IN FOCUS

The Paris Agreement on Climate Change: Background, Analysis, and Implications

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Abstract: This paper presents a critical analysis of the Paris Agreement on Climate Change, agreed upon by more than 180 countries at the Twenty-First Conference of Parties (COP 21) of the United Nations Framework Convention on Climate Change (UNFCCC). The article traces the development of the major issues and points of disagreement in climate negotiations from the Copenhagen summit of 2009 to COP 21 at Paris. The paper argues that the outcomes of COP 21 fell conspicuously short of the world's requirements in terms of climate science and equity among countries. The paper argues for carbon budgets and, in that context, further argues that the Paris Conference has set goals that are at odds with the feasibility of such goals as indicated in the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). In general, the Paris Agreement perpetuates the low levels of climate action thus far undertaken by the developed nations while offering little concrete assistance to the less-developed nations. The overall result of the agreement is likely to be, for the people of the less-developed nations, greater danger for those vulnerable to the impact of climate change and greater difficulty in guaranteeing the energy basis of their future development.

Keywords: climate change, global warming, carbon budgets, COP 21, Paris Agreement, AR5, IPCC, agriculture and climate change

Introduction

On the night of December 12, 2015, the 21st Conference of Parties (COP 21) of the United Nations Framework Convention on Climate Change (UNFCCC) adopted an agreement that is a landmark in global climate governance. COP 21 was held in the French capital, and the Paris Agreement, as the agreement is called, comes 23 years after the framework convention was adopted at Rio de Janeiro in Brazil at the Earth Summit in 1992.

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Global warming because of the emission of greenhouse gases, the most prominent and dominant component of which is carbon dioxide, is undoubtedly one of the most profound global environmental issues in the world today. Whether the Paris Agreement will indeed help the world to to come to grips with dealing with the problem of global warming of anthropogenic origin is surely a matter of concern to all of humanity.

Of the sectors of the economy that will be affected by global warming, agriculture is surely one of the most important. Although its contribution to global GDP may appear minor, agriculture is the primary source of the world's food and food security, and the impact of climate change on agriculture is therefore a matter that concerns the world as a whole. In less-developed countries, where agriculture and allied activities are the main sources of income for large sections – and often a majority – of the population, any threat to food production is a threat to mass livelihoods and food security.

Adaptation of agricultural production to climate change requires, in the first instance, that the extent of global warming be kept under check to the extent possible. *The mitigation of greenhouse gas emissions is therefore the first line of defence for agriculture in the face of the threat of climate change.* It is in this context that the Paris climate summit is of critical significance to agriculture, even though agriculture was not the explicit subject under discussion.

Unlike a predecessor problem — that of the damage to the ozone layer that protects the Earth from harmful solar radiation in the ultraviolet range of the electromagnetic spectrum because of the emission of hydrofluorocarbon gases — the problem of greenhouse gas emissions has resisted an early and quick solution. The global compact known as the Montreal Protocol, has been a remarkable success, winning early acceptance by all nations, and has led to some success in controlling the damage to the ozone layer. The problem of global warming because of greenhouse gases has, however, proven to be more intractable, and has been the subject of a long series of intense negotiations after the Earth Summit, negotiations that have involved more than 150 countries.

It is not difficult to locate the origins of the intractability of this problem of global warming. Since greenhouse gas emissions arise from all manner of uses associated with fossil fuels, and since fossil fuels are more or less the very basis of the energy requirements of modern industry, greenhouse gas emissions are part of almost every kind of modern industrial activity and of the consumption, in its most general sense, of industrial products. More generally, global warming can arise also from any disturbance of the global carbon cycle, such as deforestation and other changes in land use. A certain set of other gases, the most prominent being nitrous oxide, can also give rise to global warming. Their relative significance in actually controlling global warming is, however, a matter of some scientific debate, especially since the

bulk of greenhouse gas emissions is carbon dioxide, which is the most persistent of the gases.[1]

The solution to the dispute between nations over how global warming is to be controlled has a technological aspect: it demands re-engineering the basis of modern industrial activity. This technological challenge cannot be underestimated. The solution also has another — perhaps more formidable – aspect, an economic (and political and social and cultural) aspect. Technology functions within a particular economic order, and at the heart of climate change policy is the issue of the economics of climate change mitigation and adaptation.[2] Unsurprisingly, the question of what nations should do has become the subject of bitter debate, especially between industrially advanced nations on the one hand and less-developed nations on the other. The question of global warming and what to do about it is ultimately a political question, even if underlying the politics is the scientific and technological need to wean the world from fossil-fuel-based industrial production and consumption, and to minimise interference with the natural global carbon cycle.

