

CLIMATE CHANGE, SUSTAINABLE DEVELOPMENT AND INDIAN ECONOMY

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Abstract

Developed world degraded and harmed the fabric of the environment in their development paths. It resulted in climate change and threatening the world economy. Hence, the developed world is forcing the developing world not to commit the same high carbon mistakes, they made in their journey of development.

India does not have historical contribution to climate change. India contributes 1.18 tones of per capita CO₂ emissions. Whereas USA contributes 19.10 ton, Russia contributes 11.24 tons, UK 8.60 tons and china 4.58 tons. The largest contributor to GHGs emissions in India is from energy sector which contributes 38 percent, followed by other industries with 12 percent, agriculture 18 percent, manufacturing industries 9 percent, transport 7 percent, cement 7 percent, iron and steel 6 percent and waste 3 percent.

India is already compelled to spend almost 2.5 percent of its GDP on the programmes that help adaption to climate change. Climate change policies will be more effective if it integrated into sustainable development policies. The sustainable development aims to use the resources judiciously, keep the environment clean with ecosystem intact. Hence the climate change policies will get more boost integrating it into sustainable development policies. For example climate change policies aim at reducing the emissions and sustainable development aims at holistic economic development and better world for future generations too. Hence when these policies are integrated it will have more positive effect and contribute to mitigate the negatives.

Key words: Environment, GHGs, Climate Change, Sustainable Development, GDP

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Introduction

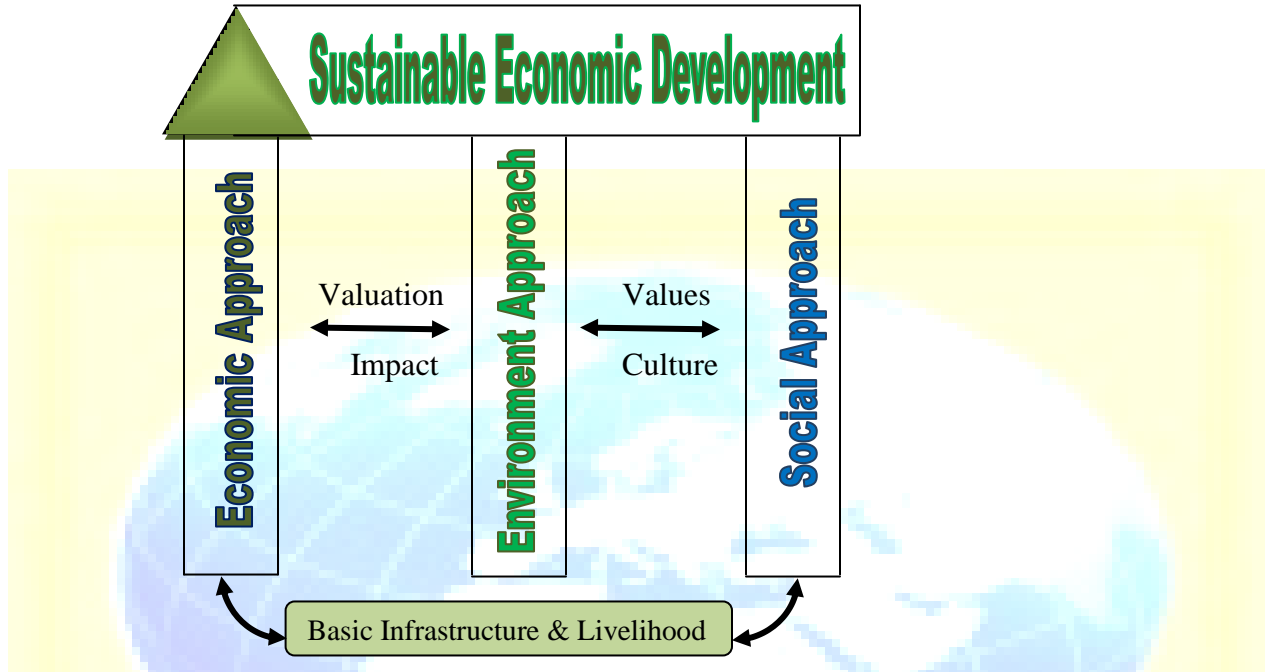
India is one of the fastest emerging economies of the world. The developed world and the Indian neighbors are cautiously watching the India's development path. The developed world, in their journey to development followed the unsustainable environment paths. They degraded and harmed the fabric of environment. Which in turn affected the world environment. It resulted in climate change and is threatening the world. The developed world utilizing the ghost of climate change is imposing environment related trade restrictions on the emerging economies including India and trying to curb their competitiveness. Some in the developed world also used this opportunity to forge and strengthen the bilateral relationship with the developing countries. The British Prime Minister David Cameron during his to India in 2010 said "The third challenge we must meet together is climate change (first two being economic, global challenge). Decisive action is long overdue and that must be global action, with all major economies playing their part. It's only fair that those with longest history of carbon emissions make the biggest contribution to this. But it's also fair that the largest polluting countries contribute too. Indian action is of course different to UK's Action. We know that India's development needs mean that its energy needs and carbon emissions will have to grow. But by working together, we can help you avoid some of the high carbon mistakes we made"

