

Equity in Long-Term Mitigation

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Despite the passage of more than 20 years since the United Nations Framework Convention on Climate Change (UNFCCC) came into existence in 1992, the adequacy of climate action in terms of both mitigation and adaptation remains a matter of profound concern across most sections of global public opinion.

The complex, if not tortuous, path that global climate negotiations have taken to arrive even at the Paris Agreement in 2015 is testimony to the considerable difficulties that attend the process of coordinated action at the global scale to deal with the various dimensions of climate action. It is well known that there are significant fault lines between different nations or groups of nations on contentious issues at the global negotiations. While the broad divide between developed and developing nations continues to exist, numerous other fault lines have appeared between nations that have begun, in part, to overshadow this older division. There are a number of issues which characterize these fault lines, but it is equity in long-term mitigation action, an issue that goes back to the origins of the global climate discourse, that will be the subject of this chapter. While this issue was originally framed almost wholly within the developed versus

developing framework, it has, perhaps unsurprisingly, continued to be one of the key contentious issues.

What do we mean by equity? For the purposes of this chapter, we shall take a pragmatic view of the concept and treat it as equivalent to the term fairness and consider it to be the equivalent in environmental governance of what is implied by the term justice in a more philosophical language (Schroeder and Pisupati 2010). This is, of course, somewhat of an oversimplification and there are subtle differences between the concepts of justice, fairness, and equity, which we shall not have cause to pursue in detail in the rest of the chapter (see Konow 2003, for a more detailed discussion). More relevant to our discussion is the fact that equity can encompass a range of ideas, drawn from a number of varying approaches to the concept. Equity may relate to equity of outcomes of a particular policy or a governance regime. Equity of processes by which a policy or a regime is arrived at is another consideration. Equity may involve redistributive justice to correct historical wrongs suffered by communities, groups, societies, or countries. It is also important to note that equity may refer to fairness between individuals, between communities or groups, or nations. Equity may also refer simply to fairness between individuals without reference to their location in communities or nations. In some perspectives, markets are inherently dis-equalizing, and hence equity requires that the unregulated functioning of markets should not be permitted. All these varying notions of equity, which by no means exhaust the entire range of possible meanings attached to equity, in fact do make their appearance in some fashion in the global climate discourse.

Equity and the Global Climate Regime

Within the narrower scope of climate action in the framework of the UNFCCC, considerations of equity in climate change typically begin from the interpretation of Article 3.1 of the UNFCCC that states: ‘The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities’ (UNFCCC 1992). Article 3.1, in fact, follows immediately on Article 2 that states the ‘ultimate objective’

of the Convention, namely, the ‘stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system’ (UNFCCC 1992). Since the primary means of protecting the climate system for present and future generations is through the drastic slowing down and eventual cessation of greenhouse gas (GHG) emissions of anthropogenic origin, considerations of equity in climate change have typically focused on mitigation and the manner in which different nations are to share the global responsibility enjoined in Article 2. Alongside equity, Article 3.1 also states clearly the principle of ‘common but differentiated responsibilities and respective capabilities’ (CBDR&RC) in protecting the climate system, and one of the key issues in considerations of equity in relation to climate change is the relationship between equity and the CBDR&RC principle.

The import of the last sentence in the statement of Article 3.1 that ‘developed country Parties should take the lead in combating climate change and the adverse effects thereof’ is clearly the recognition that global inequalities between nations demand that greater responsibility lies with the developed countries. Though sometimes not recognized as such, it is evident that this statement is an equity principle, and one that was the first to be articulated in practice as we shall discuss shortly. The demand for greater climate action from the developed countries is discussed further in Articles 4.3 and 4.5, which detail the commitments of the developed countries listed in Annex II to assist the developing countries in climate action, including the provision of finance for climate action and technology transfer. Article 4.8 further recognizes the specialized needs of some nations due to the response measures to combat global warming.

The UNFCCC itself clearly recognizes that equity in climate change cannot be limited to mitigation alone. Equity concerns are associated with adaptation as well. Many countries and communities that are poor are recognized as being particularly vulnerable to climate change (Smit and Pilifosova 2003; Smith et al. 2009). Equity issues arise in other aspects of adaptation, including adaptation finance (Ayers and Huq 2009; Denton 2010). Article 4.4 as well as Article 4.8, just referred to, specifically recognize the adaptation needs of vulnerable countries, with the latter outlining the vulnerable settings in some detail, while the equity aspect of adaptation is

specifically recognized in Article 4.4 through the responsibility of the developed countries to assist the developing ones in adaptation. To sum up, it is clear that the very need for global action in a very unequal world would immediately raise the issue of equity.

