

# Debunking the narrative of India as a large greenhouse gas emitter

J. R. Bhatt

*India is frequently portrayed as the fourth largest greenhouse gas (GHG) emitter globally, based on the current annual emissions of sovereign nation-states. Through a comprehensive review and assessment, this article argues that other metrics of country-wise emissions provide a more holistic and unbiased view. The article argues that ranking per se by any metric is of minor value unless also placed along the actual quantities. India's cumulative emissions (excluding LULUCF, 1850–2019) amount to only 4.31% of the global total, well behind the three leading emitters, the United States (22.46%), the European Union (16.06%) and China (13.45%). Therefore, in terms of annual emissions, the story of India as the fourth largest emitter is very mistaken, as the gap between us and the third is substantial. The article argues that national emissions must be judged by equity in mitigation and in the light of climate action being undertaken. On both grounds, India, relative to its responsibility and what equity demands, is doing far more than her fair share.*

**Keywords:** Climate change, GHG emission, NDC targets.

ANTHROPOGENIC greenhouse gas (GHG) emissions have changed the composition of the Earth's atmosphere, leading to significant climate change over the last century and a half<sup>1</sup>. According to the United Nations Environment Programme (UNEP) GAP Report 2018, annual global carbon emissions have continued to rise steadily since 1970 and increased to 53.5 billion tonnes of CO<sub>2</sub>eq in 2017, a record high<sup>2</sup>. To avoid the threat posed by the unprecedented growth of GHG emissions, the international community has, for the last 30 years, attempted to reduce global carbon emissions through lengthy negotiations that have faced and continue to face a deep North–South divide. One reason for this divide is the differentiation between the contributions of the developed and developing world to historical GHG emissions<sup>3</sup>. From the perspective of equity that the United Nations Framework Convention on Climate Change (UNFCCC) recognizes as the foundation of global climate action, the formulation of emission reduction programmes to minimize climate change impact should account for the responsibility for past emissions by the developed countries, to be followed by differentiation in future actions between developed and developing countries.

One of the ironies of the global warming discourse is that developed countries which were the earliest to ratify the UNFCCC, are retreating from their early commitments. This violates their commitment as signatories to the Convention to take the lead in action to mitigate climate

change. From its refusal to ratify the Kyoto Protocol, the United States, in particular, has been the leading voice of dissent among the developed countries in the evolving global climate negotiations, the high point being its declaration of intent to withdraw from the Paris Agreement. The US sought to portray itself as the 'victim of an unfair climate deal' while entirely obscuring its current and historical role. However, the United States returned to the Paris Agreement after the election of a new President in 2021.

A key element of this narrative of disaffection has been the portrayal of the major economies in the developing world as equally culpable alongside the developed nations. In particular, the portrayal of India as one of the world's biggest emitters is part of this revisionist narrative.

In recent years, India has been regularly labelled the third or fourth-largest emitter of GHGs in the world. However, any analysis of the origins, the import, and the consequences of this portrayal must begin with considering its objective validity. Indeed, as we argue here, never before has the unfairness and incorrectness of this portrayal been more starkly evident. No ranking of responsibility (if not culpability) for GHG emissions and consequent global warming can be taken on board without understanding the context in which this ranking has been framed and the implicit assumptions underlying this framing. Without such contextualization, rankings can become instruments of negotiating strategies that have little to do with the objectives of the UNFCCC.

The large emitter narrative regarding India is particularly unfair and unjust if we consider the consequences for India

J. R. Bhatt, formerly scientist, Ministry of Environment, Forest and Climate Change, Jorbagh Road, New Delhi 110 003, India.  
e-mail: jrbhatt@nic.in

