



Post-Paris:

Understanding Pledge and Review and its Implications for International Cooperation on Climate Change

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Summary

This dissertation studies the mechanisms through which the Paris Agreement proposes to limit global greenhouse gas emissions, and the prospects for these mechanisms to succeed in doing so. In particular it focuses on the Paris Agreement's pledge and review structure, taking a cumulative approach comprising three distinct research papers studying the Agreement from different perspectives.

In the first paper I systematically map the literature studying the Agreement and synthesize existing insights on whether or not it will be effective. I find mixed evidence. Potential drivers of effectiveness, such as the Agreement's transparency provisions, are often qualified by concrete barriers, with the information submitted thus far lacking in quality and comparability. Although the literature provides ample recommendations for overcoming such barriers, the success of the Agreement is found to ultimately depend on national ambition. As such, the Paris Agreement's most promising features are found to lie in its facilitation of norm-diffusion and learning.

In the second paper I use systematic evidence synthesis methods to review existing literature studying five comparable review mechanisms in the human rights, trade, finance and labour regimes. I identify six common factors that influence the performance of these review mechanisms. Using these as benchmarks to assess the Paris Agreement's review mechanisms I find that the Agreement incorporates many of these features. However, two major shortcomings remain, namely the lack of an assessment of the adequacy of national climate policies, and a lack of capacities to effectively carry out the review process. Combined with existing political constraints, these shortcomings suggest that that the Paris Agreement alone is unlikely to be effective.

In the third paper I develop a novel framework for assessing states' nationally determined contribution formulation process based on the state capacities and policy design literatures. I apply the framework to the cases of Brazil, South Africa, India and China. I find that these countries engage imperfectly with the pledge and review structure of the Paris Agreement. They lack systematic processes for formulating their nationally determined contributions, and their international pledges remain detached from domestic climate policy considerations.

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Abbreviations

AIPA – Apex Committee for the Implementation of the Paris Agreement (India)
BASIC Countries – Brazil, South Africa, India and China
COP – Conference of the Parties
DEFF – Department for Environment, Forests and Fisheries (South Africa)
EU – European Union
G20 – Group of 20
GCF – Green Climate Fund
GDP – Gross Domestic Product
GHG – Greenhouse Gas
HRC – Human Rights Council
ILO – International Labour Office
IMF – International Monetary Fund
IO – International Organisation
IPCC – Intergovernmental Panel on Climate Change
LEDS – Low-emissions Development Strategy (South Africa)
LTMS – Long-term Mitigation Strategy (South Africa)
MEE – Ministry of Environment (China)
MFA – Ministry of Foreign Affairs (Brazil)
MMA – Ministry of Environment (Brazil)
MoEFCC – Ministry of Environment, Forestry and Climate Change (India)
MRV – Monitoring, Reporting and Verification
MS – Member State
MST – Ministry of Science and Technology (Brazil)
NAPCC – National Action Plan on Climate Change (India)
NDC – Nationally Determined Contribution
NDRC – National Development and Reform Council (China)
NGO – Non-Governmental Organisation
NSA – Non-State Actor
P4C – Presidential Climate Change Coordination Committee (South Africa)
PA – Paris Agreement
PMCCC – Prime Minister’s Council on Climate Change (India)
PMO – Prime Minister’s Office (India)
PPD – Peak Plateau Decline Mitigation Range (South Africa)
REDD+ – Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
SA – South Africa
TPRM – Trade Policy Review Mechanism
UN – United Nations
UNEP – United Nations Environment Program
UNFCCC – United Nations Framework Convention on Climate Change
UPR – Universal Periodic Review
US – United States
WTO – World Trade Organisation

Part 1: Introduction, Motivation and an Overview of the Research

Chapter 1: Introduction

On December 12th, 2015, the global climate governance regime entered a new era. The 197 parties to the United Nations Framework Convention on Climate Change (UNFCCC) adopted the Paris Agreement (PA), a legal treaty with the specific target of keeping levels of global warming “well below” an agreed threshold of 1.5 – 2°C above pre-industrial levels. The literature has been divided on whether the PA should be considered a success or not. Those mindful of the failure of previous UNFCCC summits to produce any meaningful outcomes hailed the agreement as resounding diplomatic success. Through an innovative “pledge and review” process the PA guaranteed the broad participation of all parties, albeit at the expense of not including binding emissions reduction targets (Dröge 2016, Oberthür 2016). Others looking at the scope of climate action commitments in the Nationally Determined Contributions (NDCs) note that they still fall far short of the 2°C threshold (UNEP Environment 2017), questioning the effectiveness of the pledge and review mechanism (Cramton *et al* 2017). The future success of the Agreement therefore depends on the extent to which emissions reductions can be “ratcheted up” (Bodansky 2016), a process that is envisioned in Article 4 of the Agreement (UNFCCC 2015c).

Six years later it remains unclear whether the PA will be successful in ratcheting up ambition to the extent needed to meet its temperature targets. Many countries updated their NDCs in the lead up to the postponed COP26 in November, 2021 (UNFCCC 2020b). The evidence from these pledges remains mixed; although a recent swell of announcements of net-zero targets by mid-century are cause for optimism, emissions reductions pledges set out in the updated NDCs still fall short of ensuring the PA’s temperature targets are met (UNFCCC 2021, Climate Action Tracker 2020a).

This dissertation studies the PA, aiming to better understand the mechanisms through which the agreement proposes to limit global greenhouse gas emissions, and the prospects for these mechanisms to succeed in doing so. It takes a cumulative approach, comprising three distinct papers each considering the PA from a different perspective. In the first I ask what we already know about the PA, providing a systematic map of the existing peer-reviewed literature studying the agreement’s effectiveness. In the second I ask what we can learn from other international legal regimes, studying review mechanisms in the international trade, finance, human rights and labour regimes, and using

the gained insights to assess the PA's review mechanism design and effectiveness. In the third and final paper I ask what effect the PA has had so far, studying the process by which the NDCs were formulated in four cases, and suggesting best practices for national engagement with subsequent rounds of NDCs.

Together these papers contribute to furthering our understanding of the PA, taking innovative methodological approaches, bridging disciplinary divides, and highlighting overlooked areas of study. The PA has ushered in a new era for international climate policy, and perhaps international relations at large. No longer the purview of a few super-powers, this era relies on the broad participation of all states and non-state actors (NSAs). This requires flexibility and patience, two virtues that become increasingly difficult as the remaining carbon budget steadily decreases. The evidence provided in this dissertation shows that PA is not yet effective. Although it provides flexibility through the pledge and review structure, climate policy engagement is still developing too slowly to meet the PA's targets. However, in its three main chapters, this dissertation presents possibilities for enhancing the PA's effect and enabling international cooperation on climate change. These include; better promoting the PA as a platform for learning, strengthening the capacities of both states and the UNFCCC secretariate in engaging in the periodic review of national climate policies set out in the NDCs, and implementing more complete processes for engaging with the pledge and review mechanism domestically. If implemented, such developments would significantly strengthen the PA's effect and would set an important precedent for the future of pledge and review in international cooperation more generally.

In the rest of these introductory Chapters I motivate my research before introducing the three papers comprising the body of this dissertation; In Chapter 2 I highlight the urgency of the climate crisis and the imperative for international cooperation in solving it. I then provide a brief introduction to the PA and the mechanisms it establishes. I finally situate the dissertation within the broader literature on international climate governance to which it contributes. In Chapter 3 I provide an overview of the research comprising this dissertation, detailing its cumulative approach and justifying its methodological choices. I then introduce the dissertation's three research papers, describing their interlinkages and contribution to the broad goal of understanding the PA. Part 2 of the dissertation contains the three papers that make-up the main contribution to this thesis, each comprising a single Chapter. Finally, Part 3 of the dissertation discusses and concludes. Chapter 7 draws together the

insights gained from each of the main research papers and discusses their implications for the effectiveness of the PA, offering recommendations for how the PA could further be improved upon. The Chapter also discusses the dissertations limitations and presents avenues for further research. A final Chapter concludes with a broader discussion of the implications of pledge and review for international cooperation more generally.

Chapter 2: Motivation

This Chapter motivates the dissertation, presenting the urgent need for international cooperation in the face of the immense consequences of global heating, introducing the subject of this dissertation's study: the Paris Agreement, and providing an overview of the literature studying international cooperation on climate change to which this dissertation contributes.

2.1 Why do we need international cooperation on climate change? Competing framings

Already today human activities, primarily emissions of greenhouse gases caused by burning fossil fuels, have resulted in around 1°C of global warming compared with pre-industrial levels (IPCC 2021, Masson-Delmotte *et al* 2018). Current atmospheric concentrations of CO₂ (410ppm) are higher than at any point in the last 3 million years (Brannen 2021). At the current rate of greenhouse gas emissions the global average temperature is estimated to increase by 4.1 – 4.8°C by 2100 (IPCC 2021, Ritchie and Roser 2019). The implications of this are stark; impacts of a 4°C warmer world include *“severe and widespread impacts on unique and threatened systems, substantial species extinction, large risks to global and regional food security, and the combination of high temperature and humidity compromising normal human activities, including growing food or working outdoors in some areas for parts of the year”* (IPCC 2014, p 14). Geological insights into earth's history provide an alarming glimpse of the potentially catastrophic effect of anthropogenic greenhouse gas emissions; the last time in history CO₂ concentrations were 400ppm or above the arctic was forested, and sea levels were 25m higher (Brannen 2021).

Such catastrophic impacts provide ample reason for limiting global greenhouse gas emissions, and even for decreasing atmospheric concentrations of CO₂. However, the earth's atmosphere represents a global commons (Edenhofer *et al* 2015a). No individual or group owns exclusive rights over its use and so no one can be excluded from using or deriving benefits from it. Considering the tragedy of the commons framing, common pool resources, in the absence of a governing body such as a national government, will be over-utilised by rational individuals, incurring significant social costs, or externalities (Hardin 1968). It should therefore not come as a surprise that human beings have over-utilised the atmosphere by emitting greenhouse gases to such an extent that they now face the

threat of severe climate change and global warming. Given the absence of a global polity regulating access to the atmosphere, sovereign nation states must cooperate in limiting their emission of GHGs in order to avoid potentially catastrophic consequences (Hare *et al* 2010).

However, under the tragedy of the commons framing, international cooperation in the face of common pool resources faces a free-rider problem. Just as one cannot be excluded from the use of the atmosphere, the benefits derived from mitigating emissions are global benefits, benefitting all regardless of their mitigation contributions (Barrett 1990). International cooperation on climate change thus faces a problem of collective action, as states negotiating the international regulation of GHGs are incentivised to defect from cooperation and continue emitting, thus not facing the costs of mitigation but retaining the benefits of others' mitigation actions (Flachsland *et al* 2012, Barrett 1994). Although the cumulative benefits of cooperation outweigh the individual costs of mitigation, in the basic game theory model most actors will defect as this strategy maximises their individual pay-off (Barrett 2005b, 2005a). The primary solution to this collective-action problem is therefore to increase countries' payoff, incentivising climate action over free-riding, for example through the negotiation of a binding global treaty determining mitigation levels, monitoring countries implementation of these, and sanctioning non-compliance (Stavins 2011, Stern 2007, Hare *et al* 2010).

This collective action problem is further complicated by the interaction of domestic politics and international negotiations. This two-level dynamic considerably compromises the outcome of international negotiations, as domestic constituents must ratify all international decisions in some form. Thus negotiations on climate change will remain hostage to domestic politics and rely on the careful balancing of domestic political interests enabling ratification and the interests of the broader international community. The larger the membership to an agreement, the more compromised such an agreement is likely to become as the possible overlap between all participants' positions diminishes (Putnam 1988). In the case of the UNFCCC negotiations on climate change, the unanimity voting dictates that the outcome will to some extent always be sub-optimal, as individual state positions need to trade-off interests in order to gain consensus (Keohane and Victor 2016).

A number of suggestions have been made for how to overcome these problems; countries are aware of these problems and therefore able to strategically address them (Flachsland *et al* 2012). For

example, willing participants may form climate clubs, committing to action based on a collective interest in abating climate change regardless of the actions of other states not part of such clubs, with the hope of facilitating action by others in the future (Nordhaus 2015, Sabel and Victor 2017, Keohane and Victor 2016). Such a “building blocks” approach to climate governance may also include actions complementing international negotiations amongst states, such as city, civil-society, or private-sector initiatives (Sabel and Victor 2017, Hale 2016b, Dorsch and Flachslund 2017). Linking climate change with important domestic issues such as air pollution may further mitigate domestic opposition to climate action (Flachslund *et al* 2012, Keohane and Victor 2016). Linkages may also be international, as for example with the linkage of climate change and international development (Mayrhofer and Gupta 2016). Linking multilateral environmental agreements such as the climate and ozone regimes offers indirect effects, promoting better international environmental protection in the long-run (Oberthür 2002). Moreover, the effect of repeated diplomatic interaction further enforces cooperation, as defection has broader diplomatic consequences not limited to the negotiated topic (Creamer and Simmons 2019). Thus diplomacy can be seen as a self-enforcing mechanism for international cooperation (Keohane and Victor 2016). In the absence of diplomatic incentives for continuous cooperation such results may be achieved through side-payments and transfers (Barrett 1994, Putnam 1988). Free riding may also be mitigated if the lack of domestic incentives to implement climate policy is remedied through technological change (Flachslund *et al* 2012). Finally, the ethical implications of failing to act on climate change provide increasing incentives for cooperation (Barrett 1994).

Although the collective action problem has dominated research on international climate politics, recent contributions have begun to question this framing, arguing that it lacks empirical support and suggesting alternatives (Aklin and Mildemberger 2020, Hale 2020, Patt 2017). For example, empirical evidence suggests that, rather than acting as conditional co-operators, countries can act unilaterally, implementing climate policy or defecting from international cooperation on climate change in response to domestic distributive conflict (Aklin and Mildemberger 2020). Aklin and Mildemberger (2020) suggest that, rather than being a further barrier to collective action in a two level game, domestic politics is the primary determinant of national climate policies, and as such, international cooperation should focus on empowering and coordinating amongst interest groups in order to overcome entrenched domestic opposition to climate action.

A further body of literature suggests that, rather than facing a collective action problem in governing the atmospheric commons, climate action is primarily hindered by technological path-dependencies, rendering a switch from polluting to clean technologies costly and unattractive and requiring government intervention to incentivize technological development (Patt 2015, 2017, Bernstein and Hoffmann 2018, 2019). Under this technological transitions framing the role of international cooperation is to promote and coordinate technological innovation and the global diffusion of clean technologies rather than producing a collective agreement to limit greenhouse gas emissions (Patt and Lilliestam 2018, Geels *et al* 2017).

Finally, it has been suggested that the assumptions supporting the collective action framing for international cooperation on climate change need to be adjusted, proposing a catalytic theory for cooperation (Hale 2020). Hale (2020) argues that 1.) climate action provides private as well as collective benefits (joint goods), 2.) the value that actors place on mitigation, and its associated costs and benefits, varies greatly (preference heterogeneity), and 3.) past actions lower the costs of future actions (increasing returns). Under these three assumptions incentives exist for first movers to act unilaterally as they stand to gain private benefit from the provision of a public good. As these actions induce increasing returns, for example through decreasing technology costs, they adjust other actors' preferences for future action, catalysing cooperation. Thus, rather than prescribe binding targets enforced through sanctions, international cooperation should provide flexibility encouraging first movers, be iterative, adjusting to shifting preferences, and provide information to facilitate learning on increasing returns¹. This framing is supported by the suggestion that existing appraisals have often overlooked the PA's symbolic and discursive elements, proposing the PA as an 'incantatory' system of governance focused on defining common goals, decentralized implementation, and collective review and benchmarking (Aykut *et al* 2020).

Although each of these alternative framings provides evidence to support its claims, questions remain as to whether this evidence is strong enough to truly refute the collective action framing. First, although technological path-dependencies undoubtedly exist, government intervention to incentivize socio-technical transformations still requires political commitment and decision making, indicating collective action considerations remain valid. Second, although there is clear evidence that

¹ Another, earlier, contribution argued along similar lines (Urpelainen 2013).

domestic distributive conflict plays a central role in mediating state-preferences on climate change, such domestic distributive conflict does not take place in a vacuum, with international cooperative efforts having always accompanied domestic climate policy considerations. Empirically untangling these causal chains is difficult. Chapter 6 of this dissertation provides evidence for the importance of international reputation and cooperative efforts, suggesting some of the action on climate change would not exist in the absence of international cooperation. This counters claims that domestic distributive conflict is the most important determinant of national climate action. Thus, although domestic distributive conflict can help explain individual country behaviour, the collective action framing remains central to understanding global climate policy dynamics. Finally, the catalytic, or incantatory, framings provide powerful explanations for why cooperation through the PA's pledge and review structure might prove effective. However, as I show in the remainder of this dissertation, the evidence thus far indicates the PA is not yet effective, and time is running out for it to become so. Should the agreement fail to ensure the necessary levels of cooperation, these alternative framings offer little explanatory power and no effective remedy.

Considering the questions raised above, I posit that these perspectives are not as mutually exclusive as they are often presented, but rather offer nuance in explaining the causal mechanisms determining state preferences on climate change. Thus, this dissertation takes the perspective that an international agreement to reduce greenhouse gas emissions and limit global average temperature rise, as stipulated by the collective action framing, is necessary, but that both domestic distributional conflicts and technological path dependencies mediate individual country preferences on climate action. Thus, and in line with the catalytic cooperation approach, unilateral action is possible even in the face of free-riding, if domestic political support for climate policy is strong enough and/or strategic interests favour moving first. Nonetheless, in the absence of an international agreement, such unilateral action would collapse, or simply not appear, for two reasons; first, in the two level game, the domestic level does not always play first, and therefore international agreements provide an imperative signal facilitating countries engagement with climate policy (Oberthür *et al* 2021). Second, countries rely on positive international feedback in order to sustain unilateral action over-time. In the absence of information about others' actions, as well as the reputational effects of international diplomacy, unilateral action would very likely collapse in the face of persistent free-riding (Oberthür *et al* 2021). Therefore, in addition to empowering domestic constituents to

overcome entrenched interests and facilitating cooperation on technological innovation and diffusion, international cooperation should also provide guidance, information and support.

Whilst the collective action framing stipulates an ideal case scenario where countries agree to binding emissions reduction targets, as depicted above, in reality multilateralism faces numerous limits beyond the free-rider problem (Kinley *et al* 2020). Given these limits, the role of international cooperation on climate change can be described by the following five functions (Oberthür *et al* 2021, Kinley *et al* 2020, Obergassel *et al* 2020):

1. *Providing guidance and signalling to actors* in order to incentivize action.
2. *Setting rules to facilitate collective action*, ensuring countries understand the benefits of their cooperation, and consider this fair and equitable. This could include setting binding emissions reduction targets, but equally a system of pledging voluntary commitments, depending on political support and domestic preferences.
3. *Enhancing transparency and accountability*, providing information on both effectiveness (does the regime achieve its collective goals) and compliance (do individual parties achieve their individual goals).
4. *Offering support* including financial means, cooperation on technological innovation and transfer, and capacity building.
5. *Promoting knowledge and learning* through the regular exchange of experiences and best-practices.

These functions take into account the possibility for catalytic cooperation, but allow for the reinforcement of unilateral action through a more binding form of international agreement, should the necessary political support arise. They further incorporate the need to consider domestic politics, and technological path-dependencies as important factors influencing countries' preferences for climate action. The papers that make up the three main chapters of this dissertation thus take a broad perspective in assessing the PA, highlighting both its shortcomings under a collective action framing, and its importance in catalysing climate action beyond the free-rider problem. However, all three papers remain focused primarily on the PA's provisions for mitigation and as such do not speak to the technological transitions framing. I draw again on the discussion above in Part 3 of this

dissertation, considering the implications of this dissertation's findings for global governance more generally.

In the rest of this Chapter I first provide a brief introduction to the PA and the mechanisms it establishes, depicting them in light of the discussion above. I then present the most recent literature discussing the PA, situating the papers of this thesis therein.

2.2 The Paris Agreement on Climate Change: A brief introduction

The PA takes a novel approach to coordinating international cooperation on climate change. It sets an overarching global temperature target of *“holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change”*, also specifying targets on adaptation and finance (UNFCCC 2015c). Setting such an overarching target acts as a signal to actors, incentivizing action on climate change, albeit imperfectly (Oberghassel *et al* 2020, Morseletto *et al* 2017, Falkner 2016b)

The PA provides national governments with autonomy in determining their contributions to achieving these targets through the periodic “pledge” of NDCs that detail their intended climate action for a given period, including proposed efforts on mitigation, adaptation, finance, technology, capacity building, and transparency (Article 3 UNFCCC 2015c, pp 3–6). Countries are required to submit a new NDC every 5 years, with each NDC ideally increasing in ambition, and at minimum not reducing ambition compared with the previous NDC (UNFCCC 2015c). As such, the periodic pledging of NDCs is intended to “ratchet-up” ambition over time, setting rules to facilitate collective action whilst providing countries with flexibility, incentivizing first movers.

Focusing the PA on non-binding NDCs overcomes domestic opposition in the two-level dynamic, for example enabling the Obama administration to circumvent opposition in Congress that had blocked ratification of the Kyoto Protocol and hindered negotiations at COP15 in Copenhagen. However, in the absence of binding and enforceable commitments, all nations theoretically retain the incentive to defect from their NDCs and thus reap the benefits of emitting whilst letting others bear the costs

of mitigation. Non-binding pledges therefore do little to mitigate the free-rider problem. To this end, the PA stipulates that countries “pledges” and their subsequent implementation are subject to review mechanisms designed to put pressure on states to both achieve their pledged contributions and to foster future pledges that are more ambitious and in line with the PA’s targets (Falkner, 2016; Keohane & Oppenheimer, 2016). These review mechanisms serve to alter the incentives for states to cooperate, aiming to tip the balance in favor of cooperation rather than defection. They further provide for transparency and information, helping countries adjust their preferences and assisting domestic constituents looking to pressure their governments into taking further action.

The PA establishes three review mechanisms; the Enhanced Transparency Framework for Action and Support, the Global Stocktake, and the Compliance Committee. The *Transparency Framework*, sets rules for how nations are to report progress on the implementation of their NDCs, and outlines a process for assessing these reports (Obergassel et al., 2019; Article 13, United Nations, 2015, pp. 16-18). Complementing this review of individual NDCs, the *Global Stocktake* further institutes a periodic assessment of global progress towards achieving the PA’s goals. Whereas the focus of the transparency framework lies in assessing whether countries are on track in reaching the targets set out in their NDC (compliance), the Stocktake aims to assess whether submitted NDCs are collectively on track in achieving the goals of the PA (effectiveness) (Milkoreit and Haapala 2019, UNFCCC 2015c, Mitchell 2006). The distinction is important as the PA does not mandate a review of the adequacy of individual NDCs for the collective goal of limiting global average temperature rise, with the Stocktake explicitly prohibited from assessing individual contributions. Finally, the *Compliance Committee* facilitates the implementation of, and promotes compliance with, the provisions of the Agreement. This includes the structure and content of the NDCs, exemplified for example in the requirement to not submit new NDCs less ambitious than the previous ones. The committee is due to operate in a facilitative and non-punitive manner, resulting in advice and assistance for non-complying parties rather than providing any form of “hard” enforcement mechanism (Zihua, Voigt, & Werksman, 2019; Article 15, United Nations, 2015, p. 19).

These three review mechanisms², together with the periodic submission of NDCs, make up the “pledge and review” process, forming the cornerstone of the PA. Beyond the pledge and review of

² I provide further detail on the review mechanisms in Chapter 5

NDCs, the PA establishes further mechanisms speaking to the barriers to international cooperation detailed in the previous section:

First, the PA establishes a number of mechanisms in order to enable the linkage of climate policies; Article 5 enshrines the role of forests and the REDD+ mechanism encouraging positive incentives for forest conservation in achieving the PA's targets (UNFCCC 2015c). Furthermore, the PA establishes a market-mechanism encouraging the international transfer of mitigation outcomes, as well as a framework for non-market approaches to sustainable development with the aim of enhancing NSA participation in the implementation of the NDCs as well as enabling opportunities for coordination³ (UNFCCC 2015c). These initiatives help to link climate action to broader development objectives by providing positive incentives for developing countries to engage with climate actions. They also promote the "building blocks" approach referenced in the previous section by engaging NSAs in the implementation of national climate policies.

Alongside enabling the linkage of climate policies and broader objectives, the PA also establishes a number of mechanisms for the provision of support to aid countries in achieving their NDCs; Article 9 establishes the UNFCCC's Financial Mechanism, constituted of the Green Climate Fund and the Global Environmental Facility, as the primary financial mechanisms serving the PA⁴, mandating that developed countries provide financial resources to assist developing countries in the implementation of their NDCs (UNFCCC 2015c, Zhang 2019). Article 10 directs the UNFCCC's Technology Mechanism to serve the agreement, and establishes a technology framework to support the implementation of the agreement by providing overarching guidance to the work of the technology mechanism and other related institutions (UNFCCC 2015c). These mechanisms aim to strengthen and coordinate action on technology development and transfer, speaking to the transitions framing briefly discussed above. The PA further establishes the Committee on Capacity-Building in order to coordinate and review projects aiming to enhance developing country capacities in implementing the agreement (UNFCCC 2015c).

³ The engagement of NSAs is further supported through the Non-State Actor Zone for Climate Action Platform, the Lima-Paris Action Agenda and the Local Communities and Indigenous Peoples Platform detailed in the PA's accompanying decision text (Paragraphs 116-117 UNFCCC 2015b).

⁴ Paragraph 59 of the decision establishes the adaptation fund as a further mechanism serving the Agreement (UNFCCC 2015b, p 9)

Lastly, the PA addresses the issue of loss and damage, instituting the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts as the primary means to facilitate understanding, action, support and cooperation on loss and damage (Article 8, United Nations, 2015, pp. 12-13). The debate on loss and damage remains ongoing, however, although politically very unlikely, an established legal liability for loss and damage would considerably change countries' incentives to cooperate on limiting the adverse impacts of climate change.

Together these various mechanisms make up a complex "regime" of interacting parts all aiming to facilitate cooperation amongst nations in order to achieve the PA's targets. This dissertation focuses primarily on the "pledge and review" mechanisms, assessing the extent to which, through pledge and review, the PA will enable the levels of cooperation necessary to achieve its temperature targets. It provides only limited insights into the other aspects of the PA. However, considering the barriers to international cooperation described in the previous section it is clear that pledge and review in of itself may not suffice to enable the levels of cooperation necessary to achieve the PA's targets. To this end the linkage of climate policies both amongst nations and NSAs, the coordination of technological development and transfer, the provision of financial support and capacity building, as well as continued engagement on loss and damage will serve to enhance the PA's effect.

In the following section I provide an overview of the most recent literature studying the PA, introducing a discussion on the agreements' effectiveness to which this dissertation contributes.

2.3 The Paris Agreement on Climate Change: an overview of the literature

The literature studying the PA is generally in agreement that it constitutes a "new logic" for international cooperation on climate change (Falkner 2016b). Particularly its hybrid structure, combining top-down monitoring, review and reporting with bottom-up pledges and action, is presented as an innovative and novel form of international cooperation (Edenhofer *et al* 2015b, Falkner 2016b, Mayer 2019a, Pickering *et al* 2019). Beyond the innovative pledge and review of NDCs, the PA also stands out for its inclusion of NSAs. This "hybrid multilateralism" acknowledges the polycentric regime complex within which the PA acts, looking beyond states to engage other relevant actors (Kuyper *et al* 2018, Jacquet and Jamieson 2016, Hale 2016b, Keohane and Victor 2011, Dorsch

and Flachsland 2017). The PA has also been presented as an experimental form of global governance, relying on learning and the exchange of best practices through coordinated voluntary commitments (Abbott 2017, Keohane and Victor 2015, Spencer and Pierfederici 2015, Oberthür and Bodle 2016, Hermwille *et al* 2017, Gunfaus and Waisman 2021). Most recently, the PA has been proposed as a catalytic institution enabling catalytic cooperation⁵; nationally determined commitments offer flexibility engaging first-movers, pledge and review provides for an iterative process allowing countries to update their preferences, the mechanisms of the PA provide information and support in order to reap increasing returns, and the PA's temperature targets and transparent review process signal to important stakeholders and diffuse norms empowering domestic constituents (Hale 2020).

Despite being presented as an innovative form of international cooperation, there remains significant disagreement over whether the PA can be effective in reaching its targets. Many have argued that, although its broad participation remains a resolute success, it lacks the necessary incentives, or teeth, to reach required levels of mitigation ambition (Keohane and Oppenheimer 2016, Barrett and Dannenberg 2016, Bang *et al* 2016, Obergassel *et al* 2016, Sachs 2020, Karlsson-Vinkhuyzen *et al* 2018, Caparrós 2016). Put differently, the PA's design does not sufficiently solve the collective action problem. Thus, different forms of accountability may be required. Suggestions here include strengthening the role of civil society (Karlsson-Vinkhuyzen *et al* 2018), negotiating climate provisions jointly with technology coordination and/or trade (Edenhofer *et al* 2015b, Bodansky *et al* 2016), focusing on climate clubs, or "minilateralism" (Falkner 2016a, Stua *et al* 2017), and strengthening policy surveillance in order to increase pressure (Aldy 2018). Another suggestion departs more fundamentally from the PA's soft-governance structure; by setting conditional carbon prices willing first-movers could pressure other countries to follow suite, using carrots such as a multilateral compensation fund that compensates members' public good provision, or sticks such as a carbon border adjustment mechanism, in order to reduce incentives for others to free-ride (Kornek and Edenhofer 2020, Mehling *et al* 2019).

The criticisms above posit that by design, the PA alone will not suffice to enable the necessary cooperation on climate change. However, many of the agreement's provisions, for example the

⁵ See discussion in the first section of this chapter. See also earlier contributions offering a similar perspective (Urpelainen 2013)

global stocktake and provisions for loss and damage, remain a work in progress, and there exists significant scope for the agreement to develop further (Oberthür and Bodle 2016). An assessment of the first round of NDCs highlights the need for more transparency and comparability in future NDCs in order to enable an effective review of climate actions (Pauw *et al* 2018a). This is supported by a large body of literature studying the tracking of progress made in reaching the PA's targets and suggesting numerous ways in which to improve the PA's review process (Peters *et al* 2017, Grassi *et al* 2017, Romijn *et al* 2018, Iyer *et al* 2017a, Levin 2018). This suggests that the review processes' ability to put pressure on states to take action, and provide information and signalling to important constituents, may still increase, helping overcome barriers to collective action. Others have highlighted the conservative nature of the NDCs, positing that they may be overachieved (Höhne *et al* 2018). Further, the process of formulating NDCs has been shown to have catalysed national policy making processes for climate action (Röser *et al* 2020, Höhne *et al* 2018). These insights indicate that there remains significant scope for the ratcheting-up of ambition in future NDCs.

Indeed, legal analyses of the PA highlight the flexibility of the agreement as a means to promote climate action (Mayer 2019b). They present the importance of careful differentiation in enabling broad cooperation across member states (Rajamani 2016a, 2016c), and posit that a more binding agreement would have likely come at the cost of reduced participation (Bodansky 2016). In that sense the PA may yet serve to reduce free-riding, albeit imperfectly at first, with all states participating, but at initially suboptimal levels. The ratcheting up of ambitions would thereby serve as an international form of policy sequencing, with the PA setting the initial bar low in order to encourage participation (Meckling *et al* 2017, Pahle *et al* 2018, Leipprand *et al* 2020).

A further body of literature argues that a focus exclusively on national commitments ignores the significant contribution of other actors (Bäckstrand *et al* 2017, Hale 2016a, Hsu *et al* 2020a, Mai 2018, van Asselt 2016). Indeed, NSA initiatives have proliferated since the PA was negotiated, and their efforts are becoming more coordinated (Chan *et al* 2021). Notwithstanding possible overlap and uncertainties, NSAs' potential mitigation contributions are substantial and could bring global emissions reductions in line with the PA's targets (Hsu *et al* 2020b, Lui *et al* 2021). Efforts to realize such ambition are reinforced through domestic commitment to climate action (Roger *et al* 2017). Thus, as states ratchet up their ambition, even if their overall efforts remain suboptimal, there is evidence to suggest that non-state action could fill this emissions gap.

Related to this, it has also been posited that the PA provides a platform for norm diffusion, helping domestic constituents mobilize against fossil fuel interests (Green 2018), and providing discursive and normative signalling through an ‘incantatory’ form of governance (Aykut *et al* 2020). This has been exemplified recently in court decisions in Germany and the Netherlands, with these invoking the PA’s temperature targets as justification for rulings requiring the German government and the oil company Shell respectively to increase their climate ambitions (BVerfG 2021, The Hague District Court 2021). Further initiatives have increasingly managed to apply pressure on the private sector, including large oil companies such as Exxon-Mobile, to more seriously engage with climate action (The Economist 2021, Clark 2021).

Considering these recent findings, initial assessments of the PA lacking the necessary teeth may yet be proven premature. However, enabling the emissions reductions necessary to reach the PA’s targets remains an immense challenge (IEA 2021). An emerging body of literature suggests that in order to overcome this challenge, the PA, and international cooperation on climate change more generally, need to better differentiate between different sectors (Rayner *et al* 2021, Geels *et al* 2019, Busby and Urpelainen 2020). These contributions exemplify the differing needs of various sectors, for example due to diverging technological maturity, advocating for more targeted sectoral coordination efforts (Rayner *et al* 2021). Dividing mitigation efforts by sector would enable a focus on sectors and regions with high mitigation potential, enabling first movers (Busby and Urpelainen 2020). Communicating the benefits of such efforts effectively would incentivize laggard actors to follow suite, thus helping to catalyse cooperation (Busby and Urpelainen 2020). Such a differentiation could further strengthen the role of sectoral governance institutions with more power than the broad PA, such as the G20 playing a more definitive role in governing global climate finance (Kretschmer 2021).

The need for sectoral differentiation is also reflected in how we assess the adequacy of the global response to the PA. Economic performance and environmental outcomes have been the predominant criteria for assessing the effectiveness of multilateral environmental agreements. However, emerging contributions argue that the PA should not only be judged according to its ability to [efficiently] reduce emissions, but also to enable structural transformations, socio-economic conditions, and government arrangements necessary for reaching its targets (Gunfaus and Waisman 2021). This includes the institutional strength of the agreement, and its distributional outcomes

(Dimitrov *et al* 2019, Kverndokk 2018). Moreover, assessments of the PA need to be aligned across multiple levels and over-time, and with sectoral granularity (Gunfaus and Waisman 2021).

This brief discussion of the existing literature studying the PA exemplifies the diversity of insights on whether the agreement can be effective. I summarize the key arguments presented above in the table below, highlighting theoretical assumptions and relevant insights on the PA's effectiveness. However, the perspectives presented are not mutually exclusive and allow for significant overlap. For example, the catalytic cooperation perspective allows for non-state action, norm-diffusion and sectoral differentiation.

The three papers making up the body of this dissertation contribute to this body of literature in various ways: the first (Chapter 4) provides a more comprehensive overview of this literature, offering a systematic empirical assessment of the literature's ex-ante appraisal of the PA's effectiveness and including contributions studying the PA beyond its pledge and review mechanisms. Its conclusions support proposals to look beyond the PA's environmental outcomes and economic performance when assessing its effectiveness. The remaining two papers (Chapters 5 and 6) return their focus to the pledge and review process. Paper two studies the PA's review mechanisms' design and their ability to pressure states into cooperating, contributing to the legal literature on the PA's design by drawing insights from other fields of international law. Paper three studies the extent to which the formulation of pledges catalyses national action on climate change, providing novel empirical insights based on countries engagement with the PA since its negotiation in 2015. I present each of these papers in more detail in the following chapter.

Table 1: Overview of Key Perspectives on International Climate Politics and the Paris Agreement

Perspective	Theoretical assumptions	Key insights on PA	Recommendations for PA
Collective action	States cooperate conditionally; free-riding is the biggest barrier to cooperation.	PA not sufficient; NDC's lack ambition and pledge and review does not sufficiently alter state preferences; other forms of accountability are needed.	Stronger (enforceable) international agreement, unilateralism, side-payments, policy surveillance, policy linkage.
Catalytic cooperation	State preferences evolve; climate action generates increasing returns; private goods enable first-movers.	Flexibility in the PA incentivises first movers, continued development of PA's mechanisms (primarily review and support mechanisms) will help states update their preferences and ratchet up ambition.	Strengthen review and support mechanisms to enhance learning on increasing returns and support states in updating their preferences.
Non-state action	States not the most important actors in increasingly pluralistic global governance landscape.	PA's inclusion of NSAs can overcome lack of national ambition; NSA ambition reflects national ambition so ratcheting up of NDCs is doubly effective.	Strengthen NSA engagement.
Socialization/Norm-diffusion	Domestic politics are key; state interaction through the PA serves to diffuse norms and socialize states.	PA's symbolic and discursive elements crucial in enhancing climate action; mobilizing domestic support for climate policies is the primary role of the PA.	Enhance networks for domestic mobilization; strengthen experimentation and learning in pledge and review.
Sectoral differentiation	Technological path-dependencies form largest barrier to climate action in the future.	PA's focus on broad GHG emission reductions not sufficiently targeted.	Sectoral differentiation in international climate governance.

Chapter 3: Overview of the Research

In this Chapter I detail the cumulative approach taken in this dissertation and provide an overview of the papers that make-up the main contribution to the thesis.

3.1 Research Approach

This dissertation takes a cumulative approach to studying the PA's pledge and review mechanisms, consisting of three separate papers that have been published, or submitted for publication, within a peer-reviewed journal. Each paper was developed in its own right, studying the PA from distinct perspectives. However, important interlinkages exist, and taken together the papers conclusions offer a comprehensive outlook on the PA's effectiveness as is discussed in the final Part of the dissertation.

The papers divide their study of the PA into 3 broad areas. The first studies the PA at large, taking an inclusive focus on all the PA's mechanisms in reviewing the literature on the PA's effectiveness. Papers 2 and 3 hone in on the pledge and review structure, with Paper 2 focusing on the PA's *review* mechanisms, and Paper 3 on countries engagement with the *pledge* process. Thematically the papers build on each other's findings; the first paper highlights gaps in our understanding of the PA's mechanisms, and synthesizes recommendations for further research, laying a foundation for the remaining two papers: First, it identifies the transparency, or review, mechanisms as primary drivers of the PA's effectiveness. However, it also finds that the effectiveness of these mechanisms has been questioned. To this end the second paper studies the PA's review mechanisms design from a new perspective, asking what lessons can be learned from the performance of analogous international review mechanisms for the effectiveness of the PA? Second, it identifies capacity building as a significant gap in the literature, with the second paper further finding capacity building as an important condition for the success of the PA's review mechanisms. This informs the focus of the third paper, which studies the capacities of countries in formulating their NDCs, or pledges.

Each of the papers contribute to the literature studying the PA in novel ways: the first paper employs systematic evidence synthesis methods to provide a comprehensive overview of the literature

studying the PA's effectiveness. It is the first application of these methods to the study of the PA, and perhaps international cooperation more broadly, and as such provides both novel methodological and empirical insights to studying the PA. The second paper further expands the use of systematic evidence synthesis methods to collate insights across analogous international regimes to the PA. This constitutes the first application of these methods to other areas of global governance in order to study the PA. This innovative methodological approach enables the paper to bridge disciplinary divides and provide novel theoretical insights on review mechanism design generally and empirical insights on the PA review mechanisms' effectiveness. The third paper develops an original theoretical framework for studying countries engagement with the NDC process, identifying the NDC formulation process as a significant gap in the literature studying the PA. It exemplifies the value of this framework through carrying out semi-structured interviews in four cases. The results of these expand on existing empirical insights into countries engagement with the PA.

I provide further detail on the individual papers in the sections below. Before doing so, however, the use of systematic evidence synthesis methods in this dissertation warrants further discussion. Systematic evidence synthesis methods refers to a group of methods that broadly involve a comprehensive search of the evidence base resulting in the systematic collection and analysis of relevant evidence on a particular topic using verifiable and repeatable methods. As the available evidence base in most research fields is growing considerably, both in size and variety, such methods are necessary to provide an overview of this evidence that avoids limitations such as selection bias in traditional review methods (Minx *et al* 2017, Callaghan *et al* 2020). This is exemplified in recent research studying the explosion of literature on climate change and its relevance for synthesis exercises such as the regular assessment reports of the intergovernmental panel on climate change (IPCC): between 2014-2019 almost as many papers (202,000) were published studying climate change as during the previous 30 years (205,000), and the literature's vocabulary expanded from 2,000 to 95,000 unique words (Callaghan *et al* 2020). This puts significant strain on the ability for traditional methods of evidence synthesis to provide comprehensive, objective, open and transparent assessments of the available literature. Considering the literature on the PA, whilst carrying out the research for the first paper of this dissertation I identified over 3500 potentially relevant papers studying the PA published by June 2019 in the Web of Science and Scopus platforms. Since 2019 the same search results in 1500 further papers. This wealth of evidence exemplifies the

need for systematic evidence synthesis in studying the PA, and motivates its application in the first paper of this dissertation.

In addition to enabling a comprehensive and transparent review of literature on a specific topic, systematic evidence synthesis methods also allow for aggregating and consolidating evidence across disciplinary and topical divides. This attribute is particularly valuable for the second paper of this dissertation as it allows for the collation of evidence across international legal regimes, helping to bridge epistemological divides, addressing the increasing fragmentation of scientific research.

Systematic evidence synthesis will be increasingly necessary as the existing evidence base continues to grow and fragment. Papers One and Two of this dissertation exemplify ways in which these methods can be applied to manage this literature growth and fragmentation, and their value in producing novel theoretical and empirical insights. This notwithstanding, both papers highlight important limitations in the use of systematic evidence synthesis methods, particularly when faced with the critical appraisal of diverse approaches from a variety of research cultures, and the thematic synthesis of predominantly qualitative and often ex-ante evidence.

3.2 Overview of the Papers

This section provides an overview of each of the three research papers comprising this dissertation, detailing Chapters 4 – 6 of this thesis.

Paper 1: What do we already know about the Paris Agreement?

Chapter Four comprises the first paper of my cumulative PhD dissertation. In it I ask what we already know about the PA, using systematic evidence synthesis methods to map existing literature studying the PA's effectiveness, categorizing the available evidence on whether or not the "Paris Regime" can be effective. The paper serves two primary purposes; the first is to provide an overview of the literature landscape, identifying which of the PA's mechanisms have been studied most extensively and where potential research gaps lie. The second is to collate existing evidence on the PA's effectiveness identifying common drivers of, barriers to, and recommendations for, its success. This

sets it apart from the overview of literature studying the PA in Chapter 2, providing a more structured and detailed empirical contribution. The paper forms the foundation for my further study of the PA's effectiveness in the papers comprising Chapters Five and Six, anchoring the dissertation within the existing body of knowledge on the PA.