The crux of the problem of equity post the ratification of the UNFCCC was therefore not quite the recognition of the need for equity in climate action, but the manner in which this need was to be articulated in detail and operationalized, especially with regard to long-term mitigation goals. While the Convention is seemingly a stirring document for unity of action, the operationalizing of equity brings to the fore immediately all the ambiguities that are present in the language of the Convention. This is a more general problem with equity in other contexts too, that operationalization is not easy even if the broad principles are clear. As Konow (2000: 1073) notes: ‘Agreement on principles of fairness, however, does not rule out substantial disparity in claims based on those principles. In addition, the difficulty, perhaps even impossibility, of simple solutions to injustice does not preclude the existence of simple principles of justice.’

Even prior to specific means of implementing fairness in practice, one of the first fault lines that immediately emerges in the context of operationalizing equity is the tension in Article 3.1 between the term ‘on the basis of equity’ and the CBDR&RC principle that immediately follows it. Given the specificity of the latter, and the construction of the sentence, to many commentators it has seemed that the latter is simply the explication of the former, and therefore specifying the means to operationalize equity (Metz 2000; Ringius, Torvanger, and Underdal 2002). To others though, it has equally seemed that since the CBDR&RC is capable of being operationalized in a very large number of ways, equity should be the basis of selecting from among all approaches that satisfy the former. Thus, ‘on the basis of equity’ states an independent principle apart from CBDR&RC (Cazorla and Toman 2001; Pan, Teng, and Wang 2014). Over time, various approaches to equity have been suggested that cover the entire range of possibilities, from operationalizing equity in a way that automatically ensures CBDR&RC to the other, where the latter is seen as explicating the former and so effectively only the latter is taken implemented.

The first attempt at operationalizing equity was in the formulation of the Kyoto Protocol (KP), where the key equity principle was simply the differentiation between developed and developing country parties (UNFCCC 1997). Notwithstanding the enthusiasm for the KP in many developing countries for several years until the Paris Agreement, it was clear that the KP was seriously deficient in important ways. One was that the broad differentiation of Annex I and non-Annex I parties adopted in the KP clubbed many large emerging economies alongside the least developed countries in the non-Annex I category, and was unlikely to work in the long term. Furthermore, the non-Annex I parties were not required to take any action (except emissions reduction through carbon trading), while the Annex I parties had fixed targets, which soon became clear was untenable. Efforts to find more nuanced ways of differentiation of countries and regions were almost immediately undertaken, and although the Annex I versus non-Annex I classification continued to hold in the formal negotiations, different axes of classification had already started emerging in the literature. While the impact of these discussions was seen in the formal negotiations, with developing countries agreeing to undertake voluntary mitigation action in Bali, at the 15th Conference of the Parties (COP 15) in Copenhagen, the first signs of the breakdown of the KP and the emergence of a new mitigation regime became evident. The second and more important problem was that climate science was making it increasingly definite that the KP in its existing form would be highly inadequate, given the quantum of emissions reductions required to limit temperature rise, especially for long-term mitigation. In any case, the KP did not even have a long-term mitigation goal.

Since then, the focus of the equity debate in the climate discourse has decisively shifted to the problem of how the global long-term mitigation goal was to be broken down to the long-term mitigation goals of individual nations. This will be the subject of the rest of this chapter, even though, as we have already noted, this by no means exhausts the question of equity in climate action.

Operationalizing Equity in Long-Term Mitigation Goals

The many different approaches to operationalizing equity can be broadly classified by two criteria: (i) what is to be divided in terms

of the framing of the global mitigation target; and (ii) how is it to be divided in terms of the mitigation responsibility for different regions or countries.

The Global Mitigation Target—What Is to Be Divided?

Two broad categories of approaches to the definition of the global mitigation target can be identified as: the ‘resource-sharing approach’ and the ‘effort-sharing approach’ (Baer, Athanasiou, and Kartha 2007). The resource-sharing approach basically argues that the atmosphere is a sink for GHG (dominantly carbon, of course) emissions, and that this constitutes an economic resource, since it enabled in the past and enables in the present and future the use of fossil fuel-based technologies that are typically cheaper than non-fossil fuel-based ones in the transition to a carbon-free world. This argument has been further strengthened with the identification by climate science of a definite carbon budget for the world, determining the total capacity of the atmosphere as a carbon sink corresponding to a particular limit on temperature rise (Intergovernmental Panel on Climate Change [IPCC] 2013).¹ It is this carbon budget which is to be divided among regions and/or countries based on a variety of parameters. There is a choice to be made here: whether the carbon budget should refer to only the currently remaining capacity to absorb emissions (the past having been written off); or whether it should include the capacity to absorb emissions from the period of the beginning of the Industrial Revolution, when anthropogenic emissions became truly substantial.

The effort-sharing approach, on the other hand, estimates the total burden of mitigation as the difference between a baseline trajectory of emissions growth that would have taken place without mitigation and a stabilization trajectory of emissions, that is, an emissions trajectory that would ensure that temperature rise stays below a predetermined limit. Unlike the carbon space used in the first category of approaches, what is divided among countries and/or regions in these

¹ For an account of the scientific advance on the carbon budgets approach and its application to climate policy, see Kanitkar et al. (2013) and the references therein.

effort-sharing approaches is the mitigation burden, defined as the difference between these two trajectories—baseline and stabilization. Figure 6.1 provides an illustration of the basic difference between the two sets of approaches.

