

LIFE STREAM

ANNUAL ISSUE- 2019

This is the way the world ends, not with a bang, but a whimper

-- T.S. Elliot (The Hollow Men)

THEME: CLIMATE CHANGE OR CLIMATE CRISIS?

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COVER: CLIMATE CHANGE Image Credit: shutterstock.com 1269582256

"The Hollow Men" is a poem by the American modernist poet T.S. Eliot, first published in 1925. It describes a desolate world, populated by empty, defeated people.

LIFE STREAM – ANNUAL ISSUE 2019 is a publication of the Life Science Foundation

Be the change you want to see in the world- Mahatma Gandhi



(Credit: pixabay.com)

On Climate Change

“Climate change will test our intelligence, our compassion and our will. But we are equal to that challenge.”

~ Justin Trudeau

"There is one issue that would decide the contours of this century more dramatically than any other, and that is the urgent threat of climate change---Climate change is no longer some far off problem; it is happening here, it is happening now ----" said former US president Barak Obama. Scientists say that the earth's climate has been relatively stable for the past 12,000 years and that this stability has been crucial for the development of our modern civilization, and life as we know it. However, global warming is changing everything around us.

There is, at present, more awareness about the crisis of climate change than ever before; yet a significant number of people deny that it exists and continue to believe that it is not caused by human intervention, despite the scientific evidence to the contrary. We, therefore, decided to dedicate this issue of Life Stream to climate change crisis, in order to create a better understanding of the crisis among the readers.

In this issue we discuss the crisis in general with special focus on human rights in the lead article on climate change by Sudha Shrotria. The scientific evidence in its support are discussed and its economic impact on different sectors is assessed. An outline of how climate change affects the outer space is included . A poem entitled 'Darkness' by Lord Byron gives expression to our fears on the impact of global warming on life on earth.

It is not that we lay emphasis only on the crisis part. We also discuss how we could address the issue. The life and times of two valiant 'ecological warriors' who pioneered environment movements in the last century are portrayed. Also included are write-ups on how we can reshape the way we do things-the way we eat, travel, build houses etc.

As usual we have compiled information on the theme from the electronic and print media, reports, books, speeches and other sources so as to make it available all at one place, for your perusal. We invite suggestions, corrections and criticisms from our readers.

*We present here the **Annual Issue of Life Stream, 2019***

Life Science Team

SPECIAL FEATURE: THE GRETA EFFECT

"Our house is still on fire. Your inaction is fueling the flames by the hour"



Greta Tintin Eleonora Ernman Thunberg (Credit: commons.wikimedia.org)

Greta Thunberg, 17, born on 3 January 2003 in Sweden to opera singer Malena Ernman and actor Svante Thunberg is the global face of youth movement against climate change inaction. According to Greta, she first heard about climate change in 2011, when she was only eight years old, and, "-could not understand why so little was being done about it", which made her depressed.

She first came into prominence in August 2018 when, at age 15, she called for stronger action against climate change by holding up a sign reading *Skolstrejk för klimatet* (School strike for the climate) outside the Swedish Parliament. It inspired similar protests by students in other parts of Sweden. It became a school climate strike movement under the name "Fridays for Future". Soon student strikes took place every week somewhere in the world. In 2019, there were huge protests involving over a million students. Her campaigning gained international recognition.

She recently addressed the World Economic Forum at Davos, Switzerland. "We had a few demands. Of course these demands have been completely ignored. We expected nothing less". She called for immediate disinvest in fossil fuels. "Let's be clear: we don't need a low carbon economy; we don't need to lower emissions. *Our emissions have to stop* if we are to have a chance to stay below the 1.5 degree target," she said.

"Men argue. Nature acts." – Voltaire

"We are still telling you to panic, and to act as if you loved your children above all else "

"We (should) start listening to the science and we actually start treating this crisis as the crisis it is."

When she started protesting, her parents did not support her activism. Being truthful to the cause, Greta was convinced that changes should begin from her home and wanted her family to reduce their own carbon foot prints. She forced her parents to adopt a life style that would reduce global warming, by giving up air travel, taking up cycling and becoming vegans.

Greta has a no-nonsense approach to the climate crisis. Her blunt, matter-of-fact speaking manner, has won world-wide appreciation. Interestingly, she had several Twitter clashes with President Donald Trump in the last few months. The Trump administration was irked by her stand against climate change inaction. "Is she the chief economist? Who is she?"asked US Treasury Secretary. She tartly replied "Don't need a degree to know climate targets":



(Credit: righttolivelihoodaward.com)

She has won several awards and honors, including the Fritt Ord Award (2019), Rachel Carson Prize (2019), Ambassador Conscience Award (2019), International Children's Prize (2019), the Time Person of the year (2019). (Ref: en.wikipedia.org / commons.wikimedia.org)

CLIMATE CHANGE: A GLOBAL AND NATIONAL CHALLENGE

- Sudha Shrotria



(Credit: markus spiske)

Climate change poses the biggest challenge of the twenty first century. This article covers the different aspects of climate change, with special focus on human rights. Besides, it deals with the humanitarian crisis due to its impact, and the international and national efforts to meet the challenge. The article also briefly mentions the remedies now available to aggrieved citizens.

Introduction

In the recent past, there has been a growing awareness about global warming. There have been unprecedented sets of events affecting some part of the globe or the other, in the form of heat waves, warm weather, ocean warming, sea level rise, glacier melting, polar warming, spread of diseases, coral reef bleaching; heavy snowfall and floods; drought and fires which the scientists believe are due to climate change caused by anthropogenic contribution of Green House Gases (GHGs).

Small island states, countries with low lying coastal deltas and those that are prone to drought, desertification and floods are likely to be severely affected. Vulnerable states such as Maldives, Mali, Marshall Islands and Bangladesh, due to their geographical location and low capacity to adapt, are particularly threatened by global warming.

Climate change is an issue of both human rights and fundamental justice. The poor, marginalized and rural communities are hit the hardest by climate change impacts. Vulnerable groups such as women, children, persons with disabilities, elderly, minorities, indigenous groups are disproportionately

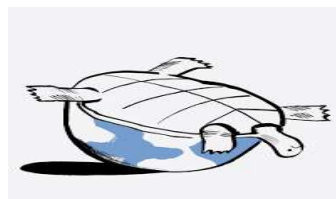
threatened. They do not have the means for providing climate adaptation strategies. Human lives, particularly of poor communities are affected by rising temperatures which are evident in respiratory illness, infectious diseases, high rise in energy costs, and extreme natural disasters such as floods and cyclones. Undoubtedly, the poor bear a disproportionate burden from the impact of climate change and from ill-designed government policies. The people most affected are the least responsible for causing climate change and the least able to cope.

The Causes

Majority of the scientists agree that the main cause of climate change is the greenhouse effect due to the increase of greenhouse gases which are responsible for warming the troposphere (lower layer of the atmosphere). These gases include water vapor, carbon dioxide, methane and nitrous oxide. Carbon dioxide is naturally emitted through cellular respiration and volcanoes, but by these natural processes alone, carbon dioxide will increase/decrease very slowly over time or remain constant. It is estimated that due to activities of mankind, about 90 million tons of carbon dioxide is being released into the atmosphere each day.

Carbon dioxide is mainly emitted from agricultural activities, meat industry, mining, manufacturing, transportation, construction, waste incineration, deforestation, industrial activity, and power plants using fossil fuels. The biggest contributors to global warming are the fossil fuels which include coal, petroleum (oil) and natural gas, formed by the decomposition of animal and marine life over millions of years, as these are being used indiscriminately to produce energy. The carbons released from the combustion of these fossil fuels combine with oxygen in the air to form carbon dioxide.

Concentrations of carbon dioxide in the atmosphere hit a record level of 407.8 parts per million in 2018 and continued to rise in 2019. CO₂ lasts in the atmosphere for centuries and the oceans for even longer, thus locking in climate change. This build-up of carbon dioxide in the atmosphere will have serious effects on humanity and valuable ecosystems.



(credit:Newyorker.com)



Wild fire in California (en. wikipedia.org)

Unprecedented Events as Indicators of Climate Change: Climate is the long-term average of the weather in a given place. While the weather can change in minutes or hours, a change in climate is something that develops over longer periods of decades to centuries. ‘Climate is defined not only by average temperature and precipitation but also by the type, frequency, duration, and intensity of weather events such as heat waves, cold spells, storms, floods, and droughts.’ (ref: www.epa.gov).

The scientists believe that the unprecedented set of events which have occurred in the recent years in the form of heat waves, ocean warming, sea level rise, glacier melting, heavy snowfall, floods, spread of diseases and fires, are due to climate change caused by anthropogenic contribution of GHGs. In 2010, a record heat-wave with temperatures greater than 100 degrees struck western Russia; the same year saw floods in Nowshera Pakistan in which millions were affected; Flash floods in Manhattan (2016) due to severe storms in New York City; global wildfires in California (2019); the Amazon rainforest; Boreal forests of Alaska and Siberia and raging bush fires in New South Wales, Australia (2019).



Wild fires (Wikipedia)

Long ago, these extreme disparities may have been solely blamed on nature’s vagaries, but now science has established that human-induced climate change is playing a major role. Climate change, caused by

*Just because sometimes it is cold doesn't mean that there's no global warming-
www.bustle.com*

emissions from industries and other human activity, is making the world warmer, disrupting rainfall patterns and increasing the frequency of extreme weather events. No country is immune to these forces, but India is particularly vulnerable.

Global warming: The report, *The Global Climate 2001-2010, A Decade of Climate Extremes*, analyzed global and regional temperatures and precipitation, as well as extreme events such as the heat waves in Europe and Russia, Hurricane Katrina in the United States of America, Tropical Cyclone Nargis in Myanmar, droughts in the Amazon Basin, Australia and East Africa and floods in Pakistan (ref: www.library.wmo) and found that the decade was the warmest for both hemispheres and for both land and ocean surface temperatures. “WMO’s report shows that global warming was significant from 1971 to 2010 and that the decadal rate of increase between 1991-2000 and 2001-2010 was unprecedented. Rising concentrations of heat-trapping greenhouse gases are changing our climate, with far reaching implications for our environment and our oceans, which are absorbing both carbon dioxide and heat.”



Giant Tree Frog-threatened by de-forestation in Amazon rain forest (Credit: en.wikipedia.org)

Average temperatures for the five-year (2015-2019) and ten-year (2010-2019) periods are almost certain to be the highest on record. While 2016, which began with an exceptionally strong El Niño, remains the warmest year, 2019 is expected to be confirmed the second or third

warmest year on record. Large areas of the Arctic were unusually warm in 2019. Most land areas were warmer than the recent

average, including South America, Europe, Africa, Asia and Oceania. The U.S. state of Alaska was also exceptionally warm. In contrast a large area of North America has been colder than the recent average.

The WMO provisional statement (<https://library.wmo>) on the State of the Global Climate, says that the global average temperature in 2019 (January to October) was about 1.1 degrees Celsius above the pre-industrial period. “If we do not take urgent climate action now, then we are heading for a temperature increase of more than 3°C by the end of the century, with ever more harmful impacts on human wellbeing,” said WMO Secretary-General Petteri Taalas.



The U.S. Geological Survey projects that reduced sea ice from climate change will lower the population of polar bears by two-thirds by 2050-en wikipedia.org

Warming of the oceans: The year 2019 ended with a decade of exceptional global heat, retreating ice and record sea levels driven by greenhouse gases from human activities. The record warmth was accompanied by a rapid decline in Arctic sea ice, and accelerating loss of net mass from the Greenland and Antarctic ice sheets and from the world’s glaciers. As a result of this widespread melting and the thermal expansion of sea water, global mean sea levels rose about 3 millimeters per year. Sea level rise has accelerated since the start of satellite measurements in 1993 because of the melting of ice sheets in Greenland and Antarctica, according to the report. The ocean, which acts as a buffer by absorbing heat and carbon dioxide, is paying a heavy price. Ocean heat is at record levels and there have been widespread marine heat waves. Sea water is 26 percent more acidic than at the start of the industrial era. Vital marine ecosystems are being degraded.

One of the main impacts of climate change is more erratic **rainfall patterns**. This poses a threat to crop yields and, combined with population increase, will mean considerable food security challenges for vulnerable countries in the future.

The greatest threat to our planet is the belief that someone else will save it-Robert Swan

Health and Nutrition: The report devotes an extensive section to weather and climate **impacts on human health**, food security, migration, ecosystems and marine life. This is based on input from a wide variety of United Nations partners. Extreme heat conditions are taking an increasing toll on human health and health systems with greater impacts where there are aging populations, urbanization, urban heat island effects, and health inequities. In 2018, a record 220 million more heat wave exposures by vulnerable persons over the age of 65 occurred, compared with the average for the baseline of 1986-2005.

