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Connecting climate action with other Sustainable Development Goals

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The international community has committed to combat climate change and achieve 17 Sustainable Development Goals (SDGs). Here we explore (dis)connections in evidence and governance between these commitments. Our structured evidence review suggests that climate change can undermine 16 SDGs, while combatting climate change can reinforce all 17 SDGs but undermine efforts to achieve 12. Understanding these relationships requires wider and deeper interdisciplinary collaboration. Climate change and sustainable development governance should be better connected to maximize the effectiveness of action in both domains. The emergence around the world of new coordinating institutions and sustainable development planning represents promising progress.

Through the 2015 Paris Agreement on Climate Change, 197 countries have committed to ambitious efforts to combat climate change, adapt to its effects and provide enhanced support to developing countries[1]. Alongside such commitments by national governments, endorsements of the Paris Agreement by companies, civil society and subnational governments have proliferated globally. In 2015, UN member countries also adopted the 2030 Agenda for Sustainable Development—a comprehensive global plan of action for 'people, planet and prosperity' comprising 17 SDGs and 169 targets to be achieved by 2030[2], including SDG13 on climate action.

These ambitious global commitments collectively mark the beginning of a new 'post-2015' era of sustainable development. They aspire for transformative change in a world confronted by grave social, economic, political and environmental challenges. They also require governance processes that cut across multiple sectors, stakeholders and countries.

Here we appraise the status of scientific evidence concerning relationships between one set of commitments and the other. For each of the 169 targets of the 2030 Agenda, we analysed a body of evidence addressing two intersecting questions: (A) Can the achievement of the Target be affected by climate change?; and (B) Is there published evidence of synergies or trade-offs between the target and climate action? Answers were developed using a consensus-based expert elicitation method. Building on a previous publication[3], the expert elicitation process was undertaken by the authors as a body of experts from diverse disciplines spanning engineering, natural and social sciences. A structured review process was adopted to reach a consensus on the results for questions A and B for all 169 targets. For question (B) we also assessed the relative strength of synergies and trade-offs using the scale proposed by Nilsson and colleagues[4,5], ranging from +3 (indivisible) to −3 (cancelling). The methodology, its limitations and the full results of the analysis are reported in the Supplementary Information. The results of our analysis are summarized below. We highlight the urgent need for better coordination between governance systems relating to climate change and other sustainable development challenges, whilst also pointing to promising progress in this area.

Climate-change action and the SDGs

There is an ever-expanding body of evidence within specific domains focusing on how commitments of the Paris Agreement, and those of the 2030 Agenda, are interconnected both normatively and empirically. This evidence indicates how impacts of climate change will make some development targets harder to achieve—for example, the impacts of climate change on agricultural production, which could set back efforts to reduce poverty and hunger[6,7]. Actions taken to mitigate or adapt to climate change can also have direct interactions with development goals, involving both positive synergies and negative trade-offs[8–13]. Analyses of diverse social, economic and country contexts have demonstrated how outcomes of climate action can have differential impacts on vulnerable social groups, including extreme cases where national climate adaptation programmes have resulted in the violent displacement of poor communities[14].

Although the links between climate-change impacts, climate action and sustainable development are broadly accepted, there has been limited structured investigation, at the level of specific SDG Targets, of synergies and trade-offs. The Intergovernmental Panel on Climate Change (IPCC) special report on *Global Warming of 1.5 °C*[15] features a chapter that investigates links between certain climate mitigation and adaptation actions and the 17 SDGs. While very useful, it does not assess specific synergies and trade-offs between climate impacts, climate action and all 169 individual targets of the 2030 Agenda. Such assessment is essential to the holistic evaluation of climate-related policies, concerning mitigation and/or