The paper splits its analysis into three methodologically distinct sections: the first categorizes the literature according to the mechanisms of the PA being studied. It uncovers a diverse body of literature, albeit with a clear focus on mitigation, identifying adaptation and capacity building to be clear gaps. The second, based on the content analysis of the literature identified as relevant, identifies common drivers of, barriers to, and recommendations for the PA's effectiveness. It provides mixed evidence, with potential drivers often qualified by more concrete barriers. Finally, the third section uses scientometrics to identify six primary research clusters studying the PA. These cover loss and damage, finance, legal issues, international politics, experimental evidence, and studies on tracking progress on the PA's targets.

Together the findings of these three sections present three central themes in the literature studying the PA's effectiveness: First, transparency is widely considered a precondition for the PA to be effective. However, a lack of clear reporting standards and comparable information renders the PA's transparency provisions ineffective. Second, the PA relies on national ambition, of which there is currently too little, and it remains unclear to what extent the Paris Regime structure itself can induce significant ratcheting-up of ambition. Finally, the PA facilitates the diffusion of norms, enables learning and the sharing of best practices. This production of shared norms provides the most promising avenue for overcoming the current lack of ambition, concluding that one of the primary successes of the PA is in providing a platform for the exchange of experiences and ideas.

The paper comprising Chapter Four is co-authored with Prof. Ulrike Kornek (University of Kiel), Prof. Christian Flachsland (Hertie School) and Dr. William F. Lamb (Mercator Research Institute on Global Commons and Climate Change) and published in *Environmental Research Letters* (Raiser *et al* 2020).

Paper 2: What can we Learn from Analogies to the Paris Agreement's Review Mechanisms?

Chapter Five comprises the second paper in my cumulative PhD dissertation. In it I ask what we can learn about the PA's prospective effectiveness from the study of other international legal regimes, focusing on the review aspect of the PA's pledge and review structure. The PA's review mechanisms are not unprecedented in international law. Other international treaty regimes similarly incorporate evaluation and review mechanisms to facilitate cooperation amongst states (Aldy 2014, Hale 2017, Pew Center on Global Climate Change 2010) and the factors that influence their performance have been subject to extensive empirical analysis across international law and international relations literatures. In the paper, I identify five review mechanisms as fitting analogous mechanisms to the PA's review mechanisms; the World Trade Organization's Trade Policy Review Mechanism, the International Monetary Fund's Article IV Consultations, the Universal Periodic Review of the Human Rights Council, the United Nations Treaty Bodies and the International Labour Office's Complaint Procedure.

The paper uses systematic evidence synthesis methods to consolidate insights on the performance of these analogous review mechanisms in order to assess the PA's review mechanism design. It divides this analysis into three stages; first it compiles a comprehensive database of literature analysing the performance of the five analogous regimes resulting in 78 documents distributed over the five analogies that form the basis of the in-depth analysis and synthesis. It then consolidates features contributing to positive or negative performance of each analogous review mechanism, synthesising these to identify six common factors that contribute to the performance of all review mechanisms: 1.) the accuracy and quality of information produced by the review, 2.) a trade-off between expert- and peer-review, 3.) repeated interaction, 4.) the capacity to carry out the review, 5.) the transparency of the review process and its outputs, and 6.) the salience and practicality of the review outcomes.

Applying these conjectures to the PA the paper concludes that the PA's review mechanism design incorporates many of these features, transparently providing highly detailed information, combining both expert and peer-review, establishing repetitive forums for state interaction and establishing institutions to build the reporting capacities of states. The PA's pledge and review design, however, offers no meaningful follow-up as to the content of the pledges, and is not set up to provide practical

recommendations at the national level. This underpins concerns over the PA's ability to "ratchet-up" future pledges. Finally, a lack of capacity or available resources to carry out the review process is shown to present a significant barrier to the performance of the studied analogous mechanisms. With a lack of existing research on the subject, it remains unclear if the UNFCCC's resources and current modalities of engagement with NSAs will suffice to manage the complex and arduous review process established by the PA.

The paper comprising Chapter Five is co-authored with Prof. Başak Çalı and Prof. Christian Flachsland (both Hertie School) and is currently under review in *Climate Policy*.

Paper 3 Has the Paris Agreement been Effective? A study of the NDC formulation process

Chapter Six comprises the third and final paper of my PhD dissertation. In it I ask what effect the PA has had so far in building domestic processes for climate policy engagement? The paper focuses on the process whereby countries formulate their pledges, thus complementing the second paper's focus on the PA's review mechanisms in the dissertation's study of pledge and review. In the paper I argue that beyond studying the content and ambition level of existing pledges, or NDCs, understanding the process of how countries formulate their NDCs can help foster more ambitious pledges in the future. However such a procedural focus remains a gap in the literature, one that the paper aims to fill. To this end I develop an analytical framework based on the state capacity and policy design literatures in order to study the NDC formulation process. I demonstrate its utility through the empirical study of the NDC formulation process in the BASIC countries.

The analytical framework developed in this paper divides the NDC formulation process into analytical, operational and political capacities. Reviewing extant literature on public policy theory and empirical insights from climate policy, the paper specifies factors influencing each of these categories. Analytical capacities concern the factual information the NDC is based on. This includes for example the availability and quality of data and the capacities and tools to use it, as well as the coordination of such analytical inputs to inform the NDC process. Operational capacities concern who is involved in the NDC formulation process and the existence of a longer-term strategy for engagement with the pledge and review process. This includes coordination within government between different ministries, as well as with non-governmental actors in civil society and the private

sector. It further considers the power hierarchies between these involved actors and the institutionalization of a longer-term engagement with the pledge and review process. Finally political capacities concern the support provided to the NDC process, focusing on issues of agenda setting in the formulation of the NDCs.

This framework allows for a comprehensive comparison of countries engagement with the pledge and review process. To this end the paper applies the framework to study the NDC formulation process in the BASIC countries. Based on semi-structured interviews with experts on domestic climate politics and practitioners working with and in government, the paper exemplifies determinants of the NDCs in each case, as well as identifying potential short-comings of the policy formulation process. It finds that the BASIC countries' NDCs by and large reflected pre-existing policies and processes, and failed to establish systematic processes coordinating the formulation of subsequent updates. Most importantly, international climate policy pledges, such as the NDCs and recent net-zero pledges, are shown to remain detached from domestic policy considerations. This suggests the PA has yet to catalyze the necessary engagement with the pledge and review process.

The paper comprising Chapter Six is single authored and is currently under review in *Global Environmental Politics*.

3.3 Outlook

Part 2 of this dissertation contains three chapters that comprise the papers described above in full. Part 3 then draws together the insights gained from each paper and discusses these in light of the overarching goal of better understanding the PA's pledge and review mechanism and its effectiveness. It links these insights back to the discussion of international cooperation on climate change in Section 2.1 above, and suggests ways in which the PA might be able to overcome identified shortcomings. It further discusses this dissertation's limitations, beyond those already recounted in the individual papers, and suggests avenues for further research. Finally the concluding chapter considers the implications of this research for international cooperation more broadly, situating the dissertation within a broader discussion on the dynamics of global governance.

Part 2: Research Papers

Chapter 4: Is the Paris Agreement Effective? A systematic map of the literature

Abstract

The Paris Agreement (PA) sets out to strengthen the global response to climate change, setting targets for mitigation, adaptation, and finance, and establishing mechanisms through which to achieve these targets. The effectiveness of the PA's mechanisms in achieving its targets, however, has been questioned. This review systematically maps the peer-reviewed literature on the PA, categorizing the available evidence on whether or not the "Paris Regime" can be effective. We split our analysis into three methodologically distinct sections: first we categorize the literature according to the mechanisms being studied. We find a diverse body of literature, albeit with a clear focus on mitigation, and identify adaptation and capacity building to be clear gaps. Second, we carry out a content analysis, identifying common drivers of, barriers to, and recommendations for effectiveness. Here we find mixed evidence, with potential drivers often qualified by more concrete barriers. Thirdly, we use scientometrics to identify six research clusters. These cover loss and damage, finance, legal issues, international politics, experimental evidence, and studies on tracking progress on the PA's targets. We conclude with a narrative discussion of our findings, presenting three central themes. First, transparency is widely considered a precondition for the PA to be institutionally effective. However, a lack of clear reporting standards and comparable information renders the PA's transparency provisions ineffective. Second, environmental effectiveness relies on national ambition, of which there is currently too little. It remains unclear to which extent the Paris Regime structure itself can induce significant ratcheting-up of ambition. Finally, the PA facilitates the diffusion of norms, enables learning and the sharing of best practices. This production of shared norms provides the most promising avenue for overcoming the current lack of ambition. One of the primary successes of the PA is in providing a platform for the exchange of experiences and ideas.

4.1 Introduction

The Paris Agreement (PA) presents an important opportunity to coordinate and strengthen the global response to climate change, setting global goals on mitigation, adaptation, and finance. It establishes a wide array of mechanisms through which to achieve these goals, ranging from the “pledge and review” of nationally determined contributions, to the engagement of non-state actors in global efforts to address climate change.

Despite the diplomatic success of 195 member-states (MS) agreeing on such a consequential and legally binding text, the efficacy of the PA remains under intense scrutiny. For example, with the initial rounds of pledges severely lacking in ambition (UNEP 2019)—and global emissions continuing to rise (Friedlingstein *et al* 2019)—many are skeptical about the viability of a “pledge and review” mechanism to ensure the necessary emissions reductions to keep global temperatures well below the 2°C threshold (and the substantially more ambitious 1.5°C threshold) (Cramton, Ockenfels, & Tirole, 2017). Similar questions of efficacy emerge for other mechanisms detailed in the PA (Spash 2016, Oh 2019, Schoenefeld *et al* 2018, Pauw *et al* 2018b). Therefore, ongoing negotiations on the Paris Rulebook and the subsequent operationalization of the many mechanisms the PA proposes to implement will be paramount in deciding whether or not the PA’s targets can be achieved (Bodansky 2016).

Informing these developments, and assisting decision makers in the successful implementation of the PA’s mechanisms thus remains a key task for academic research. Although research exists both supporting and questioning the efficacy of the PA, no attempts have been made to systematically synthesize this research field, with existing reviews either lacking systematic methods (Petticrew and McCartney 2011, Minx *et al* 2017), or remaining too narrow in their focus (for an overview of existing reviews see the protocol for this review in Annex 3). We provide new evidence on the effectiveness of the Paris Agreement by systematically mapping the literature. To our knowledge this is the first application of systematic evidence synthesis to this area of literature. Further, we offer conceptual advances, assessing the PA according to drivers of, barriers to, and recommendations for effectiveness. Following a strict and transparent protocol, we create a comprehensive database of peer-reviewed literature on the PA that is non-trivial in scope and depth. We divide our subsequent analysis of this literature into three sections:

First, we systematically categorize each paper by the aspect of the PA being studied, gaining an overview of the coverage of research on the mechanisms established by the PA. We further categorize the literature according to its general appraisal of the Agreement, identifying which documents depict the PA as a primarily positive or negative development, or offer a mixed appraisal, presenting both positive and negative aspects without favouring one over the other.

Second, we use content analysis to identify the key drivers of, barriers to, and recommendations for improving effectiveness. We define effectiveness here as whether or not the studied mechanism contributes to achieving the targets set out in Article 2 of the PA, namely; limiting global average temperature increase to 1.5°C – 2°C, increasing resilience and the ability to adapt to the adverse impacts of climate change, and ensuring that financial flows are consistent with pathways needed to achieve both targets on mitigation and adaptation, and achieving these targets in an equitable manner (United Nations, 2015, p. 3).

Third, using bibliometric analysis we identify key epistemic communities studying the PA and their interaction.

We conclude with a narrative discussion of our results depicting what we see as the main arguments being made within the literature as to why, or why not, the Paris Agreement will prove successful in tackling the challenges of climate change. We further reflect on the method, presenting both its benefits in terms of comprehensiveness and transparency, and some limitations concerning its application to qualitative ex-ante policy assessment.

In the following section we very briefly summarize the mechanisms of the PA. We then outline the methodology used, present our results, and discuss these.

4.2 The Paris Agreement and its Mechanisms: a brief overview

The Paris Agreement establishes a wide array of mechanisms through which to achieve its goals. We identify these within the Paris Agreement text, as well as its accompanying decision and Paris Rulebook and summarize the results in Table 1.

The central element of the PA is the “pledge and review” mechanism whereby member states periodically submit nationally determined contributions (NDCs) that detail their intended climate action for a given period. These “pledges” and their subsequent implementation are subject to review mechanisms designed to put pressure on states to both achieve their pledged contributions and to foster future pledges that are more ambitious (Falkner, 2016; Keohane & Oppenheimer, 2016). The NDCs should communicate efforts on mitigation, adaptation, finance, technology, capacity building, and transparency (Article 3 & 4, United Nations, 2015, pp. 3–6).

To aid MS in implementing their NDCs, the PA further enshrines the role of forests and the REDD+ mechanism in achieving its targets on mitigation (Article 5, United Nations, 2015, p. 6), and establishes two mechanisms for the linkage of national climate policies. The first consists of a market-mechanism encouraging the international transfer of mitigation outcomes. Secondly a framework for non-market approaches to sustainable development is established with the aim of promoting ambition, enhancing non-state actor participation in the implementation of the NDCs, as well as enabling opportunities for coordination (Article 6, United Nations, 2015, pp. 7-8). Although adaptation is also communicated through the NDCs, the PA puts further emphasis on the importance of adaptation in Article 7, establishing the adaptation communications as a means to track progress on national adaptation actions, and reiterating the importance of presenting national adaptation plans in order to guide this action (Article 7, United Nations, 2015, pp. 9–11). The PA addresses the issue of loss and damage, instituting the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts as the primary means to facilitate understanding, action, support and cooperation on loss and damage (Article 8, United Nations, 2015, pp. 12-13). The PA further establishes the UNFCCC’s Financial Mechanism, constituted of the Green Climate Fund and the Global Environmental Facility as the primary financial mechanisms serving the PA⁶ (Article 9, United Nations, 2015, p. 13-14; Zhang, 2019). Acknowledging the importance of technologies and technology transfer for achieving the PA’s goals, the UNFCCC’s Technology Mechanism is further established to serve the PA, instituting a technology framework to support in the implementation of the PA’s provisions (Article 10, United Nations, 2015, pp. 14-15). The PA also establishes the Committee on Capacity-Building as the primary mechanism to review progress in the field, building

⁶ Paragraph 59 of the decision establishes the adaptation fund as a further mechanism serving the PA (UNFCCC 2015b, p 9)

on previous mechanisms under the Kyoto Protocol and Durban Forum (Article 11, United Nations, 2015, pp. 15-16).

In order to review the NDCs and further information submitted by each MS, the PA establishes a transparency framework, setting rules for how nations are to report progress on the implementation of their NDCs, and outlining a process for assessing these reports (Obergassel et al., 2019; Article 13, United Nations, 2015, pp. 16-18). Complementing the national review process set out through the transparency framework, the PA institutes a periodic assessment of global progress towards achieving the PA's goals, referred to as the "Global Stocktake". In contrast, the focus of the transparency framework lies in the technical reporting of national climate actions, not an assessment of the adequacy of these pledges (Milkoreit & Haapala, 2019; Article 14, United Nations, 2015, p. 18). Finally the PA establishes a committee to facilitate the implementation of, and promote compliance with, the provisions of the PA, such as the structure and content of the NDCs. The committee is due to operate in a facilitative and non-punitive manner, resulting in advice and assistance for non-complying parties (Zihua, Voigt, & Werksman, 2019; Article 15, United Nations, 2015, p. 19).

Finally, the PA establishes two subsidiary bodies to assist in the governing of the PA, by providing information, and assisting in the assessment and review of implementation (Article 18, United Nations, 2015, p. 21-22).

Table 2 provides a full list of the mechanisms detailed in the PA and Decision 1/CP.21, and groups these for simplicity. Together these make up a complex "regime" of interacting mechanisms. Although each mechanism's effectiveness can be assessed in its own right, in this review we focus exclusively on the common attributes of these mechanisms identified as key drivers, barriers and recommendations for the PA's overall effectiveness. We thus do not comment on the specific architecture of each mechanism. However, we encourage further use of the database of the relevant literature on each mechanism we have compiled, inviting further reviews on each mechanism separately.

Table 2: The Paris Agreement's Mechanisms

Paris Agreement Article	Paris Agreement Mechanisms	Grouped Mechanisms
Articles 3 & 4	NDC/INDC	NDC
Article 6	Market Mechanism/Sustainable Development Mechanism	Flexibility Mechanisms
	Non-Market Approaches to Sustainable Development	
	Internationally Traded Mitigation Outcomes	
Article 7	Adaptation Communications	Adaptation
	National Adaptation Plans	
Article 8	Warsaw International Mechanism for Loss and Damage	Loss and Damage
Article 9	Financial Mechanism	Climate Finance
	Green Climate Fund	
	Global Environmental Facility	
	Adaptation Fund	
Article 10	Technology Framework	Technology
	Technology Mechanism	
	Climate Technology Centre and Network	
	Technology Executive Committee	
Article 11	Paris Committee on Capacity Building	Capacity Building
	Capacity Building Initiative for Transparency	
Articles 13-15	Enhanced Transparency Framework for Action and Support	Review
	Global Stocktake	
	Talanoa Dialogue	
	Compliance Committee	
Decision 1/CP.21 para 116-117	Non-State Actor Zone for Climate Action Platform	Non-State Actors
	Lima-Paris Action Agenda	
	Local Communities and Indigenous Peoples Platform	
Article 5	REDD+	
Article 18	Subsidiary Body for Scientific and Technological Advice	Further Mechanisms (not included in study)
	Subsidiary Body for Implementation	

4.3 Methods

This section presents the methods for identifying, selecting, and subsequently analysing the literature studying the Paris Agreement. We divide this up into:

1. Literature search
2. Screening for relevance
3. Extracting relevant information

We conclude the section with a brief discussion of some difficulties we encountered in systematically synthesising the documents we identified as relevant.

Literature Search

Our starting point for this study is to identify the relevant literature studying the PA and to justify our selection. Section 2 provided an overview of the PA's mechanisms, as detailed in the text of the PA, its accompanying decisions, and the Rulebook negotiated at the COP24 in Katowice last December. We use this list of mechanisms to iteratively develop a search query for the Web of Science and Scopus platforms, identifying any document within the encompassing databases that referenced the Paris Agreement (or an associated synonym) or one of the mechanisms identified (or an abbreviation of this mechanism) (see the review protocol published in the supplementary materials for the boolean search string used). We use a list of benchmark articles compiled through expert consultation in order to check the comprehensiveness of our search strategy.

We limit the date of publication to 2016 and onwards. Given the PA was concluded in December 2015 this ensures that the documents identified are relevant to the PA rather than previous climate agreements. We further exclude REDD+. This mechanism was operational long before the PA was being negotiated. Thus we found that most studies on REDD+ focused on projects that precluded the PA, and were not relevant for our analysis of the PA's effectiveness. Finally, we are aware that restricting ourselves to the Web of Science and Scopus platforms limits the comprehensiveness of our search by excluding grey-literature. Our findings on existing research-gaps must therefore be

qualified by the fact that we restrict ourselves to peer-reviewed⁷ research for this study. Nonetheless, we maintain that uncovering a gap in the peer-reviewed literature remains an important and valid finding.

Screening for Relevance

In order to ensure the relevance of the literature identified by our search we screen all documents identified by our search string at the title and abstract level using a strict set of inclusion and exclusion criteria. We include all documents explicitly studying the PA or one of its mechanisms (as identified in Section 2), as well as analyses of analogous mechanisms with explicit reference to the PA, and analyses of the UNFCCC negotiations explicitly relating to a PA mechanism. We exclude studies focused on national/regional case-studies without explicit relation to the broader function of the mechanism they study. These cases often remain confined to their context, offering no comparable information on how the PA works more generally (i.e. case studies of individual GCF projects). We also exclude all studies on climate impacts, as these may make reference to the PA but do not directly relate to its function. Finally, we exclude ex-ante models of emissions or GDP scenarios, unless they explicitly relate to a function of a PA mechanism (i.e. the conducting of the Global Stocktake). This also excludes models of the likely warming effect of the submitted NDCs. Although such models technically study the effectiveness of the PA, they are deemed to be sufficiently synthesized in the annual Emissions Gap Reports (UNEP 2019), or similar assessments. For example, the most recent Emissions Gap Report depicts that based on current NDCs, we are on track to reach 56 Gt CO₂e of Emissions by 2030, amounting to more than double the 25 Gt CO₂e threshold cited necessary as limit global heating to 1.5°C (UNEP 2019). To avoid replicating such existing synthesis we omit these studies from our research. We also exclude conference reports and book reviews. We test these criteria for consistency and clarity by screening random samples with multiple reviewers and subsequently discussing any resulting ambiguities.

⁷ We screened articles for whether or not they were peer-reviewed, albeit with some important exceptions: first, we aimed to be lenient with journals from the global south where we could not always find relevant information on peer-review practices in order to remain geographically more diverse. Second, we include commentaries, editorials and news features from journals such as Nature because, although not always peer-reviewed, they are commissioned by the editors to discuss relevant topics and provide information and arguments to enhance the discussion taking place within the peer-reviewed literature. We thus deemed these pieces to remain relevant.

We finally screen each remaining paper at a full-text level, resulting in a final database of 292 relevant documents published between January 2016 and June 2019⁸ (see figure 1).

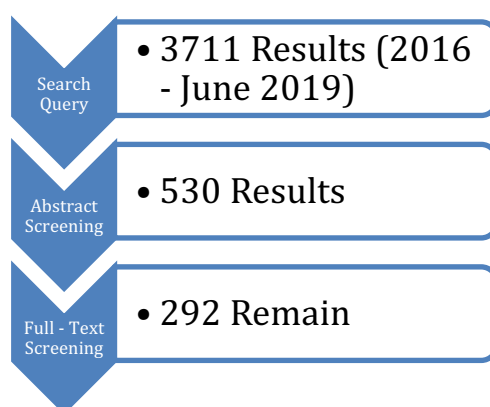


Figure 1: Search and Screening Results

Information Extraction and Analysis

Our analysis of the documents comprises three distinct stages, with corresponding information extraction and analysis in each. First, we extract and compile the following information from each document:

- Meta-data (author, title, journal, year)
- Paris mechanism analyzed (see grouped mechanisms in Table 2)
- General appraisal of the PA (Positive/Negative/Mixed/NA)

This basic information informs our systematic map of the Paris Agreement literature - a descriptive overview of the types of studies in this field, their main areas of investigation, common journals, and so forth. We source the meta-data directly from the Web of Science and Scopus platforms. We grouped the mechanisms used to inform our search query (Table 2), and subsequently classify each document according to the mechanism group it studies. We added a “general” category for relevant documents not explicitly studying only one of the mechanism groups, but rather covering more than one mechanism or the PA in general⁹. We finally classify the literature according to its overall

⁸ Our final cutoff date was the 14th of June, 2016

⁹ Some documents in the general category may focus on a specific issue (e.g. non-state actors) but study this issue across multiple mechanism groups (rather than e.g. just focusing on the non-state actor mechanism group).

appraisal of the Paris Agreement, distinguishing between documents that find the PA to be generally a positive development, negative development, or neither positive nor negative (mixed). We include an N/A category for documents that make no appraisal of the PA.

The second part of our analysis builds upon an assessment of drivers, barriers, and recommendations. In other words, we search for the main arguments made within the literature as to why, or why not, the Paris Agreement will prove effective in reaching its goals. Table 2 broadly defines what we mean by drivers, barriers and recommendations. Based on a first reading of all the documents, we iteratively develop a codebook for identifying detailed categories for drivers, barriers and recommendations: first we extract text excerpts from abstracts and conclusions that could be considered drivers/barriers/recommendations, then we develop common categories across these excerpts, and we refine our codebook in several rounds of coding sub-samples of 5-10 papers by all authors. Finally, the codebook (see Appendix 1.1) was applied to all documents. We further differentiate between hypothetical/actual, as well as direct/indirect/distinct¹⁰, drivers and barriers. We only code the abstract and conclusions, reasoning that common arguments concerning the PA's effectiveness were most likely to be present in these sections.

Table 3: Description of Drivers, Barriers and Recommendations

Drivers	Any mechanism, policy, condition etc. that enables the Paris Agreement to achieve its goals on mitigation, adaptation, finance and equity, or the functioning of one of the PA Mechanisms to achieve those goals.
Barriers	Any mechanism, policy, condition etc. that hinder the PA or one of its mechanisms to achieve its goals on mitigation, adaptation, finance and equity, or pose and obstacle/challenge to the functioning of the PA's mechanisms.
Recommendations	Practical/actionable suggestions for change so that a particular mechanism, policy, condition etc. may better enable the PA to reach its goals on mitigation, adaptation, finance and equity.

¹⁰ We added the direct/indirect/distinct category in order to help us with the coding process, as it made excerpts easier to identify and categorize. However we did not find any interesting patterns from this categorization and so leave it out of our analysis.

The final part of our analysis applies scientometric methods to uncover the main epistemic communities conducting research on the Paris Agreement. Each document contains a list of references; we use this information to generate a bibliographic coupling network, identifying common patterns of referencing across the document set. In a bibliographic coupling network, two documents are coupled if they share at least two common references. We use the *igraph* Python package to display the network (using *ForceAtlas2* layout) and perform the cluster analysis (Csardi and Nepusz 2006, Goodchild 1995), identifying groups of documents that tend to cite similar literatures. Combining these clusters with the categories we coded, we describe the mechanisms being studied by each cluster, as well as the primary drivers of and barriers to effectiveness identified by each epistemic group. Since not all documents share common references, our network is smaller than the total size of the document set (292 articles); we therefore make a careful distinction between this analysis and the broader literature in our results.

Caveats and Intercoder Reliability

Ensuring reliability in content analyses can be done through having at least two coders separately code the same units (in our case documents) (Krippendorff 2004). Having double coded a sample of 30 documents (10%) we found that our inter-coder reliability results were mixed. Our reliability was adequate for the more descriptive categories coding the mechanism being studied and the document's

Description	Krippendorffs Alpha
Paris Agreement Mechanisms	0.613
General Appraisal of the PA	0.721
Drivers and Barriers	Average: 0.431

Table 4: Inter-Coder Reliability Scores

general appraisal of the PA. We were however not able to produce consistently reliable results for our coding of drivers, barriers and recommendations (See table 4 for an overview. Appendix 1.2 details reliability statistics for each driver and barrier). Despite months of testing our codebook we found that there were simply too many factors involved in this process that were subject to coder interpretation. We therefore divide our analysis into distinct sections, ensuring we do not conflate our less reliable results with those for which we have high reliability. Furthermore, we transparently offer our coding and codebook for reader scrutiny, thus making the interpretations we base our results on openly available. We strongly encourage inspection of these and welcome any comments by readers (see supplementary materials published together with the Article (Raiser *et al* 2020)). We offer further reflections on these challenges in our conclusions.

Finally, it is important to stress that although our research approach provides for comprehensiveness and transparency, it remains a synthesis of existing knowledge. As such the added value of our findings is that they offer a truly comprehensive overview of existing peer-reviewed research on the PA, bringing together findings from a variety of fields, rather than in identifying completely new mechanisms or evaluating the validity of claims made with respect to the existence of specific mechanisms.

4.4 Results

Our analysis comprises three distinct parts: First, we descriptively analyse the literature, presenting an overview of the mechanisms being studied, systematically mapping the literature, identifying key areas of focus as well as research gaps. Combining this with our coding of the documents' general appraisal of the PA, we begin to uncover potential patterns in the evidence for the PA's effectiveness.

Second, we provide a more in-depth analysis of the evidence on whether or not the PA is likely to be effective. Here we describe the results of our coding for drivers, barriers and recommendations. We identify key patterns, grouping the evidence to provide a simpler overview. However, given the low reliability of these findings we report them with lower confidence, separating them from the aforementioned systematic map.

Finally we present the results of our scientometric analysis, describing the epistemic clusters we identify, their links to one another, and the primary arguments they offer for whether or not the PA is/can be effective.

We present these results below. Our final discussion departs from the descriptive, quantitative and systematic analysis of the previous three sections. Instead, it develops our own qualitative analysis of PA effectiveness in a narrative building on our reading and analysis of the available academic research on the PA.

Systematic Map: A descriptive overview of the literature

Our literature search resulted in 292 relevant papers studying the Paris Agreement. Of these, almost half could be classified as covering the PA generally, with a further 18% (53 papers) focusing explicitly on the NDC's. The other mechanisms established by the PA receive decidedly less attention. Surprisingly, given the prominence of adaptation within the targets set by the PA itself, only four papers explicitly focus on the adaptation communications and national adaptation plans as separate mechanisms. We found no evidence of the literature we categorized as "NDC" or "General" tackling the issue of adaptation more substantively, with only 10 papers examining adaptation in reference to one of the other identified mechanisms. Although no papers explicitly study the mechanisms established on capacity building we did find some evidence of capacity playing a role as a barrier to and recommendation for improving effectiveness.

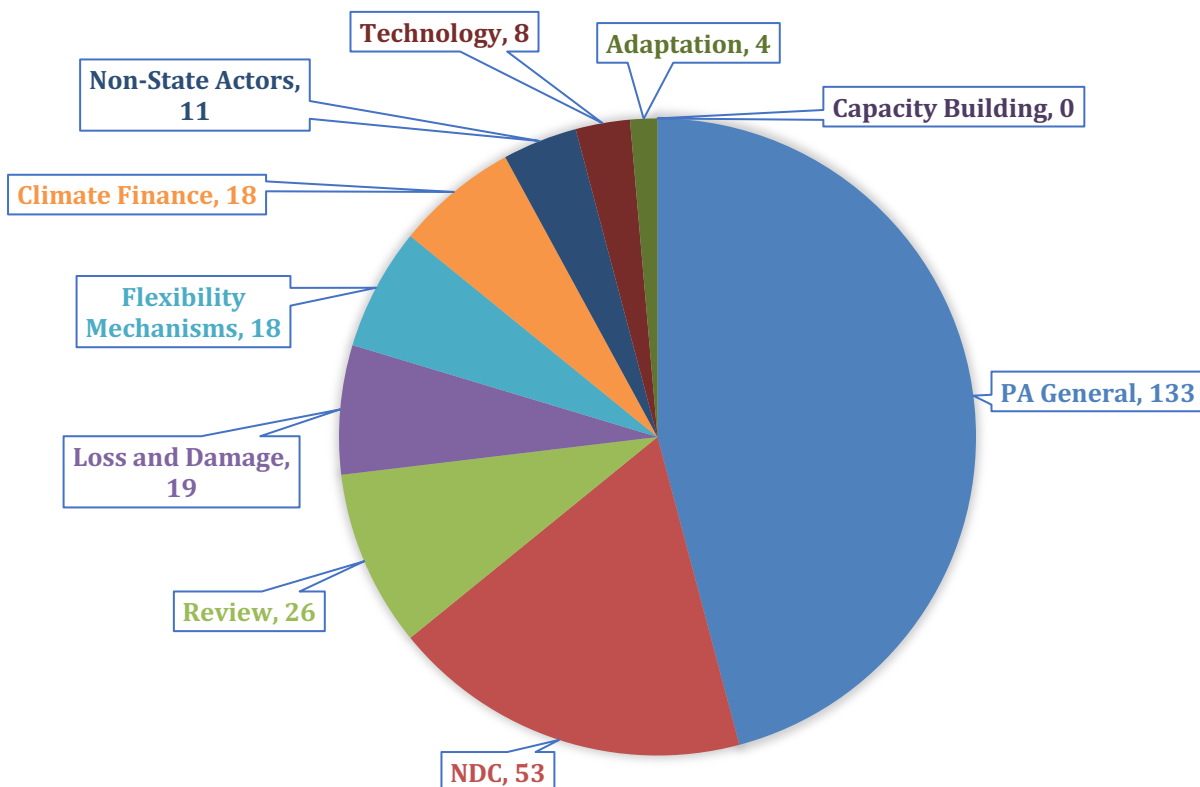


Figure 2: Coverage of PA Mechanisms

Using the meta-data recorded we are able to identify the top 10 Journals publishing research on the PA (see Appendix 1.3). We find that these top 10 Journals tend to cover a broad spread of mechanisms, with the most prominent journal, *Climate Policy*, covering all mechanisms except for non-state actors.

Concerning each document’s general appraisal of the PA, we find that most of the literature evaluates the PA as mixed. Nonetheless, the literature on non-state actors stands out for its large proportion of positive appraisals, whereas the literature on the NDCs includes very few positive appraisals of the PA (see Figure 3). We further find that the operational provisions of the PA tend to receive less positive appraisal than those provisions not yet implemented. Alongside the NDCs, the technology and financial mechanisms of the UNFCCC are already operational, tracking and reporting MS progress. Although loss and damage provides little operative provisions within the PA itself, the Warsaw International Mechanism on Loss and Damage has been operational since 2013. Conversely, the PA’s review mechanisms are only now being operationalized and many provisions of the Paris Rulebook are still being negotiated. Moreover, negotiations on the flexibility mechanisms have not yet been concluded. Whilst these are tentative findings, they do not speak kindly for the prospects of the PA to be effective as assessed by the academic literature, indicating that where there is operative experience with the PA’s provisions, this experience is rarely positive.

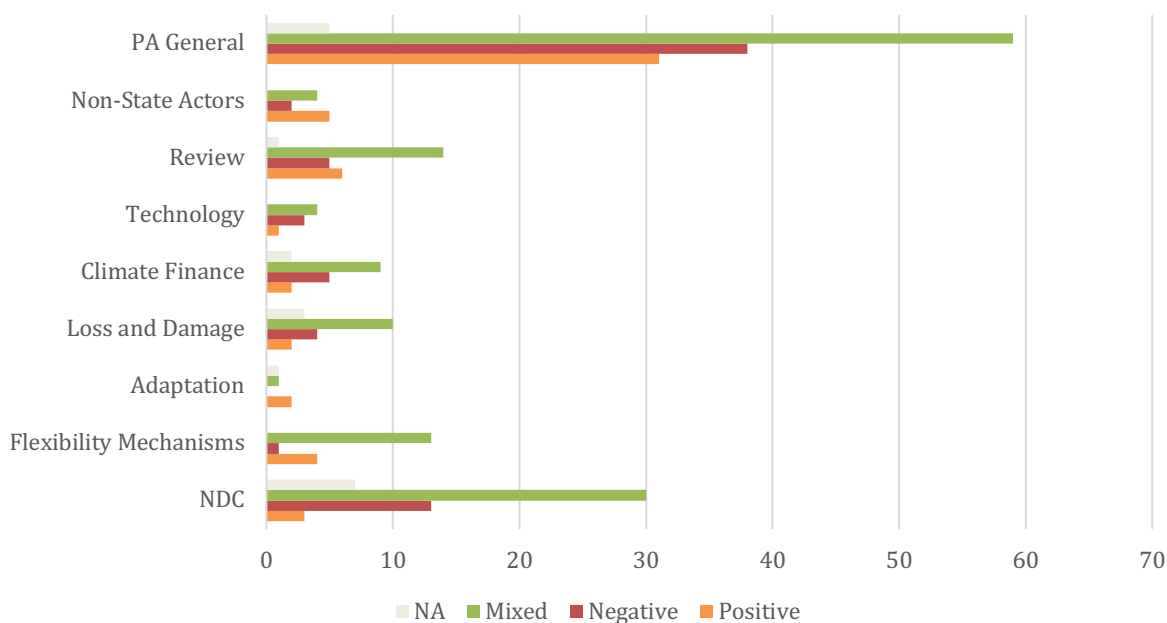


Figure 3: General Appraisal of the Paris Agreement by Mechanism

Content Analysis: Drivers, Barriers and Recommendations

With most of the literature providing a mixed assessment of the PA, we aim to gain a better understanding of the specific factors driving or hindering the PA's effectiveness. We find a wide variety of common drivers, barriers and recommendations, depicted in table 5 below. The codebook in Appendix 1.1 offers a detailed description of each driver, barrier and recommendation. Table 5 further depicts the number of times each driver/barrier/recommendation was coded providing some indication as to the importance of these. However, such an interpretation needs to be approached with caution. Certain drivers/barriers/recommendations may lend themselves to being included within a document. For example, the lack of ambition of current NDC's is a highly reported and salient topic, and is often used to provide context and motivation for a study analysing the PA. We thus preach caution when interpreting the relative weight of each driver/barrier/recommendation. Nonetheless we identify a number of trends upon which we elaborate in the following.

First, many of the common categories we identified recur as drivers, barriers, and recommendations. For example, transparency is the most commonly cited driver. It relates to the established review mechanisms and the need for transparent monitoring, reporting and verification (MRV) procedures (see Appendix 1.1). However, transparency and MRV also appear as commonly cited barriers to effectiveness. Here the primary focus is on a lack of comparable information and clear reporting standards hindering an effective (and transparent) review process. Measurement comes up again as a common recommendation, with many documents detailing specific methods and indicators for measuring progress on climate policies.

A further example of recurring categories is differentiation which, as a driver, refers to the careful differentiation of responsibilities within the PA, moving beyond "common but differentiated responsibilities" to include "respective capacities" and "national circumstances" (United Nations Framework Convention on Climate Change 2015). However, this remains contentious with continuing conflicts over this differentiation of responsibilities remaining a frequently cited barrier, and two papers suggesting ways to overcome these conflicts. "Experimentation/learning" is a further cited driver. It refers to the PA as a policy experiment, with MS and non-state actors reporting on, and subsequently learning from, each other's policy experiences. Conversely, a lack of opportunities under the PA regime for actors to gain feedback and learn from each other is referred to by the

barrier “feedback/learning”. The recommendation “communication/learning” encompasses suggestions on how to better structure communication processes under the PA in order to enable better learning between actors.

Table 5: Common Drivers, Barriers and Recommendations (categories are not horizontally linked). *A=Actual, H=Hypothetical

Drivers	Count*	Barriers	Count*	Recommendations	Count
Transparency/MRV	49 (A:27, H:22)	Ambition	54 (A:45, H:9)	Research	58
Non-state actors	40 (A:27, H:13)	MRV	33 (A: 29, H: 4)	Measurement	40
Institutionalisation	34 (A:31, H:3)	Stringency - Regime Design	31 (A: 27, H:4)	Learning/Communication	28
National Action	30 (A:18, H:12)	Clarity	23 (A:22, H:1)	Capacity Building	15
Technology	25 (A:19, H:6)	Differentiation	23 (A:18, H:5)	Human Rights (HR)	13
Participation	24 (A:24, H:0)	Lack of Funding	18 (A:18, H:0)	Trade	13
Normative Shift	24 (A:15, H:9)	US-Exit	13 (A:10, H:3)	Allocation of Finance	10
Signalling	24 (A:20, H:4)	Content - Regime Design	13 (A:12, H:1)	Carbon Pricing	10
Experimentation/Learning	24 (A:11, H:13)	Climate Justice	13 (A:11, H:2)	Cooperation	9
Goals/Targets	20 (A:18, H:2)	International Cooperation	10 (A:6, H:4)	Legal Compliance	9
Co-Benefits	19 (A:8, H:11)	Scientific Uncertainty	8 (A:7, H:1)	Climate Club	6
Flexibility	18 (A:10, H:8)	Capacity	8 (A:5, H:3)	Link Review Mechanisms	6
Science	18 (A:13, H:5)	Procedure - Regime Design	7 (A:5, H:2)	Definition	3
Procedure	17 (A:16, H:1)	Feedback/Learning	5 (A:5, H:1)	Carbon Budget	2
Differentiation	15 (A:12, H:3)	Development	4 (A:4, H:0)	Differentiation	2
International Cooperation	13 (A:6, H:7)	Transparency	3 (A:3, H:0)	Not Common/Other	67
Policy Linkage	13 (A:4, H:9)	Not Common/Other	44 (A:34, H:10)		
Climate Clubs	12 (A:1, H:11)				
Legality	10 (A:7, H:3)				
Not Common/Other	31 (A:17, H:14)				

We identify similar trends for the procedures established by the PA, which are referred to as both drivers and barriers. The same is true for international cooperation, indicating that authors disagree on the extent to which current international cooperation structures are actually driving, or rather are an obstacle to, effectiveness. Finally, some authors argue that the legal nature of the PA is a positive

attribute driving effectiveness, however, many more documents also depict the PA's lack of legal stringency to be a primary barrier.

Second, excerpts pertaining to drivers/barriers are not always equally certain of their verdicts. Some drivers/barriers were communicated as actual or current drivers/barriers, whereas others were communicated as hypothetical, leaving open whether they would come to pass. We coded for this difference (see brackets in the "Counts" columns of Table 4), and found that drivers are more often depicted as hypothetical, with 46% of Drivers communicated as hypothetical, compared to only 24% of Barriers. This reflects that the factors driving the effectiveness of the PA have not yet been fully implemented and implemented measures have yet to have consequences that can be evaluated. In contrast, those factors hindering the PA's effectiveness are mostly presented as actual barriers to effectiveness. Hence it seems that the evidence on the hurdles the PA faces in order to be effective is stronger than the evidence for the PA being able to overcome these hurdles.

The literature nonetheless offers some insight into how to overcome these hurdles. Most prominently, we have collected 40 specific recommendations for how to collect and measure climate policy, overcoming barriers to an effective transparency and review mechanism (see Appendix 1.4 for a comprehensive list). Here we identify a few recurring themes:

First, a number of papers recommend using a variety of different indicators, allowing science and other stakeholders to discuss their pros and cons, and thus enabling nations to choose indicators and methods best adapted to their specific context and capabilities (Magnan and Ribera 2016, Höhne *et al* 2018, Aldy *et al* 2017, Winkler *et al* 2018, Jacoby *et al* 2017). Second, we identify multiple suggestions to link the monitoring of climate action with monitoring of sustainable development (Waisman *et al* 2019, Sarr 2018, Chan *et al* 2019). The need to track NDC progress beyond mere emissions accounting was a further recurring topic (Jeffery *et al* 2018, Nature Climate Change 2017, Iyer *et al* 2017b). We identify a wide variety of specific recommendations on how to structure the MRV process, ranging from requiring nations to include explanations of how progress on implementing adaptation plans is assessed (Morgan *et al* 2019) to including long-term mitigation strategies within the transparency framework of the PA (Mayer 2019b). Finally a large group of documents recommends specific methods for tracking progress, primarily focusing on measuring

mitigation efforts (Scotford and Minas 2019, Peters *et al* 2017, Craft and Fisher 2018, Herrala and Goel 2016, Kameyama and Kawamoto 2018, Waisman *et al* 2019, Müller and Michaelowa 2019).

Beyond proposals for how to measure, or track progress on, climate action, recommendations present options for increasing and maintaining ambition, including revising the allocation of finance, pricing carbon, enhancing national capacities, forming minilateral climate clubs, and linking the climate and trade regimes. Further recommendations provide insights into how the PA “Regime” could be developed in the future to enhance existing drivers for effectiveness such as introducing better communication and learning strategies, finding innovative forms of legal compliance, linking the three established review mechanisms, and furthering existing human rights provisions within the PA.

Finally, we identify 58 papers that recommend avenues for further research. Here we find an immensely diverse set of research questions on all aspects of the PA (for a comprehensive list of these divided by PA mechanism see Appendix 1.5).