The area under the curve labelled ‘Global Stabilization Trajectory’ represents the global carbon space between 2016 and 2050. On the other hand, the area between the two curves labelled ‘Global Baseline Trajectory’ and ‘Global Stabilization Trajectory’ represents the global mitigation burden between 2016 and 2050. In the resource-sharing approaches, the global carbon space is divided among regions and countries, referring to the emissions that are allowed for each one in the future. In the effort-sharing approaches, the carbon space, indicated as the space between the two curves, is divided among regions and countries using different parameters, referring of course to the emissions reduction that each one has to undertake. In the resource-sharing approach, past emissions can be brought into the picture as an integral part of what is to be shared. On the other hand, in the effort-sharing approach, past emissions have to be included as an external selection parameter in determining what share of the burden is due to each country or region.

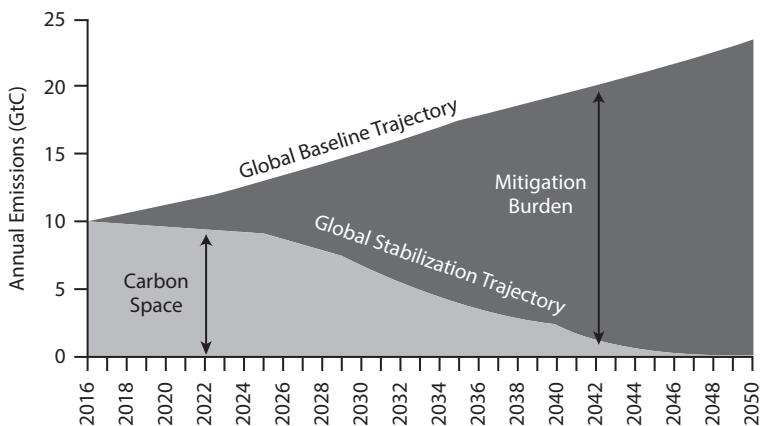


Figure 6.1 What Is to Be Divided?—Difference between Carbon Budgets (Resource Sharing) and Mitigation Burden (Effort Sharing)

Source: This figure has been created by the authors using dummy data purely for illustrative purposes.

Elementary as these sound, these two options represent the dominant approaches to equity in long-term mitigation targets. A number of developing countries as well as a wide range of global civil society and academic voices have indicated, in various ways, a preference for one or the other of these two approaches.

However, neither of these approaches to long-term mitigation goals have been popular among the developed countries. Instead, it is argued that the emission flows (typically estimated annually) from individual nations must all decrease and converge to a predetermined value by a certain period, with some leeway for developing countries perhaps to reach this value somewhat later in time (Meyer 1999). Here, the ‘equity’ principle is the equality of emission flows among the various parties, though this has been severely contested by proponents of the other two approaches. With the notion of the carbon budget having been established scientifically, this alternate approach has had to also determine the rate of decline of emissions and the value at which they would converge within the limits set by the carbon budget. This approach illustrates most sharply the tension over whether the CBDR&RC principle is tantamount to simply operationalizing equity, since it can be quite obviously argued that this approach fulfils the CBDR&RC principle, while obviously violating any commonsensical notion of equity.

Distributing the Mitigation Target—How Is the Target to Be Divided between Regions?

Once the global mitigation target is estimated, either in the form of carbon space or in the form of a mitigation burden, the next step is to divide this quantum of space or burden among different countries and/or regions. The difference between the starting points in the resource and burden-sharing schemes, discussed earlier, necessarily means that the range of parameters or indicators available for further distribution in both these approaches are different. In the resource-sharing or carbon space approach, it is the available resource that is being distributed. The simplest method available for the purpose of distribution of carbon space is a straightforward distribution based on a selected parameter, for example, distribution among countries on a per capita basis, that is, the share of each country’s population.

In the effort-sharing approach, it is the notional deviation from a baseline trajectory constructed for the future that is to be estimated and then distributed. A per capita division of the mitigation burden in this case will have to be applied differently, that is, with a reversed logic, since concerns of equity would dictate that a higher population should not translate to a higher share of the mitigation burden.

The per capita basis for distributing the mitigation target, however this may be defined, has been an enduring feature of equity proposals. At the level of parties in the negotiations, this has been most consistently argued by India. One notable feature of the per capita argument is, of course, that it takes into account both global equity and international equity in one single parameter. On the other hand, this has been contested by Annex I parties, and even by developing countries such as Brazil, who have argued for past cumulative emissions and their consequent contribution to temperature increase, without however allowing allocation to be made on a per capita basis. The other basis of differentiation that also forms part of many equity proposals from developing countries is past cumulative emissions. Developing countries have consistently argued that the very notion of differentiation in the UNFCCC is in some sense based on this 'historical responsibility'. However, developed countries have also been insistent that this principle is entirely inadmissible.

