



# INDIA'S CLIMATE CHALLENGES

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*Photo Credit: Florian Lang*



## BACKGROUND

Climate change is the pre-eminent global challenge of our times. Despite mounting scientific evidence about the need for urgent action required to avoid a catastrophic rise in global average temperatures and irreversible climate change, the response from most governments especially of the developed countries has been inadequate. Developed countries have stubbornly refused to take on deep emission cuts commensurate with their historical contributions to the problem. The 2015 Paris Agreement (PA) creates a framework that does not provide for equity between developed and developing countries. It does not also meet the requirements of science, by allowing purely voluntary emissions reductions that are inadequate to meet the stated goal of restricting the average global temperature rise to 2 degrees Celsius (°C), let alone the more ambitious aspiration of 1.5°C. The biggest historical emitter, the USA, has shamefully withdrawn from the PA, and many other developed countries are joining the race to the bottom by going back on earlier commitments. On the other hand, the very architecture of the PA is pressuring developing countries to take on a larger share of the emission reduction burden at the cost of their efforts to address domestic poverty and development deficits, all without commensurate financial and technological assistance that developed countries are obliged to extend but are reneging on.

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India is especially vulnerable to serious impacts of climate change. It will not only have implications for India's unmet development goals of poverty eradication, infrastructure development and job creation but also adversely impact agriculture, coasts, urban areas, forests, environment and the health of its population. The overall and the few sectoral mitigation targets in India's Nationally Determined Contributions (NDC) are modest, but cannot be faulted for that given the poor commitments and actions of the developed countries. However, the NDCs do not cover many sectors, do not address domestic inequity, and grossly underestimate the climate impacts predicted and the developmental actions required to address them. The Conference, held on 20 November 2019 at India International Centre, New Delhi, discussed the above issues in three broad sessions. The first was a framing session that provided information and analysis on important developments vis-a-vis climate change in the international and national spheres. In the second session, expert inputs focused on impacts and the state response in sectors such as agriculture, energy, transport and urban areas. A closing panel with representatives of forest communities, women's groups, social movements and youth groups then responded to issues raised in the previous panels and also articulated contours of the way ahead in terms of a progressive climate policy for India.



# **SECTION 1:**

## **A WORLD HURTLING TOWARDS CLIMATE CRISIS**



## Key processes over three decades

Against the backdrop of a continuous rise of global GDP over the 20th century, and in particular over the last three decades, three major processes have been unfolding. Urbanization has ballooned, inequalities have intensified, and capitalism has spread and deepened. All three processes are structural and persisting. Nagraj Adve spoke about the global trends in climate change given these processes, the need for urgent action, and the problems with the Paris Agreement of 2015.

## Rising emissions

Half of all carbon dioxide (CO<sub>2</sub>) emissions since 1750 have been released in just the last 30 years. In 2017, CO<sub>2</sub> emissions amounted to 37 billion tonnes. Even if CO<sub>2</sub> emissions are cut by more than half, to 16 billion tonnes/year, CO<sub>2</sub> levels in the atmosphere will rise after a decade.

The difference in emissions across countries has been stark but changing. The following table indicates some trends:

Indicator	India	China	EU (28 countries)	US	World	Source
CO <sub>2</sub> emissions (in billion tons) (2017)	2.5	10.9	3.5	5.1	37.1	EDGAR
Per capita CO <sub>2</sub> emissions (in tons) (2017)	1.8	7.7	6.9	15.7	4.9	EDGAR
Cumulative historical emissions (1750-2017)	3%	13%	22%	25%		ourworldindata.org
Per capita consumption (tons CO <sub>2</sub> -eq)	2.2 (South Asia)	6.0	13.1 (West Europe)	22.5	6.2	Chancel and Piketty (2015)

*Courtesy: Nagraj Adve*



US CO<sub>2</sub> emissions, while rising in preceding decades, have dipped from a peak of 6 billion tons in 2015 because of an expansion of the use of shale gas, an increase in energy efficiency, and a decline in incomes and spending after the 2008 financial crisis. The US' methane emissions, however, have been rising. China's emissions have been rising overall and in per capita terms due to cheap coal, a relatively low-income workforce, rapid urbanization and infrastructure development. In per capita terms, in fact, it has overtaken the EU and is far ahead of India. On the other hand, its cumulative historical emissions are still significantly less than the EU's or the US's, as are its per capita cumulative emissions.

The difference between India and China, countries that are often clubbed together in the emissions debate, is made even clearer by the following table:

Indicator	India	China	Source
Economy (in USD)	2.9 billion	14.1 billion	IMF
CO <sub>2</sub> emissions (in tons)	2.5 billion	10.9 billion	EU/EDGAR
Energy used (mtoe)	809 (5.8%)	3,273 (23.6%)	BP Statistical Review 2019
Solar power patents	239	52,758	AmbujSagar 2019
Wind power patents	140	17,806	AmbujSagar 2019

*Courtesy: collated by Nagraj Adve from various sources*

## Impacts and urgency

The impact of climate change gets more obvious by the day. We are witnessing chaos in the natural world. Thousands of species are being forced to shift their geographical location, some by hundreds of kilometers. Many are facing phenological changes, the timing of annual or reproductive life-cycle events. Extreme events are more widespread and frequent. Extreme heat, which used to occur over barely 0.1 per cent-0.2 per cent of the planet's land area fifty years ago, now occurs over 10 per cent of the Earth's landmass. Glaciers are melting worldwide as are the ice caps.