The British High commission at same time issued the statement calling for a stronger bilateral tie and also underlined 'we cannot allow India to commit the same mistake, which we have committed for 200 years'.

Developed world, hypocrisy though do need justifications, but still when the of world environment is threatened, when climate change is affecting safety blanket suitable for life, India and emerging countries are taking stock of the situation. The question that arises is to what extent India is contributing to climate change? Which are the sectors that are contributing to climate change in India? How can India attain its growth balancing the climate change concerns? What is the way ahead for India? The way ahead for India is sustainable inclusive economic development.

Sustainable economic development is 'development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs'

(Brundtland Commission, 1987). The most common interpretation of sustainability is based on three pillar approach namely 1) Environment approach 2) Social approach and 3) Economic approach



The three pillars are independently crucial but inter connected and hence should be simultaneously addressed (SEEA 2003). ‘There is a risk of unwittingly causing (or worsening) problems in one system, while attempting to correct problems in another. The only sure way to avoid this is to integrate decisions such that efforts in all three systems are considered before action is taken’ (Robinson and Tinker 1988, as quoted in SEEA 2003)

Economy draws the resources from the environment and also uses it as sink to absorb the unwanted by product of production and consumption. Hence addressing the environment issue set rights the production and consumption path in the economy. While doing so the empowerment of masses also should be considered. If the problem of climate change is to be addressed, it refers to correcting the production paths. India hardly have any historical contribution to climate change. The table No. 1 gives the comparative emission analysis during the year 2008.

Table No. 1: 2008 Emissions Data for Selected Countries

Region/ country	Popul ation (milli on)	GDP (billion 2000 US\$)	GDP PPP(billi on 2000 US\$)	Energy Cons. (MTOE)	CO ₂ Emissi ons MT CO ₂	Per capita Energy Cons. (kgOE)	Energy Intensity kgOE/\$G DP ppp	Kg CO ₂ / \$GD P PPP	Per capita electri city Cons. (Kwh)	Per capita CO ₂ Emission (tones)
China	1327	2623	10156	1970	6071	1.48	0.19	0.60	2346	4.58
Brazil	192	808.95	1561	235.56	347	1.23	0.15	0.22	2154	1.80
India	1123	771	4025	421	1146	0.53	0.10	0.28	543	1.18
South Africa	48	178	517	134.3	346	2.82	0.26	0.67	5013	7.27
UK	61	1766	1833	211	523	3.48	0.12	0.29	6142	8.60
USA	302	11468	11468	2340	5769	7.75	0.20	0.50	13616	19.10
Russia	141.7 9	429.55	1651.17	786	1593.8 3	5.54	0.48	0.97	6443	11.24
World	6609	39493	61428	12029	28962	1.82	0.20	0.47	2752	4.38

