CHAPTER 3
THE INTERNATIONAL CLIMATE REGIME AND FORGING THE PARIS AGREEMENT

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 as the international authority on climate science. Subsequently, the Rio Earth Summit in 1992 marked the inception of the international climate governance regime with the birth of its keystone institution, the United Nations Framework Convention on Climate Change (UNFCCC). Whilst the UNFCCC's guiding role persists, the regime (see Figure 3.1) has evolved and expanded to include complimentary bodies that channel information, provide political mandates and initiate implementation. The 2015 Paris Agreement harnessed decades of climate action and is widely recognised as a turning point in the regime's evolution[30].

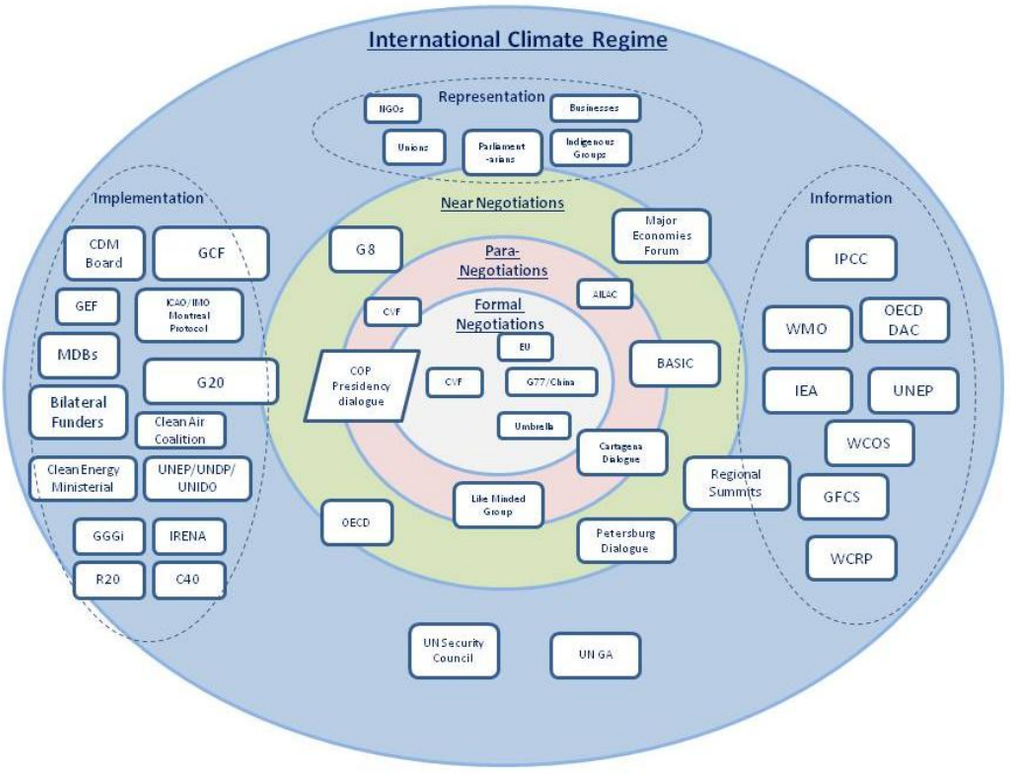
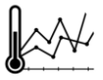


Figure 3.1: The International Climate Regime

[30] E3G (2015) **What Paris Means for Leaders**



The IPCC and other climate information institutions providing climate analysis, data and science

The dominant challenge posed to the climate science community is addressing the deficit in accessible data for decision-making. The coverage in collection of raw climate and weather data is improving and the IPCC and WMO continue to communicate long-term trends. However the following functions - required to equip decision makers - are insufficiently addressed: real-time advice on impending impacts; high-resolution data and advice on regional, national and local climate scenarios; a locus for determining research priorities; vehicles for the decision-making community to highlight needs.

Climate science, data and the flow of information inform the choices made by decision-making and implementation bodies which pursue climate action. A plethora of institutions service the international climate regimes to inform its operations.