Based on the Special Report on Global Warming of 1.5°C of the UN Intergovernmental Panel on Climate Change (IPCC), we now have only 11 years to act before the climate change becomes irreversible. Key ecosystems are threatened, and the effect is worsened as feedback loops are kicking in different planetary ecosystems. The climate crisis is unlike most other crises, in that without rapid and radical action, the window for us to intervene will soon close.





*Photo Credit: Florian Lang*

## Weaknesses in the Paris Agreement

The Paris Agreement (PA) covers mitigation, adaptation and financing. Different countries have submitted "nationally determined contributions" or NDCs. They are voluntary and self-defined, quantified and time-bound emission reduction commitments (absolute or relative to GDP) by each country. However, the PA has no mechanism to ensure that these NDC commitments add up to achieving the overall goal of limiting global warming to under 2°C above pre-industrial levels. Rajamani (2019) has shown that the central obligation in relation to mitigation in the Paris Agreement is to "submit NDCs, not to achieve them". Scientists now believe that the target of limiting warming to 1.5°C is already in the "rear view mirror", that is, unachievable. Even if the pledges made under the Paris Agreement are met, warming is likely to go up by 3°C.

The evident failure of the international community to contain the climate crisis is structural. The UNFCCC process and the Agreements arrived by it have been unable to address the underlying drivers that increased GHG emissions in the first place. Since 1997, when the Kyoto Protocol was enacted, carbon dioxide emissions have risen by 60 per cent even as 24 COPs have been held. This failure is giving rise to fanciful, uncertain or hazardous "solutions."

These include the ejection of sulphur particles into the atmosphere, and bio-energy with carbon capture and storage (BECCS). The latter will consume vast quantities of land and water. The former is extremely costly and unproven at scale.

## The energy Transition

Knowing that CO<sub>2</sub> emissions have been the major cause of this disastrous situation, are we on track to replacing fossil fuels with cleaner fuels? There are some positive signs. In the electricity sector, investment in renewable energy (RE) worldwide during 2011 to 2015 was much more than the annual investment in electricity from fossil fuels. The price of solar energy has fallen in India from Rs. 18/kWh in 2010 to Rs. 2.40/kWh in 2018. However, while there has been a large expansion in installed RE capacity, the actual generation of electricity through renewables is still modest. From 2001 to 2015, even as the share of RE in electricity generation worldwide rose from 1 per cent to 5 per cent, the share of fossil fuel electricity also rose from 63 per cent to 68 per cent. The outlook in the transport sector is even less rosy. Out of a billion cars currently used worldwide, only 0.4 per cent are electric. Besides, electric cars that run on electricity from coal do not end up reducing emissions. In industry, there is still a heavy reliance on coal and other fossil fuels for heating process-

es. With growing urbanization, there is also a growing demand for air conditioning, needing more energy. Agriculture is responsible for an emission of 6 billion tonnes of CO<sub>2</sub>-equivalent (2011) which includes methane, chiefly from cattle, and nitrous oxide mainly from fertilizer use. This points to the need for more sustainable agricultural practices.

Globally, the use of coal is still growing but at a slower rate. The demand for oil continues to rise, as does the demand for natural gas. Overall, although the energy transition may have begun, it is slow and not unidirectional. For emissions to fall at the required rate, fossil fuel use must decline urgently and sharply. Going by present trends, CO<sub>2</sub> emissions are likely to continue to rise in spurts in the near term, with some years being flat or even dipping slightly. Methane emissions will also continue to rise for a variety of reasons, including the use of shale gas in the US and elsewhere. The suggestion would be to pay more attention to China, whose emissions and energy use continue to grow from a very high base. China uses half the world's concrete and coal, and has 235,000 MW of coal capacity currently under construction. Its Belt and Road Initiative (BRI), spread across 156 countries and multiple infrastructure and energy projects, including coal-fired power plants, has massive implications for energy use and CO<sub>2</sub> emissions.

## **Growing climate movement: a tipping point?**

A few factors can be characterised as “known unknowns”: how long will the world economic crisis persist? What is the capacity of carbon sinks, such as our forests and oceans, to help us out of the crisis? Will the Left gain enough strength worldwide to aid a more equitable transition? What is known for certain is that the transition towards a low-carbon world will not be fast. In the US, various versions of the Green New Deal have even entered the electoral discourse and campaigns. In Europe, movements like Extinction Rebellion and Fridays For Future have been making headlines. In India and China though, the socio-political contexts are quite different. What is desperately needed at this point is a Left rethinking and resurgence, because in the absence of this, the energy transition will be cornered by private capital, which would be harmful for workers and low-income groups, especially in developing countries. In addition, the political effects of the climate crisis will be manipulated by the political and populist Right.

## **What is to be done?**

Awareness building by itself is inadequate. We need a sharp and urgent reduction in emissions by developed countries and China, as well as by better-off sections of the population worldwide. A particularly important reduction is by better-off consumers in urban areas. The current development trajectory has to be rethought; the “right to develop” has to attack a deeply unequal and unsustainable system at its roots. Finally, our ecosystems, wetlands, sustainable agriculture and forests will need not only protection but also revival. Tackling inequality with progressive politics will be indispensable for a just and effective response to the climate crisis.

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## **SECTION 2:**

# **INDIA IN A GLOBAL CHANGING CLIMATE: RESILIENCE, EQUITY AND DEVELOPMENT**



**D Raghunandan** laid out the inequitable architecture of the Paris Agreement, India's changing role in international negotiations and its NDCs. He also outlined the key impacts of climate change in India, the vulnerabilities in different sectors, the actions needed for building resilience, and an action agenda for NGOs, movements, State governments and the national government.