Bibliometrics

Our third and final analytical section uses scientometrics to identify different epistemic communities studying the PA. We use reference data from the documents in our database to generate a bibliographic coupling network, whereby two documents are coupled if they share at least 2 common references. This network is then clustered using a community detection algorithm, identifying groups of documents that tend to cite similar literatures. We find 6 distinct research clusters, labelling these by manually going through the documents in each cluster and identifying common research topics and methodological approaches. Figure 5 depicts these clusters and their relationship to one another, with each node denoting a document within our database and the linkages between the nodes indicating that two documents share at least 2 common references. Thus the distance between clusters can be used as a proxy for the extent to which these clusters are linked. Finally, the size of each node denotes the number of times that document has been cited overall. We label the most cited documents.

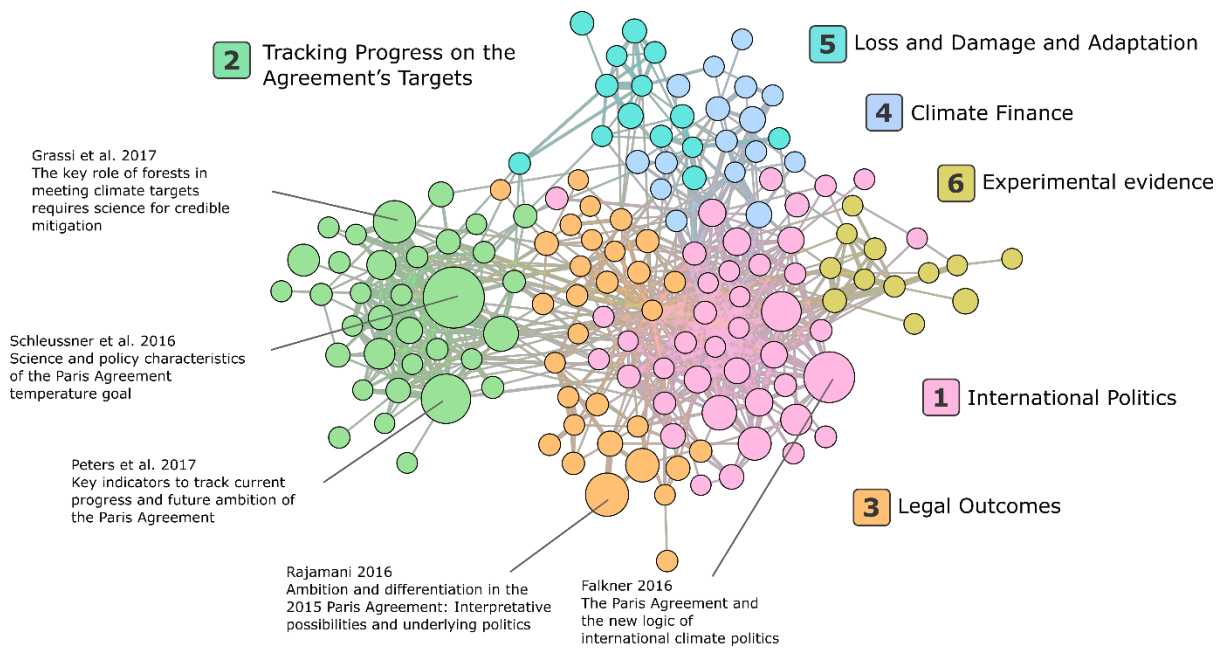


Figure 4: Bibliographic Coupling Network

We further combine these clusters with our coded categories, depicting the most prominent mechanisms studied by each cluster, their general appraisal of the PA, as well as the most cited drivers, barriers and recommendations within each cluster (see Table 6 and Figure 5).

Table 6: The most studied mechanisms, and most cited drivers, barriers and recommendations within each cluster.

Epistemic Cluster	Mechanisms	Drivers	Barriers	Recommendations
International Politics	PA General; Non-State Actors; NDC	Non-State Actors; Institutionalisation; National Action	Ambition; Clarity	Research; Trade
Tracking Progress on the PA's Targets	NDC; PA General; Review	Technology; Transparency/MRV; Science	Ambition; MRV; Content;	Measurement; Research
Legal Outcomes	PA General; NDC; Review;	Transparency/MRV; Legality; Science	Ambition; Differentiation; Climate Justice	Measurement; Learning/Communication; Capacity Building
Climate Finance	Climate Finance; Loss and Damage; PA General	Institutionalisation; Non-State Actors; Normative Shift	Stringency; Lack of Funding; Differentiation	Research; Allocation of Finance; Carbon Pricing
Loss and Damage and Adaptation	Loss and Damage; Review; Adaptation	Transparency/MRV; Legality; Science	Ambition; Clarity; Scientific Uncertainty	Measurement; Allocation of Finance
Experimental Evidence	PA General; NDC; Loss and Damage	Climate Clubs; National Action	Ambition; Stringency; Clarity	Research; Learning/Communication

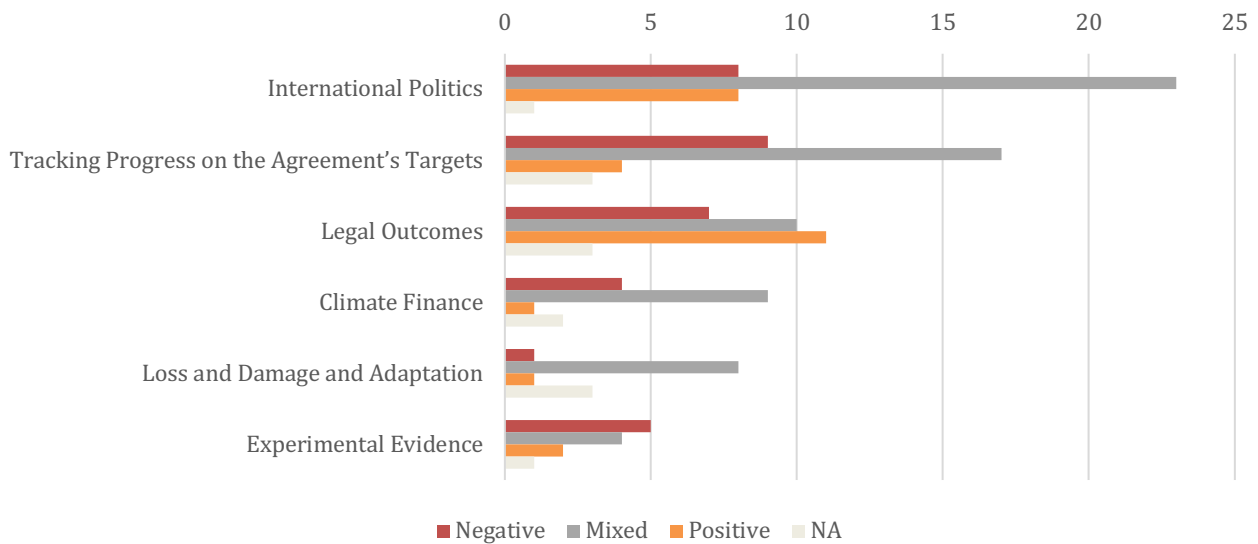


Figure 5: General Appraisal of the PA by Epistemic Clusters

Interpreting the identified clusters comes with a caveat; they are not necessarily representative of the wider literatures on their topics. Therefore the results discussed below cannot be generalised beyond the papers depicted in our bibliographic network. The results from this analysis nonetheless offer some interesting, if tentative, insights:

Cluster 6 focuses on the experimental assessment of the PA and its mechanisms. We find that these experiments rarely result in a positive appraisal of the PA, rather calling for unilateralism as a means to overcome the current lack in ambition. The documents in Cluster 2 explore means for tracking progress on meeting the PA's targets. This cluster provides a pessimistic outlook on the PA, with significantly more negative than positive appraisals. The literature in the cluster commonly cites technology and transparency as key drivers of effectiveness, but also references the lack of ambition, and problems with MRV as primary barriers. Interestingly these two clusters share few common references, despite both focusing on how the pledge and review process functions. Clusters 4 and 5 form two highly related clusters on climate finance and loss and damage respectively. They are strongly linked by common reference to loss and damage, with a large part of the literature in Cluster 4 on climate finance focused on finance for loss and damage. Finally the two centrally depicted Clusters (1 & 3) focus on the Paris Agreement more generally, with Cluster 1 encompassing insights from general international politics, and Cluster 3 retaining a legal focus. Both offer mixed appraisals of the PA with the legal literature featuring a particularly high number of positive assessments.

Whereas the international politics literature highlights the importance of national and non-state action, the legal literature presents the transparency provisions and their legal nature as primary drivers. Both, however, also highlight the current lack of ambition as a significant barrier.

4.5 Discussion

Considering the results and analysis above we conclude by discussing primary insights from our research. First we identify a number of research gaps, as well as areas for consolidation. Second, we offer some narrative insights we gained from having read and categorized all these documents. These insights steer away from a systematic analysis of the literature presented above, rather offering our own interpretation of the most important arguments made for why, or why not, the PA is effective. Finally we reflect on our novel application of systematic evidence synthesis methods to collect and analyse the literature on the PA, offering insights into the added value of applying these methods, and some potential limitations.

Research Gaps

The literature we identify on the PA largely focuses on the PA in general, and on the NDCs (See figure 2). Given the PA remains in its infancy, with negotiations on the operationalization of many of its provisions still ongoing, the relative absence of literature on the other mechanisms established by the PA is unsurprising. In this sense it is positive that so much literature already exists studying the NDCs, and, as the other mechanisms become operational, the volume of research on these can be expected to increase. However, the lack of research explicitly studying the adaptation provisions within the PA is a gap. This is mitigated somewhat by a number of papers considering adaptation as part of the PA generally (Dovie 2019, Lyster 2017, Hall and Persson 2018, Mathur and Mohan 2016, Sharma 2017), the PA's finance provisions (Sovacool *et al* 2017), the NDC's (Atteridge *et al* 2019), and the review mechanisms (Tompkins *et al* 2018, Craft and Fisher 2018). However, given the prominence of adaptation as a standalone goal under Article 2 of the PA, the lack of peer-reviewed literature on this topic is striking.

Even more striking is the complete lack of documents explicitly studying the mechanisms on capacity building. We find some evidence of capacity building playing a role as a barrier and recommendation, most of which focuses on the need for greater capacity for transparency and review (Brechtin, 2016; Millar, Allen, Rogelj, & Friedlingstein, 2016; Tian & Xiang, 2018; Tompkins et al., 2018; Umemiya, White, Amellina, & Shimizu, 2017; Winkler, Mantlana, & Letete, 2017), financial accounting (Roberts *et al* 2017, Weikmans and Roberts 2019, Sovacool *et al* 2017), and technology (Harwatt, 2019; Hofman & van der Gaast, 2019; Puig, Haselip, & Bakhtiari, 2018; Romijn et al., 2018). However, this only serves as further support for the need for more research on the ways in which the Paris Committee on Capacity Building can overcome these barriers and incorporate existing recommendations. In light of the current emissions gap, new research on strengthening capacities to increase ambition seems to be a strong desideratum.

Beyond filling these two clear gaps, our bibliometric analysis offers some further areas with potential for consolidation. First, there is a clear lack of connection between the literature providing experimental evidence for the pledge and review process's effectiveness (Cluster 1), and the literature focused on a more practical analysis tracking progress on achieving the PA's targets (Cluster 2). Both clusters focus on the pledge and review process, and whilst they employ different analytical lenses, they could offer important insights to one another. The fact that they do not cite similar literatures implies that this is not yet happening. The same is true of the literature on climate finance (Cluster 4), and the literature studying the reporting and monitoring of NDC's in line with the PA's targets (Cluster 2). With many of the NDCs contingent on financing (Kissinger *et al* 2019, Zhang and Pan 2016), it is somewhat surprising that the literature tracking progress on the NDCs does not link to the literature on climate finance more closely.

Is the Paris Agreement Effective?

Considering our results above we identify three main arguments made for whether or not the PA is effective. Borrowing from Dimitrov et al. (Dimitrov *et al* 2019) we distinguish between institutional and environmental effectiveness, with institutional effectiveness denoting that the mechanisms established by the PA are robust and function effectively, and environmental effectiveness denoting whether or not the PA's targets are ultimately met.

Concerning institutional effectiveness; we find that transparency is widely considered an imperative institutional precondition for the PA to be effective. The “pledge and review” process, by which national climate action is to be coordinated and its ambition periodically increased, relies primarily on a transparent review of national pledges in order to both effectively track progress towards the PA goals, and apply scrutiny on member-state’s climate policies. Thus, an institutionally effective PA is one that ensures the periodic submission of increasingly ambitious and comparable pledges. Implementation of these is transparently monitored and reported on, with the stocktake providing periodic accounts of collective action. However, whilst transparency is evidently a primary driver of the PA’s institutional effectiveness, it coincides with extensive reference to MRV as a barrier to such effectiveness. Here the literature references a lack of comparable information and clear reporting standards as hindering the transparent review of member-state’s climate actions. While a large number of documents recommend ways to overcome this barrier, detailing methods to measure progress on the PA’s goals, the promise of transparency, and by extension “pledge and review”, clearly comes with a caveat; existing means of review are not yet effective, but could become so if subsequent negotiations deliver sufficient outcomes and barriers are overcome.

In terms of environmental effectiveness the PA relies entirely on national and non-state actions in order to meet its targets. Even under an institutionally effective agreement, submitted and implemented pledges may simply not be ambitious enough to reach the PA’s targets, and civil society and non-state action may be unable to make up the missing gap¹¹. Indeed, current levels of ambition fall far short of what is needed to achieve the Paris Agreement’s goals with the literature making extensive reference to the lack of ambition, not only in existing NDCs, but also citing a general lack of funding and the withdrawal of the United States as primary barriers to effectiveness.

Ensuring the PA’s institutional effectiveness (for example by overcoming barriers to transparency) alone may not be enough to achieve its targets. Here we identify an intermediary channel whereby the PA influences national, and non-state, action, or environmental effectiveness. The PA is consistently presented as a significant normative shift with (all) nations agreeing on the pressing

¹¹ Equally, it is possible that nations achieve environmental effectiveness unilaterally without coordinating policies through the PA’s mechanisms. A third possibility is that the PA gives way to a further, more institutionally and environmentally effective framework, and thus acts as a form of springboard towards institutional and environmental effectiveness. In this sense continued participation in the PA despite the above cited concerns as to its effectiveness would constitute an important success.

nature of the climate problem, and recognising the need for collective action that goes beyond just the nation state. Moreover, it institutionalises new elements such as Loss and Damage and Human Rights, expanding the ways in which the climate problem is approached, and opening new doors for climate action such as human rights litigation or the need for orderly migration procedures that go beyond the refugee convention. The PA thus sends a signal to private and public actors alike, helping to diffuse new ideas, setting a common direction, and helping maintain momentum supporting climate action. Aiding this, the PA establishes a number of processes allowing for experimentation and learning, helping spread best-practices and finding innovative solutions to the climate problem. Thus, while this process of feedback and learning remains imperfect and underdeveloped, one of the primary successes of the PA is in providing a platform for the exchange of experiences and ideas. As such it increases the salience of climate change around the world, aids in tipping global attitudes towards climate action, and enables the diffusion of solutions, facilitating the rapid transformations needed to achieve the PA's targets. Thus, over time the PA may develop to provide a future platform for creating the still lacking but necessary ambition.

In summary: in order to be institutionally effective the PA must overcome barriers to transparency. However, overcoming these barriers does not inevitably lead to more ambitious national and non-state climate actions. Here the PA's properties of norm and value diffusion, and experimentation and learning, play an important role. To enhance environmental effectiveness of the Regime, more substantial reforms might be required (e.g. implementing institutions that reduce free-riding by substantially altering the incentives of states based on concepts like reciprocity (Kornek and Edenhofer 2020)).

Methodological Reflections and Limitations.

To our knowledge, this study is the first application of systematic evidence synthesis to a body of literature assessing, ex-ante, an international political regime. As such we had little previous research experience upon which we could build. Therefore, we offer some reflections on the method as applied to ex-ante policy assessments, highlighting both its benefits and draw-backs.

Using systematic methods to collect relevant literature adds tremendous value to the process of carrying out a review, overcoming the selection-bias of traditional reviews. Through agreeing on a

clear set of screening criteria and screening such a large corpus of abstracts for relevance, the authors also gain a much better insight into the general research landscape, helping orient them and further define their research focus.

Once all relevant literature has been collected, a manual coding of these according to broad descriptive categories is very useful in providing an overview of this research landscape, and identifying key gaps. However, we found manual coding to be time-consuming, and to require a lot of careful consideration from all involved authors. In this sense, if the focus of the research does not go beyond providing a broad overview of the research landscape, using computer assisted methods such as topic modelling provides a less work intensive alternative (Lamb *et al* 2019).

For this project we wanted to go beyond a broad description of the research landscape, and synthesise the evidence on whether or not the PA is, or can be, effective? Our conceptualisation of effectiveness offers a novel way to synthesise qualitative policy assessments. The use of common categories to synthesise the literature's findings offers a transparent and objective method for review. However, we also identify significant limitations.

We found such a systematic synthesis of qualitative ex-ante policy assessments to be methodologically difficult. Most of the mechanisms established by the PA are not yet operational, and so can only be assessed ex-ante. As such, much of the literature we review does not explicitly frame its findings in terms of effectiveness. Apart from the analyses of the ambition of existing NDCs, little aggregable data on the PA's effectiveness exists. This made it challenging to systematically synthesise this research. Identifying common drivers, barriers and recommendations was therefore subject to quite some interpretation, a task that is further complicated by the complexity of the PA itself and the diverse epistemic communities studying it. Whilst our findings remain insightful, the lack of inter-coder reliability in this part of the analysis is a significant limitation. Furthermore, the effort needed to iteratively develop a codebook, and subsequently code each document, renders such a task limited in its scalability. At least, it requires planning with significant resources for the coding exercise from the start (proposal) phase of the project.

Thus far qualitative syntheses have been primarily carried out through a more narrative form of review (e.g. Dimitrov, Hovi, Sprinz, Sælen, & Underdal, 2019). Although these reviews provide

immensely valuable insights into the existing evidence¹², the rapid increase in both the volume and diversity of climate related literature has questioned the ability for such reviews to remain comprehensive and transparent (Minx *et al* 2017, Peticrew and McCartney 2011). Our experience has shown that in order to answer the call for more systematic evidence synthesis on policy processes we need better systematic methods for categorizing and collating qualitative policy assessments that are scalable to be able to overcome the challenge of “big-literature”. Advances in big-data methods offer some important opportunities here (Lamb *et al* 2018, Minx *et al* 2017, Lamb *et al* 2019).

4.6 Conclusions and Open Questions

To conclude, we find a large and diverse body of literature studying the PA. Adaptation and capacity building stand out as two clear research gaps in the literature, and a number of areas exist that might benefit from more consolidation. As of yet, there is no consensus on whether the PA will be effective. Most of the literature presents mixed results, citing a wide variety of drivers and barriers supporting, and hindering, the PA’s effectiveness. We find that, in general, the barriers cited are communicated more strongly, with drivers often cited as hypothetical. By and large this indicates that, in its current state, the PA is unlikely to enable the necessary conditions to achieve its targets. However, the PA remains in its infancy, with many provisions not yet implemented, and plenty of scope for adjusting provisions once first experiences can be reflected on. Hence barriers such as the lack of comparable information or clear reporting standards may yet be overcome enhancing the PA’s institutional effectiveness. Nonetheless, we find that the most significant obstacle to ensuring the PA achieves its targets remains the current lack of ambition. Only if national and non-state ambitions are significantly increased and sincerely implemented, can the PA be environmentally, as well as institutionally, effective. Here, the PA’s diffusion of norms and values, and its properties as a platform for periodic exchange and learning are key. Further research should explore these properties further, assessing ways to enhance their impact on ambition, and coming up with suggestions for how to further develop the PA’s mechanisms to facilitate this.

Beyond the Paris Agreement, further research is needed studying national/regional processes for deciding on, and subsequently monitoring and reforming, climate policies. Although not included in

¹² Our results strongly support those found in Dimitrov et al.’s (2019) narrative review.

this study, we found a number of such case studies while searching for relevant literature on the PA (e.g. Amjath-Babu, Aggarwal, & Vermeulen, 2019; Baek, Jung, & Kang, 2019; Boehnke, Hoppe, Brezet, & Blok, 2019; Gallo & Albrecht, 2019; Mohan & Wehnert, 2019; Selvakkumaran & Silveira, 2019; Simsek, Lorca, Urmee, Bahri, & Escobar, 2019)¹³. A further synthesis of these documents would provide important insights. Beyond assessing how ambition can be raised nationally, given the uncertainties surrounding the PA's effectiveness, it is pertinent to examine the adequacy of the existing international cooperation processes. However, we find no evidence of such a discussion taking place, with very few papers questioning the adequacy of the UNFCCC and COP processes for enabling global climate action. We urge further explorative research here, and especially encourage collaboration with researchers assessing other areas of international relations and law.

The PA remains the primary means by which climate policy is coordinated internationally. Considering our findings, the prospects for the PA to deliver on achieving its targets seem slim. However, the PA enshrines the role of domestic, regional, and local climate action, leaving it up to governments, businesses and citizens to implement the policies and behavioural changes necessary to address climate change. Unlike the Kyoto Protocol preceding it, it does not define who should do what, but rather offers a platform through which all these actors may communicate, collaborate and learn from each other. Perhaps it is therefore imprudent to judge the PA predominantly on effectiveness criteria; not least because the counterfactual may have been a legally binding solution with drastically reduced participation. Perhaps it is most important that the PA (and the UNFCCC more generally) offers a forum for multilateral and multilevel exchange, where all countries have a voice, and tackling climate change remains the primary focus.

¹³ These are just some examples that appeared in the results of our search query. These studies were not systematically searched for or screened for relevance. Any further reviews should develop a query and screening criteria in order to comprehensively source all available case-studies.

Chapter 5: Beyond Pledge and Review: Learning from analogies to the Paris Agreement review mechanisms

Abstract

This article studies the effectiveness of the Paris Agreement's pledge and review mechanisms, drawing lessons from the performance of comparable review mechanisms established under other international treaties. The article employs systematic evidence synthesis methods to review the existing literature on international review mechanisms in the human rights, trade, labour, and monetary policy fields and identifies common factors influencing their performance. Applying these findings to the Paris Agreement, the analysis finds that its review mechanisms incorporate many of these factors. In particular, they combine both expert and peer review, allow for repetitive interaction and capacity building, and facilitate the regular and transparent provision of information. The comparative analysis also highlights two major design deficiencies of the Paris Agreement: the absence of procedures to assess the adequacy of national pledges and actions taken to implement them and resource constraints in carrying out a complex and arduous review process. Active engagement of non-state actors with review mechanisms is identified as a potential remedy to these shortcomings. However, the overall experience of other regimes suggests that, on their own, review mechanisms provide few incentives for states to undertake significant policy changes. Rather, the political context of each regime conditions the performance of review mechanisms. We therefore conclude that the Paris Agreement's review mechanisms alone are unlikely to effect the necessary ratcheting up of climate policy ambitions.

Policy Insights

1. Our review suggests that capacity constraints are significant barriers to effective review mechanism performance. We recommend that states ensure that the UNFCCC budget and staff are commensurate to the review task set out in the Paris Agreement.
2. The Paris Agreement explicitly prohibits an assessment of the adequacy of national pledges and the actions taken to implement them. This is a major shortcoming; non-state actors and academia should fill this gap.

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3. We recommend further research on the role of non-state actors within the review process, focusing on the ways in which they contribute to the analyses, how they exert pressure on states, the extent to which they mobilize domestic constituencies, and any possible trade-offs regarding their involvement and the legitimacy of the review process.

5.1 Introduction

The central objective of the Paris Agreement on Climate Change is to limit global warming to 1.5°C – 2°C to avoid the most catastrophic impacts of anthropogenic climate change (UNFCCC 2015c). The Paris Agreement proposes achieving this goal through a “pledge and review” mechanism requiring states to periodically submit nationally determined contributions (NDCs) that indicate their intended climate action for a given period (UNFCCC 2015c). These pledges are designed as legally non-binding promises (Rajamani 2016b). The Paris Agreement seeks to ensure the continuous implementation of these pledges by way of a review mechanism intended to incentivize states both to achieve their pledges and to increase their level of ambition over time, a process known as ratcheting-up. The review mechanism consists of (i) a transparency framework that reviews the consistency and implementation of submitted NDCs, (ii) a global stocktake that assesses collective progress on achieving the Paris Agreement’s goals, and (iii) a compliance committee that reviews state compliance with the Agreement’s provisions.¹⁴ This institutional structure constitutes a fundamental departure from the centralized structure of previous climate agreements, particularly the Kyoto Protocol, which set binding national emissions targets, the implementation of which was reviewed through the submission of periodic national reports (Doelle 2016, Falkner 2016b, Keohane and Victor 2015, Michaelowa 2015).

Despite the political success of the Paris Agreement, with 191 states ratifying an international treaty to address climate change (UNFCCC 2020c), the efficacy of the treaty’s review mechanisms in encouraging states to comply with its core objective remains disputed. With many of the initial pledges made by states in 2015 yet to be renewed¹⁵ and the first review of their implementation through the global stocktake not scheduled until 2023, a retrospective assessment of the Paris Agreement’s pledge and review mechanism is also not yet possible.

Given the centrality of the Paris Agreement to international efforts to combat climate change, the literature so far has focused on ex-ante assessments and offered mixed outlooks as to the effectiveness of the pledge and review mechanism (Raiser *et al* 2020). For example, the results of a

¹⁴ The transparency framework is set out in Article 13 of the Paris Agreement, the stocktake in Article 14, and the compliance committee in Article 15 (UNFCCC 2015c).

¹⁵ For a list of all submitted NDCs, see UNFCCC (2020b).

lab experiment analysing the process of assessment and review of voluntary pledges shows that such review processes are more likely to affect stated targets and pledges than actual contributions, calling into question the efficacy of the Paris Agreement pledge and review system (Barrett and Dannenberg 2016). Others argue that a lack of effective accountability mechanisms in international agreements requires looking beyond the Paris Agreement to other forms of accountability, such as civil society (Karlsson-Vinkhuyzen *et al* 2018). An assessment of the first round of NDCs reinforces the need for more transparency and comparability in future NDCs in order to enable an effective review of climate actions (Pauw *et al* 2018b). As such, it can be argued that the peer pressure induced by the pledge and review mechanism is unlikely to produce the necessary levels of ambition, with some arguing the Paris Agreement might eventually be at risk of disintegrating due to continued dissension, dysfunction, and disengagement (Sachs 2020).

Conversely, others highlight the conservative nature of the NDCs, positing that they may be surpassed and that the process of formulating NDCs has catalysed national policy-making processes for climate action (Höhne *et al* 2018). Others argue that a focus exclusively on national commitments ignores the significant contribution of non-state actors¹⁶ (NSAs) in meeting the Paris Agreement's targets (Bäckstrand *et al* 2017, Hale 2016a). A legal analysis of the Paris Agreement's transparency framework argues that the flexibility provided to states ensures widespread participation in the technical review process. This enables objective assessments of compliance which in turn enhance political or legal pressure in other forums (Mayer 2019b). Following these arguments it is posited that pledge and review will catalyse increasing cooperation by incentivizing first movers through flexible commitments and ensuring the iterative ratcheting-up of these commitments, enabling the sharing of knowledge and experiences, setting normative goals, and enhancing pressure built through domestic constituents (Hale 2020).

In light of these mixed assessments, understanding whether and under which conditions the pledge and review mechanism will be effective remains challenging. In this article, we contribute to this discussion by approaching the prospects for the effectiveness of the Paris Agreement from a comparative perspective. The Paris Agreement's use of pledge and review is often presented as an

¹⁶ NSAs comprise not only non-governmental organizations (NGOs) but also businesses and regional and city-level governments.

innovative form of international cooperation in the climate change literature (Falkner 2016b, Mayer 2019a, Pickering *et al* 2019). Although the incorporation of voluntary pledges that are to be ratcheted up over time remains a novel and innovative design feature of the Agreement (Falkner 2016b) the review component of pledge and review is not unprecedented in international treaty regime design, as other regimes have incorporated review mechanisms to facilitate cooperation amongst states (Aldy 2014, Hale 2017, Pew Center on Global Climate Change 2010). The factors that influence the performance of such review mechanisms have been subject to extensive empirical analysis in both the international law and international relations literature. We thus aim to contribute to the discussion about the effectiveness of the Paris Agreement by asking what can be learnt from analyses of the performance of comparable international treaties, particularly their review processes.

We study five such international regimes whose review mechanisms are comparable to the Paris Agreement:

1. The World Trade Organization's (WTO) Trade Policy Review Mechanism (TPRM)
2. The International Monetary Fund's (IMF) Article IV Consultations¹⁷
3. The Universal Periodic Review (UPR) of the Human Rights Council (HRC)
4. The United Nations Human Rights Treaty Bodies¹⁸
5. The International Labour Organization's (ILO) Complaint Procedure¹⁹

We use systematic evidence synthesis methods to comprehensively review research studying these five review mechanisms. We first compile relevant factors identified in the literature as influencing

¹⁷ Also known as bi- and multi-lateral surveillance.

¹⁸ We group these treaty bodies into one mechanism as they follow an identical process, despite their different subject matter. The full list of committees is as follows:

1. Committee on the Elimination of Racial Discrimination (CERD)
2. Committee on Economic, Social and Cultural Rights (CESCR)
3. Human Rights Committee (CCPR)
4. Committee on the Elimination of Discrimination against Women (CEDAW)
5. Committee against Torture (CAT)
6. Committee on the Rights of the Child (CRC)
7. Committee on Migrant Workers (CMW)
8. Subcommittee on Prevention of Torture (SPT)
9. Committee on the Rights of Persons with Disabilities (CRPD)
10. Committee on Enforced Disappearances (CED).

¹⁹ This includes the Committee of Experts on the Application of Standards and the Conference Committee on the Application of Standards.

each mechanism's performance. By consolidating these insights, we identify six common factors exhibited in all five mechanisms. We then assess whether the Paris Agreement's review mechanisms incorporate these factors in their design, offering conclusions on their expected performance based on findings from the literature on the other regimes.

We define the performance of a mechanism as its ability to affect a change in state behaviour that is conducive to achieving the objectives of a regime. This includes both the outcomes produced by the mechanism (e.g. the extent to which states implement the recommendations made by the reviewing body) and the process by which these outcomes are pursued (e.g. the effort, efficiency, and competence with which the reviewing body assesses state compliance and issues recommendations) (Gutner and Thompson 2010).

Our analysis identified six common design factors as contributing to review mechanism performance:

1. The ability of the mechanism to solicit accurate and sound information
2. The involvement of experts and state peers in the review process
3. The ability to ensure repeated interaction
4. The institutional capacity to carry out the review
5. The transparency of the review process and its outputs
6. The salience and practicality of the outcomes produced by the review.

The Paris Agreement's review mechanism design incorporates many of these features. It facilitates the transparent and regular provision of information on countries' climate policies. It combines expert and peer review, making use of both experts' superior knowledge and the enhanced political pressure offered by peer review. It also establishes repetitive forums for state interaction and institutions to nurture the reporting capacities of states. However, the Paris Agreement's pledge and review design offers no meaningful follow-up as to the content of submitted pledges and is not set up to provide practical recommendations at the national level. This underpins concerns over the Paris Agreement's ability to ratchet up future pledges. Finally, it remains unclear whether the UNFCCC's resources are sufficient to manage the complex and arduous review process established by the Agreement. We suggest that increased engagement with NSAs could contribute to remedying these

shortcomings, but current modalities and procedures do not allow enough room for this approach.²⁰ Finally, we discuss how the political context in which the Paris Agreement was negotiated conditions the shortcomings we identify, concluding that its review mechanisms can only be effective in conjunction with major political changes.

The paper proceeds as follows. In Section Two we justify our case selection and briefly outline our methodological approach; we provide more detail on our methods in Appendix 2.1. In Section Three we detail the six common factors influencing review mechanism performance. We apply these factors and undertake an ex-ante assessment of the Paris Agreement's review mechanisms' performance in Section Four, in which we also discuss these findings and our study's limitations. Section Five concludes.

5.2 Case Selection and Methods

Case Selection

Our selection of comparable mechanisms to the Paris Agreement was guided by a) their global reach, b) the availability of a significant body of peer-reviewed empirical literature assessing their performance, and c) whether the review mechanisms are sufficiently similar in design. Based on these criteria, we excluded review mechanisms without global reach, such as the regional peer reviews of the Organization for Economic Cooperation and Development and the open method of coordination used by the European Union. We also excluded mechanisms that do have a global reach but for which the literature assessing their performance is scarce, such as the United Nations Convention Against Corruption Implementation Review Mechanism and the United Nations Education, Scientific and Cultural Organization's World Heritage Council Committee.²¹

²⁰ Although many of the modalities and procedures of the Paris Agreement's various mechanisms are still under deliberation, under current arrangements NSAs would only be able to observe the transparency framework's peer review and, although they may submit information to the global stocktake, they would not take part in the review procedure (UNFCCC 2018). Concern over the sufficiency of the UNFCCC's resources has been voiced by Pauw and Klein (2020). The importance of NSAs to the Paris Agreement's bottom-up structure has been noted by, for example, Hsu *et al* (2020), who argue that NSAs could make up for national ambition levels that are lacking. However, these insights remain limited to implementing the NDCs and do not address the role of NSAs in the review process.

²¹ Further examples include Nuclear Non-Proliferation Treaty (NPT) Review Conferences, Convention on International Trade in Endangered Species (CITES) National Legislation Project, Law of the Sea Convention (UNCLOS) Development of Resources Periodic Review, and Convention on Biodiversity (CBD) peer review. See footnote #3 in Pew Center on Global

We further exclude the Montreal Protocol’s Implementation Review Mechanism, as that Protocol has already been extensively studied as an analogy to the international climate regime (Sachs 2020).²² Lastly, we focus on the review component of the Paris Agreement, finding no fitting analogy for its innovative ratcheting-up of pledges and discuss our findings in light of this limitation.

Review processes generally involve i) the *input* of some form of information on state compliance, usually in the form of a report submitted by either states themselves, a selected body of experts, or other NSAs such as NGOs, ii) a *review* of this information by either an international organization (IO) secretariat, states, appointed experts, and/or other stakeholders, and iii) an *output* communication summarizing the review and providing recommendations where applicable. This output is usually non-binding in nature and thereby differentiates review mechanisms from “harder” institutions such as international courts and tribunals (Pew Center on Global Climate Change 2010, Hale 2017). Using this broad structure, we found sufficient similarities between the Paris Agreement’s review mechanisms and the five international review mechanisms we have chosen to study.²³ We provide an overview of these design elements in Table 7²⁴ and offer a few general observations below.

Input: apart from the IMF consultations, all the review mechanisms rely primarily on self-reporting by states. As in the global stocktake of the Paris Agreement, this information is often complemented by a report from the secretariat or reviewing body and/or NSA reports. In the WTO review mechanism, this may be further complemented by the IO staff visiting the state under review. The IMF’s surveillance, by contrast, is based entirely on information gathered by IO staff, including country visits during which staff consult local government representatives and other stakeholders.

Climate Change (2010) for more review mechanisms. Our preliminary searches could only find two relevant papers for UNCAC and none for the others.

²² For example, papers have looked at the role of transfers and technical support in enabling the success of the Montreal Protocol (Chan *et al* 2018), reviewed financial incentives in the protocol as a possibility in climate negotiations (Kemp 2016), highlighted the different cost-benefit structures between the ozone and climate problems (Keohane and Oppenheimer 2016), and highlighted the different foci on technology and its substitutability between the climate and ozone regimes (Puig *et al* 2018). Although these studies offer valuable insights into the climate regime in their analysis of the mechanisms of the ozone regime, we turn our focus to those regimes not yet studied in the climate or environmental contexts with the intention of providing novel insights and promoting comparative analyses across different subject areas in multiple global international review regimes.

²³ For a more detailed description of the Paris Agreement’s review mechanisms, see Section Four. To offer comparative insights, Appendix 2.2 provides a detailed account of the five review mechanisms we study.

²⁴ We base this on a review of regime documents detailing the mechanisms (UNFCCC 2018, 2015c, 2015b, World Trade Organisation 1994, United Nations Human Rights Council 2020, UNOHCHR 2012, International Labour Standards Department 2019)

Review process: the process by which the mechanisms review the information submitted can be loosely grouped into two categories: expert or peer review. In the former, states nominate a body of experts to carry out the review of the information submitted. The latter relies on a more discursive form of review carried out by the states themselves. The ILO peer-review mechanism further includes NSAs such as employers and workers groups directly within the review process. Although most mechanisms focus on either peer or expert review, the ILO, like the transparency framework and the stocktake of the Paris Agreement, includes both.

Output: all the review mechanisms result in a report compiled by the IO secretariat or staff and/or the reviewing body that summarizes the review process and offers observations or recommendations to the state under review. In the UPR, the report must be adopted by consensus in the plenary. All other review mechanisms make their outputs public, although the IMF requires the approval of the state under review before a report is released.

Although we find the Paris Agreement comparable to the other global review mechanisms we identify, our comparative approach is limited in one aspect. All international review mechanisms operate in distinct institutional and political contexts at both the international and national levels. As we aim to generalize insights across mechanisms, this contextual diversity makes it difficult to control for confounding variables, limiting our ability to infer causality. We consider this further when discussing our results.

Methods

Systematic evidence synthesis methods refer to a group of methods that broadly involve a comprehensive search of the evidence base and result in the systematic collection and analysis of relevant evidence on a particular topic, using verifiable and repeatable methods. As the available evidence base in most research fields is growing considerably, such methods are necessary to provide an overview of the evidence base that avoids limitations, such as selection bias, that can weaken traditional review methods (Minx *et al* 2017). We identified 3552 potentially relevant peer-reviewed papers on the performance of the five international review mechanisms,²⁵ providing considerable

²⁵ See the methods section in the Appendix 2.1 for more detail.

scope for the use of systemic evidence synthesis to identify common factors that affect the performance of international review mechanisms. The value of our methodological approach lies in enabling such a comprehensive review of existing insights across disciplinary and topical divides.

We followed strict systematic evidence synthesis protocols²⁶ to gather and categorize the relevant literature on the five review mechanisms. We used Boolean search strings on the Web of Science and Scopus platforms to search for papers on the five review mechanisms, which led to the 3552 papers referred to above. We then screened these papers for relevance using a pre-determined set of exclusion and inclusion criteria, which left us with 78 documents distributed over the five review mechanisms. Appendix 2.1 provides more detail on the search and screening process.

In order to identify common factors influencing review mechanism performance across international regimes, we first reviewed the literature on each regime separately. From each paper, we extracted the key findings identified as relevant, looking particularly for the following elements.

1. *General* insights into the structure and procedure of the review process and whether the process affects state cooperation.
2. *Positive* factors that enhance mechanism performance: the effects of the review mechanism on state cooperation.
3. *Negative* factors that limit mechanism performance: the effects of the review mechanism on state cooperation.

We coded each paper using the three categories above as codebook categories. The coded excerpts were then summarized for each regime, yielding an account of the factors influencing the performance of each review mechanism; Appendix 2.2 documents these summaries. We also provide an Excel workbook with our coding of each individual paper in the supplementary materials. Comparing these summaries and synthesizing key themes from the literature on each regime into common categories across all regimes, we identified six factors that recurred across the five regimes

²⁶ See <https://www.roses-reporting.com/>. We did not carry out a critical appraisal of the documents we identified. We found that many documents do not explicitly define their methods but nonetheless offer relevant insights, such as Laird and Valdés (2012) and Redondo (2008): neither paper presents an explicit methodology but both offer relevant retrospective assessments, largely based on regime documents, of their respective review mechanisms. Weighting these insights based on a critical appraisal of the methods used would therefore restrict our findings.

studied. These factors inform our analysis, providing benchmarks with which we assess the Paris Agreement's review mechanism design.

Our approach has a number of limitations. We do not critically appraise the papers on which we base our synthesis of common factors; we thus cannot weight the collated evidence according to the quality or rigor of the methods employed in the individual studies we review, be they legal, qualitative or quantitative. Our approach relies instead on the assumption that the findings we synthesize are founded on methodological rigor and employ comparable (implicit) criteria to assess the performance of the mechanisms they study. Given the longstanding debate over how to measure international regime performance, we are aware that this is a significant assumption. We recognize the trade-off between a systematic review of all available literature and the starkly different methodological and data collection approaches employed in this literature. A more rigorous appraisal of the literature on methodological grounds would thus greatly reduce both the variety and size of our sample. We choose to remain inclusive in order to capture recurring themes; we discuss further limitations in Appendix 2.1.

Table 7: An overview of the review mechanisms studied

Regime	Mechanism	Input	Review	Output
The Paris Agreement	Transparency Framework: - Reviews the technical consistency of national reports	State reports detailing implementation of NDCs	- Expert Review: Technical review by a body of nominated experts - Peer Review: Facilitative dialogue involving states	A summary of the expert review and the publication of national reports
	Global Stocktake: - Reviews the collective implementation of NDCs	Reports on implementation of NDCs submitted by: - States - The IPCC - Subsidiary UNFCCC bodies - Other IOs and NSAs	- Expert Review: Compilation of information by the UNFCCC Secretariat - Expert Review: Technical assessment - Peer Review: Political deliberation	A synthesis report of - GHG emissions - Implementation of the NDCs - Adaptation - Finance
	Compliance Committee: - Reviews compliance with the agreement's provisions	- State submissions - Information from the secretariat	Expert Review: Review by 12 experts elected by the UNFCCC Conference of the Parties to three - year terms	Non-binding recommendations to state under review
World Trade Organization	Trade Policy Review Mechanism	- State report - Reports by the secretariat (may include staff visits to country under review)	Peer Review: Trade Policy Review Board of the WTO General Council discusses reports with an elected discussant	- Summary of the discussion with a position from the secretariat - State report and minutes
International Monetary Fund	Article IV Consultations/Bilateral Surveillance	Report based on IMF staff visits	Expert Review: Reports reviewed by IMF Executive Board (members nominated by states)	Board views on report are communicated back to states (publication only on approval by state under review)
UN Human Rights Council	Universal Periodic Review	- State report - Secretariat Report (including information from IOs) - NSA report	- Peer Review: Review by a nominated troika of states - Peer Review: Interactive dialogue between the state under review and the council (all states)	Outcome report summarizing dialogue (including accepted and rejected recommendations made by the troika); the report must be adopted by the plenary
UN Human Rights Treaties	Treaty Body Committees	- State reports - Shadow reports from NSAs	Expert Review: Review by committee composed of elected members	- Concluding observations of the committee - General Comments (best practices) - Individual Communications
International Labour Organization	Committee of Experts on the Application of Conventions and Recommendations: - Review of compliance with ILO provisions	- State reports	Expert Review: Review by 20 elected jurists	Annual report on state compliance with ILO conventions
	Conference Committee on the Application of Conventions and Recommendations: - Review of report by the Committee of Experts	- Committee of Experts report	Peer Review: Committee composed of states, employers groups, and workers groups	Recommendations for states

5.3 Results: Common Factors Influencing the Performance of Review Mechanisms of Other International Regimes

Our analysis of the literature on the five review mechanisms yields six common factors influencing the performance of these mechanisms.²⁷

Quality and accuracy of information

Lacking legally binding and enforceable outputs, all the analysed review processes serve first and foremost as sources of information. The literature identifies information provision as an important condition for the performance of the review processes, with states and other stakeholders relying on the periodic provision of accurate information on state compliance. The accuracy and transparency of this information is crucial. IOs with considerable staff resources like the IMF and WTO are presented as reliable sources of information and thus have considerable influence within public economic policy discourses and by extension states' economic policies.

