



NEWSLETTER

of the Ecological Society

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COP21 and India position: Commentary

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Date: December 13, 2015

The international response to climate change began in 1992 at Rio Convention. It adopted UN Framework for Climate Change (UNFCCC). The convention has 195 parties as its members. The main objective for the annual conference of parties (COP) is to review the convention's implementation. COP21 also known as 2015 Paris Climate Conference took place in December. It is very interesting to see this event unfold over a last few days. The Summit ended on a positive note that world aspires to keep the warming limit to 1.5 OC rather than the 2 OC which was being considered otherwise. This is certainly a welcome aspiration. I happened to read an article in 'The Independent on Sunday', a British newspaper, where Tim Flannery, an acclaimed author of 'The Weather Makers' made a very interesting and pertinent observation. He said, "If we were to achieve this [keeping he warming below 1.5 OC or 2 OC] there is a need for a big push on Carbon Capture technologies." What does this mean? I clearly see this as a warning that, we might therefore continue to emit carbon, with a hope that our Carbon Capture technology of now and future, might be able to capture this carbon back without further utilizing fossil energy. How that might happen, remains to be seen. Another aspect being stressed is, we must move to renewable energy – solar or wind or whatever. I wonder, how would we be able to make such a large number of panels or windmills without burning fossil fuels at an even accelerated pace.

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At energy density of incident solar energy, orders of magnitude lower than the fossil fuels, it seems hard to believe that we will indeed be able to operate at the scale of energy use, we are at – today, leave alone any acceleration in energy use to achieve 'development' goals for the Least Developed Countries (LDCs) and the developing world. Another point not considered is our dependence on OIL as a source of material. We are living in a world where almost everything that we use is touched by fossil fuels in the form of either a source of material or energy.

Here is one of the important clauses in the agreement which came out of COP 21:

'Governments decided that they will work to define a clear roadmap on ratcheting up climate finance to USD 100 billion by 2020 while also before 2025 setting a new goal on the provision of finance from the USD 100 billion floor.'

Ms. Figueres [Karen Christiana Figueres Olsen, Executive Secretary of the UNFCCC] said, "We have seen unparalleled announcements of financial support for both mitigation and adaptation from a multitude of sources both before and during the COP. Under the Paris Agreement, the provision of finance from multiple sources will clearly be taken to a new level, which is of critical importance to the most vulnerable."

While this might seem a welcome move, let us contrast this against the revenue and earnings of say Exxon Mobil. At around 365 b US\$ in revenue IN 2015 – it is at #5 in the largest corporations in the world. We can easily see that 100b a year to be contributed to help the LDCs and developing world is not even 30% of the revenue earned by one of the world's large corporations. It is needless to say that this is at best eyewash. This certainly is not taking any responsibility for what some of the developed world has done to the climate – even after we count a serious start at RIO, when science established the threat of global warming and climate change.

India believes that it needs to burn coal to see how she can provide electricity to 300m – who do not have access to electricity today. There seems to be no other option according to the government.

Considering the need for development and at the same time restricting this added carbon emission are seemingly contradictory and offer a challenge for the policy makers.

US emits 10 times per capita carbon while china emits 4 time that of India. Can they do better to provide space for India to develop? In an altruistic world anything is possible, however this is not an altruistic world and every country is trying to protect her own interest at the expense of the commons.

Garret Hardin's 'tragedy of the commons' is again playing out as it was written. It seems that, no nations are willing to learn from the lessons of the past decade of climate catastrophes and are not looking at any major policy shifts on the economy.

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Economics of climate change

Dr. Gurudas Nulkar

(Our scant knowledge of nature makes any discourse on climate change more of an opinion than a scientific discussion. The author hopes that readers will make this allowance to this piece!)