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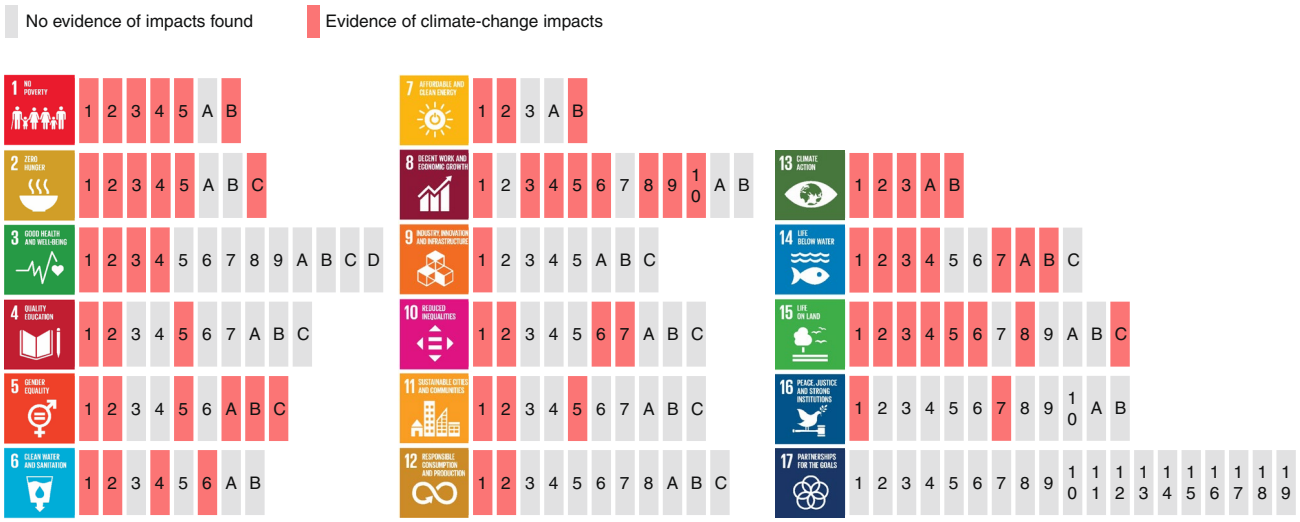

Fig. 1 | Impacts of climate change on the achievement of the SDGs. Each rectangle to the right of the relevant SDG represents a Target. For Targets highlighted in red, we found published evidence of impacts. The absence of highlighting indicates the absence of identified evidence, which does not necessarily mean absence of an impact. Credit: United Nations.

adaptation. The specificity of the SDG targets enables detailed mapping of inter-relationships with and between them, to avoid trade-offs and maximize cross-sectoral policy synergies across domains[4,16,17]. Target-level analyses of the SDGs have been called for[4,16] and completed for several subject matters, both quantitatively and qualitatively. Quantitative analyses of interlinkages among SDG targets typically use indicator data on a set of targets to understand statistical correlation, locally or globally (for example, refs. [18–20]). Qualitative analyses (to which this Perspective contributes) typically use expert elicitations and surveys and look for published evidence of interlinkages among targets. Past work includes mapping energy[3,21], water[22,23], ecosystem services[24], oceans[25], mining[26], artificial intelligence[27] and infrastructures[28] to the SDGs. However, to date no such study has been undertaken for climate-change impacts and climate action.

Climate-change impacts on the SDGs. Our review highlights the pervasive implications of climate change across the diverse range of issues addressed by the SDGs. The identified evidence suggests it will severely exacerbate the already pronounced challenges of sustainable development. We find that action to achieve 72 targets across 16 SDGs could be undermined by climate change (Fig. 1).

Specifically, climate change will affect the achievability of goals relating to material and physical well-being such as prosperity and welfare, poverty eradication and employment, food, energy and water availability and health. For example, climate-change impacts may exacerbate the distribution of disease vectors and disaster-related health risks[29] (targets 3.3, 3.4). Climate-change-driven water shortages can directly impact health by reducing access to clean drinking water and sanitation[23] (6.1, 6.2, 6.4). Climate change may also impact the productivity of agricultural lands, causing malnutrition as well as loss of livelihoods and prosperity (1.1–1.5, 2.1–2.5, 8.1, 8.3–8.5, 12.1, 12.2).

Climate change also undermines efforts to achieve justice and equality across the world. There is evidence that climate change hurts the poorest most, both within and between countries, exacerbating inequality and hampering poverty reduction (1.1–1.5, 10.1, 10.2). Climate-induced resource stresses—including on water, agricultural crops or other biotic resources—could exacerbate competition and conflict, threatening the peace and inclusivity of societies, and undermine social justice (12.1, 16.1). Climate-change-related impacts and disasters are also key drivers of human displacement and mass migrations (8.8, 10.7). Climate change can worsen gender inequalities, for example in cases where girls are the first to be withdrawn from schooling in response to drought or other climate-related shocks (4.1, 4.2, 4.5). Climate-related disasters can lead to increased vulnerability of women and girls to violence, for example if they cause a shift in family power relations or lead to women and girls being vulnerably housed (5.1, 5.2). Women's unequal access to economic resources can also compound their vulnerability to climate impacts (5.4, 5.5, 5.a–5.c).

