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Development, environmental impact and green growth: India

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ABSTRACT

In last three decades post 1990 when India's private sector was allowed to compete with public sector companies and multinational companies allowed to do business in India there has been higher growth rate and development. The GDP growth rate was over 6 percent between 1991 and 2004 and over 8.5 Percent between 2003 and 2007. In the period 2015 to 2019 the average GDP growth rate has been at 7.5%. Between 1975 to 1990 India's GDP growth rate was at 5% per annum. India has done spectacular progress in sectors of telecommunications, airlines, airports, ports, highways, railways, motor vehicles, housing, power, banking, manufacturing and others. These development reforms have reduced poverty and improved the human condition but at the same time impacted the environment in terms of air pollution, water pollution, land degradation, noise, waste generation, depletion of natural resources, loss of biodiversity, loss of water bodies, deforestation, threat to animal life and so on. Climate change through greenhouse gas emissions is an impact which no one is untouched with. Though, development is essential, but balance between development and environment is required which is the sustainable development and is now well understood and practiced. A similar approach to balance development, impact on environment and wellbeing of society is also advocated by the green growth.

Key words: *Development, Economic growth, Environmental impact, Policies, Green growth, Legislation*

Introduction

Rapid economic growth results in increased use of resources, inefficient energy use and increased emissions and waste generation leading to increased environmental degradation. Urbanisation, industrialisation, over population, deforestation are contributing to degrading environment. Enhanced urbanisation has resulted into endangering wildlife and also loss of biodiversity. Environment degradation also impacts health of humans arising out of emissions, noise, contaminated water and contaminated land. The concern of impact on environment is very well recognised by government, legislators, international community and humans and all are putting their efforts to strike a balance between development and environment through sustainable development practices. Government is actively con-

tributing through policy framework, legislations, implementation along with global alignment. Implementation of sustainable development goals, National Action Plan on Climate Change, India's Intended Nationally Determined Contribution targets for reduction in the emissions intensity of its GDP by 33 to 35 % by 2030 from 2005 level and several other similar initiatives. United Nations consistent efforts beginning from Conference on Human Environment held at Stockholm in 1972, Montreal Protocol, Bruntland Commission Report, 1987, Earth Summit, Agenda 21, 1992, Basel Convention, 1992, Kyoto Protocol, 1998, Millennium Development Goals 2000, Sustainable Development Goals 2015 and many more initiatives are intended to improve the quality of environment.

As the development cycle progresses with impact on environment, a stage comes where people start valuing environment and begin to care for environment and adopt and comply with environmental regulations, make them more stringent, improve technologies and improve processes resulting in the decline of pollution levels despite economic and industrial growth. This relationship between economic growth and environment is known as Environmental Kuznets Curve (EKC) hypothesis. (Kuznets, 1955).

The Environmental Kuznets curve (EKC), shows the relationship between economic progress and environmental degradation. It describes that as countries develop initially, the environmental degradation increases. However, at later stages as the economy achieves further development, environmental degradation decreases. Reason for this decline is people begin to value development over environmental quality and are willing to care more about environmental quality and its improvement (www.indianeconomy.net)

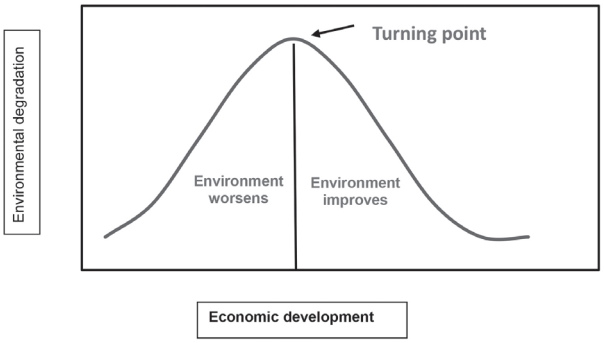


Fig. 1. Environmental Kuznets Curve

Environment deteriorates at the early stages of economic growth and subsequently improves at the later stages is also stated in EKC hypothesis by (Dinda, 2004).

