INDIA IN THE WORLD

Report on

India's Climate Mitigation and Adaptation: Key Strategies

Bonn, Germany
17 November 2017

Cover photo:
A Common Myna at the Aravalli Biodiversity Park
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Ronit Bhattacharjee

India in the World: Emerging Perspectives on Global Challenges

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India in the World: Emerging Perspectives on Global Challenges (INDWORLD) is a project under the institutional cooperation between the Institute for Defence Studies and Analyses (IDSA) and the Peace Research Institute Oslo (PRIO), funded by the Norwegian Ministry of Foreign Affairs since 2005. The cooperation aims to develop new knowledge and expertise on non-traditional security. Main topics of the cooperation in 2015-2018 are Food Security and Globalization, India´s Role in Global Nuclear Governance, and Climate Change and Common But Differentiated Responsibilities-Respective Capabilities (CBDR-RC).

This report summarizes discussions at an event co-organized by IDSA and PRIO in Bonn, Germany on 17 November 2017, during the COP23 summit, on **India's Climate Mitigation and Adaptation: Key Strategies**. The event provided an opportunity to share knowledge and discuss Indian and Norwegian viewpoints, initiatives and key strategies in green policy and technology development, to interact and discuss India's plans, perspectives, and approaches to climate change, and to learn how India is launching a new "green evolution".

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Summary

In conference of parties (COP) negotiations under the United Nations Framework Convention on Climate Change (UNFCCC), India continues to demand an equitable burden-sharing, as expressed in the principle of Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC) and the quest for green technological transfer. Meanwhile, the South Asian giant is also pursuing policies to Make in India, and this includes green technology, clean energy and healthy food.

Norway has an ambition to increase its green policy and technology cooperation with India. At an event co-organized by IDSA and PRIO in Bonn, Germany during the COP23 summit, participants discussed India's perspectives, initiatives and key strategies in green policy development, and the potential for further collaboration between India and Norway, identifying the following areas of convergence in potential green R&D cooperation:

- CO_2 sequestration in Enhanced Oil Recovery,
- mini-hydro power plants and retrofitting of turbines for rivers with high sedimentation,
- REDD+ pilots in ecosystem recovery, forest restoration, and ecological restoration of degraded lands,
- smart grid solutions for solar power and renewable energy, and
- R&D in biogas from waste through technological improvement.

Background

India is experiencing the impact of climate change as a contemporary reality, rather than a distant threat. Exceptional levels of natural variability in the climate is not new to India but adapting to greater intensity of changing weather events on account of climate change is a new challenge. India has responded through policy measures elaborated in its Nationally Determined Contribution (NDC) and state level action plans. These federal and state level policy measures include options for the use of efficient technologies that reduce overall emissions as well as policies that increase adaptation capabilities with the broad objective of facilitating equitable and sustainable economic growth.

Amidst concerns about erratic weather conditions with record temperatures, drought and flooding, there have been warnings of a sharp increase in forest fires, in central India and the Himalayan region in particular (Rao 2016). The self-propelling nature of the links between forest fires and global warming exemplify the spiral-like mechanisms by which climate change may accelerate. Increasing temperatures combined with decreasing rainfall contributes to a greater frequency of forest fire, while more frequent forest fires exacerbate global warming through the loss of carbon sink resources and an increase in atmospheric carbon-dioxide (CO_2) (TNAU Agritech Portal). Water shortage is another growing challenge, especially as irrigation farmers compete with water-dependant industries, and even public water supplies. In short, Indian policymakers recognise the challenges of climate change adaptation, including preparedness for floods and landslides, disaster management and large-scale relief efforts after extreme weather events. Across political affiliation, policymakers agree that India needs to be better equipped, whether to mitigate climate change, prepare for climate-related hazards, or adapt to a changing climate.

India is a rapidly growing and industrialising economy, and the world's second most populous country. As such, India´s stand in climate change negotiations has far-reaching implications. Developed countries have often ignored or dismissed India's developmental aspirations and its principal position of equity and Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC). Geopolitical realignment and the emergence of new blocks has weakened the idea of a global emission reduction target to be allocated to developed countries, and the differentiation between developed and developing nations in the United Nations Framework Convention on Climate Change (UNFCCC). At COP21 in Paris in 2015, world leaders agreed to adopt the Bonn Challenge, i.e. restoration of 150 million hectares of degraded lands to their natural ecological state by 2020, and another 350 million acres by 2030 as a part of climate change mitigation. To help developing countries like India achieve their goals, the Paris Agreement included the provision of finance and technology and collaboration to develop environment-friendly technologies and create a Green Climate Fund. The Trump administration´s withdrawal from the Paris Agreement was a discouraging moment, but India's commitment to meet the climate change challenge stands firm. Prime Minister Modi made clear the Indian conviction during his June 2017 visit to Paris, in a joint press conference with French President Macron, when he stated: "The protection of the environment and the mother planet is an article of faith" (De Clercq 2017).