Climate variability and extreme weather events are among the key drivers of the recent rise in **global hunger** and one of the leading causes of severe crises. More than 820 million people reportedly suffered from hunger in 2018. More than 10 million new internal displacements were recorded between January and June 2019.

The Indian vulnerability to Climate Change



(Credit: businessstandard.com)

India is more vulnerable to climate change due to the high dependency of its vast population on agriculture, which in turn depends on seasonal monsoon. Severe weather events have caused catastrophic loss of life and property across India in recent years. The state of Uttarakhand suffered floods in 2013; torrential rainfall caused floods in Jhelum and Chenab in 2014, causing nearly 400 villages in Kashmir to submerge. Chennai bore the brunt in November 2015, Assam in 2016. In 2017, Mumbai and Gujarat were forced to shut down because of record heavy rainfall. Mumbai bore the brunt of the floods again in 2019; Kerala in 2018 and 2019.

IMD researchers have analysed and predicted instant flooding over central India, where the intensity and frequency of heavy and very heavy rainfall has been increasing. Scientists at the Institute of Tropical Meteorology, Pune, published a study in ‘Nature’ in which it was

highlighted that the number of extreme rainfall events have gone up by threefold in India. (ref: punemirror.indiatimes.com).

In its recent State of the Climate Report, the US-based National Oceanic and Atmospheric Administration (NOAA) also raised concerns about the number of casualties in India because of extreme rainfall events last year. As many as 800 lives were lost in heavy rain and flood related incidents during the monsoon last year (<https://www.ncdc.noaa.gov>). According to the Ministry of Environment and Forests, in 2018-19, as many as 2,400 Indians lost their lives to extreme weather events such as floods and cyclones,. The India Meteorological Department (IMD) says these events are increasing *both in frequency and intensity*.

According to IMD data, in India the average temperatures have increased by 0.6 degrees Celsius between 1901-10 and 2009-18. At an annual level, this may seem trivial, but projections deeper into the future paint a more alarming picture. For instance, the World Bank estimates that, if climate change continues unhindered, then average temperatures in India could reach as high as 29.1° C by the end of the century (up from 25.1° C currently).

As climate change becomes more palpable, some parts of India will be more affected. Comparing the average temperature in 2009-18 to that in 1950-80 reveals that some pockets have already become much hotter. In parts of Rajasthan, Gujarat, Tamil Nadu, Kerala and the North-East, average temperature over the last decade has risen by nearly 1° C compared to the historical average during the period 1950-80.



(credit: cdkn.org)

According to the World Bank, central districts in India are the most vulnerable to climate change because they lack the infrastructure and are largely agrarian. Within this region, the districts in Maharashtra's Vidarbha region are particularly susceptible to climate change damage. These are also the districts that are already under severe rural

distress, having experienced the greatest number of farmer suicides in recent years. In these districts, the World Bank suggests that GDP per capita could shrink by nearly 10% by 2015 because of climate change. Poorer farmers in regions with weaker infrastructure and less irrigation are most affected (ref: <https://openknowledge.worldbank.org>).



(Credit: hindustantimes.com)

Climate change is also manifesting itself in the rise in extreme hot days (temperatures exceeding 35° C) across Indian cities. For instance, in Delhi, the number of days where temperatures have crossed 35° C has increased significantly. Other major cities, such as Mumbai, Bengaluru and Hyderabad, have also seen similar increases. In cities, which are epicentres of economic activity, rising temperatures can increase the spread of diseases and hurt productivity. In coastal cities, climate change-induced rising sea levels also pose an additional threat through more frequent flooding. In industries such as construction, high temperatures can make life miserable for workers and decrease their productivity.

According to the Global Climate Risk Index released by Germany-based think-tank, Germanwatch, India is the 14th most climate change-affected country in the world. This vulnerability, though, is not India's own doing. In terms of global greenhouse gas emissions, India's share remains significantly lower than those of both the US and China. In many ways, India is paying for the excesses of the developed world.

While much of India's climate change crisis is a result of outside forces, there are domestic drivers as well. The country still relies enormously on coal for electricity, the emissions from which significantly contribute to climate change and aggravate air pollution which is a major environmental problem. Thus, climate change is inextricably linked with India's other environmental problems, which needs an inclusive plan to tackle the betterment of our future.

*Facts do not cease to exist if they are ignored-
Aldous Huxley*

The National Action Plan on Climate Change

India is home to one-sixth of the world's population, a considerable proportion of which is poor, and, therefore, even more vulnerable to climate change. The Constitution of India casts an obligation on the State as well as the citizens to protect and improve the environment. The National Action Plan on Climate Change (NAPCC) was launched in 2008 under which eight missions were developed by respective ministries (Box 1). Subsequently, four new missions were proposed to be added. (Box 2)

Box 1: Missions under the National Action Plan on Climate Change

Mission	Aim/Objective
National Solar Mission (NSM)	To promote the development and use of solar energy for power generation and other uses; making solar energy competitive with fossil-energy options.
National Mission on Enhanced Energy Efficiency (NMEEE)	To improve energy efficiency of domestic, commercial and industrial sectors in India by creating an enabling policy regime and encouraging innovative business models for improving energy efficiency.
National Mission on Sustainable Habitat (NMSH)	To encourage sustainable urban planning in India with the help of policy, infrastructural and research interventions in sectors such as buildings, waste management, waste recycling, water resources and transportation.
National Water Mission (NWM)	To ensure sustainable water supply by conserving water, minimizing waste and ensuring equitable distribution of water resources
National Mission on Sustaining the Himalayan Ecosystem (NMSHE)	To prevent melting of the Himalayan glaciers and to protect biodiversity in the Himalayan region.
National Mission for Green India (NMG)	To protect, enhance and restore forests and respond to climate change with appropriate adaptation and mitigation activities.

National Mission on Sustainable Agriculture (NMSA)	To support climate adaptation in agriculture through the development of climate-resilient crops, expansion of weather insurance mechanisms and agricultural practices.
National Mission on Strategic Knowledge for Climate Change (NMSKCC)	To gain a better understanding of climate science, impacts, and challenges.

Source: Ministry of Environment, Forests and Climate Change

Box 2: Additional Missions under the National Action Plan on Climate Change

Mission	Aim/Objective
National Mission on Wind	To upscale the current installed capacity of wind energy from current 25.18 GW to 60 GW by 2022.
National Mission on Health	To assess the impacts of Climate Change on human health in various regions and build adequate capacities to deal with them.
National Mission on Coastal Resources	To prepare an integrated coastal resource management plan and map vulnerabilities
National Mission on Waste to Energy	To incentivize efforts for harnessing energy from various wastes and reduce dependence on conventional fossil fuels

Source: Ministry of Environment, Forests and Climate Change



Effects of global warming on oceans(en.wikipedia.org)

“We are living on this planet as if we had another one to go to.” -Terri Swearingen

International Efforts to Combat Climate Change

In 1988, with the objective of providing governments at all levels with scientific information that they could use to develop climate policies, the Inter Governmental Panel on Climate Change (IPCC) was formed by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP). The IPCC is an international body whose governing Panel is made up of government members representing 195 countries. The IPCC produces Assessment Reports which are drawn up by a very large, global group of scientists and experts who contribute their time in drafting, revising and reviewing. These reports bring together the best of the recently published scientific and technical literature.

The IPCC assessment reports are comprehensive and incorporate summaries for policy-makers. These reports are widely recognized as the most credible source of information on climate change. The First Assessment



(Credit: internationalmigration.iom.int)

Report of 1990 helped in the launch of negotiations on a Convention. The Second Assessment Report of 1995 brought out that the balance of evidence suggested a discernible human influence on global climate, which moved many governments into increasing negotiations on what became the Kyoto Protocol. The Third Assessment Report of 2001, confirmed the findings of the Second Assessment Report and provided new and stronger evidence of a warming world. The Fourth Assessment Report, released in 2007, provided the scientific foundation for the Marrakesh Accords. The Fifth Assessment Report, finalized in October 2014, resulted in the negotiations and policy formulation towards the Paris Agreement. (<https://www.ipcc.ch/reports/>).

The global response to the dangers of climate change have till date largely been conducted under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC) and its implementing mechanism, the Kyoto

Protocol. Every year, States Parties to both treaties meet with a view to progressing negotiations. Both the UNFCCC and the Kyoto Protocol incorporate the principle of 'common but differentiated responsibilities' (CBDR).

The Paris Agreement



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

(en.wikipedia.org)

Recognizing the urgency to take immediate action in protecting the global climate, all nations at the Twenty-First Conference of the Parties, held in December 2015 in Paris, agreed to strive towards combating climate change, adapting to its effects and providing greater support to assist developing countries to do so.

The Paris Agreement entered into force on 4 November 2016. The agreement aims to strengthen the ability of countries to deal with the impacts of climate change, specifically the developing and the most vulnerable countries, through appropriate mobilization of financial resources, a new technology framework and enhanced capacity-building in line with their own national objectives. The Paris agreement establishes a mechanism to contribute to the mitigation of GHG emissions and support sustainable development.

Though the USA, under the Presidency of Mr Donald Trump, a major climate change denier, pulled out of the Paris Agreement, the other States Parties are engaging in various efforts aimed to build up the global response to the threat of climate change by keeping a global temperature rise well below 2 degrees Celsius above pre-industrial levels. Additional endeavor is to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius in this century and beginning at some point between 2050 and 2100 to limit the amount of greenhouse gases emitted by human activity to an equal level that can be naturally absorbed by trees, soil and oceans.

Under the Paris Agreement, for the first time climate action was grounded in the context of international law. The countries have to make their own unique contribution to the prevention of dangerous climate change.

All Parties are required to put forward their best efforts through nationally determined contributions (NDCs) and to strengthen these efforts in the years ahead. The Parties are to report regularly on their emissions and on their implementation efforts. Each country's contribution to cutting emissions are to be reviewed every five years so they scale up to the challenge.

For the past 13 years, the **Climate Change Performance Index (CCPI)** has been keeping track of countries' efforts in combating climate change. The CCPI has been an important tool in contributing to a clearer understanding of national and international climate policy.

Impact of Climate Change on Human Rights-

Climate change is a threat to many of the universally acclaimed human rights such as right to life, the right to health, water, food, a clean environment and other social, economic and cultural rights. In the context of developing countries where a large population is vulnerable, it is imperative to protect human rights in the face of climate change. Human rights bodies have identified children, women, minorities and indigenous peoples as especially vulnerable and in need of protection. Human rights law obliges governments and other duty bearers to respect, promote and protect all human rights.

The Fifth Assessment Report of the IPCC also brought out that 'people who are socially, economically, culturally, politically, institutionally or otherwise marginalised are especially vulnerable to climate change and also to various adaptation and mitigation responses,' thus reinforcing how climate change (and responses to climate change) can impact people's ability to enjoy their human rights at varying degrees. The report observed that the issue of equity, justice, fairness arise with respect to mitigation and adaptation and that climate policy intersects with other societal goals creating the possibility of co-benefits or adverse side effects. These intersections if well managed can strengthen the basis for climate action.

Many developing countries feel that those countries which have imposed climate change on the rest of the world are guilty of violating the human rights of people in vulnerable countries and must be held accountable. The international community must respect the extra territorial human rights obligations and refrain from taking action that interferes with the enjoyment of human rights in other countries. They must also prevent private parties over whom they have influence from interfering in the enjoyment of human rights in other countries. While there is a broad consensus on the relationship between environment and human rights, there is no agreement on

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*"There are no passengers on Spaceship Earth. We are all the crew."
~ Marshall McLuhan*

whether states should be obliged to respect human rights of people in other countries, by reducing carbon-dioxide emissions to safe levels and be held accountable if they do not.

The UN Human Rights Council during the period 2008-2014 adopted a number of resolutions on climate change and human rights. In its resolution 10/4 on 'human rights and climate change' it recognised that 'the adverse effects of climate change have a range of direct and indirect implications for the effective enjoyment of human rights and that the effects of climate change will be felt most acutely by those segments of the population that are already vulnerable.' (UNHRC, 2009). Subsequently, the HRC reiterated that '- Human rights obligations, standards and principles have the potential to inform and strengthen international, and national policy making in the area of climate change, promoting policy coherence, legitimacy and sustainable outcomes'

In November 2007, representatives of small island developing states (SIDS) met at a conference in Maldives the outcome of which was a declaration on the human dimension of global climate change. For the first time an international agreement explicitly stated that '*climate change has clear and immediate implications for the full enjoyment of human rights*'.



Climate Change in Africa (Credit: downtoearth.org.in)

In a study on the relationship between climate change and human rights taken up at the behest of UN Human Rights Council, the OHCHR in its report brought out the implications for the enjoyment of human rights with particular focus on the effects of climate change on specific rights, effects on specific groups, the human rights implications of climate-induced displacement and conflict; and the human rights implications of measures to address climate change (UN-OHCHR, 2009).

