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The Impact of Climate change on the Asian Century and Vice Versa

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Abstract

There are various threats to Asia in realizing its potential to achieve the Asian century, among which climate change is the most prominent. Climate change, which was once considered to be a human constructed myth, is no longer a myth. Rather it is a hard reality for everyone. The devastating impact of climate change is being and will have to be borne by every state irrespective of the degree of intensity and the frequency of contribution made by them. With the advancement in the economic status of the Asian countries, there will be a lot of pressure on the natural resources and if the current trend of using nonrenewable resources continues then the impacts of climate change will be more apparent not so far from now. We are already facing the effects of climate change which were mainly caused by the development of other continents. This article seeks to demonstrate how climate change is going to affect Asia with the change in time and simultaneously also tries to provide feasible measures to tackle it. This paper also attempts to identify the various sectors which require immediate attention so as to tackle climate change by reforming them. This paper will also illustrate an overview of what we can learn from the 19th and the 20th century which were considered as the European century and the American century respectively. It will also shed light on how Asian century can be different from the previous two centuries. This paper, in conclusion, will discuss how sustainable development can play a role in tackling climate change and how we can bring in multilateral cooperation among the Asian states to tackle climate change and ultimately place everyone in a better position.

Introduction

The perception of 21st century belonging to Asia is neither predestined nor is on autopilot, rather it will have to be earned and eventually realized by the Asian states through multilateral cooperation among themselves. There are significant challenges, risks, and obstacles that Asia will have to overcome to realize its potential and achieve the promising outcome of the Asian century. The pathway to the Asian century is not a smooth paved road rather it is going to be a bumpy ride.

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In this 21st century as Asia is re-emerging as the world's epicenter of political, economic, and socio-cultural activities and as it is considered to be on the verge of achieving the Asian century, there are significant risks or challenges to be faced by Asia such as the increasing inequities between the countries, middle income trap, competition for finite natural resources, global warming and climate change, the challenge of governance and institutional capacity, etc.[1] Out of all these challenges, global warming and climate change are the paramount risk that Asia will have to tackle.

A 2011 study by the Asian Development Bank found that an additional 3 billion Asians could enjoy living standards similar to those in Europe today, and the region could account for over half of global output by the middle of this century.[2] This improvement in the living standard of the people entails both opportunities and risks as there will be intense pressure on finite natural resources with an increase in the living standard of the people along with an increase in the total population of the continent. As the pressure on the natural resources increase it will simultaneously contribute more to climate change.

Asia and the Pacific region continues to experience rapid economic development with the region's economies posting 5.8% growth in Gross Domestic Product in 2016.[3] Under the business-as-usual scenario the region's continued growth, growing access to electricity, and rapid expansion of the vehicle fleet will contribute to Asia's growing share of global greenhouse gases which could rise to 48% by 2030 from approximately 40 % in 2016.[4]

Climate change is no more a so-called 'human constructed myth' and is already a hard reality for everyone. The devastating impacts of climate change are going to affect everyone irrespective of gender, economic status, country of origin, or the intensity and degree of contribution made by an individual to climate change.

This paper is broadly classified under four categories, namely; the impact of climate change on the Asian century, the impact of Asian century on climate change, various sectors that need immediate attention, and lessons from the 19th and the 20th century.

A. Impact of Climate change on the Asian Century

Climate change is now affecting every country in every continent. It is disrupting national economies and affecting lives, costing people, communities, and countries today and which will affect even more in the future. Weather patterns are changing, sea levels are rising, weather events are becoming more extreme and greenhouse gas

1 Harinder Kohli et al., 'Asia 2050: Realizing the Asian Century: Overview', January 2011, *ResearchGate* available at https://www.researchgate.net/publication/254410752_Asia_2050_Realizing_the_Asian_Century_Overview , accessed on 19 March 2019.

2 Ibid.

3 Pretty Bhandari, 'Asia and the Pacific is at the forefront of the battle on climate change', 12 December 2017, *iD4D* available at https://ideas4development.org/en/asia-pacific-climate-change/, accessed on 19 March 2019.

4 Ibid.

emissions are now at their highest levels in history.[5]

The historic Paris Agreement of 2015 has acknowledged that the global climate crisis is arguably the greatest challenge human civilization faces in the 21st century. In this context, the role of Asia and Pacific region is characterized by a double dichotomy that entails simultaneously high risks and significant opportunities.[6]

As Asia is on the verge of realizing its potential to make the 21st century as the Asian Century, it might be obstructed from quenching its thirst due to climate change. The devastating impacts of climate change are going to affect everyone leaving no one behind. The Asia and Pacific region is extremely vulnerable to the impacts of climate change. Unabated warming could significantly undo previous achievements of economic development and improvements in living standards.[7] If climate change is not given close attention then it will not only hinder future development but also destroy the development achieved in the past.