The Indian government aims to promote sustainable living based on moderate lifestyles, and to adopt a cleaner and more environment-friendly development path as compared to the paths taken earlier, by now developed countries. On the other hand, India´s energy needs are still growing rapidly, and India will rely on fossil fuels for the foreseeable future, in particular coal, which will continue to play an important role in India´s energy mix, even as the use of renewables, nuclear energy and biogas is increasing. It is also important to recognize that emission cuts represent only one part of the solution to the climate change challenge. Another important measure for stocking CO_2 is reforestation, protection of remaining forests, and ecological restoration of degraded lands to their natural environmental state. Ecosystem recovery not only serves as a sink for CO_2, but has other important benefits for the environment such as water storage, soil protection and biodiversity preservation, generating a range of ecological services that contribute to human well-being.

Potential for green cooperation

Norway´s approach to climate change mitigation keeps a strong focus on renewable energy, which is also set to be a key area of convergence for joint initiatives between Norway and India, especially where innovative green technology needs to be tested, and scoping studies are required. In addition to these areas, we should not forget that cleaner fossil fuel production, a field in which Norway is at the technological forefront, would make a big difference to India´s climate footprint. Finally, India and Norway have a shared interest in the massive carbon capture potential of forests, and as such regeneration of forest ecosystems and ecological restoration of degraded lands are highly promising areas of green cooperation.

1. CO_2 sequestration in Enhanced Oil Recovery

Enhanced oil recovery with carbon capture (CO_2-EOR) is a technology to increase oil recovery in wells and simultaneously inject CO_2 so as to permanently store it in the subsurface. After 40 years of experience with CO_2 injection, the technology is mature for onshore use. Norway has 20 years of experience with storage of CO_2 in geological formations, and has done much to map and evaluate possible storage sites to create a CO_2 storage atlas of the Norwegian continental shelf (Pham and Halland 2017).

In a possible joint venture between India and Norway, CO_2-EOR screening studies could be done in India to evaluate the potential for using CO_2 to increase recovery in Indian oil fields combined with Carbon Capture and Storage (CCS) technologies. India and Norway could work together to map possible storage sites, and to create a CO_2 storage atlas for India. Opportunities for CO_2 sequestration might exist in oil fields in Gujarat, Rajasthan and Assam. Scoping studies could be done in Gujarat oil fields to explore the possibility of carbon capture from coal-fired thermal power plants adjacent to oil wells. Use of CCS in thermal plants (sub-critical and super-critical) that are suitably located near oil wells may be considered for demonstration in pilot projects.

2. Mini-hydro power plants and retrofitting of turbines for rivers with high sedimentation

India and Norway have both set ambitious goals for the replacement of cars running on fossil fuels with electric vehicles (EVs). In order to reach these goals, India needs to increase its electricity supply, and this will put further pressure on the need to develop India´s hydroelectric power potential. As India´s large hydropower turbine park is becoming dated and turbines will require replacement or retrofitting in the years to come, there will be much to gain from early trial projects to develop and test new turbine retrofitting technology and mini-hydroelectric Run-of-the-River (ROR) plants in local Indian settings. This provides an opportunity to test new technology for optimal turbine performance in high-sedimentation rivers, potentially enhancing plant longevity as well as hydroelectric power production.

3. REDD+ pilots in ecosystem recovery, forest restoration and ecological restoration of degraded lands

India and Norway agree on the promotion of sustainable lifestyles, and sustainable production and consumption. We also agree that forest coverage and ecosystem restoration is indispensable for climate mitigation. Norway hopes to work with India on reforestation, and we see India as an excellent location for pilot studies in support of the REDD+ programme. Joint projects could involve student and researcher exchange to allow Norwegian and Indian researchers to study the methods used in projects with proven success, such as the Yamuna and Aravalli Biodiversity Parks in Delhi, developed and managed by the Delhi Development Authority (DDA) in collaboration with the Centre for Environmental Management of Degraded Ecosystems (CEMDE) at the University of Delhi. The knowledge that has been generated through decades of biodiversity park development in India should now be harvested and shared for the benefit of humanity. Further, Indian biodiversity parks can be used as models for global replication, not only for the recovery of natural heritage but as climate resilience systems and filters for non-point-source air pollution in urban landscapes. The idea of carbon sequestration through ecological restoration ties perfectly into the "plus" of REDD+ . The aim is to help India and the globe, not only to restore forests, wetlands and other ecosystems for biodiversity and CO_2 sequestration through environmental protection, but also to develop best practices for enhanced knowledge generation and sharing to promote the benefits of eco-restoration. The successful ecological restoration of mined out areas by CEMDE, creating natural forest ecosystems within a span of 5-10 years, can serve as a global model. Within India itself, more than 56% of the total land area is degraded. Ecological restoration can contribute to the global carbon balance as well as enhanced environmental health.