The Intergovernmental Panel on Climate Change (IPCC)

The IPCC serves as the key authority on climate science for international and national decision-making. The IPCC does not conduct any of its own research but brings together scientists from across the world to review the latest science every 5-7 years to produce a consensus assessment.

Each IPCC assessment reflects the outputs and priorities of the national and international research institutions which it depends upon to provide the latest climate science. From its founding in 1988 the institution has moved from assessments which articulate basic science, to assessments which take a broader, deeper approach with far greater emphasis on the socio-economic implications of climate change. The latest iteration, the fifth assessment report[31], went even further and assessed the science of climate risk management choices – i.e. the relative value of mitigation and adaptation action.

The output of the IPCC provides an input to decision-making processes on climate. However the IPCC's potential to provide accessible guidance for decision-making is limited by the lack of exchange between the scientific and decision-making communities. Breaking with convention, in Paris the UNFCCC invited the IPCC to provide a special report on 1.5°C scenarios. The IPCC will choose whether to accept or decline this request in 2016. Traditionally requests from the UNFCCC have focused on

[31] IPCC (2014) **Fifth Assessment Report**

technical guidance (e.g. GHG accounting) however this precedent has potential to extend the IPCC's utility.

At present, the IPCC does not provide real-time advice on impending impacts; high-resolution data and advice on regional, national and local climate scenarios; or determine research priorities informed through its observation of gaps in research; or insufficiencies flagged by the decision-making community. As a result, research is lacking in some key areas required by decision-makers including: in sectors which require immediate priority action, the consequences of tipping points, developing country impacts and responses, and high-end risk scenarios.

Complimentary institutions

The capacity for data collection is varied and inconsistent across the world[32]. Developed countries have far greater capabilities for weather forecasting, whereas many who are more immediately affected - in poorer countries with vulnerable climates - are less able to gain understanding of their vulnerabilities. The **World Meteorological Organisation (WMO)** serves as a platform for data to coalesce, functioning as an authoritative voice on the 'state and behaviour of the world's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources'[33]. Like the IPCC, the WMO provides trend data and does not pass judgement on its implications. Their output supports the work of bodies which protect the environment but does not generate analysis, flag priority issues, provide direction or determine the utility of the data.

Two UN co-sponsored programmes, the **World Climate Research Programme** and the **Global Climate Observing System**, synthesise raw climate and weather data. A further programme - the **Global Framework for Climate Services** – goes even further, aiming to 'provide climate information in a way that assists decision making by individuals and organizations'[34]. Their work serves to make climate science fit for purpose, making data and research more applicable to decision-making. Beginning with four priority sectors (health, water, food security and Disaster Risk Reduction) their 2014 implementation plan aims to improve climate services worldwide within the next 10 years. A suite of UN agencies and member-state institutions have lent support but further resourcing is required to improve the probability of delivery[35].

Despite an uptick in availability of information to inform decision-making on climate, a disconnect with decision-making bodies persists. The bodies described above do not have a mandate to inform decision-making, only to create the appropriate data for

[32] Adelphi et al (2015) **A New Climate for Peace**

[33] WMO (2016) **Mission Statement**

[34]Global Framework for Climate Services (2016) **Mission Statement**

[35] The GFCS was initiated in 2009 and held its first session in 2013, work is ongoing

decision-making. And this has its limitations; ultimately data is used if an institution, country or other user can use it to achieve their objectives.

The most significant shifts in improving data to facilitate effective decision-making are beginning to surface from the bottom-up. For example, in the United States, efforts are underway to establish and in some cases strengthen collaboration between policymakers and the scientific and research communities in both the public and private sector. This was prompted in part by requests from the US Department of Defense and Navy Task Force Climate Change to ensure that decision-makers in government have access to the latest climate science, models and tools and has prompted a set of reforms in climate services and multi-agency initiatives[36]. Similarly, there were also a number of climate services initiatives launched to respond to vulnerable country demand in the run up to COP21 in Paris. The US-UK led 'Public-Private Partnership to Empower Climate-Resilient Developing Nations'[37] was created to make best use of advanced economy and private sector skill and data in a manner that corresponded with vulnerable country needs and so increased utility.