The threat of global warming, and the urgency of that threat has simply been reinforced by the periodic assessment reports of the Intergovernmental Panel on Climate Change (IPCC), a unique organisation entrusted with periodically reviewing the available scientific literature on global warming, its consequences, and the means to deal with them, and presenting an appropriate summary of the key results from these reviews. The reports of the IPCC have been published every five years since 1990 (the earliest report thus pre-dates the Earth Summit). Over time, their scope has broadened, while the studies of key scientific issues contained in the reports have become more intensive. Climate change negotiations must thus contend with the politics and economics of climate change and with the progressively more urgent warnings that come from the reports of the IPCC.

The Paris summit thus had to deal with the accumulated legacy of these disputes and to attempt to resolve them, while taking account of the relevant scientific information. Given the nature of the global threat that climate change represents, the annual climate summits are remarkable events. Apart from the large number of delegations of varying sizes from different nations, there is also a wide range of organisations — including corporations, voluntary agencies, political and social movements, academics studying different aspects of climate change, and multilateral institutions, including several associated with the United Nations system — that are

[1] Most gases other than carbon dioxide eventually decompose in the atmosphere over varying time scales into carbon dioxide and other by-products. Accounting for the global warming contribution from these gases is a somewhat complex scientific issue, with significant uncertainties attached to their precise quantification.

[2] In the climate-change lexicon, *mitigation* is the effort to limit, and eventually possibly eliminate, the continued emission, as a consequence of human activity, of greenhouse gases (the ultimate cause of global warming) into the atmosphere. Correspondingly, *adaptation* refers to measures and initiatives that help human society's production systems cope with the consequences of global warming.

also participants, official and unofficial, in these summits. While the influence of this variety of institutions is not inconsiderable, the crucial element in negotiations is, of course, direct negotiations between nations as represented by their governments.

A striking feature of the global climate change debate, and of its local versions in various countries, is its moral and ethical dimension. Even if nation-states and national governments are in the end driven more by self-interest than other considerations, they have to pay heed to the moral dimension and even statements of self-interest have to be expressed within a larger context of moral concern. There are, of course, exceptions, and countries such as Canada, Australia, United Kingdom and, above all, the United States have a distinct stratum of "climate deniers" among their business and political elites and among their population (*Newsweek* 2007). In office, however, even the deniers have to conduct business without negating entirely the moral aspect to which we referred; they must use other pretexts, like casting doubt on climate science and its results, to further their agenda.

In this paper, we deal in some detail with the making of the Paris summit, the progress of the summit itself and the outcomes of the summit. A companion paper deals more specifically with the relevance of the Paris agreement to agriculture.

On the Road to Paris

What were the key issues in contention at the Paris summit? To identify these it is necessary to step back briefly and review events over the last six years, that is, to trace the path from the United Nations Climate Change Conference held in Copenhagen in 2009 to COP 21 in Paris.

The Copenhagen climate summit of 2009, or, to give it the official designation, the 15th Conference of Parties (COP 15) of the UNFCCC, was itself the product of the Bali conference (COP 13) two years earlier, which was convened in the background of the release of the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC). The report made it clear that observed global warming was unmistakably due to greenhouse gas emissions of anthropogenic origin and that, if left unchecked, emissions would lead to an unacceptable increase of the Earth's temperature, with numerous harmful consequences for human society (IPCC AR4 2007).[3] The report removed the ambiguities in this regard that had marked earlier assessment reports. Driven by new developments in climate science, the Bali conference took the unprecedented decision that all signatories to the UNFCCC would work towards an agreement on long-term co-operative action in which all countries would be involved, even if the precise nature of this

[3] The reference here is to the global average temperature, which is not a directly measurable quantity, but is a suitably weighted average inferred from temperature observations throughout the year across the world. This global average temperature is a key base indicator in inferring the extent of global warming.