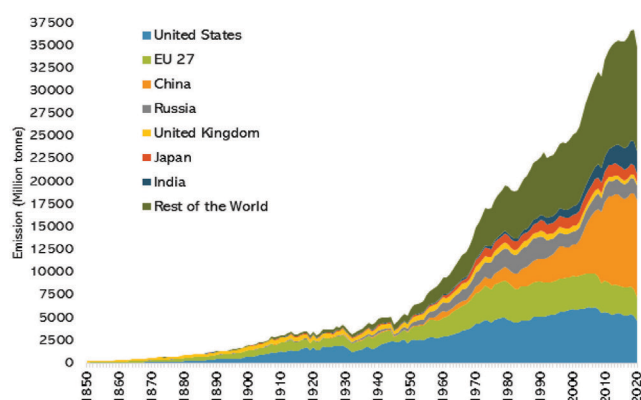
of historical and current GHG emissions. According to the Global Risks Report 2019 of the World Economic Forum, environmental risks dominate the top 10 global risks of likelihood and impact, a finding particularly relevant to a large developing country like India. The Global Climate Risk Index 2020, prepared by Germanwatch, puts India as the fifth most affected country in the world in terms of experiencing extreme weather events, a sharp rise from its 14th position in 2017 (ref. 4). The World Bank report on the Impact of Climate Change on South Asia predicts that rising temperatures and changing monsoon rainfall patterns could cost India 2.8% of its GDP and depress the living standards of nearly half of the country's population by 2050. With 1.3 billion people accounting for nearly one-sixth of humanity, 8% of global biodiversity, sizeable population below the poverty level, 17% of the global cattle population, over 8000 km of a long coastline, and more than thousand islands, India has a mere 2.4% of global land area and only 4% of world's freshwater resources<sup>5</sup>.

In this article, we review and assess different ways of defining rankings and demonstrate how India is positioned concerning these various definitions based on information from independent databases and model studies.

### Historical responsibility for CO<sub>2</sub> emission and climate change: India's minor role

The Industrial Revolution of the 19th century was the beginning of a dramatic increase in carbon dioxide (CO<sub>2</sub>) emissions, one of the most important GHGs. Climate change is a function of the accumulation of GHGs, particularly CO<sub>2</sub>, to which annual emissions contribute incrementally. The trends in CO<sub>2</sub> emissions have been very different between developed countries and developing countries during the past 170 years.

Figure 1 shows that developed economies, including the United States, the European Union, and others had substan-



**Figure 1.** CO<sub>2</sub> emissions (excluding LULUCF) trend of developed and developing countries between 1850 and 2020. (Source: Global Carbon Project, Supplemental data of Global Carbon Project 2021 (1.0) [Data set], 2021; <https://doi.org/10.18160/gcp-2021>.)

tial CO<sub>2</sub> emissions for about 100 years (1850–1950) in the early industrial period. During this phase, none of the less developed countries, including India and China, had any noteworthy contribution to global CO<sub>2</sub> emissions. For these countries, CO<sub>2</sub> emissions virtually began only after 1950.

### Cumulative CO<sub>2</sub> emissions and the carbon budget

Several studies have shown that for ambitious and effective mitigation policy targets, percentage reductions relative to a baseline year do not provide the right perspective<sup>6–9</sup>. Rather, it is the cumulative emissions that must be capped to meet the targets, especially with respect to limiting maximum temperature increases, while annual or multi-year emission reduction targets must be fixed to adhere to this limit. Even from the point of view of equity, a crucial measure is cumulative emissions, which are related to the equitable sharing of the global carbon space<sup>7–9</sup>. The cumulative emissions approach provides a powerful framework for comparing ambition and fairness.

The basic science behind the cumulative emissions approach is that temperature increase is directly proportional to the cumulative amount of CO<sub>2</sub> emitted. Rogelj *et al.*<sup>10</sup> discuss the various estimates of the carbon budget and the reasons for the variation in these estimates. In their study on country-wise carbon budgets, Kanitkar *et al.*<sup>7</sup> estimated that the developed countries will have to undertake net carbon removal as their remaining shares of the global carbon budget are negative. Kanitkar and Songola<sup>11</sup> assessed that India's emissions between 1850 and 2019 were about 112 GtCO<sub>2</sub>eq. The remaining carbon budget available to the world to restrict temperature rise to below 1.5°C, even with a 50% chance, is 500 GtCO<sub>2</sub>. If India does not claim any historical redressal of its underused carbon budget in the past, a simple, fair share of the future accords it 89 GtCO<sub>2</sub> beyond 2019. The constraints on India's budget share ease slightly for 2°C targets. Similarly, in the study of van den Berg *et al.*<sup>12</sup> on the calculation of country-wise carbon budget using various effort-sharing approaches, a much larger allocation of the remaining carbon budget for India was estimated, while smaller budgets were allocated to the EU, Japan and the USA.

Figure 2 indicates that India contributed only 3.2% of the total CO<sub>2</sub> emissions between 1850 and 2020. Over this period, the United States and the European Union were the top emitting countries. India ranks in the 7th position among the top CO<sub>2</sub>-emitting countries in cumulative emissions. This is further substantiated by Ritchie and Roser<sup>13</sup> in terms of cumulative emissions of CO<sub>2</sub> from the pre-industrial period to 2015.