Generating a multilateral political mandate for data which aids decision-making can be challenging. The disconnection between climate science and policy-making can serve as a protection against making hard policy choices. For example, at COP20 in Lima parties significantly watered down an official review of the intended nationally determined contributions (iNDCs) in a bid to limit scrutiny on their national pledges. However, the need for this input to inform policy choices for the Paris Agreement did not disappear. Think-tanks and non-government actor were leaned upon to generate the data[38] . These bodies were able to fulfil some of this function but it should not go unrecognised that the absence of a multilateral mandate and government resourcing limited its political relevance. Non-government institutions can struggle to obtain funding; often have less political credibility and authority; are subject to restrictions in some jurisdictions; and can have inferior access to data.

UNFCCC data generation

The 5 yearly stocktake of climate action and Monitoring Reporting and Verification (MRV) regime established under the Paris agreement signals greater demand and a strengthened political mandate for transparency and clarity of data. If countries are better equipped to track their progress they can better assess their needs and choices with regards to ambition, resilience, policy and resourcing.

The stocktake will also respond to the demand for guidance in adaptation planning by defining the current and globally projected temperature trajectory. These global

[36] DoD (2012) T**he department of defense and climate change: initiating the dialogue**;NOAA (2014) **NOAA launches research on next generation of high performance weather, climate models**;

[37] White House (2015) **Fact Sheet: Launching a Public-Private Partnership to Empower Climate-Resilient Developing Nations**

[38] The UNEP gap report and US led State of the Climate Report provides some analysis on mitigation action and impacts science. However neither have the mandate to consistently inform decision-making.

trends will give parameters to inform decision-making but they have limitations. A global average cannot reveal all regional and local climate realities. For example, IPCC AR5 shows us that a global average rise of 4°C actually produces an increase in warming of 6-8°C in parts of Africa[39]. Further complementary inputs will be required to provide greater guidance for regional and local climate decision-making.

The United Nations Framework Convention on Climate Change and the Paris Agreement

The UNFCCC is the core decision-making body for addressing global climate change. The international climate regime has come a long way since its inception but is far from achieving global climate protection. Historically the regime predominantly focused on mitigating against climate change however the Paris Agreement marks a rebalancing of the climate regime to better address the full spectrum of climate impacts.

At the founding of the UNFCCC in 1992, climate change was regarded as a future challenge and the institution therefore was biased towards delivering mitigation in order to reduce or eliminate the challenge before impacts posed a major threat[40]. As climate impacts have proliferated, planning for adaptation and more recently loss and damage, gained greater prominence in the UNFCCC but mitigation has persisted as the dominant priority.

The UNFCCC provides a platform for its 196 parties to negotiate a collective response to climate change (see figure 3.2 for a compressed history). In Paris at COP21 the advanced submission of Intended Nationally Determined Contributions (iNDCs) enabled parties to communicate commitments which reflected their national interest whilst pursuing multilateral solutions.

[39] IPCC (2014) **Fifth Assessment Report**

[40] The ultimate objective of the Convention is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system." It states that "such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner." As such, the founding objective of the convention was to drive mitigation action and avoid dangerous climate change before it posed a systemic threat. **http://unfccc.int/essential_background/convention/items/6036.php**