A study conducted in Bangladesh in its growing economic journey revealed that at their economic development stage, environment degradation is towards the upward trend of EKC curve having increased CO_2 emission and energy consumption. (Rahman *et al.,* 2018). A similar study on economic growth, energy intensity, and carbon dioxide emissions in China is also done by (Naminse and Zhuang, 2018). In this paper we will assess current position of India on the Environmental Kuznets Curve (EKC).

Information retrieval

21st century has seen increase in industrial development and economic activities worldwide. (Ayomoh *et al.,* 2008). Lifestyle around the world has improved due to economic growth but at the same time, it has caused environmental degradation (Gain and Moral, 2002). There are studies which link environmental degradation to increased GDP (Boopen and Vinesh, 2011, Jaunky, 2011) as with development and economic growth, there is increased depletion of resource, consumption of energy and emission of Carbon dioxide (Economy, 2011).

CO_2 emission from human activities and industries are the major contributors for global warming. CO_2 increases the residing time of water vapour considerably in the atmosphere thereby causing global warming (Andrews and Jelley, 2007). High economic development is linked with high greenhouse gases emissions causing global warming and with negative impact on flora and environment. (Hussain *et al.,* 2014); (Bravo *et al.,* 2017). With the development of industrialisation, environmental pollution has become more serious. Researchers have identified the relationship among energy consumption, environmental pollution and economic growth. (Naminse and Zhuang, 2018). Economic growth and energy consumption have high impact on greenhouse gas emissions and hence promoting sustainable economic development is the requirement of present times. (Sterpu *et al.,* 2018).

In India, estimated 203 Million Kgs of Electronic Waste was generated in the year 2014 and 249 Million Kgs in 2018 and the same is expected to reach to 273 Million Kgs in 2020 (Cherukuri *et al.,* 2018).

In India, in the year 2000, the total Hazardous Waste generated was estimated to be 4.41 Million MT. (Babu and Ramakrishna, 2003) and 6.5 Million MT in the Year 2017. In terms of Air quality for Delhi, average NO_2 level in 2014 was 62 Microgram/m^3 and in 2018 it was 74 Microgram/m^3, PM 10 was 217 microgram/m^3 in 2014 and in 2018 it was 225 microgram/m^3 and PM 2.5 was 80 microgram/m^3 in 2014 and in 2018 it was 121 microgram/m^3. In the metro cities, the Municipal solid waste generation also showed an increase (CSO 2019 – 1, Envistats India 2019, GOI).

India, development and environment

GDP worldwide is considered as most powerful statistical indicator of economic development and progress of country. GDP is a monetary measure of the market value of all the final goods and services produced and bought by the final user produced in a country in a specific time period, mostly annually. The ratio of GDP to the total population of the region is per capita GDP. GDP is more useful in comparing the national economies on international basis whereas GDP per capita is for comparing the living standards between the nations. (www.sparknotes.com). India's GDP trend is given in Fig. 2 & 3.

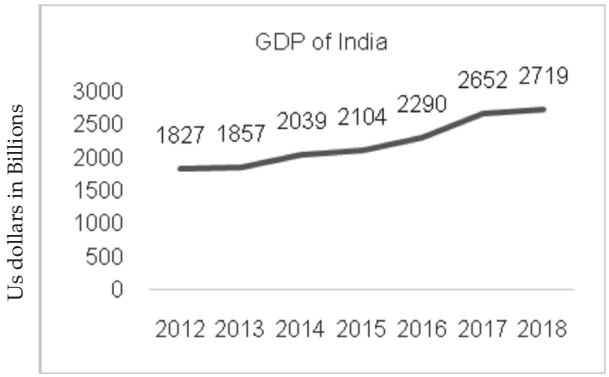


Fig. 2. GDP, Gross domestic product in current prices. In 2018, GDP for India was 2719 billion US Dollars. GDP of India increased from 467 billion US Dollars in 1999 and 1827 in 2012 to 2719 billion US Dollars in 2018 growing at an average annual rate of 10.03%. (https://knoema.com/atlas/India/GDP. World Data Atlas-Economy)

In India, in terms of development, Mobile phone users have gone up from 525 Million in the year 2013 to 775 Million in the year 2018. Number of internet users have gone upfrom 260 Million in the year 2015 to 483 Million in the year 2018, Number of registered motor vehicles have gone up from – 176.04 Million in 2013 to 252.34 Million in 2017. (www.statista.com and www.ceicdata.com)

