITIES
- 11 SUSTAINABLE CITIES AND COMMUNITIES
- 16 PEACE, JUSTICE AND STRONG INSTITUTIONS

Find out more [17, 18, 19, 20, 21]

THEME 2: SUSTAINABLE AND JUST ECONOMIES

Economic transitions are rarely just about what economies produce. The deeper question is whether they are becoming more resilient, more equitable and more capable of operating within environmental limits – and whether the opportunities and risks that come with change are distributed fairly across societies. The IEA projects that by 2030, around 5 million jobs may be lost in fossil fuel production while 14 million new ones are created in clean energy – but those jobs will not emerge in the same regions, or for the same workers, without deliberate institutional support[22].

This is largely a question of how transitions are governed. Where carbon-intensive industries continue to shape investment patterns, and innovation remains concentrated in a small number of regions, the social costs of economic change tend to fall on workers and communities least equipped to absorb them – a dynamic in which sustainability transitions can just as easily deepen inequalities as reduce them. **The difference lies not in the technologies deployed, but in whether investment systems, labour policies and governance institutions are able to connect innovation with social inclusion and long-term resilience.**

Science and engineering help illuminate the dynamics that complex transitions tend to obscure. Systems modelling, industrial innovation, logistics optimization and agricultural research can identify viable alternatives, reduce environmental impacts and anticipate unintended consequences before they become entrenched. Their contribution is not technical solutions alone, but the ability to help governments, industries and communities identify trade-offs they might not otherwise anticipate and navigate them in ways that strengthen resilience over time.

The cases in this section ground that argument in experience across contrasting economies and sectors. In Egypt, women-led garment production strengthened local livelihoods and economic participation through context-sensitive production systems and partnerships. In Finland, freight electrification is reshaping industrial infrastructure planning at scale, while cocoa-sector innovation in Trinidad and Tobago demonstrates how agricultural research and value-chain development can support local resilience and economic diversification. Across these experiences, a common thread emerges: sustainable economic transformation depends not on innovation alone, but on the institutional capacity to connect infrastructure, investment and inclusion over time.

CASE STUDY 2

Egypt – Community-based garment production expands women's economic participation

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GEOGRAPHICAL SCOPE: Rural villages in Upper Egypt.

SUMMARY: In rural Upper Egypt, deeply embedded social norms continue to limit women's participation in formal employment. The Al-Nidaa Foundation used social science evidence, behavioural research, and community-based implementation strategies to establish women-only garment factories directly inside villages, removing barriers associated with mobility, safety and social acceptability. The initiative combined formal employment, financial inclusion, and community engagement to expand women's economic participation while navigating local gender norms. The case demonstrates how evidence-informed implementation can support gradual social transformation in contexts where conventional labour market approaches have struggled to succeed.

The challenge

Female labour force participation in rural Upper Egypt is among the lowest globally[23], constrained by social norms that restrict women's mobility and economic independence. Traditional industrial employment models often require women to travel to urban centres, creating resistance from families and community leaders and limiting access to formal work.

The challenge was therefore not simply job creation. It was how to expand women's economic participation in ways that were socially legitimate, operationally feasible and locally trusted.

Science in action

Drawing on evidence from the Gender Social Norms Index, behavioural research and studies on intra-household bargaining, Al-Nidaa Foundation designed an alternative employment model adapted to local realities[24, 25]. Rather than expecting women to travel to industrial zones, the initiative established women-only ready-made garment factories directly inside rural villages.

Implementation focused as much on social trust as on production. Before factories opened, Al-Nidaa organized meetings with village mayors, elders, and male household heads to discuss concerns and build acceptance. Men were invited to inspect factory environments, while fixed daytime working hours and women-only production floors helped reduce resistance to women's employment.

The initiative also introduced formal employment contracts, social insurance and salary payments through individual bank debit cards to strengthen women's financial inclusion and income control. Worker committees and peer-support structures were later established to involve women in shaping workplace policies related to childcare, grievances, and payment arrangements.

The programme generated measurable increases in women's workforce participation and household income[26]. Families reported improved food security and greater ability to support children's education. Programme monitoring also documented early shifts in attitudes toward women's paid employment, including peer-diffusion effects as employed women encouraged neighbours to join.

Key enabling conditions

- Use of social science evidence to shape implementation design
- Community trust-building before operational scale-up
- Collaboration with village leaders and existing authority structures
- Village-based factories reducing mobility barriers
- Financial inclusion mechanisms protecting women's income access

Lessons for SDG implementation

The case demonstrates that evidence-informed implementation requires more than technical design. Institutional trust, community legitimacy, and adaptive governance were essential to translating social science evidence into real-world adoption.

The initiative also highlights the importance of sequencing reforms carefully in contexts where social norms shape access to economic opportunity. Some implementation choices – including women-only production floors and male-oriented consultations – accommodated conservative norms in the short term to expand women's participation incrementally over time.

SDG SYNERGIES

05	08	01	04	10
Expanded women's economic participation	Increased access to formal employment and social protection	Improved household income and food security	Greater ability to support children's education	Financial inclusion and reduced inequalities

KEY TRADE-OFF: The initiative navigated tensions between women's economic inclusion and local livelihood generation on one hand, and market competitiveness, labour conditions and long-term economic resilience on the other. Expanding production within a highly cost-sensitive sector risked reinforcing economic precarity without broader community support and skills development.

HOW IT WAS MANAGED: The initiative combined locally embedded production systems with partnerships supporting training, entrepreneurship and community participation. By linking livelihood generation with cooperative approaches and local value creation, the project sought to strengthen both economic participation and longer-term resilience. Several elements of the model may be transferable to other rural contexts where gender norms constrain labour force participation, particularly the combination of behavioural evidence, locally adapted governance, and financial inclusion mechanisms. The case suggests that sustainable economic transitions depend not only on creating opportunities, but on designing implementation pathways that communities are willing and able to adopt.

