1 Introduction

Climate change is one of the most daunting issues facing the international community in the twenty-first century. It is a global governance challenge par excellence, since the actions of all states, corporations and individuals in this domain often have transboundary consequences on all others regardless of territorial boundaries. The international community has made major strides towards tackling the issue since the early 1990s, including concerted efforts within the EU. However, multiple challenges continue to hinder the establishment of a comprehensive, integrated regime and institutional framework capable of effectively combating climate change. Despite ample scientific consensus that the effects of climate change are real and will have profoundly negative impacts on a range of global public goods, from security to trade, health and human rights, efforts to advance an ambitious policy response have fallen far short. The recent Paris Agreement has been hailed by some as 'a model for effective global governance in the twenty-first century' (Slaughter, 2015). However, for others, the voluntary nature of the agreement risks delivering 'appealing promises and renewed victory statements, only to prolong the waiting game' (Gollier and Tirole, 2015: 1). The stakes are as high as they get.

This Element maps the current state of the global climate change regime with a view to taking stock of recent rapid developments in scholarship and real-world events in a post-Paris Agreement era. It illuminates the scope for mobilizing collective action through political, institutional and social channels at all scales of governance, from the subnational to the highest global level of political assembly. It also provides a contemporary snapshot of the interstate regime created by the United Nations Framework Convention on Climate Change (UNFCCC), bolstered by the 2015 Paris Agreement, as well as summary insight into how other formal and informal intergovernmental organizations relate to this regime, including a sophisticated European Union (EU) apparatus already dedicated to tackling climate change at the regional level. It further locates a highly diverse and numerous non-state actor constituency, from market actors to non-governmental organizations (NGOs) to city governors, all of whom have a crucial role to play given the need for fundamental changes in how domestic societies are organized. We hope that this Element will provide the scholarly and general reader with a valuable entry point into key scholarship on global climate governance. It is also intended to serve as an exercise in clarifying complexity, providing the reader with a guide to what may, at first glance, be an almost overwhelmingly complex ecosystem of global climate political activity. As we embark on this crucial decade for averting catastrophic global warming, it is vital that policy-making on environmental protection is

rooted in a deeper understanding of how international and transnational actors interact, not just at the interstate level, but in relationship to a much wider range of domestic actors who indelibly shape political, economic and social life.

At the global level, while the UNFCCC continues to serve as a coordinating focal point within UN structures, there remains no central core to the diverse public and private regulatory arrangements on climate change that have emerged over the past three decades. As Keohane and Victor (2011) observe, there is no single global regime for climate change but rather a regime complex, comprising an array of regulatory elements that are only very partially organized hierarchically. Nevertheless, key institutions operating across different sectors and levels of governance are loosely coupled under the UNFCCC. Indeed, as we document, the Paris Agreement has led to the formalization of non-state actor participation, including by showcasing the climate commitments of cities, regions, businesses and investors through the Non-state Actor Zone for Climate Action portal (NAZCA). It is vital in any mapping of the global climate change regime to give due attention to climate policy initiatives operating outside multilateral forums, with signs of growing coherence among sub- and non-state actors in the form of umbrella initiatives such as the Global Covenant of Mayors for Energy and Climate and the We Mean Business Coalition (Hale, 2016). As this Element documents, an operational turn towards implementation ensures that national policies are now a major focus of concern. The ambitious procedural obligations set by the Paris Agreement will demand rapid and coordinated (re)deployment of local institutional capacity, as well as the building of public support for policy change and mobilization of communities to take action themselves.

One of the most striking shifts has been the evolution of climate policy in China and the United States, prior to the election of Donald Trump. In November 2014, a US–China agreement to take joint action on climate change set the stage for the momentous 2015 Paris Agreement (The White House, 2014). In 2020, the global climate governance landscape looks quite different. While public opinion may give cause for optimism, the US government has served notice to quit the Agreement and is allied with other major fossil fuel producers – Russia and Saudi Arabia – in their efforts to water down effective climate change mitigation efforts. Five years is a long time in climate politics. The obstructive tactics of recalcitrant states were on display at COP-25 held in Madrid in December 2019, widely deemed a disappointment. And this was before the world was engulfed in a global pandemic. It is too early to tell what impact COVID-19 will have on the global climate change response. While UN Secretary-General António Guterres insists that the pandemic must usher in a ‘new model of global governance … to ensure that power, wealth, and

opportunities are shared more broadly and fairly at the international level (UN Secretary General, 2020)', other observers are convinced that the pandemic will entrench 'the fundamental characteristics of geopolitics today', characterized by faltering global cooperation and increasingly antagonistic great-power rivalry (Haass, 2020). Nevertheless, Patricia Espinoza, the Executive Secretary of the UNFCCC insists that their work 'is not, in any form, on hold' (UNFCCC, 2020). Climate change governance is inevitably impacted by the power-political and organizational challenges posed by major member states which refuse to endorse the critical function of global governance structures in coordinating action on the climate emergency.