Figure 3 shows that even during the recent period, between 1990 and 2018, when India's economic growth accelerated, the percentage share of cumulative GHG emissions was around 6% of the total global emissions, and thus it holds the 5th position below China, United States, EU and Russia.

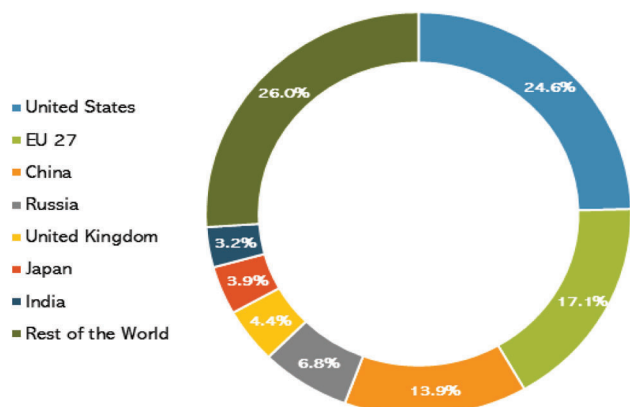
The most recent affirmation of the above assessments is from the Working Group III (WG III) contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) – Mitigation of Climate Change. The Summary for Policymakers of IPCC WG III shows that India’s cumulative emissions must be less than 4%, which is the estimate of cumulative emissions contributed by all of South Asia (Figure 4). And with LULUCF emissions also taken into account, indeed, it is less than that of Africa.

### Historical contribution to GHG emissions by countries and the achievement of NDC targets

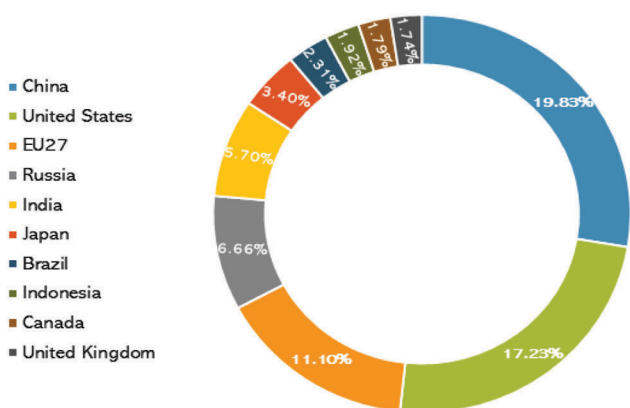
India’s mitigation commitment, as given in its Nationally Determined Contributions (NDCs), is consistent with both the CDC (Common but Differentiated Convergence) and the EPC (Equal Cumulative Per Capita) approaches<sup>14</sup> to burden sharing in mitigation. India is the only country among

the G-20 group of nations whose climate and energy policies are compliant with limiting global warming to below 2°C (ref. 15). On the contrary, Pont *et al.*<sup>16</sup> point out that NDCs mitigation targets of the G7 member countries are not only in line with a grandfathering approach but also lack the ambition to meet various perspectives of climate justice and their operationalization. It is also found that to meet the 2°C target, among the eight countries considered, only India, by achieving its most ambitious targets, could be seen as an adequate contributor. Even for 1.5°C, India’s NDC could still be able to match a large majority of the requirements to contribute to this target by implementing the most ambitious efforts.

It is evident from Figure 5 (data sourced from Gütschow *et al.*<sup>17</sup>) that for the developed nations, the exclusion of emissions from 1850 to 1989 significantly reduces their share in historical emissions while it enhances the share for developing countries like India. If one considers the whole period between 1850 and 2019 for GHG emissions, India’s position as an emitter is far behind the USA, EU, China, Russia and the UK.



**Figure 2.** Cumulative CO<sub>2</sub> emission and global share (1850–2020) as a percentage. (Source: Global Carbon Project, Supplemental data of Global Carbon Project 2021 (1.0) [Data set], 2021; <https://doi.org/10.18160/gcp-2021>.)