Some Specific Proposals to Operationalize Equity

A number of specific ways to operationalize equity have been proposed that fall within these broad classifications, using different definitions of mitigation targets as well as different parameters for their distribution among different countries or regions. Some of the more prominent and well-known ones are summarized in Table 6.1.

Next, we will examine briefly one proposal from each category to illustrate the difference in perspectives.

Convergence-Based Approaches: The Contraction and Convergence Approach

The Contraction and Convergence (C&C) approach—reducing emission flows from each country to an equal level over time—was indeed one of the earliest proposals, though the initial emphasis was

Table 6.1 Approaches to Mitigation: Overview of Some Typical Proposals

	Proposals/Approaches	Base Year	Parameters for Differentiation	Logic
Convergence-Based Approaches	C&C (Meyer 1999)	1990	Current per capita emission flows.	No historical responsibility, convergence of per capita emissions from current levels to levels of population shares in 2050.
	CDC (Höhne, den Elzen, and Weiss 2006)	1990	Historical per capita emission flows.	Convergence of per capita emissions from current levels to levels of population shares in 2050, with delayed action for developing countries taking into account historical responsibility.
Effort-Sharing Proposals	GDR Framework (Baer, Athanasiou, and Kartha 2007; Kartha and Dooley 2016)	1990	Per capita GDP, per capita emission flows, development threshold—level of per capita GDP below which emissions are exempt from mitigation.	Per capita GDP and per capita emissions flow-based index to determine share of global mitigation burden; baseline trajectory constructed for each country assuming no climate action.
	CERF (Holz, Kartha, and Athanasiou 2018)	1850–1990	Per capita GDP, per capita cumulative emissions, HDI, development threshold.	Per capita GDP and per capita cumulative emissions-based index to determine share of global mitigation burden; baseline trajectory constructed for each country assuming no climate action.

(cont'd)

Table 6.1 (cont'd)

Proposals/Approaches	Base Year	Parameters for Differentiation	Logic
Climate Action Tracker (2015)	1990	Adequacy decided based on multiple equity proposals sourced from other literature.	Tracks adequacy of country-wise pledges by assessing their adequacy in comparison with 'fair trajectory' based on burden-sharing criteria.
Resource-Sharing Proposals	WBGU (2009)	1990, 2010	Emission rates as per entitlements and trade.
	CASS (Jiahua and Ying 2009)	1850, 1970	Financial transfers for carbon debt.
	TISS-DSF (Jayaraman, Kanitkar, and D'Souza 2011; Kanitkar et al. 2010, 2013)	1850, 1900, 1970	Progressive allocation of carbon space based on past and present responsibility.

Notes: 1. The approaches are as follows—C&C: Contraction and Convergence; CDC: Contract and Differential Convergence; GDR: Greenhouse Development Rights; CERF: Climate Equity Reference Framework; WBGU: German Advisory Council on Climate Change; CASS: Chinese Academy of Social Science; TISS: Tata Institute of Social Sciences; and DSF: Delhi Science Forum.

2. GDP: gross domestic product; HDI: human development index.

Source: Prepared by the authors by classifying various papers based on the approaches they take.

on speeding up mitigation action, rather than any considerations of equity, on the argument that all countries must start reducing emissions right away. The equity principle was more explicitly recognized in the modified Contract and Differential Convergence (CDC), where differentiation is allowed more explicitly, even allowing developing countries to briefly increase emissions before emissions reduction begins. In both variants, the annual per capita emission flows of both developed and developing countries converge to a predetermined value by a target year. In Meyer (1999), this predetermined value is that of their population shares by a target year.

A particular version of the C&C approach relevant to India is the rather grandiosely labelled Manmohan Singh Convergence Principle that refers to the offer made by India's then prime minister in 2007 at the Heiligendamm G8 Summit that India's per capita annual emissions would never exceed the per capita annual emissions of developed countries (Ministry of External Affairs 2007). This has not, however, been pursued by India in practice subsequent to COP 15.

These sets of proposals focus exclusively on annual emission flows and do not consider cumulative emissions or emissions stocks in their calculations of mitigation targets for individual countries. These proposals are often thought of as uncomplicated, and therefore easy to implement as well as monitor. However, there are two fundamental drawbacks of such a flow-based formulation from the equity standpoint of most other proposals. The first is that they 'grandfather' past emissions and only consider future emission flows, in the process disproportionately penalizing developing countries. The second is that the exclusive focus on flows and the lack of acknowledgement of the implied cumulative emissions that each flow trajectory represents, violates principles of equity by allowing developed countries to capture more carbon space even in the future.