In this paper, the impact of climate change on the Asian Century is broadly classified under five categories, namely; extreme weather-related hazards, water shortage, food scarcity, climate refugee, health vulnerabilities, and pressure on finite natural resources.

1. Extreme Weather-Related Hazard

In recent years weather catastrophes such as floods, wind, typhoons, frost, wildfires, hailstorms, and heat waves have hit many Asian countries making it among the worst in the world.

Asia experienced the highest number of weather and climate-related disasters in the world during the 2000–2008 period and suffered huge economic losses, accounting for the second highest proportion (27.5%) of the total global economic loss (IPCC, 2012).[8]

Extreme weather events are not a matter of bad luck or omen, rather it has been caused by various factors among which one of the paramount factors is an increase in the global temperature affecting the existing favorable climate. This increase in the global temperature has been largely contributed by anthropogenic activities such as economic development brought in by industrialization, use of fossil fuels, deforestation, an increase in greenhouse gases in the atmosphere, etc.[9] Since the 1970s, the average global

5 'Goal 13: Take urgent action to combat climate change and its impacts', *United Nations* available at https://www.un.org/sustainabledevelopment/climate-change/, accessed on 18 March 2019.

6 Potsdam Institute for Climate Impact, 'A Region at Risk: The Human Dimensions of Climate Change in Asia and the Pacific', June 2019, *Asian Development Bank Institute* available at http://hdl.handle.net/11540/7303, accessed on 19 March 2019.

7 Ibid.

8 Yasuaki Hijioka, Erda Lin & Joy Jacqueline Pereira, 'Asia In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects, Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change', 2014, *The Intergovernmental Panel on Climate Change* available at https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap24_FINAL.pdf, accessed on 15 March, 2020.

9 Peter Miller, 'What's Causing Extreme Weather?', 21 August 2012, *National Geographic* available at https://news.nationalgeographic.com/news/2012/08/120820-extreme-weather-heat-waves-science-environment-global-warming/ , accessed on 20 March 2019.

temperature has risen by 0.9 °F (0.5°C), primarily as a result of greenhouse gases in the atmosphere, according to most scientists.[10]

With an increase in the global temperature of the earth the oceans and seas are heated much faster making them warmer which eventually leads to evaporating more moisture in the atmosphere.[11] With an increase in the moisture present in the atmosphere, it leads to production of more rainfall than favorable amounts causing various disasters such as floods, landslides, soil erosion, and so on.

There are various other implications of climate change and some of the most prominent implications on extreme weather hazards are discussed below.

Some of the extreme weather-related hazards are as follows:

1.1. Typhoons (Tropical cyclones)

A typhoon is a mature tropical cyclone that develops between 180° and 100°E in the Northern Hemisphere. This region is referred to as the Northwestern Pacific Basin, and is the most active tropical cyclone basin on Earth, accounting for almost one-third of the world's annual tropical cyclones.[12]

Typhoons start as tropical thunderstorms whereby the strong winds pull in moisture from the oceans and the thunderstorms convert the moisture into heat eventually causing more air to flow to the center of the storm causing evaporation. Thus, all the heat and airflow toward the eye creating the typhoon.[13] Typhoons are caused by an increase in the temperature of the oceans. The warm oceans and sea surface temperatures intensify tropical cyclones. As the oceans are heated much warmer by the rise in global temperature, it evaporates more moisture which is converted into heat by the thunderstorms causing more air to flow to the center of the storm causing evaporation.[14] And a typhoon originates with all the heat and air flowing towards the eye of the typhoon.

The heavy and persistent rainfall and coastal storm surges that typhoons bring can also have devastating effects. In addition to making homes uninhabitable, the flooding associated with typhoons can cripple rescue and aid efforts by making roads impassable.[15] There are various negative impacts of typhoons such as the effect on the natural environment, watercraft, structural damage to the buildings, human health, and livelihood.[16]

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10 Ibid.

11 Ibid.

12 'What is a Typhoon', Open Hazards.com available at https://www.openhazards.com/faq/hurricanes-tropical-cyclones-and-typhoons/what-typhoon , accessed on 21 March 2019.

13 Carrie Cockburn, 'Explainer: How are typhoons formed?', 5 October 2018, *The Globe And Mail* available at https://www.theglobeandmail.com/news/world/explainer-how-are-typhoons-formed/article15373372/, accessed on 21 March 2019.