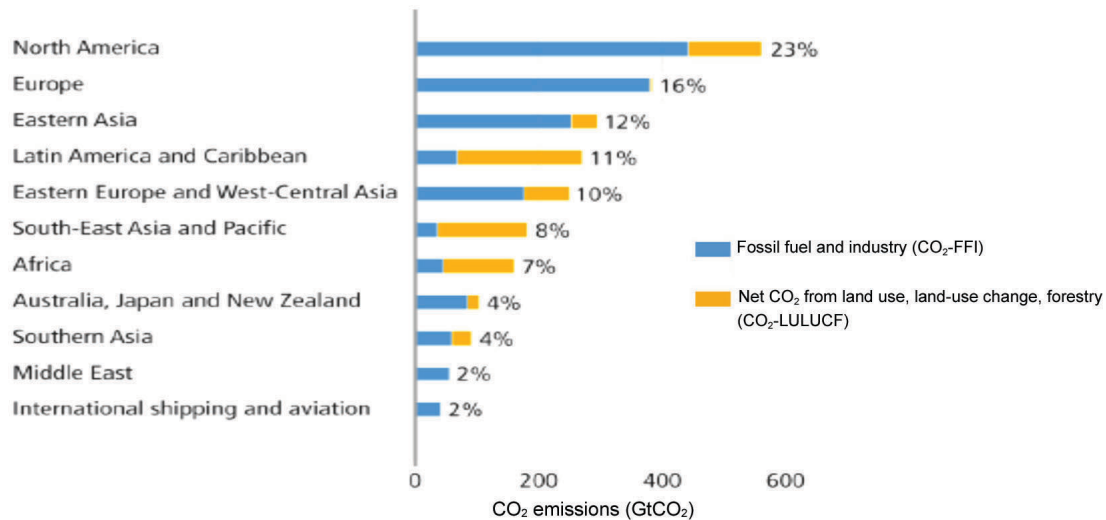


**Figure 3.** Cumulative GHG emission (excluding LULUCF) and global share (1990–2018) as a percentage. (Source: WRI Climate Watch Data (<https://cait.wri.org/>).

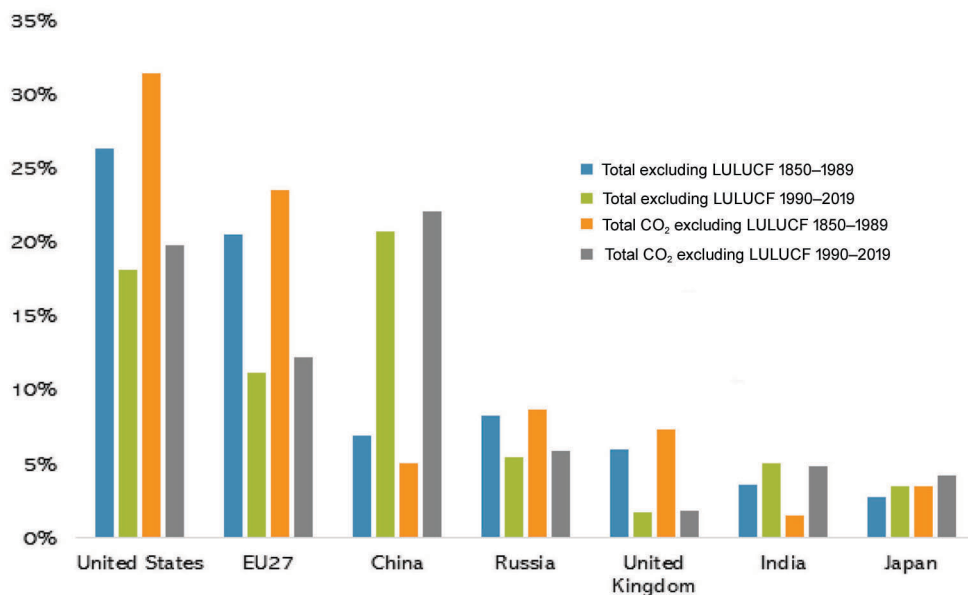
### Country’s share of emissions on per capita basis

The IPCC 1.5 report points out that social justice and equity must be among the core goals of climate-resilient development pathways to keep global temperature rise below 1.5°C. Undoubtedly, the world requires a proper formulation of equity to raise its ambition for mitigation actions<sup>18</sup>. This is particularly applicable to developing countries like India which has approximately 18% of the global population but contributes to only 4.31% of annual GHG emissions (excluding LULUCF, 1850–2019) in the present day. Therefore, the per capita basis for distributing the mitigation target, either the mitigation burden or the share of the carbon space, has been an enduring feature of proposals concerned with equity. Similarly, the role of equity cannot be separated from the discourse of responsibility, and it has already been shown earlier that India had virtually no historical responsibility until 1950.