Source: Climate change & 12th Five year plan, report of sub group on climate change, Government of India, planning commission, New Delhi

In 2008, the world had 6609 million population. The CO₂ emissions was 28962 MT CO₂, while the per capita CO₂ emissions of the world average was 4.38 tons. Developed economies had more per capita CO₂ emissions than world average; USA with 302 million populations consumes energy of 2340 MTOE and emits 2340 MT CO₂ where the per capita CO₂ emission was largest at 19.10 tons. It is followed by Russia with 141.79 million populations with 1593.83 CO₂ emissions (MT CO₂) where the per capita CO₂ emission was 11.24 tons. China, the fastest emerging economy is the highest contributor to the CO₂ emission with 6071 MT CO₂, but as it is the home of 1327 million population, its per capita CO₂ emission was 4.58 tons. India share to CO₂ emissions was 1146 MT CO₂, as it is home for second largest population with 1123 million, its per capita CO₂ emission was coming to 1.18 percent. Though the contribution is negligible, India must aim for green sustainable inclusive development so that in the long run India emerges as clear winner in economic development.

It is true, that rich countries produce most of world's greenhouse gases. But disadvantaged sections of the developing economy suffer most from them. India should intensify its pressures on developed world to cut emissions and at the same time bargain to transfer the clean technology to developing world to adopt green and clean technology to reduce greenhouse gases emissions.

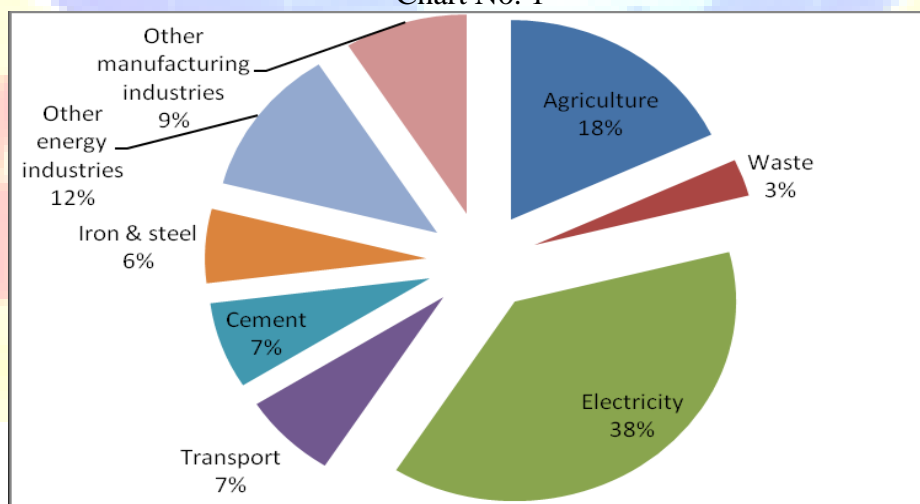
The largest contributor to greenhouse gases emissions in India is from energy which contributes to the extent of 38 percent followed by other energy industries with 12 percent, Agriculture contributed 18 percent followed by other manufacturing industries 9 percent transport 7 percent cement 7percent, iron and steel 6 percent and waste 3percent.

Energy, Worst Contributor

The major factor contributor the climate change is burning of fossil fuel. The present usage of energy sources implies dominance of fossil fuels in the energy combination of India. At present the major source of energy in India are 1) Thermal 2) Hydro 3) Nuclear and 4) others (solar, wind). Thermal contributes to 63.53 percent (131.2 thousand MW), Hydro contributes 18.20 percent (37.6 thousand MW), Nuclear contributes 2.32 percent (4.8 thousand MW), and others (solar, wind, etc) contributes 15.93 percent (32.9 thousand MW) of the total production of 206.5 thousand MW.