14 Ibid.

15 Ibid.

16 Erik Devaney, 'The Effects of Typhoons', 19 April 2019, S*ciencing* available at https://sciencing.com/

Typhoons can destroy and damage vegetation including crops that communities depend on for their livelihood. As it blows from oceans and seas, it brings in salt water with them which can affect crops posing threat to food production. It can also destroy the forest which is an important carbon sink and it will affect the amount of greenhouse gas in the atmosphere.

In addition to causing mayhem on land, typhoons can also affect oceans and seas especially business associated with it like fishing, oil extraction, etc. Human health is also at risk due to strong typhoons in various ways.

1.2. Flood

A flood is defined as any high flow, overflow, or inundation by water which causes or threatens damage.[17] Floods are caused or amplified by both weather and human-related factors. Major weather factors include heavy or prolonged precipitation, snowmelt, thunderstorms, storm surges from hurricanes, and ice or debris jams.[18] Human factors include structural failures of dams and levees, altered drainage, and land-cover alterations (such as pavement).[19]

With rising global temperatures due to an increase in heat-trapping emissions, more water evaporates from the land and oceans. The warmer atmosphere can hold more water vapor which means that when it rains, there is a higher potential for heavy rainfall, which is the main cause of inland flooding.[20]

As global warming is hindering the favorable climate by exacerbating sea level rise and extreme weather, the potential and risk for increase in flooding is expected to rise. Climate change would not affect or induce floods directly but it exacerbates many of the factors that do affect flood and establishes a relationship between flood and climate change.

With an increase in the global temperature of the Earth, its atmosphere becomes warmer which increases its potential to hold more moisture or water leading to intense rainfall increasing the sea level and other water bodies. Climate change is also increasing the frequency of storms making them stronger than ever before which sweeps through coastal areas bringing in sea water to the inland causing major destruction.[21] As the temperature of the ocean increases and the glaciers on high mountains melt due to climate change induced by global warming, global sea levels are rising posing a great threat to coastal regions as the potentiality of flood increases drastically.

effects-typhoons-6060279.html, accessed on 21 March 2019.

17 'Floods', *National Climate Assessment* available at https://nca2014.globalchange.gov/highlights/report-findings/extreme-weather/content/floods, accessed on 22 March 2019.

18 Ibid.

19 Ibid.

20 'Climate Change, Extreme Precipitation and Flooding: The Latest Science', 2 July 2018, *Union of Concerned Scientists* available at https://www.ucsusa.org/global-warming/global-warming-impacts/floods, accessed on 22 March 2019.

21 Ibid.

The consequences of flood are both short term and long term affecting everyone on their path. The most obvious effects are on the destruction of properties, loss of human life and wildlife, loss of vegetation, flooding of agricultural lands, contamination and diseases, pollution of drinking water, etc. Aftermath of flood includes the repair and replacement of roads that are damaged, bridges, public infrastructures, etc. costing millions of money.

Flood is also related to other sectors such as food scarcity, human health, and so on. As the flood sweeps away agricultural land, the food production decreases as it sweeps away the crops planted in the field and also degrades land through soil erosion and landslides. It also affects human health as waters are contaminated and polluted due to pollutants like chemicals present in water brought in by the flood. All these lead to economic loss and human capital loss as well.

1.3. Drought

Drought is also one of the extreme weather-related hazards and it has far reaching consequences. Though drought has also been occurring in the earlier days, its frequency and intensity were less but now it has become more intense and the lasting period of it has also increased drastically due to climate change.

Warmer temperatures can amplify the impacts of drought. Increased temperatures enhance evaporation from soils, making periodic droughts worse than they would be under cooler conditions.[22] While droughts can have different causes depending on the area of the world and other natural factors, the majority of scientists have started to link more intense droughts to climate change. That is because, as more greenhouse gas emissions are released into the air, causing air temperatures to increase, more moisture evaporates from land and lakes, rivers, and other bodies of water. Warmer temperatures also increase evaporation in plant soils, which affects plant life and can reduce rainfall even more. And when rainfall does come to drought-stricken areas, the drier soils it hits are less able to absorb the water, increasing the likelihood of flooding – a lose-lose situation.[23]

Drought can affect agriculture, water supply, human health, etc. Due to long periods of drought, water supply is hindered consequently affecting practice of agriculture reducing the total amount of food production leading to food scarcity. As there is a limitation to the amount of food available, the price of food will eventually spike up. Because of that, poor people will not be able to afford it leading to various diseases such as malnutrition. It can also have a great impact on energy supply such as energy produced by hydropower plants which solely relies on water.