According to Parikh and Painuly<sup>19</sup>, unsustainable consumption patterns are partly responsible for climate change. In the 1990s, developed countries having just 24% of the world population (at present, Annex-I countries have 18% of the world’s population), were consuming a disproportionate fraction of global commodities. Their share was between 50% and 70% for products that fulfil basic needs like cereals, milk and meat. For other products like iron and steel, the share was 80%, while for chemicals and automobiles, it was as high as 85% and 92% respectively. In per capita terms, in 2011, compared to the non-Annex I countries, Annex I countries consumed twice the quantum of cereals (645 to 309 kg/person), 3.4 times as much milk (250 to 74 kg/person) and twice as much meat and fish (60 to 31 kg/person)<sup>20</sup>. The overall energy consumption by the



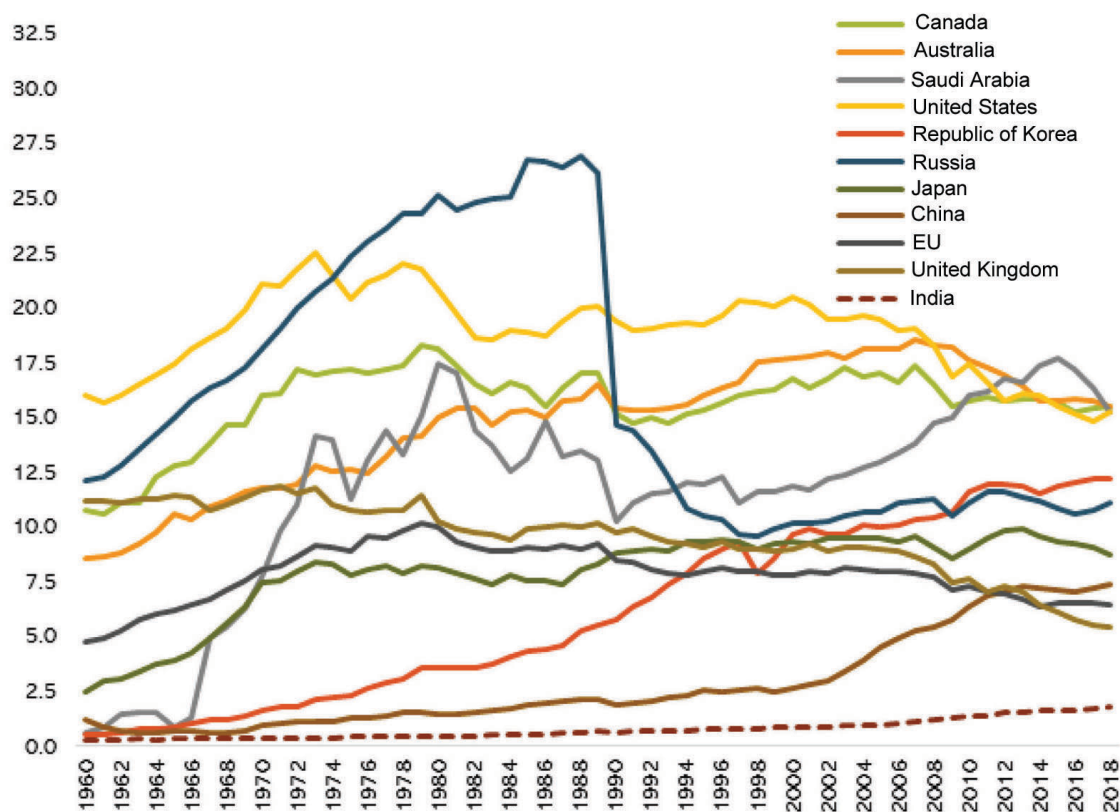
**Figure 4.** Historical cumulative net anthropogenic CO<sub>2</sub> emissions per region (1850–2019)<sup>27</sup>.



**Figure 5.** The share (in %) of cumulative historical emissions of various countries using different scopes indicated in colours, 1850–2019. (Source: Gutschow, J., Günther, A. and Pflüger, M., The PRIMAP-hist national historical emissions time series (1750–2019) v2.3.1. zenodo, 2021; doi:10.5281/zenodo.5494497.)

developed world was 75% of the world's total in the early nineties. The skewed consumption pattern of the developed countries in the early nineteenth century and earlier indicates their responsibility for high levels of GHG emissions. It is found that South Asia's production emissions have always been higher than consumption emissions, unlike North America and Europe, which show a very opposite trend, thus enjoying the benefit of offshoring emissions without truly reducing them. Matthews *et al.*<sup>21</sup> estimated that the combined pledges of the USA, EU and China to limit 2°C limit leaves little room for other countries, essentially requiring them to move towards per capita emissions 7 to 14 times lower than the EU, USA, or China by 2030.