All review mechanisms also include some form of NSA participation. This is found to be vital in aiding in the collection of information, with the IMF and WTO staff consulting NSAs when compiling their reports, the UPR and Treaty Bodies relying on shadow reporting to supplement states' self-reporting,²⁸ and the ILO including NSAs directly in its tripartite structure. The consultation of NSAs, particularly by IMF staff, serves to ensure the independence of the information provided which self-reporting by states alone could not achieve. Nonetheless, an overreliance on NSAs in the Treaty Bodies is shown to negatively affect their legitimacy, with NSAs' inputs to the review processes often considered overly critical and unconstructive by states participating in the review process. This undermines the ability of states to negotiate candidly and highlights the need to carefully balance NSAs' involvement. The literature also frequently cited a lack of reporting capacity amongst states as an impediment to the review mechanisms' performance. We therefore find that a greater diversity

²⁷ For details on the performance of each review mechanism studied, see Appendix Two.

²⁸ The Treaty Bodies committees established a process of engaging with NSAs after they were established by the UNOHCHR, indicating that such engagement could also be undertaken by committees established by the Paris Agreement's review mechanisms at a later date; see OHCHR (2020a, 2020b, 2020c).

of sources from which information is solicited and the higher capacity of these sources (primarily states) to provide accurate information lead to better review mechanism performance.

Expert vs. Peer Review

One of the primary distinctions between the review mechanisms studied is whether a review is conducted by experts, peers, or a combination. Our analysis reveals a potential trade-off in this regard. Whereas expert review processes such as in the Treaty Bodies and IMF consultations provide technical, non-political information and thereby enhance state learning, they also lack the political pressure of peer-review mechanisms. By contrast, the literature on the UPR consistently highlights the political nature of peer review as a factor exerting considerable pressure on states to comply. This is further supported by evidence from the peer review in the WTO TPRM. Nevertheless, the political nature of peer review is shown to impede the kind of constructive dialogue that enables learning in expert-review mechanisms. We thus find that the choice between expert- and peer-review designs accentuates different effects of the review process, with expert review putting the focus on information exchange and learning and peer review on political pressure. A combination of both designs might elicit the benefits of each. However, the literature on the ILO's review mechanisms, which do combine expert and peer review, offers no conclusive empirical evidence on whether this is the case.

Repetition and interaction

A further commonly identified feature determining review process performance is the institutionalized repetition of reviews and interaction. Review processes are shown to have a cumulative effect rather than producing one-shot outcomes. Repeated interaction serves to socialize states and diffuse norms. Moreover, repeated and interactive dialogue and the publication of best practices is shown to facilitate learning in the Treaty Bodies, WTO, IMF, and ILO review processes. Related to such repetition is the need for follow-up procedures, with review processes considering states' implementation of previous recommendations. These are shown to increase pressure on states to comply, as exemplified in the UPR, where follow-up helps to ensure states not only accept recommendations under peer review but also enact measures to implement them before the next review cycle.

Capacity to review

A common deficiency of the review processes is a lack of resources. Periodic review requires extensive resources. Whereas the IMF is praised for its considerable use of staff resources for review, the Treaty Bodies, ILO, UPR, and WTO are all criticized as being under-resourced and thus unable to keep up with the arduous task of reviewing all the states in their remit.

Transparency

To allow for the dissemination of the outputs of the review process, transparency is crucial, and the involvement of NSAs is shown to be particularly important. Beyond aiding in supplying information for review, NSAs form the primary means of domestic mobilization that pressures national governments to implement recommendations. This is especially pertinent in the Human Rights and ILO review processes, where NSAs are directly involved. The WTO and IMF review processes do not allow for such direct involvement, and any role of NSAs in domestic mobilization is not cited by the literature studying these mechanisms. However, the IMF's influence on broader economic policy discourse is one example of how review processes may also indirectly influence NSAs and domestic political processes.

Impractical recommendations

Review outputs are frequently criticized as being too broad and lacking actionable recommendations for states. In the case of the Treaty Bodies, the lack of political expertise of experts is identified as contributing to vague recommendations. In the UPR and WTO, the tight schedule and limited capacity to review all states leads to short individual reviews, restricting the possible depth of the interaction between the state under review and the review bodies. This reinforces of the importance of sufficient IO resources and staff expertise.

5.4 Assessing the Paris Agreement’s Review Mechanisms’ Design: Applying Lessons Learnt from the Performance of Other International Regimes

In this section, we use the six factors detailed above as benchmarks to assess the Paris Agreement’s review mechanisms. We first describe the structure of those mechanisms before assessing their design using the six factors. We base our analysis on the Paris Agreement text (UNFCCC 2015c), its accompanying decision (UNFCCC 2015b), and the rulebook (UNFCCC 2018). We complement these documents with insights from recent research on the Paris Agreement. We summarize our findings in Table 8. We finish the section with a discussion of the implications of these findings for the expected performance of the Paris Agreement’s review mechanisms; specifically, we highlight the importance of considering the political context in which the Paris Agreement was negotiated.

The Paris Agreement’s Review Mechanisms

The Paris Agreement’s review procedure is split into three distinct review mechanisms (UNFCCC 2018, 2015b, 2015c):

The *Enhanced Transparency Framework* reviews states’ progress in implementing their NDCs as detailed in parties’ biennial transparency reports. These are based on self-reporting by states, with the Paris Agreement’s rules ensuring consistency in the format of reports. However, the level of ambition of individual NDCs and domestic actions to implement them are not assessed. The review is carried out by a committee of nominated experts,²⁹ augmented by a peer review in the form of a facilitative dialogue that is to take place at the sessions of the subsidiary body for implementation. The transparency framework results in the publication of a summary of the expert review, the facilitative dialogue, and the original state reports by the UNFCCC secretariat. The transparency framework will become operative in 2024, when the first biennial transparency reports are due (Paragraph 38 UNFCCC 2018).

²⁹ The Enhanced Transparency Framework Expert Group shall serve the Convention beginning January 1st, 2023. They have yet to be nominated (Paragraph 10 Ad Hoc Working Group on the Paris Agreement 2018).

The *Global Stocktake* reviews the collective ambition and implementation of the NDCs and global progress made towards achieving the Paris Agreement's goals³⁰ at five-year intervals. It bases its review on a number of sources, including reports submitted by states and information provided by the Intergovernmental Panel on Climate Change (IPCC), the UNFCCC secretariat, and NSAs (Paragraph X.37 UNFCCC 2018). This information is reviewed in three stages: the UNFCCC secretariat (a) compiles all information in a report, which then (b) undergoes an expert review, the (c) outcome of which is finally discussed amongst states in a plenary. The final output of the stocktake is a synthesis report of global progress on achieving the Paris Agreement's goals compiled by the UNFCCC secretariat. The Global Stocktake is explicitly prohibited from assessing the adequacy of individual states' contributions to this collective progress. The first stocktake will take place in 2023 (UNFCCC 2015c).

The *Committee to Facilitate Implementation of and Compliance of Parties with the Provision of the Paris Agreement* (compliance committee below), is tasked with reviewing state compliance with the procedural provisions of the Paris Agreement, such as whether a state submits its NDC on time and includes the right information. The committee is made up of 12 experts nominated by state parties who base their review on information provided by states upon request by the committee or on information provided by the secretariat. The review results in committee recommendations for the state under review. Unless otherwise decided, the committee meets at least twice a year, holding its meetings in conjunction with sessions of the subsidiary bodies serving the Paris Agreement. The committee reports annually to the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (UNFCCC 2018).

Results

Quality and Accuracy of Information

Both the transparency framework and the global stocktake require the submission of detailed information on states' greenhouse gas emissions and their (intended) climate actions. This includes a report on national anthropogenic greenhouse gas emissions by sources and removals by sinks,

³⁰ It is not yet certain how such a collective review will be carried out without reviewing individual state ambition. For more information see (Milkoreit and Haapala 2019)

information necessary to track progress on each state's NDC, information on climate impacts and adaptation, and information on support required (developing countries) or provided (developed countries); for more detail, see the Annex on the modalities and procedures relating to the transparency framework (UNFCCC 2018, pp. 95–123). Ensuring states can provide all this information will require building significant reporting capacities, particularly in developing and least developed countries. All three Paris Agreement review mechanisms explicitly refer to the need to consider national capacities, and the Agreement establishes the Capacity Building Initiative for Transparency to aid in that effort (Paragraph 84 UNFCCC 2015b, p. 12). However, it remains to be seen whether this can be done effectively and at the necessary scale, with the existing literature highly critical of past capacity-building initiatives (Khan *et al* 2018, 2020). The stocktake allows for NSA submissions, which should enhance the accuracy of the information submitted.

Expert vs. Peer Review

The Paris Agreement's combination of expert and peer review in both the transparency framework and stocktake make for a hybrid design feature. From our analysis of analogous mechanisms, expert review can be expected to provide both states and other relevant stakeholders with important information on the implementation of NDCs and may facilitate learning through the sharing of best practices in the global stocktake. Meanwhile, peer review may subsequently put pressure on states to respond to any criticisms of their practices. However, the extent to which this will be realized remains to be seen and depends largely on how both experts and states participating in the peer review interpret and engage with the review process. The ILO's combination of expert and peer review explicitly divides naming and shaming, with the expert review identifying non-compliers and peer review putting pressure on them to respond. An emphasis of the need for a "facilitative review in light of national circumstances" in the Paris Agreement text indicates that both expert and peer review may lack such a critical approach, limiting the pressure they apply on states (Article 13.3. UNFCCC 2015a). Moreover, recent evidence shows that engagement with existing expert-review processes remains uneven and that facilitative peer review has encountered capacity constraints, lacks follow-up procedures, and risks ritualization (Weikmans and Gupta 2021, Gupta *et al* 2021).

The evidence from other review mechanisms suggests that involving NSAs could resolve these shortcomings, especially by mobilizing domestic actors. However, under the Paris Agreement, NSAs

may only observe the peer review, calling into question whether NSAs are sufficiently involved to mobilize domestic pressure. Nonetheless, the Treaty Bodies' experience shows that there is scope for the committees established by the Paris Agreement to introduce NSA involvement in its working methods in the future.³¹

Repetition and Interaction

A further positive aspect of the Paris Agreement's review mechanisms lies in their repeated (periodic) nature. The transparency framework requires states to submit reports on implementation every two years, and the stocktake reviews collective ambition every five years. However, although our analysis of other review mechanisms presents such repetition as a positive factor enabling state socialization, the UNFCCC has been holding high-level negotiations in the form of conferences of the parties every year for over 25 years, and the Kyoto Protocol also required states to submit periodic reports and greenhouse gas inventories.³² We must therefore caution against an overly optimistic interpretation of the Paris Agreement's repeated nature and encourage further study of whether the Agreement's structure is more conducive to socialization than previous agreements (e.g. because it is now concerned with domestic policies).

Capacity to Review

The Paris Agreement sets up a demanding and multi-layered review process requiring an immense institutional effort by states, the UNFCCC Secretariat, and other stakeholders. It remains to be seen whether NSAs will be able to provide comprehensive input to the review process and whether the resources of the UNFCCC will suffice to co-ordinate the daunting task ahead. With almost all the comparable review mechanisms we study suffering from a lack of resources and reporting capacities, the experience of the IMF is instructive in this regard. Through the strategic use of considerable resources, IMF staff are able to effectively survey state compliance; for example, they create feedback loops in the form of repeated interactions with national stakeholders. They are seen as

³¹ The compliance committee convened twice in 2020 and is in the process of developing general provisions to guide its work, which could include engagement with NSAs (UNFCCC 2020a).

³² Reporting requirements differed for Annex I and Non-Annex I countries. Nevertheless, all countries were required to submit biennial reports, with national communications due every four years (UNFCCC 1998).

reliable experts with considerable influence within economic policy discourse and use this influence to diffuse policy advice where individual reviews are ineffective. With only a fraction of the IMF's budget,³³ such influence seems far beyond reach for the UNFCCC. Rather, it appears more likely that limited resources will pose a serious threat to meeting its own arduous review schedule.

The involvement of NSAs could help alleviate this lack of resources. The UPR and Treaty Bodies actively encourage NSA input, minimizing procedural hurdles whilst requiring a common format for written input to facilitate comparison and synthesis; they offer an encouraging model. Indeed, efforts such as the UNEP emissions gap reports or the individual country reviews of the climate action tracker already offer scope for similar engagement by NSAs with the Paris Agreement (UNEP 2018, Climate Action Tracker 2020a). Nonetheless, despite the engagement of the UPR and Treaty Bodies with NSAs, the literature still cites a lack of capacities as limiting their performance, suggesting that NSAs cannot entirely overcome internal capacity constraints.

³³ IMF: \$US1,186 million (International Monetary Fund, 2020b); UNFCCC: US\$203 million, converted from €172 million (UNFCCC, 2020).

Table 8: Characterizing and assessing the Paris Agreement review mechanisms with respect to key factors distilled from the performance of other review mechanisms

Important Features for Review Mechanism Performance	Paris Agreement Review Features			
	Transparency Framework	Global Stocktake	Compliance Committee	Overall Assessment
Quality and accuracy of information	<ul style="list-style-type: none"> - Submission of detailed information - Capacity building frequently highlighted 	<ul style="list-style-type: none"> - Submission of detailed information - Allows for NSA submissions - Capacity building frequently highlighted 	<ul style="list-style-type: none"> - Supports states in reporting - Capacity building frequently highlighted 	<ul style="list-style-type: none"> - Positive: highly detailed information requirements and explicit reference to capacity needs and building
Expert vs. peer review	<ul style="list-style-type: none"> - Expert and peer review - NSAs may only observe the peer review 	<ul style="list-style-type: none"> - Expert and peer review - NSAs may only observe the peer review 	<ul style="list-style-type: none"> - Expert review only 	<ul style="list-style-type: none"> - Mixed: a combination of expert and peer-review that lacks NSA participation
Repetition and interaction	<ul style="list-style-type: none"> - Every two years - Follow-up impossible due to lack of review of national ambitions 	<ul style="list-style-type: none"> - Every five years - Follow-up impossible due to collective nature 	<ul style="list-style-type: none"> - Ongoing - No provision for follow-up 	<ul style="list-style-type: none"> - Mixed: repetition but no follow-up
Capacity to review	<ul style="list-style-type: none"> - UNFCCC resources for review unclear 	<ul style="list-style-type: none"> - UNFCCC resources for review unclear 	<ul style="list-style-type: none"> - UNFCCC resources for review unclear 	<ul style="list-style-type: none"> - Not applicable: no assessment of UNFCCC resource adequacy possible
Transparency	<ul style="list-style-type: none"> - Outputs are highly transparent - Extent of domestic mobilization unclear, with NSA involvement limited 	<ul style="list-style-type: none"> - Outputs are highly transparent - NSA participation in submitting information to review may promote domestic mobilization 	<ul style="list-style-type: none"> - Output transparency unclear³⁴ 	<ul style="list-style-type: none"> - Positive: highly transparent processes; domestic mobilization through NSAs remains unclear
Practical recommendations	<ul style="list-style-type: none"> - Prohibition of the review of the adequacy of national ambition and the adequacy of actions limits practicality of outputs 	<ul style="list-style-type: none"> - Not applicable due to collective nature of the review 	<ul style="list-style-type: none"> - Committee is mandated to provide practical recommendations for states 	<ul style="list-style-type: none"> - Negative: only compliance committee has the scope for practical recommendations

³⁴ See note 18.

Transparency

A clear positive of the Paris Agreement's review mechanisms' design lies in their transparent provision of information on state compliance with procedural requirements. The transparency framework and global stocktake are tasked with collecting and reviewing information on a wide variety of matters relating to the implementation of NDCs. The transparency of these processes ensures that anyone with access to the internet may access this information. Nonetheless, uneven engagement with transparency processes in the past will need to be overcome to fully benefit from these provisions (Weikmans and Gupta 2021). Finally, recent research has questioned the beneficial role of ever-increasing transparency in the climate regime, providing evidence that this may in fact distract from accountability (Gupta *et al* 2019).

Practical Recommendations

The prohibition of the transparency frameworks' assessment of the adequacy of individual state action is the most pertinent shortcoming of the Paris Agreement's review mechanisms, as it profoundly limits their ability to incentivize cooperation. Although the framework does review the individual implementation of the NDCs, its inability to provide meaningful recommendations on how to improve states' actions limits their ability to learn how to best enhance their ambitions. Moreover, lacking a review of the adequacy of individual state pledges and actions, the review process is not set up to apply significant and policy-specific pressure on states, remaining instead primarily a source of more general inventory information on existing state policies. This drawback is compounded by the lack of follow-up procedures, although here the experience of the Treaty Bodies show that follow-up procedures can be established as time passes.³⁵

Discussion

Through its three-part structure, the Paris Agreement incorporates many of the features we identify as important for the performance of review mechanisms. It combines expert and peer review,

³⁵ With the compliance committee currently drafting its rules and organizational arrangements, follow-up procedures may still be implemented for the Paris Agreement in the coming years (UNFCCC 2020a).

although this is qualified by uneven engagement with similar processes in the past and the explicitly facilitative nature of the review. Its detailed transparency framework ensures the clear provision of structured information on state climate actions every two years, and the global stocktake provides for a comprehensive overview of global progress on climate change. Here too, however, past evidence indicates the benefits of increased transparency are limited. Repetition and a focus on national capacities in all three review mechanisms suggest that the Paris Agreement will offer plenty of chances for learning and sharing best practices. The experience of review mechanisms in other international regimes also indicates that repetitive interaction facilitates state socialization through the diffusion of norms. However, the lack of an individual review of ambition and policy effectiveness severely restricts the Paris Agreement's review mechanisms' ability to pressure states and offer them practical recommendations. As such, whilst the Paris Agreement provides the important information required for tracking states' climate actions, it offers few incentives for states to significantly change their behaviour. This is further compounded by a lack of direct participation by NSAs in the review process itself, potentially inhibiting the extent to which NSAs could mobilize domestic pressure, unless they find alternative avenues to do so. Finally, the complicated and highly detailed review structure will require immense effort and resources from the UNFCCC and all involved parties and stakeholders. Although no existing assessment of the adequacy of the UNFCCC's resources exists, the experience from other regimes is hardly encouraging.

These findings suggest that, from a design perspective, the Paris Agreement's review mechanisms lack the necessary stringency and resources to substantially alter states' behaviour in the area of cooperation. However, international review mechanisms do not operate in a political vacuum. In our analysis of comparable regimes, we find considerable evidence that institutional arrangements at both the international and national levels condition review mechanism performance (see Appendix 2.2). The IMF, for example, has the consistent support of powerful states which dominate the organization through weighted voting systems. The evidence we review on the IMF shows that this political dynamic influences the performance of its review mechanism, highlighting its uneven effect and bias towards powerful members. The studies on the UPR further show that political pressure exerted by peer-review in the UPR is conditioned by geopolitical allegiances. The ILO's review is shown to work best in confluence with other forms of pressure such as international diplomatic ties.

There is no doubt that political dynamics will also condition the Paris Agreement's review mechanisms' performance; indeed, they have already influenced their design. The considerable tensions between states surrounding the negotiation of the Paris Agreement rulebook, in which most of the details of the review mechanisms were determined, suggest negotiators were (and still are) aware of the shortcomings we identify through our analysis (Rajamani and Bodansky 2019, Gupta *et al* 2019). The UNFCCC's institutional arrangement dictates that negotiated outcomes will, to some extent, always be sub-optimal as individual state positions need to trade off interests in order to gain consensus (Keohane and Victor 2016). In viewing the shortcomings we identify above, it can be argued that they reflect the political context and constraints which gave rise to the Paris Agreement. This lends important support to our conclusion that the Paris Agreement's review mechanisms can only be effective in conjunction with major changes in this political context, such as changing states' domestic preferences or the UNFCCC's institutional arrangements (e.g. introducing conditional financial or other incentives for ratcheting up domestic policy).

Considering these findings, we note one final caveat here: lacking an appropriate analogy to the Paris Agreement's pledges, our analysis does not offer any conclusive insights on whether the requirement for states to submit increasingly ambitious pledges will actually facilitate ratcheting up the ambitions of global climate action. Game-theoretic analysis of such a pledge and review process suggests they will not because, on its own, pledge and review facilitates only gradual and limited implementation (Barrett and Dannenberg 2016). By contrast, Hale (2020) suggests that the Paris Agreement may in fact catalyse increased ambitions by providing the necessary incentives for action by incentivizing first movers through flexible commitments that enable iterative ratcheting up of these commitments, via the sharing of knowledge and experiences, setting normative goals, and enhancing pressure built through domestic constituents. Without having studied the dynamics of increasingly ambitious pledges outright, our analysis of comparable review mechanisms point towards the former diagnosis, suggesting that the Paris Agreement review processes will fail to produce the necessary incentives for significantly deepening state cooperation. Rather, we argue that other factors beyond review mechanisms are needed to change state incentives and push states to implement meaningful climate policies. These include changes in domestic political preferences, as through social movements, NSA assessments of policy effectiveness, and strategic industrial competitiveness considerations that

increase corporate demand for stringent climate policy to gain shares in emerging clean technology markets.³⁶

5.5 Conclusions

The Paris Agreement's pledge and review mechanism constitutes the primary means through which to facilitate state cooperation on climate change and coordinate international climate action. With many of the Agreement's provisions yet to be implemented, this article has studied what can be learnt from the experience of comparable review mechanisms in other international regimes.

In light of our findings, we make three recommendations for the continued development of the Paris Agreement's review mechanisms: 1) there is an urgent need to ensure that the UNFCCC budget and staff are commensurate to the review task; further research on the budgetary and staff requirements to undertake these reviews is needed. 2) Further research into the role of NSAs in the review process would be useful; it could focus on (a) how NSAs can contribute to the review process and technical analyses and on any possible trade-offs regarding their involvement and the ability for states to negotiate candidly and (b) on the role of NSAs in exerting pressure on states and the extent to which they are able to mobilize domestic constituencies given the existence of the Paris Agreement review mechanisms. 3) Given that the Paris Agreement explicitly prohibits an assessment of the adequacy of national NDCs and actions taken to implement them, NSAs and academia should fill this gap by continuing and enhancing efforts such as the UNEP emissions gap reports and the individual country reviews of the Climate Action Tracker (UNEP 2018, Climate Action Tracker 2020a).

To conclude, based on our analysis of other international regimes we find no reason to assume that the Paris Agreement's review mechanisms will have a major impact on national emission reduction efforts. Although they incorporate many of the lessons we draw from the review mechanisms of other international treaties, the experience with those mechanisms also shows that incentives for changing policy based on the information and agenda-setting functions by themselves appear limited. In the decidedly restrictive institutional arrangement of the UNFCCC, the potential for review mechanisms to sufficiently alter state behaviour appears even more limited. Only in conjunction with

³⁶ For a study of perceived obstacles and options involving climate policies, see Kornek *et al* (2020).

other major changes (e.g. in national public opinion, industry positions, and energy technology costs) might the Paris Agreement structure facilitate ratcheting up of policy ambition.

Chapter 6: Behind Ambition: The Importance of Process in the Formulation of Nationally Determined Contributions

Abstract

The Paris Agreement's (PA) "pledge and review" of Nationally Determined Contributions (NDCs) is the primary mechanism for coordinating international climate policy. The academic literature since the PA has mainly focused on evaluating the ambition of countries' pledges, with minimal attention paid to understanding the process of how countries formulate their NDCs. Based on a novel framework, this paper analyses and compares the NDC formulation processes in Brazil, South Africa, India and China. The analysis finds that in all cases the political mandate to engage with the NDC process came primarily from the head of state with an aim to gain political capital at the international level. This has had a significant influence on these countries' engagement with the NDC process, with essential climate considerations lacking in domestic policy processes. This disconnect is magnified by a lack of coordination between key ministries, risking further misalignment between the NDCs' targets and the sectoral measures needed to implement them. This raises concerns about the substance of increasingly ambitious international targets and the overall effectiveness of pledge and review.

1. Introduction

The first Nationally Determined Contributions (NDCs), submitted in the lead up to the Paris Agreement (PA) in 2015, have been criticized for a lack of ambition, detail and consistency (UNEP 2019, Pauw *et al* 2018b, Höhne *et al* 2017). Five years later, it remains unclear whether the PA will be successful in ratcheting up the level of ambition needed to meet its temperature targets. At the time of writing, countries are expected to update their NDCs ahead of the postponed COP26 in November 2021, and many have already done so (UNFCCC 2020b). The response to updated targets was mixed. Despite a surge of optimistic announcements of net-zero targets by mid-century, many of these were not supported by concurrent medium-term targets in the updated NDCs³⁷ (Climate Action Tracker 2020a).

Whereas most of the peer-reviewed literature has focused on studying the content of the NDCs, researching and better understanding the process of how countries formulate their NDCs can contribute to enabling more ambitious NDCs in the future (Röser *et al* 2020, De Pinto *et al* 2018). Inadequate processes, even if delivering sufficiently ambitious NDCs, may inhibit implementation by resulting in unachievable targets or poorly designed policies (Röser *et al* 2020). The results of annual surveys carried out with delegates to the UNFCCC suggest many countries lacked the capacities necessary to formulate ambitious, but also achievable, NDCs (Röser *et al* 2020). A lack of integration of the political and technical processes, combined with knowledge and analytical capacity constraints, were cited as significant hurdles to the formulation of initial NDCs. Despite this, engagement with the NDC process has improved coordination on climate change within government and has increased capacity for future climate policy design (Röser *et al* 2020).

These insights underscore the importance of studying the NDC process, both as a barrier to formulating more adequate NDCs, and as a catalyst for increasing the capacities of governments to engage with climate policy more generally. In light of the present lack of ambition in the NDCs, this catalyzing function of the PA is imperative in determining its effectiveness moving forward (Hale 2020, Aykut *et al* 2020). Moreover, the first Global Stocktake, a comprehensive review of global

³⁷ This is based on evidence from a select group of high-emitting countries with an outside influence of global mitigation ambition.

climate policy ambition established by the PA, is slated for 2023. Key to providing an accurate account of ambition will be to ensure that country pledges are followed up with commensurate measures and actions.

Previous studies of the NDC formulation process have focused on single case studies without offering a comparative analysis. They are also largely confined to the grey literature, comprising reports from initiatives such as the mitigation partnership (Calero and Diego 2019, Hultman *et al* 2019, Figari and Gomez 2015, Buirra and Arredondo 2019, Van Tilburg *et al* 2018, Zevallos and Figari 2015, Kurdziel and Day 2015). Recently, more systematic analyses have turned their focus to the formulation of long-term low emissions development targets, providing best-practices based on a comparative assessment of a number of cases (Jotzo *et al* 2021).

This paper also takes a more systematic approach and contributes to the literature by studying the NDC formulation process of four key emerging economies: Brazil, South Africa, India and China (BASIC countries). Accordingly, I have developed an analytical framework for assessing the NDC formulation process by gathering insights from state capacity and policy design literature. I then apply this framework to the aforementioned case studies, basing my analysis on insights gained from interviews with experts from the respective countries, and from insights found in the existing literature. I find a considerable disconnect between these countries' international targets, such as the NDCs or net-zero announcements, and their domestic climate policy engagement. This disconnect is enhanced by a further lack of coordination between key ministries that causes misalignment and runs the risk of implementing insufficient and maladapted policies that are unlikely to meet targets set in the NDCs. Shrinking these gaps and mainstreaming NDC formulation within domestic political agendas will be key for the success of the PA.

I focus on the BASIC countries due to their defining position within international climate politics. They have played a vocal role in previous international climate negotiations, pooling their influence as a negotiating block, and remain highly influential in engaging other developing economies (Hochstetler and Milkoreit 2015, Olsson *et al* 2010, Tabau and Lemoine 2012). Under the PA, all countries must submit NDCs, regardless of their historic responsibility in contributing to climate change. Although the burden to drastically reduce near-term emissions and to provide support to other countries falls largely on industrialised economies, meaningfully engaging the highest emitting emerging economies

will play an outsized role in defining the future dynamics of international climate politics. Of course, there are several other top emitters that warrant further study but are not considered in the scope of this paper, including the United States and the European Union, as well as emerging economies such as Russia, Indonesia and Iran.

The remainder of this paper is structured as follows: In the next section I develop my analytical approach by defining specific capacities needed for NDC formulation. In Section 3 I briefly discuss my methods for applying the analytical framework and their primary limitations. In Section 4 I put forward the four country case studies, first by providing a brief introduction of their respective climate policy backgrounds and institutional contexts, and then present the results of my research detailing each NDC formulation process. In Section 5 I analyze these results and highlight and elaborate on three key findings. I conclude the paper with the implications of this study for the PA and the effectiveness of its pledge and review mechanism.

2. Analytical Framework: State Capacities for NDC Formulation

This study employs a three-pronged analytical framework to evaluate the NDC formulation process based upon insights gained from the literature on state capacities and policy design. *State capacity* here is defined as the ability of a given state to formulate and implement policies (Fukuyama 2013). Focusing specifically on the formulation aspect of state capacities, *policy design* is conceptualized as a deliberate and purposeful attempt to define policy goals and the measures to achieve these goals (Howlett 2015). The literature divides state capacities for policy design into three categories: 1.) *Political capacities* determine whether there is sufficient support for the policy to be executed and sustained over time; 2.) *Operational capacities* determine whether the policy can be prepared and implemented in practice; and 3.) *Analytical capacities* determine whether a policy is designed, ex-ante, so as to be able to achieve its goals (Wu *et al* 2015, Mukherjee and Giest 2019, Craft and Howlett 2013, Bali *et al* 2019).

These considerations, when applied to the NDC formulation process, offer us a useful theoretical foundation. *Political capacities* determine whether a country has the necessary political support to meaningfully engage with the NDC process and climate action domestically; *Operational capacities*

determine whether measures can be implemented to reach NDC targets and lastly; *Analytical capacities* determine whether states are able to formulate ambitious and feasible NDCs in line with the PA's targets.

I use these three broad categories to suggest a framework to assess the NDC formulation process. Reviewing existing literature on climate and environmental policy, I identify several factors influencing the analytical, operational and political capacities relevant to the NDC formulation process. Table 9 below provides an overview of these influencing factors, relating them to key questions for each capacity, and summarizes how they are operationalized in the context of NDC formulation processes.

Table 9: A Framework of Capacities for NDC Formulation

Capacities	Key Questions	Influencing factors	Operationalization
Political	Do key stakeholders support the NDC formulation process?	Political support	Public support
			Private sector support
			Government support
			International/diplomatic pressure
			Lead agency mandate
Operational	Who is involved in the NDC formulation process?	Inter-ministerial coordination	Formal institutions for inter-ministerial coordination
			Interdependencies between sectors/ministries
			Regular meetings and participation
			Formal process for gathering (written) inputs on draft NDCs
		Stakeholder participation	Formal institutions for stakeholder consultation
			Transparency
Analytical	What factual information is the NDC being based on?	Technical Inputs	Data availability and quality
			Capacities within government to employ data-based planning tools and understand results (e.g. economic modelling)
			Capacities and variety of external institutions providing analytical inputs (research, civil society and private sector)
			Coordination of analytical inputs both within government and from external sources

Political Capacities

Political capacities “help to obtain and sustain political support for policy actions” (Wu et al 2015). As such, they influence all aspects of the policy formulation process, determining whether a mandate

exists for engaging with the policy problem, who's setting the mandate, and whether it can be sustained over time.

Political support is imperative for the formulation of NDCs. It provides the broad mandate for a national government and other stakeholders to engage with the NDC process. Given the two-level structure of international climate politics, in the absence of domestic support for the NDC formulation process, targets set in the NDCs may not be reflected in domestic policies and thus be rendered inconsequential (Aklin and Mildenerger 2020, Putnam 1988, Keohane and Victor 2016). For example, while a given national environmental ministry might have ambitious international climate objectives per the PA, its overall mandate and efforts to push for legislative action could be curtailed by the head of state. Moreover, the NDC process is an iterative one, states are expected to update their pledges every five years, thus sustaining the political mandate to engage with this process over time is crucial for the effectiveness of the PA.

Where support for policy actions comes from is an important determinant of the political capacities for NDC formulation. Considering the cross-cutting nature of climate policy, climate actions, as found in the NDCs, require wide support across domestic government departments and society (Oberthür *et al* 2021, Rayner *et al* 2021, Victor *et al* 2019). Empirical insights into the formulation of NDCs and related policy processes underscore the importance of a lead agency, such as a ministry or inter-ministerial commission, holding a clear mandate to prepare the NDC and engage with international climate politics with the explicit support from the head of government (Buirra and Arredondo 2019, Zevallos and Figari 2015, Figari and Gomez 2015, Kurdziel and Day 2015).

Besides political support from within government, international pressure has an important agenda-setting function by prompting domestic legislative change on climate policy (Iacobuta *et al* 2018). Public support for climate action also plays an important role, particularly in legitimizing and sustaining engagement with the protracted NDC process. In this regard, research on agenda-setting for climate change has exemplified the influence of political elites on public opinion, with high-level political discourse often overriding scientific information in the media (Brulle *et al* 2012, Carmichael and Brulle 2017). Additionally, sub-state and private sector engagement with climate action also plays an important role in shaping the NDC process and its outcomes (Clark 2021, Hsu *et al* 2020b).

Political capacity is operationalized for each respective BASIC country by examining whether key stakeholders are engaged, or support engagement, with the NDC process. This gives us insight into which government institutions are mandated to coordinate and carry out the NDC formulation process (i.e. environment ministries, office of the head of government, economic or finance ministries), and where support for this engagement comes from (i.e. the head of state, civil society, private sector, other government departments, or international pressure).

Operational Capacities

Operational capacities “allow for the alignment of resources with policy actions so that they can be implemented in practice” (Wu *et al* 2015). This includes coordination between relevant government departments and with non-governmental stakeholders (Hughes *et al* 2015), as well as the ability for leading agencies to coordinate the policy formulation process, mediated, for example, through their relationship with legislative and executive institutions (Peters 2015).

Policy integration, or coordinating climate policy engagement across all relevant government departments, is integral for managing climate change, as ambitious climate policies have economic and societal implications in all sectors (Jordan and Lenschow 2010, Candel and Biesbroek 2016, Van Asselt *et al* 2015). A lack of policy integration could render NDC policy targets infeasible as they may not be aligned with the sectoral measures available to achieve them. This is exemplified in studies advocating a “whole of government” approach in formulating NDCs and long-term strategies under the PA (Buirra and Arredondo 2019, Zevallos and Figari 2015, Figari and Gomez 2015, Kurdziel and Day 2015, Calero and Diego 2019, Hultman *et al* 2019, Jotzo *et al* 2021).

To measure the extent of policy integration in the country-specific NDC formulation processes, I examine whether formal procedures or institutions exist for coordinating between relevant government departments, and if so, whether they function in practice. This includes, for example, 1.) whether regular meetings were held that involve relevant ministries and stakeholders, 2.) whether there were inter-ministerial working-groups tasked with drafting the NDC or specific sections thereof; and 3.) whether procedures for ministries to provide written inputs to the NDC exist.

Achieving NDC targets relies not only on government policy, but also non-state actions (Hale 2016a, Lui *et al* 2021, Hsu *et al* 2020a). This emphasizes the need for a broader consultation process that includes non-governmental stakeholders such as the private sector and civil society (Hsu *et al* 2017, Jotzo *et al* 2021, De Pinto *et al* 2018). Important factors contributing to effective consultation processes include involving stakeholders right from the start (Calero and Diego 2019) and holding regular stakeholder meetings throughout the process (Buirra and Arredondo 2019). What's more, communication of progress to the wider public is recommended in order to maintain domestic support for climate action (Zevallos and Figari 2015, Figari and Gomez 2015, Kurdziel and Day 2015). It is therefore important to consider the existence of formal procedures for stakeholder engagement, how transparent the NDC formulation process is, and to what extent progress and challenges are communicated to the public as important determinants of operational capacity.

Analytical Capacities

Analytical capacities *“help to ensure policy actions are technically sound in the sense that they can contribute to the attainment of policy goals if carried out”* (Wu *et al* 2015). This includes, for example, data availability and quality and the capabilities of relevant actors in providing or understanding analytical inputs. Analytical capacities are imperative to the NDC formulation process, as the PA text repeatedly urges states to base their NDCs on the ‘best available science’ or ‘scientific knowledge’ (UNFCCC 2015c). This provides states with a reference point for determining how ambitious their NDC targets are and acts as a rubric for evaluating how viable proposed measures are in meeting the PA’s goals.

Analytical capacities for NDC formulation include: 1.) the availability and quality of the evidence-base, such as greenhouse gas emissions or socioeconomic data; 2.) the technical capability of the institutions and individuals in assessing the data, e.g. quantitative modelling; and finally, 3.) the demand for, and understanding of, such analyses by policy makers (Wu *et al* 2015, Hsu 2015). An important distinction here is where this information comes from. Analytical capacity is often conceptualized as being held within government by highly-trained bureaucrats intended to advise politicians, also known as bureaucratic capacity (Huber and McCarty 2004). However, wicked problems such as climate change require non-siloed analytical collaboration between many actors,

with insights and knowledge drawn from scientific researchers and practitioners from government, academia, industry, and civil society (Head 2019, De Pinto *et al* 2018).

3. Method

The framework outlined in the previous section is applied to the NDC formulation processes of the BASIC countries in order to identify which factors most shape their NDCs, and where the capacity deficits lie, if any. These results thereby improve our understanding of the BASIC countries' engagement with the NDC process and provide practical recommendations for improving future rounds of NDCs. I used process tracing theory to inform my approach, employing the operationalized categories detailed in Table 9 as "empirical fingerprints" when assessing whether relevant capacities, such as policy integration, were at play in the NDC formulation process (Beach and Pedersen 2016).

In order to gather empirical evidence on each case, I conducted twenty-nine semi-structured interviews with practitioners working with or in the governments of BASIC countries on NDC formulation, as well as experts with in-depth knowledge of national climate politics in the relevant countries. These interviews were carried out between January and May 2021. I selected my interview participants via a snowballing process: First contacting experts on climate policy in each of the countries, and then following recommendations for further participants from previous interviews until no additional participants were suggested. In total I completed seven interviews with participants from both South Africa and Brazil, five from China, and ten from India.

Participants were asked to detail the NDC formulation process, both for the first NDCs and any recent or ongoing processes regarding the updated NDC. The framework developed in the previous section was used to structure and guide every interview. Namely, by using the key questions detailed in Table 9 as broad interview questions, and by asking participants to elaborate on important aspects based on the operationalized factors also found in Table 9. Evidence was cross-referenced in subsequent interviews, where possible.

To obtain my results, I coded each interview transcript using the operationalized categories from Table 9 as primary codes and differentiating between different rounds of NDCs. I also coded for more

general categories on the broader historical or institutional context in each case. I then collated the coded excerpts, aggregating the evidence to develop a descriptive roadmap of the NDC formulation process and capacities at play therein, in each case. In order to further bolster validity, I supplemented my interview results with relevant insights from existing literature on climate governance in each country.

This research method engenders two main limitations: The first being limited access to relevant interview participants. For example, I was unable to correspond directly with government officials in China. Access to officials was also limited in India and South Africa, although to a less inhibitive extent. This reduced the scope of some results, with some interviewees unable to offer information on all of the categories identified in Table 9. Despite cross-checking evidence where possible, this also has implications for the reliability of my findings, potentially biasing them towards the view of non-governmental actors. Secondly, at the time of carrying out the interviews, NDC update procedures were ongoing in each country except Brazil. For this reason, I was unable to obtain ex-post accounts of these processes, and can only offer tentative insights into procedural developments since the formulation of the initial NDCs.

4. NDC Formulation in the BASIC Countries

In the following section I present my results, organized by case. For each country, I provide a brief overview of the broader climate policy context, detailing historic trends and institutional developments that form the context within which the NDC formulation process is embedded. I base this overview on existing studies of climate policy in the BASIC countries, supported by accounts provided in the interviews. For reference, I provide in Table 10 below an overview of each country's NDC targets, their previous Copenhagen Pledges, and where applicable, their long-term emissions reduction targets.

I then present the findings of my research, detailing the initial NDC formulation processes for each country, and where applicable, the most recent NDC updates. I structure these findings according to the three broad capacities contained in the framework and highlight selected insights ascertained

from the interviews. A comprehensive overview of the study's findings for each framework category can be found at the end of this section in Table 11.

Table 10: The BASIC Countries NDC Targets, Copenhagen Pledges and Long-Term Targets

International Climate Pledges		Quantitative Targets			
		Brazil	South Africa	India	China
Copenhagen Pledge ² <i>Voluntary pledges submitted in 2009/2010 as part of the accord negotiated at COP15 in Copenhagen after a failure to come to a unanimous agreement on a treaty to replace the Kyoto Protocol.</i>		- 36.1% - 38.9% below BAU by 2020	- 34% below BAU by 2020	- 20-25% below 2005 emissions intensity of GDP by 2020	- Carbon intensity: -40% to -45% below 2005 by 2020 - Non-fossil share of energy supply: 15% in 2020 - Forest cover: +40 million ha by 2020 compared to 2005 - Forest stock: +1.3 billion m ³ by 2020 compared to 2005
Paris Agreement ¹	NDC 1	- Reduce GHG emissions by 37% in 2025, and by 43% (indicative) in 2030 below 2005 levels - 45% renewables in the energy mix by 2030 (including hydropower)	- 398 – 614 MtCO ₂ e between 2025-2030 <i>(Annual emissions. Emissions in 2019: 479 MtCO₂e³, 1990: 313 MtCO₂e³)</i>	- To reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level. - To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF). - To create an additional carbon sink of 2.5 to 3 billion tonnes of CO ₂ equivalent through additional forest and tree cover by 2030.	By 2030: - To achieve the peaking of carbon dioxide emissions around 2030 and making best efforts to peak earlier; - To lower carbon dioxide emissions per unit of GDP by 60% to 65% from the 2005 level; - To increase the share of non-fossil fuels in primary energy consumption to around 20%; and - To increase the forest stock volume by around 4.5 billion cubic meters on the 2005 level.
	NDC Update	- No change in the targets, although baseline year data has changed rendering the overall ambition less than in the first NDC	- 398-510 MtCO ₂ e by 2025 ⁴ - 350-420 MtCO ₂ e by 2030 ⁴	- N/A	- N/A
Long-Term Targets ²		- Climate neutrality by 2060 (conditional on market mechanisms) - <i>Target announced together with NDC update in December, 2020</i>	- Net-Zero by 2050 (proposed in the LEDS but not committed) - <i>LEDS submitted to the UNFCCC in February, 2020</i>	- N/A	- Carbon neutrality by 2060 (announced) - <i>Announced by President Xi at the UN General Assembly in September, 2020</i>

1. Data from Climate Watch (Climate Watch 2020)
 2. Data from Climate Action Tracker (Climate Action Tracker 2020b)
 3. Data from Our World in Data (Ritchie and Roser 2020)
 4. Official NDC submission to the UNFCCC NDC registry (Republic of South Africa 2021)

Brazil

Historical Background and Institutional Context

Historically in Brazil, climate politics was defined largely by a narrative representing Brazil as a poor-country unable to engage in mitigation without foreign support, framing climate change as a foreign affairs issue (Interview 29). This changed in the lead up to COP15 in Copenhagen in 2009. Climate change became a stronger domestic priority under the Lula presidency thanks to two highly influential environmental ministers: Marina Silva and Carlos Minc. Particularly under Marina Silva, the environment ministry was able to drastically decrease deforestation through strict regulation and enforcement of forestry policy (Hochstetler 2021). This resulted in a notable reduction in emissions that laid the foundation for later, more ambitious mitigation targets set in Brazil's Copenhagen Pledge and NDC (Interview 5, 20).