## Inequity in the Paris Agreement

The Paris Agreement (PA) is fundamentally iniquitous since it ignores historical emissions, 75 per cent of which have been dumped in the atmosphere since the industrial age by the industrialized countries (IC), and adopts a purely "forward looking" perspective i.e. is concerned only with future emissions. Since most IC emissions are either declining or close to doing so, because energy consumption has almost reached saturation levels there, this transfers the burden of emissions reduction to developing countries (DCs) whose emissions are, inescapably, rising given their early stage of development and their need to remove poverty and overcome other developmental deficits. As such, in the Cancun emission reduction pledges, those of the DCs were about 2.5 times that of the ICs. IC emission reduction commitments both in the Cancun pledges and even in PA are also much less than those called for in 2007 by IPCC/AR4 viz. about 40 per cent below 1990 levels by 2020 and 85-95 per cent below 1990 levels by 2050 (IPCC/AR4/WG3). As a result, the PA architecture perpetuates the occupation of the global atmospheric commons, and hence economic domination, by the developed countries. Further, by adopting voluntary emission reduction commitments in the form of the Nationally Determined Contributions (NDC) without any mechanism to ensure that the sum of NDCs will enable the goal of keeping global temperature rise to under 2°C, PA has triggered a race to the bottom, particularly by ICs. All this has landed the planet in the present climate emergency, with the sum of NDCs leaving an emissions gap of 15 GtCO<sub>2</sub>-eq (giga tons CO<sub>2</sub> equivalent = billion tons CO<sub>2</sub>-eq) in 2030 for 2°C and 35 GtCO<sub>2</sub>-eq for 1.5°C.

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*Photo Credit: Florian Lang*

## India and International Negotiations

India has a chequered trajectory of engagement in international climate change negotiations. It played an important role initially during the drafting of the UNFCCC, by introducing the concepts of equity between nations based on per capita emissions, and the equity principle of “common but differentiated responsibilities” of developed and developing countries. Later, regrettably, India went along with the US and other ICs’ positions at Copenhagen/Cancun and Paris in pursuit of a “strategic partnership” with the US and a desire to be considered an important global power. Its negotiating positions have been driven by foreign policy considerations rather than by the serious domestic impacts and hence vital national interest in limiting climate change, in particular through deep emission cuts by ICs.. Its changing stance has led to India losing its traditional developing country allies, who have increasingly come to view India too as part of the problem along with developed countries

## India’s Nationally Determined Contributions

India has pledged to reduce the emissions intensity (EI) of its GDP by 33 to 35 percent by 2030 relative to 2005 levels. This is an extrapolation of the pledge it made in Copenhagen/Cancun, where it committed to reducing its emissions intensity by 20 to 25 percent by 2020 relative to 2005 levels. Since India’s emissions intensity has declined by around 2.5 per cent per annum between 2005 and 2010, so target must be considered relatively modest .(see Climate Tracker 2018, 19). This however, cannot be faulted given the low ambition targets of developed countries with few of them found compliant with the 2 degrees C goal unlike India, leave alone 1.5 degrees C. The US even withdrew from the Paris Agreement, while Australia, Canada and Japan have all back-pedaled on their pledges. Only the EU has announced it will legislate its target of reaching net zero emissions (i.e. emissions = absorption by sinks) by 2050.

India’s main quantitative targets are as follows:

1. To build 175 GW renewable energy (RE) electricity installed capacity by 2022 and increase the share of non-fossil fuels to 40 per cent

of the total electricity generation capacity by 2030. Again, it should be noted that 36 per cent of installed capacity in India is already from non fossil-fuel sources. Observers have assessed that India is likely to achieve 40-41 per cent reduction of EI by 2030 and achieve its RE generation capacity by 2020-22! (See Climate Tracker, and Climate Action Support Trends 2019).

2. To increase forest/tree cover from 24 per cent to 33 per cent in the long term, and create a carbon sink of 2.5 - 3 billion tonnes of CO<sub>2</sub> equivalent by 2030 through additional forest/tree cover. The persistent conflation of forests and tree cover by India is very disturbing, since these two entities have very different carbon sequestration capacity, as well as perform quite different ecological and social services.

The rest of its pledges are minor mitigation targets, except for a strong push for electric vehicles which continues to be resisted by the automobile industry. It says almost nothing of adaptation or climate resilience, programmes and funding relating to which have been virtually non-existent.

India's NDC lacks a cross-sectoral, multiple-benefits approach, and so it provides no framework for transition to a low-carbon, equitable development pathway. It privileges mitigation over equity, and other co-benefits such as on local pollution/environmental impacts, public health, alternative job creation, technological capability. The dilution of environmental regulations and the diversion of forest land for other uses continue unabated. The NDC does not touch upon mass public transport or non-motorised modes of transport in urban areas, which would reduce air pollution, free up urban space for improved habitat, and promote public health. It does not tackle waste treatment, source for one of the fastest growing emissions in India, namely methane; it does not encourage a major road-to-rail shift or an integrated transport policy. In fact, national policies like UDAAN (Ude Desh ka Aam Nagrik) to promote regional air travel connecting tier-II and tier-III cities/towns, is a massive contributor to emissions from civil aviation, with passenger growth in aviation in India recording double-digit growth for the past decade and more.

## Climate change impacts in India

South Asia is among the ten worst affected regions of the world in terms of climate change. Its 7516 km long coastline is vulnerable to a rise in sea levels. Climate change also means a shift in the onset and retreat of monsoons which, along with increase of temperatures, will see agriculture badly affected, with substantial reduction in wheat and paddy yield, as well as nutritional content. We will see more cattle stress with impacts on milk yields. Fish stocks will likely migrate to newer habitats. We are already witnessing an increase in the number and intensity of droughts, heat waves and extreme rainfall events, with consequent rural and

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*Photo Credit: Florian Lang*

urban flooding. Sea-level rise will see inundation affecting many major cities on the coast, ingress of sea-water into fresh water aquifers in coastal belts, coastal erosion leading to loss of habitat, all likely to lead to climate refugees from coastal regions. All these impacts will have serious negative effect on people lives and livelihoods.