involvement would have to be specified (UNFCCC 2008). This long-term agreement would be negotiated by COP 15 at Copenhagen and would specify the action that would be taken beginning from 2012. It was also decided that the agreement would consider the issues of adaptation, the provision of financial support to the less-developed countries by the developed nations for climate action, and the question of technology transfer that would help developing countries to pursue growth by means that were not as dependent on fossil fuels as were the means used by the advanced industrialised nations (UNFCCC 2008).[4]

In retrospect, it is evident that progress between the Bali and Copenhagen conferences was inadequate to deal with the complexity of the issues involved. Nevertheless, there was an extraordinary upsurge of activity relating to climate policy across the world over the two years following Bali. The deadline of Copenhagen forced major developing countries, particularly China and India, to take climate policy more seriously. The pace of the negotiations that followed Bali also put intense pressure on a number of less-developed countries, straining the capacity of their policy-making machinery.

The response of the developed countries to Bali was mixed. Some developed countries, most notably those in the European Union, began to develop elaborate schemes of mitigation and adaptation. The United States, too, with its newly elected president, Barack Obama, appeared willing to initiate serious action to deal with global warming (Samuelsohn and Friedman 2009). This was in contrast to the George Bush administration, which had been more sympathetic to climate deniers than to its own scientists. There was also a significant spurt of activity across the world by non-government organisations that sought to suggest, develop, and advocate various types of climate action.

Fundamental divisions emerged in negotiations between various countries. The developed nations' basic strategy had three key elements. The first was the declaration of a global goal in terms of a year when the sum total of world-wide emissions would reach a peak, and a subsequent target for the reduction of global greenhouse gas emissions by 2050 (the preferred target year at the time was based on the AR4 of the IPCC) relative to the annual emissions level of 1990 (the year of the first report of the IPCC) (IPCC 2007). Secondly, all nations, including less-developed nations, were to declare the specific year in which their national emissions would reach a peak (UNFCCC 2009). The third element was the establishment of a system of global carbon trading. This was to enable the reduction of global emissions in the most efficient way possible. Some aid was promised to the most vulnerable countries, along with finance and technology transfer to less-developed countries.

[4] Brief summaries of the various major landmarks in the evolution of the global climate negotiations are available at http://unfccc.int/2860.php.

Less-developed countries opposed all three elements of the developed countries' agenda. Article 3.1 of the UNFCCC enjoins all parties to protect the Earth's climate system "on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities," (UNFCCC 1992) and on that basis less-developed countries argued that the demands of developed countries were entirely unacceptable. They argued that developed nations should take the lead in making deep and immediate cuts in emissions, the extent of which had already been indicated by the IPCC in AR4. They argued that the declaration of a global goal without indicating how different countries would share the burden of mitigation was tantamount to imposing one-sided restrictions on less-developed countries. Further, since the developed countries were responsible for the overwhelming bulk of the greenhouse gases in the atmosphere, they had a historic responsibility with regard to the problem of global warming, an argument that developed nations as a whole rejected out of hand. The less-developed countries also argued that while they were prepared to move to a path of development that involved less greenhouse gas emissions, they would not promise any immediate or binding reductions in emissions in the near future (Sethi 2009). Whether they would do so in the longer term would be determined by whether they received adequate financial and technological support and by their specific development needs.

The sharp division between developed and less-developed countries came to a head at Copenhagen. A diplomatic disaster for Denmark, who as the host country assumed the presidency of the COP, the conference was marked by high drama as conflicts sharpened. It was only a showdown at which President Obama met the representatives of India, China, Brazil, and South Africa and hammered out a compromise agreeement that prevented the summit from collapse.[5] The Copenhagen Declaration was ultimately signed by only 28 countries and was not, properly speaking, an official decision of the Conference of Parties. Nevertheless, the deed was done, and much of the content of the Copenhagen Declaration was renewed as the official decision of all countries at the next year's climate summit, held at Cancun, Mexico.