Following the succession of President Lula by Dilma Rousseff in 2011, climate change dropped off the domestic agenda. President Rousseff faced impeachment following a drastic drop in her approval ratings in the wake of a serious economic crisis, and deforestation rates began to rise again, with the previous controls on illegal deforestation being enforced less (Aamodt 2018). Despite the political turmoil, Brazil was the only developing country to submit an absolute emissions reduction target in its' NDC (Upadhyaya *et al* 2018).

Following Rousseff's impeachment and the election of president Bolsonaro, an open climate denier, the Brazilian government dismantled several domestic climate policy efforts, resulting in drastic increases in deforestation and subsequent emissions (Gerretsen 2020). Although the Bolsonaro administration did submit an updated NDC, its targets remain unchanged from Brazil's previous submission. In fact, adjusted emissions data from the 2005 baseline have decreased the overall ambition of the updated NDC, and conditional references to climate neutrality by 2060 have been dismissed as insubstantial given the current administration's open climate denialism (Gerretsen 2020).

Institutionally, the climate policy agenda in Brazil is defined by ultimate direct accountability to a powerful presidency (Hochstetler 2017, Aamodt and Stensdal 2017). Achieving climate policy

objectives does not require much inter-sectoral coordination in Brazil as its forestry sector accounts for a majority of total national emissions (Hochstetler 2021). In the lead up to COP15, civil society organisations were strongly represented within the environmental ministry, and engaged with the Brazilian Forum on Climate Change (here after Forum) (Interview 17, 9). The influence of stakeholder participation in Brazil, however, relies heavily on the president and their chosen cabinet. For example, the relevance of the Forum has fluctuated, losing influence under Rousseff, being temporarily revived under Temer, and again rendered ineffective under Bolsonaro (Interview 17, 5, 7).

Formulating the first NDC

Politically, the NDC formulation process in Brazil was heavily influenced by the powerful presidency. As previously mentioned, prior to the PA, climate change was not prominent on president Rousseff's agenda (Interviews 29, 17). However, in the lead-up to the PA, in a bid to distract from a drop in approval ratings, Rousseff changed her stance, mandating the Ministry of Environment to pursue an absolute emissions reduction target (Interview 29). As such, the political support for Brazil's engagement with the NDC process was determined less by a domestic agenda for ambitious climate policy, but rather as an international distraction from domestic political turmoil.

Operationally, President Rousseff granted environment minister Teixeira considerable power to coordinate the NDC process (Interviews 17, 9, 5, 10, 7). The Ministry of Environment is also responsible for the forestry sector, by far the largest contributor to Brazilian GHG emissions, granting it further autonomy in determining the NDC's targets (Interviews 5, 29). As such, Brazil did not make use of existing institutions for coordination, both between different ministries, and with non-governmental stakeholders. The formal Inter-Ministerial Commission on Climate Change headed by the Ministry for Science and Technology was not involved in the NDC formulation process, with the Ministry of Environment and Ministry of Foreign Affairs instead convening a number of ad-hoc informal consultations with other relevant ministries and sectors behind closed doors (Interviews 17, 9, 11).

Despite the previous success of the Forum in enabling stakeholder participation, it lost prominence during Teixeira's tenure at the Ministry of Environment and no other formal process was instituted

to involve stakeholders in the NDC formulation process (Interviews 17, 9, 5, 11). Instead, the Ministry of Environment carried out ad-hoc informal meetings with selected stakeholders (Interviews 17, 9, 5, 11). Although some basic consultations in the form of a survey were conducted by the Ministry for Foreign Affairs in late 2014, they were criticized as being ineffective in adequately engaging stakeholders (Interviews 9, 11).

Analytically, the NDC formulation process in Brazil was characterized by conflict between two leading ministries. In 2014, the Ministry for Science and Technology, which had historically been responsible for coordinating technical analyses for climate policy, commissioned a comprehensive economy-wide modelling study of mitigation options to contribute to the NDC process (Interview 10). Under President Rousseff, however, the mandate for engaging with international climate policy was transferred from the Ministry for Science and Technology to the Ministry of Environment, with the Ministry for Science and Technology retaliating by withholding the results of the study from the Ministry of Environment (Interviews 17, 29, 10). The Ministry of Environment was left gathering uncoordinated inputs for different sectors from various research institutes, which lead to incompatible results (Interviews 10, 11, 17).

NDC Update and Current Developments

Brazil was the first BASIC country to have communicated an NDC update to the UNFCCC. Procedurally, Brazil's NDC update included no formal analytical process, inter-ministerial consultations, or stakeholder engagement (Interviews 17, 9, 5). Despite President Bolsonaro's open climate denialism, two factors put pressure on his government to remain at least minimally engaged with the international climate regime: 1.) the threat of negative trade impacts due to noncompliance with the PA deeply concerned influential government and private actors (e.g. powerful agribusiness actors looking to increase their exports); and 2.) Joe Biden's victory over Donald Trump had removed the international precedent for open defiance of the PA (Interviews 9, 10, 5, 29).

South Africa

Historical Background and Institutional Context

Historically climate policy in South Africa has been defined by the dominance of a powerful cluster of industrial conglomerates with a strong lobbying arm in the minerals-energy sector (also known as the minerals-energy complex)(Tyler and Hochstetler 2021). Nonetheless, under president Zuma, South Africa became a strong advocate for climate policy internationally, whilst consistently highlighting the importance of common but differentiated responsibilities in light of historical emissions (Tyler and Hochstetler 2021). A desire to be seen as an international leader on climate change increased interest in climate policy domestically in the lead-up to COP15 in Copenhagen in 2009 and COP17 in Durban in 2011 (Upadhyaya *et al* 2018)(Interview 2). This led to the formulation of the Long-term Mitigation Strategy (LTMS) and the Peak, Plateau and Decline (PPD) mitigation range, which have since remained central to South Africa's climate ambitions, informing both the Copenhagen pledge, South Africa's first NDC and the recently submitted update (Tyler and Torres Gunfaus 2016)(Interview 20, 14).

Under the Zuma presidency, however, state capture of the minerals-energy complex, primarily through the large coal industry run by Eksom, meant international ambitions were rarely matched by domestic implementation (Tyler and Hochstetler 2021, Rennkamp 2019, Baker *et al* 2014)(Interview 20, 2, 14). This has changed recently with climate policy climbing the current government's agenda, supported by the emergence of a just transition narrative that has helped to engage South Africa's powerful labour unions (Tyler and Hochstetler 2021)(Interviews 6, 30). Government plans to reach net-zero by 2050 announced in the Low-Emissions Development Strategy (LEDS) in 2019, and the establishment of a presidential climate change coordination commission, or P4C, in 2020, support this trend (Calland 2021). Despite this, a draft of South Africa's NDC update published in March, 2021 fell short of the necessary ambition needed to meet the PA's temperature targets (Climate Action Tracker 2021b). The final version submitted to the UNFCCC in September, 2021, however, increased the ambition level³⁸ (Republic of South Africa 2021), and is now considered compatible with the PA temperature targets (Climate Action Tracker 2021a).

³⁸ It revises the 2030 target from 398-440 to 350-420 MtCO₂e.

Formulating the first NDC

Politically, climate change is not a salient issue in South Africa, having garnered little public attention within civil society in the past decades (Levi 2021)(Interviews 6, 2, 1). With climate policy still considered a foreign, not domestic, issue, the NDC formulation process, led by the Department for Environment, Forests and Fisheries (DEFF), was passed over by powerful ministries such as the Department of Energy (Interviews 2, 6). Thus, South Africa's engagement with the NDC process remained primarily a foreign policy exercise, receiving little support from domestic political actors.

Operationally, DEFF is mandated to coordinate the NDC process but requires approval from cabinet (Interviews 1, 2, 14). However, DEFF has diminished authority in the policy formulation process on account of the departments for resources and for energy holding considerably more power and influence in domestic politics (Interviews 6, 2). Although South Africa's NDC formulation process followed established procedures for coordinating ministries, the effectiveness of these formal procedures is questionable.

According to a government white paper, the inter-ministerial, inter-governmental, and national committees on climate change have a mandate to coordinate climate policy. Yet the committees rarely met and were often neglected by key ministers and thus held little to no influence in the NDC formulation process (Interviews 6, 20, 2, 1, 14, 30). The powerful influence of the minerals-energy complex further limited the authority of DEFF to coordinate with other departments, especially with climate change not high on the national agenda (Interviews 2, 1, 14, 30). Other ministries were, however, formally invited to provide written input to draft versions of the NDC prior to cabinet approval (Interviews 20, 14).

A formal stakeholder engagement process produced the release of a draft NDC for comment, and a series of official stakeholder consultations (Interviews 2, 14, 8). Despite a strong tradition of stakeholder participation in South Africa, doubts remain on the process's overall influence with concerns that many decisions were being reached before stakeholder were officially consulted (Interviews 2, 20, 8). Recently, South Africa established the P4C, a multi-stakeholder commission to coordinate and review the implementation of the NDC; however, questions remain regarding its

mandate to influence the formulation of subsequent NDCs and its ultimate effectiveness given the shortcomings of previous committees (Interviews 6, 14).

Analytically, South Africa's NDC formulation process used the same underlying analytical approach that informed the Copenhagen Pledge submitted in 2010. The NDC was informed by the LTMS and mitigation potential analysis that had been commissioned in the lead-up to COP15. The same modelling team from the University of Cape Town were contracted for all analyses, including a revision of the LTMS in 2010 (Interviews 10, 6, 20, 2, 1, 14). Some civil society actors see this reliance on a single modelling team as a shortcoming by not allowing for sufficient deliberation of the analytical approach that determines the LTMS and the resulting PPD (Interviews 2, 8, 30). Data availability was also cited as a barrier caused by a lack of transparency from private actors responsible for data collection in the minerals-energy complex (Interviews 6, 20, 2, 14).

NDC Update and Current Developments

South Africa's NDC update has maintained the same formal process that defined the first NDC, with the LTMS remaining a central touchstone (Interviews 6, 20, 2, 1). As such, the update required minimal inter-ministerial coordination (Interview 30). The COVID pandemic was cited as a barrier to effective stakeholder engagement, limiting in-person consultations (Interview 30). Nevertheless, a draft of the update was submitted for comments and a series of online webinars were held, although only after the draft received cabinet approval (Interview 30). Pressure from non-state actors and grassroots initiatives to engage with a mid-century net-zero target, has been heeded in the LEDS process (Interviews 6, 14). Indeed, South Africa's official NDC update³⁹, submitted to the UNFCCC in September, 2021, aligned with recommendations from the multi-stakeholder P4C to increase ambition (see Note 2) (Mountford 2021).

³⁹ This update was submitted to the UNFCCC after the interviews and analysis for this paper had already been finalized. The analysis was adjusted to include its revised ambition level vis-à-vis an earlier draft that was released earlier in 2021. The analysis relies instead on preliminary insights from other sources (e.g. Mountford 2021).

India

Historical Background and Institutional Context

Historically, India has been reluctant to commit to climate action internationally, citing a lack of historic responsibility (Dubash *et al* 2018). Facing considerable vulnerability to climate change, however, helped to increase domestic awareness of and engagement with the climate emergency (Dubash *et al* 2018). As such, the National Action Plan on Climate Change (NAPCC) established in 2008 in the lead-up to COP15, created eight national missions to address climate change. Implementation relied mainly on local bottom-up initiatives using a co-benefits framing to garner support. Indeed, climate policy engagement has been shaped by tensions between ambitions for international leadership and an equity focused narrative inhibiting the incurrence of significant mitigation costs. This has resulted in the bottom-up growth of mitigation policies that also meet development objectives, but has inhibited more strategic engagement (Pillai and Dubash 2021)(Interview 22, 25).

Institutionally, the Ministry of Environment, Forestry and Climate Change is the convening ministry for climate action. It is officially mandated to coordinate amongst the eight missions set out under the NAPCC, but lacks a strong executive to implement them (Aamodt 2018)(Interview 27). There remains a reluctance to commit to stringent international climate goals despite considerable domestic ambition (Aamodt and Stensdal 2017). For instance, Prime Minister Modi recently updated India's already ambitious domestic renewable energy target of 150 GW of renewable energy capacity by 2022 to 450 GW by 2030. Nevertheless, the Indian government has yet to commit to updating its NDC despite being on track to overachieve many of its first NDC targets (Wegner and Spencer 2020) (Interview 24, 25).

Formulating the first NDC

Politically, support for domestic climate policy is endogenous in the Indian political system, stemming mainly from the Prime Minister's Office that drives climate policy engagement (Interviews 28, 27, 26, 25, 3). A history of reluctance to overcommit at the international level has led to a policy dynamic where ambitious domestic climate policies are not matched by international targets (Interviews 22,

25, 26, 3, 27). Domestic ambition is promoted through: 1.) A co-benefits narrative garnering support for local initiatives on climate action; 2.) increasing international pressure to engage with climate politics; and 3.) demand for climate policy engagement from industry and businesses looking to take advantage of new markets and technologies (Interviews 22, 24, 25, 26).

Operationally, the Ministry of Environment ultimately holds the political mandate for coordinating the NDC process (Interviews 22, 25, 24, 27), albeit with support from the cabinet secretary (Interviews 3, 25, 28). The Prime Minister's Office also remains highly involved in the process (Interviews 22, 28, 27, 25, 26, 3). Overall, the NDC formulation process lacked formal procedures for coordinating among relevant ministries and stakeholders. Previous inter-ministerial institutions such as the Prime Ministers Council on Climate Change lacked member participation and attempts to revive them failed (Interviews 28, 24).

The Ministry of Environment, whilst mandated to coordinate implementation of the NAPCC missions across ministries, had little influence and lacked the convening clout to engage other ministries (Interviews 25, 26). However, with support from the Prime Minister's Office, the Ministry of Environment did hold ad-hoc consultations with relevant ministries in preparing the NDC (Interviews 22, 28, 24, 25, 3). India has further established the Apex Committee for the Implementation of the Paris Agreement (Apex Committee) to coordinate and review the implementation of the NDC; however, its effectiveness remains to be seen given previously failed attempts at inter-governmental coordination (Interviews, 28, 24, 26).

Analytically, India's NDC formulation process intentionally involved a number of different organizations that provided technical inputs with the overarching aim of fostering a wide variety of viewpoints and analyses (Interviews 16, 24, 25, 26, 27, 28). Three research institutes were commissioned by the Ministry of Environment to provide technical inputs. The institutes were invited to present their findings to key government officials in a series of workshops, however, each institution presented its results separately with little deliberation across organizations (Interviews 3, 24).

NDC Update and Current Developments

India does not officially intend to update its NDC, as it interprets the PA as only requiring an update if previous targets had not extended to 2030⁴⁰ (Interview 3). Nevertheless, the continued increase in renewable energy ambition exhibits a willingness to engage with climate policy domestically, despite there being concerns with the analytic foundations of the 450 GW by 2030 target (Interviews 22, 26). In the lead-up to COP26, the government has commissioned a number of studies on achieving net-zero by mid-century (Interviews 24, 3). However, reports of an immensely ambitious 2047 net-zero target have led some experts to argue that the primary motivations are cosmetic and only serve to eclipse China's ambitions (Interviews 28, 26). At the time of writing no official target has been announced.

China

Historical Background and Institutional Context

The Chinese government began engaging with climate change as a policy issue in 2003 when it moved the Climate Change Committee, a national coordinating group on climate change, from the Meteorological Commission to the National Development and Reform Council (Qi and Wu 2013). The establishment of the National Climate Change Program in 2007 further laid the foundation for setting climate change as an explicit policy goal in the twelfth five-year plan in 2010 (Heggelund 2021, Teng and Wang 2021). The Chinese have relied on all-encompassing national narratives to drive support for their climate policies. For instance, a "green economy" narrative meant to rally industry to decarbonize has shifted to a newer "ecological civilization" narrative that appeals to a wider swath of society (Heggelund 2021, Shen and Xie 2018).

Climate policy planning follows a top-down institutional structure in China whereby the central ministries, without any legislative debate, define targets and call upon regional authorities for implementation (Shen and Xie 2018, Qi and Wu 2013, Teng and Wang 2021)(Interview 15). However,

⁴⁰ The PA Decision text "...requests [Parties] whose intended nationally determined contribution pursuant to decision 1/CP.20 contains a time frame up to 2030 to communicate or update by 2020 these contributions and to do so every five years thereafter pursuant to Article 4, paragraph 9, of the Agreement;" (Paragraph 24 UNFCCC 2015a).

implementation has occasionally proven difficult due to regional resistance (Heggelund 2021, Shen and Xie 2018, Teng and Wang 2021). Nevertheless, China leads globally in renewable energy development with a total installed capacity in 2019 of almost 800 GW (IRENA 2020), largely supported by centralized government subsidy programs (Heggelund 2021, Shen and Xie 2018).

In December 2020, President Xi announced that China would aim to peak emissions before 2030 and become carbon-neutral by 2060. A report from Tsinghua University even suggests the possibility of China peaking its emissions by 2025 (Heggelund 2021)(Interview 4). However, recent plans laid out in China's new five-year plan offer little scope for this, proposing an energy intensity reduction of just 18% as was similarly the case in the previous five-year plan (Farand 2021).

Formulating the first NDC

Politically, President Xi's international ambitions were vital in defining China's international climate policy engagement. The US-China Joint Announcement on Climate Change in 2014 largely set the agenda for the NDC (Interviews 15, 4, 21, 12). As such, China's NDC remained primarily an exercise in foreign diplomacy, as exemplified by the Ministry of Environment's rejection of a more ambitious peaking target for the NDC despite supporting an equally far-reaching domestic target (Interview 4).

Operationally, despite the State Council holding ultimate authority, the National Development and Reform Council was mandated to coordinate the NDC process, but required support from the other ministries (Interviews 12, 4, 14). China's NDC was determined by a formal process with heads of relevant ministries convening to discuss NDC draft proposals in designated working groups (Interviews 15, 12, 4). Accounts of disagreements between the Ministry of Environment and the National Energy Agency on targets further suggest there was active coordination across ministries (Interview 4). Although non-governmental stakeholders were not involved in the actual NDC formulation process, they were able to participate indirectly in the analytical discussions informing the NDC by publishing reports and attending workshops (Interviews 15, 19). Sub-national governments were also occasionally consulted (Interviews 19, 21).

Analytically, China's NDC involved technical inputs from a wide variety of sources (Interviews 21, 12, 19, 4, 18), following a long-term debate across a network of research institutions vying for influence

over target setting (Interview 4). Inputs were disclosed through a series of workshops and seminars with key government stakeholders (Interviews 21, 12, 19, 4, 18). Data availability and quality was cited as an analytic barrier due to responsible sub-national actors lacking capacity to collect data (Interviews 15, 18, 19, 21).

NDC Update and Current Developments

China officially proposed updated targets for its NDC in 2020, but has yet to submit an official NDC update to the UNFCCC at the time of writing. The process for formulating the update largely follows the same procedure as for the first NDC, with the mandate for coordinating the process moving from the NDRC to the Ministry of Environment (Interviews 4, 15, 21). Research and data informing the updated 2030 target was already gathered in 2019 prior to the COVID pandemic, indicating a considerable level of preparedness (Interviews 15, 21, 4, 19). Nevertheless, there was surprise at President Xi's 2020 announcement of China's 2030 ambitions and 2060 net-neutrality target (Teng and Wang 2021)(Interviews 19, 4), with these surpassing less-ambitious recommendations made by a high-level ministerial working group (Interview 15).

Table 11: Assessing the NDC Formulation Capacities in the BASIC Countries: an Overview of Results

Policy Formulation Capacities	Influencing Factors	Operationalization	Brazil	South Africa	India	China
Political Capacities	Political support	Public support	Civil society pressure for absolute emissions reduction target (but largely unheeded)	Just transitions important in mobilizing support from labour unions	Co-benefits narrative used by local initiatives to garner support for climate policies	Air pollution used by the government as an important issue linkage to support climate agenda domestically
		Private sector support	No information for the first NDC, but private interests played an important role in setting the agenda for formulating an update	No information but historic influence of minerals energy complex likely still plays a role	Some private sector (mainly technological) interest in increased renewable energy capacity helped support domestic climate policy agenda	No information provided by interviews
		Government support	Presidency was very influential setting the agenda for an absolute reduction target	Head of state was historically influential but no information on whether this remained the case in the NDC. Cabinet approval required, with the departments for energy and resources holding considerable influence	Prime Ministers Office was very influential providing the needed convening power to engage relevant ministries	President Xi very influential in setting the national agenda for climate policy and narrative of an ecological civilisation. Ultimate authority for the process lies with the state council
		International/diplomatic pressure	International ambition through NDC used as a bid to distract from domestic turmoil	International pressure to engage with climate change the primary driver of the NDC agenda	International leadership the primary motivation for engaging with the NDC	Climate considered an important foreign affairs issue enabling Chinese to assume international leadership
		Lead agency mandate	Ministry of Environment received strong mandate from the presidency to coordinate NDC	DEFF mandated to coordinate NDC but considered weak	Ministry of Environment mandate to coordinate NDC but ineffective	National Development and Reform Council mandated to coordinate NDC (now moved to Ministry of Environment) but with coordination of other ministries
Operational Capacities	Inter-Ministerial coordination	Formal institutions for inter-ministerial coordination	Inter-ministerial committee inactive, coordination was ad-hoc and behind closed doors	Inter-ministerial committees irrelevant; P4C established but not yet active	Ad-hoc coordination. Apex Committee established but not yet active	Inter-ministerial high-level working group established to draft NDC
		Interdependencies between sectors/ministries	No information provided by interviews	No information provided by interviews	No information provided by interviews	No information provided by interviews

		Regular meetings and participation	Ad-hoc meetings, but process was overall rushed	Ministries often did not participate	Lack of participation	No information provided by interviews	
		Formal process for gathering (written) inputs on draft NDCs	None	Yes – NDC draft was distributed to ministries for written inputs	None	Yes – NDC draft was distributed to ministries for written inputs	
	Stakeholder participation	Formal institutions for stakeholder consultation	Institution for stakeholder engagement exists (Forum) but was inactive for the NDC	Series of stakeholder workshops and consultations were held, but questions remain as to their effectiveness	None	None	
		Transparency	No information provided by interviews	No information provided by interviews	No information provided by interviews	No information provided by interviews	
		Public dissemination/communication	Ad-hoc survey was carried out, but considered ineffective	NDC draft gazetted and released for public comment	None	None	
	Policy feedback	Institutionalized process for formulation of subsequent NDC	None	P4C but unclear whether the mandate extends to NDC formulation	Apex Committee established but unclear whether the mandate extends to NDC formulation	Ministry of Environment given mandate to coordinate climate policy. Establishment of the special envoy on climate change	
		Review of previous NDC implementation to inform subsequent rounds	None	P4C established to review NDC implementation	Apex Committee established to review NDC implementation	No information provided by interviews	
		Long-term target to inform NDC target setting	Indicative in NDC update	Net-Zero Announced in LEDS	Rumours and studies commissioned but no official announcement	Net-Zero by 2060 Announced	
	Analytical Capacities	Technical Inputs	Data availability and quality	No information provided by interviews	Lack of available data	Lack of data quality	Lack of data quality
			Capacities within government to use data and understand results	No information provided by interviews	No due to frequent rotation of personnel from DEFF to other departments	No information provided by interviews	No information provided by interviews
Capacities and variety of external institutions providing analytical inputs (research, civil society and private sector)			Modelling capacities in various research institutes	Modelling capacities particularly in the University of Cape Town	Modelling capacities in various research institutes	Modelling capacities in various research institutes	
Coordination of analytical inputs both within government and from external sources			Turf-war between ministries hindered a coordinated approach, instead relying on ad-hoc sectoral analyses from different organizations	Reliance on single academic organisation	Multiple organizations were invited to present inputs but no coordination between institutes providing input	Multiple institutions invited to present results to various working groups with high levels of coordination between actors	

5. Discussion

This study, thanks to its robust analytical framework and case scope, has produced a wealth of results on how countries actually engage the PA and NDCs, and where the challenges for future engagement lie. Despite the fact that the NDC formulation processes of the BASIC countries operate in different political and organizational contexts, there are several cross-cutting findings that can be drawn from all four cases. Key among these are: 1.) the divergence between the international targets set in the NDCs and domestic climate policy ambitions; 2.) the lack of policy integration among government and non-governmental stakeholders; and 3.) the uneven coordination of information and analysis upon which the NDC targets are set.

Divergence between international targets and domestic ambitions

As noted in the framework developed in Section 2, the political agenda and actors supporting the NDC process permeate all other state capacities influencing the NDC formulation process. In the BASIC countries, the political agendas for NDC engagement are directed primarily by the heads of state, who have an interest in driving engagement with the NDC process to attain international leadership. Considering the two-level dynamics of international climate politics, this study finds a discrepancy between the ambition of international targets and comparatively modest domestic policy engagement that risks the continued effectiveness and legitimacy of international climate politics under the PA.

This is exemplified particularly in the developments surrounding the NDC updates and the announcement of net-zero targets by mid-century. China, as one example, pledged climate neutrality before 2060, but has yet to significantly increase ambition in its proposed NDC update and most recent five-year plan. President Xi's ambitious steering of international targets has surprised both the international climate community and domestic policy actors and suggests China has outpaced its domestic political system, questioning whether these ambitious proposals will be met in practice. In Brazil, as another example, a net-zero target was set by an administration entirely unwilling to engage with climate change domestically. The discrepancy between international and domestic ambition is reversed in India where a reluctance to overcommit has inhibited the formulation of a more

ambitious NDC, despite considerable progress on, and increasing ambition of, domestic climate policies.

These examples suggest that the BASIC countries' engagement with international climate politics is not yet adequately reflected in domestic policy ambitions, calling into question the feasibility of targets set in the NDCs. This raises concerns, especially in light of the upcoming Global Stocktake. If the targets assessed in the stocktake are not implemented with corresponding domestic policy measures, then the international climate regime risks losing legitimacy. Nevertheless, the South African NDC update submitted to the UNFCCC in September 2021, suggests this trend may be shifting. Its revised target for 2030 (see Note 2) makes considerable progress towards achieving net-zero emissions by 2050. The role of the P4C in driving more ambitious targets, suggests that climate policy in South Africa is becoming more embedded within domestic politics, closing the gap between the international and domestic levels. A similar increase in ambition in China's NDC update would further substantiate this finding.

Lacking policy integration among government and non-state actors

Despite increasing state ambition, effectively implementing climate policies to meet NDC targets requires support from all relevant domestic actors. China's initial NDC formulation process was the only one to include systematic coordination amongst ministries, consisting of regular inter-ministerial meetings in the form of a high-level working group. In Brazil, India and South Africa, existing fora for inter-ministerial coordination were either ineffective or simply not used. This was largely due to a lack of convening power within the lead agency. In South Africa and India, fora for inter-ministerial coordination on climate change lacked participation from more powerful ministries. In Brazil's case, although the mandate for coordinating the NDC process had shifted to the Ministry of Environment, the Ministry for Science and Technology was still the head of the Inter-Ministerial Commission on Climate Change. As a result the commission was not active in the NDC formulation process. In the absence of formal inter-ministerial coordination processes, ad-hoc consultations, as were the case in Brazil and India, lacked transparency and risked shutting out non-participant sectors. Such a lack of policy integration jeopardizes the integrity of the NDC process, running the risk of targets not being adequately supported by sectoral measures needed to implement them.

Newly established fora for inter-ministerial coordination in South Africa and India suggest a more coordinated approach may be taken for future NDCs in these countries. For example, the influence of the P4C in encouraging the South African government to revise its initially proposed 2030 target in the updated NDC provides proof of the value of policy integration. Finding similar means of overcoming barriers to coordination in other countries will be integral to ensuring increased ambition in international pledges is accompanied by commensurate climate policy measures domestically.

Beyond inter-ministerial coordination, involving sub- and non-state actors is imperative to ensuring the targets in the NDCs can be implemented domestically. Implementing sectoral measures to meet NDC targets requires support from local governments, industry and civil society. Moreover, in the absence of climate actions, non-state actors are among the primary means to apply pressure on governments to do more.

South Africa was the only country to engage in a structured stakeholder engagement process with non-governmental stakeholders. Conversely, the Apex Committee established in India did not include non-governmental actors, and its NDC process did not formally engage them or sub-state governments. This occurred despite the importance of local initiatives in the implementation of the NAPCC. Similarly in Brazil, the historic influence of the Forum in pushing the climate policy agenda domestically reinforces the importance of involving non-state actors. However, similar processes were lacking in the formulation of both the first NDC and the current update. Nonetheless, powerful agri-business actors were able to keep the current government from withdrawing from the PA, pushing it to remain minimally engaged with the NDC process. This reinforces the importance of broad engagement with the NDC process beyond the head of state and lead coordinating agency. In China, sub-national governments were formally consulted, however, the extent of influence of non-state actors in a highly centralized political system is questionable. With regional resistance to climate policy historically hindering implementation, involving sub- and non-state actors more candidly would help ensure that future targets are more readily implemented.

Uneven coordination of information and analysis

This study has shown that formulating ambitious and feasible NDCs in line with the PA's targets requires a technical assessment and understanding of mitigation options within domestic contexts.

To this end, the BASIC governments all exhibited the capacity, through external research institutions, to carry out economic modelling in order to substantiate their NDC targets. The BASIC countries did, however, take different approaches to coordinating between external research institutions and other relevant actors able to provide these analytical inputs.

China implemented the most systematic coordination of technical inputs of the cases studied, including a long-term process involving analytical inputs, such as models of Chinese emissions peaking, from various research institutes through workshops and seminars. This allowed for an engaging discussion on the NDC's ambition and paved the way for President Xi to announce more ambitious targets than were previously expected. By contrast, in Brazil, the turf war between the Ministry for Science and Technology and Ministry of Environment obstructed a systematic approach, with the process instead relying on ad-hoc analyses carried out by different organizations for each sector. Incompatibilities between these sectoral analyses highlight the need for better coordination. Although Brazil's NDC was able to rely substantially on its past successes in reducing emissions from deforestation, in the medium to long-term, economy-wide emissions reductions will be necessary to meet the PA's targets, further necessitating better coordination of sectoral analyses.

This study finds that South Africa and India fall somewhere between China and Brazil. In South Africa, despite the LTMS process exhibiting strong technical planning capacity, the reliance on a single organization to carry out the technical analysis underpinning the NDC lacks a broader consideration of institutional alternatives and other analytical approaches. In India, although multiple organizations were invited to contribute technical inputs, there was little coordination between organizations, inhibiting a broader discussion with stakeholders beyond select government officials. A more coordinated approach in both cases would strengthen the integrity of announced targets. Particularly in India, better coordination would ensure that ambitious proposals such as the recently announced renewable energy target, or the afforestation target of the first NDC, were met with less skepticism.

6. Conclusions

Five years after its adoption, the PA's pledge and review mechanism has yet to prove it can reach its goals by effectively ratcheting up domestic climate policy ambition and implementation. However,

in the last five years, all parties to the PA have engaged with a process of formulating NDCs, implementing policies to achieve them, and tracking progress in order to update their pledges. Studying and assessing these processes provides an indication of the PA's effect beyond the ultimate ambition of the resulting NDCs.

To this end, this paper develops an analytical framework to assess the NDC formulation process, demonstrating its utility by studying NDC formulation in the BASIC countries. The core findings, while limited in their generalizability, indicate that the PA has a procedural impact in bringing countries to engage with the NDC process. However, significant gaps remain that, if left unaddressed, threaten the ultimate success of the PA. Most importantly, international climate policy pledges, such as the NDCs and recent net-zero pledges, are shown to remain detached from domestic policy considerations. This disconnect is enhanced by a lack of coordination between key ministries that risks misalignment between targets and the sectoral measures needed to implement them. Overcoming such barriers will be key to ensuring the PA's effectiveness.

Nonetheless, the emergence of net-zero pledges, even if so far lacking in substance, has pushed the discussion surrounding the NDCs towards a more systematic and long-term process. If coupled with efforts to better engage relevant stakeholders, both analytically and operationally, the NDC process could bridge international climate policy considerations with domestic policy processes. To this end, capacity building efforts could strengthen coordination processes both between government departments, and with non-state actors. The success of the P4C in South Africa presents an important example in this respect. However, such engagement is predicated on a broader agenda supporting the NDC process that goes beyond the interests of the head of state. The NDC process, and climate action more broadly, must therefore become more embedded within domestic political agendas in order for the PA to prove effective.

Part 3: Discussion and Conclusions

Chapter 7: Discussion, Limitations, and Recommendations for Further Research

Against the backdrop of an increasingly urgent need for international cooperation on climate change, the aim of this thesis has been to gain a better understanding of the mechanisms through which the Paris Agreement proposes to limit global greenhouse gas emissions, and the prospects for these mechanisms to succeed in doing so. The three papers making up the body of this dissertation approach this question from three distinct perspectives. In the two final chapters of this dissertation I summarize their key findings and discuss their implications for international cooperation on climate change and the prospects for the PA's effectiveness (this Chapter), and for global governance more broadly (Chapter 8). In the following sections I first recount the main takeaways from each of the papers, discussing their contributions to the overall aim of this thesis, and embedding their findings within the existing literature studying the PA. I further present this dissertation's limitations and propose recommendations for further research.

7.1 Key Findings From Chapter 4: assessments of the PA's effectiveness

In the first paper of this cumulative dissertation I ask what we already know about the PA and its effectiveness, using systematic evidence synthesis methods to provide an overview of the existing literature studying the PA, and synthesise insights on whether or not the PA is effective. The paper finds a growing and highly diverse body of literature studying the PA, with contributions ranging from game theoretic modelling of the PA's pledge and review mechanism, to legal analyses of the PA's provisions and the obligations they put on its member states. This overview further highlights adaptation and capacity building to be primary gaps within the literature that warrant further research. Carrying out a bibliometric analysis of epistemic groups studying the PA, the paper also finds a disconnect between the literatures studying the dynamics of pledge and review in theory, and those studying the practical implications of the PA's review mechanisms, despite considerable overlap in their focus. As such, whilst there exists a diverse and growing body of research studying the PA, gaps persist, and the research remains somewhat fragmented across various epistemic clusters.

Beyond providing an overview of existing research on the PA, the paper set out to synthesise insights on whether or not the PA is effective. To this end, based on its review of relevant literature, the paper identifies three primary factors determining the PA's effectiveness: first, institutionally the PA relies on the effective review of NDCs in order to both track progress on meeting the PA's targets and apply scrutiny to individual countries' contributions to these targets. However, the literature studied in the paper consistently underlines the shortcomings of existing transparency provisions, highlighting a lack of comparable information and reporting standards as primary barriers to the PA's effectiveness. This notwithstanding, the PA remains in its early stages with transparency provisions still in development, and the literature provides numerous recommendations for how to overcome prevailing shortcomings. As such it remains unclear whether the PA's mechanisms will prove institutionally effective, enabling the periodic pledge and review of NDCs as envisioned. The second paper of this thesis (Chapter 5) studies this in more detail, assessing the PA's review mechanisms design.

Second, given the voluntary nature of the NDCs, in order to prove environmentally effective, the PA remains entirely beholden to national and non-state climate policy ambitions. Thus, even if institutional shortcomings such as incomparable information are overcome, domestic climate policy actions may simply not be ambitious enough to reach the PA's targets, and non-state actions unable to make up the gap. The paper cites the persistent gap between the emissions reductions pledged by the NDCs and those needed to ensure the PA's temperature targets are met, as well as a general lack of funding and support, as incriminating evidence on the prospects for the PA to ensure the necessary levels of ambition. This suggests the PA does too little to enable more stringent cooperation. However, more recent evidence provides some, if small, respite. The announcement of a series of net-zero by mid-century targets made by high emitters suggests some scope for higher ambition levels than currently envisioned in the NDCs. Furthermore, research on the contribution of non-state actors also suggest these may be increasingly able to make up the remaining gap in ambition. Nevertheless, with neither the NDCs, nor longer-term targets yet implemented, these developments remain tentative at best.

Finally, and perhaps most importantly, the paper identifies a third factor influencing the PA's effectiveness that provides a more positive outlook. The PA is consistently presented as a significant normative shift in international cooperation on climate change, with (all) nations agreeing on the

pressing nature of the climate problem, and the need for collective action beyond domestic policies. It is argued that this opens new possibilities for climate action, such as empowering domestic constituents by setting collective targets to which all parties agreed and thus can be held accountable for, or enabling litigation under a human rights framing. This signalling is further aided through the experimental nature of the PA, with the periodic pledge and review of NDCs enabling learning and norm diffusion. And indeed, it is in these aspects that recent evidence suggests the PA has been the most effective. As discussed in Chapter 2 of this dissertation, recent court cases in the Netherlands and Germany have invoked the PA in requiring more ambitious climate actions from both fossil fuel companies and national governments respectively.

7.2 Key Findings from Chapter 5: the PA's review mechanism design

In the second paper of this cumulative dissertation I ask what we can learn about the effectiveness of the PA's review mechanisms from the performance of analogous review mechanisms in other international regimes? The paper uses systematic evidence synthesis methods to collect and collate ex-post evidence concerning the performance of five analogous mechanisms with comparable global reach in the human rights, trade, labour and monetary policy fields. Synthesising insights across these mechanisms it draws design lessons for the PA, identifying six common factors influencing review mechanism performance, namely: 1.) the accuracy and quality of information produced by the review, 2.) a trade-off between expert- and peer-review, 3.) repeated interaction, 4.) the capacity to carry out the review, 5.) the transparency of the review process and its outputs, and 6.) the salience and practicality of the review outcomes. Applying these to assess the PA it finds the PA's review mechanisms incorporate many of these factors, enabling the transparent provision of information, including both expert- and peer-review, establishing repetitive fora for state interaction and providing support to build the reporting capacities of states. However, the PA's review mechanisms are not mandated to assess the adequacy of individual pledges, thus lacking in salience and practicality. It further remains uncertain whether the UNFCCC's capacity and resources will suffice to carry out the arduous review task.

These findings exemplify a number of points that warrant discussion: first, evidence from the analogous review mechanisms studied suggests review mechanisms are effective primarily through

three functions: 1.) the provision of information, 2.) socialization and norm diffusion through repeated interaction amongst peers and 3.) providing signalling and guidance. These mirror the 5 functions of global governance presented in Chapter 2, and support the findings from the first paper (Chapter 4) that assessing the PA primarily according to its institutional and environmental effectiveness ignores the importance of experimentation and learning and the possibility of more catalytic forms of cooperation.

Nonetheless, the explicit prohibition of an assessment of the adequacy of individual countries pledges severely limits the salience of the review process and the pressure the PA is able to put on countries to change their behaviour. It further stifles the possibility for the review process to provide practical recommendations to countries for how to better engage with climate policies domestically. Whilst non-state actors may be able to fill this gap to an extent, for example through publishing shadow reports complementing the PA's review mechanisms, the extent to which this can truly substitute formal inter-state review processes requires further research. As such the PA's review mechanisms are limited in their ability to alter states' incentives to cooperate, putting more emphasis on factors such as domestic public opinion and political preferences or technological innovation to enable cooperation. To this end, the third paper of this dissertation considers domestic engagement with the pledge and review process more closely.

Finally, the capacity constraints of the UNFCCC secretariat are something that has not been sufficiently analysed in the literature studying the PA. Compared with the analogous review mechanisms studied in this paper, the PA's review mechanisms are significantly more complex. However, many of the analogies studied exhibited a lack of capacities to carry out the review process effectively, with review outputs often significantly delayed, and overburdened reviewers unable to ensure the necessary level of detail to provide useful information. By contrast, through strategic use of its considerable resources, IMF staff are able to effectively survey state compliance, and are seen as reliable experts with considerable influence within economic policy discourse generally. While it seems politically unlikely for the UNFCCC to emulate this, more research needs to be carried out to better understand the UNFCCC's capacities to effectively implement the PA.

7.3 Key Findings from Chapter 6: domestic engagement with the NDC process

In the third and final paper of this cumulative dissertation I ask what effect the PA has had so far on domestic climate policy formulation, studying countries engagement with the pledge and review process focusing on the formulation of the NDCs. To this end I develop a framework for assessing countries capacities for NDC formulation, broadly categorizing these as political, operational and analytical capacities. Applying the framework to studying the NDC formulation process in specific cases allows for the identification of important determinants of countries' NDCs, and capacity deficits. This improves our understanding of countries' engagement with the NDC process and enables better directed recommendations for enhancing the NDC formulation process for future rounds of NDCs. The paper demonstrates the value of the framework by applying it to compare the NDC formulation process in the BASIC countries.

The experience of the BASIC countries shows that domestic engagement in climate policies remains relatively new in emerging economies, with all four cases first engaging with climate policies domestically in the lead up to COP15 in Copenhagen in 2009. This suggests that much of the debate surrounding climate policy engagement in these countries remains at an early stage and offers scope for this to develop. Indeed, two of the cases have recently established institutions mandated to coordinate and review NDC implementation. This bodes well for the iterative nature of pledge and review, with countries still experimenting and learning how to best cooperate on climate change. Indeed, the role of the Presidential Climate Change Coordinating Commission in increasing the ambition of South Africa's NDC is a particularly pertinent example of progress being made towards achieving the PA's targets.

However, the paper also highlights significant shortcomings in the BASIC countries' NDC formulation process. These include a lack of systematic coordination amongst relevant stakeholders, both analytically and operationally. Two things stand out in this regard: first, although all the BASIC countries have the necessary analytical capacities to inform the NDC process, they did not always establish coordination processes to best make use of this capacity. Second, the NDC formulation process often lacked integration amongst relevant government sectors, with powerful ministries simply not participating in established fora for inter-ministerial coordination. This questions the effectiveness of recently established institutions mandated to coordinate and review the NDCs.