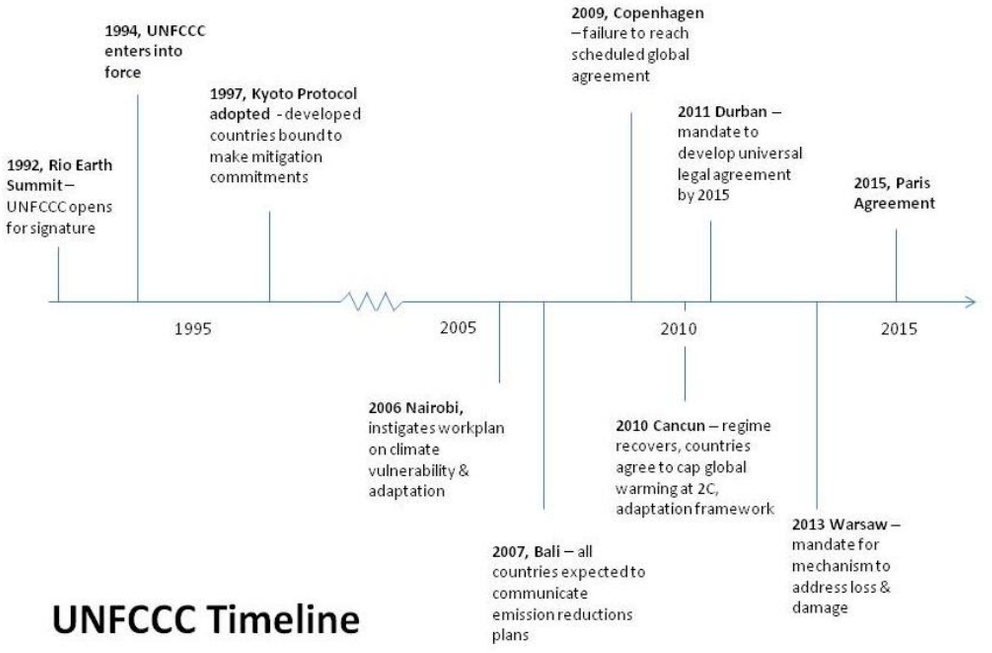


Figure 3.2: compressed history of the UNFCCC 1992-2015

Addressing the full spectrum of climate risk: the Paris Agreement

The Paris 2015 Agreement carries the UNFCCC into a new era with a renewed hope in multilateralism. The Agreement is universal, enduring, dynamic and iterative. The components are not exhaustive but provide an anchor to multilateral action which rebalances the regime across the full spectrum of climate risk management – A) mitigation, B) adaptation and C) contingency planning for loss and damage.
5 key components of the Paris Agreement:

1. **A stronger understanding of manageable global climate risk:** the Paris agreement strengthened the global limit on warming from of 2°C to 'well below 2 °C...and to pursue efforts to limit the temperature increase to 1.5°C'[41]. The political attention given to establishing a more stringent limit served to refocus debate on the consequences of climate impacts. The 5 yearly stocktake will maintain a regular assessment of the aggregate level of global action and include climate science inputs from the IPCC. In turn this stocktake will inform a debate about commensurate national and international climate action on mitigation, adaptation and loss & damage.
2. **An ambition mechanism to achieve net zero emissions:** the Paris Agreement formally acknowledges the inevitability that net zero emissions will need to be

[41] UNFCCC (2015) **Adoption of the Paris Agreement**

reached in the second half of the century to limit warming well below 2°C. To reach this end, the Agreement established an ambition mechanism where countries take stock, revisit and submit additional efforts every 5 years. In tandem all countries are expected to achieve resilience to climate impacts**.** The long-term, universal and iterative process allows parties to update their level of effort in line with evolving lived, scientific, political and technological realties.

3. **Contingency planning for the worst climate impacts:** The tools for managing climate risks expanded to incorporate contingency planning for the worst climate impacts, known in the UNFCCC as loss & damage. These tools will help countries understand their full spectrum of exposure to climate risks and should inform corresponding management strategies to deal with climate change.
4. **Sustained support for the most vulnerable:** Developing countries, with particular reference to the Least Developed Countries (LDCs) and Small Island Developing States (SIDS), will receive increasing support to manage climate risk and cope with climate impacts. Steps were also taken to trigger the process of making all financial flows climate consistent, including a request to UN institutions to climate proof development assistance.
5. **A form of empowering multilateralism:** The Paris Agreement was achieved by actors from across the political and professional spectrum, far beyond traditional nation-state to nation-state multilateralism. Actors including cities, multilateral institutions, frontline communities, business and NGOs each played a role in forging the agreement (see BOX 2). The diversity of its consensus awards confidence in implementation beyond the limits of policy-certainty and government leadership.