Find out more [27, 28, 29, 30, 31]

Snapshot 3: Finland – Research-guided logistics hub enables freight electrification

Authors

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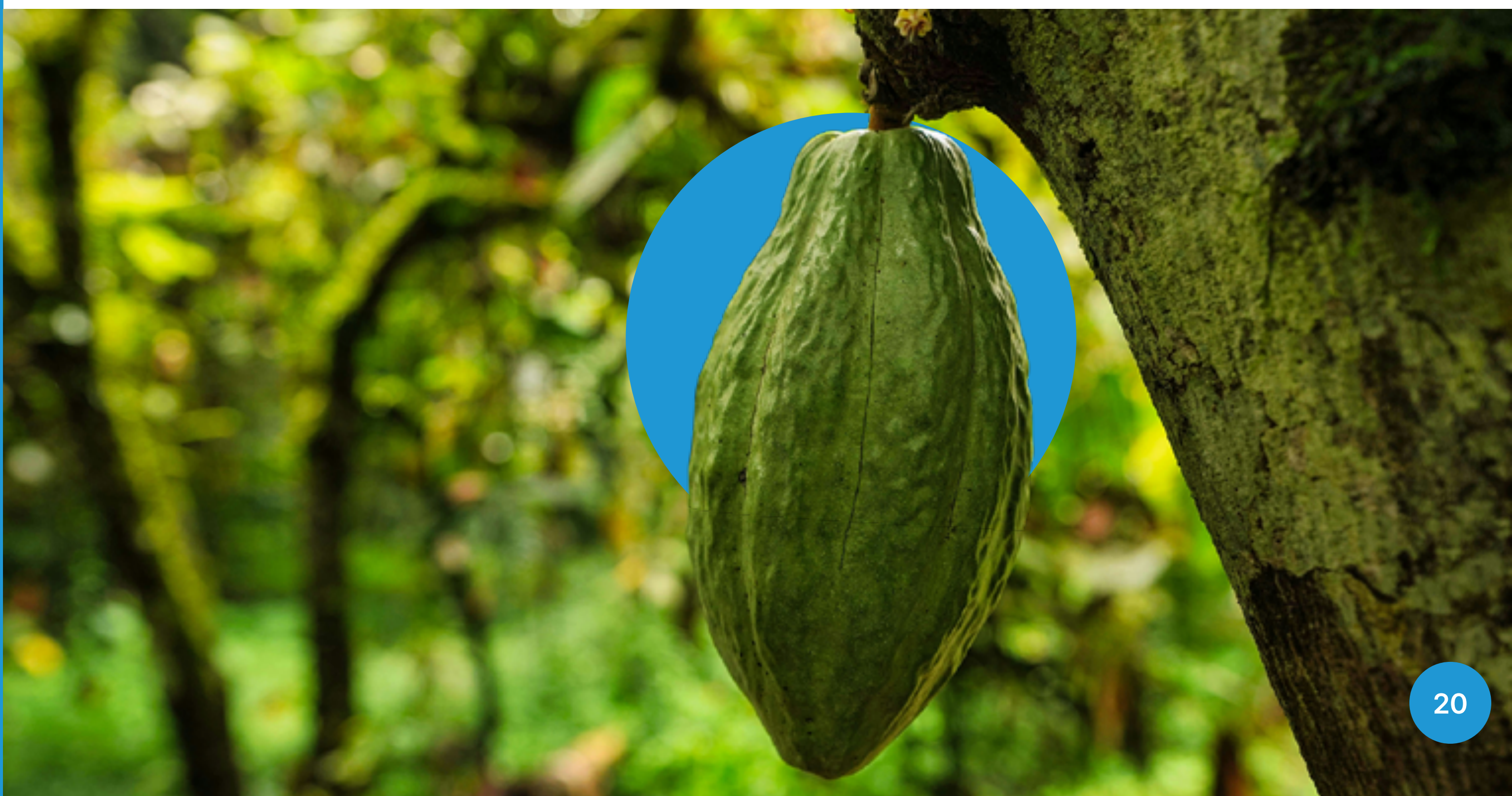
In Naantali, southwest Finland, research on freight electrification systems informed the development of a logistics-energy hub serving freight routes between Finland and Sweden. The initiative combined stakeholder mapping, multi-actor interviews, system-level modelling and 3D visualization to clarify charging infrastructure needs, actor roles and business model options for heavy-duty freight electrification.

The hub opened in September 2024 with a high-power public charging station offering up to 720 kW capacity, supported by on-site solar generation, battery storage and renewable energy sourcing. The case shows how science-industry collaboration can translate decarbonization goals into real infrastructure investment, while helping manage grid constraints, coordination barriers and investment risks.

Key SDGs:

Find out more [32, 33, 34, 35]



Snapshot 4: Trinidad and Tobago – Cocoa innovation strengthens community livelihoods and value chains

Authors

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In the rural cocoa-growing community of Lopinot-La Pastora in Trinidad and Tobago, the Cocoa Research Centre of the University of the West Indies applied science-based interventions to support local livelihoods, strengthen farm sustainability and improve economic resilience. The initiative combined climate-resilient cocoa varieties, risk mapping, quality management systems, climate- and disease-risk mitigation, traceability tools and value-chain development, while also supporting youth- and women-led start-ups, cooperative labour approaches and local business development. Research and technical support helped farmers improve productivity, reduce environmental risks, and meet market standards, including through measures to address contamination risks that can affect cocoa exports.

Implemented through a whole-of-community approach involving government, NGOs and local institutions, the initiative has since informed national policy discussions and proposals to replicate the model across other cocoa-growing communities in Trinidad and Tobago.

Key SDGs:

01 NO POVERTY

05 GENDER EQUALITY

08 DECENT WORK AND ECONOMIC GROWTH

09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

10 REDUCED INEQUALITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

17 PARTNERSHIPS FOR THE GOALS

Find out more [36, 37]

THEME 3: SUSTAINABLE FOOD SYSTEMS AND HEALTHY NUTRITION PATTERNS

The global food system feeds eight billion people and is simultaneously one of the leading drivers of the climate and biodiversity crises that threaten to make that task progressively harder. In 2024, nearly 2.3 billion people remained moderately or severely food insecure within a system responsible for around one-third of global greenhouse gas emissions – and where agricultural drivers, including land use change, chemical inputs and habitat conversion, account for an estimated 70% of projected terrestrial biodiversity loss by 2050[38, 39, 40, 41].