## Resilience and Adaptation in India

### Agriculture

The National Mission for Sustainable Agriculture (NMSA), that is supposed to focus on modified agricultural practices, improved and appropriate plant material for changed climatic conditions and rainfall patterns, (Note: it also speaks of GM crops), rain-fed agriculture development, soil health management, on-farm water management and climate change information dissemination, is at a standstill. Funding is poor and while a few trials and research projects have been undertaken, there has been little field extension. Many well-known problems which have been around for more than a decade, such as the Kullu apples now only growing at higher altitudes, are still waiting for the long-promised "quick chilling varieties." India needs to work on diversifying the

crop base, groundwater management, modified practices and cropping patterns, focus on dry-land agriculture, and rejuvenating the collapsed extension system in agriculture to guide climate resilient agriculture.

### Rise in sea levels

Many major cities in India are at risk due to rising sea levels, as are other coastal habitations, especially those of fishers. We are likely to see large scale migration due to this, especially as natural protective barriers, for example mangroves, are being threatened by commercial "development" in coastal regions, and vulnerability is worsening. What is needed to tackle coastal erosion is not just disaster management type practices, but improvement in protection measures.

### Urban infrastructure

India's urban infrastructure is highly susceptible to extreme rainfall events. The storm water drains in our cities are designed for average rainfall throughout the year, not for sporadic heavy rainfall, a pattern that is likely to occur more frequently going forward. This means that the entire drainage system has to be redesigned, along with revised urban planning to facilitate drainage of rainwater and groundwater recharge. Cities





*Photo Credit: Florian Lang*

are “urban heat islands” with average temperatures about 1.5 degrees C more than surrounding areas and thus centers of high energy use particularly through air conditioners. They are urgently in need of more green cover and water bodies. These would improve the urban micro-climate, help ameliorate climate impacts especially higher temperature, while also improving urban habitat and living conditions, and improve access to better urban commons for better living conditions and lifestyle. Waste management also needs drastic action to facilitate methane removal and use, cleaner and healthier urban environment, and dignified “green jobs” in recycling and reuse.

## Takeaways for India

Climate vulnerabilities sit on top of, and magnify, pre-existing structural vulnerabilities. The challenges of governance become more complex due to this. For example, resilience issues, such as in agriculture, land, water management, disaster management, and urban governance including waste management, are primarily State subjects. But States have severe capacity and finance inadequacies due to over-centralization of governance, institutions and finances in India over several decades despite 73rd and 74th Amendments. This underscores the

need for separate and substantial climate resilience budgets instead of piecemeal finance for resilience, and serious State-level and Urban Local Governance reforms. India needs to start need-based and goal-oriented action on climate resilience as soon as possible.

## What is to be done?

Climate groups and movements need to move away from obsessively tracking the minor details of international negotiations. Negotiations circle around only two main issues: national and global mitigation targets, and financing for developing countries. There is real danger of such groups and governments of smaller/poorer developing countries getting bogged down and diverting their attention to issues such as loss and damage, this or that financial mechanism etc because, when you come down to it, all finance issues really converge into one, namely transfers from developed to developing countries, and this is not really moving beyond relatively small amounts over so many years/COPs, regardless of the name given to such funds. There is a need to shift focus again to the US and laggard developed countries in the negotiations, to press for deeper cuts, and to hold them accountable, including through punitive actions. At respective national level, groups and

movements must push for urgent, adequate national targets. A greater dialogue with NGOs in the West, who struggle to appreciate developing country positions, is necessary.

India needs to radically improve its negotiating positions and strategy going forward. It can even consider offering higher reductions in emissions, but strictly conditional on deep emissions cuts by developed countries. To participate more fully in negotiations, India needs mass political support and greater capacity in government to understand and act on climate issues.

Lastly, climate groups and movements need to focus a lot more on domestic action against climate change, covering mitigation, resilience and adaptation, hopefully with an integrated multi-sectoral, multi-benefit and transformational perspective. This aspect of action has been sadly neglected so far.

**CLIMATE GROUPS AND  
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**SECTION 3:**  
**INDIA'S CLIMATE CHALLENGES:**  
**A SECTORAL DEEP- DIVE**

# Agriculture and climate change

Dr. Rajeshwari Raina sketched the importance of framing the question of agriculture and climate change correctly. Abstract discussions around 2 degrees Celsius global average temperature increase do not speak to farmers or policymakers. The political reality is messy, where the problem statement is presented esoterically and "neutrally". We need to connect the climate crisis to the lived and directly perceived issues of life and livelihoods. She then discussed the necessary reordering of the macroeconomic and political order to avert a climate-change driven agricultural crisis.

Indian agriculture is no longer largely a primary sector undertaking. A primary sector activity is normally marked by its ability (in agriculture) to convert solar energy to something that supplies more energy. Agriculture, in many parts of India now, is a net energy guzzler, and agriculture in the United States uses more energy than all of France. Climate variability and climate change will build on and worsen existing structural inequities in agriculture.

Agriculture has many different "meanings" depending on the frame of reference. The Table below shows, for instance, that the knowledge embedded in agricultural systems differs with their purpose and type. Turnhout et al (2016) argue that the dominant global environmental knowledge comes pre-packaged to be relevant for policy, thus being prescriptive of policy rather than being policy-neutral. It does not understand or help different people who live in different climate realities, for example with adaptation. The processes of dominant global climate knowledge creation themselves have to be interrogated, particularly when local agricultural knowledge is so crucial for climate change adaptation.