Climate change poses a major stress for all ecosystems. For example, marine ecosystems face the threats of temperature change and ocean acidification (14.1–14.3, 14.7, 14.b) whereas terrestrial ecosystems may be profoundly altered through deglaciation of mountain systems, increased desertification, invasive species, habitat loss and other climate-related factors (15.1–15.6, 15.8).

Finally, different levels of climate change will have different impacts across national and subnational contexts. A global warming trajectory of 1.5 °C could result in fewer people exposed to climate risks, reduced food and water insecurity, and reduced health impacts and economic losses when compared with a 2 °C trajectory[15].

There is also evidence that climate change could have limited positive impacts, at least for some time, in certain areas of the world. For example, increased temperatures in temperate zones could support efforts to increase agricultural productivity (2.3). However, the literature reports that these positive impacts are most likely to be experienced by currently high-income countries, thereby increasing inequality between countries of high and low income[30].

Sustainable development and climate action. It is of great concern that climate change might impact almost all aspects of sustainable development, giving rise to a pressing need to understand how action to address climate change can reinforce or undermine all other SDGs and vice versa. Our analysis identifies evidence of synergies between climate action and 134 targets across all SDGs (Fig. 2).

For example, climate action can enable and reinforce building prosperous, equal and peaceful societies. It provides a foundation for building strong, functioning and capable institutions (17.1–17.19), and has synergies with targets concerning poverty reduction, welfare and jobs targets (1.1, 1.2, 1.4, 1.5, 1.a, 8.1, 8.2, 8.4, 8.5, 8.8, 8.9). The north-to-south and the south-to-south mechanisms