The consequences of fragmentation are increasingly visible. Food insecurity persists alongside environmental degradation; climate shocks destabilize already vulnerable production systems, pushing millions into acute crisis; and some of the same agricultural practices that drive productivity are also among the leading causes of habitat loss and species decline. Improving yields alone cannot resolve these tensions, and addressing biodiversity loss or climate adaptation without reforming the food systems that drive them misses the point entirely. **The challenge is to build food systems capable of sustaining both people and biodiversity under growing and compounding pressures.**

Science and engineering help reveal the connections across ecological, nutritional, economic and social dimensions that governance too often treats in isolation. Agroecological research, climate modelling, biological control systems and participatory governance approaches can identify more resilient pathways, strengthen adaptation to climate variability and support biodiversity recovery while adapting solutions to local realities. Their contribution is not innovation alone, but the ability to help societies manage trade-offs across interconnected systems that no single discipline or sector can address on its own.

The cases in this section ground that argument in experience across diverse and often difficult conditions. In Gaza, women-led agroecological farming initiatives supported local food production and livelihoods under prolonged crisis and instability. In Ecuador, biocontrol approaches supported more sustainable fruit production among smallholder farmers, demonstrating that ecological and economic resilience can be strengthened together. The Montpellier Process illustrates how science-policy-society interfaces can help build shared approaches to food systems transformation across global contexts. Across these experiences, a common thread emerges: resilient food systems depend not on technical solutions alone, but on governance approaches capable of linking sustainability, climate adaptation, biodiversity conservation and local participation over time.

CASE STUDY 3

Gaza – Women-led agroecological farming strengthens food system resilience under crisis conditions

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GEOGRAPHICAL SCOPE: Gaza Strip, Palestine.

SUMMARY: In Gaza, years of blockade, restrictions on agricultural inputs and repeated destruction of productive infrastructure created a highly fragile food system long before the current war. Through rapid assessments, field-based research and collaboration with local communities, Gaza Foodways helped translate scientific evidence into women-led agroecological responses that sustained decentralized food production under conditions of systemic collapse. Working with a network of 500 women producers across Gaza, the initiative supported rooftop cultivation, seed saving, localized food distribution and mutual aid systems. The case demonstrates how community-based agroecological practices can strengthen resilience and preserve local productive capacity even under extreme crisis conditions.

The challenge

Gaza's food system had already become structurally vulnerable due to prolonged blockade, restrictions on land and sea access, limitations on agricultural inputs and repeated targeting of productive assets. The recent war intensified these pressures into widespread destruction of farms, irrigation systems, markets and food distribution networks, contributing to severe food insecurity and growing dependence on disrupted external supply chains.

The challenge was not only humanitarian. It was how to identify and support locally rooted capacities capable of sustaining food access and rebuilding resilience under conditions of ongoing instability and institutional breakdown.

Science in action

Research played a central role in documenting both food system collapse and emerging forms of community resilience. Rapid assessments, value-chain analysis, market observation and field-based data collection helped trace disruptions across local production, food access, input supply and prices, while also identifying adaptation practices already being used by communities.

Through Gaza Foodways (a transdisciplinary research collaboration between academic institutions), this evidence was translated into women-led agroecological action. The initiative worked with the Urban Women's Agripreneur Forum, a network of over 500 active women producers across Gaza's five governorates, representing a wider constituency of approximately 3,000 women agripreneurs[42], who continued organizing food production and mutual aid despite displacement and destruction. By 2025, the initiative had also supported the establishment of a Local Seeds Forum comprising 21 community-led seed initiatives, 93% of which are women-led[43].

Responses included rooftop and backyard cultivation, seed saving and exchange, localized food distribution and community care initiatives[44]. These actions helped preserve local productive capacity, maintain access to fresh foods and reduce dependence on disrupted supply chains. The initiative also helped position 'baladi' seeds (heirloom varieties endemic to the area), women's knowledge and decentralized agroecological production as important components of future recovery planning[45].

While agroecology cannot be the sole solution to Gaza's food crisis, the initiative identified practical entry points for strengthening resilience and rebuilding a more socially embedded food system.

Community resilience mechanisms

- Rooftop and backyard cultivation.
- Local seed saving and exchange.
- Women-led food distribution networks.
- Community-based mutual aid systems.
- Low-input and water-efficient production practices.

Lessons for SDG implementation

The case demonstrates how scientific evidence can support implementation even in contexts of extreme fragility and conflict. Continuous engagement between researchers, local organizations and community networks enabled real-time evidence to inform practical adaptation strategies under rapidly changing conditions.

The experience also highlights the importance of recognizing local knowledge systems and women-led community action as central components of resilience and recovery planning, rather than treating them as informal or temporary coping mechanisms.

SDG SYNERGIES

02	01	11	13
Improved access to fresh and locally produced food	Support for livelihoods and community survival mechanisms	Strengthened decentralized urban and peri-urban resilience	Promotion of low-input agroecological practices

KEY TRADE-OFF: The Gaza case highlighted tensions between immediate food production needs under crisis conditions and longer-term ecological sustainability. Pressures to maximize short-term agricultural output risked further degrading already fragile soils, water systems and local biodiversity.

HOW IT WAS MANAGED: Agroecological approaches helped strengthen local food production while supporting soil conservation, climate adaptation and biodiversity protection. Community participation and locally adapted farming practices helped balance immediate livelihood needs with longer-term environmental resilience.
The initiative suggests that recovery strategies in crisis settings should build on existing community resilience capacities rather than relying exclusively on centralized food systems. Several elements of the approach – including decentralized agroecological production, local seed systems and women-led distribution networks – may offer transferable lessons for other contexts facing protracted instability and food system disruption.

Find out more[46, 47, 48]

Snapshot 5: Ecuador – Biocontrol supports sustainable small-fruit production in the Andes

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In Ecuador's Andean province of Tungurahua, smallholder farmers sought to expand production of Andean blackberry as a high-value fruit crop, but pest and disease pressures were causing plot failures and limiting commercialization. Instituto Nacional de Investigaciones Agropecuarias, working with AgResearch New Zealand, local enterprises, extension agents, communities and local authorities, developed an agroecological Integrated Fruit Production system using locally selected and quality-controlled biocontrol agents.

Implemented largely between 2014 and 2020, the approach was tested through farmer field schools, with strong participation from women farmers who are central to fruit production in the region. The system has since supported wider uptake of blackberry cultivation, contributing to the incomes of more than 10,000 farming families and informing broader bioinput regulation and application to other crops.