Meanings of agriculture	Kinds of knowledge	Types of agriculture/bio-economic realities	Purposes of agriculture
<b>Heterogeneous, diverse, ecological</b>	Localised, environmentally determined	Integrates food, fodder, fiber; usually	
<b>Under feudal/quasi-feudal conditions</b>	Consumption, exchange, cultural		
<b>Dependent</b>	Fragmented, external	Forced, commercial	Markets, profits
<b>Price-responsive, commercial</b>	Fragmented, intermediary driven	Share-cropping	Profits, markets, controls
<b>Differentiated</b>	Localised and fragmented, official	Share-cropping, tenancy, locally contested	Surplus extraction, profits
<b>Differentiated components – "one system" understanding</b>	Intermediary knowledge/technologies, instrumental control oriented		
<b>Economic dominance/labour subordination</b>	Uniform, standardised		

*Table compiled from presentation made by Rajeshwari Raina*





*Photo Credit: Florian Lang*

This calls for a review of the problem statement of climate change and agriculture. We usually take for granted that any kind of growth is always beneficial, including for the poor; that LDCs will have to follow the same development path as rich countries (i.e. through a polluting industrialization and commercialization); that externalities are likely to be internalized; that countries/regions are equally free to enter into such an exchange; and that uncertainties are negligible, for instance with respect to long-term health or environmental costs. Climate adaptation in agriculture demands changes in the overall macro-economic, trade, labour, and political regimes.

Instead of thinking in terms of global or nation-state terms, we need to think of agriculture in terms of planetary or local terms. Agriculture has been the major driver for the transgression of four of nine planetary boundaries: biosphere integrity, bio-geochemical flows, land-system change, and freshwater use. Climate change is one of the planetary boundaries that are at increased risk, and agriculture is a significant contributor to it as well. Domestically, we can begin by understanding the modern history of three phases of Indian agriculture, based on the relationship between the state and agriculture. In the Nehruvian phase (post-independence till the mid-1960s), agriculture was considered the basis of all development. In the Green Revolution phase (mid-1960s to late-1990s), the prevailing narrative

was that of modernising agriculture for development. In the Strong Contenders phase (late-1990s till date), agriculture and its alternatives in development dominate the discussion. These phases have articulated and institutionalised the kind of development that we recognise today.

To re-frame the question, we require post-growth concepts. Agriculture can no longer be looked at through the lens of human capital development or international food policy – an oxymoron, since food policy ought to be local. Nor can it be looked at as life-science based capital intensive global value chains. Framing agriculture as agro-ecology is perhaps our only way out. Climate change and agriculture have to be considered part of a given ecological space. Agro-ecology has not been widely adopted as an approach because it is not compatible with the global agri-food system today driven by global capital. This is why India is an exporter of high value and diverse crops to the developed world, and an importer of bulk food. Ultimately, India's agricultural climate change challenge cannot be solved without social movements. Whenever the state has acted favourably in this sector, it has done so only in response to social movements. To bring back rural manufacturing, to protect livelihoods, and to further local agricultural and other knowledge in a changing climate, social movements and public pressure must take root and strengthen.

## Energy and climate change

Haritha Songola outlined global and Indian renewable energy targets, the likelihood of them being achieved, the different technologies within renewable energy that are viable, the geopolitics of energy transition and the role of short-term profits in this transition.

As the leader or representative of the Global North, the United States' withdrawal from the Paris Agreement deepens the impending climate crisis. Historically, the Global North has been responsible for the majority of emissions. This implies that these countries of the Global North used up more than their fair share of carbon space, became richer and bear larger responsibility for the temperature rise already happening and that is expected to happen, whereas many countries in the Global South are still poor, and the impacts of climate change will affect them severely owing to their state of development, making them more vulnerable than the Global North.

Although this gap is evident, the world as a whole is expected to cut emissions. But this also means that the countries of the Global South must build expensive renewable energy (RE) plants while bearing the full force of climate impacts. The fact remains, however, that the Global South also has to act and do what they can (Note: Common but Differentiated Responsibility and Respective Capabilities) for the Earth to be livable. In this context, as already mentioned, one of India's NDCs is to increase its energy usage from renewable sources.

India's installed capacity for renewables has gone up from 38,959 MW in 2014-15, to 69,022 MW in 2017-18. This transition to renewables was expected, even though certain specific targets have only been decided in the last few years. Yet how India has dealt with this transition is unsatisfactory, as is the existing state of its power sector. In its plan to expand generation from renewables, it did not invest in research and development of renewable technology, nor did it invest in expanding manufacturing capabilities. Instead of the government taking up RE projects as public sector initiatives, it decided to push private players to bring in the technology. These private players became service providers and not manufacturers, since they do not have and are not interested in building indigenous technology capability, leading to renewable integration through buying equipment from other countries. In

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*Photo Credit: Florian Lang*

other words, the state preferred to give incentives to private companies to import, instead of investing in productive assets. These incentives include ease of imports (through cheap loans to buy from foreign sellers) as well as high tariffs for generation (plus no transmission cost). High tariffs were set to ensure that RE generators could recover their investments. Such policies ended up imposing a double burden on India as it not only did not invest in building manufacturing capacity in RE, but also locked itself into high tariffs for solar plants that have set their tariffs for a 25 year life span (starting from 2015-16 onwards).