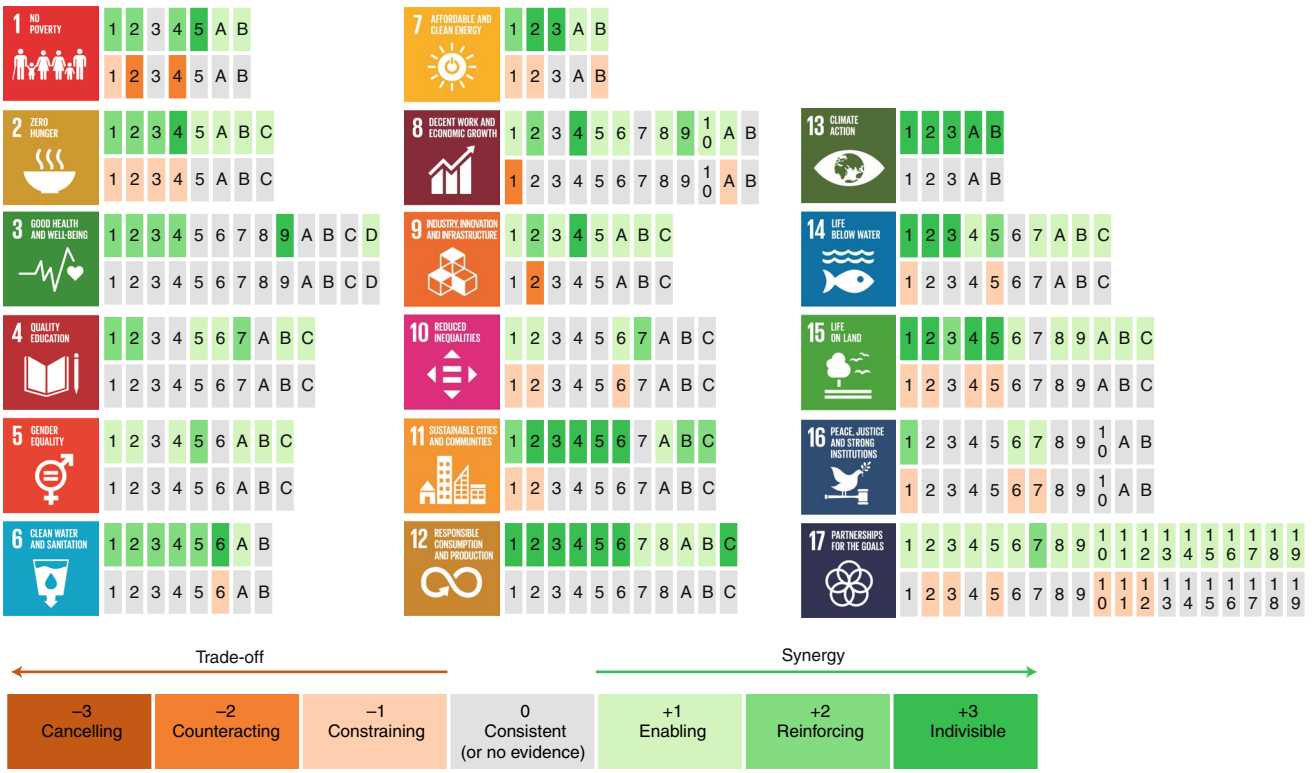

Fig. 2 | Synergies and trade-offs between climate action and the SDGs. Each rectangle to the right of the relevant SDG represents a Target. The highlighting represents the strength of an interaction (the scale[4,5] is explained in detail in the Supplementary Methods). The absence of highlighting indicates the absence of identified evidence. Absence of identified evidence does not necessarily imply the absence of an interlinkage. Figure adapted from refs. [4,5], Springer Nature Ltd. Credit: United Nations.

embedded in climate action are consistent with commitments to both 'contract and converge' emissions and 'level the playing field' across countries, decreasing inequalities among and within countries (10.1, 10.2, 10.7, 14.7, 15.6).

Climate action will require efforts to better plan and manage resources in an integrated way. Many of the targets on food (2.1–2.5, 2.a, 2.b), water (6.1–6.6, 6.a) and energy (7.2, 7.3) systems are reinforcing or indivisible with climate action. Progress on several targets concerning sustainable consumption and production (12.1–12.6) will advance climate action by reducing emissions related to waste and production. Climate action is also indivisible from the achievement of several environmental and health targets. We found synergies between climate action and the management and conservation of other environmental resources, such as marine (14.1–14.5) and terrestrial (15.1–15.5, 15.8, 15.9) ecosystems. Climate action can improve global health outcomes (3.3–3.4, 3.9) by reducing local pollution in households and cities, which harms billions of people every day[31]. Finally, evidence shows sustainable cities and human settlements, as home to the majority of the world's population, (11.1–11-6) will have to play a key role in both climate mitigation and adaptation efforts.

Notably, there are approximately four-times fewer trade-offs than synergies between climate action and the delivery of the SDGs (34 targets across 12 SDGs). Those trade-offs nevertheless have the potential to block climate action—or conversely other development gains—for two broad reasons: climate mitigation policies can be costly in the short term in macroeconomic terms, especially for carbon-intensive and energy-exporting regions (8.1)[15] and could impair carbon-intensive activity and industries (9.2) (while boosting others). Climate action could also adversely affect communities relying on the fossil fuel industries, if a 'just transition' plan is absent. Second, climate policies, if not properly designed can be socially and economically regressive, exacerbating inequality and poverty (1.1, 1.2). For instance, certain climate policies can impact land and food prices (1.4, 2.3, 2.4), increasing the risk of leaving behind small agricultural holders (2.3, 2.4). Ill-designed local climate policies could have transboundary spill overs, affecting SDG advancements in other nations[32]. Some national climate adaptation programmes have even resulted in violence, conflict and death[14]. In the energy sector, while climate action would underpin the adoption of efficient and renewable energy (7.2, 7.3) it might affect the delivery of affordable, reliable and modern energy services for all by 2030 (7.1)—as fossil-fuel energy can be cheaper in certain energy-poor areas[33].

Such issues may pose difficult choices for decision-makers, which cannot be resolved simplistically and require careful consideration[16]. Navigating the complex interactions between climate change and sustainable development requires rethinking both how scientific evidence is generated and how governance and politics operate across sectors.

Finally, it is worthwhile to recall that the targets under each SDG are divided into number-designated outcome targets and letter-designated means of implementation (MoI) targets (Fig. 2). In considering alignment with climate action, it is relevant to focus on the MoI targets and to appreciate that 15 out of 17 SDGs have one or more MoI targets that enable (+1) or reinforce (+2) climate action (and vice versa)—whereas only 2 SDGs include MoI targets that have direct trade-offs with climate action. This result indicates a particular alignment of the implementation actions for the SDGs with climate action.