Most pertinently, the paper highlights the overarching importance of political support for domestic engagement with climate policies. Thus far, the BASIC countries NDCs remain directed primarily by the head of state, with an interest in international leadership playing an important role in driving engagement with the NDC process. This has resulted in a divergence between these countries' international climate ambitions, and their domestic climate policy processes. Considering the two-level dynamic of international climate politics this finding suggests that even if countries' international pledges, such as the NDCs or net-zero targets, increase in ambition, this may not yet be supported domestically. Therefore, in order for the PA to be effective, climate policy considerations need to become more embedded within domestic political agendas.

7.4 Is the Paris Agreement Effective?

The pledges submitted to the PA still fall short of the required ambition in order to reach the PA's temperature targets. Although the emissions gap is closing⁴¹, particularly when considering the recent announcement of net-zero targets by a multitude of high emitters, the combined insights gained from the three papers suggest that under a strict tragedy of the commons framing, the PA fails to enable the levels of cooperation necessary to overcome barriers to collective action.

First, the PA's review mechanisms exhibit significant shortcomings, lacking comparable information, and being prohibited from appraising individual countries' ambition (Chapters 4 and 5). Second, countries' pledges are not embedded within domestic political processes, questioning their implementation (Chapter 6). Third, the papers highlight the need to look beyond immediate environmental outcomes when assessing the PA's effectiveness, identifying more subtle causal chains for ratcheting up ambition. Here they exemplify the PA's role as a platform for experimentation and learning (Chapter 4), the review mechanisms' socialization and norm diffusion features (Chapter 5), and the formulation of NDCs as a means to integrate climate policy domestically (Chapter 6).

⁴¹ This assumes announced targets will be met. Currently implemented policies still fall far short of reaching the PA's goals (Climate Action Tracker 2020a).

These more subtle causal chains reflect the limits of international cooperation on climate change beyond the free-rider problem, as discussed in Chapter 2. Considering the five governance functions suggested in response to these limits, the papers show that the PA fulfils many of these functions, although important limitations remain:

1. The PA *provides guidance and signalling*, albeit imperfectly. As depicted in Chapter 5, the PA's review mechanism design limits the practicality and salience of resulting recommendations. Further, Chapter 6 provides empirical evidence of countries' engagement with the NDC process, suggesting that despite pledging climate action internationally, the NDCs and long-term targets are not yet embedded in domestic climate policy considerations. Thus, although the PA has provided a signal to countries, for example to announce net-zero targets by mid-century, this signal has not yet had a considerable effect on actual policy implementation. Nonetheless, there is some evidence to suggest the PA's signalling function may yet intensify. Namely, the influence of the Presidential Climate Change Coordinating Commission in increasing the ambition of South Africa's NDC update as discussed in Chapter 6, but also the proliferation of non-state action, and the invocation of the PA in recent court cases, as discussed in Chapter 2.
2. The PA *sets rules to facilitate collective action*, however, Chapter 6 provides evidence that the PA's rules are interpreted differently by individual countries, with India interpreting the PA as not requiring the submission of an updated NDC in the lead-up to COP26, or simply disregarded, with Brazil reducing ambition in its NDC update as compared with its first NDC. Moreover, possible capacity constraints identified in Chapter 5 might limit the ability of the UNFCCC to effectively enforce the PA's rules.
3. The PA establishes complex mechanisms in order to *enhance transparency and accountability*. Chapter 5 shows that the PA's review mechanisms are designed to enable the transparent provision of information through both expert- and peer-review and provide support for enhancing countries' capacities for transparency. However, as exemplified in Chapter 4 and 5, information submitted thus far lacks comparability and quality, and although the PA's review mechanisms do account for whether countries are on track to meet their

pledges, they do not allow for an appraisal of the adequacy of these pledges, limiting countries accountability.

4. The PA establishes mechanisms to *offer support*, including on finance, technology and capacity building. Although not the focus of this dissertation's research, evidence from Chapter 4 presents a shortage of finance as a significant barrier to the PA's effectiveness, although the capacity building provisions for transparency are positively appraised in Chapter 5. A more comprehensive appraisal of the PA's support mechanisms lies outside the scope of this dissertation.
5. Finally, Chapter 4 exemplifies that the PA *promotes knowledge and learning* through the regular exchange of experiences and best-practices. This is further supported in Chapter 5, with the iterative nature of the review process identified as an essential means to socialize states and encourage learning and norm diffusion. Chapter 6 provides tentative empirical evidence of learning in practice, with two of the cases studied establishing institutions mandated to review the implementation of the NDCs domestically. However, questions remain as to whether these institutions' mandates will extend to informing subsequent NDCs, and past experiences caution that such institutions may not be effective in practice.

Beyond these five governance functions, the results of this dissertation also pertain relevance to the other framings of international cooperation on climate change discussed in Chapter 2. First and foremost, although the findings of this dissertation support the claim that unilateral action on climate change is possible, and that domestic politics are a highly important determinant of international cooperation outcomes, they also suggest that international cooperation remains important as a means to embolden climate action globally. Here it is pertinent to consider the counter-factual: what if there were no PA? Under this circumstance it seems unlikely, for example, that the BASIC countries would be announcing net-zero targets by mid-century, with the PA having clearly played an important role in signalling the normative desirability of setting such targets, and pressuring countries to follow suite. Considering that this dissertation finds little evidence to suggest that the PA has impaired climate action, it emerges that intergovernmental agreements on climate change such as the PA remain desirable.

Second, this dissertation's findings show that proposed framings of the PA as a form of catalytic cooperation or incantatory system of governance hold some merit. The PA sets collective goals, and through decentralized implementation of these retains flexibility that facilitates first-movers. The collective review and benchmarking of countries climate ambitions through the NDCs accounts for changing preferences and ensures countries are aware of increasing returns, although the identified shortcomings of the review mechanisms in the first and second papers caveat this. Indeed, the updated NDCs and net-zero pledges demonstrate that ambition is being ratcheted-up, and invocations of the PA in recent court cases suggest a broader symbolic and discursive role for the PA. However, the overbearing importance of the interests of the head-of-state in setting announced targets also demonstrates that international cooperation still remains firmly intergovernmental. The disconnect between international targets and domestic policy processes further suggests the PA's catalysing, or incantatory, role risks hollowness unless climate policy engagement is better integrated domestically.

Third, it is pertinent to reflect on the validity of the collective action framing in light of the papers findings. The evidence presented in Chapter 5, that review mechanisms in other international regimes can be effective, suggests that international pressure is a useful mechanism for enhancing cooperation. However, whether this is enough to overcome problems to collective action in climate policy remains unclear. Similarly, the BASIC countries' experience is instructive in showing that international reputation is a key element driving countries announced climate commitments. At the same time, under a strict collective action framing, China's 2060 net-zero target would have been unlikely. So why did China cooperate? Multiple explanations are possible. For example, the rational choice perspective would suggest China acted strategically based on the threat of carbon border adjustments and decreasing competitiveness as new technologies take hold. Another explanation could be that the PA's signalling/discursive elements diffused norms and pressured China to follow-suit. However, neither of these help explain why other countries moved first, generating a reaction from China. Moreover, if China acted based on international pressure and norm-diffusion alone, why are similar results not possible for Human Rights? A more fitting explanation would be that the Chinese leadership is genuinely concerned about climate change, and, coupled with its ability for long-term strategic planning, had an incentive to support ambitious global climate policy. Nonetheless, as depicted in Chapter 6, Chinese cooperation remains conditional, and would not have been possible without international pressure, learning, and norm-diffusion.

Whilst it is out of the scope of this dissertation to provide more definitive empirical proof, this suggests collective action retains its explanatory power, albeit with some important augmentations. International cooperation on climate change mitigation is a repeated game where states act as conditional co-operators in accordance with preferences determined through domestic politics, technological considerations, and international pressure, learning and norm-diffusion. Thus preferences can transcend narrow self-interests, allowing for a degree of normative considerations and altruistic cooperation and enabling first moving. As preferences are not static, repeated interactions may serve to overcome free-riding. This notwithstanding, more research needs to be carried out to uncover the complex causal mechanisms determining individual countries preferences for engaging with climate policy.

Finally, against the background that international cooperation on climate change remains best explained through a collective action lens, it is pertinent to revisit suggestions that overcoming free-riding requires more stringent measures such as conditional carbon prices. Such measures, if supported by a critical mass of high-emitters, would undoubtedly significantly advance global mitigation efforts. Carbon pricing remains an integral part of the domestic climate policy mix. Conditional measures, reducing incentives for others to free-ride, could strengthen their impact globally. However, coordinating such measures still requires international cooperation. The evidence presented in this dissertation suggests that without the PA the enforcement of such measures would be tough. Without the PA's guidance, signalling, and norm-diffusion, unilateral implementation of such measures outside of any international framework would lack legitimacy. Pledge and review further provides a platform for exchange, with countries able to justify their policy choices, facilitating learning and the sharing of best-practices. Negotiations on Article 6 of the PA regarding market mechanisms remain ongoing. Despite the necessary compromise of the UNFCCC negotiations, and their decidedly slow pace, conditional prices would be stronger if implemented within the multilateral framework of the PA.

To conclude, the PA's pledge and review mechanism engages countries in an iterative process for climate policy formulation, review and implementation. The flexibility granted to countries, allowing them to autonomously determine the ambition of their pledged contributions, has resulted in combined pledges falling short of what is needed to ensure the PA temperature targets are met. Although the PA envisions a ratcheting-up of this ambition over time, time is rapidly running out. The

frequent deduction in this dissertation is that the PA alone is not sufficiently effective to ensure ambition levels will be ratcheted up to the extent needed and within the necessary time horizon. However, the PA is not alone, but rather relies on national governments and institutions, domestic constituents, as well as a wide array of non-state actors and transnational governance initiatives. From a pure performance basis the PA is not effective, but judged from the perspective of building institutional mechanisms for coordinating climate action, it may yet be. Though its review mechanisms exhibit considerable shortcomings, and domestic engagement with climate politics leaves much to be desired, these faults can be remedied. The task now is to ensure that the engagement sparked by the PA results in actual emissions reductions, that credible plans are formed for how to implement pledges, and that through the continued interaction of all these actors through the various mechanisms established by the PA, climate policy is ever further embedded within our everyday lives, politically and otherwise.

7.5 Limitations and Recommendations for Future Research

Each of the individual papers making up the body of this dissertation include a section discussing limitations and recommendations specific to the papers themselves. For example, Section 4.2 in Chapter 4 discusses limitations encountered in the systematic synthesis of qualitative and ex-ante evidence on the PA's effectiveness. Chapter 4 also ends with a number of recommendations for further research including assessing domestic processes for climate policy engagement and how to ratchet up ambition in individual national contexts. Section 5.2 of Chapter 5 similarly reflects on methodological limitations (Appendix 2.1 reflects on this further) and the Chapters conclusions recommend avenues for further research, particularly on the role of NSAs in the PA's review mechanisms. Finally, Chapter 6 reflects on limitations to its scope and methods in Section 6.3. Beyond these paper-specific considerations, the dissertations broad approach pertains important limitations that are discussed below.

This dissertation set out to study the effectiveness of the PA, focusing on the mitigation component and the agreement's pledge and review mechanisms. As such the dissertation's findings are limited to this scope, and offer no conclusions on the PA's effectiveness for enhancing adaptation, finance, technology or capacity building. As depicted in Chapter 2, however, these remain highly important

aspects of international cooperation on climate change that have also been extensively studied. Future research should aim to better integrate these findings, exploring the interaction between the PA's pledge and review mechanism and its other provisions, as well as between its goals beyond mitigation.

The dissertation's cumulative nature also limits some of its findings, as the individual papers making up the body of the dissertation were written and published separately, and as such could not always account for more recent developments in the knowledge base. For example, Chapter 4 synthesises insights from literature published until June 2019. Since then, at the time of writing these conclusions, over 1500 further papers have been published studying the PA. The criticisms of a lack of comparable information in the NDCs that feature prominently in the findings from Chapter 4 do not take into account the NDC updates submitted in late 2020 and 2021, with assessments of these only just emerging at the time of writing. Future research needs to be done to confirm and where necessary adjust this dissertation's findings, accounting for the continuous development of international climate politics.

Finally, this dissertation's research and writing coincided with the COVID pandemic, restricting its approach somewhat. Original plans to hold interviews with relevant stakeholder for Chapter 5 had to be abandoned during the early months of the pandemic. Moreover, the intention had been for Chapter 6 to involve studying the effect of the PA in its first five years through participation and research at the COP26 in Glasgow in 2020, and UNFCCC meetings taking place in the lead-up to this. The aim was to survey relevant actors' assessments on whether and where the PA had been effective over its first 5 years, and what the prospects are for its effect in the future? The postponement of the COP due to the pandemic necessitated a change in direction leading to the focus of the final paper on the NDC formulation process. However, the original research question remains pertinent and should be pursued in the future.

Chapter 8: Conclusions

This dissertation has studied the PA's pledge and review mechanism. In the previous Chapter it discussed its findings and whether pledge and review will be effective in achieving the PA's targets. It highlights significant shortcomings that, if left unaddressed, would render these targets unattainable. Despite these shortcomings, the PA's hybrid structure, combining top-down monitoring, review and reporting with bottom-up pledges and action, remains an innovative and novel form of international cooperation. As such, studying the PA also pertains implications for the study of global governance more generally. Thus, to conclude this dissertation, this final chapter depicts some of the most recent developments in the global governance literature and reflects on the precedent of the PA in light of these.

The global governance landscape has exhibited a shift in the past decades. Whereas international cooperation after the second world war exhibited a strong focus on interstate relations primarily through intergovernmental organizations, since approximately the 1990's global governance has become more pluralistic, and contested. The rise of emerging economies and a proliferation in non-state and private governance initiatives diversified the actors and institutions engaged in efforts on international cooperation, and the power structures therein. At the same time, (hyper) globalization has led to increasing contestation of global governance amongst domestic constituents, exemplified most prominently in the election of Donald Trump and Brexit. These shifts have challenged existing global governance structures, putting emphasis on the role of new institutions and domestic politics.

The PA reflects these dynamics, presenting a model for global governance in an increasingly pluralistic and contested context. Its pledge and review structure is an exemplary case of soft, or experimentalist, governance. With states unable to agree to binding emissions reduction targets, the PA defines common goals, but defers their implementation to the determination of national governments, albeit coordinated through collective review (Allan *et al* 2021). This reflects a trend in global governance initiatives, with similar structures used in the millennium development goals, the UN global compact on migration, and the EU's open method of coordination (Aykut *et al* 2020).

Although the flexibility granted to countries by the pledge and review structure ensured wide-spread participation, and allowed particularly the US to bypass domestic opposition to climate action that

had previously undermined the Kyoto Protocol, the PA remains susceptible to identified risks of softer, or experimentalist, governance. For example, as exemplified in Chapter 6, announced net-zero targets provide evidence of virtualization whereby countries are pressured to offer performative signals without providing concrete implementation options or embedding these within political realities (Aykut *et al* 2020). In setting aspirational global goals without holding individual countries accountable for their achievement, the PA risks fatigue and cheap-talk, potentially undermining positive attributes of mobilizing action and norm-diffusion (Finnemore and Jurkovich 2020).

The PA also accounts for increasing pluralism by engaging with non-state actors, transnational initiatives and other informal institutions. As such it can be argued to play a central part in the 'hybrid institutional complex' for climate change (Abbott and Faude 2021). However, the increasing reliance on orchestration and informal institutions reflects growing gridlock in global governance (Biermann *et al* 2009, Hale and Roger 2014, Reinsberg and Westerwinter 2021), and it has been argued that this remains a 'second best' solution taken only when more formal forms of governance have failed (Roger 2020). Here too the findings of this dissertation support the broader global governance literature. For example, Chapter 5 also identifies NSAs as a second best solution to shortcomings in the PA's formal review mechanism design.

These institutional traits further reflect increasing domestic contestation of global governance structures, highlighting the importance of domestic politics for global governance outcomes. Recent theory argues that, with growing authority, intergovernmental organizations' weak legitimacy has become ever apparent resulting in domestic constituents contesting countries engagement in global governance structures (Zürn 2018, Rauh and Zürn 2020, Brands and Gavin 2020, Rodrik 2020). Intergovernmental organizations' authority is reflexive, with countries deferring to such organisations because they deem these to be valuable rather than feeling obliged to follow their orders (Zürn 2018). This enhances the reputational effect helping to explain the global increase in governance indicators, or 'scorecard diplomacy', although here too the domestic political context is crucial in mediating how states respond to reputational triggers (Kelley 2017, Merry 2011, Zürn 2018). Indeed, as shown in Chapter 5, pledge and review relies on the international reputational effect in order to apply pressure on governments to cooperate, and evidence presented in Chapter 6 suggests that international reputation has driven countries engagement with climate politics in the past. However, the cases studied in Chapter 6 also highlight that if climate change lacks domestic

political salience, international reputational pressure does not suffice to integrate climate policy considerations within domestic policy decisions.

Thus, the PA reflects the conflictual global governance landscape within which it was negotiated. However, as the shortcomings of the PA identified in this thesis denote, solving the climate crisis will require a broader, more fundamental, transformation. Given the predominant growth framework's overbearing reliance on fossil fuels and the destruction of the natural world for resource extraction, ensuring a sustainable future will rely on a paradigm shift, better accounting for natural capital and its boundaries alongside human and physical capital (Dasgupta 2021).

Whether the PA serves to facilitate such a shift lies beyond the scope of this dissertation. However, understanding what kinds of governance structures will be needed to enable such a transformation deserves more attention. For example, implementing ambitious targets such as net-zero emissions by midcentury will require policy approaches that cut across sectoral divides. This dissertation has shown that policy integration is necessary for aligning domestic measures with ambitious international targets. However, it has also been suggested that a more differentiated global approach is needed, coordinating international action by sector rather than simply setting overarching global goals and relying on domestic implementation of these (Oberthür *et al* 2021, Rayner *et al* 2021, Geels *et al* 2019, Aykut *et al* 2020). Thus, perhaps the PA is not best suited to ensuring its long-term targets are met, but rather should serve as a stepping stone, catalyzing more integrated global governance in the future.

In this regard, global governance structures follow an 'ebb and flow' reflecting changing domestic ideologies (Grigorescu and Başer 2019). In the past year and a half, the world has changed dramatically. The current pandemic reasserts the centrality of the state, at least domestically. It has led to suggestions of a shift in the focus of global governance, away from consumer interests and financial markets, towards a better integration of individuals well-being, democratic accountability, and the governance of global commons such as climate change or biodiversity, rather than private (or national) economic goods (Rodrik 2020, Brands and Gavin 2020). Although these suggestions have yet to be met with tangible state action, they reflect growing calls for a more fundamental transformation of global socio-economic structures. It is too soon to tell whether such calls will result in actual changes in domestic ideologies. However, should the PA prove effective at reducing

emissions, its ratchet mechanism coupled with its discursive elements would provide a blueprint for how to advance such transformations beyond the climate space.

The pandemic also suggests risks for global climate governance. Although many governments initially seemed willing to implement drastic measures to counter the pandemic's threat, this conviction quickly faltered in the face of opposition. This sets a worrying precedent given the scale of the transformation needed to address the climate problem, and the staunch opposition to more stringent climate action. The pandemic has also reaffirmed and increased global inequalities, and has shown that above all else, national governments are concerned with national, not global wellbeing (Peters 2021). Post-pandemic recovery plans do not indicate the predicted "green recovery" or that we are "building back better" (Evans and Gabbatiss 2021, O'callaghan and Murdock 2021). The lead up to COP26 in 2021 was mired by distrust, with governments from the global south lamenting inaction on the diffusion of vaccines (Banerjee and Duflo 2021), and the G7 unwilling to provide details on how commitments on finance will be achieved (Helm and McKie 2021). Such distrust could cause cooperation reliant on soft promises to break-down, exemplifying the fragility of the PA.

Looking forward, although the PA's design was the product of historical and institutional constraints (Allan *et al* 2021), it now provides important avenues for advancing global mitigation efforts, and supporting a broader sustainable transformation:

- First, the scientific consensus and non-state pressure that set the stage for the negotiation of the PA must advance further. Having defined the safe-operating space that informs the PA's temperature targets, science must now provide means for achieving these targets. Supporting this, non-state initiatives need to continue advancing awareness among civil society, furthering the legitimacy of pursuing climate policies, and pressuring governments to take action.
- Second, and most importantly, domestic policy makers need to move beyond discursive targets, translating the increasing demand for climate action into effective policies that actually reduce emissions. This will require far-reaching coordination among government departments, private sector interests, scientific research and civil-society. Establishing functioning domestic institutions for such coordination should form a first step. In this regard, it is paramount that rich countries invest heavily into multilateral cooperation and support to ensure that emerging

and developing economies can profit from novel technologies and cost reductions, capacity building and the diffusion of best-practices.

- Finally, governments must be held accountable to the targets they set. Ideally, the PA's review mechanisms should be reformed in order to better pressure individual countries to increase ambition and implement credible measures to achieve their targets. In the absence of such reforms, non-state initiatives such as the emissions gap reports or the independent global stocktake must double down on their efforts. Endorsement of these from coalitions of willing states would greatly add to the influence of such initiatives.

Despite these avenues for advancing mitigation efforts, a few major risks bear mentioning here. The rise of populist rhetoric and increasing political polarization globally threaten the stability of global climate action. Whilst the election of Donald Trump was not enough to entirely dismantle the PA, another set-back of similar proportions would render the PA's already ambitious goals entirely unachievable. Moreover, even if Trump's open defiance of the climate regime is not repeated as such, achieving the PA's goals will require sweeping transformations and bold government action. Wavering social stability in the wake of multiple global crises inhibits such bold action. Here it is essential that domestic actors work to overcome the political short-termism obstructing more ambitious policies. Finally, the increasing likelihood that the PA's 1.5°C target will be out of reach must not result in defeatism. The focus on global climate action should not rest primarily on achieving aspirational goals, but instead on taking every possible measure to reduce emissions.

Thus, while the potential for the PA to point the way forward for a new global governance is clear, whether global governance is actually developing in the direction of more cooperation and innovative coordination mechanisms is not clear. It is all the more important that the conclusions of this dissertation – that such cooperation is useful even in cases where faced with a clear collective action problem – are remembered and subjected to further study. The risk of the world going in the opposite direction and ending in tragedy indeed remains considerable.

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Published Papers

Paper 1:

Is the Paris Agreement Effective? A systematic map of the literature was co-authored with Prof. Ulrike Kornek (University of Kiel), Prof. Christian Flachslund (Hertie School) and Dr. William F. Lamb (Mercator Research Institute on Global Commons and Climate Change) and published in *Environmental Research Letters Vol 15, #8*, <https://iopscience.iop.org/article/10.1088/1748-9326/ab865c>.

Paper 2:

Beyond Pledge and Review: Learning from analogies to the Paris Agreement Review Mechanisms was co-authored with Prof. Başak Çalı and Prof. Christian Flachslund (both Hertie School) and is currently under review in *Climate Policy*, <https://www.tandfonline.com/toc/tcpo20/current>.

Paper 3:

Behind Ambition: the importance of process in the formulation of nationally determined contributions was single-authored and is currently under review in *Global Environmental Politics*, <https://direct.mit.edu/glep>.

Annexes

Annex One: Is the Paris Agreement Effective? A systematic map of the evidence: Appendices

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Appendix 1.1: Codebook

The aim of this research is to identify the possible drivers of, and barriers to, effectiveness of the Paris Agreement, as depicted within the peer-reviewed literature. You will be assigned a set of papers that have been selected from a comprehensive corpus of relevant peer-reviewed literature on the Paris Agreement. In the previous research steps a list of common drivers, barriers, and recommendations was iteratively developed. Your task will be to identify excerpts of the texts in which these common drivers, barriers, and/or recommendations are referred to. This will allow for a comprehensive assessment of the effectiveness of the Paris Agreement, as depicted by the academic literature. We define effectiveness as the ability for the PA to reach its goals on mitigation, adaptation, finance and equity, as defined in Article 2 of the agreement.

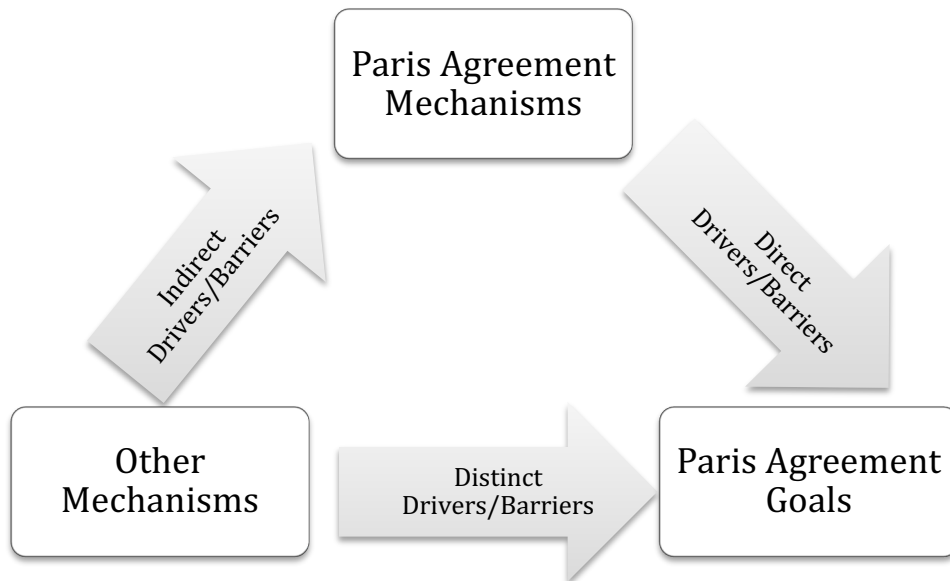
Actual/Hypothetical:

For each driver and barrier we distinguish between actual and hypothetical drivers/barriers. We assume that, given their nature, all recommendations are hypothetical.

- Actual: driver/barrier is communicated with words such as is, does, will, ensures etc. Language explicitly states that this is presently a driver/barrier.
- Hypothetical: driver/barrier is communicated with words such as could, might, etc. Language leaves open whether this will actually come to pass.

Direct/Indirect/Distinct:

We further distinguish between direct, indirect and distinct drivers and barriers:



Appendix 1.1, Figure 6: Direct vs. Indirect Drivers and Barriers

As seen in the figure above:

- Direct drivers/barriers are causal mechanisms whereby the Paris Agreement’s mechanisms effect/prevent the change necessary for the agreement to be effective.
 - Example of a direct driver: Transparency/MRV - The Global Stocktake puts pressure on states to achieve their NDCs
- Indirect drivers/barriers are causal mechanisms whereby a process outside of the Paris Agreement’s mechanisms is required for/prevents the Paris Agreement to be effective.
 - Example of an indirect driver: Participation - The Global Stocktake can only be effective if all member states participate
- Distinct drivers/barriers are causal mechanisms that enable/disable the Paris Agreements goals to be achieved independent of the functioning of the Paris Agreement’s mechanisms.
 - Example of a distinct driver: Technology – large-scale implementation of carbon dioxide removal is necessary in order to reach the 1.5°C goal
- We do not include this distinction for recommendations as these are assumed to generally be direct (actionable changes to the PA)

The following section will describe identified drivers, barriers, and recommendations for PA effectiveness, followed by a description of the coding procedure.

Drivers:

Broadly, drivers of effectiveness encompass any mechanism, policy, condition etc. that enables the Paris Agreement to achieve its goals on mitigation, adaptation, finance and equity, or the functioning of one of the PA Mechanisms to achieve those goals. We distinguish between PA mechanisms themselves as drivers of PA effectiveness (*direct* drivers), and drivers outside the PA that interact with PA elements to work towards PA effectiveness (*indirect* drivers), or themselves drive PA effectiveness (*distinct* drivers) (for more detail see above).

The following categories were iteratively developed based on a qualitative reading of the literature under review.

Drivers	
Participation	<ul style="list-style-type: none"> - Excerpt referring to the universality of the PA or the participation of states within the PA’s mechanisms (e.g. equal representation) enhancing PA effectiveness. - Category focused on state participation; <u>not</u> non-state actors. - Keywords: universal, participation, collaboration, collective.
Non-state actors	<ul style="list-style-type: none"> - Excerpt referring to the positive role of non-state actors in achieving the PA’s goals/targets. - Non-state actors include transnational networks, civil society, private actors, NGO’s, etc. - Keywords: non-state, private sector, transnational networks, civil society, public, cities.
Transparency/MRV	<ul style="list-style-type: none"> - Excerpt referring to the review mechanisms of the PA (Transparency Framework, Compliance Committee, Stocktake) as drivers of effectiveness. - Excerpts referring to the need for transparent processes. - Excerpts referring to monitoring, reporting and verification/review of relevant national policies or information. - Keywords: transparency, reporting, accounting, compliance, review, monitoring, information, data.
Institutionalisation	<ul style="list-style-type: none"> - Excerpts referring to the inclusion of certain topics within the PA as a positive driver for effectiveness.

	<ul style="list-style-type: none"> - Excerpts referring to the creation of institutions and/or mechanisms as a positive driver of effectiveness. - Excerpts referring to the formalisation of policies/mechanisms. - Keywords: integration, formalization, mandate, inclusion, institutionalisation.
Procedure	<ul style="list-style-type: none"> - Excerpts referring to the establishment of a common procedure as a driver of effectiveness. - Keywords: rules, standards, guidelines, process, guidance, conduct, robust, framework.
Differentiation	<ul style="list-style-type: none"> - Excerpts referring to the differentiation of responsibilities as a driver of effectiveness. - Keywords: equity, differentiation, common but differentiated responsibilities (CBDR), burden-sharing, UNFCCC Annex system, distribution, fairness.
National Action	<ul style="list-style-type: none"> - Excerpt refers to the role of national politics/policy and political will in order to make the PA effective. - Includes references to multiple nations (e.g. G20/BRICS). - Excludes references to the need for international cooperation. - Keywords: emitters, political will, country willingness, leadership, national, domestic, OECD, China, G8/20.
Normative Shift	<ul style="list-style-type: none"> - Excerpt refers to a shift in attitude/norms brought about by, or enhancing the effectiveness of, the PA - Keywords: Paradigm, norms, discourse, framing,
Co-Benefits	<ul style="list-style-type: none"> - Excerpts refers to the benefits from climate policy beyond climate; most prominently development. - Linkage between PA and SDGs. - Keywords: sustainable development, SDGs, benefits, win-win, development, additional,
Signalling	<ul style="list-style-type: none"> - Reference to the PA as an effective signal/call to action. - Excerpts like “PA sends a strong message...” etc. - Keywords: encourage, signal, anticipation, incentives, direction, message, awareness, momentum, narrative.
Flexibility	<ul style="list-style-type: none"> - Excerpt refers to flexibility of the PA as a means to ensure effectiveness. - Includes references to national circumstances.

	<ul style="list-style-type: none"> - Excludes references to differentiation. - Keywords: flexibility, ambiguity, voluntary, soft, compromise, pragmatic.
Science	<ul style="list-style-type: none"> - Excerpt refers to the role of research in informing the PA and thereby enhancing effectiveness. - References to technical capacity for collecting and assessing relevant data. - Keywords: IPCC, scholars, input, science, expert, research, assessment, methods.
International Cooperation	<ul style="list-style-type: none"> - Excerpt refers to the need for trust between nations to achieve the PA's goals. - Excerpt refers to cooperation on global policy. - Excerpt refers to the role of the COP/UNFCCC and/or other international political forums. - Keywords: International, UNFCCC, COP, trust, cooperation, coordination.
Experimentation/Learning	<ul style="list-style-type: none"> - Excerpts referring to the PA as a policy experiment. - Excerpts referencing learning and the sharing of best-practices. - Keywords: experimentation, learning, experience, lessons, reflection, interaction.
Technology	<ul style="list-style-type: none"> - Excerpt refers to technological fixes to the climate problem. - Includes references to land-use and/or other sectoral mitigation (or adaptation) options. - Keywords: technological progress, low-carbon technologies, land-use.
Legality	<ul style="list-style-type: none"> - Excerpt refers to the legal nature of the PA enhancing its effectiveness. - Keywords: obligations, legal.
Goals/Targets	<ul style="list-style-type: none"> - Excerpt refers to the role of goals and targets within the PA to enhance effectiveness. - Keywords: targets, goals, ambition.
Climate Clubs	<ul style="list-style-type: none"> - Excerpt refers to the role of climate clubs/minilateralism to enhance PA effectiveness. - Keywords: minilateralism, climate club, coalition.
Policy Linkage	<ul style="list-style-type: none"> - Excerpt refers to the linkage of climate policies as drivers of PA effectiveness. - Includes broader linkage of the Climate Regime to the WTO and trade, or similar.

	- Keywords: linkage, collaboration, cooperation, integration
Not Common/Other	- Any drivers not fitting the above categories.

Barriers:

Broadly, barriers to effectiveness encompass any mechanism, policy, condition etc. that hinder the PA or one of its mechanisms to achieve its goals on mitigation, adaptation, finance and equity, or pose and obstacle/challenge to the functioning of the PA's mechanisms. We distinguish between PA mechanisms themselves as barriers to PA effectiveness (*direct* barriers), and barriers outside the PA that interact with PA elements to work against PA effectiveness (*indirect* barriers), or themselves independently pose barriers to PA effectiveness (*distinct* barriers) (for more detail see above).

The following categories were iteratively developed based on a qualitative reading of the literature under review:

Barriers	
MRV	<ul style="list-style-type: none"> - The excerpt refers to elements of the monitoring, reporting and verification (MRV) process as an obstacle to effectiveness. - Issues include: data quality, lack of assessment methods, lack of comparable indicators/targets. - Keywords: reporting, accountability, measurement, indicators, data availability, review, assessment.
Clarity	<ul style="list-style-type: none"> - Excerpt refers to a lack of clarity from the PA text or an associated document, inhibiting effectiveness. - Includes vagueness as well as lack of [common] definitions. Also includes a lack of clear guidance. - Keywords: clear, definition, focus, direction, rules, guidance, vague, rules, understandable, missing details, ambiguity.
Differentiation	<ul style="list-style-type: none"> - Excerpt refers to the inequalities and conflicts between countries, often between developed and developing countries, or any related synonyms. - Keywords: developed/developing, global North/South, equity, fairness, burden-sharing, responsibility, differentiation, emitters, distribution.
US-Exit	<ul style="list-style-type: none"> - Excerpt refers to the announced exit of the US from the PA - Keywords: Trump, US-exit, withdrawal, non-participation.

Scientific Uncertainty	<ul style="list-style-type: none"> - Excerpt refers to the lack of scientific certainty as a barrier to effectiveness. - May also refer to complexity/quality of information, or the variability of scenarios/possibilities. - Keywords: complexity, variability, uncertainty, accurate, scientific, attribution, estimate, discrepancy, projection, scenario.
Transparency	<ul style="list-style-type: none"> - Excerpt refers to a lack of transparency/comparability of information. - Refers to a lack of effectiveness within the transparency/compliance framework. - Keywords: transparency, comparability, public scrutiny.
Ambition	<ul style="list-style-type: none"> - Excerpt refers to a lack in ambition of the PA and its associated mechanisms. - Excerpt refers to a lack of national action, or an unwillingness/inability to act due to national circumstance. - Includes lack of ambitious NDC's or other climate policies such as financial contributions. - Also includes references to the gap between actions and rhetoric. - Keywords: pledges, voluntary, inconsistency, goals, gap, promises, ambition, government, domestic, national, individual countries, policy-making, political will.
Stringency - Regime Design	<ul style="list-style-type: none"> - Excerpt refers to a lack of stringency in the PA regime design as a barrier to effectiveness. - For example: the lack of legally binding commitments, the facilitative nature, etc. - Keywords: legal, obligations, bottom-up, voluntary, compliance, soft law, accountability, binding, enforceability, implementation.
Procedure - Regime Design	<ul style="list-style-type: none"> - Excerpt refers to existing procedures/processes as barriers to effectiveness. - May also refer to a lack of procedures/processes as a barrier to effectiveness. - Focus on barriers to the practical realization of the PA's goals.

	<ul style="list-style-type: none"> - Keywords: tools, implementation, support, strategies, instruments, mechanisms.
Content - Regime Design	<ul style="list-style-type: none"> - Excerpts refer to the content, or lack of content, of the PA. - These barriers should either focus on what the PA omits, or on the actual content of the PA as a barrier in of itself. - This does not include the ambition of the present content, but rather the inclusion/omission of content itself. - Keywords: omission, article, decision, mention, issue, provisions, elaborated.
Development	<ul style="list-style-type: none"> - Excerpt references the trade-off between limiting greenhouse gas emissions and poverty reduction/economic development as a barrier to the PA's effectiveness. - Keywords: development, poverty.
Lack of Funding	<ul style="list-style-type: none"> - Excerpt refers to a lack of finance. - Keywords: funding, finance, mobilization, flows.
Capacity	<ul style="list-style-type: none"> - Excerpt refers to a lack of capacity/capabilities to ensure the effectiveness of the PA. - Includes national and non-state actor capabilities to address climate change, report data, implement policies, etc. - Keywords: capabilities, capacity, availability, support.
International Cooperation	<ul style="list-style-type: none"> - Excerpt refers to a lack of international cooperation, or an incentive not to cooperate. - Keywords: trust, cooperation, free-ride, negotiations, political constraints.
Climate Justice	<ul style="list-style-type: none"> - Excerpts refer to the lack of climate justice/equity considerations. - Does not include considerations of differentiation. - Keywords: climate justice, equity, human rights,
Feedback/Learning	<ul style="list-style-type: none"> - Excerpt refers to a lack of feedback mechanisms to enable learning. - Keywords: learning, feedback, lessons.
Not Common/Other	<ul style="list-style-type: none"> - Any barriers not fitting the above categories.

Recommendations:

Recommendations encompass practical/actionable suggestions for change so that a particular mechanism, policy, condition etc. may better enable the PA to reach its goals on mitigation, adaptation, finance and equity.

Recommendations will often be overlapping with Drivers. Recommendations do not include broad statements on what is needed for effectiveness, as these would rather be considered hypothetical drivers (i.e. need more transparency). In order to distinguish between the two, recommendations should offer a specific actionable suggestion that can be implemented by an existing agent/group

Common Recommendations	
Allocation of Finance	<ul style="list-style-type: none"> - Text excerpt recommending the development of allocation rules for existing climate finance. - Also includes more broad recommendations for managing finance supply. - Keywords: Allocation, Funding, Replenishment.
Capacity Building	<ul style="list-style-type: none"> - Excerpt recommends capacity building efforts in order to increase effectiveness. - Keywords: Capacity, Support, Domestic Institutions.
Carbon Budget	<ul style="list-style-type: none"> - Excerpt recommends the use of a carbon budget. - Keywords: Carbon Budget.
Carbon Pricing	<ul style="list-style-type: none"> - Excerpt refers to the use of carbon pricing in order to achieve PA goals. - Keywords: Carbon Price, Levies, Taxes.
Climate Club	<ul style="list-style-type: none"> - Excerpt recommends a specific strategy for implementing climate clubs (or similar minilateral solutions) in order to enhance effectiveness. - Keywords: Coalitions, Clubs, Alliance
Cooperation	<ul style="list-style-type: none"> - Excerpt recommends cooperation between nations in order to drive effectiveness. - Should include specific recommendations for how to structure this cooperation. - Keywords: Cooperation, coordination, interactions.
Definition	<ul style="list-style-type: none"> - Excerpt explicitly recommends defining a certain concept, or using a specific definition within the Paris Regime. - Keywords: Define, concept, conceive.

Differentiation	<ul style="list-style-type: none"> - Excerpt recommends a form of differentiation of responsibilities. - Keywords: Differentiation, burden-sharing, equity, capabilities.
Human Rights (HR)	<ul style="list-style-type: none"> - Recommendation references human rights to enhance attainment of PA goals. - Keywords: Human rights, rights.
Learning/Communication	<ul style="list-style-type: none"> - Recommendation to learn from previous experiences. - Recommendation to reframe process towards mutual learning. - Recommendations that specifically suggest changing communications strategies. - Keywords: Learning, reference, experience, lessons, communication, conversation, engagement.
Legal Compliance	<ul style="list-style-type: none"> - Recommendation for an explicit legal compliance mechanism - Keywords: Arbitration, legal, binding, obligations, enforcement, compliance.
Link Review Mechanisms	<ul style="list-style-type: none"> - Recommendation suggests the linkage of aspects of the PA. - Keywords: Stocktake, transparency framework, compliance committee, Article 13, 14, and 15, link.
Measurement	<ul style="list-style-type: none"> - Recommendation for a specific means to measure progress on climate policies. - Includes recommendations for which indicators to use, as well as how to better structure measurement processes to be effective. - Keywords: Measurement, indicators, assessment, monitoring, metrics, data, accounting.
Research	<ul style="list-style-type: none"> - Recommendations for more research. - Keywords: Study, research, insight.
Trade	<ul style="list-style-type: none"> - Recommendations for using trade, and related policies, as a means to promote climate action. - Keywords: border adjustments, tariffs, WTO, trade, transfer.
Not Common	<ul style="list-style-type: none"> - Recommendations that do not fit the above descriptions.

Coding Procedure:

In order to ensure all excerpts are relevant to the research question, when you identify an excerpt referring to a driver/barrier/recommendation you should ask yourself the following:

- **Is this about the Paris Agreement?**
 - This would include all relevant associated mechanisms, and the ongoing negotiations on PA mechanism after 2015
- **Is this about the Paris Agreement's effectiveness?**
 - This includes hypothetical/conditional effectiveness
 - Exclude any excerpt where you are not sure if the author is really referring to the effectiveness of the PA
- **You should exclude any drivers of/barriers to agreement during the process of negotiating the PA as:**
 - The agreement has been ratified and entered into force.
 - These do not relate to its subsequent effectiveness of the agreement.