BOX 2: The Lima-Paris Action Agenda (LPAA)

The Lima-Paris Action Agenda facilitated the submission of **11,619** informal commitments to the UNFCCC, many of which came from non-state actors. This effort enabled actors to pledge commitments in a shared collaborative effort to make their efforts greater than the sum of their parts. This dynamic is recognised as a key element of diplomatic efforts in the run-up to Paris (**Chatham House**, 2016). To maintain multilateral climate consensus and collaboration will require sustained investment into this form of effort.

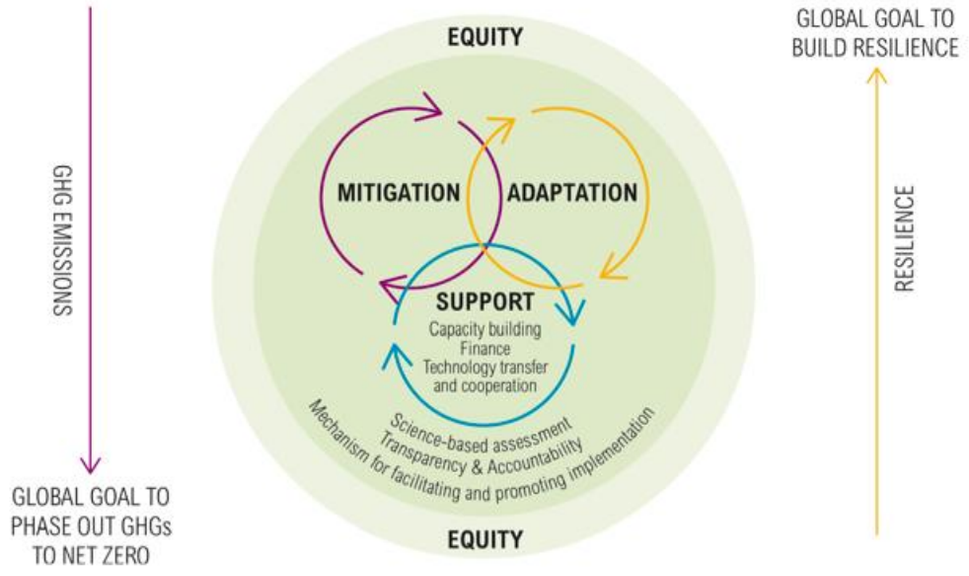


Figure 3.3 Core Components of the 2015 Paris Agreement. **Source:** ACT 2015, 2015

The rebalancing of the regime – to manage impacts as well as avoid them – is especially significant given that the first round of nationally determined mitigation contributions to the Paris Agreement in themselves fall short in limiting warming well below 2°C[42]. However, it is important to recognise that adaptation and loss & damage policy and practice is much less developed than mitigation. Adaptation policy has provided thin and incremental guidance for building resilience at the national and local level but has not taken a systemic or transformational economy-wide approach[43]. Adaptation outcomes have historically been pursued by more vulnerable countries and the global, collective value of adaptation action has been inconsistently recognised[44]. The progress made on loss and damage is impressive given the infancy of the policy area (first operationalised in 2013[45]) but remains underdeveloped to address the scale of the challenge. To cope with the level of current, locked-in and impending impacts countries, cities, investors, businesses and institutions will need to test and refine new innovative approaches to protect themselves from the changing climate.

[42] UNFCCC (2015) **Synthesis report on the aggregate effect of the intended nationally determined contributions**

[43] World Resources Institute (2014) **What is the Role for Transformation in Adaptation?**

[44] IDDRI (2015) **National Adaptation is Also a Global Concern**

[45] UNFCCC (2013) **Warsaw Decision on Loss and Damage**

Climate Decision-Making in International Political Fora

There is a fragmented process across major international fora to discuss climate change. Discussions are predominantly prompted by significant moments in the UNFCCC calendar rather than in response to the experience or increased awareness of the scale of climate risks. Accountability in these fora is inconsistent and has posed challenges to implementation.