Connecting the sciences

Knowledge and evidence concerning relationships between sustainable development and climate action are scattered across many different institutions, locations and disciplines—both at the global and local scale. This fragmentation represents a critical barrier to a holistic and integrated understanding of the social–environmental systems embodied in the SDGs[34]. Understanding the potential impacts of climate change on all sustainable development domains is crucial to raise awareness and policy support for climate action, and for planning adaptation programmes that minimize climate-change impacts and maximize progress across all SDGs. The current structure and practice of research simply do not do justice to these connections in at least three ways, which we now explore and suggest solutions to.

First, 'climate–development' research requires mutually respectful methodological integration across natural sciences, engineering and social sciences/humanities to both understand the complex social–ecological dynamics at play and develop solutions that are based on a sound understanding of both physical and social systems. Advantages of such interdisciplinary approaches to science include enhanced legitimacy, the ability to attract and retain cutting-edge scientists and students, delivery of useful knowledge to society and enriching of research[35]. However, institutionally such post-disciplinary work can be difficult to justify to funders focused on narrow academic fields, who assess research excellence and risk accordingly. Some communities are also dismissive of others and perpetuate 'disciplinary chauvinism'[36]. To remedy this situation, funding agencies and research institutions could be further encouraged and incentivized to support research across disciplines, spanning the full range of physical sciences, engineering, social sciences and arts and humanities. Funding agencies could for example require applicants to specify how proposals link to specific SDGs. Such an approach, being pioneered by the likes of the Swedish Research Council Formas and UK Global Challenges Research Fund, allows stakeholders to organize projects into SDG-thematic areas and facilitates linking research outputs across disciplines. Effort should also be dedicated to the monitoring of how funded projects enable practical progress towards sustainable development[37] and on strengthening the science–policy interface[38].

Second, research on specific topic domains is often siloed and relatively little research is done across them. At the macrolevel, climate-change mitigation, climate-change adaptation and sustainable development are commonly characterized as distinct fields, despite their inextricable interconnections. At the microlevel, topics such as water, energy, mobility and transport, food, land use, biodiversity and so on are starting to be treated through integrative 'nexus' approaches, but these do not yet predominate. More efforts are needed to develop practical frameworks for exploring interlinkages among SDGs, also giving attention to overlooked drivers and regions[39,40]. Limited literature has systematically evaluated context-specific synergies and trade-offs between climate action and the SDGs[15]. Addressing this challenge further will require diverse knowledge communities (including custodians of traditional or 'non-expert' knowledge) to gather together to tackle the world's most pressing sustainable development challenges in a coherent and synergistic manner. It is important in this context to acknowledge and address deeply ingrained cultures and norms that prevent the fruitful exchange of information and ideas. The growing body of research on the interconnections among disciplines in the context of the SDGs is encouraging but remains confined to relatively few research teams. Our mapping exercise could also be used as a starting point to identify interlinkages where little or no published evidence is available. Large research organizations should dedicate some effort to identifying how their focal research areas interact and promote collaboration across disciplinary teams. These could be guided by pioneering activities such as those for mapping research contributions in universities to the SDGs[41].

Moreover, addressing both the breadth and depth of the knowledge necessary to progress the SDGs will be necessary. Meta-analyses could be used to gather studies across many disciplines (breadth) to highlight areas where more focused research is needed (depth)[42]. For that to happen, inter-disciplinary programmes and collaborations will be needed to build upon the deep understanding of participants in their field while bringing data and expertise together to provide breadth. The SDSN networks (https://networks.unsdsn.org/) are a promising example of this, bringing together research institutions from across the world. Inclusion of interactional expertise will also be necessary to encourage greater feedback and integration of diverse viewpoints[43], collecting knowledge from non-traditional actors such as laypersons, indigenous groups and community leaders.