Copenhagen set in motion a trend that has since marked climate negotiations. In the Copenhagen declaration signatories made unilateral statements of what they would do without reference to such action deriving from any explicit distribution, based on science and equity, of the burden of mitigation. Although developed and less-developed countries promised different levels of action - with some developed countries promising some mild reductions, and large less-developed countries promising reductions in emissions as a proportion of their GDP (referred to as emissions intensity), these were not adequate to control global warming. Ironically, the absence of coordination or design has been presented in the literature as evidence

[5] The diplomatic maneouvering that preceded the summit and an assessment of the outcomes of the Copenhagen have been analysed in detail in Jayaraman (2009 a and b) and Jayaraman, Kanitkar, and D'Souza (2010).

of democratic decision-making, of a "bottom-up" as opposed to a "top-down" approach. This approach has been promoted by the United States, a country that has emerged as the leader in delaying climate action.

At Copenhagen, the developed countries also promised to provide $100 billion dollars a year by 2020 by way of climate finance to less-developed countries. This amount was to be used for mitigation and adaptation efforts. The other contentious issue was technology transfer, where the crucial sticking point was intellectual property rights over so-called "green" technologies. Less-developed countries demanded that developed countries provide them such technologies, and, indeed, that they be provided free access to green technologies. Developed countries have never of course, acceded to these demands, and continue to reject them six years after Copenhagen.

It would be wrong to conclude that, after Copenhagen, developed countries were no longer keen to see through a solution to the climate question. The Fourth Annual Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) had established global warning as a scientific fact. In developed countries, a substantial body of informed opinion raised the climate question with the seriousness it deserved. The governments of developed countries sought to reconcile the demands that they faced with the imperatives that guided their economies and with the objective of minimising the burden on corporate capitalism in their countries. Another clear pressure group among nations was a group of smaller countries, many of them small island states, whose very physical existence was threatened by rising sea levels caused by global warming. Other less-developed countries feared that the impact of climate change would impose new and severe burdens on the development process as they knew it.

Several small nation-states, including the small island states, less-developed countries, and others were unwilling to rest with the Copenhagen declaration, and they made an effort in 2011 at Durban to achieve a more effective climate agreement. Their strategy was, in the face of what they felt was the intransigent attitude of China and India, to initiate a process to reach an agreement with a strong mitigation commitment within a specified time frame. More than 70 countries — led by South Africa and supported strongly by the European Union – were involved in this effort. India and China, who were joined by a small group of other nations, argued that it was unacceptable to initiate such a process without specifying the principles that would determine strong mitigation commitments. China, India, and the other countries with them eventually had to accept the common decision, particularly after the United States decided to support the group led by South Africa. The Durban platform finally issued a mandate for a new climate agreement with legally binding commitments, to be arrived at by 2015 (UNFCCC 2011). The Durban platform marked a significant shift in the strategic correlation between countries in the UNFCCC, since on the one hand it provoked a considerable breach in the ranks of the developing countries, while on the other

hand the final decision removed all references to equity in the solution of the climate question as well as any reference to common but differentiated responsibilities.[6]

From Durban to Paris

In the four years between Durban (2011) and Paris (2015), changes in policy have not measured up to developments in climate science. The United States came gradually to dictate the terms of engagement of the developed countries in the climate negotiations. Other developed countries, with the notable exception of the European Union, turned increasingly lukewarm towards any serious effort at climate mitigation. Among the less-developed countries, who function as a group in the UNFCCC negotiations and are referred to as G77+China, three notable strands have emerged.

China has swung closer to the position of the developed countries in a key respect: it has accepted the notion of declaring a peak year for its emissions. China was also willing to make specific commitments with regard to increasing the proportion of renewable energy in electricity generation and to lowering the emissions intensity of its economy. The commitments were made by China as part of the outcome of a summit meeting between Presidents Obama and Xi Jinping in Beijing in November, 2014.[7] While China has not explicitly announced a long-term emissions reduction goal, its current policy has moved it out of the ranks of the less-developed countries in many respects, even while it has not quite relinquished its leadership role among them.

By contrast, India, still smarting from the blow it suffered at Durban,[8] continued to resist putting forward an agenda for climate action or even spelling out in concrete terms what it demanded by way of equity in climate action.[9] At the Warsaw COP 19, India refused to accept the introduction of a South African proposal for a so-called "equity reference framework," a somewhat generic proposal that focused a great deal on the process of achieving an equitable agreement, rather than on the substance of that equity itself (Ngwadla and Rajamani 2015). In the absence of a clear policy in the subject, India's position turned out to be something of a public relations disaster for the Government. India and a number of other countries in the loose grouping known as the Like Minded Developing Countries' (LMDC) group, thus represent another distinct strand among the less-developed countries.[10]

[6] For an immediate reaction to the passage of the Durban platform, see Jayaraman (2011).

