'Strong will of the people is the key to propel global pact to address climactic extremes'

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The United States has said that it will come out of the Paris Agreement. How would climate-exit effect the global pact to reduce global emissions? What would the impact be for developing countries?

This is a burning topic in the climate arena as to how the world will move forward since a major power is poised to exit the Paris Agreement. Under Article 28 of the Paris Agreement, a party may wish to withdraw at any time three years after the date on which the agreement for the country entered into force. For the US, the formal exit would not be until 2020. 21 years ago, the story was not so different. The US did not ratify the Kyoto Protocol because of domestic economic concerns. The argument was based on the fact that India and China both were exempt from the agreement emissions targets and thus the US would not partake at the seemingly unfair treatment. Not surprisingly, China now accounts for over 29% of global C02 emissions and followed by the US at 14%. It is important to note that even without US involvement within the Paris Agreement framework, the remaining signatories of the Paris Accord will still account for almost 80% of the global emissions of greenhouse gases.

Moreover, many countries export negative externalities through for eg, the sale of coal and set up of "clean-coal" burning plants as part of a tech-transfer policy, and China being an example of doing just that. Further complications arise through accountability of emissions is on shaky grounds because the methods of verification are still being developed. A recent BBC article from August 2017 titled "Dodgy Green House Gas data threatens Paris Accord," clearly shows us how verification and accountability is on a weak pedestal.

In the article it states "Our estimate for this location in Italy is about 60-80 tons of this substance (a type of GHG) being emitted every year. Then we can compare this with the Italian emission inventory, and that is quite interesting because the official inventory says below 10 tons ..." The article continues: "Levels of some emissions in India or China are so uncertain that experts say it is plus or minus 100%."

Therefore, we can postulate that efforts to curb Green House Gases is already a major challenge for the world to address. Regardless of the final policy decisions, 14 US states are a part of the US Climate Alliance which together accounts for approximately 22% of US C02 emissions. This is an automatic movement towards cleaner energy forms simply because through economies of scale, it is becoming cheaper to adopt green energy. Furthermore, did you know that five US cities are already running on 100% renewable energy?

It has been the case that some media and eager politicians have actively portray developing countries with a complete doom and gloom scenario. However, it is important to note that is not the entire case. Countries such as Kenya, India, Brazil, Costa Rica (90% of total energy required are renewables), to name a few, are doing well in terms of moving towards cleaner forms of energy and prices are falling every year.

However, adaptation to weather extremes is pertinent. That is with rising sea levels, lowering of agricultural output due to droughts or sudden deluges, we must be able to reduce impact through saline resistant crops, low carbon farming, infrastructure development such as building of sea walls, to name a few. This is an area that developed countries can assist poorer countries through GEF. It seems fair to have wealthy nations contribute significantly to global pools and although we have seen slow progress, the process will significantly slow down our adaptation to climate extremes.

Noting your research and studies with climate envoy Todd Stern and former Assistant Director for the Environment in the White House Office of Science and Technology Policy Paul Anastas, how do you envision global policy to address extreme climate variation?

Both President Obama and US climate diplomat Todd Stern were instrumental in garnering international support for a globally agreed policy. Professor Paul Anastas was a key person to bring the field of Green Chemistry to the US EPA. However, aside from these important strides, we now understand that the US political position has changed. However, the debilitating position of extreme weather has not.

Weather events which causes extreme and uncontrollable forest fires, longer droughts and deluges (as we had seen in Bangladesh and the Texan coastline in 2017 to name just a few places), and oceanic acidification from increased atmospheric C02 levels is creating an uncertain future for our ailing planet.

One such example which will help better equip ourselves to extreme environmental change is through technology transfer, stated in Article 10 of the Paris Agreement. This movement falls under the auspices of TEC (Technology and Executive Committee) which focuses on policy, and CTCN (Climate Technology and Center Network) which focuses on implementation. This is important to reduce the unnecessary impact of reinventing the wheel. However, much is needed to propel it forward. We need to garner further global support to get tax free and extremely strong incentives as a package to transfer technology and materials.

This is critical if Article 10 is to make the most efficient use of monetary resources. We cannot limit our options due to a financial figure stamped by regulatory authorities when it comes to weather extremes. Our next global policy movement should be a new omni-directional global priority to transfer knowledge circumventing any weaknesses of inter-governmental issues, economic regulations, and trade impediments.