Key SDGs:

Find out more [49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63]

Snapshot 6: Global – The Montpellier Process strengthens science-policy-society interfaces for food systems transformation

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Nexus Action – the Montpellier Process is a global learning process designed to strengthen inclusive science-policy-society interfaces for food systems transformation. It responds to the need for more flexible and coordinated spaces across sectors and scales, where scientists, policy-makers and other knowledge holders, together with public and private decision-makers can confront disagreements, build shared understanding and turn knowledge into action across the feed-care-protect nexus.

The process has mobilized hundreds of stakeholders, including 300 scientists, policy-makers and civil society representatives from 60 countries at the 2012 Montpellier gathering that produced the Montpellier Statement. It has since continued through engagements linked to the Conference of the Parties to the Convention on Biological Diversity, Nutrition for Growth Summit, European Union Conference, EAT Communities for Action living lab, and Stockholm Food Forum 2025. The case illustrates how science can support food systems transformation not only through evidence generation, but through methods for dialogue, co-creation and decision-making across scales.

Key SDGs:

02 ZERO HUNGER

03 GOOD HEALTH AND WELL-BEING

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

15 LIFE ON LAND

17 PARTNERSHIPS FOR THE GOALS

Find out more [64, 65, 66]

THEME 4: ENERGY DECARBONIZATION AND UNIVERSAL ACCESS

Clean energy investment has never been higher, but most of the world is not part of it. The most advanced economies and China account for approximately 85% of global clean energy investment, while emerging markets and developing economies outside China account for the remaining 15% despite comprising the majority of future energy demand[67]. For much of the world, the energy challenge is therefore not simply decarbonization, but the more complex task of simultaneously expanding access, reducing emissions, managing rising demand and avoiding infrastructure lock-in that may become economically or environmentally unsustainable within decades.

These pressures rarely unfold in sequence. Energy poverty coexists with rapid urbanization; decarbonization targets compete with short-term development needs; and infrastructure investments made today will shape economic and social trajectories for generations. **The difficulty is therefore not simply deploying new technologies, but coordinating long-term transitions across finance, infrastructure, governance and public legitimacy in contexts where those systems rarely operate together**.

Science and engineering help make these transitions more navigable. Energy modelling, systems analysis, infrastructure design and collaborative experimentation allow governments and industries to test pathways, anticipate bottlenecks and evaluate trade-offs before they become entrenched. Their contribution is not technical innovation alone, but the ability to help societies plan transitions that are realistic, equitable and capable of enduring political and economic change.

The cases in this section ground that argument in experience across contrasting energy contexts. In Kenya, science-informed national planning supported the development of a clean cooking transition strategy linking energy access, health and environmental sustainability. In Tamil Nadu, subnational net-zero modelling informed regional transition planning and investment priorities, while multi-actor forums and living labs in the Black Sea region supported collaborative approaches to sustainability transitions and regional coordination. Across these experiences, a common thread emerges: successful energy transitions depend not on isolated technological breakthroughs alone, but on the institutional capacity to coordinate infrastructure, finance and long-term implementation across systems.

CASE STUDY 4

Kenya – National eCooking Strategy advances clean energy access and public health

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GEOGRAPHICAL SCOPE: Kenya.

SUMMARY: Kenya has made major progress on electricity access, yet clean cooking adoption has lagged behind. In 2023, 69% of households still relied on polluting fuels such as firewood, charcoal and kerosene, with major consequences for health, forests, emissions and women's unpaid work. Whole-energy-system modelling helped show that large-scale electric cooking adoption could be integrated into Kenya's predominantly renewable electricity system without compromising grid reliability. This evidence directly informed the Kenya National eCooking Strategy (KNeCS), launched in 2024, which sets a pathway for 10% of households to transition to eCooking by 2028.

The challenge

Kenya's clean cooking transition has not kept pace with electrification. While electricity access rose from 37% in 2013 to 79% in 2023, clean cooking access increased only from 10% to 31%[68], leaving 69% of households dependent on fuels that contribute to indoor air pollution, respiratory illness, deforestation and greenhouse gas emissions[69].

The challenge was not only to promote a cleaner household technology, but to determine whether electric cooking could be integrated into national energy planning in a technically reliable, affordable and equitable way.

Science in action

The Ministry of Energy and Petroleum worked with technical partners to apply whole-energy-system modelling to the question of national eCooking adoption. The modelling assessed grid readiness, electricity demand, investment needs and infrastructure implications, while drawing on baseline household data and Kenya's broader energy planning framework.

This evidence was translated into policy through a multi-year process involving the Ministry of Energy and Petroleum, Modern Energy Cooking Services, Climate Compatible Growth, GIZ, AFD, Nuvoni Centre for Innovation Research, private sector actors and other partners. A Technical Working Group helped synthesize modelling results into evidence packages for policy-makers and link them to stakeholder consultations.

The modelling showed that Kenya's electricity system, supported by a strong renewable generation base, could accommodate projected eCooking demand[70]. This directly informed the design and launch of KNeCS in 2024 as Kenya's first national framework for accelerating electric cooking adoption. The strategy includes national targets, fiscal incentives for efficient appliances, infrastructure planning and market-development interventions.

Early signs of implementation are already visible. KNeCS sets a target for 10% of households to transition to eCooking by 2028[71]. Kenya Power has committed to transitioning 500,000 customers to eCooking by 2026, while pilots in Kenyan schools have demonstrated the operational feasibility of large-scale electric cookstoves for meal preparation[72].

From modelling to national strategy

- Whole-energy-system modelling assessed grid readiness, demand impacts and investment needs.
- Technical partners synthesized evidence for government decision-makers.
- A multi-stakeholder Technical Working Group linked modelling with policy design.
- Kenya launched KNeCS in 2024, setting targets, incentives and implementation pathways.

Lessons for SDG implementation

The case demonstrates the value of integrating clean cooking into national energy planning rather than treating it as a separate household intervention. Scientific modelling helped policy-makers anticipate infrastructure needs, assess affordability and grid-readiness risks, and align clean cooking with electrification and decarbonization objectives.