[7] See https://www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change

[8] For a review of India's debacle at Durban, see Jayaraman (2011).

[9] In a perceptive note, Lavanya Rajamani, pointed out how the Indian government had always used the rhetoric of equity more as a "shield" than a "sword," see Rajamani (2011).

[10] The existence of several named groupings of countries is a feature of the climate negotiations. Many of these have existed over a long period, while some are relatively new. These groups are officially recognized in the negotiations and speak through designated countries acting as spokespersons. Several countries belong to more than one grouping.

As the 2015 deadline neared, it was evident that the developed countries, especially the United States, were having their way. COP 19 at Warsaw decided that all countries would submit their proposed climate action plans with specific reference to mitigation and adaptation, and for developing countries with the inclusion of their need for financial and technological assistance from the developed nations. Climate action plans submitted by each country in a written document, referred to as Intended Nationally Determined Contributions (or INDCs), were to be the basis of what, taken together, would constitute global climate action. Intense negotiations followed on these proposals – on the form in which they would be submitted to review and on how their adequacy as appropriate contributions to the total would be judged. These negotiations remained inconclusive. The confrontation between the developed and less-developed countries, however, continued to dominate every climate summit after Durban.

In the event, by the time the Paris conference neared, it was clear that whatever promise the Durban Platform held had been diminished. As the year progressed, the United States swung back from its stance at Durban – where it had agreed that Paris would represent the deadline for a legally binding agreement – to its Copenhagen strategy of arguing against any legally binding arrangement insofar as actual emissions reductions were concerned. This policy position echoes the one taken at the time of signing the Kyoto Protocol in 2008, when, despite the approval of President Clinton, the U. S. Congress voted overwhelmingly against ratifying the Protocol. This time round, the United States did not even present the excuse that it presented then, that a legally binding agreement would not be acceptable unless similar emissions reduction restrictions were imposed on China and India. Instead, before Paris, the United States made it clear that it was unilaterally against any such legally binding restrictions. The European Union, by contrast, insisted on some kind of legally binding commitment with regard to emissions reduction.

The diplomatic effort that the United States had made prior to the Paris Conference became evident as the Paris Conference entered its final stages. The foreign minister of the Marshall Islands, Tony De Brum, announced a "high-ambition coalition" that consisted of an alliance of several African, Caribbean, and Pacific nations, together with the United States and the European Union, and later joined by countries such as Australia and Brazil.[11] It appears that the United States and the European Union want to use this alliance – roughly corresponding to the group that initiated the effort to create the Durban platform – to push back China, India, and their allies. Many countries of the alliance see India and China as crucial to reducing global greenhouse gas emissions, despite the fact that the bulk of greenhouse gas emissions come from the advanced capitalist countries. China responded to the announcement of this coalition with some disdain, while India remained silent.

[11] See, for instance, Mathiesen and Harvey (2015). For an enjoyable critique of the use of the term, see Bhushan (2015).

The large number of developing countries that have gathered under this banner represent a third distinct trend. Some states, notably Brazil and South Africa, have had a more ambiguous role and do not fit easily into this classification. While at Durban they were certainly part of an old version of the "high ambition coalition," they were certainly not part of it at Paris and appeared to be closer to China and India on key issues, though Brazil did bolt to the high ambition group on the penultimate day of the summit.

One should not underestimate the multi-faceted character of the negotiations, where notwithstanding the overarching political and foreign policy imperatives, the minutiae of negotiations – especially aspects of international law and the formation of global regulatory regimes and attendant issues – play a significant role.[12]

It is also arguable that the US strategy, which was eventually followed by the European Union as well, bore clearly the imprint of President Obama's personal style of handling controversial issues, of offering substantial concessions to potential objections even before they are articulated, in effect diluting one's own proposal before fully setting it out publicly. However, as we will indicate shortly, such a strategy was fraught with its own problems.