Finally, in terms of archaic inefficiencies of some UN bodies, it is nonetheless still the most effective vehicle for moving policy initiatives through political and national boundaries. However, at the end, I believe it is the strong will of the people to demand green living and businesses following suit that will propel our global pact to address climactic extremes. Otherwise it would not be long before we see climate refugees shaking the foundations of our governments creating the platform for regional followed by global instability.

What are some of the latest research you are concerned with in addressing green-house gas emissions and climate extremes?

This year has been challenging for the US. In particular, California has seen some of the worst fires in recorded history. The last Thomas Fire burned over 280,000 acres and has thus far cost the state 110 million dollars to fight it. It is estimated that the fires have cost California $10 billion in damages alone. This money could have been better used to both mitigate and adapt to increasing fires from dry forests. In order to address this serious problem, we can attempt to postulate a simple cause and effect to better understand the reasons behind forest fires.

In many regions we are experiencing a period of high rainfall which causes a rapid increase of forest floor shrubs. In California's case, it was followed by a very hot summer which dried out vegetation and became an easy fuel source. Any lightning, dry barks rubbing against each other or someone accidentally throwing away a cigarette butt can cause uncontrollable and deadly fires.

This is one example of many national and international catastrophes. Most worrying is that the public is becoming is slowly becoming desensitized and inured to these events due to the increased frequency of them. We urgently need better systems in place to recognize when an area may generate an uncontrollable fire.

As one example of data gathering, our understanding of total atmospheric concentration of C02 comes from measurements on top of a 3,400-metre mountain in Hawaii. This is combined with GIS data from satellites, national fuel accounts and power plant data to paint a global emissions picture. However, just by that information, one can gather several accountability and technical limitations to the system. First, it is dependent on the information the parties involved wishes to divulge, second, the satellites are using passive sensors (basically taking a picture at a certain time dependent on the reflection of the sun), along with a dependence on the geo-stationary position.

To overcome these issues, I call for another system using existing commercial aircrafts to be retrofitted to carry light weight active and passive sensors. Commercial flights follow a predictable route and if one looks at global flight data paths, it creates a world-wide grid system covering most geopolitical and oceanic boundaries. The idea will utilize light weight passive and active sensors (for eg Lidar for topographical bathymetric, multispectral image analysis etc) retrofitted on commercial aircrafts.

The new proposed system of using the existing commercial aircraft network will enable us to gather big data sets. Cities will better understand their emissions and the Paris Agreement will be able to take better policy decisions. This far simpler and much more reliable system can be used to gather scientific data to better understand the carbon sequestration cycle, rising sea levels, and to help better prepare firefighting mitigation and adaptation. In fact, I believe the world will reap its benefits if this simple technology is amended right into Article 10 within the Paris Agreement framework.

I see this system to be in a three-prong advantage.

First, the system will be easier to maintain and upgraded on a regular basis. Therefore, it would take away the necessity of monumental expensive space rocket flights and extremely expensive space materials. Second, the data can be real time, using an algorithm to constantly update emissions and other data such as forest canopy moisture from certain locations based on the aircraft overhead. This data can be put together for scientists to better understand GHG emissions and visualize the moisture of vegetation and soil, combined with wind patterns from weather systems analysis, and thus be able to effectively predict forest fires, flood zones and so on. This is envisioned to be a simple technology that will save millions of dollars and most importantly save human lives around the world.

Some professors and scientists at Yale have already shown strong interest in this work of mine and if successful, it will be an important part of the tool set scientists and governments can use to better understand and subsequently adapt to global climate change.

We spend a large amount of time deciphering economic data to give credence to national policy decisions. I believe the major impediment to us moving forward is our attempt in rationalizing every bit of action we take through egregious financial data. The question is, can we ever really put a capitalistic and greedy monetary value for a just and safer planet for all?