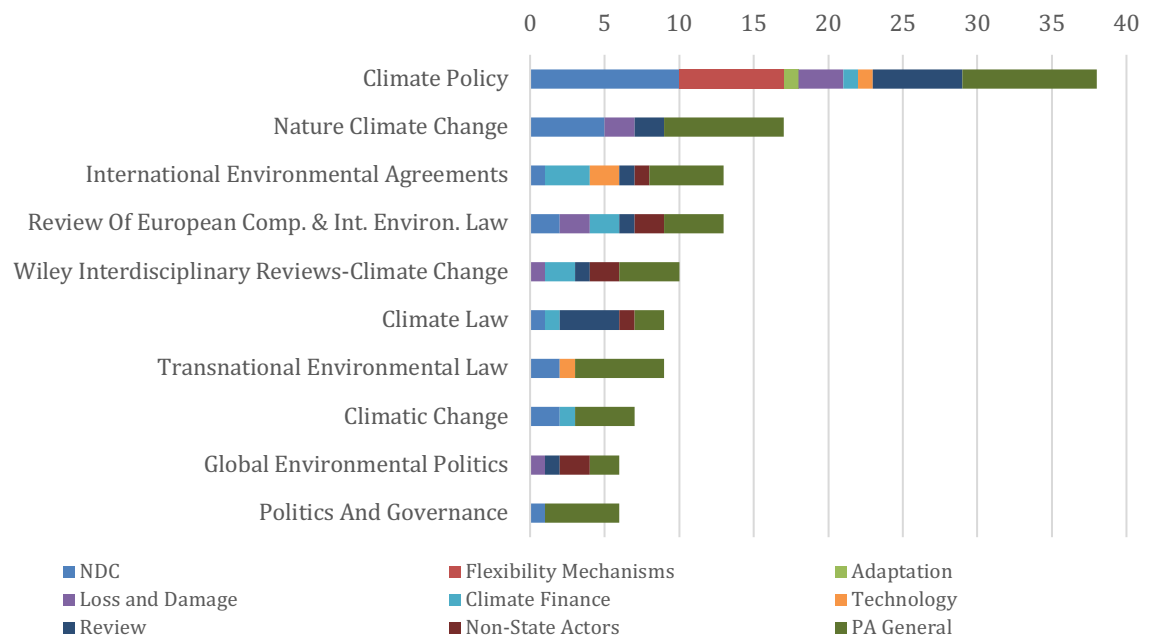
In order to code the texts you will need to use the provided Excel sheet. Each row represents a paper. You are only required to read the abstract and conclusion of each paper. In cases where there is no abstract/conclusion you should use your own judgement as to which sections are likely to provide the "high-level" information on drivers, barriers and recommendations and note this in the notes column of the sheet.

- There are column sections in the excel sheet labelled driver/barrier/recommendation. These columns provide you with a drop-down list of possible codes. This list corresponds to the categories in this codebook.
- For each identified barrier/driver/recommendation you should copy the text excerpt into the provided "reference" column, together with the page number.
- If a paper has more than 1 barrier/driver/recommendation you should create a new set of columns corresponding to the variable being coded (driver/barrier/recommendation) and label this accordingly.
- If you find that an excerpt would fit more than one of the categories, use the same excerpt multiple times to include all categories.

Appendix 1.2: Inter-Coder Reliability Scores

Drivers	KrippAlpha	Barriers	KrippAlpha
Participation	-0.0351	MRV	0.59
Non-state actors	0.523	Clarity	0.356
Transparency/MRV	0.672	Differentiation	0.1
Institutionalisation	0.252	US-Exit	1
Procedure	0.793	Scientific Uncertainty	1
Differentiation	0.356	Transparency	1
National Action	0.356	Ambition	0.344
Normative Shift	0.785	Stringency - Regime Design	0.205
Co-Benefits	-0.0351	Procedure - Regime Design	-0.0172
Signalling	1	Content - Regime Design	-0.113
Flexibility	0.272	Development	0
Science	0.523	Lack of Funding	0.785
International Cooperation	0.636	Capacity	-0.0172
Experimentation/Learning	0.672	International Cooperation	-0.0351
Technology	0.272	Climate Justice	0.785
Legality	-0.0172	Feedback/Learning	1
Goals/Targets	-0.0172	Not Common/Other	NA
Climate Clubs	0.636		
Policy Linkage	0.473		
Not Common/Other	NA		
Average	0.427178947	Average	0.43640625

Appendix 1.3: Top Journals



Annex 1.3, Figure 7: Top 10 Journals Covering the Paris Agreement

Appendix 1.4: Measurement Recommendations

Adaptation	<p>A way to reconcile the pros and cons of indicators could be for scientists to provide parties to the UNFCCC with an updated synthesis of benefits and limitations of existing methods to assess adaptation efforts qualitatively and quantitatively—in line with the IPCC principle of being policy-relevant without being policy prescriptive. Parties could discuss the relevance of those references from a policy point of view and identify indicators to apply at the country level, in accordance with national circumstances and country-driven principles enhanced in the Paris Agreement (Art. 2.2 and 7.5). (Magnan & Ribera, 2016, p. 1282)</p>
	<p>Include explanations, as Annexes to the official submissions, of how the progress of implementing adaptation plans is assessed as part of the reporting in order to create better understanding what actions and processes countries have taken in fulfilling their reporting requirements. (Morgan, Nalau, & Mackey, 2019)</p>
Climate Finance	<p>To prospect a way forward on the issue reviewed above, namely whether global-scale vulnerability and/or risk syntheses are appropriate at all to inform global climate policy on allocating funding for adaptation, we advocate for the full integration of knowledge between science and adaptation policy in order to define methods that embed the multidimensional layers of vulnerability within a risk framework. (Muccione, Allen, Huggel, & Birkmann, 2017, pp. 6–7)</p>
	<p>The tasks [in establishing a comprehensive MRV system for climate finance] involve developing a measurement system with consistent data basis and accounting basis, a reporting system with more detailed guidance and standardized formats, as well as a verification mechanism balancing top-down and bottom-up review processes. (Xu, Dong, & Wang, 2016, p. 235)</p>
	<p>Weighting the HR, UN, and GEF approaches with the Preference Score Compromises (PSC) method could yield a compromise scheme in which the regional contributions are highly similar to those under the GCF initial resource mobilization from 2015 to 2018. GCF financing heavily depends on contributions from the developed countries even if the donor parties are extended to emerging economies. (Cui & Huang, 2018, p. 173)</p>
	<p>Two accounting systems are needed for the two distinct purposes of (1) keeping track of whether pledges are being met and (2) whether “shifting the trillions” away from fossil energy to renewables is taking place around the world. (Roberts & Weikmans, 2017, p. 135)</p>
Flexibility Mechanisms	<p>Unit quality can, in theory, be ensured through appropriate design of carbon market mechanisms; in practice, existing mechanisms face considerable challenges in ensuring unit quality. Unit quality could be promoted through guidance under Paris Agreement Article 6, and reporting and review under Article 13. (Schneider & La Hoz Theuer, 2018, p. 386)</p>

	<p>For mitigation outside the scope of the host Party’s NDC, we propose using a tally- based interpretation of Internationally Transferred Mitigation Outcome (ITMO) use, as opposed to the target-based variety used in the 1997 Kyoto Protocol, and stress the need for additionality testing. This interpretation allows for mandatory corresponding adjustments for all ITMO usage, while the host Party NDC level remains unchanged. A buffer registry is created for corresponding non-NDC adjustments of the selling party. (Müller & Michaelowa, 2019, p. 812)</p>
	<p>In particular, a monitoring, reporting, and verification framework is needed to guarantee the additionality of emissions reductions under the trading system. (Rose, Wei, Miller, Vandyck, & Flachsland, 2018, p. 179)</p>
<p>Loss and Damage</p>	<p>This article also highlights the need for the Warsaw International Mechanism to play an active role in quantifying the scale of loss and damage that is projected from human-induced climate change in different regions and in different national contexts, over different time frames and at different emission pathways. (Mace & Verheyen, 2016, p. 197)</p>
<p>NDC</p>	<p>The results show that despite the use of agreed methodologies there is little information support to make a comprehensive analysis and a relevant assessment that could establish at what extent the accomplishment of the 1.5 Celsius degree target could be met by respecting the INDCs. For instance, base line reference and indicators were different for all of the ten INDCs. Further inquiries will be needed to narrow down the range of reporting indicators in such a way that effective institutional and legal design to be performed in most of the countries. (Bran, 2016, p. 303)</p> <p>New analytical processes and tools are needed to support the process codified in the Paris Agreement. They should support the design of national low GHG emission development strategies that are consistent with global climate ambition and can support national policy formation and implementation. They should also inform the sectoral and international discussions needed to reveal the key priorities of global cooperation. Based on the DDPP, we have described principles and methodologies for such an approach. These include: the definition of multiple country-specific strategies framed by common drivers of decarbonization in a context of deep uncertainty; the use of a variety of national modelling tools to translate narrative strategies into quantified scenarios and indicators reported in a common dashboard; and national and sectoral benchmarks to provide guidance towards collective mid-century mitigation ambition. These building blocks are combined in an iterative integrated framework for pathway design, encouraging cross-stakeholder communication and learning, enabling the assessment of compliance with national development and global emissions goals, and providing concrete support to policy formation in the context of the Paris Agreement. (Waisman et al., 2019, p. 265)</p> <p>We recommend that such a comprehensive ambition assessment framework, employing a large variety of approaches, is used in the future</p>

	<p>to capture a wide spectrum of perspectives on ambition. (Höhne, Fekete, den Elzen, Hof, & Kuramochi, 2018a, p. 425)</p>
	<p>Given existing data collection by international organizations, an array of easily available metrics could be developed to facilitate comparisons in the near term. Unofficial but independent expert analysis could synthesize these data to construct some of the more challenging but informative metrics. In turn, stakeholders and other users could provide feedback on the feasibility, integrity, and precision of various metrics to enable further refinement and enhance their value to the negotiations. (Aldy, Pizer, & Akimoto, 2017, p. 512)</p>
	<p>While no single indicator of equity was used by all INDCs, a menu of quantified indicators or tiered approaches could provide bounded flexibility across different national circumstances. (Winkler et al., 2018, p. 99)</p>
	<p>The methodology developed in this study is simple enough for any country to use and was effective in grasping the overall characteristics of the climate mitigation policy package in each country or region studied. The study recommends that the UNFCCC create a rule requesting countries to submit estimates of population, GDP, total energy demand, share of renewables, and other relevant factors for the target year when they submit their successive intended NDCs. (Kameyama & Kawamoto, 2018, p. 210)</p>
	<p>Our results demonstrate the need for global stocktaking exercises to evaluate the NDCs using metrics broader than emissions to better illuminate their effectiveness in addressing the Paris Agreement’s long-term goals. (Iyer et al., 2017, p. 871)</p>
	<p>Based on a methodological approach (refer to Appendix 1 for the methodological description) in analyzing MRV system development in the West Africa region and on implemented systems in other parts of the world, I came to the conclusion that there are nine key success factors for an efficient and transparent MRV system. These key factors should be taken into account in the design, development and implementation of an MRV system for NDCs under the PA. These key success factors are listed below: (Political leadership, alignment between NDCs and national development plans, progressive sectoral approach, ownership, principles and guidelines, simplification and integration of processes, performance indicators and continuous improvements, fund management, and do not lose GHG emissions reductions) (Sarr, 2018, p. 362)</p>
	<p>More specifically, we think that after corporations have agreed to certain emission cuts, there must be an independent measurement, monitoring and verification mechanism in order to ascertain that the volunteered cuts are real and not just empty commitments. (Taebi & Safari, 2017, p. 1302)</p>
	<p>Supporting country GHG estimation includes regular reviews of the latest science, expanding the scope of the operational methods in the IPCC guidance, as has been done for REDD+, and incorporating opportunities</p>

	<p>offered by emerging satellite data available through highly accessible products. More confidence also requires independent checks of the transparency and reliability of data, for example, by reproducing and, verifying countries' GHG estimates. According to IPCC guidance verification of GHG inventories is key to improve scientific understanding and to build confidence on GHG estimates and their trends. This can be achieved by comparing GHG inventories with scientific studies using partially or totally independent data sets and/or different methods, including greater integration of modelling and measurement systems of land-use- related net emissions. Meaningful verification requires improving mutual understanding and cooperation between the scientific community and the developers of national GHG inventories. (Grassi et al., 2017, p. 225)</p> <p>This study contributes a transparent empirical econometric tool for such an assessment. It shows that, using a formal decomposition framework that uniquely disentangles the macroeconomic and other influences on emissions, effort sharing in global greenhouse gas reductions can be achieved in a way that promotes innovation and environmental efficiency to reduce emissions without interfering with the right of poor countries to catch up economically. Based on GDP projections by the IMF and the OECD in a sample of about 185 countries, it presents country level CO2 emission targets applicable as benchmarks to assess the adequacy and fairness of national contributions. (Herrala & Goel, 2016, p. 29)</p> <p>Identification of metrics for assessing progress that are not based solely on emissions, such as infrastructure investment, energy demand, or installed power capacity. (Jeffery & Rocha, 2018, p. 1260)</p>
Non-State Actors	<p>As they work out the details for the operationalization of the indigenous peoples and local communities' platform, parties to the climate regime should consider adopting guidelines on the use of traditional knowledge in scientific assessment and documentation processes. (Savaresi, 2018, p. 50)</p>
PA General	<p>The global stocktaking which is being done for mitigation action in line with the 2°C goal, will also need to be undertaken for adaptation contributions. Top-down elements can only be institutionalised in this way. (Mathur & Mohan, 2016, p. 341)</p> <p>The discussion on adaptation has to move on from the focus on planning to full-scale implementation, with adequate financial and other means of implementation provided at the global level. The global willingness to share responsibility for adaptation must go beyond words and plans – mutually agreeable ways of assessing adaptation needs and raising adequate support have to be found. (Sharma, 2017, p. 44)</p> <p>NDCs need to be evaluated using more than just emissions accounting to ensure that the short and long-term goals are met. (Nature Climate Change, 2017, p. 847)</p> <p>For example, "voluntary national reviews" of SDG implementation and 5-year reviews under the Paris Agreement could check the progress of</p>

	<p>nonstate actions and compatibility with sustainability goals. (S. Chan et al., 2019, p. 6)</p>
	<p>We need to update our conceptual apparatus for understanding what they are accomplishing and where they might be headed. Only then can we actively assess if they are going to work or not to turn aspirational goals into a decarbonized reality. Yet, we lack a consensual or proven means to grasp the impact of subnational activity. Our framework takes experiments seriously as a potential means to catalyze decarbonization trajectories, recognizing that their potential or trajectory generally cannot always be calculated a priori. Instead, it provides a way to identify and track the political forces and mechanisms through which experiments have an impact upon targets of intervention and make (or fail to make) broader connections. (Bernstein & Hoffmann, 2018, p. 207)</p>
	<p>To align BECCS with the development of the Paris Agreement and its market mechanisms, specifically the rulebook for accounting biomass, CO2 and climate finance domestically and internationally, nations must negotiate and adopt a standardized accounting and rewarding framework for BECCS. (Torvanger, 2019, p. 338)</p>
<p>Review</p>	<p>In this paper we propose a new “stocktaking” approach to document the spectrum and prevalence of observed adaptation over large scales. The four-step stocktaking approach focuses on: (a) obtaining consensus on the objectives of adaptation; (b) agreeing the sources of evidence; (c) agreeing the search method; and (d) categorizing the adaptations. By focusing on documenting rather than evaluating adaptation, the simple approach avoids some of the adaptation heuristic traps. (Tompkins, Vincent, Nicholls, & Suckall, 2018, p. 1)</p>
	<p>We propose a mixed-methods approach to addressing these challenges, combining short-term needs for reporting with longer-term aims of enhancing national adaptation actions. Broad domains of adaptation activity could be identified within each of the objectives of the adaptation goal and progress could be measured and aggregated through simple scorecards. The goal should have both process and outcome indicators as well as some narrative linking activities to outcomes over time. Reporting could be a compilation of national data using qualitative and quantitative sources, aligning with the global stocktake’s aim of enhancing national actions over time and reducing immediate reporting burdens. There would be a complementary role at least in the short term for an expert assessment of priority areas. (Craft & Fisher, 2018, p. 1203)</p>
	<p>The nested structure we have demonstrated and applied facilitates the tracking of key indicators that need significant change to avoid 2 °C of warming. The methodology allows consistent and robust decomposition of current emissions, energy, and technology trends, and helps identifying key policy needs. We argue that extending tracking across indicators, scales, and time periods will increase the likelihood that policies will be implemented that ensure the societal transition consistent with the Paris Agreement. (Peters et al., 2017, p. 122)</p>

	<p>In particular, the method proposed in this article is important to consider in the process of the five-yearly global stocktake pre- scribed by Article 14 of the Paris Agreement, which calls for examination of mitigation, adaptation and support measures in order to ‘assess the collective progress’ of parties. (Scotford & Minas, 2019, p. 80)</p>
	<p>The transparency framework should extend to providing information on how a state envisages that it will cease greenhouse gas emissions in the long-term, in order to allow observers to assess the consistency of short- and medium-term mitigation action with this long-term strategy. (Mayer, 2019, p. 63)</p>
	<p>We present different methods to extend near-term emissions pathways that have been developed by the authors or used by different research groups and nongovernmental organizations to estimate 21st century warming consequences of Paris Agreement commitments. The abilities of these methods to project both low and high warming scenarios in line with the scenario literature is assessed. We find that the simpler methods are not suitable for temperature projections while more complex methods can produce results consistent with the energy and economic scenario literature. We further find that some methods can have a strong high or low temperature bias depending on parameter choices. The choice of methods to evaluate the consistency of aggregated NDC commitments is very important for reviewing progress toward the Paris Agreement’s long-term temperature goal. (Gütschow, Jeffery, Schaeffer, & Hare, 2018, p. 1242)</p>
	<p>Continued investments will be needed to sustain programmes and keep improving datasets to serve the objectives of the many stakeholders involved in climate change mitigation and should focus on increased accessibility and transparency of data to encourage stakeholder involvement: Centralized platforms that allow comparison are increasingly becoming available and are important for better stakeholder engagement. Data providers should make data uptake easy and should provide these data openly and freely, together with detailed metadata and guidance on how to use them and in which situation. This would increase transparency of data sources, definitions, methodologies and assumptions, important for implementation of the Paris Agreement. It would create more legitimacy with stakeholders and therefore increase opportunities for their participation, in particular those currently underrepresented. On the other hand, users should be aware of the quality of data and data products offered. Transparent documentation and adequate explanation will help users getting better insights into the types of errors and uncertainties and their implications. (Romijn et al., 2018, p. 109)</p>
	<p>We implement a new method of disaggregation of global land model results that allows greater comparability with GHG inventories. This provides a deeper understanding of model–inventory differences, allowing more transparent analysis of forest-based mitigation and facilitating a more accurate Global stocktake. (Grassi et al., 2018, p. 914)</p>

	<p>For a comprehensive transparency framework to emerge, it will be necessary to also develop accounting modalities for financial support received. (Weikmans & Roberts, 2019, p. 105)</p>
	<p>The article makes the case that effective implementation will require further work on methodologies for adaptation needs and costs. It may be advisable to create a set of options, given the complexity and context-specific nature of information on adaptation. (Winkler, Mantlana, & Letete, 2017, p. 868)</p>
	<p>These studies and analyses will be from many sources. To the extent they are inconsistent and confusing, or colored by advocacy, it will be useful to clarify differences that result from varying assumptions and methods, and whether they are appropriate. This will help to assure credibility to support domestic decisions about current effort and more ambitious future pledges. (Jacoby, Chen, & Flannery, 2017, p. 887)</p>

Appendix 1.5: Research Recommendations

Climate Finance	Comparative framework applied to the role of national and transnational actors in driving climate finance (different case-studies) (Pickering & Mitchell, 2017)
	How donors could further incentivise their grant recipients for the achievement of individual outcomes (e.g. carbon sequestration, climate resilience), using a multitask principal–agent model to analyse how the varying abilities of an agent to deliver on certain tasks require different incentive contracts. (Basak & van der Werf, 2019)
	Analysing the role of trust as an element that has an influence on the principal and agent over the longer term. (Basak & van der Werf, 2019)
	Exploring institutional instruments, such as cooperating with some large private funds to share costs. (Cui & Huang, 2018)
	Exploring the schemes for raising the public finance of the GCF. (Cui & Huang, 2018)
	Dynamic exploration of schemes to fund GCF including diverse benchmarks, and more variation in the magnitude of financing using the PSC method. (Cui & Huang, 2018)
	Using other models than the PCS to determine the effectiveness of schemes to enable climate finance that can model political factors. (Cui & Huang, 2018)
	Identify the country- specific requirements to render such policy reform [switching from climate- to sustainable development- finance] effective from an efficiency and distributional point of view. (Steckel et al., 2017)
Flexibility Mechanisms	Explore views [on the voluntary carbon offset market] from the NGO community and policy makers as well as voices from other countries [not North America and Europe]. (Lang, Blum, & Leipold, 2019)
	The role of businesses as a potential driving force behind new demand [for voluntary carbon offsets] deserves a much closer look. (Lang et al., 2019)
	Research on the modalities needed to be included in the rulebook for article 6.4 of the agreement [Sustainable Development Mechanism] (Olsen, Arens, & Mersmann, 2018)

	Better understand the effects of resource scarcity in terms of land, water or power [for negative emissions technologies], which are likely to result in competition with food production, general power needs or other societal needs. (Honegger & Reiner, 2018)
	The feasibility and practical implementation of these four broad approaches for designing flexibility mechanisms [robust accounting, ambitious and economy wide targets, ensuring unit quality, and restricting transfers where environmental integrity is threatened] is subject to further research. (Schneider & La Hoz Theuer, 2019)
Loss and Damage	Empirical and theoretical explorations of transformations generally. (McNamara & Jackson, 2019)
	What do people value and how do they engage with loss and grief? (McNamara & Jackson, 2019)
	Perspectives of the most vulnerable groups [on loss and damage], and the representation of these at the decision making level. (McNamara & Jackson, 2019)
	Policy relevant explorations of loss and damage and the Warsaw international mechanism. (McNamara & Jackson, 2019)
NDC	Discourse analysis of post-paris negotiations in order to understand key divisions and reasons for difficulties. (Jernnäs & Linnér, 2019)
	Understanding and modelling of the policy process by researching governance structures and mechanisms, and national - international linkages. (Brown, Alexander, Arneth, Holman, & Rounsevell, 2019)
	Compilation of case-studies to better understand policy processes. (Brown et al., 2019)
	To what extent do NDCs and related declarations recognize existing legal obligations [under international law], rather than create new ones? (Mayer, 2018)
	What links exist between obligations arising from the NDCs as unilateral declarations and the diverse mechanisms and institutions established under the UNFCCC? (Mayer, 2018)
	What are the limitations of constitutional power of the executive branch to make unilateral declarations binding the state beyond the term of a particular government? (Mayer, 2018)

	Why did gender play an important role in the NDCs, and what are the commonalities and differences between different positions on gender? (Tobin, Schmidt, Tosun, & Burns, 2018)
	Studying the role of external consultants in drafting the NDCs. (Tobin et al., 2018)
	What lead to the creation of sub-groups within broader negotiating coalitions at the UNFCCC? (Tobin et al., 2018)
	Combining framing experiments with interactive games in order to find out to what extent public support for climate policy differs across the two contexts? (Anderson, Bernauer, & Balietti, 2017)
	Additional modelling of long-term, moderate [climate] action scenarios. (Jeffery, Gütschow, Rocha, & Gieseke, 2018)
	Complete sets of decarbonization indicators, also covering future developments under the NDCs. (Höhne, Fekete, den Elzen, Hof, & Kuramochi, 2018b)
	Comprehensive comparisons of policies implemented by countries. (Höhne et al., 2018b)
	New calculations [of NDC ambition] that are compatible with 1.5°C. (Höhne et al., 2018b)
	Identification of detailed transition pathways for animal to plant-sourced protein shifts, including targets, policy measures, time- frames, and quantification of co-benefits. (Harwatt, 2019)
	Search for possible future [mitigation] measures for the agricultural sector. (Hönle, Heidecke, & Osterburg, 2018)
	Better incorporate land-related aspects [into the AIM model], such as water bodies and ecosystems, as well as a better representation of energy technologies and economic systems for the mid-term assessment. (Fujimori et al., 2017)
Non-State Actors	Will the hybrid policy architecture of the PA spur the ambition and participation necessary to reach 2 degrees? (Bäckstrand, Kuyper, Linnér, & Lövbrand, 2017)
	Which powers will be held accountable for failure to comply with the 2 degree target? (Bäckstrand et al., 2017)

	<p>What is the capacity of non-state actors to hold states and intergovernmental actors to account for their actions? (Bäckstrand et al., 2017)</p>
	<p>Is global civil society being coopted when asked to provide voluntary climate targets in the service of governments? (Bäckstrand et al., 2017)</p>
	<p>What is the place of ideological critique and political dissent when NGOs take on the roles as intermediaries of international goals? (Bäckstrand et al., 2017)</p>
	<p>Need systematic knowledge of cities contribution to climate governance: modelling city pathways as well as comprehensive and detailed inventories of city action. (Bertoldi, Kona, Rivas, & Dallemand, 2018)</p>
	<p>Develop an empirical understanding of the operations of cross-border sub-national and non-state climate initiatives and the real-world impacts they produce. (Mai, 2018)</p>
	<p>What are the implications of the transnational turn at Paris for the climate regime and for world politics more broadly? (Hale, 2016)</p>
	<p>What is the direct effect of sub/nonstate climate action on the climate problem? (Hale, 2016)</p>
	<p>What is the effect of sub/nonstate climate action on national policies? (Hale, 2016)</p>
	<p>What is the effect of sub/nonstate climate action on climate politics? (Hale, 2016)</p>
	<p>Conduct a series of structured interviews with various indigenous peoples (IPs) involved in the process of developing the platform in order to gain their views on: (a) how inclusive the process was in accounting for Indigenous views and perspectives; (b) the extent to which TEK [Traditional Knowledge] was considered in the development of the platform; and (c) how best it should be structured given concerns with TEK incorporation and IP's environmental and cultural justice. (Shawoo & Thornton, 2019)</p>
	<p>Investigating the experiences of IPs [indigenous peoples] participating in the UNFCCC through other channels, examining the implementation of the LCIPP [Lima] platform and its impacts on communities, tracking the implementation of international decisions, and investigating the tangible impacts of UNFCCC outcomes on diverse Indigenous communities at local and regional levels. (Belfer, Ford, Maillet, Araos, & Flynn, 2019)</p>

PA General	In depth analysis of states evolving positions on mitigation, adaptation and loss and damage in the UNFCCC. (Hall & Persson, 2018)
	Analysis of other institutions involved in governing and managing adaptation beyond the UNFCCC [fragmentation and complexity of the climate regime]. (Hall & Persson, 2018)
	Focus on the conditions in which minilateralism can create club benefits that change states' preferences and interest calculations. This should involve systematically considering and comparing experiences with different areas of global policy coordination. It should also lead to more empirical investigations of how club benefits alter sectoral or issue-specific interests at the domestic level. (Falkner, 2016)
	Research should also be conducted on how to structure the relationship between emerging minilateral and existing multilateral regimes, so as to promote integration and synergy within an increasingly de-centralized global governance architecture. (Falkner, 2016)
	Overview of the state of justice issues within the current climate regime. (Okereke & Coventry, 2016)
	Including commitment to environmental protection and cooperative approaches within assessments of the stability of far-sighted coalitions on climate change. (Osmani, 2019)
	Interplay of international regimes [Climate, SDGs, Trade, etc.] (Maljean-Dubois, Sandrine; Wemaëre, 2017)
	Management of regime complexity at the national level. (Maljean-Dubois, Sandrine; Wemaëre, 2017)
	Implications of hard v. soft law in differentiation, adaptation, loss and damage, and finance [not just mitigation]. (Pickering, McGee, Karlsson-Vinkhuyzen, & Wenta, 2019)
	Study how the interaction between legal character and other aspects [i.e. non-state actors] affect reflexivity [ambition]. (Pickering et al., 2019)
	Comparative studies on legal character and reflexivity across further environmental areas (i.e. biodiversity). (Pickering et al., 2019)
	Why are some climate justice principles accepted and others not, and why are principles with only few mentions still included in the PA. (Gach, 2019)

	<p>Questions have also emerged regarding the decrease in climate justice mentions since the signing of the Paris Agreement: is progress being made to further clarify and operationalize the climate justice principles included in the agreement? Do critical states continue to express a desire to meaningfully embrace climate justice? Have any new issues emerged in UNFCCC negotiations that could be responsible for this decrease? (Gach, 2019)</p>
	<p>Integrate the PA into theoretical analyses of international climate cooperation. (Caparrós, 2016)</p>
	<p>Research on structural and procedural dynamics of UNFCCC negotiations: role of micro-dynamics, logistical organisation, and argumentation in influencing policy preferences. (Dimitrov, 2016)</p>
	<p>Research should be more divisive [should spur debate and challenge positions] (Lahn, 2018)</p>
	<p>Implications of the Paris Agreement’s architecture for other elements of climate justice, especially in terms of fairness in adaptation responses and the rising prominence of “loss and damage” beyond the limits of adaptation. (N. Chan, 2016)</p>
	<p>Replicate study on public support for climate policy dependency on external actors actions with a focus on fossil fuels and emissions more generally [not just carbon pricing] (Beiser-McGrath & Bernauer, 2019)</p>
	<p>Explore whether and how political support of citizens for their respective governments (rather than for climate policy more narrowly), defined in broad terms, changes as they learn that their government complies with or weakens its commitment to its existing NDC in response to other countries weakening their commitment or disengaging from mitigation policy. (Beiser-McGrath & Bernauer, 2019)</p>
	<p>Reduce uncertainties in calculation of the size of carbon budgets compatible with the 1.5 and 2 degree targets. (Mathews, 2017)</p>
	<p>Sustainable and efficient biomass production and use, the interaction of negative emissions with the global carbon cycle, efficient capture of CO2 from industrial sources, and safe CO2 storage in geological formations. (Torvanger, 2019)</p>
	<p>Assessments of climate projections and climate risks beyond global summaries providing detailed information on regional changes at different levels of warming. (Schleussner et al., 2016)</p>

	How the type of political and economic system within countries affects how sub-national units – such as states and provinces – actually cooperation across borders? (Victor, 2018)
	Research on the current allocation of finance to countries with no, or very little, mitigation potential [e.g. Belize]. (Brechin, 2016)
	Understanding of the conditions that produce neoliberal shifts in international environmental governance, the forces that drive effective efforts to create more just and ambitious agreements, and how distinct variegated forms of neoliberal environmental governance vary across issue areas such as bio-diversity, hazardous waste transport, desertification and disaster response. (Ciplet & Roberts, 2017)
	Inform how the UNFCCC regime and other relevant multilateral processes might be retooled to address the gaps in ambition, transparency, equity, and representation. (Ciplet & Roberts, 2017)
	More granular analysis of private climate governance initiatives and their potential. (Banda, 2018)
	Analyse the applicability of the internationally agreed SDG indicators for assessing sustainable development impacts of climate projects. (Oberghassel, Mersmann, & Wang-Helmreich, 2017)
	Study whether there is room to create synergies between the reporting procedures under the PA and Agenda 2030? (Oberghassel et al., 2017)
	More research to advance and test policy sequencing framework. (Pahle et al., 2018)
	More theoretical and empirical work is needed to address the various complexities of international climate negotiations that result from the heterogeneity of interests, political obstacles, and the design of monitoring and reciprocity mechanisms. (Cramton, Ockenfelsy, & Tirolez, 2017)
	Big technical questions still need to be answered [in how to create the suggested IT model], such as how the continued prevalence of fuel subsidies in many countries would be dealt with, how nuclear energy would be classified, or how other significant contributors to greenhouse gas emissions (e.g. cement production, land-use change) could be gradually included. (Spreng & Spreng, 2019)
	The question of the policy's [IT model that determines emissions budgets] legitimacy - who confers it and how could it be withdrawn - or

	the incorporation of justice considerations will have to be considered further. (Spreng & Spreng, 2019)
	Better governance with nonstate actors, focusing on the many and complex interactions between actors in a fragmented governance environment, how actions can be stimulated in the most critical areas, and how differences between and across types of actors may relate to governance risks. (S. Chan et al., 2019)
	Specific knowledge will also be key to critically appraise geographically imbalanced outcomes of nonstate actions. (S. Chan et al., 2019)
	How consequential non-state actors are, whether they substitute unsustainable activities, and whether their scope is broad enough to generate systemic change. (S. Chan et al., 2019)
Review	Research on experiences in other compliance mechanisms of the Kyoto Protocol/Montreal. (Basaran, 2017)
	Research on creating a better science-society-policy interface. (Sanwal, Wang, Wang, & Yang, 2017)
	Research on the stringency and implementation of policies and targets. (Iacobuta, Dubash, Upadhyaya, Deribe, & Höhne, 2018)
	Country case studies of how climate action, through policies, legislation, targets, strategies, shapes outcomes. (Iacobuta et al., 2018)
	Which factors and forces contribute to varying capacities for transparency. (Ciplet et al., 2019)
	In what way does a robust transparency mechanism support rather than undermine the status quo [neo-liberalism]? (Ciplet et al., 2019)
	How might the function and impact of transparency differ in governance regimes that explicitly serve the interest of capital, as compared to those that are more oriented toward protecting public goods and advancing justice? (Ciplet et al., 2019)
	More research should be directed at what shapes distinct transformative capabilities of transparency in domestic and local contexts in both developing and developed countries, as these are the building blocks of the overall system seen in international regimes. (Ciplet et al., 2019)
	How to design transparency regimes that enable accountability (of ambition) and comparable data? (Gupta & van Asselt, 2019)

	<p>Role of non-state actors in accountability, and the effect of their involvement on geopolitical dynamics in the climate regime. (Gupta & van Asselt, 2019)</p>
	<p>New research on EU monitoring of climate policy. (Schoenefeld, Hilden, & Jordan, 2018)</p>
	<p>The global modelling community should design future models and model experiments to increase their comparability with historical GHGs and thus their relevance in the context of the Paris Agreement. (Grassi et al., 2018)</p>
Technology	<p>Research on negotiation on technology with a specific focus on the positions of developing countries. (Oh, 2019)</p>

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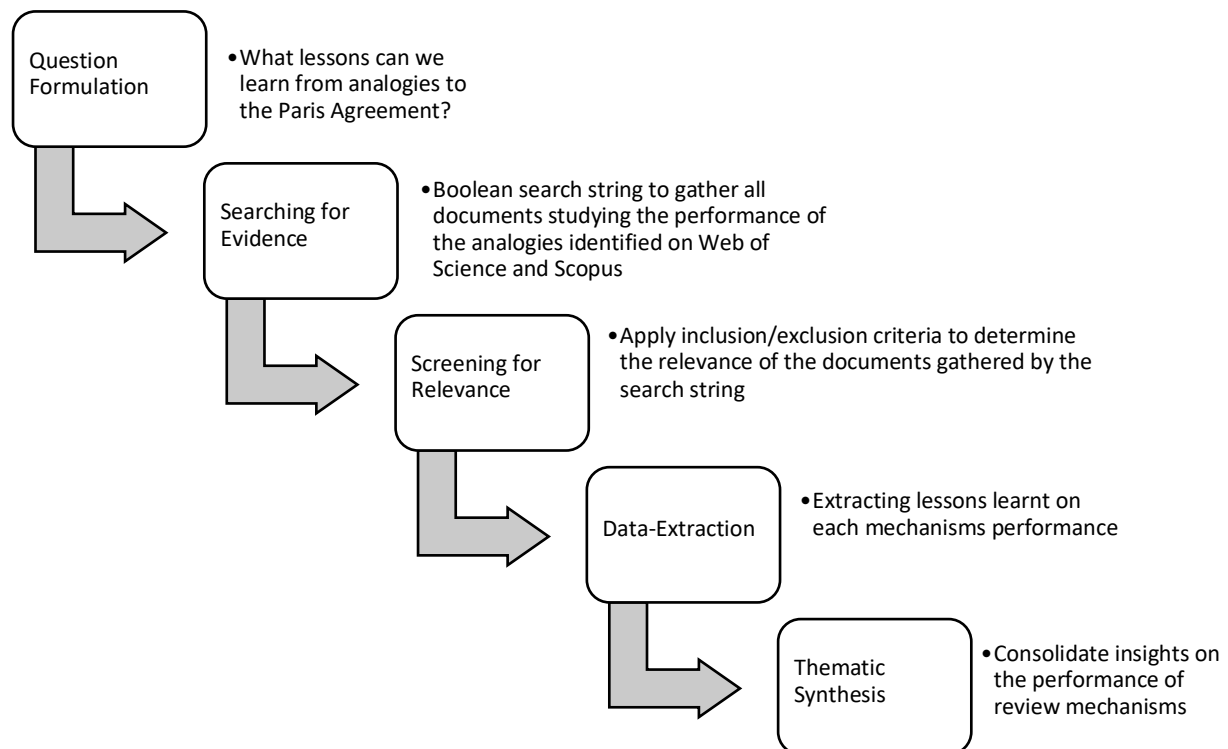
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Annex Two: Beyond Pledge and Review: Learning from analogies to the Paris Agreement Review Mechanisms – Appendices

Appendix 2.1: Methods

We systematically collected the available peer-reviewed literature assessing the performance of the five review mechanisms we identify as comparable to the Paris Agreement’s review mechanisms. In line with systematic evidence synthesis protocols⁴² we proceeded as follows: 1.) we developed our search strategy in order to gather as much relevant literature as possible, 2.) we screened the gathered literature for relevance following strict criteria, 3.) we extracted our data by analyzing each relevant document and sorting the extracted data into categories, 4.) we carried out a thematic synthesis of these findings in order to consolidate insights on the performance of review mechanisms and inform our analysis of the Paris Agreement. Figure 1 visually depicts these steps, providing a brief explanation of each of the steps in the context of this paper. We subsequently detail each step in the following subsections.



Appendix 2.1, Figure 1: Systematic Evidence Synthesis Process

⁴² For example see <https://www.roses-reporting.com/>. We do not carry out a critical appraisal of the documents we identify. We find that many documents do not explicitly define their methods but nonetheless offer relevant insights, (e.g. (Laird and Valdés 2012; Elvira Domínguez Redondo 2008): neither paper presents an explicit methodology but offer relevant ex-post assessments, largely based on regime documents, of their respective review mechanisms). Weighting these insights based on a critical appraisal of the methods used would therefore restrict our findings.

Literature Search

In order to ensure comprehensiveness of our search we developed a series of search queries, one for each of the analogous mechanisms, for use in the Web of Science and Scopus platforms. We structured the query for each mechanism identically. In particular, we created a Boolean search string consisting of the name of the broader regime of the review mechanism and the name of the review mechanism in question. We specified a list of synonyms for the term “review” based on a first review of the literature.⁴³ Table 1 reports the specific search strings used in this study.

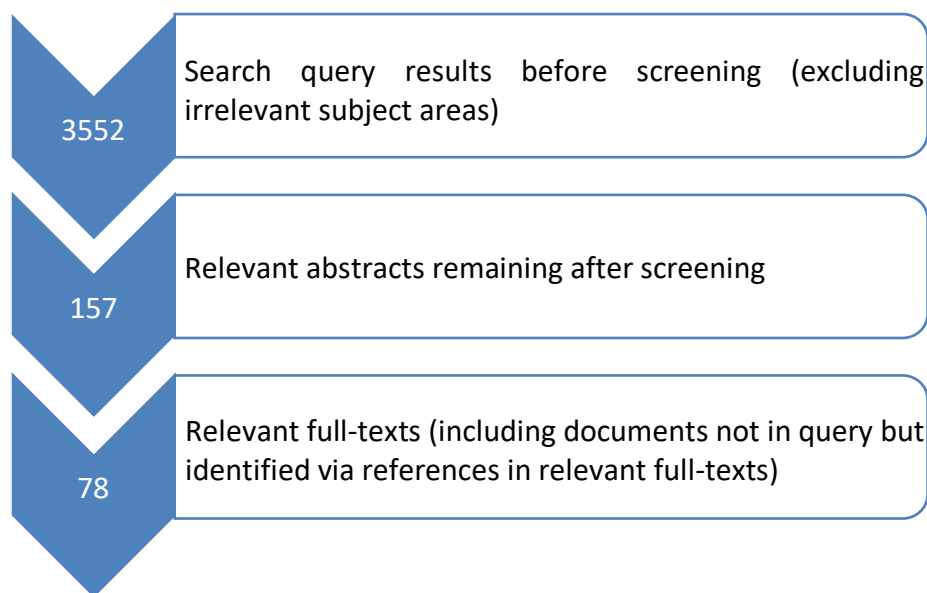
Appendix 2.1, Table 1: Boolean Search String

Regime		Mechanism		Generic Terms
“World Trade Organization” OR “WTO”	AND	“Trade Policy Review Mechanism” OR “TPRM”	OR	“Review” OR “Surveillance” OR “Monitoring” OR “Reporting” OR “MRV”
“International Monetary Fund” OR “IMF”		“Article IV Consultations”		
“United Nations Human Rights Council” OR “UNHRC” OR “Human Rights Council” OR “HRC”		“Universal Periodic Review” OR “UPR”		
“Human Right*” OR “Women* Right*” OR “Child* Right*” OR “Disab* Right*” OR “Rights of Persons with Disabilities” OR “Worker* Right*” OR “Migrant* Right*” OR “Economic Right*” OR “Social Right*” OR “Cultural Right*” OR “Political Right*” OR “Racial Discrimination” OR “Torture” OR “enforced disappearance”		“Committee” OR “Treaty Bodies”		
“International Labor Office” OR “ILO”		“Complaints Procedure” OR “Committee of Experts” OR “Conference Committee”		

⁴³ For a more detailed account of the methods see: (Haddaway et al. 2016; James, Randall, and Haddaway 2016; Minx et al. 2017; Raiser et al. 2020)

We excluded papers with topics obviously not related to the five international regimes such as the health sciences or engineering. This was done directly in the search string⁴⁴ resulting in a total of 3552 papers spread over the five analogous mechanisms identified by this first query step. These search results remain limited to the Web of Science and Scopus platforms. In order to enhance our comprehensiveness, we therefore also searched through the reference lists of documents identified as relevant during screening (see subsequent subsection) for further documents that may be relevant but were not included in our search queries.

Appendix 2.1, Figure 2: The number of papers identified at each step of the screening



Screening for Relevance

We next screened all remaining documents at the title and abstract level using a strict set of inclusion and exclusion criteria. These are:

1. *Focus on the review mechanism* – We excluded any documents not focused on the review mechanism in question, thus excluding many search results where a document referenced the encompassing regime (i.e. the HRC) and a synonym for review, but does not study the review mechanism itself (e.g. in the case of the HRC, the UPR).⁴⁵
2. *Ex-post analysis* – We included all ex-post analyses of the identified review mechanisms. Generally, such ex-post analyses are based on primary sources, with a clear methodology. However, many of the documents identified by our search query did not explicitly define their methodology and based their analysis largely on

⁴⁴ We excluded 2843 papers. These were excluded using the SUBJAREA command in our search string. We only did this for the Scopus platform as the Web of Science platform only resulted in 1574 documents. For the full search string for each analogy for both the Web of Science and Scopus platforms see the SM.

⁴⁵ With many papers stating that they “review the current literature/evidence” we found many such examples.

secondary sources. In these cases, we determined whether the document offers an assessment of the performance of the mechanism or rather a description of the mechanism’s history or function. We excluded articles of the latter type.

3. *Scope of the analysis* – Finally we excluded all case studies (even if they are ex-post). These involved geographic case-studies discussing the performance of a mechanism only within a single country or region (Criteria 3.1) and sectoral case-studies discussing the performance of a mechanism in a single subject or sector (i.e. the IMF surveillance of fossil fuel subsidies) (Criteria 3.2).

In order to aid us in the screening process we developed a decision tree (Table 2). All documents deemed relevant at the title and abstract level were screened again at the full-text level.