Third, the global institutional framework for evidence assessment and synthesis is fragmented, with insufficient attention paid to connecting efforts across distinct but substantively non-discrete institutional mandates. Remedying this situation is challenging. The sheer scope of the remit of an evidence synthesis body such as the IPCC, to take one example, is vast, with three working groups covering the physical science of the climate system, impacts and mitigation. With such in-depth expertise across such a wide area, a straightforward call for the panel itself to achieve even greater breadth, in order to better address crosscutting issues, might be seen to test the limits of practicability to breaking point. Nonetheless, the panel's explorations of impacts and dynamics in, for example, land, oceans and biodiversity, bring clear overlaps with activities of other existing organizations such as the International Land Coalition, the International Oceanographic Commission, the International Resource Panel and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Thus, the key question is less how to make any individual existing body broader in scope, but rather how existing in-depth expertise marshalled by various expert evidence synthesis organizations can be leveraged and combined in a way that also enables the crosscutting nature of the SDG challenges to be addressed.

International institutions tasked with evidence assessment and synthesis should devote some effort to organizing their work in terms of specific SDGs and targets, building as appropriate on the recent work of the IPCC[15] and the UN International Resource Panel[44], while leveraging the existing knowledge of other initiatives such as the Campbell Collaboration[45] and the Global Evidence Synthesis Initiative (GESI)[46]. The design of the assessment activities themselves can also help by embedding crosscutting themes within the guiding research questions that are used to structure research synthesis. An approach of this kind has been demonstrated by the UN's *Global Sustainable Development Report*[47]. Rather than addressing the SDGs sequentially, the report instead proposes crosscutting themes or questions as the basis for moving between SDGs and identifying links between them. For example, the 2016 *Global Sustainable Development Report*[47] 'examines interlinkages between infrastructure, inequality and resilience'. Similarly, the report also takes a crosscutting view on the role of technology in delivering the SDGs. In this way, the structure of the research design used in the *Global Sustainable Development Report* naturally brings out cross-SDG linkages, and therefore could offer a potential template for scaling up. Another interesting example of an assessment report structured in such a way to enable systematic analysis across SDGs is the *IPBES Assessment Report on Land Degradation and Restoration*[48]. This report identifies a theme and uses the SDGs as a structuring device to identify important synergies. Building on these examples, regular programmes of joint meetings between different evidence synthesis and assessment bodies should be considered, alongside the possibility of coordinated action through co-development of workshops, reports, and media events focused on connecting evidence concerning climate change and sustainable development.

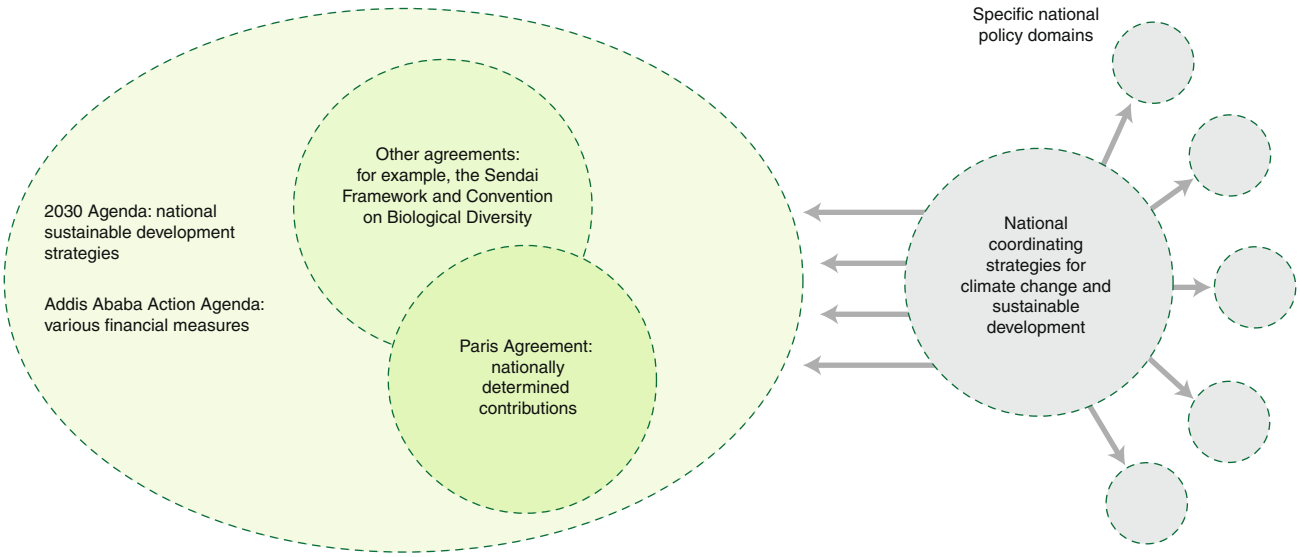

Fig. 3 | Process links between international commitments on climate change and sustainable development. Circles represent the overlapping subject matter scope of each set of commitments—for example the scope of the 2030 Agenda includes climate change (SDG13) which is the principal focus of the 2015 Paris Agreement.