Nearly 40 % of working adults in the world rely on agriculture as its main source of

[22] 'Drought and Climate Change', *Center For Climate And Energy Solutions* available at https://www.c2es.org/content/drought-and-climate-change/, accessed on 22 March 2019.

[23] 'The Facts About Climate Change and Droughts', 15 June 2016, *The Climate Reality Project* available at https://www.climaterealityproject.org/blog/facts-about-climate-change-and-drought, accessed on 22 March 2019.

income.[24] So, if droughts lead to water shortages in an area dependent on agriculture, it not only puts the health and wellbeing of animals and crops at risk but also of the farmers and communities that depend on them.

Then there are consequences we might not immediately think about, like greater wildfires. That is because droughts dry out the land, killing plant life, and creating tinderbox conditions.[25] And, with less predictable rains, it's harder to stop these fires once they begin. These wildfires can leave communities and governments with millions of dollars in damages, not to mention the incalculable costs of lost plants, animals, and even human lives.

1.4. Heat Waves

'Heat wave', 'excessive heat event', 'heat advisory', 'hot spell'; extreme heat has many different names but all of them generally refer to temperatures that are either exceptionally high relative to typical local conditions or temperatures that reach levels that may be harmful to human health or infrastructure.[26] When extreme daytime temperatures persist over a prolonged period (usually at least two days), it is often referred to as a heat wave.[27]

Extreme heat can increase the risk of other types of disasters. Heat can exacerbate drought which in turn, can encourage more extreme heat, as the sun's energy acts to heat the air and land surface, rather than to evaporate water. Hot, dry conditions also increase the risk of wildfires.[28]

It has a lot of negative impacts on the environment and human health as well. Because of the heat waves, there is high humidity and an increase in temperature causing heat-related illness and mortality. Because of the high temperature, some crops cannot survive as they require cool temperatures as well, which will eventually lead to food scarcity. Livestock such as cows will also have a tough time coping with the heat and there will be a decrease in the production of dairy products as well.

Heat waves will also have pressure on demand for electricity as people will need more energy for cooling. As already stated above, heat waves will have an impact on drought causing a decrease in water supply for hydropower as well.

2. Water Shortages

Asia is currently home to 4.5 billion people who use around 65% of the world's water

24 Ibid.

25 Ibid.

26 'Heat Waves and Climate Change: What the Science Tells Us about Extreme Heat Events', 31 July 2018, *Union of Concerned Scientist* available at https://www.ucsusa.org/our-work/global-warming/global-warming-impacts/heat-waves-and-climate-change-what-science-tells-us, accessed on 22 March 2019.

27 Ibid.

28 'Heat Waves and Climate Change', *Center For Climate And Energy Solutions* available at https://www.c2es.org/content/heat-waves-and-climate-change/, accessed on 22 March 2019.

supply and around 30% of the Asian population is already facing water scarcity.[29]

Roughly 60 percent of the global population lives in Asia, often with limited access to water: There is less than half the amount of fresh water available per inhabitant in Asia, compared to the global average.[30] This situation is going to further degrade with an expected increase in population of the continent and the melting of glaciers at a faster rate due to climate change.

The glaciers across the High Mountain regions of Asia have shown measurable signs of recession. However, changes are highly heterogeneous. Available climate change impact assessments have shown an increase of both the risk of flooding and water shortages, as the natural storage capacities of glaciers diminish while glacial lake outburst floods become more likely.[31] As a result, the dependency on rainwater increases.[32]

As the temperature of earth is increasing and becoming much hotter day by day eventually leading to glacier retreating at a faster rate than ever it leads to the formation of glacial lakes and as the glacial lakes are constantly supplied with water from melting glaciers, it leads to an outburst of such lakes causing floods.

Many parts of Asia are facing water shortages and the East Asian region, in particular, is experiencing increasing water shortages, negatively affecting its socioeconomic, agricultural, and environmental conditions, which is attributed to lack of rains and high evapotranspiration, as well as over-exploitation of water resources.[33]

This issue of water shortage is not mutually exclusive and they can impact one another. It will affect various sectors such as agriculture, industry, environment, and so on. For instance, due to water shortages, human health will be at great risk as people's access to fresh water will be minimal whereby people will have to resort to using water that is actually not feasible. With this, many waterborne diseases will spread in the region.

Due to water shortages, the crop harvest will decrease drastically as water is an important element for plants. As the food production is less, people who are from poor economic backgrounds will not be able to afford higher food prices leading to malnutrition.