4. Smart grid solutions for solar power and renewable energy

Electrification of all households, providing adequate power for the agricultural sector and 24/7 availability of power to every citizen by 2019 are among India's key energy policy goals. India also has the ambitious plan of installing 175 GW of renewable energy by 2022. When more solar and renewable energy is brought into the electric grid, maintaining grid

stability is a challenge. This is an area where new technological solutions are sorely needed. Given that renewable energy is intermittent, the necessity of having a grid that is highly adaptive in terms of supply and demand has been acknowledged by all stakehholders. In 2015, the Ministry of Power, Government of India, established the National Smart Grid Mission (NSGM) to plan and monitor the implementation of policies and programs related to smart grid activities. Smart Grid projects are promoted under the NSGM through a funding support of 30% on capital expenditure (Government of India, Ministry of Science and Techology, 2017). NSGM promotes deployment of Smart Grid technologies like Advanced Metering Infrastructure (AMI), substation renovation and modernization with deployment of Gas Insulated Substations (GIS) wherever economically feasible, distributed generation in the form of rooftop solar PVs, real-time monitoring and control of distribution transformers, development of medium sized micro-grids, and creation of Electrical Vehicle (EV) charging infrastructure for supporting the proliferation of EVs in India.

The opportunities for building smart grids in India are immense, at distribution as well as transmission level. WIth Norway´s equally ambitious EV and renewable energy goals, this is an area in which Norway and India will benefit greatly from working together.

5. R&D in biogas from waste through technological improvement

Another green technology area of potential interest to both India and Norway is waste management, especially biogas production from waste. In India there is a potential for biogas to replace natural gas in household cooking, as well as institutions and industries. Under the demonstration phase in the early 2000s, the Ministry of New and Renewable Energy (MNRE) of the Government of India sanctioned financial assistance for a limited number of biogas from waste projects for implementation, following an entrepreneurial mode in the states of Chhattisgarh, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Madhya Pradesh, Andhra Pradesh and Rajasthan. According to the MNRE, eleven biogas bottling projects of various capacities and technologies have been commissioned in the country after obtaining the required licenses for filling and storage of compressed biogas in CNG cylinders from the Petroleum and Explosives Safety Organization (PESO), the Pollution Control Board (PCB), and other governmental agencies. The Indian Institute of Technology (IIT) has been assigned the responsibility for technical monitoring and administration of the promoters, and preparation of documentation on different types of technology that may emerge out of these projects.

There is a need to develop and improve technologies for efficient functioning of biogas plants in India, creating a scope for joint ventures between Norway and India on the production of bioenergy and other value-added products from waste and sewage sludge. A key aim of the Norwegian strategy for biogas, presented in October 2014, is to stimulate biogas production through research and development. Norwegian research includes microbial studies and studies on the use of hyperthermophiles for the pretreatment of waste, focusing largely on production. This complements the Indian need for environmentally friendly waste management solutions and scope for application of improved biogas technology in India.

References

De Clercq, G., 2017, France, India to cooperate in fighting climate change, Reuters, 3 June 2017, online at: https://uk.reuters.com/article/uk-france-india/france-india-to-cooperate-in-fighting-climate-change-idUKKBN18U051

Government of India, Ministry of Science and Techology, 2017, India Country Report: Research, Development, Demonstration and Deployment of Smart Grids in India, online at http://dst.gov.in/sites/default/files/India%20Country%20Report%20on%20Smart%20Grids.pdf

Pham, V. and E. Halland, 2017, Perspective of CO_2 for Storage and Enhanced Oil Recovery (EOR) in Norwegian North Sea, Energy Procedia, 114, July 2017: 7042-46, online at: https://doi.org/10.1016/j.egypro.2017.03.1845

Rao, M., 2016, Too hot to handle — alarming rise in forest fires this year, The Hindu, 22 December 2016, online at: http://www.thehindu.com/news/national/karnataka/Too-hot-to-handle-—-alarming-rise-in-forest-fires-this-year/article16922685.ece

TNAU Agritech Portal, Disaster Management, Tamil Nadu Agricultural University, online at: http://agritech.tnau.ac.in/agriculture/agri_majorareas_disastermgt_forestfire.html

Key documents

EU-India Joint Statement on Clean Energy and Climate Change, 2017, online at: https://ec.europa.eu/clima/sites/clima/files/news/20171006_statement_en.pdf

India. Second National Communication to the United Nations Framework Convention on Climate Change, 2012, Ministry of Environment and Forests, Government of India, online at: http://unfccc.int/resource/docs/natc/indnc2.pdf

India´s Intended Nationally Determined Contribution: Working towads climate justice, 2015, online at: http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf

India's National Action Plan on Climate Change, Government of India, Prime Minister´s Council on Climate Change, online at: http://www.moef.nic.in/sites/default/files/Pg01-52_2.pdf

Opportunities in diversity: The Norwegian Government's strategy for cooperation between Norway and India, 2009, online at: https://www.regjeringen.no/globalassets/upload/ud/vedlegg/utvikling/indiastrategi_norsk_engelsk_endelig.pdf