As a result, we produce expensive electricity and consumers have to bear the cost in a country where despite the rhetoric on complete rural electrification a sizeable percentage of rural India do not have access to proper electricity. On the other hand in China, the government planned RE projects well in advance, and investments were made to develop self-reliant technological and manufacturing capabilities. It increased its R&D investment pool and managed economies of scales, thus integrating RE power without overburdening its people. Currently China is the largest manufacturer and exporter of solar panels. It is also India's largest exporter, having supplied Rs. 37 Billion worth of modules and cells in the first quarter of 2019. India failed to ensure protection of indigenous technology in renewables developed in the private sector because of WTO restrictions. If this technology was instead

developed as part of public sector initiatives to build a knowledge pool in the country, then it could have attempted what China did in renewable technology R&D and manufacturing. Overall, this private sector-driven approach to transition has led to privatizing profits while socializing losses. This is with the fact that RE generation also results in losses to the state owing to its intermittency and must-run status.

These losses will continue to increase beyond the existing capability to manage them, as the RE installed capacity is expected to increase significantly. One way to deal with this is to have a long-term electricity storage strategy according to expected RE integration levels. Existing flexibility in the power system is managing this RE balancing requirement but large targets of 2030 will definitely need expansion in storage capacity. Yet, current news and developments show that we are waiting to make the same mistake again. Of the storage technologies available, the most viable option based on per unit cost, longevity and familiarity with the technology, is Pumped Storage Plants (PSPs). Our current storage capacity is based on PSPs. The other technology trending right now, Battery Energy Storage Systems (BESS), is very new, and India has only few small installations in place. BESS requires battery replenishment every 5 years on average and it is still uncertain as to how this battery waste is to be handled. India does not have battery manufacturing units and the few systems that India does have in place currently are fully imported.

Yet there is a strong push in India for BESS, including for the purpose of grid level services. This is not sensible policy, and only indicates the existence of vested interests that stand a chance to gain profits at the cost of making electricity even more expensive and increasing consumer tariffs. Given the studies on balancing requirements for the grid in the short- to mid-term future where India's RE capacity is expected to increase further, serious consideration must be given to increasing PSP capacity, the more economically viable option instead of BESS. BESS will be useful in the mid- to long-term future, and therefore if investments must be made, they should be made in building manufacturing capability and expanding research and development in battery technology.

One crucial element of BESS is lithium. One of the largest lithium deposits yet to be extracted lie in the salt flats of Bolivia. The recent coup against Evo Morales shows how efforts to use crucial resources for mitigation without giving up on development of the people have to struggle against the tide of capitalist forces bent on making profits. This is the crux of the problem today, that given the global nature of climate change, mitigation needs and technologies are in conflict with the developmental needs of the people, even if there are solutions that can meet both criteria. Vested interests of private players always push for what they see as the most profitable pathway rather than the most effective and socially beneficial pathway.

Indian energy policies and actions have also been affected by this, where time and again instead of having long term plans of mitigation and development, the way was paved for short term profits for some individuals. The global carbon budget is planned for 2100 and it will be exhausted well before this time-line without serious consideration for long term planning. India must not only claim its fair share of this small leftover space, but it must plan its energy use and developmental goals with a strong scientific rationale.

## Urban transport and climate change

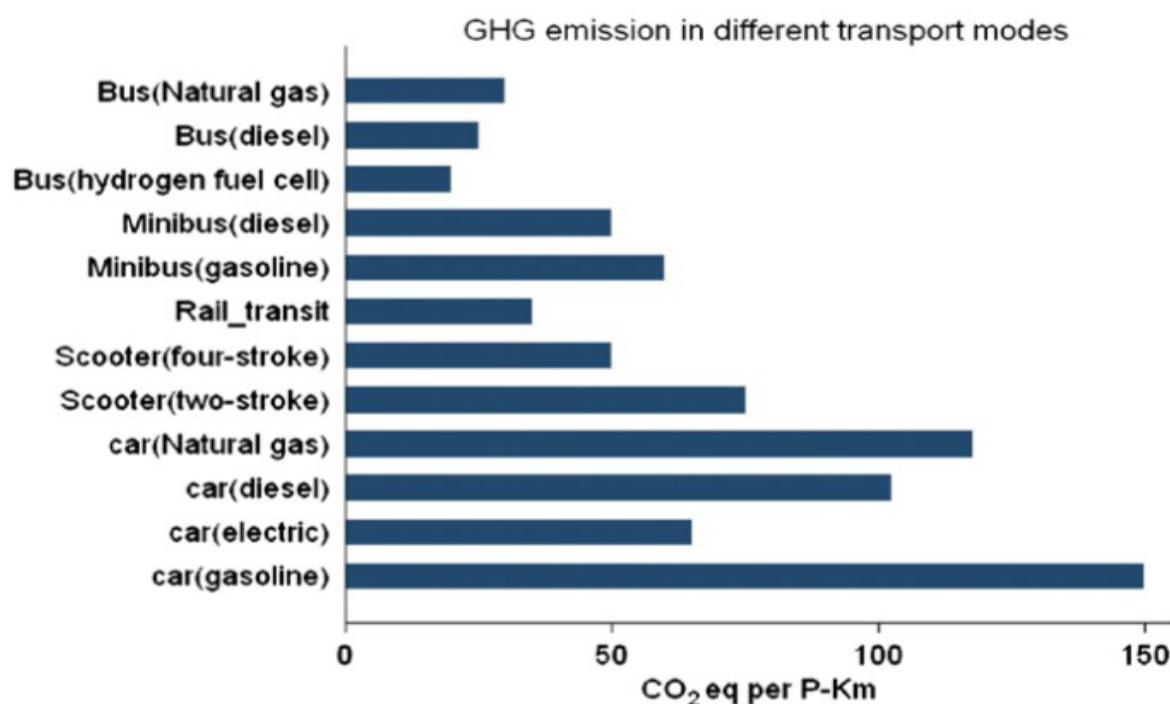
Geetam Tiwari detailed the meaning of low-carbon transport, the difference between the Metro and buses, the electrification of transport, the impact on emissions of different urban transport models, and the possibility of climate-responsive transport.