With all these issues, people will be affected greatly and people will have to invest a lot of money on their health. All these will eventually lead to drastic decrease in the living standard of people in the region.

The impact of climate change on water is immense which includes severe water shortages from a drier climate and reduced fresh water flows from Himalayan glaciers,

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29 Helen Tunnicliffe, 'Is Asia facing a coming water crisis?', 9 January 2019, *International Institute for Applied Systems Analysis* available at http://www.iiasa.ac.at/web/home/resources/publications/options/Is_Asia_facing_a_coming_water_crisis_.html, accessed on 18 March 2018.

30 Peter Dizikes, 'Study: Climate action can limit Asia's growing water shortages', *MIT News* (June 2018) available at http://news.mit.edu/2018/study-climate-action-limit-asia-growing-water-shortages-0619, accessed on 19 March 2019.

31 Potsdam Institute for Climate Impact (n 6).

32 Ibid.

33 Hijioka (n 8).

seawater intrusion into aquifers, more severe weather patterns leading to possibly more intense typhoons, amplified storm surges, increased flooding of coastal megacities and increase in vector borne and diarrheal disease.[34]

3. Food Scarcity

Climate change poses large, but regionally differing, threats to agriculture and food security in Asia through higher temperatures, drier conditions, sea-level rise, and flooding. Major uncertainties pertaining to the extent of the threat relate to the potential effects of carbon dioxide fertilization.[35] Climate change impacts on temperature and precipitation will affect food production and food security in various ways in specific areas throughout this diverse region.[36]

Weather variability driven by climate change will have negative impacts on food production and the total amount of food production will decrease drastically in times to come. As the temperature of the earth increases, the growing period of crops like rice will decrease which will eventually lead to lower yields of rice. Not only rice production, but other food crops like wheat, maize, barley, will also have decreased production.

The untimely arrival and unwanted amount of various precipitation will also have a great impact on food production. For instance, heavy rainfall during the harvest season of rice will damage most of the rice plants leading to decrease in the collection of the rice and not having enough water during plantation of rice will also affect the total amount of rice harvested.

Melting of glaciers at a faster rate due to increase in the temperature of earth enhanced by global warming and climate change will affect the availability of water in the long run. This in turn will lead to water scarcity for agriculture. As the availability of water decreases, food production is also going to decrease and the situation is going to be further deteriorated by an increase in the population of the continent.

The decrease in food production is not mutually exclusive, rather it is correlated with other fields as well. Due to lack of availability of sufficient water to practice agriculture, people who are from the agricultural sector can no longer depend upon it for their livelihood. Due to that, some people in the particular region will migrate to other places feasible to practice agriculture which will have higher pressure on the finite natural resources due to over population in that place.

Food scarcity is also going to hamper human health as people will not have sufficient food to eat leading to various diseases like diarrhea and malnutrition as well. With the deficiency in the health of the people, they will have to invest a lot of money to buy imported food which is going to be of higher prices and those who cannot afford these expensive foods will have to suffer from various diseases.

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34 Kohli (n 1).

35 Potsdam Institute for Climate Impact (n 6).

36 Hijioka (n 8).

It is also going to affect Asia's dependency on imports of food from other continents which will have a direct impact on the economy and security issues as well. Its economy is also going to be hindered as the import of food spikes up.

4. Climate Refugees

Climate change is a multi-causal hazard that interacts with other factors to increase the drivers of migration. Left unmitigated, it is projected to slow economic growth, compromise livelihoods, erode food security and create new poverty traps, especially in urban, coastal and agriculture-dependent areas and emerging hotpots, many of which are in Asia and the Pacific.[37]

Climate change has led to thousands of people to migrate from their homes to other places due to a lot of vulnerabilities associated at their home place brought in by climate change. Many people have become climate refugees and the situation will deteriorate further in the future. If this issue of climate change migration is not managed effectively and efficiently, then many issues such as unmanaged population growth in a place and intense pressure on finite natural resources will originate.

As already stated above, various factors like extreme weather patterns, food scarcity, water shortages, disasters will compel people from a particular place to migrate to other places. Climate change impacts are projected to be large, particularly because monsoonal rainfall patterns could become less reliable and cyclonic activities more intense and well-being of people is highly vulnerable to environmental hazards and degradation of natural resources.