On the other hand, India, which is still characterized by relatively low per capita CO<sub>2</sub> emissions of approximately 1.9 tonnes of CO<sub>2</sub> per person per year in 2016 (still 60% below the global annual average of 4.9 tonnes of CO<sub>2</sub>), in combination with a large population and relatively rapidly increasing carbon-intensive human activities, its per capita emission is 5 tonnes lower than the EU average<sup>22</sup>. The UNEP Emission GAP Report 2018 states that India's per capita emission is lower than the United States, Russia, Japan, China and European Union and lowest within G20 countries<sup>2</sup>. Cumulative emission per capita between 1960 and 2018 shows India stands at the 129th position, indicating its sustained low per capita emission trend. According to



**Figure 6.** Trends in annual CO<sub>2</sub> emissions in metric tonnes per capita from 1960 to 2018. (Source: World Bank, <https://data.worldbank.org/indicator/EN.ATM.CO2E.PC>; accessed on 17 January 2022.)

the data of the 2019 EDGAR report<sup>23</sup> on fossil carbon dioxide and GHG emissions, India ranks 126th of 209 countries (including EU 28). Ritchie *et al.*<sup>13</sup> cited earlier ranks India 125th by the criterion of annual per capita emissions of carbon dioxide. In fact, the non-EIT Annex-I parties are projected to reach 2020 with an increase of 0.4% in annual GHG emissions over 1990 levels (synthesis of fourth biennial reports UNFCCC 2020). For non-EIT Parties, GHG emissions in 2018 were lower than those in 1990 by 1.5% without LULUCF and by 3.1% with LULUCF, even though the total GDP of those parties rose by more than 70% over that period<sup>24</sup>. According to Gupta *et al.*<sup>25</sup>, the reduction in carbon emissions in Annex-I countries has been nullified significantly by increases in imports of energy-intensive goods from developing countries. For example, the transfer emissions from the European Union and the USA in 2012 amounted to 781 and 382 MtCO<sub>2</sub>/year (embodied in the goods and services imported), whereas India bears an additional emission of 198 MtCO<sub>2</sub>/year from products exported to developed countries.

Figure 6 shows that if per capita CO<sub>2</sub> emission is considered, India's share is lower than countries like Canada, Australia, Saudi Arabia and the Republic of Korea, in addition to the USA, European Union, China, UK and Russia. China's share also gets lowered, although it remains higher than India's share.

## Conclusion

This article has argued, based on an array of evidence, that the entire debate on the ranking of countries based solely on their annual rate of current emissions of GHGs is a flawed exercise. Ranking indicates little in the absence of specifying the metric used to define the ranking and in the absence of the comparison of the actual quantum of emissions from different countries evaluated through such metrics. Such ranking, especially using only current annual emissions, is an attempt to avoid the responsibility for historical emissions by the developed world. Such evasion of responsibility has been especially manifested in the refusal of the United States to ratify the Kyoto Protocol and in its withdrawal from the Paris Agreement. Developed countries have turned their backs on undertaking legally binding commitments and have opted instead for voluntary climate action. However, despite voluntary climate action, India belongs to the group that is well on target to achieve a significant part of its NDC commitments.

Specifically, only the metric of current total annual GHG emissions tags India as the fourth largest global GHG emitting nation. Other indicators do not project India in this light. Responsibility for historical emissions shows that India has contributed only 3.2% of the global cumulative CO<sub>2</sub> emission from 1850 to 2020. India is in the seventh

position if the ranking is based on cumulative emissions. India's per capita CO<sub>2</sub> emissions are the lowest if the top 10 emitting nations are considered, and this has been the trend observed for the last 50 years. If the parameter of cumulative emission per capita is considered from 1960 to 2018, India's position is as low as 129 among the 197 countries that have ratified the UNFCCC.

Thus, the narrative that India is the fourth largest GHG emitter is biased and tendentious and does not reflect reality. The developed nations with a history of large early emissions and sustained high emissions per capita are the largest contributors to cumulative GHG emissions. While India, a country that is not part of the problem, is playing its role as one of the front runners in solving the problem in a number of ways<sup>5,26</sup>, the developed nations are the ones who bear the responsibility for any climate catastrophe arising from their past and current inaction.

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