The HRC appointed an independent expert (IE) on the issue of human rights obligations relating to enjoyment of a safe, clean, healthy and sustainable environment. The IE enumerated the

rights that are threatened by climate change. In early 2015, a group of experts in international law, human rights law and environmental law evolved a set of principles based on human rights law known as the Oslo Principles on Global Climate Change Obligations (Oslo Principles, 2015). To ensure that development process fosters full respect for human rights the World Bank incorporated the human rights and climate change considerations into its development policy (World Bank, 2015).

Regional arrangements have also been established to combat climate change, with the leading example of the European Union. In addition to the UNFCCC and Kyoto Protocol, a number of other treaties and, in particular, widely agreed principles on environment are of relevance to climate change.

While many least developed countries (LDCs) have drafted national adaptation programs of actions (NAPAs) under the UNFCCC process – identifying activities to address their most urgent adaptation needs – the needed funding from other nations has been slow. A growing number of countries have integrated cap-and-trade schemes and/or carbon taxes into their national climate policies. Many countries have passed formal laws by acts of parliament, whereas in some countries policy directions are defined by executive policies such as executive orders, strategies, action plans and decrees. A major focus by majority of the countries including India, is on energy regulations wherein the laws and policies address climate change through energy efficiency and renewable energy.



People's climate march 2017 (en.wikipedia.org)

With the growing awareness on Climate Change, the new generation has started demanding action from their governments. Youth activists have started protests and school-strikes to pressurise courts and lawmakers to act. Swedish student Greta Thunberg has given voice to the anger felt by the younger generation faced with the gravity of inheriting a hotter and more inhospitable environment to live in (Pl. see the special feature on Greta Thunberg included in this issue of Life Stream)

“It is cost-effective to postpone global climate action. It is profitable to let the world go to hell.”

~ Jørgen Randers



(Credit: hippoquotes.com)

Climate Change Litigation



(Credit:teachingclimatelaw.org)

With respect to human rights, international human rights law regimes may provide an avenue for individuals and communities to seek redress for harms caused by global climate change. Nevertheless, it is not easy, to establish the causal relationship between those emitting excessive greenhouse gases and those suffering the consequences – the law is not designed to that end, and difficult questions of causation and standing arise.

In several countries, the climate change litigation has been taken up by NGOs, citizens including teenagers, students, elderly women and farmers who have challenged government policies on adaptation, mitigation and national commitments to contain the greenhouse gas emissions.

For a long time the climate discourse remained within the purview of physical sciences; now it has come to the Courts arena. Many courts the world over are presently accepting the human rights arguments towards cutting down on greenhouse gases. The discourse has since shifted from not only the social and economic impacts of climate change, but also on the implications it has for the fundamental human rights. In a recent case by Dutch citizens, in Netherlands (*Urgenda vs the State*) the legal basis for the arguments included human rights to protect the citizens against climate change.

Jurisprudence linking environment to human rights already exists in the

judgments of the European Court of Human Rights and a large number of national jurisdictions including India. The Regional human rights systems have developed an extensive jurisprudence on environment related issues. The European Court of Human Rights (ECHR), the Inter-American Court of Human Rights (IACHR) and the African Commission on Human and Peoples' Rights (ACHPR) have been active in dealing with environment related issues.

Way back in 2005, the IACHR faced a petition (ref: <https://www.independent.co.uk/news>) from the Inuit community (ref: <http://climatecasechart.com>) on the human rights consequences of climate change.

KEY DRIVERS FOR CLIMATE CHANGE LITIGATION

- Compensation for the costs of adaptation to climate change
- Challenging climate change-related legislation and policies, or their application
- Preventing future emissions and contributions to climate change
- Requiring governments or regulators to take action to meet national or international commitments
- Raising awareness and exerting pressure on corporate actors, regulators or investors

Ref: whitecase.com

The ten families were from Portugal, Germany, France, Italy, Romania, Sweden as well as Kenya and Fiji. Although a year later, the petition was rejected, it succeeded in raising global awareness about the issue. In 2007 the Commission invited the Inuit Alliance, CIEL and Earth justice to provide testimony on the link between global warming and climate change.

National Courts and Climate Change

The courts in many countries are presently accepting the human rights arguments towards cutting down on greenhouse gas emissions. In the Urgenda case (Urgenda Foundation vs The State of Netherlands, (2015) C/09/456689/HA ZA 13-1396. 886) Dutch citizens sued the Dutch government. The judge in the Hague ordered the government to take action to cut down the greenhouse gas emissions by 25% within five years (by the end of 2020 compared to 1990 levels). The court ordered the government to protect the citizens from climate change using the principles of Tort Law, human rights law and the case law of the European

Court of Human Rights and is the first case in which human rights are used as a legal basis to protect the citizens against climate change and the court has ordered a country to take more aggressive action on climate change.

In the US, eight teenagers won a case to force the state to consider science-based emissions regulations. The Children's Trust (ref: www.ourchildrentrust.org) has supported climate-related cases in six different States in the USA, invoking the human rights of young American citizens.

The cases show that citizens are exerting their rights and demanding action from their governments. More and more citizens are becoming aware of the climate change issues affecting them. Clearly, the government's action is under scrutiny of the courts and the governments are bound to act for appeasing the electorate.



Students protest against inaction (Credit: shutterstock.com)

Climate related cases in the Indian Context

In the eighties and the nineties there was a surge of Public Interest Litigation (PIL) in India on environmental matters and the Supreme Court gave several landmark judgments on environment (closure of limestone quarries, taking measures for controlling vehicular pollution, industrial pollution; protecting the river Ganges from pollution, shifting stone crushing units out of the capital) and many of the principles laid down by the Supreme Court (polluter pays principle, precautionary principle, doctrine of public trust, intergenerational equity) were subsequently incorporated into the environment policy. Pollution Control laws were amended and a new environment legislation was enacted.

The court has played a major role in environmental governance in the country. Moreover, even though not independently articulated, nor explicitly written in the Constitution of India, the court has recognized the fundamental right of the citizens to live in a safe and clean environment – drawing the right from Article 21 of the Constitution, namely the right to life.

The Indian Parliament enacted the National Green Tribunal Act, 2010 (Act No 19 of 2010 on 5 May 2010; (assented on 2 June 2010) enabling the creation of a special tribunal, the National Green Tribunal (NGT) to handle the expeditious disposal of cases pertaining to environmental issues. Two climate related cases are pending before the NGT.

The first case which came up before the NGT on climate change was concerning the environmental impact of tourism on the Rohatang pass which is a popular tourist spot in Himachal Pradesh. The Tribunal gave a number of directions to the concerned state authorities for controlling pollution and prohibiting activities which caused environmental damage in the region.



Indian villager with a solar lamp. Credit: theguardian.com)

In 2014, the Tribunal was petitioned to direct the states to put on record the progress made towards compliance of the National Action Plan on Climate Change. The States were asked to put forth their own State Action Plans on Climate Change.

In a recent matter before the NGT, a nine-year-old girl Ridhima Pandey filed a case (Ref: Court on its own motion v State of Himachal Pradesh - NGT, 9 May 2016) against the government alleging inaction over climate change and failure on part of the government to fulfil its duties as per the Constitution of India, the Public Trust Doctrine and intergenerational equity to mitigate climate change. The petition alleges that the government has failed to take steps to regulate and reduce greenhouse gases emissions which are causing extreme weather conditions.

Similarly, Julia Olson, the lead counsel in *Juliana v U.S.*, brought an analogous lawsuit by 21 young people against the United States government.

“People may doubt what you say, but they’ll believe what you do.”

~ Lewis Cass

International law recognizes that each state is legally responsible for the acts within its own state which may have an adverse impact in another state. It also involves obligations to co-operate for the protection and advancement of fundamental human rights. In the context of climate change people should be able to exercise their rights which include but not limited to right to life, right to health, food, water, a clean environment and other social, economic and cultural rights.

The Way Forward

Climate Change poses a serious risk not only to both present and future generations, but also to other living species and to the biosphere. The efforts to mitigate and adapt to climate change should be guided by relevant human rights norms and principles including right to information, right to participation, transparency, accountability, equity, access to justice and non-discrimination. Integration of a human rights based approach addresses cross cutting social, cultural, political and economic problems while empowering persons, groups and peoples especially in vulnerable situations.



(Credit: m.economicstimes.com)



(Credit:istockphoto.com)

MANAGEMENT:**MANAGING CLIMATE CHANGE**

(Credit: unsplash.com solutions)

Advent of technology and the ingenuity of human beings still gives us hope for the planet.

The key action points on how to deal with climate change are discussed in this article

We have seen how complex and unpredictable climate change is and how it has now assumed the proportions of a climate crisis. It is clear that unless determined efforts are made at all levels-- international, national, regional, local and individual - it will be impossible to reverse and slow down the crisis .

We saw that global efforts made so far include the setting up of the Inter-governmental Panel on Climate Change (IPCC), signing the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, the Paris Agreement and Climate Action Summit, 2019. At the regional and local levels efforts are being made by the European Union , the European Space Agency, countries like UK and Germany, several states in the US and cities in Australia, Canada, Europe, Japan, Latin America, Mexico, New Zealand, South Africa, South Asia, Southeast Asia.

IPCC has proposed two approaches to deal with the issue: to reduce the emission of green house gases

Life Stream

(**mitigation**) and adapting to climate change (**adaptation**). Mitigation is about avoiding human interference significantly, by stabilizing the levels of greenhouse gas, within a definite time-frame. This allows ecosystems to adapt naturally to climate change and enables economic development to proceed in a sustainable manner. Adaptation involves adjusting to actual or expected future climate.

Based on scientific data and observations, NASA has listed ten possibilities for managing catastrophic climate change. ---1. Forego Fossil Fuels 2. Upgrade infrastructure 3. Move closer to work 4. Unplug 5. Stop cutting down trees 6. Consume less 7. Be efficient, 8. Eat smart, go vegetarian 9. Limit children 10. Future Fuels/technology.

Scientific American, the popular science magazine (www.scientificamerican.com) too suggested seven action points 1. Clean Power Plants 2. Local Action 3. Control of Methane leaks/ leaks in pipelines, storage tanks and other infrastructure 4. Tougher emissions and efficiency standards— 5. Greener farming 6. Private sector action.7. New kinds of geo-political consensus

Action points

The key action points are discussed below.

1. Forego Fossil Fuels- According to Database maintained by Carbon Majors --- '**71 percent of global greenhouse gas emissions since 1988 can be traced back to just 100 fossil fuel companies;** unless these corporations, their customers, and other large enterprises phase out fossil fuels it may not be possible to reduce global warming by 1.5°C or 2°C'. For that, augmenting new taxes to generate revenue for investments and incentives for renewable energy, reforestation, and carbon removal technologies need to be pursued . Divesting from oil stocks or investing in companies practicing carbon capture and storage would be needed. Plant-derived plastics, biodiesel, wind power are being tried as alternatives to fossil-fuels, but have the limitation that carbon neutral bio-fuels could increase food prices and lead to destruction of forests, and nuclear power produces radioactive waste.

“The earth is not dying. It is being killed, and the people killing it have names and addresses.”

~ Bruce Duncan ‘Utah’ Phillips- American folk singer and poet Issue 2019



(credit: un.org)

Up to now, at least 40 countries have reportedly priced carbon, some through a carbon tax or others through cap-and-trade schemes for carbon dioxide (example the Emission Trading System of the EU). China now runs the world's largest carbon trading market. To remove carbon dioxide from the atmosphere proposals inter-alia include framing policies like renewable portfolio standards, feed-in tariffs, and investment tax credits. Other suggestions are -- close coal plants; cut off the fossil fuel supply, electrify and get more efficient; end production and sales of cars, trucks, and buses that run on fossil; provide grants, loans and tax incentives for installing wind turbines and roof-top solar; invest in innovation; keep aging nuclear plants running (Ref: www.vox.com) .



(Credit: ocisolarpower.com)- *Harnessing solar power*

- UK has become the first major country to propose cutting greenhouse gas emissions to net zero by 2050.
- The London street is the first to ban all petrol and diesel cars;
- More Germans are swapping planes for trains
- California is making solar power the standard.
- More than 29 million homes around the world now use solar panels for heating purposes.

Solar energy is considered to be the ideal replacement for the conventional energy to fight climate change. Virtually unlimited supply of fuel (the sun) and the large tracts of land available for its installation makes it an attractive alternative to fossil fuels (reports suggest that even a 1 MW solar power plant can cut down carbon emissions by almost 1000 tons per annum, which is equivalent to planting about 5000 trees every year). Solar technology is cost effective, under economies of scale. Many countries like India, Spain, Germany and China are now leading the rest of the world in harnessing solar energy.