Effort-Sharing Proposals: The Climate Equity Reference Framework

The Climate Equity Reference Framework (CERF) is currently one of the popular approaches in the literature to achieve equity, especially in academia and civil society. It was advocated initially

as an approach that can potentially include both elements of the CBDR&RC principle, that is, responsibility and capability (Baer, Athanasiou, and Kartha 2007; Kartha and Dooley 2016). In the more recent versions (Holz, Kartha, and Athanasiou 2018), historical cumulative emissions have been included as one of the potential measures of responsibility. In this proposal, typically the CBDR&RC is seen as the operational guideline for equity.

In this typical effort-sharing approach, the baseline scenarios have been constructed using variants of integrated assessment models that produce projections of economic growth, energy use, and corresponding emissions using a large number of exogenous and endogenous variables. Several such models have been constructed and several scenarios have been investigated (see, for instance, Nakicenovic et al. 2000). In most of these models, the global scenario is built from bottom-up considerations based on the globe divided into several regions, with the regions being linked through trade and investments. The emissions trajectory which must be reached through mitigation action was earlier (in the period before the IPCC *Fifth Assessment Report* [AR5]) based on some stabilization trajectory chosen from a range of possible trajectories referenced in the IPCC. In the more recent literature, authors underline that their chosen ‘stabilization pathways’ are consistent with AR5 results. This means that the trajectory chosen, say, a ‘66% probability—2°C trajectory’, should be compatible with a corresponding value of cumulative emissions allowed between, say, 2016 and 2100. The difference between the baseline trajectory and the stabilization trajectory chosen is then the global mitigation burden.

Having defined the global burden, the next task is to distribute this burden among different countries and regions. This step varies widely across different proposals. Among these proposals, the one which does the most justice to the equity principle is the CERF. In this approach, equity is ensured by the process of assigning for every country a certain amount of emission rights automatically, in proportion to the number of people below the poverty line. The CBDR&RC is implemented through the provision of sharing the remainder of the shift (after the poverty-based emissions rights for all countries is implemented) from the business-as-usual to the target trajectory, by a formula that accounts for both the responsibility

aspect (based on cumulative emissions from a certain base year) and the aspect of capability (that is based on per capita gross domestic product [GDP]).

The CERF approach and some of its variants are often considered as advantageous for three reasons. First, it explicitly acknowledges both responsibility and capability indicators, thus including the full scope of the principle of CBDR&RC in its analysis. Second, while it uses cumulative historical emissions as an indicator of responsibility, the actual calculation of mitigation burdens is emissions flow based, which is claimed to make the approach amenable to a periodic review process to monitor and verify progress on mitigation. Third, it completely avoids any narrative of 'entitlements', except for the poverty factor, which may make it a politically easier option around which consensus may be built. The Climate Equity Reference Calculator (CERC)² provides a tool for interactive use based on various assumptions that can be used to demonstrate the application of the CERF.

We put forward criticisms of the approach in two categories. First, the mitigation burden that is calculated is primarily determined by the global stabilization trajectory chosen and the baseline trajectories constructed for each country/region. The chosen simulation is only one among many possible stabilization trajectories that obey the limit of total allowable cumulative emissions for the future. The baseline trajectory, on the other hand, is essentially a counterfactual; and especially for developing countries, with dynamically changing economic structures and policies, such baselines for the long term are fraught with uncertainty. Thus, the particular choices of trajectories have serious consequences for how the mitigation burden is distributed across parties.

The second problem with this approach is that the mitigation burden for each region, which is essentially a share of the global mitigation burden, is progressively calculated. This implies that any growth leading to substantial increase in per capita GDP for a country would lead to an increase in its share of the mitigation burden. In the perspective of the resource-sharing approach, this progressive estimation of the burden implies that with economic growth, the

² Available at <https://calculator.climateequityreference.org/>.

share of the carbon space allocated to a country would progressively decrease, and typically successful poverty alleviation would result in the penalty of a higher mitigation burden. Thus, the approach progressively undermines its own stated principle of historical responsibility, leading to potentially significant negative consequences for large emerging economies in particular.

Resource-Sharing Proposals: The Carbon Budget Approach

The carbon budget approach, though originally proposed very early on, has been considerably sharpened more recently. Going beyond the first significant versions of more recent times, with specific quantitative estimates, the approach has attracted attention from others, especially climate scientists, since cumulative emissions became the preferred mode (in the *Fifth Assessment Report* of the IPCC) of calculating the maximum allowed emissions for keeping global warming below a specified temperature increase (of course, keeping in mind the uncertainties involved). At the same time, the approach attracts much political pushback, including on one occasion from the Secretary-General of the UNFCCC whose rejection of the approach was based on the assumption that the approach would be politically infeasible to implement (Harvey 2013).