The Paris Agreement

The final outcome at Paris consists of an overall resolution (or "decision" in UNFCCC parlance) and an agreement that appears as an Annexure to the decision document. Perhaps an easier way of understanding the parts of the document is to conceive it as an agreement accompanied by a decision that elaborates the means for the adoption and implementation of the Agreement.

The crucial parts of the Agreement are the decision on mitigation and the global and individual goals of developed and developing nations with respect to mitigation. The global goal is divided into two parts. The first, in Article 2.1(a) of the Agreement, is the assertion that all parties would strive to keep the increase in global average temperatures "well below 2℃ above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5℃ above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change." In order to achieve this goal, however, individual nations have been left to do what they want, without any clear indication of how the gap between what needs to be done and what nations are prepared to do is to be bridged. Article 4.1 does not provide any quantitative measure of how emissions are to be curbed either globally or by individual nations such that the objective laid out in Article

[12] For an introduction to some of these issues in the context of climate change, the reader is referred to Okereke (2010). For detailed accounts from a Third World perspective on the actual year-by-year maneouvering by various parties in the negotiations, the detailed despatches provided by the Third World Network are among the best sources. These are available at http://www.twn.my/climate.htm.

2.1 (a) can be achieved. It also does not provide any quantitative measure of what individual nations should do.

The Agreement thus sets aside some scientific facts that have been well established and articulated in AR5 of the IPCC. As AR5 notes, and discusses in some detail, there are clear limits on the permissible emissions of greenhouse gases over a specified time period if the global average temperature is to be kept below some specified limit.[13] For a 2℃ temperature limit, the limits on cumulative emissions are stringent. As has been noted by Tejal Kanitkar in her companion piece in this issue,[14] if the world restricts cumulative emissions between 1870 and 2100 to 992 GtC, then there is a 67 per cent probability of limiting temperature rise to 2℃. This means that only 325 GtC can be emitted between 2012 and 2100.

The corresponding cumulative emisssions limits to ensure a temperature rise limit of 1.5℃ are even more stringent.[15] The companion paper in this issue explores this question in greater detail. The point to remember is that, except under very special circumstances of rapid technological change, the goal stated in Art 2.1 (a) is well out of reach. As scientists have noted, ensuring a maximum temperature increase of less than 1.5℃ (or even 2℃), requires the deployment of carbon capture technologies yet to be developed. It is clear that several leading climate scientists are very unhappy with the formulations of the Paris Agreement;[16] indeed one scientist observed at a seminar during COP 21 in Paris that "1.5℃ is in the rear-view mirror."[17]

As has been reported in the media, some countries, including China and India, were clearly against the formulation in Article 2(1),[18] while the developed countries encouraged the small island states and the least developed countries that were mainly responsible for pushing this formulation in the two weeks of negotiations prior to the final agreement. The unattainable "aspirational" goal, as it has been described, made it to the final version of the agreement. As India's veteran climate activist Sunita Narain pointed out, the key climate laggards in the developed country camp had taken control of the negotiations by the halfway mark, and encouraged the demand for the 1.5℃ goal, even while diverting attention from the low commitments that they had made to climate change mitigation (Narain 2015).

Thus, the Paris Agreement includes a goal that is in the nature of a promise to the most vulnerable nations, and one that it cannot under any reasonable conditions achieve. Nothing short of extraordinary developments in technology (which Bill

[13] See IPCC (2013), Ch. 11 of the full report.
[14] See the accompanying article by Tejal Kanitkar.
[15] See the accompanying article by Tejal Kanitkar.
[16] See Hertsgaard (2015).
[17] Author's notes.
[18] Goldenberg and Vidal (2015).

Gates has described as an "energy miracle") can ensure its realisation.[19] The political, social and human consequences of an obvious failure to achieve this goal are enormous. The riskiness of the path that the world has taken at Paris has no obvious parallel in contemporary history. By ignoring the global carbon budget, the Paris Agreement has set about moving global climate governance to a path that ignores the best results that science has to offer. The realisation is yet to sink in to global public opinion that *the Paris Agreement challenges the very role that climate science has to play in providing the evidential basis for policy-making*.

Another key aspect of the Paris agreement is that the Nationally Determined Contributions to mitigation action are not legally binding in any sense. This was because United States Congress, dominated by the Republican Party, would have been certain to have vetoed any agreement that involved legally binding commitments on their country.