Climate diplomacy has evolved in its scope and complexity far beyond the UNFCCC. A range of multilateral decision-making bodies have discussed climate change and instigated climate action.

Climate change has been on the agenda of both the **G20 and G7** and have endorsed the obligation to limit warming below 2°C prior to Paris[46]. The G20 has agreed to phase out fossil fuel subsidies, and promoted action on green growth and low carbon finance. In 2015 the G7 refined its endorsement of the 2°C obligation by articulating their commitment to decarbonising the global economy in the second half of the century[47]. Beyond mitigation these bodies have also begun exploring more comprehensive measures to manage climate risks. The Financial Stability Board under the G20 is investigating the risks to investments from climate related actions. And the 2015 meeting of G7 leaders agreed to insure up to 400 million more vulnerable people against climate extremes. In addition, the G7 foreign ministers meeting endorsed a report entitled 'A New climate for Peace'[48] outlining reform processes to tackle climate-fragility risks. The outcomes created by both fora have been productive in sending political signals of intent but processes for implementation are inconsistent. For example, whilst the fossil fuel subsidy phase-out agreement was reached in 2009 there is still no roadmap for delivery.

Other bodies dedicated to building consensus and ambition of country positions under UNFCCC have also emerged. The **Major Economies Forum** (MEF) and **Petersberg dialogue** provide complementary discussion spaces for major negotiating groups to advance their positions. The MEF has taken an additional diplomatic step by founding initiatives and joint ventures but they have predominantly focused on mitigation efforts to improve negotiating politics in the UNFCCC. Deeper discussions on the implications of climate risk on countries and economies have been largely absent from these fora.

[46] G7 (2015) **Leaders Declaration G7 Summit**, G20 (2015) **G20 Leaders Communiqué agreed in Antalya**

[47] Ibid

[48] Adelphi et al (2015) **A New Climate for Peace**

The **UN Security Council** has hosted a number of debates considering the implications of climate change on security. These debates have succeeded in recording evidence of country experience but have not been without challenge. The debates included participation from China and other major developing countries but there have been tensions over hosting this debate in a membership-limited forum. Members and others have also cautioned against 'securitising' the debate, voicing concerns that fundamental human security threats will be crowded out in this forum[49].

The **UN General Assembly** (UNGA) has also provided a space for governments to form their positions on climate. The adoption of the **Sustainable Development Goals** (SDGs) in 2015 marks a significant shift in the global approach to managing climate risk (see Box 3). Emerging from the Rio +20 process, these goals succeed the Millennium Development Goals (MDGs) to respond to a new normal of climate instability and resource constraint. The UNGA also provides a platform for the UN Secretary General to foster climate leadership. For example, in September 2014 Ban Ki Moon hosted his 'Climate Summit' to kick-start the run up to COP21 in Paris. As a consensus body, the role and success of the UNGA as a fora to further climate action is driven by leadership from the UN Secretary General and/or coalitions of countries. The UNFCCC timetable has consistently provided the strongest steer for the timing of UNGA climate interventions.

BOX 3: How do the Sustainable Development Goals address climate risk?

The debate surrounding the SDGs was always rooted in the reality that you could not achieve sustainable development without tackling climate change. Goal 13 is specifically dedicated to 'Climate Action' and includes a target to 'integrate climate change measures into national policies, strategies and planning'. In addition there specific components across the goals that further climate action, these include:

	Goal	Summary
Mitigation	Energy, Growth, Cities, Consumption & Production	Mandate for providing sustainable energy access for all, decoupling growth from environmental degradation
Adaptation	Poverty, Hunger, Cities, Infrastructure, Inequality, Land	Predominantly focused on triggering a swift surge in preparations for escalating impact and frequency of extreme weather events
Awareness	Hunger, Health, Consumption & production, Oceans	Increased in early warning measures and mandate to improve understanding of systemic climate impacts
Transparency	Peace, Partnerships	Principles concerning access to data, information and support will help to achieve climate outcomes

Climate Governance across the UN System

UN institutions have played an essential role in mobilising climate action but have made less progress in reducing exposure to climate risks in its own operations. However, the 2015 mandate awarded by the Sendai framework for disaster risk reduction, the Sustainable Development Goals and the Paris Agreement demonstrates a maturation of the UN system's approach to adapting to climate impacts.