Connecting governance

Frictions between climate action and broader sustainable development policy can undermine social and political support in both domains, whereas capitalizing on synergistic actions can enable both sets of objectives to be met more quickly, efficiently and effectively. For these reasons, several calls have been made for policy-making on climate action and sustainable development to act more holistically across multiple agendas[9,11,15,49].

Both nationally and internationally, many decisions about climate change and sustainable development remain isolated within their respective silos. For example, while all of the 173 nationally determined contributions (NDCs) have impacts on the achievement of selected SDGs[50] both globally and regionally[51], to date only 22 explicitly mention the SDGs and none discuss in detail the impact of climate policy on the achievement of the SDGs. NDCs published by only two governments (Palestine and Tunisia) discuss at a general level the possible impacts of the NDCs on sustainable development.

The interrelationships shown in Figs. 1 and 2 highlight the shortcomings of this prevailing approach to governance. The widespread potential impacts of climate change—spanning 16 SDGs and ~40% of the targets—challenge conventional modes of governance, presenting a powerful case for harmonization of climate action with policies, plans and strategies for social and economic development. It is encouraging in this context that we have identified evidence of synergies between climate action and ~80% of targets in the 2030 Agenda. This underscores the opportunities that can be seized by identifying, and marshalling resources behind climate actions that have been shown to have a wider 'development–dividend'. While the trade-offs between climate action and other sustainable development targets are fewer in number (~20% of targets), knowledge of the distributional impacts of climate action is crucial to design holistic policies in which no-one is left behind.

Harmonizing climate action with broader SDGs will require considerable reform to the policy and governance structures in both domains. Internationally, there is a need for new linking of strategies and deliberations—for example at the UN Climate Change Conferences and the High-Level Political Forums on Sustainable Development—that empower countries and other stakeholders to implement relevant climate change and sustainable development commitments in a coherent and mutually reinforcing manner. In addition to the range of commitments recognized in the Paris Agreement and 2030 Agenda, these also include the Addis Ababa Action Agenda on Finance for Sustainable Development, Sendai Framework for Disaster Risk Reduction, Convention on Biological Diversity and other multilateral agreements concerning the environment. As Fig. 3 illustrates, each of these commitments entails national implementation and reporting processes, which should be connected together in governance processes as an interlocking whole.

Within countries, there is an urgent need to develop ambitious and coordinated policy frameworks for climate change and sustainable development. Consistent leadership in both domains could be supported by: (1) stronger coordination between the lead institutions (often separate ministries with their own topical jurisdictions) responsible for development and climate policy; (2) having either the institution responsible for the SDGs or climate action leading the coordination of the two agendas; or (3) designation of a single institution responsible for the leadership of both the SDGs and climate action[52]. Efforts like the NDC Partnership—a coalition of countries and institutions working to advance the NDC in synergy with the SDGs—will be crucial for promoting such coordination and sharing best practices.

A key step therefore will be to ensure that institutional frameworks within governments are designed to coordinate working across SDG areas. The Organisation for Economic Co-operation and Development (OECD) recommends 'dismantling intellectual and policy silos' and 'enhancing policy and institutional coherence by identifying policy interactions, trade-offs and synergies across economic, social and environmental areas'[53]. Institutional arrangements that encourage the joining up of potentially siloed ministries or portfolios are key to successful implementation at the national level. In some cases, countries have created new institutions and frameworks specifically for the implementation of the 2030 Agenda. In Colombia, an important institutional innovation was the establishment of a High-Level Inter-Agency Commission for the Preparation and Effective Implementation of the Post-2015 Development Agenda[54]. The cross-departmental constitution of this commission may prove useful in helping to improve a cross-sectoral approach to the SDGs.