Ultimately, mobilizing cooperation on the myriad 'wicked problems' which comprise the climate challenge presents an unprecedented collective action problem, given that exacerbation of the risks arises directly out of both macro-environmental interdependence and countless micro-interactions, with virtually all individuals, often unaware, implicated in their intensification (Bernstein and Hoffman, 2019). In other words, not even the most powerful states (or international organizations) will be able to resolve this problem alone and could easily make the situation worse. Indeed, the COVID-19 pandemic has starkly demonstrated the fragility of global response structures and their limited effectiveness in managing such complex global catastrophic risks. It has also highlighted the dangers posed by the erosion of trust in scientific advice as well as national and international public authorities, exacerbated by exclusionary nationalist policies by some major powers and a cyber-enabled 'infodemic' of fake news (United Nations, 2020). In turn, as this Element highlights, agreeing upon the contours of 'the problem' posed by climate change is itself a challenging task. This matters. As policy scholars' flag, accurate problem identification is crucial to devising an appropriate governance response (Peters, 2005). We probe the problem identification challenge through a novel examination of the global public goods dimensions of climate change governance. General agreement that a safe and relatively stable climate is a vital global public good belies the relative lack of consensus over how the problem of climate change should be understood, what must be done, and by whom – with important consequences for which kind of actors get to participate in climate governance processes.

Our mapping of the global climate change regime complex provides an unusually comprehensive insight into how a multilateral architecture of systems-wide principles, rules and procedures is being reshaped to serve as a stable evolving framework capable of accommodating the dynamism of global public policymaking and delivery in the new century (Coen and Pegram, 2018). Designing and enabling responses to climate change will require broad goal-

setting, supplemented by rapid and strategic experimentation by many decentralized actors cognizant of the opportunities and challenges posed by their own operational contexts. This experimental approach is well captured by Hale's (2017) framing of the Paris Agreement as embracing a 'catalytic' model of cooperation, breaking with the legacy 'regulatory' approach. In turn, we complement this notion of a 'catalytic' UNFCCC regime with Keohane and Victor's (2011) framing of a global regime complex. Importantly, we also explore a novel extension of global governance through the creation of independent national climate advisory bodies as a viable pathway to global-to-local climate policy implementation. Given the vast scale of the global climate change regime complex, combined with the absence of any central data repository to account for all regime participants, data collection relies largely on desk research surveying academic literature and policy reports, relevant websites, as well as online data collections, including the International Environmental Agreements (IEA) Database Project.

This Element begins by defining global climate change governance before turning to an analysis of its global public goods dimensions. It then provides an overview of the historical development of the global climate change regime which has resulted in the Paris Agreement. This is followed by a summary mapping of actors involved in global climate change governance. Finally, the analysis locates these diverse actors within the context of an increasingly integrated global regime complex, spotlighting emergent coordinated efforts to accelerate implementation of global climate policy within domestic political jurisdictions. This sets the scene for future work on independent climate advisory bodies, as well as the role of the private sector in limiting warming to a 1.5 °C limit.

2 What Is Global Climate Change Governance?

Before embarking on a domain-mapping exercise, it is important to be explicit on the definitional boundaries of that domain. Climate change has emerged as a priority issue within the broader framework of global environmental governance over the past four decades. Pluralization of authority beyond the nation state is a key feature of this domain, where 'reconfiguration of authority across various actors and multiple levels of decision-making' is a longstanding feature (Hickmann, 2017). More broadly, scholarly efforts to grapple with a globalizing climate governance arena exemplify a rapidly developing cross-disciplinary convergence across a highly diverse body of social, technical and geophysical scholarship (Coen and Pegram, 2018). However, as a useful point of departure, global climate change governance can be defined generally as, 'all purposeful mechanisms and measures aimed

at steering social systems towards preventing, mitigating, or adapting to the risks posed by climate change, established and implemented by states or other authorities' (Jagers and Stripple, 2003: 385).