SDG SYNERGIES

07	03	05	08 09	13
Expanded access to clean household energy	Reduced exposure to household air pollution	Reduced time burden and drudgery for women	Opportunities for local manufacturing and market development	Lower emissions and reduced pressure on biomass fuels

KEY TRADE-OFF: Kenya's clean cooking transition strategy required balancing affordable household energy access and local cooking realities with public health objectives, infrastructure costs and long-term decarbonization goals. Rapid transition pathways also risked excluding low-income households if costs and access barriers were not addressed.

HOW IT WAS MANAGED: Energy modelling, systems analysis and multi-stakeholder planning helped evaluate transition pathways under different social and economic conditions. The strategy combined health, energy and environmental objectives while accounting for affordability, infrastructure constraints and differing regional needs. The approach may be replicable in countries with growing electricity access and renewable energy potential. Its core lesson is that evidence becomes actionable when modelling is co-created with policy-makers, embedded in existing national planning instruments and linked to financing, market development and sustained stakeholder engagement.

Learn more [73, 74, 75]

Snapshot 7: India – Sub-State modelling supports net-zero transition planning in Tamil Nadu

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Tamil Nadu became one of the first Indian states to develop a subnational net-zero framework grounded in integrated energy modelling. Researchers and policy institutions worked with state authorities to develop decarbonization pathways across electricity, transport, industry, buildings, agriculture, livestock, land use and waste sectors while accounting for investment and development priorities.

The decarbonization plans informed the work of the Tamil Nadu Green Climate Company and contributed to state-level planning on renewable energy expansion, energy transition, sustainable agriculture, waste management and enhancing carbon sinks. The initiative demonstrates how science-based subnational planning can help translate national climate targets into operational investment and governance strategies tailored to economic and geographical realities along with regional priorities.

Key SDGs:

07 AFFORDABLE AND CLEAN ENERGY

09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

11 SUSTAINABLE CITIES AND COMMUNITIES

13 CLIMATE ACTION

15 LIFE ON LAND

17 PARTNERSHIPS FOR THE GOALS

Find out more [76, 77, 78]

Snapshot 8: Black Sea region – Multi-actor forums and living labs support regional sustainability transitions

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The DOORS and BRIDGE-BS initiatives established multi-actor forums and living labs across the Black Sea region to strengthen regional cooperation on sustainable blue economy transitions. The initiatives brought together researchers, policy-makers, businesses, civil society organizations and local communities to co-develop solutions related to marine governance, coastal resilience, renewable energy, fisheries and regional innovation.

Scientific assessments, participatory workshops and collaborative pilot activities informed regional policy dialogue and implementation planning. The case demonstrates how science-policy collaboration and transboundary governance platforms can support sustainability transitions in complex regional contexts where environmental, economic and geopolitical challenges intersect.

Key SDGs:

Find out more [79, 80, 81, 82]

THEME 5: URBAN AND PERI-URBAN DEVELOPMENT

More than half the world's population lives in cities today – a share projected to reach two-thirds by 2050, with most of that growth concentrated in regions already under severe climate and infrastructure deficits[83]. Urban areas are simultaneously the primary engine of global economic activity and its most exposed frontier of climate risk, and how they are planned and governed over the next decade will shape the life conditions of billions.

The pressures are well known, but the interactions between them are often underappreciated. Flooding worsens when drainage systems are designed in isolation from housing policy and wetlands are drained or destroyed; water scarcity intensifies when urban expansion outpaces infrastructure; peri-urban areas absorb population growth while falling between the jurisdictional cracks of urban and rural governance. These are not separate problems – they are symptoms of fragmented planning.

Integrated modelling, hydrological assessment and climate-risk analysis do not just generate evidence – they create a shared picture of how urban systems behave under stress, making it possible for decision-makers across sectors to plan together. **The value is not evidence alone, but the capacity to reveal interdependencies that are easily obscured through fragmented governance.**

The cases in this section put that argument to the test. In Southeast Asia, integrated water management linking wastewater, flood adaptation and nature-based solutions reshaped how rapidly urbanizing cities approach climate resilience. In Jordan – one of the most water-scarce countries on earth – systems modelling became the basis for climate finance decisions and long-term urban water planning. Both cases point to the same conclusion: urban transformation depends less on any single technology than on the institutional capacity to plan across systems.

CASE STUDY 5

Southeast Asia – Integrated urban water management strengthens climate resilience

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GEOGRAPHICAL SCOPE: Singapore (primary case), with supporting evidence from Malaysia, Thailand, and Indonesia.

SUMMARY: Rapid urbanization and climate change are increasing flood risks and water management challenges across Southeast Asia. In cities such as Singapore, Bangkok and Jakarta, traditional drainage systems alone have proven insufficient to manage extreme rainfall and wastewater overflow. Through hydrological modelling, integrated urban water planning and implementation of nature-based solutions, several cities established coordinated resilience strategies through combined wastewater management, flood adaptation and urban planning. These cities' experience demonstrates how scientific evidence and engineering know-how can support integrated urban governance through reducing flood exposure, improving water quality and strengthening long-term climate resilience.

The challenge

Cities across Southeast Asia face growing exposure to flooding, water pollution and climate-related risks due to rapid urban expansion, land subsidence and increasingly extreme rainfall patterns. In many cases, wastewater treatment, drainage systems and flood-control infrastructure were planned separately, resulting in fragmented governance and inefficient investments.

The challenge was therefore not simply technical flood control. Cities needed integrated planning approaches capable of linking infrastructure, land use, environmental management and climate adaptation across institutions that had traditionally operated independently.

Science in action

Scientific advances in hydrology, wastewater engineering and climate modelling enabled a shift towards integrated urban water management systems combining wastewater treatment plants, smart drainage and nature-based solutions. Satellite data, predictive flood modelling and water quality monitoring informed infrastructure design, flood-risk mapping and long-term urban planning decisions.

Singapore became a leading example of this transition through its 'source pathway receptor' approach, which integrated drainage systems with water treatment and retention infrastructure at a citywide scale. Similar approaches were adapted elsewhere in the region. Malaysia upgraded wastewater treatment systems to maintain functionality during extreme weather events, Bangkok introduced parks designed to store and gradually release stormwater, and Indonesia expanded decentralized wastewater systems in urban areas.

The transformation relied on sustained collaboration between governments, researchers, engineers and planners. Public investment, particularly in Singapore, supported long-term infrastructure development, while scientific tools helped authorities assess risks, prioritize interventions and continuously refine implementation strategies over time.