Appendix 2.1, Table 2: Decision tree employed in screening for relevance. A document needs to qualify as “yes” in all three columns (ex-post, geographic case-study, sectoral case-study) in order to be considered relevant

Criteria 1: Does the document study one of the identified review mechanisms?						
Yes						No - Exclude
Criteria 2: Ex-Post		Criteria 3.1: Geographic Case Study		Criteria 3.2: Sectoral Case Study		
Does it base its analysis on firsthand empirical data (i.e. primary documents or interviews)?		Does the document study all countries involved in the mechanism?		Does the document study all sectors that the mechanism covers?		
Yes	No	Yes	No	Yes	No	
Does it use secondary sources to assess the mechanisms performance?		Does the document study some countries in order to generally assess the mechanisms performance?		Does the document study some sectors covered by the mechanism in order to inform the general performance of the mechanism?		
Yes	No Exclude – the document is simply descriptive and is not relevant	Yes	No Exclude – the document is a case-study that only studies the performance of the mechanism in one country/region and does not offer lessons on the mechanisms performance in general	Yes	No Exclude – the document is a case-study focused on the performance of the mechanism in one specific sector and does not offer lessons on the mechanisms performance in general	
If yes in each criterion, then include						

Following the screening of all documents for relevance, we were left with 78 documents distributed over the five analogies that formed the basis of our in-depth analysis and

synthesis. Figure 2 above depicts how many documents were deemed relevant at each step (we provide a full database of these relevant documents in the supplementary materials).

Data-Extraction

In order to synthesize the available evidence on the performance of analogous review mechanisms, we classified each document according to the regime it studies and extracted key insights from its analysis of that regime's performance. We adapted our method for extracting and analyzing relevant insights from the thematic synthesis method for the systematic synthesis of qualitative research in the medical sciences.⁴⁶ This method involves two primary steps for consolidating the evidence. First, descriptive themes are identified that provide an overview of the evidence being reviewed. These are then further consolidated into analytic themes which, rather than merely describing the evidence base, include the researchers own analysis and interpretation.

Following this approach, we first reviewed the literature on each review mechanism separately. We read and extracted common insights on each mechanism's performance from the documents identified as relevant. We organized the excerpts we extracted from each document in a structured table along the following three categories (see the supplementary materials for the full table including all extracted information):

4. **General:** insights into the structure and procedure of the review process and whether the process affects state cooperation.
5. **Positives:** factors that enhance mechanism performance or the effect of the review mechanism on state cooperation.
6. **Negatives:** factors that limit mechanism performance or the effect of the review mechanism on state cooperation.

Practically this involved qualitatively coding each document with the categories above serving as a broad codebook. The coded excerpts were then summarized as key findings for each regime, resulting in a descriptive account of the factors influencing the performance of each of the review mechanisms we study as depicted in the existing literature. This descriptive account is detailed in Appendix Two.

We subsequently collated these insights into six common factors, or analytic themes, that recurred across the five regimes studied. This provides a generalized assessment of factors influencing review mechanism performance that is not specific to each individual mechanism. Here, in line with the thematic synthesis method, we include our own interpretation. These six analytic themes inform our analysis of the Paris Agreement's review mechanism design, providing benchmarks with which we assess the Paris Agreement's review mechanism design.

We discuss the limitations of our approach below.

⁴⁶ We do not carry out a strict line-by-line coding of the texts. We refer to this further in our limitations section. For more information on the method see (Thomas and Harden 2008)

Limitations

Our study comes with a number of methodological limitations:

First, reviewing such a broad body of literature necessarily limits the depth at which the factors determining each analogous mechanism's performance can be presented. This further limits the depth with which we were able to analyze the Paris Agreement's institutional structure. As such our findings remain general and may serve primarily as entry points to more focused analyses of specific mechanism features. For example, we highlight that the Paris Agreement does allow for repetitive interaction, which the literature on the other review mechanisms we study shows to enhance state socialization. However, we do not consider whether the kind of repeated interaction offered in the pledge and review mechanism is the right kind to facilitate socialization. Here a follow-up study, considering specific cases in more detail, would be of value.

Second, although we deduce lessons for the Paris Agreement from our analysis of analogous mechanisms, we can still only add to ex-ante assessments of the Paris Agreement's performance. Whether the positive aspects we identify will truly work as foreseen, or whether the negative aspects we identify may yet be avoided can only be determined once we have gained more practical experience with the Paris Agreement's review cycles.

Third, the synthesis of such a diverse body of primarily qualitative research is necessarily subject to interpretation by the authors. We approach this subjectivity by transparently reporting all our research steps and presenting our data.⁴⁷ As such we invite and encourage readers to inspect our interpretations of the research we synthesize and welcome any comments they may have.

Fourth, we do not carry out a detailed critical appraisal of the literature on which we base our analysis. As such we cannot weight the collated evidence according to the quality or rigor of the methods employed, be they legal, qualitative or quantitative. We, however, present all the literature and our analysis transparently in the supplementary materials.

Finally, our limited focus on the review component of the Paris Agreement does not speak to the important interaction between "pledge" and "review". However, the review component provides the primary mechanism through which it is envisioned that countries are put under pressure to ratchet up their pledges, and subsequently implement them. As such we argue that despite its limitations our study remains very useful and further discuss this together with our findings.

⁴⁷ The "data" in the supplementary materials shows our categorization of the literatures analysis of each review mechanism's performance into *positive, negative, and general*, categories, but does not present the subsequent consolidation steps. These are shown in the figures within the body of this paper.

Appendix 2.2: The Performance of Analogous Mechanisms

The Trade Policy Review Mechanism of the World Trade Organization

Overview and General Insights

The WTO TPRM periodically reviews state's trade policies and practices and their impact on the multilateral trading system. In each review cycle, states submit reports on their trade policies which are further supplemented by a second report from the WTO secretariat, usually based on WTO staff desk work and occasionally additional country visits. The Trade Policy Review Board (which consists of all WTO member-states) subsequently reviews these reports, with an appointed state acting as discussant leading proceedings. A final summary of this peer-review process is published alongside the secretariat's position, the state report, and the minutes of the review.⁴⁸

Despite highlighting some deficiencies, the ex-post literature on the TPRM that we review highlight its' success as a transparency mechanism, providing governments, markets and other stakeholders with important information about individual country's trade policies.⁴⁹

Positives

Beyond merely providing important information on state trade policies, the literature highlights the TPRM's capacity to facilitate learning amongst states – in particular about policy interlinkages and best practices – as an important strength.⁵⁰ For example, as a result of trade policy reviews, many developing countries started putting emphasis on macroeconomic policy to redress savings-investment balances rather than relying on import restrictions.⁵¹ Remaining separate from the binding and legalized dispute settlement procedure, the TPRM's non-confrontational nature allows for discussion in areas where no agreement is possible, offering a more cooperative way to approach state conflicts.⁵² Despite being non-confrontational studies have shown that the secretariat does not shy away from highlighting gaps in states' reports. Evidence based on an empirical analysis of annual trade policy reviews suggests that this peer-review process acts as a deterrent and disincentivises states from breaching trade law in order to avoid negative reviews.⁵³

Negatives

Despite the generally positive assessment of the TPRM as a transparency mechanism, a number of weaknesses are highlighted. Firstly, although it provides a comprehensive overview over trade policies that has been found to enable learning, the TPRM has also been criticized for its broad focus, with its reports often not context specific enough to inform

⁴⁸ (World Trade Organisation 1994)

⁴⁹ (Chaisse and Chakraborty 2007; Froese 2009; Ghosh 2010; Kende 2018; Laird and Valdés 2012; Rendak 2014)

⁵⁰ (Edwards 2018; Laird and Valdés 2012)

⁵¹ (Laird and Valdés 2012)

⁵² (Karlas and Parížek 2019; Laird and Valdés 2012)

⁵³ (Edwards 2018)

national reforms, diluting the practicality and salience of the review to individual states.⁵⁴ Authors further cite a lack of constructive interaction between states in the peer-review process with proceedings shying away from true debate and reflection, remaining overly courteous and diplomatic.⁵⁵ The TPRM is further shown to lack an effective means of following up.⁵⁶ Thus, while evidence suggests the TPRM deters states from breaching trade laws, the extent to which it applies pressure on states to implement further reforms of their trade policies remains limited.

Beyond the lack of effective pressure put on states, authors criticize the lack of state participation in the review process, with many countries both unable to attend the many meetings, and uninterested in contributing to them.⁵⁷ This is mediated somewhat by high participation in the reviews of larger traders, covering up to 90% of global trade volume.⁵⁸ Nonetheless, the TPRM seems to have little traction outside of the review process itself, with authors citing a lack of communication and dissemination of review outputs.⁵⁹ Finally, authors cite the lack of capacity, both within the WTO and amongst states, to keep up with the arduous review schedule as membership expands.⁶⁰

The WTO TPRM		
General	Positives	Negatives
Transparency mechanism providing governments and other stakeholders with information on MS trade policies	<ul style="list-style-type: none"> - Learning - Forum for discussion in areas where no agreement is possible - Peer-review pressures states to comply 	<ul style="list-style-type: none"> - Review outcomes broad and not salient - Lack of constructive interaction in peer-review (diplomatic and courteous) - Lack of follow-up - Lack of participation - Lack of dissemination/media attention - Lack of capacity to review

The International Monetary Fund’s Article IV Consultations

Overview and General Insights

The IMF Article IV consultations annually review states' economic policies. This review is carried out by the executive board, a group of elected experts, and is based on IMF staff reports. IMF staff continuously monitor states economic policies, conducting country visits in order to consult national stakeholders. Following the review, the executive board’s views are summarized and communicated back to the state under review. The state under review may

⁵⁴ (Conzelmann 2007; Froese 2009; Ghosh 2010; Kende 2018; Laird and Valdés 2012; Rendak 2014)

⁵⁵ (Conzelmann 2007; Karlas and Parížek 2019; Kende 2018)

⁵⁶ (Conzelmann 2007; Kende 2018; Laird and Valdés 2012)

⁵⁷ (Conzelmann 2007; Ghosh 2010; Kende 2018; Laird and Valdés 2012)

⁵⁸ (Karlas and Parížek 2019)

⁵⁹ (Edwards 2018; Keesing 1998; Laird and Valdés 2012)

⁶⁰ (Ghosh 2010; Karlas and Parížek 2019; Keesing 1998; Kende 2018; Laird and Valdés 2012)

choose whether these reports are made public, and also retain the option of discussing the board’s communications multilaterally.⁶¹

Ex-post studies of the IMF’s surveillance highlight its role in the diffusion of information to states and other stakeholders.⁶² As such, the IMF’s surveillance is shown to have a direct effect on states’ economic policies and financial markets,⁶³ but also indirectly through influencing the broader discourse on economic policy.⁶⁴

Positives

The success of the IMF’s surveillance in influencing state and financial market behavior is considered to be largely due to its command over extensive resources, and its efficient use thereof. IMF staffs’ standing as leading experts on economic policy, and their engagement with the broader academic world, add legitimacy to their surveillance work.⁶⁵ Staffs’ ability to learn and thus improve their policy advice is a further source of legitimacy.⁶⁶ Moreover, the IMF is seen to strategically use its resources, creating feedback loops in the form of repeated interactions and influence within the broader economic policy discourse in order to diffuse its policy advice when its annual reviews lack direct influence.⁶⁷ Finally, the acumen of its leaders is cited as an important factor determining its influence on states’ behavior.⁶⁸

Negatives

The primary constraint of the IMF’s surveillance lies in the power imbalance of its member-states, with IMF policy advice being shown to have both less influence over powerful members, and rather more influence on states beholden to IMF loans,⁶⁹ as well as being biased in favor of its powerful member’s interests.⁷⁰

IMF Article IV Consultations		
General	Positives	Negatives
<ul style="list-style-type: none"> - Influence within economic policy discourse - Information sharing has a direct effect on MS policies and financial markets 	<ul style="list-style-type: none"> - Large resources and expert staff - Strategic use of resources by staff 	<ul style="list-style-type: none"> - Surveillance only influential in states beholden to IMF loans

⁶¹ (International Monetary Fund 2020)

⁶² (Broome and Seabrooke 2007)

⁶³ (Broome and Seabrooke 2007; Edwards 2018; Fratzscher and Reynaud 2011; Lombardi and Woods 2008)

⁶⁴ (Broome and Seabrooke 2007; Clift 2018)

⁶⁵ (Clift 2018)

⁶⁶ (Broome and Seabrooke 2007)

⁶⁷ (Clift 2018)

⁶⁸ (Clift 2018)

⁶⁹ (Clift 2018; Edwards 2018; Lombardi and Woods 2008)

⁷⁰ (Fratzscher and Reynaud 2011)

The Universal Periodic Review of the Human Rights Council

Overview and General Insights

The UPR was established as part of the Human Rights Council (HRC) in response to criticism of the politicization of the former Commission on Human Rights.⁷¹ The UPR reviews the extent to which all UN member-states respect their Human Rights (HR) obligations under 1) the UN Charter, 2) Universal Declaration on Human Rights, 3) HR instruments to which the state is party, 4) voluntary pledges and commitments made by the state and 5) applicable law.⁷² Review periods last four to five years, with 47 states reviewed every year according to a pre-determined schedule. The reviews themselves are carried out by a troika of states who act as rapporteurs. The review is based on three reports: first the states themselves submit a report detailing their compliance with the relevant HR provisions. States are encouraged to hold national consultations with relevant NSAs and other stakeholders to compile the report. The other two reports are submitted by the Office of the United Nations High Commissioner for Human Rights (OHCHR), with one summarizing information from other HR bodies (such as the Treaty Bodies) and relevant IOs, and the other compiling official submissions from NSAs. The review consists of an interactive dialogue between the state under review and the HRC. During this dialogue states may make recommendations which the State under review is free to accept or reject. NSAs may only observe the interactive dialogue. This review process results in an outcome report summarizing the discussion as well as accepted and rejected recommendations. The final report must be adopted by the HRC plenary before being published.

In the literature we review the UPR is praised for its universality and inclusive scope, covering all human rights.⁷³ Although only active since 2008, first assessments indicate that it has generally been effective in putting pressure on states to implement accepted recommendations.⁷⁴ Nonetheless a number of issues prevail limiting the UPR's performance.

Positives

Analyses of the UPR highlight its explicitly political nature as an important factor in its success as states are pressured to accept recommendations made by their peers and particularly geopolitical allies.⁷⁵ Furthermore, the high level of NSA involvement is frequently cited as

⁷¹ (Elvira Domínguez Redondo 2008)

⁷² (United Nations Human Rights Council 2020)

⁷³ (Charlesworth and Larking 2015; Chauville 2015; Etone 2018; Freedman 2011; McMahon, Busia, and Ascherio 2013; Milewicz and Goodin 2018)

⁷⁴ (Carraro and Jongen 2018; McMahon and Ascherio 2012; Milewicz and Goodin 2018; Moss 2010; UPR Info 2016)

⁷⁵ (Abebe 2009; Carraro 2019b; Carraro and Jongen 2018; Etone 2018; Kälin 2015; Milewicz and Goodin 2018; Terman and Voeten 2018; Tomuschat 2011)

crucial⁷⁶ to ensure that the international review process generates domestic pressure.⁷⁷ A further positive factor is the UPR's complementarity with the Treaty Bodies. States and NGOs often cite the concluding observations of the treaty body reviews in the UPR, dispelling early concerns that the UPR may dilute the treaty bodies' expert review.⁷⁸ As such the UPR provides states with a forum within which they can learn from each other and share best practices.⁷⁹ The transparency of the review further provides an important source of information both for NGOs and civil society to apply domestic pressure.⁸⁰ Finally, the repetition of the process allows for follow-up, helping to ensure that that states are not only pressured to accept recommendations under peer-pressure, but also pushed to implement recommendations before their next review.⁸¹ Here, the predictability of the reviews, with schedules fixed years in advance, are considered crucial and help NSAs to prepare for review cycles.⁸²

Negatives

Despite the pressure the UPR puts on states, a significant drawback of the UPR's political nature is that it has led to a considerable amount of regionalism, where geopolitical allies shield each other from criticism.⁸³ The UPR's recommendations are further found to be vague and not critical enough to offer truly practical feedback to states.⁸⁴ With over 190 states reviewed every 4-5 years, reviews of individual states are necessarily short, further limiting the detail of the review process.⁸⁵ The review process is further restricted by a lack of state and NSA capacities, with overall low levels of participation, and the risk of fatigue amongst review participants.⁸⁶ Analyses have also cited efforts by states to undermine NSA participation⁸⁷ and a lack of media coverage⁸⁸ as constraints to the UPR's performance. Finally, recommendations are submitted before the interactive dialogue takes place, resulting in reduced pressure on states to respond.⁸⁹

⁷⁶ Although NSA involvement is cited as an imperative for inducing pressure on governments domestically, not all NSA submissions are included in the stakeholder report: (Moss 2010; Sweeney and Saito 2009)

⁷⁷ (Carraro 2019b; Carraro and Jongen 2018; Chauville 2015; Collister 2015; Cowan and Billaud 2015; Duggan-Larkin 2010; McMahon, Busia, and Ascherio 2013; Milewicz and Goodin 2018; Moss 2010; Sweeney and Saito 2009; UPR Info 2016)

⁷⁸ (Abebe 2009; Duggan-Larkin 2010; Etone 2018; E. D. Redondo 2008; Sweeney and Saito 2009)

⁷⁹ (Charlesworth and Larking 2015; McMahon, Busia, and Ascherio 2013; Milewicz and Goodin 2018)

⁸⁰ (Carraro 2019b; Carraro and Jongen 2018; Moss 2010)

⁸¹ (Charlesworth and Larking 2015; Cowan and Billaud 2015; Milewicz and Goodin 2018)

⁸² (Collister 2015)

⁸³ (Abebe 2009; Charlesworth and Larking 2015; Duggan-Larkin 2010; Freedman 2011; McMahon and Ascherio 2012; McMahon, Busia, and Ascherio 2013; Milewicz and Goodin 2018; Sweeney and Saito 2009)

⁸⁴ (Abebe 2009; Carraro 2019b; Chauville 2015; Collister 2015; Duggan-Larkin 2010; Kälin 2015; McMahon and Ascherio 2012; Moss 2010)

⁸⁵ (Abebe 2009; Duggan-Larkin 2010; Freedman 2011; Kälin 2015; McMahon, Busia, and Ascherio 2013; Sweeney and Saito 2009; Tomuschat 2011)

⁸⁶ (Abebe 2009; Carraro 2019b; Charlesworth and Larking 2015; Chauville 2015; Cowan 2015; Moss 2010; UPR Info 2016)

⁸⁷ (Abebe 2009; Moss 2010)

⁸⁸ (Freedman 2011; Joseph 2015)

⁸⁹ (Freedman 2011; Sweeney and Saito 2009)

UPR		
General	Positives	Negatives
<ul style="list-style-type: none"> - Universal and comprehensive (reviews all MS on all of HR law) - Has been found to positively influence MS HR compliance 	<ul style="list-style-type: none"> - Peer-pressure through political process - NSA participation - Repetition - Complementarity to Treaty Bodies - Transparency 	<ul style="list-style-type: none"> - Geopolitical alliances shield from criticism - Broad/weak/vague recommendations - Time constraints - Capacity constraints

The UN Human Rights Treaty Bodies

Overview and General Insights

The Human Rights Treaty Bodies are committees of experts tasked with reviewing the implementation of the core international human rights treaties (see footnote 5 in the main manuscript for a list of committees). Though not identical, all of the committees follow a similar structure, with the primary difference being the subject of the treaties whose implementation they monitor. We group the Treaty Body literature in order to offer more general insights also applicable to the Paris Agreement.⁹⁰

The Treaty Bodies consist of 10-25 experts nominated and elected by state-parties to the human rights convention in question. All states are required to submit periodic reports on their implementation of the treaty being monitored. The committee selects a rapporteur assigned to check the consistency of the reports and check the State under review's progress on previous recommendations. NSAs are further invited to submit shadow-reports to the committee. The committee reviews the reports submitted and subsequently questions the state under review in an interactive dialogue. The committee then publishes its concluding observations with non-binding recommendations for the state under review. The committee also regularly publishes general comments detailing how it interprets specific provisions of the treaty when it monitors state parties. Finally, most of the treaties monitored by the Treaty Bodies allow for individual complaints, with the committees tasked to deliver views in individual cases⁹¹ or inquiry procedures.⁹² We do not take these procedures into consideration as our focus is on state review procedures.

The literature we review on the Treaty Bodies finds them to influence states' behavior and facilitate compliance with human rights law.⁹³ Some point out that the effect is cumulative,

⁹⁰ Not all Treaty Bodies are studied equally. Of the literature we identify 2 study the CESCR, 2 the CEDAW, 2 the CERD, 5 the HRC, 5 the CAT, 7 the CRC, and 17 the Treaty Bodies generally.

⁹¹ (UNOHCHR 2012; Çalı and Galand 2020)

⁹² (UNOHCHR 2020).

⁹³ (Anaya-Muñoz, Nuñez, and Ponce 2018; Byrnes 2011; Carraro 2019b; Creamer and Simmons 2019b; 2019a; Kanetake 2018; Lundy 2012; McCall-Smith 2019; Polonko and Lombardo 2015)

has grown over time,⁹⁴ but also remains selective with not all states being equally influenced by the committees' reviews.⁹⁵

Positives

One of the most important factors enhancing the Treaty Bodies' performance identified by the ex-post literature is their engagement with NSAs.⁹⁶ Using the information the Treaty Bodies provide, NSAs are able to mobilize domestic pressure⁹⁷ and are better equipped to promote a domestic discourse on legislative debate and reform.⁹⁸ This, however, relies on the dissemination of Treaty Body communications⁹⁹ as well as the specificity and accuracy of the committees reports.¹⁰⁰ NSAs further aid the committees by providing information for review and so increasing the quality of reports.¹⁰¹ The Treaty Bodies legitimacy and quality of communications is further conditional on the committee members' independence and expertise.¹⁰²

An additional factor enhancing the Treaty Bodies' performance is their periodic nature which is shown to socialize states by diffusing human-rights norms.¹⁰³ The interactive dialogue between experts and states and the communication of interpretive guidance through general comments also facilitates learning.¹⁰⁴ Finally, the OHCHR's capacity building initiatives are shown to play an important role, both in increasing the reporting capacity of states, and training domestic NSAs to better engage in the review process.¹⁰⁵

Negatives

The Treaty Bodies suffer from a lack of resources, with committees often struggling to reply to the state under review, despite not all states submitting reports.¹⁰⁶ Authors also highlight the unrealistic and broad nature of communications, with committee members lacking the political expertise necessary to make practical recommendations.¹⁰⁷ Some studies highlight a

⁹⁴ (Creamer and Simmons 2019a; 2019b; Lundy 2012; Stein 2016)

⁹⁵ (Kahn-Nisser 2019; Liebenberg 2020; McQuigg 2011; Parrat 2010; van Alebeek and Nollkaemper 2012)

⁹⁶ (Byrnes 2011; Erdem Turkelli and Vandenhole 2012; Keller and Ulfstein 2012; Schlütter 2012; Zipoli 2019)

⁹⁷ (Carraro 2019b; Creamer and Simmons 2019a; 2019b; Krommendijk 2015; McQuigg 2011; Zipoli 2019)

⁹⁸ (Carraro 2019b; Creamer and Simmons 2018; 2019a; 2019b; Polonko and Lombardo 2015)

⁹⁹ (Creamer and Simmons 2018; 2019a; Davis and Powell 2003)

¹⁰⁰ (Creamer and Simmons 2019b; Lundy 2012)

¹⁰¹ (Creamer and Simmons 2015; 2018; Keller and Ulfstein 2012; Lintel, Lintel, and Ryngaert 2013; McCall-Smith 2019; Zipoli 2019)

¹⁰² (Carraro 2019a; Shikhelman 2017)

¹⁰³ (Anaya-Muñoz, Nuñez, and Ponce 2018; Creamer and Simmons 2015; 2018; 2019a; 2019b; Kanetake 2018; Lundy 2012)

¹⁰⁴ (Carraro 2019b; Creamer and Simmons 2019b; Erdem Turkelli and Vandenhole 2012; Kanetake 2018; Keller and Grover 2012; Keller and Ulfstein 2012)

¹⁰⁵ (Abashidze and Koneva 2019; Creamer and Simmons 2019a; Parrat 2010; Prouvez 2009)

¹⁰⁶ (Abashidze and Koneva 2019; Creamer and Simmons 2019b; Halme-Tuomisaari 2020; Keller and Ulfstein 2012; Krommendijk 2015; Zipoli 2019)

¹⁰⁷ (Carraro 2019b; 2019a; del Prado 1985; Farha 2012; Krommendijk 2015; Prouvez 2009)

lack of monitoring¹⁰⁸ and a lack of publicity and dissemination as a further obstacles to the Treaty Bodies performance.¹⁰⁹ A lack of standardized data further stifles the review process.¹¹⁰ Despite the supposed independence of committee experts, some studies have identified the committee’s politicization as a problem, with committee members not treating all states equally.¹¹¹ Other authors illustrate the political nature of expert election and question their independence.¹¹² It has also been argued that the Treaty Bodies rely too much on NGOs, decreasing their legitimacy.¹¹³ Finally, the Treaty Body review process risks becoming ritualistic, with state reporting becoming an end in of itself, distracting from the overall goal of improving human-rights.¹¹⁴

Treaty Bodies		
General	Positives	Negatives
<ul style="list-style-type: none"> - Generally effective in a cumulative and selective way - Follow-up procedure - Capacity Building - NSAs important in facilitating review 	<ul style="list-style-type: none"> - Domestic mobilization through NSAs - Role as a source of information - Repetition and interaction facilitate socialization and learning - Capacity Building 	<ul style="list-style-type: none"> - Overburdened/lack of capacity - Vague recommendations - Politicisation of committee experts - Lack of standardized information

The International Labor Office’s Regular Supervisory System

Overview and General Insights

The ILO’s supervisory system is regarded as the prototype for multilateral review.¹¹⁵ It is made up of two primary mechanisms, the committee of experts on the application of the conventions and recommendations (CEACR), and the conference committee on the application of standards (CAS). The CEACR constitutes a body of experts mandated to periodically review reports submitted by states on their compliance with ILO conventions (every two years for fundamental conventions and five years for others). The CEACR may make a direct request to states for further information when necessary. Having reviewed all states, the CEACR subsequently publishes its observations on state compliance in an annual report. The CAS constitutes a tripartite committee of ILO member-states and employer and worker representatives. This committee considers the annual report of the CEACR, making specific referrals to instances of non-compliance (a group of 25 particularly non-compliant

¹⁰⁸ (Keller and Ulfstein 2012; Krommendijk 2015; Meier et al. 2018; O’Flaherty 2006)

¹⁰⁹ (Kälin 2012; Keller and Ulfstein 2012; Lundy 2012; McQuigg 2011; van Alebeek and Nollkaemper 2012)

¹¹⁰ (Meier et al. 2018; Polonko and Lombardo 2015)

¹¹¹ (Carraro 2019a; Kahn-Nisser 2019; Kelly 2009; O’Flaherty 2006)

¹¹² (Keller and Ulfstein 2012; Krommendijk 2015; Shikhelman 2017; Thornberry 2005)

¹¹³ (Creamer and Simmons 2019b; Krommendijk 2015)

¹¹⁴ (Creamer and Simmons 2019b; Keller and Ulfstein 2012)

¹¹⁵ (Maupain 2013; Weisband 2000; Wissikirchen 2005)

states are singled out for in-depth review).¹¹⁶ The committee finally publishes a report of recommendations for state action. This division of roles between the CEACR and the CAS separates the “naming and shaming” process, with the CEACR expert observations identifying non-compliance (naming), and the CAS peer-review applying pressure on states to reform (shaming).¹¹⁷

Although the ILO is seen to pressure states to reform,¹¹⁸ this pressure has been shown to be selective as a consistent group of states remain repeated defectors.¹¹⁹ Moreover, ILO review is considered to work best in confluence with more stringent forms of pressure for example from domestic constituents or bilateral foreign policy pressures (i.e. US trade policy).¹²⁰ Finally, the effect of ILO review remains gradual rather than transformative.¹²¹

Positives

A number of specific elements of the ILO’s review mechanisms can be identified that foster its performance. The ILO’s tripartite structure, including national government representatives as well as employer and worker representatives, is commonly cited as a positive contribution to the ILO’s review mechanisms legitimacy.¹²² Practically, the ILO’s monitoring is shown to provide an important source of information to other stakeholders such as national courts and NGOs, enabling them to apply pressure on governments to enact labor law reforms.¹²³ This source of information is also valuable to national governments, providing terms of reference for multilateral cooperation on labor standards,¹²⁴ and enabling states to learn from best practices.¹²⁵ The repeated process of review is also shown to offer a discursive element, socializing states into compliance.¹²⁶

Negatives

The ILO review mechanism is considered to have two primary shortcomings. First, it has not exerted visible influence on its own but only becomes effective in confluence with pressure from other actors such as the US trade representative.¹²⁷ Moreover, even in instances where governments enact legislative changes to better comply with ILO conventions, these are often not shown to transform into practice.¹²⁸ Second, the ILO review mechanisms lack the

¹¹⁶ (International Labour Standards Department 2019)

¹¹⁷ (Koliev and Lebovic 2018; Weisband 2000)

¹¹⁸ (Douglas, Ferguson, and Klett 2004; Koliev and Lebovic 2018)

¹¹⁹ (Weisband 2000)

¹²⁰ (Douglas, Ferguson, and Klett 2004)

¹²¹ (Brudney 2017)

¹²² (Douglas, Ferguson, and Klett 2004; Koliev and Lebovic 2018; Maupain 2013)

¹²³ (Brudney 2017; Douglas, Ferguson, and Klett 2004)

¹²⁴ (Douglas, Ferguson, and Klett 2004)

¹²⁵ (Weisband 2000)

¹²⁶ (Brudney 2017; Weisband 2000; Wissikirchen 2005)

¹²⁷ (Douglas, Ferguson, and Klett 2004)

¹²⁸ (Brudney 2017)

necessary capacity to effectively monitor all state practices.¹²⁹ Similarly, states have lacked capacity both in terms of reporting requirements and in implementation.¹³⁰ Finally, the literature cites a number of specific issues with the practice of the CEACR and the CAS. For example, the success of the CEACR as an independent expert group providing transparent monitoring of state compliance led it to expand its own mandate and jurisprudence. This is shown to have diluted its core practices of reviewing state reports, but has also led stakeholders to question the CEACR's continued legitimacy.¹³¹

ILO		
General	Positives	Negatives
<ul style="list-style-type: none"> - Prototype review mechanism - Tripartite structure including NSAs 	<ul style="list-style-type: none"> - Inclusion of NSAs - Role as a source of information - Long-term review tradition socializes states 	<ul style="list-style-type: none"> - Ineffective without outside influence - Lack of implementation - Lack of capacity

¹²⁹ (Maupain 2013; Wissikirchen 2005)

¹³⁰ (Maupain 2013; Wissikirchen 2005)

¹³¹ (Maupain 2013; Wissikirchen 2005)

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Annex 3 – Protocol for Paper 1: The Paris Agreement and solving the “wicked problem” of climate change: a systematic map of the literature

Abstract

The Paris Agreement sets out to strengthen the global response to the threat of climate change, setting targets for mitigation, adaptation and finance, and establishing various mechanisms through which to achieve these targets. The effectiveness of these mechanisms in achieving the targets set out in Article 2.1 of the Paris Agreement, however, has been subject to debate. A diverse set of literature has developed over the past years researching the functionality of the Paris Agreement’s mechanisms and their effectiveness in achieving the agreement’s targets. Despite this growing research field, there have been few attempts at consolidation, with research remaining fragmented by epistemological and ontological divides, as well as practical challenges such as an exponential growth in the volume of literature. The purpose of this review is to fill this gap by systematically mapping the available evidence on the prospects for the Paris regime to be effective in achieving its various targets. This will serve as an entry point to 1.) identifying the effect and effectiveness of the Paris regime, 2.) identifying research gaps and, 3.) identifying synergies within the research and potential areas for consolidation.

Research Question:

What is the evidence on prospects for the Paris Agreement’s regime features to be effective in achieving its targets on mitigation, adaptation and finance?

Summary of the Work:

Introduction

- Research Questions:
 - The opening section will introduce the purpose of the study, and provide justification of its importance.
- Why systematic evidence synthesis?
 - This section will present the need for systematic evidence synthesis in light of the growing volume of literature and the need for comprehensive and transparent review methodologies.
- What else has been done?
 - This section will present an overview of previous reviews undertaken within the field and what is novel about the proposed systematic map.

Methods

- Literature Selection
 - A description of the search strategy by which articles were selected for the review, the inclusion and exclusion criteria by which they were selected, and a justification for the method of selection.

- Analysis
 - A description of the methods utilized for analyzing the selected articles and compiling the systematic map.

Results

The primary product of the analysis will be a spread sheet which categorises the research. Each row details a publication, each column a coded feature of this publication. We intend to code the publications according to the following categories:

- Meta-data (author, title, journal, year)
- Study aims
- Methodology
- Location (if case study)
- Topic (e.g. the Paris Agreement (PA) regime feature)
- Assessment of effectiveness (if any)
- Identified barriers to effectiveness
- Recommendations for measures to increase effectiveness

Using this information, we intend to provide two outputs:

The first part consists of a descriptive map of the literature based on its aims topics, methods and geography. This map will allow a characterization of the literature by the identified aspects of the PA, possibly providing an indication of research gaps. Moreover, combining this mapped information with scientometric citation data enables us to identify whether studies within our database cited each other. This allows for a better understanding of the linkages between the research communities and potential areas for consolidation.

The second part of the results consist of a more detailed, qualitative coding of the discussion on the effect and effectiveness of the PA. Depending on the scope of relevant literature we may focus on one or a few specific elements of the PA. We do not aim to integrate research results, but want to map the discussion on the Paris regimes effectiveness, showing which areas of the PA have been considered effective in which circumstances, and identifying the causal mechanisms for this effect. Finally, we aim to present recommended measures to enhance effectiveness, as detailed in the identified literature.

Analysis

- The final section of the review will provide a discussion of the results detailed above. This discussion will be structured as follows:
 - What does the research tell us about the effect and effectiveness of the PA?
 - Where are the research gaps?
 - What is the outlook for the future?
 - Promising areas of consolidation?
 - Lessons for politics and policy?

Motivation

The PA presents an important opportunity to coordinate and strengthen the global response to climate change. However, the “wicked problem” of climate change covers an immense array of social, economic and political factors. Assessing the effectiveness of the PA’s mechanisms therefore is an inherently interdisciplinary and complex undertaking.

Retaining an overview of this research remains imperative if we are to further our understanding of the conditions under which the PA can be effective. Although authors have already questioned the effectiveness of the PA, for example in light of its voluntary pledges enforced by “naming and shaming” (Crampton, Ockenfels and Tirole 2017), the Paris regime remains a work in progress. Ongoing negotiations on the Paris Rulebook and the subsequent operationalization of the many mechanisms the PA proposes to implement will be paramount in deciding whether or not the PA’s targets can be achieved (Bodansky, 2016). As such research on the PA must continue.

Through this systematic map we aim to identify and categorize the causal mechanisms leading to an effective (or non-effective) “Paris regime”, as proposed by the literature, providing an overview of the “solutions space” for international climate governance. We define effectiveness as the extent to which a studied mechanism contributes to achieving the targets set out in article 2.1 of the PA (UNFCCC, 2015). An overview of the literature on these mechanisms allows for the identification of gaps in the research as well as potential areas for consolidation. For example, we will map how this evidence is distributed amongst the various aspects of the Paris regime (eg. REDD+, GCF, etc.), identifying aspects of the Paris Regime that warrant further research. Combining this evidence with scientometric data provides a map of epistemic communities, and their relationship to one another. Hence we can show how various research communities approach the problem of implementing the Paris regime, and, through analysing citation data, how/whether these communities interact with each other. As such we aim to develop a better understanding of which approaches exist within which research communities, and potential synergies between these approaches. By collecting, categorising and collating the existing evidence we intend to inform the ongoing debate on the effectiveness of the Paris regime, providing impetus both for further research and the ongoing negotiations and thus hopefully aiding the development of a regime that is indeed effective.

Previous Reviews

In the past years a number of systematic reviews have been carried out within various research areas of the climate literature: for example, Berrang-Ford et al. (2011) focus on climate change adaptation research (also see Biesbroek et al., 2013). Further examples focus on urban transformations (Koch et al., 2017), renewable energy politics (Sequeria and Santos, 2018) and energy security (Azzuni and Breyer, 2018), as well as private finance for low-carbon investment (Polzin, 2017), policy innovations (Auld et al., 2014), and, climate change and violent conflict (Sakaguchi et al., 2017). Although it is encouraging that systematic review methodologies are beginning to gain in popularity within this body of literature, there remains ample space for improvement (for an overview of the use of systematic review methods within the adaptation literature see Berrang-Ford et al., 2015). Existing systematic reviews do not consider the evidence on achieving the PA’s targets specifically.

Review articles not explicitly using systematic review methods remain similarly limited in scope, for example focusing on; emissions trading (Page 2013, Hermwille et al. 2015), human rights (Okereke and Coventry 2016, Klinsky and Dowlatabadi 2009, Bell 2013), loss and damage (Roberts and Pelling

2018, Surminski and Lopez 2015), climate engineering (Horton and Reynolds 2016, Corry O 2017), local governance (Mah and Hills 2016, Broto 2017), Non-state actors: (Kuyper et al., 2018). The few reviews that do consider the climate regime more generally were published before the resolution of the PA in 2015, and can thus be considered out of date and do not analyse specific features of the PA (eg. Wang and Chen 2013, Zelli 2011, Michaelowa 2015).

Methods: Article Selection and Screening Criteria

Search Criteria

We focus on literature explicitly studying an element of the PA. We define an element of the PA to mean the mechanisms detailed within the PA text, by which the agreement intends to achieve its targets (for a preliminary list of PA elements see Table 1). Using a search query in both Web of Science and Scopus we source all relevant peer-reviewed literature. We will assess the relevance of further databases and grey literature as potential additional sources.

Table 1: Paris Agreement Regime Features¹³²
Nationally determined contribution (NDC)
Intended nationally determined contribution (INDC)
Internationally traded mitigation outcome
Global stocktake
Paris rulebook
Framework of non-market approaches to sustainable development
REDD+
Loss and damage
Clean development mechanism (CDM)
Green climate fund (GCF)
Global environment facility (GEF)
Adaptation fund
Enhanced transparency framework for action and support
Subsidiary body for scientific and technological advice (SBSTA)
Subsidiary body for implementation (SBI)
Paris committee on capacity building
Capacity-building initiative for transparency
Non-state actor zone for climate action
Climate technology centre and network
Talanoa Dialogue

The search string used to source our literature was developed iteratively, starting with a review of the text of the PA and its Decision. This review provided a primary list of key words which were used to create a Boolean search string. The results of this string were then cross-referenced with a list of

¹³² The elements presented in this table were identified through going through the PA as well as consulting expert opinion. As such they represent a preliminary list that may be subject to change given the iterative process of developing our search string.

benchmark articles that were compiled through expert consultation. Benchmark documents not included within the results of the search string were read and the search string expanded/adjusted to include relevant articles. We also reviewed citation data, considering articles that cited our benchmark body of literature, repeating the process of reviewing which of these articles were definitely relevant and not-included within our search string, and subsequently adding terms to the search query to account for these.

Given this process our preliminary search string is as follows:

(TS= ("paris agreement" OR "paris climate agreement" OR "paris climate accord" OR "paris accord" OR "paris treaty" OR "climate conference" OR "conference of the parties" OR "climate agreement" OR UNFCCC OR "united nations framework convention on climate change" OR "united nations convention on climate change" OR "framework convention on climate change" OR COP21 OR COP22 OR COP23 OR COP24 OR "pledge and review" OR "nationally determined contributions" OR "intended nationally determined contributions" OR "internationally transfer* mitigation outcome" OR "global stocktake" OR "paris rulebook" OR "framework of non-market approaches to sustainable development" OR REDD+ OR "loss and damage" OR "warsaw international mechanism" OR "clean development mechanism" OR "green climate fund" OR "global environment facility" OR "adaptation fund" OR "enhanced transparency framework for action and support" OR "subsidiary body for scientific and technological advice" OR "subsidiary body for implementation" OR "paris committee on capacity building" OR "capacity-building initiative for transparency" OR "non-state actor zone for climate action" OR "climate technology centre and network" OR "talanoa dialogue")) OR (TS= ((Climat* OR "climat* change" OR "global warming" OR "planetary warming" OR paris) AND (GCF OR GEF OR NDC OR INDC)))*

This entails over 6,000 results using the Web of Science platform. However, we limit our search by year from 2016-2018 given that the PA was adopted late in 2015. This results in 2413 articles from the Web of Science platform with an estimated 1000 expected from Scopus. To further ensure comprehensiveness we will issue a call for evidence to all authors included within our final document database following screening for relevance at title and abstract level. Any resulting literature not already included within our database will be screened for relevance, and upon successful screening, will be added to the database.

Screening: Selection Criteria

In order to ensure the relevance of the literature we select we will screen all articles collected at both title and abstract level. We include all literature that consider the function of an element of the PA (as defined within our search strategy) for a specific context (ie. policy/region/actor-group etc.). We exclude any literature that does not explicitly reference an element of the PA or analyses a UNFCCC mechanism prior to the PA. We also exclude any literature on climate impacts. For an overview of these criteria see Table 1:

Inclusion Criteria	To Be Determined	Exclusions Criteria
Function of an element of the PA for a specific context (i.e. policy/technology/actor group)	Analyses of analogical mechanisms with explicit reference to PA (e.g. Trade)	Non-climate (e.g. biodiversity)
Discusses the functioning of a Paris feature for international climate governance		Studies considering policies/regions/actor-groups without function of PA (i.e. broad study of NETs without relation to the PA)
Impacts could relate to any level of governance (int, reg, nat, sub-nat), actor group, technology		Climate Impacts under warming scenarios
Analyses of the COP negotiations (including Paris but not before)		Studies not explicitly referencing an aspect of Paris
Studies considering the function of a PA mechanism (i.e. REDD+) for a case (e.g. country/region)		Studies analyzing UNFCCC mechanism in place prior to PA, but without explicit relation (e.g. CDM, REDD, pre-Paris)
Studies considering the function of the PA temperature targets (i.e. role of NETs for achieving 1.5)		
Studies considering the function of a PA mechanism for national policies		

We will carry out a number of sample screens and testing the selection criteria, including a test with a researcher not involved within our project. Once we are satisfied with the cohesion of our responses we will split the screening duties amongst ourselves ensuring some overlap to further test for cohesiveness. Any papers where the relevance is unclear shall be considered at full-text level.

Expected Outcomes

We expect two primary outcomes from this review:

- 1.) First, we expect that the outcome of the map will present a strong topical, disciplinary and geographic skew both between and within the various elements assessed. Specifically, we expect to identify significant differences in the amount of literature on, and thus attention given to, the various regime features of the PA.
- 2.) Considering the evidence on the PA's effect and effectiveness we aim to present preliminary results on which areas of the PA have been considered effective in which circumstances, identifying causal mechanisms for effect and evaluations of these, as well as categorising proposals to increase the effectiveness of the discussed mechanisms.

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