Transportation- The transport sector is said to be the fastest growing contributor to climate emissions. It is the second leading source of greenhouse gas emissions in the U.S. (burning a single gallon of gasoline produces 20 pounds of CO₂). Replacement of existing vehicles with electrical ones, upgrading technology, stricter emission norms, use mass transit, or switching over to walking, cycling or some other energy saving mode are catching up.

Future Fuels / Technology- NASA says that radical interventions involving new technologies to either block sunlight or reduce greenhouse gases, is a potential last resort for

If it can't be reduced, repaired, rebuilt, refurbished, refinished, resold, recycled or composted, then it should be restricted, redesigned or removed from production. – Peter Seeger

addressing the challenge of climate change.

2. Upgrade Infrastructure

Investments in new infrastructure, upgrading existing highways and transmission lines, constructing energy-efficient buildings and improved cement-making processes would help cut greenhouse gas emissions and drive economic growth in developing countries.



Producing more millets can help-
(Credit; indiawaterportal.com)

3. Food production Agriculture and land use are also major sources of greenhouse gases. Agriculture, deforestation, and other human activities have altered 70% of the land on Earth's surface (IPCC). In the past decade, land-use alone was responsible for 22% of global greenhouse gas emissions. According to the National Academy of Sciences (2011) for 'every degree Celsius of global warming there will be a 5 to 15 percent decrease in overall crop production'. *Farming must work with nature, not against it.* Silvo-pasture-combining pasture land with climate-cooling trees is an option. An article in New York Times dated August 9, 2019 advocates better land and forest management, eating more plant based food and reducing food wastes. 'Ways have to be thought as to how to nourish a growing global population, but do so in a way that minimizes carbon footprint due to agriculture'.

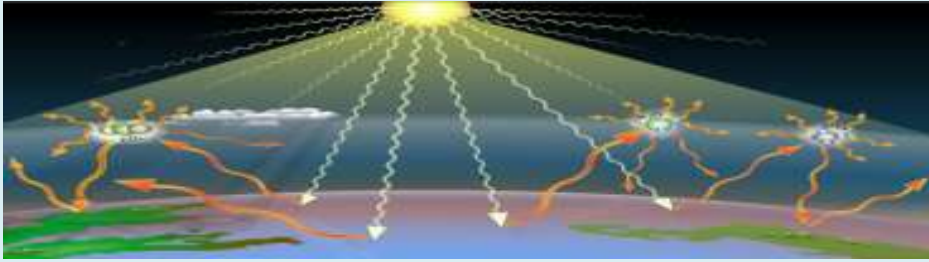
CLIMATE IS CHANGING. FOOD AND AGRICULTURE MUST TOO---FAO

The World Resources Institute says that better forest management has the largest potential for reducing emissions. Timber harvesting in the tropics alone contributes 1.5 billion metric tons of carbon to the atmosphere. Zero deforestation policy envisages that public procurements do not contribute to deforestation of the rainforest. Tropical forest restoration, and adapting plant-based diets, reduced food wastage in the supply chain rotting on farms, or, spoiling during storage or distribution are important.

Local action- NASA points out that while climate change is a global issue, it is felt on a local scale. Cities and municipalities, other local bodies like *Panchayats* should, therefore, be at the frontline of adaptation. Creating awareness among the public, protecting water bodies, soil conservation, greening waste disposal, promoting sustainable farming, education, health care, nutrition, e-construction, reducing wastage, encouraging tree plantation, planning to prevent/cope up with natural calamities and other actions can go a long way in adapting to climate change.

4. Social factors Social factors are also important in reducing carbon footprints. The UN Environmental Program estimates that it requires 54 acres to sustain an average human being today—food, clothing and other resources extracted from the planet. Continuing such population growth seems unsustainable. (Ref: e-press.news). Restricting family size, universal education with emphasis on girl's education and health care can help populations to adapt to climate change.

After one look at this planet, any visitor from outer space would say "I want to see the manager" - William S Burroughs, American writer



(en.wikipedia.org)

What can individuals do?

1. Be aware
 2. Build eco-friendly homes
 3. Opt for renewable energy
 4. Invest in energy-efficient appliances
 5. Reduce water waste
 6. Move closer to work
 6. Work from home and telecommute
 7. Use mass transit, or switch to walking, cycling or some other mode
 8. Restrict flying - take only critical, long-distance trips
 9. Consume less, minimize waste
 10. Eat smart, go vegetarian -(choose balanced food - nutritious, tasty and eco- friendly)
 11. Unplug gadgets and appliances when not in use .Purchase energy-efficient gadgets
 12. If a farmer, practice nature friendly farming
 13. Stop cutting down trees
- (Credit: NASA/ e-press. news)

5. Role of Business The Business and Sustainable Development Commission (BSDC) in its report on *Better Business, Better World 2017* stated that sustainable business models could open economic opportunities worth upto \$12 trillion and increase employment by up to 380 million jobs in the near future.

Focus on sustainability is increasingly linked to better investor returns and large cost savings. Reports indicate that many companies have achieved an average internal rate of return of 27 percent on their low-carbon investments. In a review of 200 Studies on Sustainability and Corporate Performance Oxford University and its partner, concluded that-- 'Ninety percent of studies in this area found that high environmental, social and governance (ESG) standards reduced companies' cost of capital, and that 80 percent show a positive correlation between stock price performance and good sustainability practices-'.

Consumer choices IMF, in a paper entitled 'The world Economy in the 20th century; striking developments and policy lessons' pointed out that the biggest barrier to sustainability is no longer consumer awareness, or

attitudes, but *it is the lack of affordable eco-friendly alternatives*, that prevents them from making healthy choices in their daily lives. The companies, therefore, have a responsibility in offering eco-friendly alternatives to consumers.

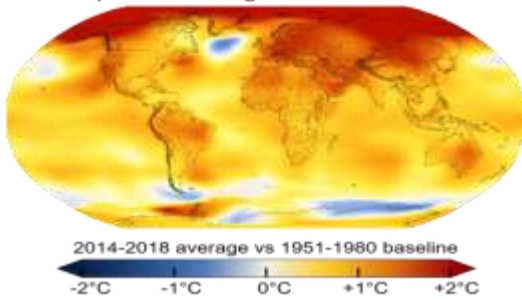
Dealing with skeptics: Despite un-equivocal evidence supporting climate change due to human intervention, a large section of people still refuses to accept the reality. A comprehensive study published in Nature in 2015 ((Ref: The New York Times dated Jan 2, 2020) involving 6,000 people across 24 countries found that 'emphasizing the shared benefits of climate change was an effective way of motivating people to take action— even if they initially identified as deniers'. People were more likely to believe in climate change caused by human intervention, if its mitigation can produce economic benefits and scientific development. The fact that experts agreed on climate change increased the chances of their acceptance that 'climate change was happening, was human-caused, and presented a real threat'. The solutions clearly lie with us human.

Ref: en.wikipedia.org/www.scientificamerican.com/www.nytimes.com/

*“The world must learn to work together, or finally it will not work at all”
- General Eisenhower*

SCIENCE: CLIMATE CHANGE-MYTH VS REALITY?

Temperature Change in the Last 50 Years



(Credit: en.wikipedia.org)

"Most of those skeptics of climate change subscribe to other, older orthodoxies that emerged from the industrial revolution presenting human development, enterprise, and ingenuity being the internal combustion engine of civilization and modernity".

Climate change denotes 'abnormal variations in climate patterns that exists for a significant period of time and has the potential to change the incidence and intensity of extreme weathers'. Most of these changes are said to be due to very small variations in Earth's orbit that affect the amount of solar energy it receives. However, in spite of what we directly observe and experience, climate change skeptics refuse to accept the reality and deny that the crisis is caused by human interventions.



Latin America -drought (credit:earthtimes.org)

Some skeptics of human-induced climate change believe that global warming is caused

We need to put a price on carbon in the markets and a price on denial in politics

by natural variations in the sun's energy due to sunspots and/or solar wind, and that there is correlation between an increase in sunspot activity and global warming. NASA, however, points out that while many scientists do agree that sunspots and solar wind could be playing a role in climate change, the majority view it as very minimal. The warming of the Earth is primarily due to emissions from industrial activity, a claim backed up by a number of peer-reviewed studies.

Only about half to two-thirds of Americans reportedly believe that climate change is caused by humans. Evangelical Christians tend to be skeptics. It is viewed with concern that the Trump administration moved to withdraw the U.S. from the Paris Accord on Climate Change signed in 1975. It also appointed climate-change skeptics and deniers to key positions in administration, besides, rolling back environmental regulations.



(Credit:independent.co.uk)

It is pointed out that skeptics of climate change in the US who are opposed to the idea of climate change caused by human interventions are from the fossil fuels industry - oil, gas, or coal, who are chiefly responsible for CO2 emissions. Further, fossil fuel companies stand accused of routine manipulation of research, policy, and public opinion. A City Bank study reviewing 187 Exxon climate change communications from 1977 to 2014 revealed that "---83 percent of peer-reviewed papers and 80 percent of internal documents acknowledge that climate change is real and

human-caused. Evidence continues to mount that fossil fuel companies have tried to shield their businesses from a market

1.	Climate's changed before"	Climate reacts to whatever forces it to change at the time; humans are now the dominant force.
2	"It's the sun"	In the last 35 years of global warming, sun and climate have been going in opposite directions
3	"It's not bad"	Negative impacts of global warming on agriculture, health & environment far outweigh any positives.
4	"There is no consensus"	97% of climate experts agree humans are causing global warming.
5	"It's cooling"	The last decade 2000-2009 was the hottest on record.
6	"Models are unreliable"	Models successfully reproduce temperatures since 1900 globally, by land, in the air and the ocean. (Ref: skepticscience.com)

reaction they know is inevitable, in much the same way that the tobacco industry lied to consumers for decades about the awful health effects of smoking. The motive is obvious. If cleaner energy sources take hold internationally, gas stands to lose \$3.4 trillion between 2015 and 2040 and coal could lose \$11.5 trillion in the same period' --. Interestingly explanations for some of the commonly held views on climate change are given in *skepticscience.com*. A few important ones are listed here (see box).

Scientific evidence: The Intergovernmental Panel on Climate Change observed that the *scientific evidence for warming of the climate system is unequivocal.*

We do not have a freehold on the earth, only a full repairing lease - Margaret Thatcher

NASA's earth Observatory (Credit: NASA)

NASA, through scientific studies and regular monitoring has

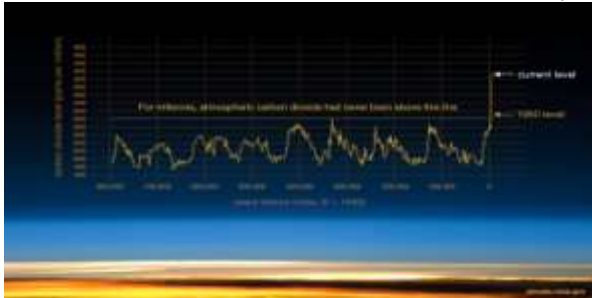
- Ninety-seven percent of climate scientists agree that climate-warming trends over the past century are extremely likely due to human activities (NASA);
- The 10 years to the end of 2019 have been confirmed as the warmest decade on record by three global agencies- NASA, NOAA and the UK Met Office. Last year was the second warmest in a record dating back to 1850;
- Most of the leading scientific organizations worldwide have issued public statements endorsing this position;
- Ancient evidence can also be found in tree rings, ocean sediments, coral reefs, and layers of sedimentary rocks. It reveals that current warming is occurring roughly ten times faster than the average rate of ice-age-recovery warming.

Evidence by NASA: NASA is a world leader in climate studies and Earth science. NASA says that its role is not to set climate policy or prescribe particular responses or solutions to climate change. But its purview does include providing the robust scientific data needed to understand climate change. It then makes this information available to the global community – the public, policy and decision-makers and scientific and planning agencies around the world.



listed the following as evidences confirming that climate change and global warming are indeed real. Data from the agency’s Gravity Recovery and Climate Experiment (GRACE) and Ice, Cloud and land Elevation Satellite (ICESat) missions and from radar instruments in space have shown rapid changes in the Earth’s great ice sheets. The Jason-3, Jason-2/OSTM Surface Topography Mission (OSTM) and Jason-1 missions have documented an increasing sea level since 1992. NASA’s Carbon Monitoring System (CMS) is improving the monitoring of global carbon stocks (where carbon is stored around the planet) and fluxes (how carbon is cycled from one stock to the next). Megacities Carbon Project is focused on the problem of accurately measuring and monitoring greenhouse-gas emissions from the world’s biggest cities

1. Global Temperature rise: The heat-trapping nature of carbon dioxide and other gases and their ability to transfer infra-red energy through the atmosphere has been measured using scientific instruments. "The planet's average surface temperature has risen about 1.62 degrees Fahrenheit (0.9 degrees Celsius) since the late 19th century.