5. Health Vulnerabilities

Climate change threatens human health. A report from *The Lancet,* the world's leading general medical journal, declared climate change "the biggest global health threat of the 21st century." While the health impact of climate change is still not fully understood, an emerging body of scientific evidence and empirical data appear to indicate a strong association between climate change and human health.[38]

Impact of climate change on human health can be broadly classified under two categories namely; direct impact and indirect impact. Extreme climatic events cause direct impacts on humans such as death, disabilities and bodily injuries. While indirect impact on human health is through the impact on other factors linked with human health. For example, as the global temperature of the earth increases the glaciers melts at a faster rate exacerbating the risk of floods through the outburst of glacial lake.

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37 United Nations Economic and Social Council, 'Migration and climate change in Asia and the Pacific', Asia-Pacific Regional Preparatory Meeting for the Global Compact for Safe, Orderly and Regular Migration, Bangkok, 6-8 July 2017.

38 Kazuyuki Uji, 'The health impacts of climate change on Asia-Pacific', 2012, *Asia-Pacific Human Development Report Background Paper Series 2012/16* available at https://www.undp.org/content/dam/rbap/docs/Research%20&%20Publications/human_development/aphdr-2012-tbp/RBAP-HDR-2012-APHDR-TBP-16.pdf, accessed on 22 March 2019.

Through this, flood waters are contaminated and in the long run there will be water scarcity as glaciers are retreating at a faster rate than normal expected rate. Through this scarcity of water and the quality of water human health is also indirectly affected. In the short run, through these floods, agricultural lands are degraded and crops are swept away leading to loss of crops.

Climate change can expose people to a greater risk of malnutrition and food insecurity. The World Health Organization ('WHO') pronounces malnutrition as "the largest health effect" of climate change. Varying rainfall patterns, climate, floods, droughts, and seawater warming catalyzed by climate change, are expected to reduce agricultural, fishery and aquaculture outputs, which could induce hunger and malnutrition. By 2030, climate change is projected to account for about 4.7 million cases of malnutrition, or about 10% of the global total.[39]

Climate change poses a significant risk to human health in Asia and the Pacific, threatening to reverse many of the health improvements that have been achieved in the past decades. The WHO recently estimated approximately 16,000 annual deaths among children below 15 years of age and 26,000 annual deaths in small children below 5 years of age related to undernutrition (stunting), attributable to climate change in the 2030s across the Asia and Pacific region.[40]

6. Pressure on finite Natural resources

Climate change is going to have an enormous impact on finite natural resources. It is further going to worsen with an expected increase in population in the region. Asia has a wealth of natural resources and ecological and biological diversity. Yet, population growth and economic development are threatening the region's rich heritage through the expansion and intensification of agriculture, the uncontrolled growth of industrialization, the destruction of natural habitats, and urban sprawl.[41]

Climate change and rise in the human population have put stress on virtually all of our natural resources, making these resources increasingly scarce or certainly more expensive to source. The resulting complexities of the issue plague us from multiple sides. On one front, we battle the loss of species as some in the scientific community think we are in a current period of mass extinction. On another front, we struggle to maintain environmental ecosystems that are threatened by invasive species, urban sprawl and an increased demand for resources.[42]

Climate change with additional pressure from increase in population brings a lot of stress or pressure on natural resources. Disasters like floods, droughts, typhoons which

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39 Ibid.

40 Potsdam Institute for Climate Impact (n 6).

41 'The Future of Population in Asia: Population, Natural Resources, and Environment', *East West Center* available at https://www.eastwestcenter.org/fileadmin/stored/misc/FuturePop10Environment.pdf, accessed on 22 March 2019.

42 Thomas Long, 'Climate change and its effects on natural resources', 22 October 2014, *Michigan State University* available at https://www.canr.msu.edu/news/climate_change_and_its_effects_on_natural_resources, accessed 22 March 2019.

existed before as well are now further enhanced by climate change. With this kind of disaster increasing in its frequency of occurrence and with intensification of such disasters, major damage is being caused to natural resources. For example, droughts lasting longer duration can cause damage to food production whereby people will resort to using other land for cultivation. People will have to migrate to other places efficient to practice agriculture inserting pressure on limited natural resources.

As these types of events affect our food and energy supplies, it becomes increasingly problematic as we now have more mouths to feed, more energy needs and a growing need for economic development. The growing populations need clean water, food to eat and energy to power their lifestyles. Therefore, managing our resources is essential for the health of our communities and the world.