In other cases, existing institutions, frameworks and tools may be usefully adopted as part of the 2030 Agenda strategy. For example, in Mexico the National Council for the Evaluation of Social

Development Policy (CONEVAL) has developed a multi-dimensional poverty measure, which has been used since 2012 'to target and coordinate multi-dimensional, inter-agency and inter-government (federal, state, municipal) social development strategy'[55]. The multi-dimensional nature of this measure makes it well suited for addressing SDG1 in a way that accounts for synergies with other goals, including hunger, health and wellbeing, education, water and sanitation, affordable and clean energy, reduced inequalities and sustainable cities and communities. Comparable multi-dimensional tools for measuring progress on SDG13 would be similarly helpful in tracing the interdependencies and identifying the synergies between climate action and the other goals.

There are also promising examples of connected national governance within strategies and proposals of nation states. In Canada's Federal Sustainable Development Strategy[56], the 13 goals of the strategy are connected with relevant SDGs and targets. The final report of the Swedish Delegation for the 2030 Agenda[57] presents a number of recommendations to help meet the agenda targets, including around governance processes, enhancing opportunities at regional levels and enabling the participation of all actors. South Korea's Third Basic Plan for Sustainable Development[58] is described as a "basic platform to implement the Agenda 2030". It comprises 14 strategic targets within four overarching goal areas, namely healthy land, integrated and safe society, inclusive creative economy and global responsibility. South Korea has a number of other plans that correspond to other SDGs. A similar approach was taken in Indonesia[59] where an SDG Transition Secretariat was established, which sorted the SDGs, targets and indicators into four areas: social, economic, environment and law and governance, before mapping the SDGs against the government's National Medium-Term Development Plan (RPJMN). The above-mentioned efforts present plans to achieve several SDGs holistically, however they are still limited in identifying and leveraging on synergies and trade-offs among SDG targets.

To connect climate action with broader sustainable development, NDCs (and more broadly national climate policy) could explicitly include assessments of the synergies and trade-offs with broader sustainable development. Similarly, donor agencies could assess the sustainability of particular climate action interventions. Such assessments should be undertaken at a granular level using the detail provided by the SDG targets. Although a political compromise, the SDGs provide a powerful lens through which people and institutions can test the potential outcomes of their decisions across a wide range of objectives that have gained political acceptance at a global level. Clear guidelines on how to connect climate action and sustainable development will be needed. The IPCC, academics and other stakeholders could build on current progress, working together to develop a framework gathering such guidelines. This could also build on previous efforts in tracking the progress of SDGs[60] and setting priorities among SDGs both with qualitative[61] and quantitative[10,62,63] methods. Further, the recurring Conference of the Parties (COP) meetings provide an opportunity for the international community to discuss how to make commitments to coherent and convergent implementation of the Paris Agreement, 2030 Agenda and other post-2015 commitments.

Connecting climate change and other sustainable development governance structures is vital to avoid detrimental trade-offs in either direction, but it also presents a compelling and considerable opportunity for mutually enhancing outcomes to deliver a better world by 2030 and beyond.

Limitations of the analysis

While the authoring team have a wide topical and geographical expertise (spanning engineering, natural and social sciences and with published research covering all continents), it is reasonable to believe that several interlinkages between climate change, action and the SDGs were not captured in this Perspective. For instance, some existing literature on specific interlinkages might not have been found by the authors. For other existing interlinkages, there might not be published evidence yet. Therefore, the absence of identified literature does not necessarily mean the absence of an interlinkage. However, the interlinkages captured in this Perspective are based on existing published literature and are therefore verifiable and replicable. Another possible issue of any meta-analysis based on existing literature is the potential for existing literature to make erroneous inferences. This aspect is mitigated by the experts assessing the evidence, and by reviewing several studies for the found interlinkages. The full methods and results are reported in the Supplementary Information.

Future research could use this study as a starting point, adding interlinkages or evidence to the analysis where appropriate, and as an initial body of literature to identify possible interlinkages of interest for in-depth qualitative and quantitative local-level studies. Finally, qualitative analyses based on existing evidence such as this one can be enriched by quantitative approaches analysing correlation among goals and targets.

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Authors contributions

F.F.N. coordinated the research team for this Perspective, designed and contributed to the expert elicitation process and wrote and reviewed the paper. B.M., B.S. and N.H. designed and contributed to the expert elicitation process and wrote and reviewed the paper. L.C., E.C., M.H., M.T., J.T. and H.Z. contributed to the expert elicitation process and to writing and reviewing sections of the paper.

Competing interests

The authors declare no competing interests.

Additional information

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