The early period of the industrial revolution, back in the 1700s, must have been one of excitement and jubilation. With the discovery of coal and iron, industry was rapidly making products and processes which promised a better life. It has kept its promise over the last 300 years or so. In this quest, fossil fuels and natural resources were converted into products which created wealth and made corporations and nations rich. In the euphoria of technological progress and economic growth, we never fully realized the impact of industrial activities. Even today, with all the talk on sustainable development, many of the developed nations are not ready to compromise their lifestyle. Paul Ehrlich had proposed the environmental impact of human progress by his equation $I = P \times A \times T$, where I is the impact, P is population, A is affluence

and T is technological progress. As it turns out, curtailing I would need keeping a check on population and consumption and diverting technological advances to produce necessities rather than discretionary and luxury products. Grossly disregarding Ehrlich's predicament, industry continues to consume finite and non-renewable natural resources to make discretionary products which only a few can afford to buy.

In estimating the economic cost of mitigating climate change, we have to speculate the various scenarios of global warming. Today, we are at a 0.8 degree rise and, if we were to continue business as usual, we expect a 5 degrees rise. Between this range of 1 to 5 °C, climate scientists predict an increasing intensity of disruption on four counts which concern humans – Weather, Water, Food and Ecosystems.

A detailed discussion follows:

Economics of climate change. Continued from page 2

Scenario 1 – Up to 2 degrees rise

Weather – Rising intensity of storms, droughts, ice melts. We are experiencing this already.

Water – Smaller glaciers start to recede, water scarcity in some places.

Food – farm productivity goes up in places which get irrigated by glacial melts, in other places, crops need to be genetically modified to adapt to the rise. New rainfall regimes and falling ground water levels can be expected.

Ecosystems – Extensive damage to coral reefs. These are one of the most productive ecosystems on the planet. This affects marine life. In history, civilizations have collapsed because of neglect of changes in ecosystems.

Scenario 2 – up to 3 degrees rise

Weather – Fires in arid regions, increased intensity of rough weather, higher unpredictability in rainfall.

Water – Significant water disruptions in many places, rapid depletion of ground water sources in most places.

Food – falling crop yields in most places. Increased water for irrigation puts pressure on water sources.

Ecosystems – Species extinction visible. Endemic species are under severe threat due to warming. Food chains are disrupted. Pollination services affected. Biodiversity shrinks significantly.

Scenario 3 – Above 4 degrees rise

Weather – Rising ocean temperatures cause large scale weather events. Summer temperatures will take its toll on human life.

Water – Permafrost melting in most regions. Significant increase in sea levels threatening human habitation on coasts. Water scarcity erupts.

Food – Major changes in what can be grown for food. Large scale genetic interventions required to sustain crops. Heavier water demand due to evaporation losses.

Ecosystems – Most life under threat. Many species will go extinct. Ecosystem productivity changes

dramatically thereby nature's services altered. Nature's capability of sustaining life reduces significantly

In the analysis of scenarios there is a high degree of uncertainty because we have not fully understood nature. We do not quite know the interdependence of species and their habitats. What happens when a species goes extinct? What is the effect of a tsunami on marine life? How would crop yields be affected in warmer situations? Each question opens up further uncertainties. Our predictions may go wrong completely. In such a situation of high uncertainty, an estimation of the economic and social costs of climate change is constrained by our knowledge of biotic and abiotic factors. As a result, all our efforts to mitigate the problem will be tentative rather than specific social costs, for example, can never be accurately estimated. Scarcity of resources has also resulted in wars and social unrest. These may intensify with each of the above scenarios.

Corporations are already seeing business opportunities in global warming – clean energy, carbon credits, new mining regions, GM crop technologies – however; technology can never replace the resources we have consumed or environmental services that have been disrupted. Nature is highly resilient, but painstakingly slow in recovery. Technological interventions go against this fundamental principle of nature and create more trouble than peace. Our efforts of mitigation require a paradigm shift and must be founded on reducing demand, reducing economic growth and controlling consumption – none of which we have ever achieved in the past. But then the planet has never experienced such rapid climate change in its history. Can humans come together to mitigate the predicament? Only time will tell.

Evidences of Climate Change in Ladakh

By Dr. Swati Gole

Regular periodic variations in the climatic elements like temperature and rainfall are part of the seasonal cycles which occur on earth. Inter-annual or greater time scale climate variations are like El Nino and La Nina cycles. El Nino events have occurred about every three to seven years over the past few hundred years. All these events are termed as climate variations. On the other hand, climate change is said to occur when semi-permanence type of changes occur over a century time scale and a new base line climate emerges. Climate variations or change has a spatial reference. It is possible to have different responses from region to region reflecting boundaries of climate change or variations. (Ref: T. R. Karl, K. E. Trenberth.)