Asia faces the most acute pressure on agricultural land of any region in the world. Over the past 30 years, while Asia's total population increased by about 68 percent, the total area of land under cultivation increased by only 21 percent—from 355 to 430 million hectares. This expansion has been largely at the expense of lowland forests. Today, there are very few possibilities for further expansion—almost all the suitable land in the region is already under cultivation. Despite past expansion of the area under cultivation, less agricultural land is available to feed each person in Asia (0.16 hectares per person) than in the world as a whole (0.26 hectares per person) (World Resources Institute 2001).[43]

B. Impact of Asian Century on Climate Change

If Asia leaves climate change abated or does not take climate change into account while putting forward and prioritizing economic development, then it will have a lot of negative repercussions in the future. Even if Asia as a whole improves drastically with the living standard of people improving and thus making the 21st century belong to Asia, the success of it might be short lived.

With advancement in economic status brought in by development, there will be intense pressure on natural resources. With development, many issues arise such as increase in temperature brought in by the use of fossil fuels, exhaustion of natural resources, and human health vulnerabilities. Asia might enjoy the fruits of success for a while but then it will be short lived. It is going to contribute a lot to climate change whereby a lot of sectors such as agriculture, water, health, natural resources are vulnerable.

As Asia sets out to realize its potential to achieve Asian century, it will have various impacts on climate change. If the current trend of using fossil fuels in industries continues then the Greenhouse gas emissions in the atmosphere will increase which in turn will increase the temperature of earth leading to various climate change driven disasters.

For instance, with a lot of economic development taking place and with the continuous

[43] 'The Future of Population in Asia: Population, Natural Resources, and Environment' (n 41).

use of fossil fuels in industries the global temperature increases leading to various hazards such as heat waves, water shortages, drought, melting of glaciers causing flood, etc. With these kinds of disasters taking place more frequently, it will pose greater threat to food scarcity. Due to food scarcity, Asia will have to import more food from other continents causing the external flow of money affecting the economy and human health as well.

This is just one possible problem associated with the impact of Asian century on climate change. There are a lot of similar relationships.

C. Various Sectors which need immediate attention

Agriculture

Agriculture is one of the most sensitive economic sectors affected by climate change and it is also an important sector in most Asian countries.[44] It currently accounts for about 10 percent of their economy.[45]

Various factors have accounted to threatening agriculture and making it less sustainable such as soil erosion, landslides, non-responsive yields, calamities like floods, drought, decrease in quality of water, degradation of fertile land through salinity and pest incidence, groundwater water depletion, etc.

With global warming and climate change making glaciers retreat at a faster rate, the supply of water for agriculture is at risk. In some cases, the amount of water is so huge that it floods away all the crops in the field while in some places due to scarcity of water, fields dry up jeopardizing food production, human health and eventually the livelihood of people.

If Asia wants to sustain itself by not depending on import of food from other continents, then agriculture should be given close attention and priority. One of the main threats to agriculture is the lack of water causing drought and on the other side the availability of accessible water for agriculture, which is hampered by floods. So, building water reservoirs to store water is an essential step to make water available for agriculture. For example; when there is a flood in a particular place water can be stored in the reservoir making it available in times of need. With the rainfall being less reliable, as time changes, water reservoirs can play an even greater role in providing water for crops. So, Asia will have to depend on effective management of existing reservoirs and the construction of new ones in places where it is much needed.

As the climate changes, some crops cannot adapt in the same place as it is used to. Therefore, countries in Asia should facilitate in providing those varieties of crops that can adapt in that climate and also provide crops which are climate and heat resilient for better production. Money should be invested in infrastructures like irrigation canals and reservoirs.

44 Kohli (n 1).

45 Ibid.

Water

Water is an essential element for everyone and climate change is bound to have its impact on water as well. Due to climate change, supply of water is disturbed making it temporal and also affecting spatial variation in flow which is going to affect the generation of electricity. With this, there will be variation in the production of electricity through hydro power affecting the economy of those countries that depend on hydro power generation.

As glaciers retreat at a faster rate forming glacial lakes which are highly vulnerable to bursting and leading to floods in the rivers. The rivers are subsequently polluted through sedimentation which is going to affect the productivity of agricultural crops. Glacial lake outburst flood will also take away lands and crops with it affecting the agricultural sector.

Due to an increase in the global temperature and variation in precipitation, the supply of water through rainfall is scarce leading to droughts due to which people are affected in many ways. One such way is through the polluted water which is not safe for drinking and causing various diseases.

Industries

Asia is one of the major and growing sources of greenhouse gas emissions (GHG). With urbanization and more economic developmental activities taking place, the amount of GHG emissions contributed in the atmosphere is bound to increase unless new greener means of conducting business is adopted by many countries.