The text of the Paris Agreement is more amenable to and considerate of the concerns of many less-developed countries, including India. There were early concerns that references to equity or to common but differentiated responsibilities (CBDR) would be removed, as they were in Durban. These were, however, included in the final draft, and the phrase occurs at more than one place in the text. Unfortunately, nevertheless, while the Agreement refers to the principle of equity, it makes no reference to any mechanism to implement equity. During the negotiations, in the last draft of the Ad Hoc Working Group on the Durban Platform submitted to the full conference for consideration, one of the negotiations options was a provision for the equitable distribution of the global carbon budget. In the drafts circulated by the COP presidency directly for consideration, immediately after it took over the last part of the negotiations process, this reference was removed.

It is a matter of record that no developing country has ever held up the proceedings of a COP because it argued for the inclusion of some particular mechanism by which to ensure equity. In the absence of any concerted campaign by countries on such specific mechanisms for equity in the months prior to the COP, it is difficult to imagine that they would have enforced the adoption of such a requirement at the last moment. It is worth noting that India repeatedly referred to the need for adequate carbon space for its development in the first week of the Paris Conference, but when the process of finalisation of the agreement moved to the COP presidency, India dropped any further insistence on the retention of this option.[20]

The key political victory for the developed countries has been the removal of the question of historical responsibility from the negotiating agenda (at least for now).

[19] See the interview with Bill Gates in *The Atlantic*: Bennett (2015).
[20] India's Prime Minister, Narendra Modi, referred to India's need for adequate carbon space in his opening speech to the COP 21 and in an article in the *Financial Times* (Modi 2015).

A United States official was quoted as saying that the Paris Agreement "revises the architecture of the climate system with the means of differentiation that looks forward, not back. It provides for robust financial and technological support for the poor and developing countries with a strong participation of the private sector."[21] This particularly difficult issue has hung over the negotiations for years and has slowed down negotiations because of the unbudging refusal of developed nations to countenance any legally binding reference to historical responsibilities for climate change in official documents of successive conferences.

There is of course provision for a regular review of pledges submitted by parties to the negotiations. The first review is scheduled for 2018, that is, prior to the coming into force of the post-2020 commitments and the first "global stocktake" that is to occur in 2023. Subsequent reviews are to take place every five years after 2023. Inclusion of the provisions for these reviews in the final document were the subject of prolonged wrangling. The developed countries insisted that the reviews be common to both developed and developing countries, while the latter insisted on separate reviews. In the end the matter was resolved in favour of the developed nations, but with some concessions for small island states and least-developed countries. Uniform reporting by all nations of their greenhouse gas inventory every two years is now mandatory.

The manner in which the burden of mitigation is defined, both globally and for individual countries, and the manner in which mitigation action is to be implemented are crucial issues for all nations. At the same time, many among the ranks of underdeveloped nations are more concerned with climate change adaptation than with mitigation. The negotiations on the question of adaptation have largely been dominated by the question of delineating a hierarchy of vulnerability to the impact of global warming and the corresponding demand for financial and technological support from developed nations for climate change adaptation. One of the significant decisions from Copenhagen was the promise by developed nations that 100 billion US dollars would become available by 2020 for such assistance. The developing nations have been unhappy at the slow pace of mobilisation of such funds, demanding that they be additional to existing financial flows and be explicitly targeted for climate-related activity. Developing countries have demanded that finance for climate-related activity come from public funds of the developed world, while the government of developed countries have insisted on the inclusion of private funding, including foreign direct investment, equity flows, and so on, while accounting for this assistance. Prior to the Paris Conference, a report of the Organisation for Economic Cooperation and Development (OECD) said that $57 billion worth of climate finance had been made available by developed countries in 2013 and 2014. A report by India's Finance Ministry challenged this conclusion, arguing that the real amount was only $2.2 billion. At Paris, the contention over these numbers was sharp. In the final outcome, the agreement deals generally with the provision of financial

[21] See, for instance, George (2015).

assistance by developed countries, while the accompanying decision contains a more specific promise to ensure the provision of $100 billion a year by 2020; in short, the situation prior to Paris continues.