The impacts have been significant. Singapore reduced flood-prone land from around 3,200 hectares in the 1970s to less than 25 hectares today[84]. In Malaysia, upgraded systems helped prevent approximately 85% of flood-related contamination incidents, while decentralized systems in Indonesia increased infrastructure resilience by an estimated 40%[85]. Across the region, nature-based solutions reduced stormwater runoff by roughly 20%[86, 87]. These results reflect integrated national programmes in which wastewater modernisation was a key enabling component, alongside drainage infrastructure, nature-based solutions, and governance reforms.

Integrating urban water systems

- Hydrological modelling identified links between flooding, wastewater flows and land use.
- Cities integrated drainage, wastewater and adaptation planning.
- Nature-based solutions complemented engineered infrastructure.
- Urban areas strengthened flood resilience while improving water quality and ecosystem services.

Lessons for SDG implementation

The case demonstrates that urban climate resilience depends not only on infrastructure investment, but on coordination across water, planning and environmental governance systems. Scientific modelling helped cities move beyond fragmented sectoral planning and evaluate long-term resilience benefits across multiple urban systems.

SDG SYNERGIES

06	11	13	17
Improved wastewater management and urban water quality.	Reduced urban flood exposure and strengthened resilience.	Enhanced climate adaptation and risk reduction.	Strengthened coordination between scientific institutions and urban authorities.

KEY TRADE-OFF: The urban water initiatives revealed tensions between rapid urban growth and infrastructure expansion on one hand, and long-term water security, ecological resilience and institutional coordination on the other. Short-term flood control or wastewater solutions risked creating new environmental pressures when implemented in isolation.

HOW IT WAS MANAGED: Integrated systems modelling and cross-sector planning helped cities coordinate wastewater management, flood adaptation and nature-based solutions across fragmented governance systems. Scientific analysis supported longer-term planning capable of balancing infrastructure development with environmental resilience.
The experience suggests that integrated urban water management can generate substantial co-benefits for resilience, public health and infrastructure efficiency, particularly in rapidly urbanizing regions facing increasing climate risks. The approach may be transferable to other cities where fragmented governance weakens long-term adaptation planning.

Find out more[88]

Snapshot 9: Jordan – Water systems modelling informs climate finance for urban water resilience

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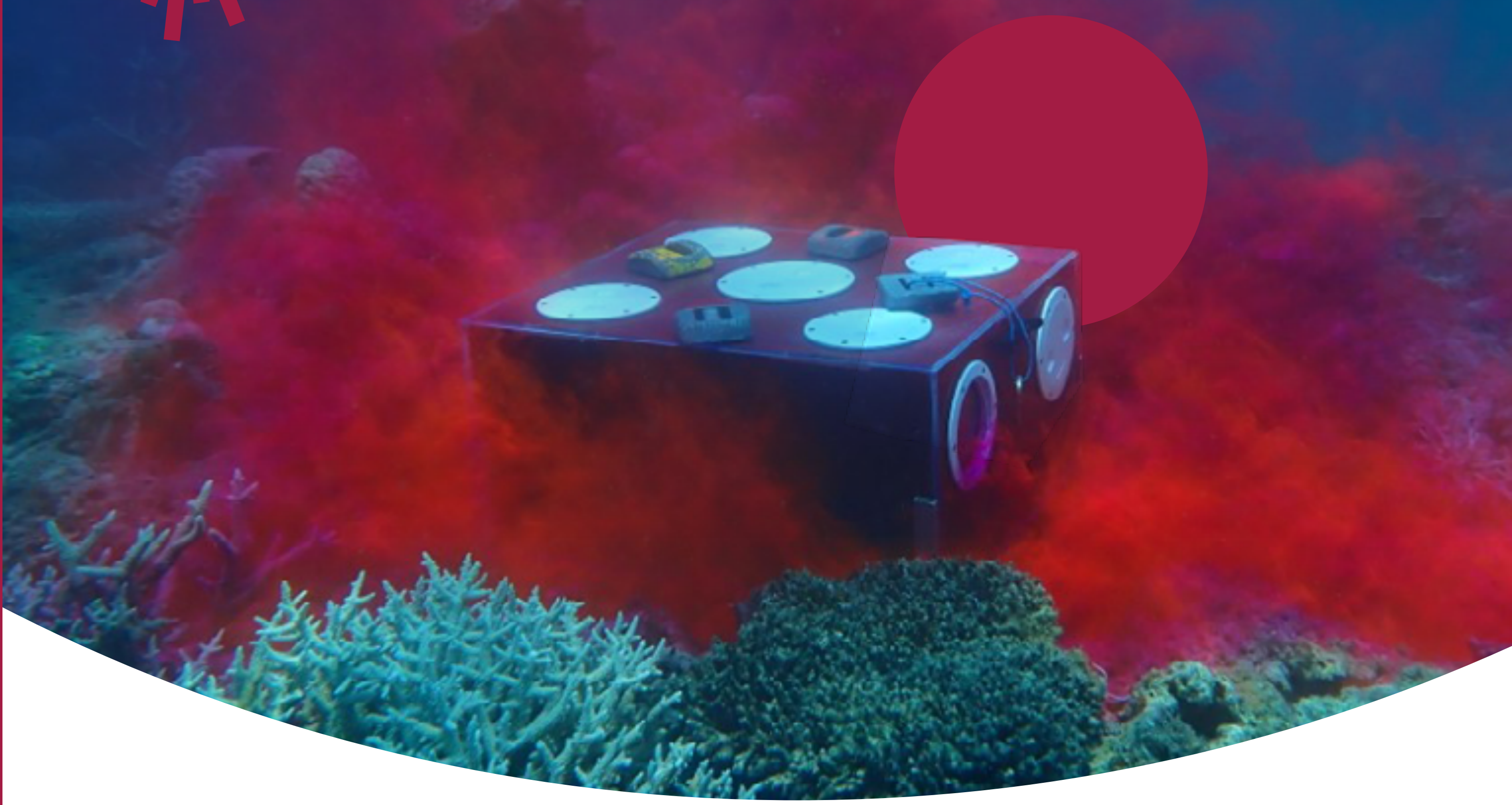
Jordan's water crisis reflects the interaction of limited natural supply, groundwater depletion, infrastructure constraints, population growth, governance failures and climate change. Researchers developed the Jordan Water Model, a nationwide coupled human-natural-engineered systems model, and later extended the work to quantify tanker-water markets, which had become a critical but poorly understood coping mechanism for urban water shortages.