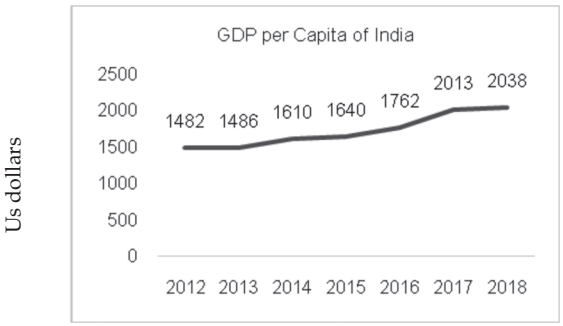


Fig. 3. GDP, Gross domestic product per capita in current prices. In 2018, GDP per capita for India was 2038 US Dollars. GDP per capita of India increased from 462 US Dollars in 1999 and 1482 US Dollars in 2012 to 2038 US Dollars in 2018 growing at an average annual rate of 8.43%. (https://knoema.com/atlas/India/GDP. World Data Atlas-Economy).

Number of mobile users grew by almost 48% from 525 Million users in 2013 to 775 Million users in 2018, Fig 4, similarly, internet users grew by almost 86% from the year 2015 to 2018, Fig. 5.

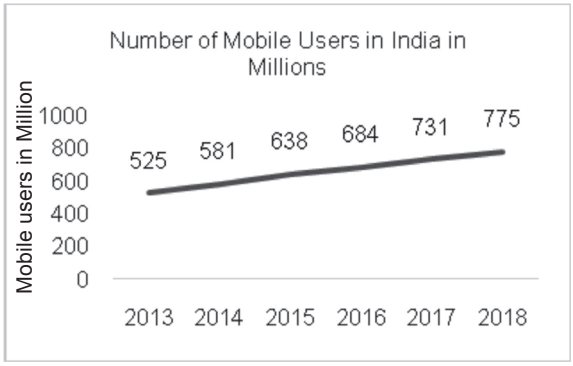


Fig. 4. (www.statista.com)

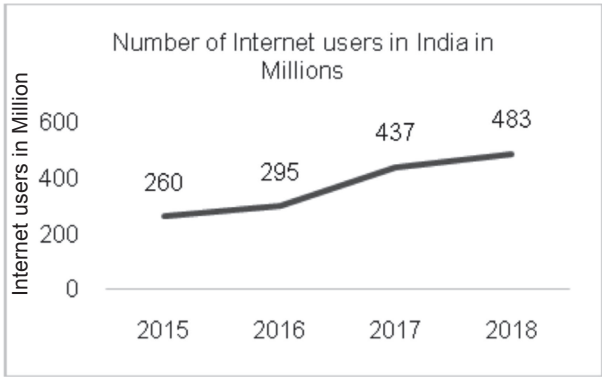


Fig. 5. (www.statista.com)

Number of registered motor vehicles grew by 43% from the year 2013 to 2017, Fig. 6.

As the development took place, there is an impact on environment in terms of emissions, consumption of energy, quality of air, water, waste generation and many other environment parameters.

India is amongst the top three emitters of CO_2 globally after China and USA, (https://www.indexmundi.com). CO_2 emission in India has increased by almost 13 % from year 2014 to 2018.

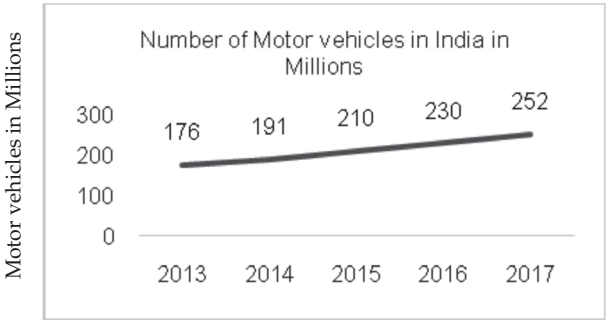


Fig. 6. (www.ceidata.com)