Transport-related issues form part of many sustainable development goals, covering infrastructure, access, road safety, public transport and the environmental impact of cities. Li (2011), adapted from Sperling and Salon (2002) has shown the greenhouse gas (GHG) emissions in different transport modes in Indian cities, interestingly

Mode of transport	Total GHG emissions (in g CO <sub>2</sub> -eq per person kilometre)
CNG bus	14.1
Delhi Metro	24.2

*Courtesy: Geetam Tiwari*





*Source: Li 2011*

demonstrating that an electric car is 1.5 to 2 times worse than a diesel bus in terms of emissions.

Metro systems are being promoted in cities with more than 3 million population as “the cleanest public transport system” having least adverse impact on environment. The question to ask here is if a bus passenger shifts to metro, does it reduce harmful impact on environment? Transport systems impact environment at several stages: manufacture, infrastructure construction, operation and disposal. As concerns for energy consumption, GHG emission and other emissions grow, impact in the complete life-cycle of the system must be taken into account. Using the life cycle assessment method on public transport in Delhi, the emissions of the Delhi Metro are higher than those of CNG buses. The following table shows peak time total GHG emissions per person kilometer:

The Metro produces 7.5 times more carcinogens and 1.8 times more GHGs as compared to CNG buses in Delhi. The difference is because there are significant energy and environmental impacts due to infrastructure construction, vehicle manufacturing and maintenance. Moreover, the electricity used to run the Metro produces harmful impacts on non-users at the source of electricity production. On the other hand, CNG buses in Delhi produce 4.8 times more ozone depletion than the Metro.

The other major area of policy in urban transport

has been electric vehicles (EVs). The National Electric Mobility Mission Plan (NEMMP) 2020 identifies critical areas where interventions would be required, including demand incentives. The Plan estimates that for battery EVs, the investment requirement would be about INR 13,500–INR 13,850 crores, whereas for buses that investment would be about INR 500–INR 550 crores.

Under the NEMMP, the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) Scheme was adopted. In its second phase, a total of 5095 electric buses were sanctioned for 64 cities. However, in any discussion about EVs in Indian cities, we must be conscious that most state transport undertakings are facing financial losses. Ridership in Delhi Transport Corporation (DTC) buses is down, and Telangana State Road Transport Corporation (TSRTC) has been rocked by strikes. The capacity of states to electrify urban transport is not encouraging.

We have an opportunity to arrest the increase of emissions in our cities by redesigning public transport. Every policy is aggressive about electric cars, but if space is increased for cars, the number of cars also increases. This means that we have to re-orient our efforts from trying to reduce congestion for cars, to trying to increase multi-modal and sustainable transport in our cities. We have to increase infrastructure for other kinds of transport so that urban transport can be climate-responsive.

## Cities and Climate change

Tikender Panwar spoke about what it means for cities to be resilient to climate change, the funding agencies for resilience and the incentives they can create, the importance of water systems and the role of neo-liberal reforms in shaping Indian cities.

A Global Humanitarian Forum report shows that more than 300,000 people die every year due to climate change related factors, and 4 billion people are extremely vulnerable due to them. 90 per cent of the loss takes place in the Global South. 99 per cent of all climate change deaths take place in the developing world. Least developed countries are extremely vulnerable, although they contribute to only 1 per cent of carbon emissions. These global contradictions even manifest in cities. For instance Leipzig, a city where all public transport is free and where personal cars are heavily restricted, relies heavily on the manufacture and sale of Porsche cars to the rest of the world!

Cities in South Asia are extremely vulnerable to climate crisis effects. They are also hubs of economic inequality. Between 1994 and 2012, while the consumption expenditure of the bottom 40 per cent in urban India had the slowest increase, the top 10 per cent registered fastest growth at 98 per cent. Yet, neo-liberal myths in city governance continue to be perpetuated, harming climate change resilience. The 74th Amendment to the Constitution of India furthered the idea that cities should “handle their own finances”. For cities to be run as “entrepreneurial forces”, a certain level of privatisation of the commons has to take place. Gurgaon is an example of the failures of neo-liberal governance in cities. Smart Cities, often using Special Purpose Vehicles (SPVs), by-pass public bodies. Their development is de facto run by Consultants or officials of bodies like the World Bank, with the sole responsibility of building infrastructure and no accountability of how to build it.

Cities end up choosing this model because it is dictated by funding agencies. The World Bank invests massively in infrastructure in Indian cities. In Shimla, an Asian Development Bank funded project created concrete drains that were com-

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pletely unsuitable for a hill city. The concrete drains replaced the earlier embanked drains, which restricted the natural re-charging of water resources as it didn't allow water to seep in, Shimla has since faced floods, a phenomenon unheard of before in the city.

This does not mean that cities cannot follow alternative models, but the governance challenges in Indian cities make this inordinately difficult. There are multiple authorities responsible for different aspects in different areas in a city but, for citizens facing climate impact, these differences in authority does not mean much. In addition, peri-urban areas contribute resources to cities, but there is no concrete governance model for them.