(Credit: NASA) This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, provides evidence that atmospheric CO₂ has increased since the Industrial Revolution

Most of the warming occurred in the past 35 years, with the five warmest years on record taking place since 2010. 2016 the warmest year on record. The dry, hot weather has increased the intensity and destructiveness of forest fires".

2. Warming of oceans

The oceans have absorbed much of this increased heat,



(Credit: indiatoday.in) Increased levels of greenhouse gases cause the Earth to warm as is evidenced by drawing ice cores from Greenland, Antarctica, and tropical mountain glaciers.

with the top 700 meters (about 2,300 feet) of ocean showing warming of more than 0.4 degrees Fahrenheit since 1969

3. Shrinking ice sheets

The Greenland and Antarctic ice sheets have decreased in mass. Data from NASA's Gravity Recovery and Climate Experiment show Greenland lost an average of 286 billion tons of ice per year between 1993 and 2016, while Antarctica lost about 127 billion tons of ice per year during the same time period. Further, the rate of Antarctica ice mass loss has tripled in the last decade.

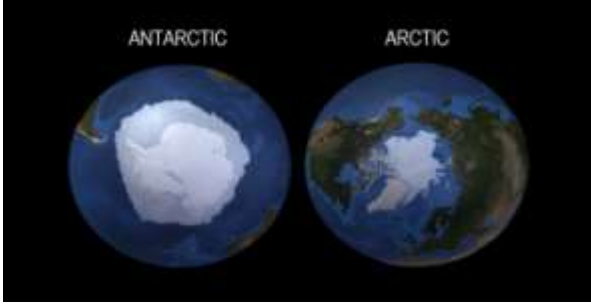


en.wikipedia.org

A cross-section through a glacier. The base of the glacier is more transparent as a result of melting.

Numerous studies have concluded that the West Antarctic and Greenland ice sheets are melting, which within this century could raise the ocean levels to 10feet and 23 feet, respectively.

*“They’re polluting the planet for free, and you’re paying the price”
~ Christine Milne, leader of the Australian Greens*



Credit: NASA

4. Glacial Retreat - Glaciers are retreating almost everywhere around the world, including in the Alps, Himalayas, Andes, Rockies, Alaska and Africa.

5. Decreased snow cover- Satellite observations reveal that the amount of spring snow cover in the Northern Hemisphere has decreased over the past five decades and that the snow is melting earlier.

6. Sea Level rise

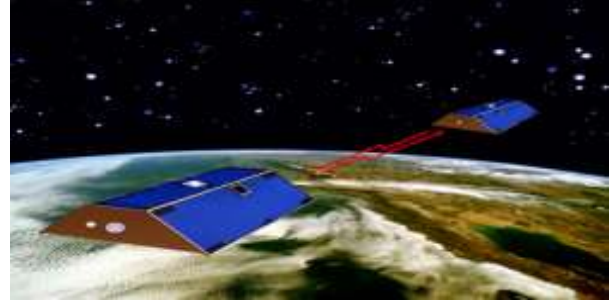


(Credit: NASA) Global sea level rose about 8 inches in the last century. The rate in the last two decades, however, is nearly double that of the last century and is accelerating slightly every year.

7. Declining Arctic sea ice- Both the extent and thickness of Arctic sea ice has declined rapidly over the last several decades.

8. Extreme Events- The number of record high temperature events in the United States has been increasing, while the number of record low temperature events has been decreasing, since 1950.

9. Ocean Acidification- Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent.



NASA's Earth observing Mission

This increase is the result of humans emitting more carbon dioxide into the atmosphere and hence more being absorbed into the oceans. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 2 billion tons per year.



Melting Ice--(Credit:theevolvingplanet.com)

The way forward- The hard evidence provided by NASA is enough to convince the staunchest of skeptics to accept the reality of man-made climate change. If they refuse to get convinced is another matter. The majority who believe in it needs to get their acts together to minimize its impact. Ref: skepticalscience.com/nasa.com/en.wikipedia.org/nationalgeographic.com.



(Credit:qz.com)

After the last know comes 'yes', on that 'yes' the future of he world depends- quoted by Al Gore

ECONOMICS: CLIMATE CHANGE- ECONOMIC IMPACT



Climate related adverse events have a huge impact on the economy and our social life. Analyzing the economic and social cost of the impact of climate change is, therefore, critical in understanding and mitigating the problem. However, quantification of the costs is somewhat complicated due to the long-term and global scale of the problem. Besides, its future impact and costs are not fully known. Despite these constraints, it appears that a beginning has been made in understanding its impact vis-a-vis the costs involved.

- A United States government report in November 2018 raised the possibility of US GDP going down 10% as a result of the warming climate, including huge shifts in geography, demographics and technology.
- According to a paper that the Obama administration released in 2014, any delay in cutting CO₂ emissions “could increase economic damages by approximately 0.9 percent of global output. These costs are not onetime, but are rather incurred year after year because of the permanent damage caused by increased climate change resulting from the delay.” The paper forecasted that 0.9 percent of the U.S. gross domestic product for the year would be around \$150 billion.
 - A 2015 Citibank report estimated the worldwide cost of keeping temperatures below 3.6 F would be \$190.2 trillion, while the price of inaction

would be \$192 trillion.

- Climate change exacerbates poverty, disease, famine, and conflict, and the human costs will only increase along with CO₂ concentrations and temperatures. By 2100, rising oceans could force as many as 2 billion residents of coastal areas worldwide to migrate toward higher ground



Climate change impacts within the Dutch Caribbean (Credit:dcnature.com)

Sector-wise economic impact: Scientists say that with a medium (2-3 °C) to high level of global warming (greater than 3 °C), negative impacts would escalate. But what would be the overall sector-wise impact of climate change?

Agriculture: This sector is expected to be worst affected, projected to account for 60% of the damage. Climate change threatens the world's food supply. Undernutrition is the largest health impact of climate change in the 21st century. The number of undernourished people in the world has been increasing since 2014, reaching nearly **821 million** — a staggering 11 percent of the entire global population — in 2017. More than 60 percent of all new displacements last year were the result of weather-related disasters, with a total of **17.2 million people** around the world being driven from their homes by drought, hurricanes and landslides — almost 50,000 people every day.

Coasts and low-lying areas would be hard hit, as climate change causes rise in sea-level

Costal erosion salt water intrusion and flooding: Socio-economic impact would be enormous in developing countries, as their cost of

“As the economy gets better, everything else gets worse” - Buchwald's Law

protection against rising sea levels will be high.

Infrastructure: Roads, airport runways, railway lines and pipelines, (including oil pipelines, sewers, water mains etc.) may require increased maintenance.

Water supply: Scientists predict that access to clean water is likely to become even more limited. Due to household flooding water supplies are disrupted; costs usually exceed benefits as they include costs of investments in infrastructure for maintenance and repair of water supply systems.



Rural poverty- Latin america (Credit: climatechange.ifpri.info)

Hunger and famine: The risk of hunger and famine is expected to become even greater than it is today. By 2050, climate change reportedly has the potential to increase the number of people at risk of hunger by as much as 20 percent. The majority of those at risk live in Africa.

The **health effects** of these disruptions include increased respiratory and cardiovascular disease, injuries and premature deaths related to extreme weather events, changes in the prevalence and geographical distribution of food- and water-borne illnesses and other infectious diseases, and threats to **mental health**. Rates of mortality and diseases caused by extreme weather events would rise. These include floods, droughts, tsunamis, heat-waves and other disasters which kill thousands of people in both the developed and developing worlds. Over 280,000 people were killed by the Asian tsunami of 2004, while the 2003 European heat-wave killed 15,000 people in France alone.

Higher temperatures pose major health risks to the elderly and raise the likelihood that those who work outside – such as farmers and builders – will suffer from heat exhaustion

Life Stream

and heat stroke. Many killer diseases, including malaria and cholera, increase as temperature and rainfall would increase. Experts now think that climate change is raising the incidence of mental health illnesses.

Industry: A small increase in global mean temperature would result in net negative impact on the market sector in many developing countries and net positive market sector impacts in many developed countries. Climate change would create substantial regional differences, developed world getting most benefits with poorer countries having strongly negative impacts.

Productivity: The International Labor Organization (ILO) in its report titled: "Working on a warmer planet: The Impact of Heat Stress on Labor Productivity and Decent Work", 2019, estimated that even with rise in temperature limited to 1.5 degree, by the year 2030, climate change will cause losses in productivity to the tune of 2.2% of all the working hours, every year, equivalent to 80 m full time jobs or to 2,400 billion dollars

Other sectors: Other sectors affected by climate change, include the livestock, forestry, fisheries, industries, energy, insurance, tourism and recreation industries, goods and services, refuse collection, emergency, repair work, transport and sports.



(Credit: climatenexus.org)

Migration More than 60 percent of all new displacements last year were the result of

If you really think that the environment is less important than the economy, try holding your breath while you count your money."
Guy McPherson

weather-related disasters, with a total of 17.2million.



(Credit abc.net.au)

people around the world being driven from their homes by drought, hurricanes and landslides — almost 50,000 people every day. By 2100, rising oceans could force as many as 2 billion residents of coastal areas worldwide to migrate toward higher ground. This would be the biggest refugee crisis the world has ever seen. Barack Obama has warned that climate change could create a refugee crisis that is unprecedented in human history.

Eco-system: Apart from monetary costs human impacts of climate change is very high due to loss of aquatic and other species.

Competition & conflicts

The website mercy corps .org points out that by amplifying existing environmental, social, political and economic challenges, climate change increases the likelihood of competition and conflict over resources and intensifying existing conflicts and tensions. But while climate change can lead to conflict, it can also provide an opportunity for collaboration. These challenges present a unique opportunity for collective action and cooperation in order to mitigate the impacts.

Winners and losers In an article on climate change (www. researchgate.net -July 16, 2018) Karen L O'Brien and Robin M Leichenko state that in a globalized world countries could be either winners or losers .Climate change increases the income inequalities between and within countries. The authors estimate that although the economic costs of climate change at

national or large regional scale, may be only a few percent of the total economy in the year of the event, but in developing countries, short-term damages would be more than 25% GDP n the year of the extreme event.

Winners show better economic performance in terms of gross domestic product (GDP), foreign direct investment (FDI), employment, trade balance and other parameters and also improvements in social sector indicators like health, education and access to services. Losers face economic hardships due to globalization and have higher levels of unemployment, increased income inequality, and reductions in social services.

Measuring costs & benefits: The authors further stated that the net benefits from climate changes could be measured in terms of increased productivity, increased resource availability , decrease in hazards, or decreased climate-related expenditures . Losses could be measured in terms of decreased agricultural productivity, increased water scarcity, or increased climate-related mortality.

The Stern Review: The two important issues relating to climate change are often raised: what are the potential costs of cutting greenhouse-gas emissions? Can such reductions be achieved without sacrificing economic output?

Those who refuse to accept the Kyoto Protocol claim that its implementation would be too expensive or harm economic growth. **The Stern Review** published in October 2006 by the British government, (the *Stern Review on the Economics of Climate Change* authored by Sir Nicholas Stern, economist and fellow of Cambridge University) answers these questions by raising a third question: *What are the economic costs if we do nothing?* The report pointed out that inaction on climate change issues could lead to environmental devastation and long-term economic crisis.

Without international action to counteract climate change “the overall costs and risks

There are two possible routes to affluence. Either produce much, or desire little - unattributable

of climate change will be equivalent to losing at least 5% of global GDP each year...If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more", compared with the economic cost of taking action to reduce climate change at around 1% of global GDP.

Moving Ahead According to Stern Report, "What we do now can have only a limited effect on the climate over the next 40 or 50 years, but what we do in the next 10 or 20 years can have a profound effect on the climate in the second half of this century and in the next. Mitigation - taking strong action to reduce emissions - must be viewed as an investment, a cost incurred now and in the coming few decades to avoid the risks of very severe consequences in the future. If these investments are made wisely, the costs will be manageable, and there will be a wide range of opportunities for growth and development along the way."--For this to work well, policy must promote sound market signals, overcome market failures and have equity and risk mitigation at its core. Tackling climate change is the pro-growth strategy for the longer term"--.

The Stern Report proposed a three-point plan for action as mentioned below .

1. The major challenge would be to bring annual emissions down to more than 80% below current levels. Implement a regulatory system for trading and taxing carbon .
2. Provide government support for the development and deployment of low carbon technologies.
3. Educate the public and policymakers to increase individual responsibility.

According to the report, developing countries, many of whom had contributed least to greenhouse-gas levels and should not be required to bear the full costs. Stern acknowledged that climate change prevention could cause some mild to moderate market losses. However, some of those initial losses would be offset by growth in the development of green technologies. *Entire new*

markets will be created in low-carbon energy technologies and other low-carbon goods and services worth hundreds of billions of dollars each year.