Apart from it the substantial increase in the use of aviation fuel, lubricants, Naphtha, fuel oil, light diesel oil, kerosene oil, and high speed diesel also contribute to climate change in India.

Chart No. 1



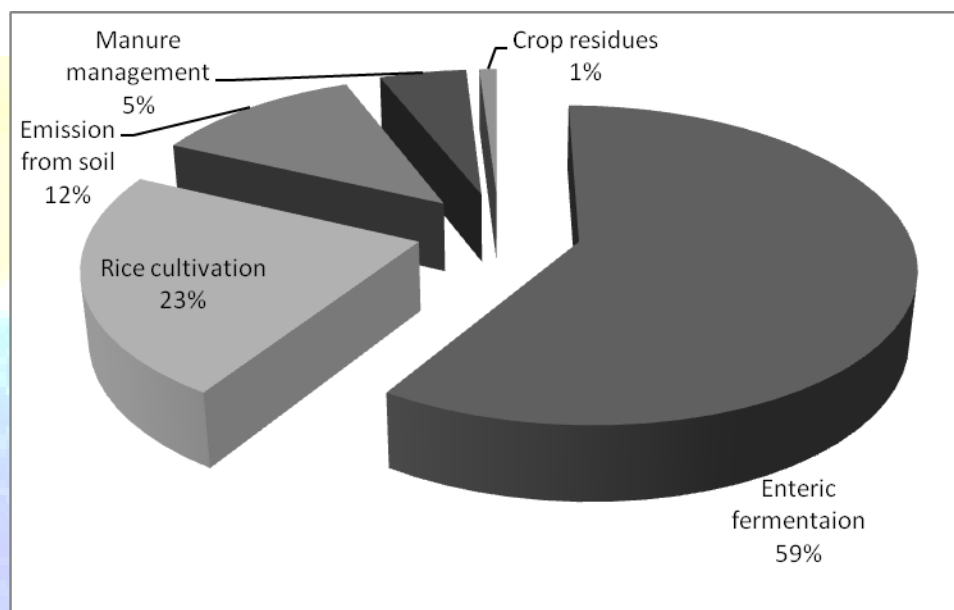
Source: Report of Sub group on Climate change (2011), Planning Commission

Green house gas emissions from Indian agriculture and animal husbandry

It is interesting to note that, Indian agriculture and animal husbandry is not only affected by climate change, but Indian agriculture and animal husbandry is also contributing to climate

change. Methane emission from irrigated paddy cultivation fields, enteric fermentation in ruminant animals, nitrous oxides from application of manures and fertilizers to agriculture. Soil constitutes the major green gas house emissions from agriculture and allied sector in India. It contributed 28 percent of the total green gas house emissions from India in 2007.