The research was used in the preparation of the Green Climate Fund proposal for the Aqaba-Amman Water Desalination and Conveyance Project, also known as the National Water Carrier. Model outputs helped frame long-term water insecurity and quantify climate co-benefits from reduced reliance on diesel-intensive tanker-water delivery. The case shows how systems modelling can make hidden urban infrastructure dependencies visible and help translate scientific evidence into large-scale investment and climate finance.

Key SDGs:

Find out more [89, 90]

THEME 6: THE GLOBAL ENVIRONMENTAL COMMONS



Since 1970, the abundance of monitored wildlife populations have declined by an average of 73%[91]. Climate systems, biodiversity and oceans – the foundations on which every economy and society ultimately rests – are being degraded faster than the institutions governing them can respond, on timescales that political and financial systems were never designed to manage.

The consequences are not distant. Ecosystem degradation and biodiversity loss accumulate across landscapes and generations, while environmental risks that appear local increasingly cascade across food systems, water security, migration and economic stability[92, 93]. The Amazon rainforest is approaching a tipping point at which dieback may become self-reinforcing[94], while coral reef systems face near-total collapse under two degrees of warming[95]. The degradation of one system increasingly accelerates pressure on the others. **The challenge is therefore not environmental conservation alone, but governing interconnected systems whose consequences transcend borders, sectors and generations.**

Science and engineering help make these dynamics more visible and more actionable. Ecological monitoring, restoration science, climate modelling and adaptive management systems help identify long-term risks, evaluate interventions and support more coordinated forms of stewardship before thresholds are crossed. Their contribution is not evidence alone, but the ability to help institutions, communities and governments recognize risks accumulating in real time and sustain cooperation under conditions of uncertainty and competing priorities.

The cases in this section ground that argument in experience across contrasting ecosystems and governance contexts. On China's Loess Plateau, long-term ecological research informed one of the world's largest restoration initiatives while also generating significant socio-economic benefits for local communities. In Australia, coral restoration technologies are being tested on the Great Barrier Reef, while community-based reforestation efforts in Mexico are linking ecological science with local stewardship at scale. Across these experiences, a common thread emerges: protecting the global environmental commons depends not on environmental ambition alone, but on the long-term institutional capacity to coordinate restoration, governance and collective action across systems.

CASE STUDY 6

China – Ecological restoration on the Loess Plateau links ecosystem recovery with poverty reduction

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GEOGRAPHICAL SCOPE: Loess Plateau, China.

SUMMARY: China's Loess Plateau has long experienced severe soil erosion, land degradation and rural poverty. Through long-term field observations, ecological modelling and integrated land-use planning, researchers and policy-makers developed restoration approaches that informed the large-scale Grain for Green Program. Scientific evidence helped determine optimal revegetation thresholds, land-use configurations and water management strategies suited to different ecological conditions across the Plateau. Since implementation began in 1999, vegetation coverage, carbon sequestration and soil retention have increased significantly, while rural incomes and livelihood diversification have also improved. The case demonstrates how science-informed ecological restoration can generate both environmental and socio-economic benefits at the regional scale.

The challenge

The Loess Plateau is the world's largest and deepest loess deposit, covering approximately 640,000 km². Decades of unsustainable land use contributed to severe soil erosion, declining ecosystem productivity and persistent rural poverty across the region.

The challenge was not simply to increase vegetation cover. Large-scale restoration also needed to account for water availability, ecosystem resilience and rural livelihoods in a fragile and water-limited environment.

Science in action

The initiative combined plot- and catchment-scale observations, field experiments, transect investigations, remote sensing and ecosystem-service modelling to better understand the relationships between land-use structure, soil erosion, water availability and vegetation dynamics.

This research informed the design and refinement of the Grain for Green Programme, one of the world's largest ecological restoration initiatives. Scientific evidence was used to identify optimal spatial arrangements for forests, grasslands and croplands, determine revegetation thresholds and assess trade-offs between ecological restoration and water demand under current and future climate conditions[96, 97].

Implementation brought together research institutions, local governments, implementation partners and communities. Restoration strategies combined top-down planning with bottom-up local knowledge, including site-specific practices for terracing, land preparation, seedling planting and young-forest management. Farmers received subsidies to convert marginal farmland into forests, orchards or grasslands, while local governments supported implementation and scaling.

The impacts have been substantial. Between 2000 and 2020, vegetation coverage increased from 31.6% to 67%, annual carbon sequestration rose from 127 million to 212 million tonnes, and soil erosion declined by 108 million tonnes per year. At the same time, farmers' per capita net income increased from CNY 1,916 to CNY 14,400, while income inequality narrowed and livelihoods diversified beyond traditional agriculture[98]. Therefore, place-based, coupled human–natural research has facilitated the historic transformation of the Loess Plateau from 'yellow' to 'green', achieving a win-win outcome for both the ecosystem and local livelihoods, and breaking the socio-ecological trap.

From ecological research to large-scale restoration

- Field observations, remote sensing and ecosystem modelling identified restoration thresholds and land-use trade-offs.
- Scientific evidence informed the design of the Grain for Green Programme.
- National funding and farmer subsidies enabled large-scale implementation.
- Local knowledge supported site-specific adaptation and long-term ecosystem management.

Lessons for SDG implementation

The case demonstrates that large-scale ecological restoration is most effective when grounded in long-term scientific understanding of ecosystem processes and land-use dynamics. Scientific modelling helped policy-makers balance ecosystem restoration, water availability and livelihood needs across different ecological zones of the Plateau.

SDG SYNERGIES

15	13	01	10	07
Large-scale ecosystem restoration and reduced land degradation	Increased carbon sequestration and climate mitigation benefits	Higher rural incomes and livelihood diversification	Reduced income inequality	Increased hydropower potential through improved watershed conditions

KEY TRADE-OFF: The Loess Plateau restoration programme required balancing large-scale ecological restoration and erosion control with the immediate livelihood and agricultural needs of rural communities dependent on degraded land for income and food production. Restricting land use created risks for already vulnerable populations during the transition period.