Complementary political fora have helped to bolster and strengthen the international climate regime. These fora have provided opportunities to build political will, test innovative approaches and improve consistency of alignment across international priorities.

ECOSOC was founded under the 1946 UN charter as 'the principal body for coordination, policy review, policy dialogue and recommendations on economic, social and environmental issues, as well as for implementation of the internationally agreed development goals'. Despite a number of reform processes[50], ECOSOC has consistently struggled with inadequate resources to deliver its extensive mandate. It is currently undergoing review in order to incorporate the **Sustainable Development Goals** (SDG's) mandate to the **High Level Political Forum** (under the auspicious of ECOSOC) to follow-up and review the **2030 agenda**. To bridge the gap whilst ECOSOC has under-delivered, a number of supplementary organisations and initiatives have emerged.

The UN system's activities are coordinated through the **'Working Group on Climate Change'** which comes under the high-level committee on programmes[51]. The group is chaired by the **WMO** and meets approximately every 6 weeks to exchange information on the UN's climate activities. The list of participant UN institutions in this group is extensive but its mandate is predominantly focused on information sharing and alignment. It has generated some inter-agency collaboration and the creation of discrete projects (e.g. UN REDD, Climate Smart Agriculture) but does not have a mandate to generate reform within UN institutions in order to manage climate risks.

Across the UN system a number of tools and mechanisms are deployed to help prompt climate action. Treaties and frameworks are one such tool. Emissions reductions in shipping[52] and aviation[53] are discussed under respective UN policy

[50] Global Policy Forum (2016) **Reform of the ECOSOC and The Social Economic Policy Processes at the UN**

[51] **High Level Committee on Programmes, chaired by UNEP**

[52] **International Maritime Organisation, IMO**

[53] **International Civil Aviation Organisation, ICAO**

frameworks. Governments act as the main conduit between the objectives laid out in the UNFCCC and their translation in each UN body or treaty but consistency in negotiating positions is far from guaranteed. The UNFCCC has limited formal capacity to align these treaties and mandate that they accelerate climate action. However, given the political significance of the Paris Agreement many actors are demonstrating renewed hope in integration across the UN system[54].

In some areas the implications of climate and carbon risks are being felt more immediately and in turn are being more comprehensively responded to. **UN-Energy** facilitates inter-agency coordination to promote coherence in energy projects. Here there is progress in shifting investment from high to low carbon energy but low carbon energy is not yet guaranteed as a de-facto choice for UN investment. Low carbon energy is becoming more of a reality than aspiration however the UN's transition is not exempt from the economic, social and political challenges experienced across the world.

Climate impacts have begun impinging on the operations of programmes concerned with cities, food security and disaster risk reduction. To take one example, the **World Food Programme** states that almost half of their emergency and recovery operations totalling US$23billion on helping food insecure people recover from climate-related disasters[55]. Programmes like these have been forced to reform their operations to continue delivering on their objectives. This progress was captured in the adoption of the cities and food security **Sustainable Development Goals** (SDGs) which take a more advanced approach to integrating climate resilience in to their activities. Similarly, the **Sendai framework** took steps to incorporate current climate risks into Disaster Risk Reduction (DRR). However, in most cases these reform efforts largely respond to current levels of climate impacts and do not prepare for forecast rises in temperature trajectories. The Sendai framework is set to last for the next 15 years but only captures guidance for DRR on the basis of disasters in the context of marginal climate change and is not set up to absorb the dynamic reality of evolving climate risks. Both the SDG's and DRR outcomes mark progress in adapting to climate impacts in the UN system but do not protect against the full spectrum of future climate risks.