Developing adaptive capacity: Bangladesh's journey towards resilience from vulnerability under LGED

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Bangladesh, known to be one of the most vulnerable countries to climate change impacts, has taken some serious strives that are turning it into arguably the most adaptive country in the world.
Although the climate induced natural calamities have increased their frequency and intensity in past few decades, the country has accelerated on its development highway. This has been achieved through a robust development approach, not only in the infrastructure but also in the capacity of its citizens.
The Coastal Climate Resilient Infrastructure Project (CCRIP), a project of the Local Government Engineering Department (LGED) for instance, is a demonstration of Bangladesh's recent approach where even an infrastructure development project has a component for enhancing capacity of people to address climate change.
To do so, the International Centre for Climate Change and Development (ICCCAD) has developed training materials and began facilitating a series of workshops – 12 in district-level: Madaripur, Shariatpur, Gopalganj, Bagerhat, Shatkhira, Khulna, Jhalokathi, Pirojpur, Barisal, Bhola, Barguna, and Potuakhali; 68 in Upazila-level, and 51 in village-level under this project.

THE KEY HIGHLIGHTS OF THE WORKSHOPS

- Bangladesh needs planned adaptation strategies to tackle climate change, which means strategies taken after scientific assessment of climate change impacts and vulnerabilities in long term, between 50 to 100 years and formulating impact reduction measures, both structural and non-structural with local experience.
- To reduce climate change impacts, there is a need to build erosion-protected climate resilient embankments and improved water drainage system. It will help reduce the impacts of sea level rise, salinity intrusion, and help protect land from erosion.
- To reduce water scarcity, large water bodies need to be excavated with high embankment to conserve rainwater in different locations in a village or a community. Embankment of such water bodies should be raised to make them free from inundation by flood and saline water.
- There is a need to stop tree cutting activities and people should be encouraged to plant more fruit bearing and location specific trees. Timber tree plantation activities should be discouraged.
- Human capital resource development initiatives such as promoting education, mass awareness programs, and skill development training on different IGAs need to be continued for undertaking sustainable adaptation strategies.
- The coastal people in Bangladesh are climbing up the ladder of developing adaptive capacity to climate change. Through this series of workshops, participants are encouraged in contributing more to the climate change resilience activities.
- They feel that such type of training workshops should be organized frequently in community, Upazila, and district levels. There is also a need for coordination and cooperation among different departments and stakeholders for getting effective results on climate change adaptation related projects.

Workshop participants include district and Upazila-level government officials, local government representatives, university faculties, college and madrasa principals, teachers, NGO representatives, religious groups, retired government officers, students from colleges, high schools, and madrasas, local elites, freedom fighters, journalists, local businessmen etc.
The workshops provided a common platform where resourced people on climate change and other sectors meet together to share their ideas and knowledge about climate change hazards, impacts, and adaptation.
The workshops provided the participants with a basic understanding of climate change, followed by climate change hazards, impacts, and adaptation options from Bangladesh's perspective.
People from coastal Bangladesh are facing several climate induced hazards like tidal floods, riverbank erosion, salinity intrusion, cyclones etc on a regular basis.
Due to tidal floods, thousands of acres of land get submerged under saline water, hampering agricultural production and fish cultivation. People are forced to change their livelihoods due to salinity intrusion.
Two consecutive cyclones, Sidr in 2007 and Aila in 2009, have caused monumental damage to the people, causing many casualties and loss of property during the events and affecting their livelihoods afterwards.
[caption id="attachment_253512" align="aligncenter" width="800"]

Facilitating workshop in Rupsha upazila[/caption]
People in Bhola district are under constant threat of erosion. Many erosion victims are migrating to the capital city every day, ending up in one of the "Bhola" slums without any guarantee of basic needs like food, health, and sanitation.
People in these regions know about the climate change impacts. After attending the workshop, they now understand the reason behind it, and what needs to be done to tackle climate change at local, national, and international levels.
They may not comprehend the jargons related to climate change, but they can easily understand the situation if they can relate the local context with the global climate change.
Some of the key highlights of these workshops are as follows:
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To reduce climate change impacts, there is a need to build erosion-protected climate resilient embankments and improved water drainage system. It will help reduce the impacts of sea level rise, salinity intrusion, and help protect land from erosion.
To reduce water scarcity, large water bodies need to be excavated with high embankment to conserve rainwater in different locations in a village or a community. Embankment of such water bodies should be raised to make them free from inundation by flood and saline water.
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