There is significant scientific literature now, providing a range of estimates for the allowed cumulative GHG emissions into the future and the quantum of the cumulative emissions that have occurred since the last quarter of the nineteenth century, according to the temperature increase target that is specified (IPCC 2013; Rogelj et al. 2016; Tokarska and Gillet 2018). The carbon budget approach to sharing the global mitigation target has been explicated in other publications by the authors of this chapter, and has also been discussed in other proposals in this category (Jiahua and Ying 2009; Kanitkar et al. 2010, 2013). In this approach, the distribution of cumulative emissions, whether taking account of the past or not, depends upon an upfront calculation based on entitlements. The basis for such entitlements is of course a matter of negotiation, and different proposals may use varying assumptions and parameters.

In some variants of the carbon budget approach, there is a straightforward entitlement to cumulative emissions for countries based on

the per capita principle (this requires a choice of base year for determining the population), from which it emerges that developed countries have far overdrawn their 'fair share' and owe the world a carbon debt, while developing countries face a deficit in the gap between the cumulative emissions possible and their 'fair share'. However, such proposals reach a dead end unless a possible way of dealing with the carbon debt is outlined. Recent discussions in the literature have echoed much older proposals suggesting that 'negative emissions', namely, sequestering carbon on a large scale from the atmosphere, is possible. However, such proposals are highly speculative at this point (see Kartha and Dooley 2016; Smith et al. 2016). Another possibility is to neglect the past cumulative emissions, but this certainly appears to be inequitable to many. A third alternative chooses a middle path in including past emissions in determining the entitlements to future cumulative emissions (Kanitkar et al. 2013). Other parameters may be included in determining responsibility and capability, including per capita GDP or non-income human development index (HDI). Such possibilities have been explored in Jayaraman, Kanitkar, and D'Souza (2011).

The advantage of the carbon budget approach is that it eliminates the uncertainties in determining both stabilization trajectories and baseline trajectories characteristic of the CERF in the effort-sharing category. Even more, it allows much flexibility in providing developing countries the flexibility to set their own trajectory of eventual emissions reductions based on their individual national circumstances. The other advantage is that the upfront estimation of an entitlement does not penalize developing countries as a result of future growth. The disadvantage of the approach, however, is that monitoring cumulative emissions may be more difficult as compared to monitoring annual emission flows, and monitoring adherence by countries to their declared cumulative emissions budget will be a little more complicated.

Equity and the Paris Agreement

In the climate negotiations after the raw differentiation of the KP came under considerable pressure, the developing countries have by and large failed to provide any detailed credible scheme to

operationalize equity in long-term mitigation goals. The reasons are not far to seek. Many smaller developing countries, especially outside the ranks of the emerging economies including India, neither have nor aspire to have large industrial bases and are far more concerned with adaptation and adaptation finance issues. This is particularly true of the small island states which have little sympathy with equity issues in long-term mitigation and consider it a distraction in achieving rapid emissions reductions for their safety. The sole exception to this failure has been the Brazilian proposal. However, with its rejection of the per capita principle or any weighting for economic and social vulnerability, it met with little support from either of the two sides.

Much of the equity discussion, from Bali to Copenhagen, was devoted to pushing back the inequity of the top-down emission reduction mechanisms put forward by the developed countries who demanded that all developing countries should declare their emissions reduction trajectory in advance for any viable programme for emissions reduction. However, as has been perceptively noted, many emerging economies, particularly India, tended to use equity 'as a shield rather than a sword' (see Rajamani 2013) and no specific scheme for operationalizing equity in long-term mitigation goals was ever put explicitly on the negotiating agenda.

In the event, COP 15 at Copenhagen initiated the process of turning back on the global allocation of mitigation goals. By the time the Paris Agreement was signed, there was ostensibly no trace left of it, and all countries merely had to pledge to adhere to their self-determined targets. The Paris Agreement also explicitly turned its back on historical responsibility. Nevertheless, even as this agreement was being negotiated, it was clear that in order to simply even assess the adequacy of the Intended Nationally Determined Contribution (INDC) of each country, it required some top-down global allocation mechanism. Following the Paris Agreement itself, in the Global Stocktake (GST), a five-year review of the Nationally Determined Contributions (NDCs) (what the INDCs became after the Agreement was signed) submitted by parties to the UNFCCC, the aggregate effect of the NDCs and their adequacy to meet the temperature targets is to be reviewed in the light of equity as specified in Article 14 of the Paris Agreement.

Equity as the basis for reviewing the adequacy of actions is, therefore, still relevant in the global negotiations.

Over the years since the UNFCCC was signed, China has moved further along the spectrum from emerging economy status to near-developed status. Its stance on equity has clearly undergone a shift from the earlier period—a shift made evident in a joint Obama–Xi Jinping declaration prior to the Paris conference stating that they were committed to implement climate action and encourage other parties to do the same, despite the fact that many aspects of equity and its operationalization were not clear at this point and continue to remain ambiguous even now.³ Given this statement and the stance it signals, China is unlikely to lead the charge on equity in the negotiations. If India is to claim its due share of carbon space and promote an equitable solution to the issue of the adequacy and enhancement of the NDCs, then it must begin to articulate its concerns more clearly at the current critical stage while the modalities of the implementation of the Paris Agreement are being worked out.