Now let us look at an example of Ladakh where climatic variations (change?) over four decades have influenced the occurrence of once rare black-necked crane, through change in habitat. Under the leadership of Dr. Salim Ali, in 1976, Prakash Gole was a team member in an expedition to search for black-necked crane in Ladakh. In 1976 the team sighted two pairs of the bird with one juvenile, taking the total count to five. Several expeditions followed the first one to survey entire area of Ladakh to estimate population of the cranes. Till 1983 the number of black-necked cranes was dwindling between 4 and 10. I joined the 1983 expedition. On the very first day, what I observed was rather unusual. While taking a stroll in Leh city, suddenly there was snowfall. It was the month of May and snow melted into water in no time. This was rather unusual experience for Leh citizens. They are wary of rainfall and started protecting mud roofs of their houses. Historically, snowfall was restricted to the higher parts of Ladakh and Zanskar ranges. Village elders did not remember experiencing a snowfall in Leh city. Was this a beginning of climate variation or was this a base shift?

The populations of the black necked cranes have been monitored since then by various wildlife agencies and scientists. These studies continued until 2008. Snowfall and rain are now usual events in the Indus valley since 1983. In August 2010, the big cloud burst event was followed by flash flood, debris flow and mud flow which buried the village of Choglamsar. This was another incidence indicating serious climate variation. However the major change in these four decades was seen on the population of black-necked cranes. The proximate reason for this may be excessive snow melt creating innumerable wetlands providing an ideal habitat for these birds. According to WWF 2004 report of the 2002–2004 study there was a sharp rise in the population

Year	1976	1978	1983	2002	2003	2004
Pairs of black necked crane	2	4	2	59	60	64

(Ref: WWF India)

This high number of the birds continued. The study by Indu Sharma and Avatar Kaur Sidhu reported 53 birds in 2008. (Ref: I. Sharma and A.K.Sidhu).



Pair of Black-necked Cranes in Ladakh

Evidences of climate change in Ladakh. Continued from page 4

This example of regional climate variation affecting physical processes and in turn affecting bird population may be due to climate change. However, further investigation of this and such instances might provide us with tools to build a more robust climate change model. Can the ultimate reason of this change in population be traced to shift of the base climate?

Ref:

T. R. Karl & K. E. Trenberth, Climate change & Biodiversity Yale University Press
awsassets.wwfindia.org/download/black-necked_crane_final_print_version.pdf
 I. Sharma and A.K.Sidhu, Biological forum- An International Journal, 3 (1): 87-90 (2011)

Climate Alerts

Compiled By: Mrunmayee Pense(Batch 2015-16), Suhas Sapatnekar

CLIMATE ALERT FOR BENGAL TIGERS

As water levels rise in Sundarbans, tigers are struggling to survive.

Of the twelve species that National Geographic has highlighted in its current issue on climate change, the Sundarbans tiger has been listed as one that will struggle to survive. A WWF led study reports that a predicted 11 inch rise above sea levels from the year 2000 would destroy most tiger habitats in that region. Eventually tigers will need scuba gear to live in the mangrove dominated Sunderban. Bengal tigers along with woodland caribou, Arctic fox and spectacled eider (a northern duck) will suffer from climate change.

WHO SAYS CUT EMISSIONS, FIGHT CLIMATE CHANGE

The World Health Organization (WHO) has called for urgent action to avoid climate change by reducing emissions of black carbon, ozone and methane as well as carbon dioxide. Due to emissions over seven million premature deaths occur annually.

7 MORE BIRD SPECIES OF INDIA FLY INTO RED LIST

The International Union for Conservation of Nature has added seven species of birds found in India to the red list of threatened species. Globally 70 birds have moved to the danger zone.

In India, the number of threatened species of the birds has gone up from 173 to 180.

CLIMATE CHANGE AND HUMAN BEHAVIOUR

According to Behavior Scientists from Princeton University and California University at Berkeley, there is co-relation between climate change and incidences of human violence. They have observed that there is 4 % rise in individual violence if there is increase or decrease in temperature and rains.