To turn the situation around in Indian cities, they need to be consciously integrated. India's severe shortage of town planners needs to be remedied. City Master Plans need to be more widely adopted and, wherever prepared, need to speak to climate realities, not just to narrow concerns of land use. Cities must be mapped according to hazard and vulnerability. The three pillars of any Disaster Risk Reduction strategy have to be mapping, integration and mainstreaming. Integrating the water system into city management has positive impacts on not just climate change resilience, but also on public health. Besides, for a lot of these actions, cities need to own their data as it has the potential to point towards strategies to improve climate resilience in cities.



*Photo Credit: Florian Lang*



## **SECTION 4:**

# **PEOPLE'S MOVEMENTS ON CLIMATE CHANGE: BUILDING A NEW POLITICS FROM THE GROUND UP**

Representatives from movements of forest workers, women farmers, youth groups and other social movements brought out the issues as perceived by their movements and their efforts to organise for climate issues, and their challenges in doing so.

Ashok Chowdhury from the All India Union of Forest Working People stressed that the climate crisis was a political and social issue, and that modern technology, rather than being neutral, has been used to strengthen capitalism. Exploiters of natural resources now want to invest in alternative energy.

Indian forests have been controlled through eminent domain by the state and elites since colonial times, forcing adivasis and other forest dwellers to become outsiders. The neo-liberal regime in India wants to expand mining and acquisition inside forests, but the Forest Rights Act is an important bulwark against this tendency. The Act has given tremendous positive energy to forest dwellers, especially where they are organised.

Ashok Chowdhury outlined three main challenges for the movement in terms of climate change:

1. Reclaiming lost resources that were looted by vested interests;
2. Creating a democratic republican order in forest areas, now that the entire political scenario has changed in forests; and
3. Organising in the midst of heterogeneity – representing, as a composite class of primary producers, adivasis who are Scheduled Tribes (STs), adivasis who are not STs, non-adivasis, and pastoralists.

Subhalakshmi Nandi of Mahila Kisan Adhikaar Manch pointed out that women and children were worst affected by climate change. The climate crisis impacts the way labour and resources are controlled. Women collect fuel, fodder and water; women manage the commons. Beyond the feminisation and defeminisation of labour, the climate crisis compels us to ask: how is the labour of women, and its drudgery, affected?

The National Rural Employment Guarantee Scheme helped in creating resilience in rural areas. But women have many more solutions for resilience, including bringing back traditional practices. Their solutions are not allowed to blossom due to state policy or lack of attention.

## **BEYOND THE FEMINISATION AND DE-FEMINISATION OF LABOUR, THE CLIMATE CRISIS COMPELS US TO ASK: HOW IS THE LABOUR OF WOMEN, AND ITS DRUDGERY, AFFECTED?**





account the health of not only residents in the area, but also construction workers. Diesel is more polluting than petrol, but diesel cars often cost less to own and run. Laws must not target diesel truck drivers but should tax wealthy city residents who use diesel cars. These are a few of many ways in which action against air pollution in Indian cities can be progressive.

The government as well as sections of the media scapegoated farmers for burning crop stubble and causing pollution in Delhi. Aside from the fact that many other factors are responsible for Delhi's pollution, farmers have only been responding to mechanisation, depleting water tables, changing crop cycles and drastically reducing farming revenues by burning crop stubble. If an appropriate mechanism is developed by the government to enable crop stubble to be removed and transported to bio-fuel plants, stubble burning can stop without further burdening India's already struggling farmers. In this respect, the youth in cities can stand with farmers against their victimisation.

The movement against climate change can serve as a good entry point for broadening the base of the Left among Indian youth, and at the same time, progressive movements will have to be active to ensure that the poor are not punished in the name of climate action.

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### **FOCUS ON THE GLOBAL SOUTH**

Focus on the Global South is an Asia-based regional think tank that conducts research and policy analysis on the political economy of trade and development, democracy and people's alternatives. It works in national, regional and international coalitions with peoples' movements and civil society organisations and has offices in New Delhi, Manila, Phnom Penh and Bangkok.



### **ALL INDIA PEOPLE'S SCIENCE NETWORK (AIPSN)**

The All India Peoples Science Network (AIPSN) is a network of over 40 peoples science organisations from across India. The AIPSN works at the interface of science with society on issues such as science and technology policy, self reliance, education, health and pharmaceuticals, rural technology, scientific temper or science and reason, and environment, with special emphasis on issues related to gender and social justice. It uses diverse communication strategies in its work such as publications, briefing notes, slide shows, video films, public meetings, songs and street theatre.



### **ROSA LUXEMBURG STIFTUNG (RLS)**

The Rosa Luxemburg Stiftung (RLS) is a Germany-based foundation working in South Asia as in other parts of the world on the subjects of critical social analysis and civic education. It promotes a sovereign, socialist, secular and democratic social order, and aims to present alternative approaches to society and decision-makers. Research organisations, groups for self-emancipation and social activists are supported in their initiatives to develop models which have the potential to deliver greater social and economic justice.

How bad is the climate crisis globally, and what can be done to overcome it? What are the impacts of climate change on India, and what steps must it take to avoid disaster? How can we frame climate policies that are responsive to people's concerns, that take into account livelihoods, equity and development? How can different social movements respond to the climate crisis?

Climate experts, sectoral scholars and representatives from social movements answered these questions in this round-table discussion. They analysed the global climate policy architecture, India's opportunities and challenges, just energy transition, the implications of climate change on agriculture, transport and Indian cities, and the paths social movements are taking and should take to ensure climate justice and a secure future for people worldwide.

This discussion paper summarises a day-long discussion that spanned science, policy, political theory, international relations, people's experiences, and organization. It can serve as an introduction to the major issues, both cross-cutting and sectoral, for India in a changing climate.