Chart No. 2



Source: Report of Sub group on Climate change (2011), Planning Commission

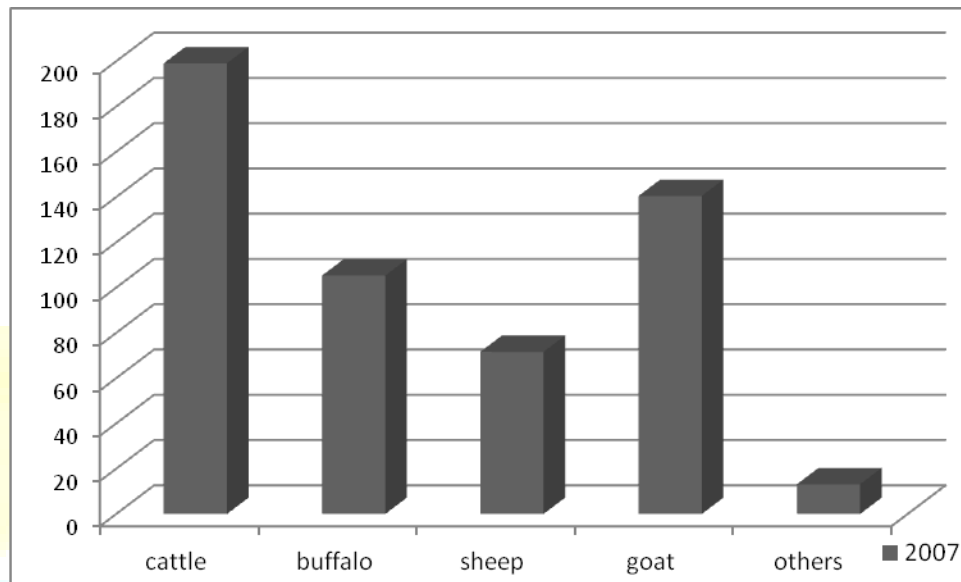
The green gas houses from agriculture, if it remains unabated will increase as the demand for food will increase and productivity in agriculture will decrease. Enteric fermentation amounts to 29 percent of GHGs in Indian agriculture, whereas Rice cultivation contribute 23 percent, emission from soil contribute 12 percent, manure management contribute 5 percent and crop residues contribute 10 percent for GHGs in India agriculture.

Methane emissions from Indian live stock

The natural digestive process in ruminant animals (cattle and sheep) that produces methane as by product is called as enteric fermentation. Indian is having largest cattle population in world with 199.1 million, they generate 274.96 million tones dung (Dry mater basis).

The total cattle stock in India during 2007 is 529.7 million. The following chart gives the details of India's livestock population in India.

Chart No. 3



Source: www.nddb.org

Cattle's are irreplaceable part of our system. Removal of Indian cattle is neither possible nor desirable as livestock is the life line of common Indian and provides large benefits to nation. ((Report of sub group on Climate Change 2011, planning commission)

More so the rural Indian economy depends on cattle not only for milk (female cattle) but also as a source of power and fuel. They contribute to the economy to the tune of 35,000 mega watt energy. If the rural economy had not dependent on this, they would have used more diesel/petrol for their agriculture activities and use of dung as fuel had saved the cutting of forest which are most powerful carbon dioxide sink (Report of sub group on Climate Change 2011, planning commission)

Policy measures to reduce green gas emissions

Majority of the policy suggestions are put forth discussed and debated by IPCC, various institutions, agencies and governments, few of them are

Green energy

Green energy which is clean should be produced and used. The major impetus for green energy is given by promotion of the non conventional energy sources like solar, wind etc, The non conventional reduces the carbon emissions. In addition to it, biofuel policy should be adopted to reduce the stress on petroleum products and also mitigate CO₂ issues.

Agriculture

Agriculture is the backbone of Indian agriculture. In order to mitigate the impact of climate change on agriculture the stress should be to shift to organic and natural farming. Research and Development should be aimed at developing new crop varieties which can resist the impact of climate change such as drought, flood, salinity pest and diseases. The integrated effective pest management should be implemented to mitigate the pest and disease invasion.

The stress should be to shift to organic and natural farming. Instead of constructing the large dam the small dams can be constructed. Micro irrigation schemes should be encouraged.

Shifting to organic and natural farming though desirable is not an easy task. It takes lot of preparation and time for all the involved stake holders. The report of sub group on climate change (2011) by planning commission lists out the important policy recommendations relevant for Indian conditions.

- 1) Improved water and fertilizer management in rice paddies to reduce emission
- 2) Improved management of livestock population including its diet
- 3) Use of nitrification inhibitors, such as neem coated urea and fertilizer
- 4) Improving the efficiency of energy use in agriculture

Water resources

Ground water is the principal source of drinking water in India. 85 percent of the population in India is dependent on ground water for drinking water. But in India the ground water is withdrawn hapzardly without recharging it adequately. The increase of salinity in water and reduction of quality in drinking water has to be addressed. Hence rain water harvesting must be implemented in rural and urban areas, including residential and commercial building. Water management system must be implemented at the earliest.