Perhaps the more serious issue with the Paris Agreement is that its goal of striving to keep the rise in global temperatures below 1.5°C is likely to be unattainable, since the carbon budget left to the world until the end of the century is likely to be exceeded fairly soon, and certainly by 2035–50, at current rates of emissions reduction (Jayaraman and Kanitkar 2016). The release of the IPCC special report signals this fact clearly, even though there appears to be some ambiguity in the manner in which the feasibility of restricting temperature rise to 1.5°C is discussed in the report (IPCC 2018). Given the nature of the NDCs, even the 2°C goal appears very difficult to attain. It is not unlikely, unless there is a serious and dramatic course correction, that at some point in time in the future, the globe will have to declare a climate emergency. It is in such a scenario that the challenge of equity in all aspects of climate action is likely to be unprecedentedly severe.

³ Available at <https://obamawhitehouse.archives.gov/the-press-office/2016/03/31/us-china-joint-presidential-statement-climate-change>; accessed on 30 May 2019.

References

- Ayers, Jessica M. and Saleemul Huq. 2009. 'Supporting Adaptation to Climate Change: What Role for Official Development Assistance?', *Development Policy Review*, 27(6): 675–92.
- Baer, Paul, Tom Athanasiou, and Sivan Kartha. 2007. *The Right to Development in a Climate Constrained World: The Greenhouse Development Rights Framework*. Berlin: Heinrich Boell Foundation, Christian Aid, EcoEquity, and Stockholm Environment Institute.
- Cazorla, Marina and Michael Toman. 2001. 'International Equity and Climate Change Policy', in Michael Toman (ed.), *Climate Change Economics and Policy: An RFF Anthology*, pp. 235–47. Washington, DC: RFF Press.
- Climate Action Tracker. 2015. 'Climate Pledges will Bring 2.7°C of Warming, Potential for More Action', available at <http://climateaction-tracker.org/news/253/Climate-pledges-will-bring-2.7C-of-warming-potential-for-more-action.html>; accessed on 1 November 2018.
- Denton, F. 2010. 'Financing Adaptation in Least Developed Countries in West Africa: Is Finance the "Real Deal"?', *Climate Policy*, 10(6): 655–71.
- German Advisory Council on Climate Change (WBGU). 2009. 'Solving the Climate Dilemma: The Budget Approach', in *Special Report of the German Advisory Council on Global Change (WBGU)*. Berlin: WBGU. Available at <https://www.wbgu.de/en/special-reports/sr-2009-budget-approach/>.
- Harvey, Fiona. 2013. 'IPCC's "Carbon Budget" Will Not Drive Warsaw Talks, Says Christiana Figueres', *The Guardian*, 24 October, available at <https://www.theguardian.com/environment/2013/oct/24/ipcc-carbon-budget-warsaw-climate-change-christiana-figueres>.
- Höhne, Niklas, Michel den Elzen, and Martin Weiss. 2006. 'Common but Differentiated Convergence (CDC): A New Conceptual Approach to Long-term Climate Policy', *Climate Policy*, 6(2): 181–99.
- Holz, Christian, Sivan Kartha, and Tom Athanasiou. 2018. 'Fairly Sharing 1.5: National Fair Shares of a 1.5 C-compliant Global Mitigation Effort', *International Environmental Agreements: Politics, Law and Economics*, 18(1): 117–34.
- Intergovernmental Panel on Climate Change (IPCC). 2013. 'The Physical Science Basis', in T.F. Stocker, D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds), *Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK, and New York, NY: Cambridge University Press.