While advanced countries are conscious of the impacts of climate change, and formulate mitigation strategies early, the developing and least developed countries have by and large ignored or failed to take action. Federal and state budgets ought to be formulated carefully accounting for climate change events short term and long term, and ought to resort to appropriate taxation policies, making adequate provision for funds, encourage public action etc. Developed countries ought to assist least developed and developing countries with funds and technology.

While the above recommendations are to be dealt with at the highest levels in governments, what could be done at the grass-root levels to cope up with climate change? The lowest administrative units like Panchayats need to take the initiative in preparing an action plans detailing areas likely to be affected, type and frequency of natural disasters, evacuation, relief camps, funds and functionaries, health-care, food-security, employment opportunities. Ref: www.epa.gov › [environmental-economics /www.encyclopedia.com/www./www.researchgate.net](http://environmental-economics/www.encyclopedia.com/www./www.researchgate.net)



(credi: goodread.com)

Sustainable development: Growth without cheating our children- unattributable

PERSONALITIES: ECOLOGICAL WARRIORS

'The tragedy is that we are no longer shocked by the vision of silent springs; we are now attuned to them'

In this write up we discuss the life and works of two extraordinary women - Rachel Carson and Wangari Mathai who warned us on the damage caused to the natural world by human activities. Both had a profound influence on founding environmental movements across the globe .

1. RACHEL CARSON

Rachel Carson is a name well known to those who care for the environment and her book 'Silent Spring' is a perennial source of inspiration for all. Even after hundred years of her birth she is still remembered for her bold and pioneering work on preservation of the environment.



Rachel Louise Carson (1907-64), American biologist, was born on May 27, 1907, at Springdale, Pennsylvania, USA. Rachel joined Pennsylvania College for Women with English as main subject, wanting to be a writer, but changed to biology and took a bachelor's degree in 1929. She graduated from John Hopkins University. In 1931 she joined the faculty of Maryland University where she taught for five years. She also taught in the John Hopkins summer school from 1929 to 1936 and did postgraduate studies at the Marine Biological Laboratory in Woods Hole, Massachusetts. In 1936 she joined the US Fish and Wild Service in Washington DC as marine scientist. She worked as a writer,

editor as also as editor-in-chief of the service's publications until 1952. She died of cancer April 14, 1964, Silver Spring, Maryland at the age of 56.

"One way to open our eyes is to ask yourself what if I had never seen this before? What if I knew I will never see it again?" --Rachel Carson

Works: Rachel developed a deep interest in nature and the natural world early in life. She portrayed the impact of humans on the natural world through her powerful writings. She was known as the scientist-poet of the sea (to quote: "the lobster feels his way with nimble wariness through the perpetual twilight."). Published in 1941 her first book, *Under the Sea-Wind*, was on the life of birds and animals living near the sea . *The Sea Around Us* (1951), a virtual biography of the sea, became an international best seller, winning the National Book Award and was translated into 30 languages. Her third book, *The Edge of the Sea* focused on the eco systems of the eastern coast from Maine to Florida was published in 1955. It was acclaimed that 'all three books were physical explanations of life, all drenched with miracle of what happens to life in and near the sea'. But it was *Silent Spring* (1962), serialized in The New Yorker, that became a sensation.

Significance: Rachel Carson is celebrated as one of the finest nature writers in the world. All her books were noted for their 'scientific accuracy and thoroughness, combining an elegant and lyrical prose style'. It is true that as a scholar working for the government she could easily take advantage of the latest scientific materials available.

The environmental pollution is an incurable disease.It can only be prevented

-Barry Commoner

Quotes:

Those who dwell among the beauties and mysteries of the earth are never alone or weary of life.

The more clearly we can focus our attention on the wonders and realities of the universe about us, the less taste we shall have for destruction.

In every outthrust headland, in every curving beach, in every grain of sand there is the story of the earth.

In nature nothing exists alone.

But man is a part of nature, and his war against nature is inevitably a war against himself

Silent Spring In early 60's there were reports

that numbers of birds in the US, including America's national bird, the bald eagle, were dropping alarmingly. Bird watchers also noted that eggs were often not being laid or were not hatching. The same phenomenon was reported from Britain. Several explanations like poisons, viruses or other disease agents were attributed, but no one had a definitive answer. It was left to Rachel to explain that indiscriminate use of pesticide was the cause.

The Silent Spring became one of the most influential books of the 20th Century. It is an eminent example of how powerful writing could make a huge impact on society. It is indeed amazing that a book containing hard scientific facts, that too authored by an obscure

biologist, could attain world-wide acceptance and that it could influence government policy. The title 'Silent Spring' was inspired by a line from a poem by John Keats "La Belle Dame sans Merci" that evokes a ruined environment in which "the sedge is wither'd from the lake, / And no birds sing."(ref: The Guardian dated 26th May, 2012). It seemed that the very title of the book could shake the conscience of ordinary Americans; for them a spring bereft of the songs of birds was indeed bleak and desolate. No wonder the sales of Silent Spring soared, reaching a million by her death in April 1964.

Silent Spring explained how indiscriminate application of chemicals and pesticides polluted our streams, harmed bird and animal populations, and caused severe health problems for humans. She questioned 'the scope and direction of modern science' and over turned the widely held notion that humans could have mastery over nature by using chemicals and bombs, and through conquest of space. She pointed out that our planet's ecosystem was reaching the limits of its sustainability .

For her views on the use of pesticides she faced threats of lawsuits from the chemical industry. Personal attacks on her by the vested interests were vicious. Some even accused that she was a communist. Carson was suffering from breast cancer and the effects of radiotherapy. Yet she fought back. She continued denouncing the unholy links between science and industry. Despite all personal attacks and the propaganda against her *Silent Spring* was a huge success. Carson died from cancer less than two years after Silent Spring was published, but she lived long enough to know that she could indeed make the desired impact .

The Impact: President John F Kennedy instructed his science advisory committee to investigate her claims which found them to be

*The environment is everything else, except me
- Albert Einstein*

real. Her influence led to tighter control of pesticides, including DDT, despite opposition by the chemical industry. Ten years after the publication of her book, the production of DDT and its use in agriculture was banned in the US. Britain officially banned its use some years later.

The book inspired grass roots environmental movements. It also caused the passage of the Clean Air Act (1963), the Wilderness Act (1964), the National Environmental Policy Act (1969), the Clean Water Act and the Endangered Species Act (both 1972); and led to the establishment of the Environmental Protection Agency, in the US in 1970.

Friends of the Earth and Greenpeace trace their origins directly to Silent Spring. Rachel ,according to environmentalists, 'raised the consciousness of a generation; she became the trusted public voice of science in America'.

Honors: Rachel Carson was posthumously awarded the Freedom Medal by President Jimmy Carter.

Relevance: Carson's words were indeed prophetic. Not only humans suffer but also birds and animals. Today they are pushed to the edge, due to environmental pollution. Little birds like house sparrows which flitted around our backyards have disappeared; vultures which congregated near waste dumps are nowhere to be seen and owlets hiding in dark spaces near our homes no longer stare at us. Barring domestic animals, many others have withdrawn to the interiors or perished. The tragedy is that we are no longer shocked by silent springs; we are now attuned to them.

Ref:

en.wikipedia.org/www.rachelcarson.org/www.britannica.com/www.womenhistory.com/The guardian dated 7th December, 2012.

*"In the course of history, there comes a time when humanity is called to shift to a new level of consciousness, to reach a higher moral ground. A time when we have to shed our fear and give hope to each other. That time is now."-
-----Wangari Maathai.*

II. Wangari Muta Maathai

The first African woman to win the Nobel Prize for Peace (2004)



Not many in the present generation have heard of Wangari Maathai nor they know about her contributions. I was lucky to hear her speak in Harvard University way back in the 90's on saving trees and other issues, with great passion. The impact of her speech still lingers in my memory.

Born in Nyeri, a rural area of Kenya on 1st April, 1940 Maathai was famous as a fearless social activist, an environmental crusader and a political activist. Life was indeed a struggle for her. That did not deter her from pursuing higher education. Maathai was a pioneer from an early age in many spheres. She took a degree in Biological Sciences from Mount St. Scholastica College, Kansas (1964), a Master of Science degree from the University of Pittsburgh (1966), and pursued doctoral studies in Germany and the University of Nairobi and obtained a Ph.D. (1971) from the University of Nairobi. She was the first woman in East and Central Africa to earn a doctorate degree. Professor Maathai became Chair of the Department of Veterinary Anatomy and an associate professor in 1976 and 1977 respectively. In both cases, she was the first woman to have held those positions in the region.

Maathai was married to Mwangi Mathai,

The best way to predict the future...is to create it- unattributable

a fellow Kenyan who had also studied in America. They had three children. The marriage ended in divorce in 1977.

Quotes .

"Every person who has ever achieved anything has been knocked down many times. But all of them picked themselves up and kept going, and that is what I have always tried to do."

*"Human rights are not things that are put on the table for people to enjoy. These are things you fight for and then you protect."
"There are opportunities even in the most difficult moments."*

"The generation that destroys the environment is not the generation that pays the price. That is the problem."

In Kenya deforestation was threatening the subsistence agriculture and affecting lives of women. Her work with voluntary groups made her conscious of the struggles of women in rural Kenya. She, therefore, encouraged them to plant trees to ensure supplies of firewood and to protect water sources and crops. She founded the Green Belt Movement, a non-governmental organization, in 1977, with the goals of planting trees, protecting the environment, and championing women's rights. The Movement soon spread to other African countries, and reportedly contributed to the planting of over 47 million trees worldwide. By taking up reforestation of Kenya the lives of over 900,000 women were reportedly improved through economic empowerment. She was affectionately called "Mama Trees".

Maathai's agenda quickly widened. She played an active part in the struggle for democracy in Kenya by joining the struggle against the repressive and corrupt regime of Daniel Arap Moi. Her efforts to stop powerful politicians grabbing land and forests brought her into conflict with the authorities. She was beaten and arrested numerous times. Her bravery and defiance made her a national hero

and a towering figure in Kenya'.

Achievements:- Elected as Member of Parliament in 2004; Assistant Minister for Environment and Natural Resources in the government of Kenya from 2003 to 2005; nominated as an Honorary Councilor of the World Future Council; affiliated to professional bodies and received several awards.

She authored four books: The Green Belt Movement; Unbowed: A Memoir; The Challenge for Africa; and Replenishing the Earth. A documentary film Taking 'Root: the Vision of Wangari Maathai' was made on her and the movement she spearheaded (Marlboro Productions, 2008).

Awards and Honors She won the Right to Livelihood Award in 1984. *She became the first African woman to win the Nobel Prize for Peace (2004) "for her contribution to sustainable development, democracy and peace."* She also won the Indira Gandhi Peace Prize in 2006.

Maathai suffered from ovarian cancer. Her end came on September 25, 2011. Ref:en.wikipedia.org/www.greenbeltmovement.org/en.unesco.org/ The Guardian September 26, 2011 May 26, 2012.



Photo: Kenya, 1985 – Our 'Life Stream' Associate Editor, Sudha Shrotria (standing extreme right) with Prof. Wangari Maathai (in the centre) on a tree planting mission in Kenya.

*"There is no such thing as 'away'. So, when we throw anything away, it must go somewhere."
– Annie Leonard*

POEM : DARKNESS----- By Lord Byron (George Gordon)



In this poem the poet imagines the end of the world through a series of natural, social, and possibly supernatural events. The first two stanzas of the poem are reproduced here.

*I had a dream, which was not all a dream
The bright sun was extinguish'ed, and the stars
Did wander darkling in the eternal space,
Rayless and pathless, and the icy earth
Swung blind and blackening in the moonless air:
Morn came and went----- and came, and brought
no day,
And men forgot their passions in the dread
Of this their desolation; and all hearts
Were chill'd into a selfish prayer for light:
And they did live by watch fires--- and the thrones,
The palaces of crowned kings---the huts,
The habitations of all things which dwell,
Were burnt for beacons; cities were consum'd,
And men were gather'd round their blazing homes
To look once more into each other's face;
Happy were those who dwelt within the eyes
Of the volcanoes, and their mountain- torch:
A fearful hope was all the world contain'd;---*



A diagram of the estimated ash fallout from the 1815 Mount Tambora eruption. Ash clouds travelled much further. Ref: Wikimedia Commons

'Darkeness' is a poem written by Lord Byron in July 1816. The poem is believed to have been influenced by the mass hysteria of the time brought about by a prediction by an Italian astronomer that the sun would burn itself out on July 18th, thus destroying the world. (www.gradesaver.com). That year was known as the **Year Without a Summer (1816)**, because of the eruption of Mount Tambora in the Dutch East Indies the previous year (unknown at the time). " During this gloomy time, the sun was pale and the sky clouded and hazy. Temperatures dropped and thunderstorms dominated the weather.