There are also a number of pilot projects and initiatives in the areas of health, migration, technology and the private sector. Institutions that cover these briefs have begun developing pilot projects but the approach is not yet integrated into their broader work. For example, health related agencies are collaborating through the Global Framework for Climate Services to anticipate outbreaks of malaria, cholera and other diseases affected by a changing climate in Malawi and Tanzania[56]. This project shows promise but is limited in its geographic reach and only has the mandate to develop understanding of the risks which alone will not guarantee the delivery of

[54] European Commission (2016) **Commission welcomes landmark deal on CO2 standards for aircrafts**

[55] World Food Programme (2015) **Climate Change Adaptation**

[56] Global Framework for Climate Services (2015) **Projects Map**

reforms needed to manage these risks. Similarly UN migration agencies are only just beginning to understand the climate change implications on their operations; they have yet to take proactive reforms to protect themselves from climate risks[57]. Technology[58] and private sector projects have gone beyond research to enable the implementation of climate action but these capture isolated best practice rather than fundamental shifts in the sectors operational behaviour.

The Bretton Woods institutions, the **World Bank and International Monetary Fund** (IMF), play a significant role in delivering upon UN objectives. Neither have had a consistently strong reputation in delivering sustainable development and tended toward a two track, high and low carbon approach. More recently both institutions have begun to better recognise climate risks. Christine Lagarde managing director of the IMF recently commented that climate change was 'one of the great existential questions of our age' and is exploring reform options inside the institution[59]. The World Bank created the position of Vice President and special envoy for climate change in early 2014 to carry the institution into a new era which avoided the 'ultimate curve ball' for delivering development[60]. These advances reinforce the low carbon resilient direction of travel and will shape the real economy to aid the implementation of the SDGs and the Paris Agreement.

The **UN Secretary General** (UNSG) also has their own role to play and has permission to elevate security concerns like climate change to the UNSC. The guidelines of their role are informed by member-state priorities but they are awarded certain freedoms to intervene if the values and moral authority of the UN are challenged. Current UNSG Ban Ki-moon has consistently put sustainable development at the top of his priority list during his term. Ban has played an active role in the discussions on the SDGs and Paris 2015 agreement and launched of a number of initiatives (see box 4 for one example). The next UNSG will take office in 2017, their positioning on climate and sustainable development will undoubtedly effect the implementation of 2015's climate outcomes.

[57] UNCHR (2015) **The Storm Ahead**

[58] UN-OHRLLS (2015) **Least Developed Countries Move Toward Greater Access to Science, Technology and Innovation**

[59] IMF (2015) **Policymakers Face Historic Opportunity to Fight Climate Change**

[60] FT (2014) **World Bank Climate Change Envoy Rachel Kyte on Her New Mission**

BOX 4: A2R – Anticipate, Absorb, Reshape

At COP21 in Paris Ban Ki Moon launched his contribution to the rebalancing of the international climate regime. The 'A2R' initiative seeks to extend existing action on early warning systems, climate insurance and other adaptation projects, whilst sowing the seeds of a bigger reform agenda – 'reshape'. This initiative was welcomed by state, non-state actors as well as UN institutions. In 2016 FAO, UNEP and the UN SG's climate office will form the secretariat of this initiative. The appointment of the next Secretary General, to take office in 2017 could constrain or expand the potential of the initiative.

In summary, despite fragmented attempts, the scale and speed of climate action across the UN system is insufficient to respond to the scale of the threat. The UN is not comprehensively assessing or managing its exposure to climate risk. The distorted understanding of UN exposure is limiting demand for climate action and not addressing the full spectrum of climate risks.

If this is not addressed then the UN's ability to deliver on its mission of maintaining international peace, rights and security is under threat. The 2015 mandate provides a lever for UN reform to make all UN operations climate compatible. To embrace reform the UN system will have to consider where the responsibility lies to manage climate risk and stress-test its operations against future climate scenarios.