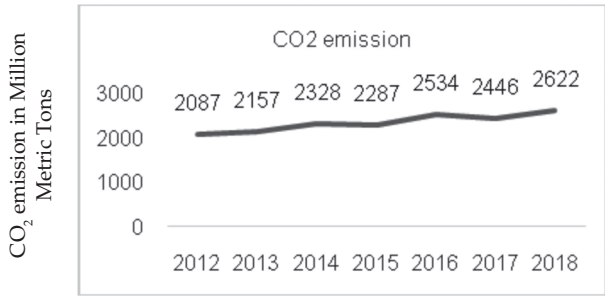


Fig. 7. India CO_2 emissions.
In 2018, CO_2 emissions for India was 2622 million metric tons which increased from 143 in 2007& 2087 Million Metric Tons in 2012 at an average annual rate of 7.45%

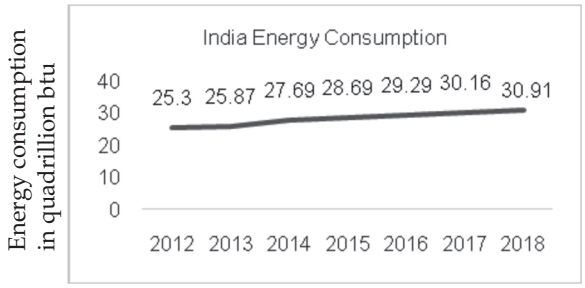


Fig. 8. India – Total primary energy consumption.
In 2018, primary energy consumption was 30.91 quadrillion btu. Between 2012 and 2018, primary energy consumption of India grew substantially from 25.3 to 30.91 quadrillion btu, 22% increase. (https://knoema.com/atlas/India/environment. World Data Atlas-Environment)

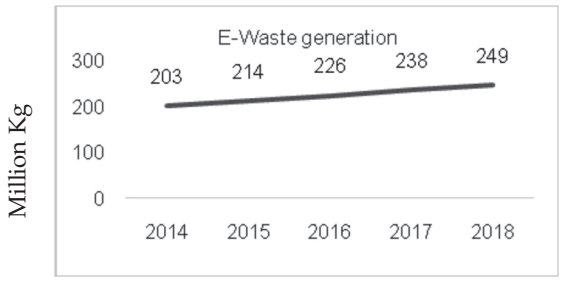


Fig. 9. India E-Waste generation.
Source: (Cherukuri *et al.,* 2018)
Increase of 23% from the Year 2014 to Year 2018

Fig. 10. India Hazardous Waste generation.
Increase of 47% from March 2000 to March 2017
(Babu and Ramakrishna, 2003),
(CSO 2019–1, Envistats India 2019,GOI).

Figures 11, 12, 13 show the deterioration of Delhi's air quality from the year 2014 to 2018 and the Figure 14 shows the increase in solid waste generation in four Metro cities of India which represent the impact on environment due to various factors of development.

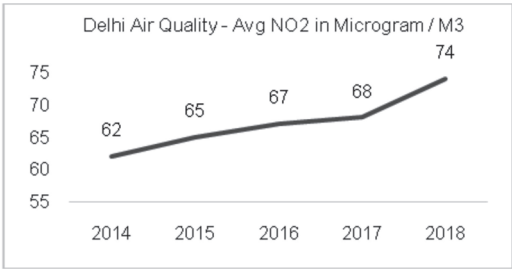


Fig. 11.

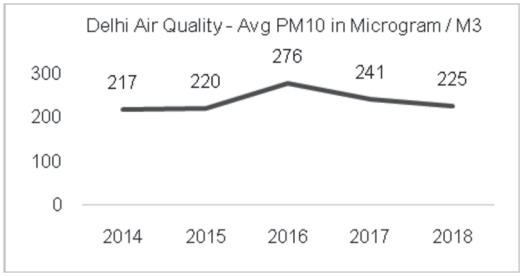
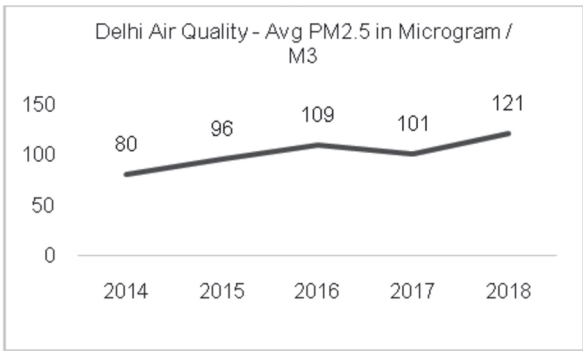