"During the solar eclipse of June 9th-10th, the sun actually seemed to vanish from the sky". It led to abnormal weather across much of north-east America and northern Europe at that time.

All these natural phenomena combined to into a state of panic. This pall of darkness inspired Byron to write his poem. Byron composed his poem after the predicted date of sun's death, therefore emphasizing that the end of days had not arrived, but that the spectre of complete destruction may still lie ahead one day.

If you feel you are in a black hole, don't give up--there's a way out--Stephen Hawking

ARCHITECTURE: BUILDINGS FOR CLIMATE CHANGE

"We shape our buildings; thereafter they shape us" -- Winston Churchill



(Credit: eco-business.com)

Very few people know that the buildings we construct have a significant impact on climate change. In this article we discuss how climate change impacts buildings and buildings in turn affect climate change.

Climate change has short-term and long term impacts on buildings- their construction, strength, durability and security. While social, cultural, and economic aspects are important, it is the climate of the locality that chiefly influences the design and type of buildings we make. Climate change, especially higher ground water levels due to flooding and storms affect the durability of buildings and their indoor climate. The buildings need to be safeguarded against seepage and flooding. Heavy rains cause water logging and rise in water levels making excavation for utilities or basements difficult. Flood waters can erode roads near the buildings. We know that natural calamities like droughts, Tsunami, sea erosion as also forest fires affect buildings in no small way. small way.



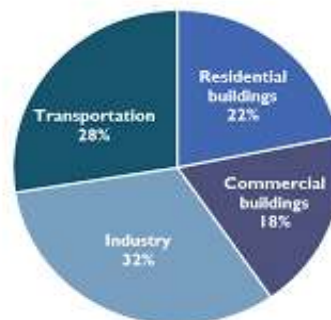
(Credit; pixel.com)



Impact of Hurricane Maria-Puerto Rico (Credit: Getty images)

Climate change can also affect the labor supply for building construction and on the job productivity. Experts say that beyond 90 F labor supply gets reduced up to 14 percent due to fatigue and illness. One sample study based on Houston, in the US found that by end of the century, the erection of a typical steel structure will require 7 percent or more additional labor hours.

How buildings influence climate change: While climate change impacts buildings, the reverse is also true; buildings also affect climate change



Co2 emissions (Credit: bcapcodes.org)

significantly. Some studies show that construction accounts for up to 50% of climate change, 40% of energy use globally, and 50% of landfill waste. It also causes air, water, and noise pollution and destruction of natural habitats.

We all know that carbon dioxide causes global warming. According to reports buildings consume about 40 percent of the energy in the U.S. annually, and they emit

nearly half of the carbon dioxide (CO₂), chiefly through green field development, cement production, and the burning of fossil fuels such as oil, gas, and coal.

A climate-responsive building depends on eco-friendly building design and green construction practices. Building designs are usually based on the weather conditions, including factors like seasonality, intensity of the sun, wind, rainfall and humidity. Modern building designs have provision for renewable energy like solar panels, smart appliances and HVAC systems, and maximizes the use of natural light. Better construction practices like reducing noise, upgrading heavy equipment to more fuel-efficient models or using alternative fuels as well as carefully maintaining all equipment, using recycled or natural building materials that produce less CO₂ can help reduce waste at construction sites. According to modern architects sustainable building operations must include

- 1) steps to climate responsive architecture.
- 2) Site Analysis
- 3) Layout the building
- 4) Windows
- 5) Minimizing building footprint
- 6) Design for natural ventilation
- 7) Relaxing the occupants comfort standards
- 8)

Green building (also known as green construction or sustainable building) refers to both a structure and the application of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from planning to design, construction, operation, maintenance, renovation, and demolition. This requires close cooperation of the contractor, the architects, the engineers, and the client at all project stages. The Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort -en.wikipedia.org

Modeling and Analysis.

Sustainable architecture: Under the presence of natural and man-made hazards, citizens' welfare depends on the performance of the structures that surround them. Architects face a choice: to remake the built environment so that it produces no CO₂, or

to carry on, business as usual, and live with the consequences. The architect today is deeply concerned with creating livable, pleasant environment for the common people. Sustainable architecture tries to minimize the negative environmental impact of buildings by efficiency and moderation in the use of materials, energy, and development space and the ecosystem. Architects must minimize the use of energy- and carbon-intensive technologies such as electric lighting and air-conditioning, and revive low-tech solutions such as passive ventilation.



Ref: (en.wikipedia.org): Washington, D.C. is the first LEED Platinum city in the world. Pictured in 1225 Connecticut Avenue,

Solar architecture is an architectural approach that takes in account the Sun to harness clean and renewable **solar** power. The continued development of photovoltaic (PV) thin film **solar** has provided a lightweight yet robust vehicle to harness **solar** energy to reduce a building's impact on the environment.

Eco houses



en.wikipedia.org: Eco house near Faaker See, Austria

The concept of an eco-house means a dwelling that has a low impact on the environment.

Human history is a race between education and catastrophe - H G Wells

An eco house could include some or all of the following:

- Higher than normal levels of thermal insulation
- Better than normal air tightness
- Good levels of daylight
- Passive solar orientation — glazing oriented south for light and heat
- Thermal mass to absorb solar heat
- Minimum north-facing glazing — to reduce heat loss
- Mechanical ventilation with heat recovery (MVHR) system
- Heating from renewable resources (such as solar, heat pump or biomass)
- Photovoltaic panels, small wind turbine or electricity from a 'green' supplier
- Natural materials — avoidance of PVC and other plastics
- Rainwater harvesting
- Grey water collection
- Composting toilet
- Glass that has two or three layers with a vacuum in between to prevent heat loss; (double or triple-glazed windows)
- Solar panels or wind turbines
- Geothermal heating and growing plants on the roof to regulate temperature, quieten the house, and to produce oxygen (en.wikipedia.org)
- A vegetable patch outside the house for some food

(Ref:en.wikipedia.org)

Traditional buildings: *Vastu shastra* is a traditional Indian system of architecture originating in India which literally translates to "science of architecture."



Simplicity is the ultimate sophistication- Leonardo Da Vinci

These are texts found on the Indian subcontinent that describe principles of design, layout, measurements, ground preparation, space arrangement, and spatial geometry. The designs are intended to integrate architecture with nature. The essential premise of *Vastu Shastra* is that there is always an invisible and constant inter-relation between all five elements-- earth, water, fire, air and space.

The fundamentals of **Feng Shui** bring the ideals of function,

flow, and harmony into the visions of **architectural** ideation. **Feng Shui** literally means "wind-water" in English and is the Chinese art or



The Temple of Longxing en.wikipedia.org

practice of positioning objects or structures so as to harmonize with spiritual forces

Euro-codes:- The European Union has put in place a comprehensive legislative and regulatory framework for the construction sector. EU points out that the availability of European advanced codes- the Euro-codes- a set of European standards for the design of buildings and other civil engineering works- is a starting condition for risk reduction and harmonization in construction.



Euro-codes play a key role in making European construction companies more competitive

The way ahead Constructions everywhere should conform to net-zero energy building standard, and policies need to be framed to achieve it. Building design, analysis, materials, systems, construction, and operations ought to be those which help mitigate climate change. Creating awareness about eco-friendly constructions need to be taken up by governments everywhere. Housing programs taken up by the Governments ought to comply with standards laid down.

Ref; <https://www.architectmagazine.com> > archive.unu.edu / ec.europa.eu > European Commission/ designing buildings for climate change /constructionclimatechallenge.c

TRAVELOGUE: IN SEARCH OF THE SACRED AND THE SUBLIME



" Most people think of the Himalaya as 'eternal' and 'immutable', whereas I've tried to show that everything is migrating, from rocks and glaciers to trees, birds and human beings. I look upon the mountains as a living landscape that is constantly changing. The geography is dynamic but also fragile and transient"-Stephen Alter

The two books by Stephen Alter- *Sacred Waters*, and *the Wild Himalaya: A Natural History of the Greatest Mountain Range on Earth*, published in 2001 and 2019 respectively give us an account of the Himalayas then and now.

---"To surrender my thoughts to the surroundings-- allowing the mind to receive rather than to seek impressions----- it is then that the eternal speaks; that the mutations of the universe are apparent; the very atmosphere is filled with life and song; the hills are resolved from mere masses of snow, ice and rock into something living. When this happens the human mind escapes from the bondage of its own imaginings and becomes as one with its creator"--

Rama
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About the Author Stephen Alter was born in the Himalayan foothills to two American missionaries, and was brought up in India. Author of seven books, he is the former Writer-in-Residence at MIT, and a recipient of a Fulbright grant. He presently lives in India with his wife. Being born and brought up in the Lower Himalayas, and having spent most of his life there, he considers himself "an endemic species".

The Himalayas span a distance of roughly

Western civilization is a loaded gun pointed at the head of this planet- Terence McKenna

2300 kilo meters in length and between 350 and 150 kilometers in breadth, rising to a maximum height of almost 9 kilo meters above sea level.

Sacred Waters When a colleague of mine presented me with a copy of *Sacred Waters*, little did I imagine that it would be such an inspiring and fascinating account of the Himalayas. The author embarks on a journey to the four holy places of Hinduism, namely, *Char Dhams* (Badrinath, Kedarnath, Gangotri and Yamunotri). In the last leg of his journey he visits the Valley of Flowers too. The journey is unique in that he travels alone, by foot, to snow covered mountains and valleys following the trails left by pilgrims, avoiding motor vehicles as far as possible. He carried no modern accessories, (not even a camera), except a petrol stove for cooking food and tent for his stay, away from *Dharmshalas* (resting places). It is also a spiritual journey, in search of the source of the Hindu religion and the ancient culture of India and also a journey of self revelation.

"Awareness of this oneness of being' leads us outside the boundaries of conventional religion, beyond the pale of sanctified culture and society". "The world seems to be shrinking even as it appears to be falling apart"- Stephen Alters"

Along the way, Alter passes through remote towns, hamlets holy places and temples meeting pilgrims, holy men as well as ordinary folks. He explores the folklores, myths and traditions of the areas visited.. He delves deeply into the Indian philosophy, recounting stories from Indian epics of *Mahabharatha* and

with riveting tales. He describes the Himalayan fauna and flora and discusses the ecology of the Himalayas, with the precision and authority of a scientist. Science and literature are beautifully blended in his descriptions. His writing is mellow and contemplative. The author makes us feel as though we were indeed walking by his side, experiencing every bit of that exhilarating journey. In fact, you don't just read this book; you experience it.

In *Sacred Waters* he writes with concern that " --villages/towns which were once self sufficient, clean,

hygienic (where) the denizens, very likely happy and carefree, have now become overcrowded, unhygienic and polluted. The pristine environment

" What is it that makes us human? What is it that links us to a rock, a blade of grass, the stature of an elm? For questions like these there is no surety of a single truth, no scientific formula or dogmatic creed; but instead of enigmas and mysteries of natural world, of which we are inseparably a part'--

has been destroyed to make hotels and other amenities for the tourists. The pure mineral hot springs have been reduced to nothing better than polluted ponds" He speaks about the controversial Tehri dam and about the Chipko movement lead by Sundarlal Bahuguna.

II. In Wild Himalaya: A Natural History of the Greatest Mountain Range on Earth (published by Aleph Book Company in August 2019). Alter narrates the life story of the Himalayas (he prefers to use the local version of the name *Himalaya*)-complete with its history, geology, science, economy, flora and fauna, folklore, myths, religion, legends, tradition and culture. The book captures 'the incredible complexity and majesty of the Himalayas'. Alter 'brings alive the greatest mountain range on earth in all its terrifying beauty, grandeur and complexity'.

According to Alter, "More than anything the Himalaya are full of stories. Many of the stories are scientific narratives about the evolution or behavior of insects, mammals and reptiles. At the same time, there are so many myths, legends and folktales in the mountains that describe some of the same species and their natural habitats. When you combine the information in a field guide with the lore of a storyteller seated by a campfire, it evokes a magical, mysterious world".

While writing this book, almost two decades have passed since he had undertaken the earlier journey on foot, before writing *Sacred Waters*. Whereas his journey was limited to the Indian side of the Himalayas earlier, this time he covered not only the Himalayan states of India, but also Nepal, Sikkim, Bhutan, Arunachal Pradesh and western Kashmir, traversing the entire length and breadth of the Himalayas. Many of the journeys were undertaken on foot, his preferred mode of travel, and also by jeep and car.

The book is divided into eight sections, each covering a particular aspect of the Himalayas-- 'Orogenesis' (origin, evolution, geology and

geography). 'The Third Pole' (weather, glaciers, wetlands, and rivers) , 'Flora Himalaensis' (the unique Himalayan plants and trees), 'Winged Migrants'

(Himalayan birds and insects), 'Mountain Mammals' (fauna-brown bears, blue sheep and snow leopards), 'Ancestral Journeys' (human settlements, origin, migration ancient and present), 'At the Edge of Beyond' (mountaineering) and 'In the Thousand Ages of the Gods' (Himalayan art, folklore and music).