HOW IT WAS MANAGED: Long-term public investment, adaptive management and scientific monitoring helped align ecological restoration with livelihood support and alternative income opportunities. The programme combined restoration goals with socio-economic measures designed to strengthen long-term community resilience alongside environmental recovery.

The experience suggests that ecological restoration can generate durable socio-economic co-benefits when linked to supportive policy frameworks, local participation and long-term scientific monitoring. The combination of ecosystem modelling, adaptive land-use planning and livelihood support mechanisms may offer transferable lessons for other large-scale restoration initiatives in environmentally fragile regions.

Find out more [99, 100, 101, 102, 103]

Snapshot 10: Australia – Coral seeding at scale on the Great Barrier Reef

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The Reef Restoration and Adaptation Program is developing and testing a coral seeding toolkit to support large-scale reef restoration on the Great Barrier Reef. The initiative combines coral biology, reef ecology, engineering, robotics, data science and social sciences to improve coral propagation, larval delivery and restoration-site selection.

Large-scale trials began in 2023, including more than 10,000 deployment devices. In 2024, low-cost SeedBoxes released around 14 million coral larvae across two hectares of reef, achieving settlement rates averaging 24 times higher than natural recruitment. In 2025, 32,000 devices were deployed from coral aquaculture, across the northern and southern regions of the GBR. The case shows how cross-disciplinary science and engineering can move reef restoration from experimental research towards operational climate adaptation, while involving reef managers, Traditional Owners, tourism operators and local communities.

Key SDGs:

08 DECENT WORK AND ECONOMIC GROWTH

09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

13 CLIMATE ACTION

14 LIFE BELOW WATER

17 PARTNERSHIPS FOR THE GOALS

Find out more [104, 105, 106]

Snapshot 11: Mexico – ReforestAcción restores urban and peri-urban ecosystems in Colima

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ReforestAcción, led by the University of Colima, addresses soil degradation, biodiversity loss and declining ecosystem services in urban and peri-urban areas of Colima, Mexico. Scientific evidence informed the selection of native and climate-resilient tree species, based on ecological studies, soil analysis and regional climate data.

Since 2024, the initiative has planted more than 20,000 native tree species selected for climate resilience through site selection, soil preparation, community planting days and environmental education. A digital platform supports geolocation, monitoring and adaptive management of planted trees. The case demonstrates how universities can translate ecological knowledge into low-cost, community-based restoration action that strengthens urban green spaces, biodiversity and climate resilience.

Key SDGs:

- 04 QUALITY EDUCATION
- 11 SUSTAINABLE CITIES AND COMMUNITIES
- 13 CLIMATE ACTION
- 15 LIFE ON LAND
- 17 PARTNERSHIPS FOR THE GOALS

Find out more [107, 108]

CONCLUSIONS AND RECOMMENDATIONS

Taken together, the cases presented in this paper suggest that the decisive challenge of sustainable development is not whether solutions exist, but whether societies can build the institutional capacity to implement and sustain them under conditions of complexity, uncertainty and competing priorities.

Across very different contexts – from urban water systems and ecological restoration to public health, energy transitions and food resilience – the most durable forms of progress were rarely driven by isolated innovations alone. Instead, successful implementation depended on institutions capable of coordinating across sectors, integrating different forms of knowledge, sustaining long-term investment and adapting policies over time.

The cases also challenge a common assumption that transformation is primarily a technological process. Again and again, progress depended less on the existence of new tools than on the ability of governments, communities, researchers and practitioners to work across fragmented systems and maintain cooperation under pressure. In many of the strongest examples, science and engineering contributed not by replacing political decision-making, but by helping make complex transitions more understandable and hence more governable.

Modelling, monitoring, systems analysis and participatory approaches helped decision-makers anticipate trade-offs, evaluate long-term pathways and coordinate action across interconnected challenges. Just as importantly, many of the cases demonstrated that implementation becomes more durable when communities, local actors and diverse knowledge holders are involved early on in shaping solutions and adapting them to local realities.

A further lesson emerging across the cases is that transformation is cumulative. Many of the most impactful examples were built through sustained institutional work rather than short-term interventions: public systems strengthened gradually, governance arrangements refined over time and partnerships maintained across political and financial cycles. **The cases, therefore, point towards a broader conclusion for the final years of the 2030 Agenda: durable transformation depends not only on innovation, but on societies' capacity to maintain coordination, learning and collective action over time.**

Drawing on these lessons, the Scientific and Technological Community Major Group offers the following recommendations to Member States, the United Nations system and other stakeholders participating in the 2026 High-level Political Forum:

1. **Strengthen long-term implementation systems connecting science, engineering and public decision-making:** Move beyond ad hoc or crisis-driven forms of science advice towards durable institutional arrangements capable of integrating scientific and engineering expertise into long-term planning, infrastructure development, public investment and governance processes.

2. **Invest in institutional and technical capacity for implementation:** Support sustained investment in public institutions, scientific infrastructure, engineering capacity, data systems and technical training, particularly in under-resourced settings where implementation gaps remain greatest[109].

3. **Align financing and investment with coherent long-term transformation efforts:** Strengthen the integration of scientific evidence into climate finance, infrastructure planning and public and private investment systems to support long-term resilience, prevention and sustainability rather than fragmented or short-term responses.

4. **Embed participation, interdisciplinarity and co-production into implementation processes:** Support governance approaches that bring together scientific disciplines, engineering expertise, communities, Indigenous Peoples, local knowledge holders, civil society and affected groups in the design, implementation and evaluation of sustainability initiatives.

5. **Safeguard international scientific cooperation as a global public good:** Protect cross-border scientific collaboration, open scientific data – particularly on climate and environmental change – equitable participation in science, and open knowledge exchange as essential foundations for collective problem-solving, shared learning and long-term progress across the Sustainable Development Goals.

The experiences presented throughout this paper demonstrate that the foundations for transformation already exist. Around the world, scientific and engineering communities, governments, civil society organizations and local actors are building practical pathways towards more resilient, equitable and sustainable futures. The decisive leap to 2030 will depend on whether these efforts remain isolated examples – or whether the institutional, financial and political conditions needed to sustain and scale them can now be strengthened collectively.

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