Fig. 12



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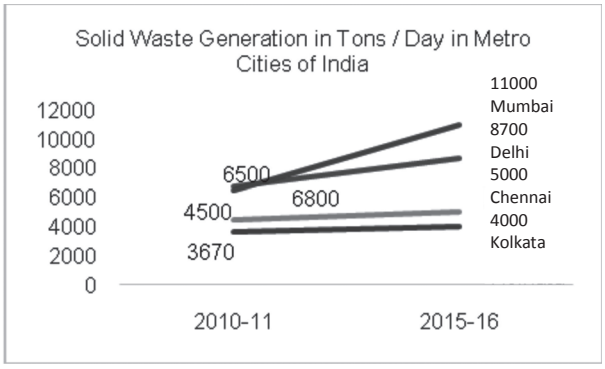

Fig. 14

(CSO 2019 – 1, Envistats India 2019,GOI).

Green growth in India

Green growth is a strategy to address financial crisis and deliver both economic as well as environmental gains. Green growth has emerged as a paradigm of development, which is capable of achieving both economic and environmental objectives simultaneously (Hammer *et al.*, 2011).

Organisation for Economic Co-operation and Development (OECD) Green Growth Strategy (2011b), defines the concept as follows: Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and ecosystem services on which our well-being relies. To do this it must catalyse investment, competition and innovation, which will underpin sustained growth and give rise to new economic opportunities.

Green Growth as a strategy is an approach to promote economic growth with economic benefit, complying with ecological principles and creating more opportunities for employment and income generation and minimizing the impact on environment (Soundarrajan and Vivek, 2016). The concept of green growth talks about economic growth, taking care of environment, meeting ecological principles and wellbeing of humans. The green development concept is thus at par with sustainable development concept which also addresses the balance between environment, economic and society pillars.

In India, CII, Green Business Centre, Hyderabad initiated a comprehensive methodology for Green growth and developed a methodology including assessment for green growth as green company rating based on the parameters of Energy efficiency, Water conservation, Renewable energy, Greenhouse gases reduction, Material conservation recycling & recyclability, Waste management, Green supply chain, Life cycle analysis, Product stewardship and Other initiatives of ventilation, indoor air quality, selection of site and innovations (Green company Rating System, 2012). Green building concept from India green building council is also popular in India.

Legislation development in India and United Nation have played a significant role in Green growth. India is signatory to Sustainable development goals, 2015 and post 1972 for green growth several legislations and policy framework for environment protection evolved in India. National environmental policy, National action plan on climate change, adoption of Sustainable development, Precautionary, Polluter pays, Doctrine trust principles all aim towards green growth in India (Verma *et al.,* 2018)

Similar studies highlighting economic growth, its impact on environment in terms of CO_2 emission, Energy consumption are available for Bangladesh, China by (Rahman *et al.,* 2018; Naminse and Zhuang, 2018).

Energy supported China's economic growth in past three decades but with environmental destruction of being world's largest energy consumer and having impact on its fuel reserve. China being the highest emitter of CO2 emission has the international pressure to control its emissions. Thus the fundamental focus on renewable energy in the coming decades with it becoming the main source of energy, which is an indicator for green growth development (Dai *et al.,* 2015).

The focus in India is thus on the green growth to have development without impacting the environment. This is reflected through the EKC curve where first development happens with increased environment degradation but later, a turning point is

reached where the development happens but without degrading the environment.

The present situation

The figures below summarise the present situation of India considering few indicators of development and environmental impact.

The Figures 15a, b, c show that India is on the path of development being a developing country which is indicated by the figures of GDP, GDP per capita, mobile phone users, internet users, motor vehicle users. These are some of the indicators and there are many other indicators including the growth in infrastructure, manufacturing growth. At the same time, the environment indicators highlighting impact on environment have also gone up e.g. the CO_2 emission, Energy consumption, E-waste generation, Hazardous waste generation, Solid waste generation, Air quality. These are some, there are others as well. The figures indicate as development is going up,the degradation of environment has also increased. This situation positions India currently on the left hand side of the Environmental Kuznets Curve indicating development is happening but with environment degradation.