GLOBAL CLIMATE CHANGE IS CAUSING INCREASE IN DISEASES

According to America's Natural Resource Defense Council, because of global climate change, change in rainfall and increase in humidity, there is favorable condition for different insects, micro-organisms and viruses to grow. It has been observed that now diseases are spreading over a vast geographical area.

Ref: Times of India and Internet

COP21 and India. Continued from page 2

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Garret Hardin's 'tragedy of the commons' is again playing out as it was written. It seems that, no nations are willing to learn from the lessons of the past decade of climate catastrophes and are not looking at any major policy shifts on the economy. It is abundantly clear that earth has her own limits to absorb wastes (like CO₂ and other greenhouse gases in this case) and we are not serious about attacking the root cause – which is perpetual growth, which requires energy and there is no energy, which is dense enough and abundant enough today than coal and oil that can at least for some more time provide this energy.

First, we have to stop classical GDP growth at a world level. If, India and other developing world need to grow a bit more, may that be. Second, start looking at reducing the scale of energy use – as no other option will work for the scale of energy use that we are talking about. Third, we must realize that, any new technology is powered by fossil fuels and unless resource efficiency is practiced after the paradigm shift, it will only cause what is called the 'rebound effect' and more energy is destined to be used over a period of time.

One point that India is putting forward – that of technology will develop for us to be able to reduce the footprint – looks rather weak. Every piece of technology, the world over has been about, causes unintended side effects of pollution of this kind or the other. Resource efficiency is great, if policies are first designed to reduce scale and aggregate energy use.

Promoting growth of cities and calling them part of a sustainable development plan is an oxymoron. Cities are energy guzzling entities and their growth is bound

to multiply our requirement of energy, certainly not reduce this need. Intensive agriculture needs far more energy [and resources] than natural farming. Incentivizing and supporting move towards natural farming could be a desirable policy shift. Unless we specifically incentivize distributed development, down-scaling of energy needs by actively promoting schemes like generate your own energy, or make your own village better, incentivize local economic activity and stop all direct and indirect subsidies to the large industry, we will not see movement towards sustainability. These and more such policies can indeed drive the aggregate energy use down. Resource efficiency can then be promoted in such a policy framework for even better results.

All nations should start looking at reducing aggregate energy use over a midterm horizon and developed nations should start this right away – not be reducing carbon emission by moving manufacturing to China, or a Mexico or an India – but genuinely tracking the embodied energy associated with consumption, which is a real measure of energy use by her citizens. It is abundantly clear that consumption driven economic policies will only lead to increase in energy consumption. Alternative and different policies are the best way to move towards sustainability, if we indeed can. Should developed nations commit to this, developing nations will have to carve a path which is consistent with the world order and will automatically follow this path. India if it starts with a premise that it would like to reduce the aggregate energy use, will then shape the policies in that direction and even while we might see some increase in energy use in the interim to provide equitable energy access to all her citizens, we could see some balancing out as energy use in her economy starts falling otherwise – as it must in the developing world.

While fighting for equitable carbon space is a noble cause, trying to design and implement policies for

effective reduction of aggregate energy use by order(s) of magnitude, might in fact be nobler for the whole world and not just for India.

Ref: <http://newsroom.unfccc.int/unfccc-newsroom/finale-cop21/>

Book Review:

The Sixth Extinction – An Unnatural History by Elizabeth Kolbert Ajay Phatak

Elizabeth Kolbert is a staff writer at 'The New Yorker' and also an author of 'Field notes from a catastrophe: Man, Nature and Climate Change'

The book is about stories of extinction – of the present and the past, species which have survived millions of years and are those which are now getting extinct. Extinct species, which were once significant species of the past and most interestingly how humans are making the world less diverse, not just because of extinctions, but also because of movement of species across continents at an unbelievable pace.

It starts with a story of a Panamanian frog – a distant relative of the golden toad, which became extinct just a couple of years ago as the forest 'walked' northwards; as an impact of climate change. This frog and its many more cousins became extinct not so much because of climate change but possibly because of a fungus which moved through continents – thanks to human effort.