A focus on 'all purposeful mechanisms and measures', as well as the implementation prerogatives of 'states or other authorities' provides the coordinates for this Element's mapping exercise. We build upon this definition by differentiating among key definitional elements along the dimensions of types of actors (state and non-state), scales of governance (global-to-local), as well as functional domains (regime complexes). The concept of regime complex has become a prominent lens through which to examine increasingly dense clusters of 'partially overlapping and non-hierarchical institutions governing a particular issue-area' (Raustiala and Victor, 2004: 279). Climate change is no exception. The UNFCCC-centred multilateral system constitutes an international regime in and of itself, understood as 'principles, norms, rules and decision-making procedures around which actors' expectations converge in a given area of international relations' (Krasner, 1982: 186). However, it also forms part of a larger *regime complex for climate change* spanning diverse formal and informal arrangements (e.g. private regulations, clubs, transnational initiatives) operating within this issue-area which together constitute a system of loosely coupled regulatory elements that are only partially organized hierarchically (Keohane and Victor, 2011: 12). Crucially, understanding climate change as a regime complex acknowledges that international institutions are themselves embedded within broader institutional frameworks. Opening up inquiry into the causes and consequences of overlaps and intersections among different regimes with an authority claim for a particular issue area (or territory) presents a significant departure from earlier work which tended to focus on discrete regimes ostensibly designed to govern discrete problems (Alter and Raustiala, 2018: 330).

As the concept of regime complex makes clear (see later discussion in Section 6.1), the problems posed by climate change go far beyond environmental governance which can be understood more narrowly as 'directed towards a range of causes – including conservation and environmental protection, spatial and land use planning, (sustainable) management of natural resources, and the protection of human health' (Challies and Newig, 2019). As van Asselt (2011: 59) observes, '[b]ecause of the intricate connections between climate change and other issue areas, there are interrelationships between the global climate regime and other areas of international law.' If we look at climate change regulation, as Wirth (2015) has suggested, important advances could be made quickly if the World Trade Organization (WTO) moved decisively to ensure that custom duties at the border accurately reflected the true environmental costs of

goods. However, these interrelationships have only recently begun to receive academic attention, let alone been subject to effective supranational coordination (Gehring and Faude, 2013).

Finally, fragmentation has been identified as 'one of the fundamental problems of our current regime of global environmental governance' and is a recurring feature of this analysis (Esty, 2009: 427). The possible outcomes of fragmentation (as opposed to integration) of the global climate governance architecture has become a key focus of debate for both scholars and practitioners (Biermann et al., 2009; Isailovic et al., 2013). One frequently highlighted consequence of fragmentation is that responsibility for environmental issues is widely dispersed among different authority structures resulting in suboptimal policy coordination (Esty, 2009). For example, despite some obvious links and issue crossovers, 'the evolving regimes for climate change and biological diversity have little in common' (Young, 2008: 18). 'There are too many organizations engaged in environmental governance in too many different places, often with duplicative mandates' (Najam, Papa and Taiyab, 2006: 14). Beyond definitional boundaries or the functional challenge of effectively coordinating within such a dense actor ecosystem, as the next section makes clear, climate governance also confronts different views regarding its global public goods dimensions, with important distributive and normative consequences.

3 The Global Public Goods Dimensions of Climate Change Governance

A safe and relatively stable climate is now widely considered a vital global public good that requires global collective action. Global public goods (GPGs) are goods whose benefits or costs are of nearly universal reach or potentially affecting anyone anywhere. Arguably, most 'contemporary global challenges tend to possess the properties of a [GPG], or at least include components of a GPG nature' (Kaul and Blondin, 2016: 32). Although there are some GPGs that are naturally available (e.g. the oceans), many are human-made (e.g. the rules governing global trade or the international communication infrastructure). The latter include not just tangible goods or resources but also governance frameworks – including rules, norms and policies – that aim to address common global challenges. Just as 'publicness' is not a static category, 'globalness' is not always a 'natural, persistent property' (Kaul et al., 2003: 10). In other words, states often make political decisions about how 'public' or 'global' a particular good is. To explore the contested boundaries of GPGs in climate change governance, we interrogate three of the core objectives which inform the UNFCCC regime (for a summary, see Table 1 at the end of this section):

Table 1 Global public goods (GPG) dimension of climate change g

	Mitigation	**Adaptation**
GPG dimension widely acknowledged?	Yes, explicit in Convention	No: both the 'public' and the 'global' nature of adaptation remain contested
Main GPG provided?	Climate stability	Global climate resilience
GPG clearly defined?	Yes: Paris Agreement sets goal of limiting global warming to well below 2 °C and ideally 1.5 °C	No: Paris Agreement sets goal of 'enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change' but unclear what exactly that means and how progress can be measured (UNFCCC, 2015)
Other GPG relevant policy objectives (or co-benefits)?	Mitigation has a range of GPG co-benefits, such as reduced dependence on fossil fuels, reduction of pollution, health benefits, etc.	Adaptation is also addressed in the context of sustainable development as well as disaster risk management

Table 1 (cont.)