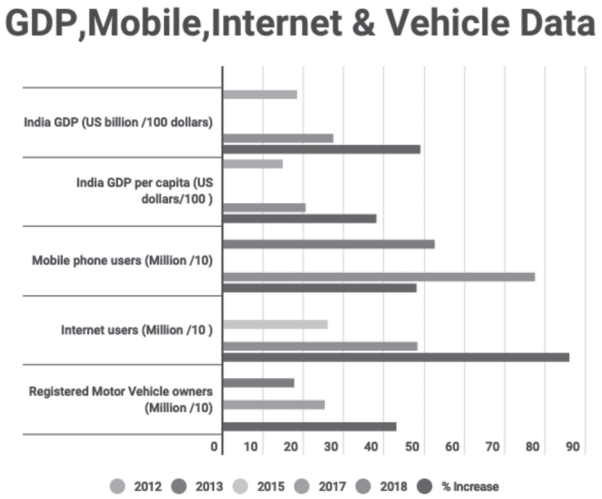

Fig. 15a

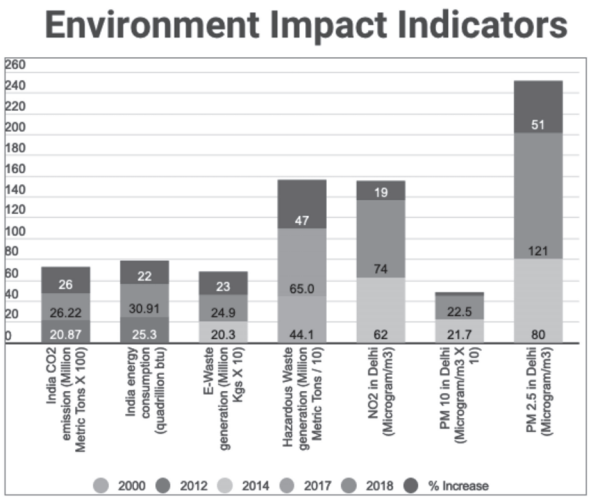

Fig. 15b

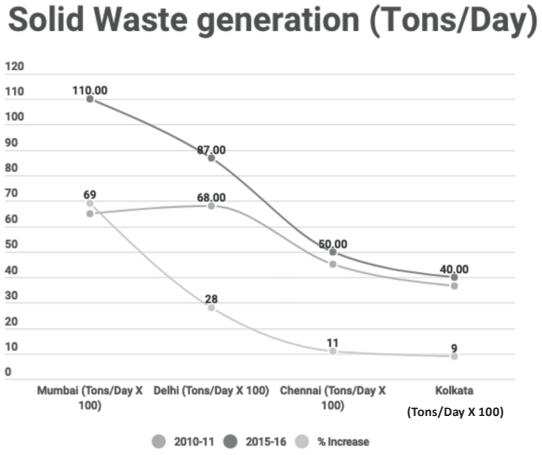

Fig. 15c

However, this situation of economic growth with increased environmental degradation is well realised by the government, organisations, societies and citizens. With the strategies & policies, changes in legislations, stricter implementation India is now almost at the turning point of curve through various initiatives of government through introduction of a. National action plan on climate change, b. adopting India's intended nationally determined contribution targets for reduction in CO_2 emission intensity of its GDP by 33 to 35 % by 2030 from 2005 level, c. commitment to comply with United Nations sustainable development goals of 2015, d. Introduction of new emission norms for automobiles, BS Stage VI and earthmoving and construction equipment, BS Stage IV in 2020 and e. changes and amendments in the existing environmental laws, f. strict implementation of laws. National green tribunal (NGT) is strict on violation of the law with severe penalties through implementation of polluter pays and sustainable development principle.

Conclusion

India is on the right track of green growth through its policies, legislation and implementation for being confident of economic development without degrading environment and reaching to right hand

side of the Environmental Kuznets Curve where development happens but without impacting the environment. This is the journey towards the right mix of development for economic gains, not harming the environment and at the same time conserving the resources for future generation and taking care of the society involving them through many corporate social responsibility initiatives by the organisations.

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