We then get into the previous chapters of nature, the *discovery* of extinction. Cuvier's discovery of extinction was a sensational event then. Based on the fossil records and the discoveries of skeletons, he was able to construct history of the lost world as a series of catastrophes. This paradigm broke down as fossil records started becoming so numerous that catastrophes could not keep pace. Modern description of natural history therefore became more like – long periods of boredom

interrupted occasionally by panic!

You are bound to get tickled by some interesting history of the word Anthropocene and how Crutzen's discovery of Ozone depleting substances saved the world at least for the first time. The book reads more about how Humans have changed the face of the earth and altered the natural ecosystems to an extent that many of us do not even know what these natural ecosystems were.

The author ends the discourse with the chapter called New Pangea – the world without borders and how we are moving species around at a speed no species would ever have moved by herself! Ballasts of large sea vessels and loads of micro-organisms that passengers carry as they travel the world are causing unprecedented disturbances in ecosystems far and wide. The Sixth extinction – as confirmed by the scientific community recently has in fact commenced.

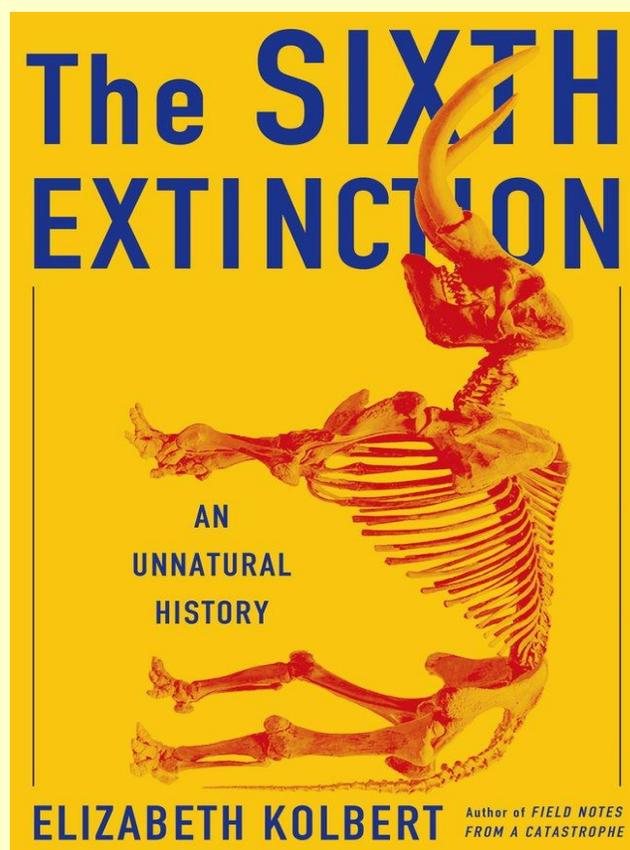
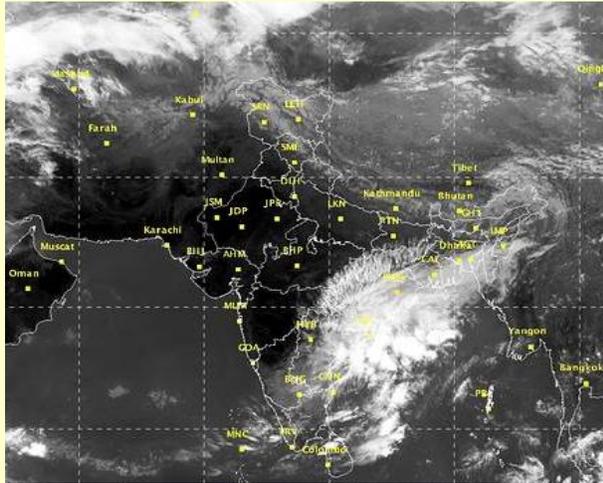


Photo Feature Effects of Climate change in our lives

Manasi Karandikar

Mumbai in July 2005, Surat in August 2006, Ambala and Moradabad in 2010 and Srinagar and Guwahati in September 2014. Now it is Chennai in November 2015



The tropical storm in bay of bengal



Chennai 2015



Chennai 2015



Airplane seeking refuge in tree cluster



No water to drink

Images : various sources on Internet