Forest

Everyday 333 acres of forest is lost says ministry of forest (2013). Forests have the potential of acting as carbon sinks. Hence deforestation has to be prevented and afforestation has to take place. Protection of existing forests is also the need of the hour.

Waste

Solid waste management has become a major challenge in urban areas. Every day 1, 60,000 metric tons of waste is generated in urban areas. The proper segregation of bio medical waste, chemical waste, and waste from households has to be done. Each type of waste has to further segregated, for example, households waste can be segregated into the dry and wet waste and appropriately treated.

At individual Level

At individual level, one can definitely contribute to reduction of climate change. The important among them are

- 1) Using public transport
- 2) Constructing the green house
- 3) Buy green electricity from renewable sources
- 4) Installing solar water heaters
- 5) Lesser solid waste
- 6) Buying less, re using more and recycling
- 7) Avoiding wasteful use of natural resources
- 8) Planting trees and preventing the cut of trees
- 9) Refusing to buy the products which does not use clean or green technology
- 10) Send your children to school through school bus or public transport
- 11) Avoiding flights for short distances. Aviation is growing contributor to climate change. 16000 worlds' commercial jet air craft produce more than 700 million tones of CO₂ every year which is as much as whole of Africa.

Conclusion

India is already compelled to spend almost 2.5 percent of its GDP on the programmes that help adaption to climate change. Climate change policies will be more effective if it integrated into sustainable development policies. The sustainable development aims to use the resources judiciously, keep the environment clean with ecosystem intact. Hence the climate change policies will get more boost integrating it into sustainable development policies. For example climate change policies aim at reducing the emissions and sustainable development

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Bibliography

1. Aggarwal. P. K.(2002), 'Vulnerability of Indian Agriculture to Climate Change: Current State of Knowledge', Indian Agricultural Research Institute, New Delhi,
2. Climate change & 12th Five Year Plan (2011) Report of sub group on climate change, Government of India, planning commission, New Delhi
3. Frazerlance (2009), 'Climate change will warmer soil be as fertile, Environment health perspectives', Feb 2009, 11(2), A 59.
4. Generin R Greg, Wen Haixia and Lowe L Andrew (2012), 'Leaf Morphology shift linked to climate change', retrieved from rsbl.royalsociety.publishing.org on 14 March, 2014
5. Hand Book of National Accounting (2003) 'Integrated Environmental and Economic Accounting 2003', United Nations, European Commission, IMF, OECD, World Bank.
6. Heller, Lorraine (2007), "Climate change: FAO urges changes to ensure food security", www.foodnavigator-usa.com/Suppliers2/Climate-change-FAO-urges-changes-to-ensure-food-security.
7. Kavikumar KS 'Climate sensitivity of Indian agriculture, do spatial effects matter', sandee working paper No. 45-09 retrieved from www.sandeeonline.org.
8. Keshava S.R (2013), 'Climate change and Environmental sustainability- An Analysis', inaugural and Keynote address at UGC Sponsored National Seminar on climate change and Environmental sustainability organized by Fatima college, PG And research Dept of Economics, Mary Land, Madurai-18
9. Keshava S.R (2014), Climate change, Environment and Agricultural Development', Delivered Keynote address at ICSSR Sponsored Two days National Conference on Climate change, Environment and Agricultural Development organized by School of Economics, Dept. of Environmental Economics, Madurai Kamaraj University, Madurai.
10. Leiman A (2007)', 'The Economics of Climate Change (Stern Review) By Nicholas Stern', South African Journal of Economics, Volume 75, Issue-2, page 369-372.

11. Mascarelli Amanda (2012), 'climate change linked to shrinking leaves retrieved from www.nature.com/news/climate-changed. retrieved on 14 March 2014.

Websites

- 1) www.nddb.org
- 2) <http://www.cseindia.org/dte-suplement/industry>
- 3) TheFreeDictionary.com/environmental+physiology.