If the current conventional means of using fossil fuels to power up the industry is being continued for economic development, then the issue of climate change is going to deteriorate even further. But on a positive note, as Asia is at the stage of developing whereby major infrastructures are yet to be built, there are favorable ways through which Asia can develop by not affecting climate change at a greater degree if it is adopted by many countries in the region.

Favorable means are use of renewable energy from hydro power, wind and solar energy, etc. to power huge industries rather than resorting to use of fossil fuels like coal. And industries can also use the concept of green buildings.

Health

Human health is also vulnerable to climate change and it needs immediate attention. Climate change has far reaching consequences on various factors linked with human health. As the temperature of the earth increases, it contributes to air pollution, heat stress, spread of vector-borne illnesses and many more. One of the important factors affected by climate change, which is also linked with human health, is agro-ecological systems and hydrology which is going to have a great impact on the availability of water and food production. Through these ways, human health will also deteriorate.

For this, Asian countries should focus on adaptation in a new phase whereby all these issues are brought into attention and solutions to them must accordingly be figured out.

D. Lessons from the 19th and 20th century- How can Asian century be different from European century and the American century

As the countries in Asia compete with one another for economic growth, they will pose great pressure on finite resources. During the past two decades, greenhouse gas emissions from Asian countries, particularly carbon dioxide, have been increasing rapidly, mainly due to industrialization and population growth. Four of the ten countries in the world with the highest CO2 emissions from fossil-fuel use today are located in Asia.[46]

Countries usually use fossil fuel to power their industries which lead to an increase in greenhouse gas emission. So, the present way of conducting business should be thrown away and a new efficient way should be adapted for the benefit of everyone.

In the 19th and 20th century non-renewable energy like fossil fuels were used as a major source of energy for various industries and the use of renewable energy from hydroelectricity, solar energy were very minimal. These use of fossil fuels have led to an increase in greenhouse gas emissions in the atmosphere contributing to global warming making climate change. The repercussions can be seen and is felt by the present generation in various forms. Though Asia's contribution to global warming and climate change is significantly low we are suffering its impacts.

So, with Asia developing with major leaps, we should be careful of our activities. Various measures can make the development take place without affecting the environment and climate on a large scale. Asia should shift from the present economic model to a better and efficient model which has less impact on nature and contributes less to climate change. Asia should prioritize and work on low carbon emission and use of finite resources in an efficient manner. It should invest in clean energy and subsidize use of such energies rather than providing subsidies to fossil fuels.

Various industries can be fueled by renewable energy such as hydroelectricity, solar energy, wind energy, etc. which will contribute largely to reducing greenhouse gas emissions in the atmosphere. This in turn, will reduce its impact on climate change. As Asia is developing, it can resort to use of green technologies in building huge infrastructures such as construction of green buildings and also climate proof buildings.

Asia should also strive to strike a balance between development and conservation of the environment. Sustainable development goals should be prioritized.

Transportation can also have a critical role in promoting or contributing less to greenhouse gas emissions. Instead of using petrol and diesel as fuel for transportation,

[46] Toufiq A. Siddiqi, 'The evolving Role of Asia in Global Climate Change', *East West Center* (January 2008) available at https://www.east west center.org/news-center/east-west-wire/the-evolving-role-of-asia-in-global-climate-change, accessed on 23 March 2019.

governments can make use of electric vehicles. Public transportation should be made efficient so that people can opt for it rather than taking personal cars for commuting within the city.

Countries in Asia should come together and cooperate for a better Asia. The benefit of such cooperation is beyond monetary gains.

Conclusion

In this 21st century, as Asia is in the midst of a truly historic transformation whereby it is faced with both opportunities and challenges, it has to be mindful of taking positive steps towards development and conservation of the environment.

Undoubtedly, climate change is one of the paramount challenges to Asia in realizing its potential to make the 21st century as the Asian century. Though the impact of climate change caused by the development of other continents cannot be undone, the action that we take now will help reduce the degree and intensity of the problem in the future. It will also help in adaptation during change in climate and avoid severe consequences.

If we focus only on the economic development and abate our pristine environment whereby the development takes place at the cost of our highly valued environment, then the success and the total well being achieved by it will be very minimal. What is the use of economic development if people in the country always have to spend more money than ever on their health and if the water, air, and all these resources are polluted? Rather than bringing in wellbeing, it is going to give birth to various ill-being.

Asian countries should come together and work with one another to realize its potential of achieving major economic developments like Europe and America but by taking conscious steps so as not to affect our pristine environment. Asia can achieve its potential by not affecting the environment through sustainable development and following the middle path. With this no force can stop Asia from realizing the Asian century.