No particular advance was registered in the Paris Agreement on the issues of technology transfer. No mention was made of intellectual property rights or the transfer of "green technology." One of the concessions made by the developed nations was to accept that their assistance to underdeveloped countries by means of finance, technology transfer, and capacity building efforts would be part of the five-year review, although it is not clear whether this concession is more a matter of form than of substance.

Conclusions

Among the many events that took place in Paris on the occasion of the climate summit were some that were characterised by a more democratic and science-oriented stance on global warming than were the actual negotiations. One particularly noteworthy event was a meeting organised by trade unions in Paris and by a number of other progressive and democratic organisations and addressed by activist and author Naomi Klein and the newly elected leader of Britain's Labour Party, Jeremy Corbyn. Corbyn argued strongly for a new economic dispensation that would restore the role of public action, led by the state, in combating global warming. He urged that developed nations undertake strong action towards immediately reducing the fossil-fuel dependence of their economies. Naomi Klein also drew attention to the role of global capital in the making of the climate crisis, the difficulties in resolving the crisis and the need to ensure that the solution to the climate crisis be founded on equity and on economic and social justice to working people across the world.[22]

A large number of countries have undoubtedly had their specific political concerns addressed in various parts of the Paris Agreement. But the outcomes fell conspicuously short of what the world requires in terms of climate science, equity among countries, and adequacy. Most regrettably, the Paris Conference has set goals that are at odds with the the feasibility of such goals as indicated in the Fifth Assessment Report (AR5) of the IPCC.[23]

Among the successes for the developing countries are the explicit language on equity and the references to the principle of common but differentiated resposibilities (CBDR) that are to be found in several places in the text. In the light of the widespread fear that both these principles would be deleted, their retention

[22] From notes taken by the author at the meeting held at the Salle Olympe de Gouges, Paris, in the evening on December 7, 2015.
[23] On this and related comments on the Paris Agreement, see the statement by Jayaraman and Kanitkar reported in Ananthakrishnan (2015).

is undoubtedly welcome. Another success is that the principle of differentiation informs the discussion of mitigation, adaptation, financial transfer, technology transfer, and support for capacity building in the developing countries. It is noteworthy also that finance, technology transfer, and capacity building – all tasks allotted to developed countries – are now to be subject to periodic review and the global "stocktake."

The agreement has, however, deliberately turned away from the notion of the global carbon budget, which the IPCC had characterised as being the next appropriate global indicator of climate change, after temperature rise. While indicating the goal of 2℃ or 1.5℃, the Agreement allows developed countries to commit to only such emissions reductions as they wish. It has not ensured that the sum total of their actual greenhouse gas emissions will be compatible with their fair share of the global limit on cumulative emissions (the global carbon budget).

In the process, the notion of historical responsibility has quietly been given up, and this abandonment constitutes the biggest political gain for the developed countries. A global carbon budget, defined in terms of permissible cumulative emissions from 1850 to 2100, could have provided one means to operationalise historical responsibility. Now that the case for a carbon budget has been ignored, this means is no longer available.

In proposing that temperature rise be limited to 1.5℃, the Paris Agreement ignores the scientific reality that, given the global emissions expected until 2025 and 2030, even the 2℃ target is difficult to meet.[24] Thus on the one hand, to the most vulnerable nations, especially the small island states, the agreement makes a promise that cannot be kept. On the other hand, for other nations, it sets a false goal with respect to adaptation. The anticipation of 1.5℃ increase can lull countries into false complacency, leaving them underprepared if the rise is higher.

Despite India's and other developing nations' satisfaction at having preserved equity and common but differentiated responsibilities in the Agreement, this will be an empty victory if developed nations do not keep emissions down to their fair share of the global carbon space. Equity, therefore, has not been operationalised in any specific fashion in the Agreement.

Not only are the emission reduction targets of developed nations inadequate, no consequences will apply if they are not met. The process of review promised in the Agreement is likely to result in many acrimonious and bitterly disputed climate summits. At the same time, before the first global stocktake of 2023, little change in emissions reduction is likely to occur. In the meantime, the world will face increasing difficulties: the danger from global warming will confront the world

[24] See the accompanying article by Tejal Kanitkar.

as a whole, and the inevitable shrinking of carbon space will render economic development and people's well-being in developing countries, including India, more difficult.

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