	Mitigation	**Adaptation**
	Across all three domains, data and knowledge production/sharing on climat constitutes co-benefits with GPG character	
Historical importance?	Recognized as main objective from the beginning. As mitigation goals become less realistic, more emphasis being placed on adaptation and, more recently, L&D	Recognized from the beginning but largely sidelined for the first decade of the UNFCCC process. Adaptation and mitigation now formally enjoy equal importance; however, policy practice remains biased towards mitigation
Source of contestation?	Equity and differentiation (fair burden-sharing); emissions accounting	Disproportionate focus on mitigation over adaptation; lack of sufficient funding for adaptation
	Strong North-South division runs through all three domains but is probably	

- Climate change mitigation (stabilization of greenhouse gas concentration in the atmosphere)
- Climate change adaptation (enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change)
- Climate change loss and damage (distributive or corrective justice through liability and compensation for climate change impacts)

It is important to note that there is no consensus on the boundaries, substance, distinctiveness or relative importance of these three domains. The international climate change regime remains primarily focused on mitigation, corresponding to an increasingly sophisticated institutional apparatus under the UNFCCC. Although the need for adaptation has informed international climate negotiations from the very beginning, it was only in the early 2000s that it emerged as a widely accepted policy objective (Schipper, 2006). Indeed, many initially considered adaptation a 'taboo', arguing that a focus on coping with climate change would distract from and weaken mitigation efforts (Pielke et al., 2007). Today, mitigation and adaptation are widely recognized as complimentary rather than dichotomous. Yet, as explored in the following, the GPG dimensions of adaptation remain contested and discussions under the UNFCCC continue to frame it 'as an exclusively local-to-national issue' (Benzie et al., 2018: 7). The limited success of both mitigation and adaptation efforts under the UNFCCC has led climate vulnerable countries to increasingly emphasize loss and damage (L&D) – the need to address unavoidable and unmanageable climate change impacts – as a separate policy objective. With the adoption of the Paris Agreement, L&D has been elevated, at least on paper, to 'a third pillar of international climate change law' (Broberg, 2020: 528). However, it continues to provoke controversy among negotiating parties due to its ambiguous definition and its emphasis on distributive and corrective justice.

A discussion of mitigation, adaptation and L&D as separate policy objectives allows us to place a spotlight on different conceptualizations of GPGs: What 'goods' should be provided? By whom? How 'global' or 'public' are these goods? What role does justice play? This provides vital context to the mapping of actors, mechanisms and processes of climate governance found in this Element. While analytic description of form, function, mechanisms and procedures provides valuable empirical insight into the workings of global governance, it is also important that global policy scholars do not lose sight of the deeper governance challenges posed by underlying distributive and normative implications of internationally agreed standards. Importantly, the different GPG implications of mitigation, adaptation and L&D do not justify siloed policy approaches. As explored in Sections 3.1–3.3, the three domains are closely

linked and often hard to delineate, also spill over into issue areas such as sustainable development or disaster risk reduction. They present both synergies and potential trade-offs, calling for integrated perspectives and policy approaches that are sensitive to the multidimensional, multi-scalar nature of climate change (Thornton and Comberti, 2017).

3.1 GPG Domain #1: Climate Change Mitigation

Climate change mitigation is the original key objective of the UNFCCC regime. Global mitigation efforts can either be framed as preventing a global public 'bad' – climate change – or providing a global public 'good' – climate stability. Importantly, what constitutes 'dangerous climate change' or a 'stable climate' is ultimately a political decision. Under the 2015 Paris Agreement, governments have set the goal of limiting global warming to well below 2 °C above pre-industrial levels and pursue efforts towards a 1.5 °C limit, but experts warn that even global warming of 1.5 °C would pose serious risks for natural and human systems (IPCC, 2018a).

Human-induced climate change is widely recognized as a GPG problem par excellence. Climate change stability is not a GPG that is 'nice to have'; it is essential for human survival and it provides the basis for the provision of other GPGs such as biodiversity preservation or the containment of infectious diseases. Global warming also poses significant second-order threats to the legitimacy and stability of governance systems more generally. Conversely, climate change mitigation can generate economic, environmental, social and political/institutional innovations and secondary benefits which might constitute (global) public goods in themselves. Such 'co-benefits' of mitigation policies, implying 'a "win-win" strategy to address two or more goals with a single policy measure', have now become a central concept in academia and policy (Mayrhofer and Gupta, 2016: 22). They include, for example, the reduction of pollution and improvements of local air quality through decarbonization, which in turn provide huge health co-benefits. Mitigation measures are increasingly pitched to developing countries as win-win opportunities; reducing their dependence on imported fossil fuels, enhancing fiscal stability, providing green jobs and promoting technology transfer and investment (Mayrhofer and Gupta, 2016).

A stable climate is sometimes considered a pure GPG with non-excludable and non-rival properties: nobody can be excluded from enjoying its benefits and one person's consumption does not diminish the amount available to others. However, as the climate system is reaching key tipping points, it is more appropriate to conceptualize the climate, or, more precisely, the global sinks for greenhouse gases (GHGs), as a global common-pool resource rather than