- . 2018. *Global Warming of 1.5 Degrees C: An IPCC Special Report on the Impacts of Global Warming of 1.5 °C Above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*, available at http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf, accessed on 22 October 2018.
- Jayaraman, T., and T. Kanitkar. 2016. 'The Paris Agreement'. *Economic & Political Weekly*, 51(3).
- Jayaraman, T., Tejal Kanitkar, and Mario D'Souza. 2011. 'Equitable Access to Sustainable Development: An Indian Approach', *Equitable Access to Sustainable Development: Contribution to the Body of Scientific Knowledge*, pp. 59–77, available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.684.4372&rep=rep1&type=pdf>; accessed on 1 June 2019.
- Jiahua Pan and Ying Chen. 2009. 'The Carbon Budget Scheme: An Institutional Framework for a Fair and Sustainable World Climate Regime [J]', *Social Sciences in China*, 5(6): 83–98.
- Kanitkar, Tejal, T. Jayaraman, Mario D'Souza, Mukul Sanwal, Prabir Purkayastha, Rajbans Talwar, and D. Raghunandan. 2010. 'Meeting Equity in a Finite Carbon World,' in *Proceedings of Global Carbon Budgets and Burden Sharing in Mitigation Actions*. Ministry of Environment and Forests, Government of India.
- Kanitkar, Tejal, T. Jayaraman, Mario D'Souza, and Prabir Purkayastha. 2013. 'Carbon Budgets for Climate Change Mitigation—A GAMS-based Emissions Model', *Current Science*, 104(9): 1200–6.
- Kartha, Sivan and Kate Dooley. 2016. 'The Risks of Relying on Tomorrow's "Negative Emissions" to Guide Today's Mitigation Action', Working Paper 2019–8, Stockholm Environmental Institute, Somerville, August. Available at <http://www.jstor.org/stable/resrep02826>.
- Konow, James. 2000. 'Fair Shares: Accountability and Cognitive Dissonance in Allocation Decisions', *American Economic Review*, 90(4): 1072–91.
- . 2003. 'Which Is the Fairest One of All? A Positive Analysis of Justice Theories', *Journal of Economic Literature*, 41(4): 1188–239.
- Metz, Bert. 2000. 'International Equity in Climate Change Policy', *Integrated Assessment*, 1(2): 111–26.
- Meyer, Aubrey. 1999. 'The Kyoto Protocol and the Emergence of "Contraction and Convergence" as a Framework for an International Political Solution to Greenhouse Gas Emissions Abatement', in Olav Hohmeyer and K. Rennings (eds), *Man-made Climate Change*, pp. 291–345. Heidelberg: Physica-Verlag.
- Ministry of External Affairs, Government of India. 2007. 'PM's Intervention on Climate Change at the Heiligendamm Meeting', Berlin, 8 June,

- available at <https://mea.gov.in/in-focus-article.htm?18822/PMs+intervention+on+Climate+Change+at+the+Heiligendamm+meeting>.
- Nakicenovic, Nebojsa, Joseph Alcamo, Gerald Davis, Bert de Vries, Joergen Fenhann, Stuart Gaffin, Kenneth Gregory, Arnulf Grubler, Tae Yong Jung, Tom Kram, Emilio Lebre La Rovere. 2000. 'Special Report on Emissions Scenarios: A Special Report of Working Group III of the Intergovernmental Panel on Climate Change (No. PNNL-SA-39650)'. Pacific Northwest National Laboratory, Richland, WA (US), Environmental Molecular Sciences Laboratory (US).
- Pan, Xunzhang, Fei Teng, and Gehua Wang. 2014. 'Sharing Emission Space at an Equitable Basis: Allocation Scheme Based on the Equal Cumulative Emission per Capita Principle', *Applied Energy*, 113: 1810–18.
- Rajamani, Lavanya. 2013. 'Halfway between Durban and Paris', *The Indian Express*, 29 November, available at <http://archive.indianexpress.com/news/halfway-between-durban-and-paris/1200924/0>.
- Ringius, Lasse, Asbjørn Torvanger, and Arild Underdal. 2002. 'Burden Sharing and Fairness Principles in International Climate Policy', *International Environmental Agreements*, 2(1): 1–22.
- Rogelj, Joeri, Michiel Schaeffer, Pierre Friedlingstein, Nathan P. Gillett, Detlef P. Van Vuuren, Keywan Riahi, Myles Allen, and Reto Knutti. 2016. 'Differences between Carbon Budget Estimates Unravelling', *Nature Climate Change*, 6(3): 245–52.
- Schroeder, Doris and Balakrishna Pisupati. 2010. *Ethics, Justice and the Convention on Biological Diversity*. Nairobi: United Nations Environment Program, Nairobi.
- Smit, Barry and Olga Pilifosova. 2003. 'Adaptation to Climate Change in the Context of Sustainable Development and Equity', *Sustainable Development*, 8(9): 9.
- Smith, Joel B., Stephen H. Schneider, Michael Oppenheimer, Gary W. Yohe, William Hare, Michael D. Mastrandrea, Anand Patwardhan et al. 2009. 'Assessing Dangerous Climate Change through an Update of the Intergovernmental Panel on Climate Change (IPCC) "Reasons for Concern"', *Proceedings of the National Academy of Sciences*, 106(11): 4133–7.
- Smith, Pete, Steven J. Davis, Felix Creutzig, Sabine Fuss, Jan Minx, Benoit Gabrielle, Etsushi Kato et al. 2016. 'Biophysical and Economic Limits to Negative CO₂ Emissions', *Nature Climate Change*, 6(1): 42–50.
- Tokarska, Katarzyna B. and Nathan P. Gillett. 2018. 'Cumulative Carbon Emissions Budgets Consistent with 1.5°C Global Warming', *Nature Climate Change*, 8(4): 296–9.

- United Nations Framework Convention on Climate Change (UNFCCC).
1992. 'United Nations Framework Convention on Climate Change',
1771 United Nations Treaty Series, 107, 165.
- . 1997. 'Kyoto Protocol to the United Nations Framework
Convention on Climate Change', 2303 *United Nations Treaty Series*,
148, available at <https://unfccc.int/resource/docs/convkp/kpeng.pdf>;
accessed on 1 June 2019.