Alter on climate change Alter writes that weather is both the cause and consequence in the Himalayas. In fact dramatic extremes exist in weather patterns. In addition to annual weather patterns, innumerable microclimates exist in the Himalayas caused by altitude and terrain. The mountains are especially vulnerable to climate changes because of its latitude. Although north and south poles are experiencing rising temperatures, the Himalayas report even greater warming due to their proximity with the equator. Alter points out that throughout their existence the Himalayas have endured the effects of climate change. However, unlike previous climate changes, the current shifts are a direct result of human interventions.



Glacial melt water flowing through snow in Himalayas of north Indian state of Uttarakhand. (Wikimedia Commons)

He observes that climate affects everything in the Himalayas, from biology and glaciology to mountaineering and philosophy. Even insignificant variations in temperature have dire consequences- glacial burning fragile ice dams, mudslides that bury villages, unpredictable monsoons, disappearing species and disrupted migration patterns. If the glaciers dry up and disappear, as predicted by some scientists, the entire region would be

Climate is an angry beast and we are poking at it with sticks-
- Wallace Broecker,

like the sandy deserts of Sahara.

Alter says that calculating the human cost of Himalayan warming would indeed be staggering. The high ranges separate two largest populations on earth, with China (1.418 billion) to the north and India (1.363 billion) to the south. The ice caps are a vital source of fresh water for those who live on either side. Melting ice caps could adversely affect some of the most important river systems like Brahmaputra, Ganga and Indus, Salween and Irrawaddy in Myanmar, the Yellow River and Mekong in China and southeast Asia upon which billions of people rely for water.

Alter is concerned about religious tourism, one of the fastest growing and the least regulated industries in the Himalayas. "Piety and pollution go hand in hand. Investing mountains with mythical significance, scattering their slopes with religious symbols and stories, human beings have set in motion a cycle of ecological destruction. Natural phenomena like hot springs, caves or unusual rock formations as well as sources and confluences of rivers, become popular pilgrimage destinations that are often cluttered with rest houses, food stalls and parking lots, obscuring the beauty and isolation of their sites".



Pollution in the Himalayas (Credit:lifescience.com)

Destruction of forests and rivers due to rapid urbanization, hydropower projects, waste generated due to tourism and issues of out-migration are discussed in the book. In an interview to the Free Press journal dated September 15, 2019 he stated “ --the diversity of species that exist in the Himalayas depends on and interacts with each other. Human beings are part of this rich biome. The Himalaya, more than any other place on the planet, is vulnerable to these shifts in temperature and precipitation,” - "We must control human greed and waste". The ecological

Life Stream

destruction due to human intervention reported in *Sacred Waters* becomes more intense in *Wild Himalayas*.

The Hindu (October 12, 2019) in its book review on *Wild Himalaya* aptly pointed out "Stephen Alter writes about the breathtaking Himalayan glaciers, alpine forests, rivers, rhododendrons, brown bears, steppe eagles and butterflies, you WILL feel sad knowing that they all might vanish one day in the foreseeable future.". Alter is concerned that laws are framed without any regard to the ecology of the area. The state has vested absolute power over forests to the Forest departments ignoring rights of forest-dwellers. The original inhabitants are pushed to the margins. State/ country borders running through the Himalayas have been drawn arbitrarily, dividing the local communities and disrupting their life and livelihood. The presence of military has disturbed the wilderness. Rampant poaching is accelerating the disappearance of both plant and animal species. Alter is concerned about trophy hunting (legal in parts of Pakistan) and also about ritual animal sacrifices during *Dussehra* festival. At last when you put down the book you are left with a profound feeling of having encountered the Himalayas in all its majesty and magnificence.



(credit: pinterest.com)

"Climate change is a lot like death. We all understand it's inevitable, but few of us truly accept it."

~ Brian McDermott, 18 years old

FOOD: MINDFUL EATING

-----"*The need for eating healthily, economically, ethically and compassionately, food that is both good for health, good for the environment –*" (The Guardian)

We have seen how climate affects food security of a region. But most people are not aware or they do not care that the reverse is also true--the plants we grow and the food we consume also impact climate change.

The food we eat: Our food habits are generally influenced by local availability, seasonality, culture and traditions of the region. Food availability as well as our attitude towards food have undergone prodigious changes in the last hundred years. Most of us eat a lot more food than our ancestors did due to increased food supplies worldwide on account of economic development, urbanization, and globalization. Traditional, largely plant-based diets are being replaced by diets that are high in sugars and animal fats but low in starches, dietary fibre, fruits, and vegetables. Although food is more diverse now chiefly due to crop immigration, globally we are moving towards more uniformity in our food habits and tastes.

Diet and climate change: According to The Guardian (Oct 8, 2019) food systems contribute 21% to 37% of global greenhouse gases, which leads to deforestation, biodiversity loss and declining water tables. The Amazon forest fires in Brazil are directly related one way or another to food production. Agriculture is one of the leading contributors to both methane and nitrous oxide emissions.

Population growth underlies the increased demand for animal source foods. Some countries consume very high levels of red meat (OECD and Latin America); consumption is low in low-income countries in Asia and Africa. The Earth Institute, Columbia University (Ref: State of the Planet report dated 25th July, 2018) pointed out that compared

with plant based foods, meat and dairy account for 14.5% percent of all greenhouse gases. Compared with plant proteins, like lentils, animal protein in general takes a lot more land, energy and water to produce a pound of protein. Beef and lamb have greater impact- 50 grams of beef protein generate more than 37 pounds, or 17 kilograms, of carbon dioxide. The same quantity of farmed fish produces about seven pounds of carbon dioxide. Livestock use a third of global crop land and contribute 15% of global greenhouse gas emissions. Maintaining livestock is resource and energy-intensive.

Land use The use of land for growing food and forestry accounts for around a quarter of global greenhouse gas emissions .

Inter-governmental Panel on Climate Change (IPCC)

The Panel's recommendations include

- More effective use of land can help store more of the carbon emitted by humans.
- There should be a major shift towards vegetarian and vegan diets. More people could be fed using less land, if individuals cut down on meat intake.
- High consumption of meat and dairy produce by western countries is fuelling global warming. Switching to a plant-based diet can help fight climate change. Most of the protein ought to be from nuts and legumes (such as beans and lentils) instead.
- Fruits and vegetables should make up half of every plate of food we eat; one can still have a couple of portions of fish and chicken once a week
- Eating less meat, especially in developed countries, and reducing food wastes could save millions of square kilometers of farm land from

*There is no such thing as a free lunch-
-Barry Commoner*

being degraded and release those lands for forestry or bio-energy crops.

The Planetary Health Diet



(Ref: university of california.edu)

Ranking based on evaluated eight types of diet based on their carbon mitigation potential

1. Vegan: Completely plant-based, with no animal source food.
2. Vegetarian: Grains, vegetables, fruits, sugars, oils, eggs and dairy, and generally, at most one serving per month of meat or seafood.
3. Flexitarian: 75 per cent of meat and dairy replaced by cereals and pulses; at least 500 g per day fruits and vegetables; at least 100 g per day of plant-based protein sources; modest amounts of animal-based proteins and limited amounts of red meat (one portion per week), refined sugar (less than 5 per cent of total energy), vegetable oils high in saturated fat, and starchy foods with relatively high glycemic index
4. Healthy diet: Limited sugar, meat and dairy - based on global dietary guidelines
5. Fair and Frugal: Global daily per-capita calorie intake of 2800 kcal/cap/day, paired with relatively low level of animal products.
6. Pescatarian: Vegetarian diet that includes seafood.
7. Climate carnivore: 75 per cent of ruminant meat and dairy replaced by other meat.
8. Mediterranean: Vegetables, fruits, grains, sugars, oils, eggs, dairy, seafood, moderate amounts of poultry, pork, lamb and beef. **(Ref: IPCC Report)**

Europe and North America need to cut back massively on red meat, East Asia needs to cut back on fish, Africa on starchy vegetables.

Climate Change and Health Scientists warn that climate change will have a grave impact on human health, including food insecurity; water scarcity; resource-based conflicts; forced migration; spread of infectious diseases and worsening air quality that impacts respiratory, cardiovascular and mental

“The only way to keep your health is to eat what you don’t want, drink what you don’t like, and do what you’d rather not.” – Mark Twain

health. The food transition coupled with a more sedentary lifestyle and a low level of physical activity also run the risk of developing chronic diseases .

Combating climate change is largely a matter of personal responsibility

EAT-Lancet Commission. EAT FORUM, a Norway-based think-tank and the British journal the Lancet teamed up to commission an in-depth study, covering 35 different locations around the world . The team devised a 'planetary Health Diet' that promises to save lives, feed 10 billion people and all 'without causing catastrophic damage to the planet'.

The report points out that the global food system is broken as industrial agriculture devastates the environment, forests are razed, and, billions of cattle emit methane. Further, 'unhealthy diets are the leading cause of ill health worldwide, with 800 million people currently hungry, 2 billion malnourished and further 2 billion people overweight or obese. The world's diets must change dramatically'.

The team claims that the first science-based diet devised by it tackles both the poor food eaten by billions of people and addresses environmental issues. The diet (proposed below) would save at least 11 million people a year from deaths caused by unhealthy food, while preventing the collapse of the natural world that humanity depends upon'..

1. **Nuts** - 50g a day
2. **Beans**, chickpeas, lentils and other legumes - 75g a day
3. **Fish** - 28g a day
4. **Eggs** - 13g a day (so one and a bit a week)
5. **Meat** - 14g a day of red meat and 29g a day of chicken
6. **Carbs** - whole grains like bread and rice 232g a day and 50g a day of starchy vegetables
7. **Dairy** - 250g - the equivalent of one glass of milk

The whole world is our dining room, but be careful: it is also our garbage can-

- Ashleigh Brilliant

8. **Vegetables** -(300g) and fruit (200g)

The diet provides for 31g of **sugar** and about 50g worth of **oils** like olive oil.

UNDP Cook Book UNDP (United Nations Development Program) has launched a new cookbook' titled '*Adaptive Farms, Resilient Tables*', looking at how climate change is affecting food security in developing countries and how communities are adapting their traditional recipes to survive.

Food Wastage

Currently more than a quarter of the food produced rots in the fields, gets thrown away because it is damaged, or spoiled in overstuffed refrigerators. The amount of food that is wasted and unused accounts for close to a 10th of global emissions. According to www.highspeedtraining.co.uk, *we throw away 7 million tones of food and drink from our homes every year*, most of which could have been eaten.

Mindful eating What can we as concerned citizens do? As consumers we do have many choices Here are some suggestions.

- Choose a diet that includes plenty of fruits, vegetables and plant-based protein sources including legumes, soybeans and nuts, along with modest amounts of poultry, fish, milk and eggs, and small amounts of red meat.
- Be a vegetarian by day; allow yourself small servings of non-vegetarian foods in the evening; go meatless on Mondays.
- Choose pork and poultry instead of beef and lamb (to limit gas emissions)
- Eat locally produced food (to reduce energy spent in transportation), Avoid air transportation and favor short distances;
 - Choose fresh produce and avoid greenhouse (a lot of energy is needed for electric lighting, watering and heating)

and deep-frozen vegetables

- Try Asian cuisines, which tend to be more plant-based.
- Start with kids – school meals can create healthy habits early on;
- Avoid waste -curbing food waste at an individual or household level; use every part of ingredients (apple cores, cheese rinds, etc.) to limit food waste. If you are going to go for red meat, choose quality over quantity: eat more meat cuts and less processed meat.
- Learn to support food producers who make efforts to produce low-impact meats
- Governments-Investment in public health information; support policies that promote healthy eating -economic, safe and convenient
- Taxes on red meat, or subsidized fruit and vegetables
- Raise livestock on lands that are too arid to grow crops, feed differently so they produce lower methane emissions and they produce manure that can fertilize soil. It is entirely possible to eat well without depriving ourselves. nationalpst.com
- There are many traditional cuisines which are easy to cook and healthy. A great variety of millets, are far more nutritious than rice and wheat that have become staple diet of people.

Ref:- www.highspeedtraining.co.uk/
www.greenfacts.com /
<https://blog.ciat.cgiar.org/www.>
eternity.org/meals/ <https://www.bbc.com>

SOME EXAMPLES

Recipes: Two easy to cook simple recipes which are examples of Planetary Health Diets are included here.

Dhokla /Khaman Dhokla (steamed cake) is a vegetarian specialty which has

“The planet will continue to cook.”
 – Paul Krugman

its origin in the Indian state of Gujarat. **Dhokla** is made with a fermented batter made using rice and chickpeas whereas the more common **Khaman Dhokla** is made from gram flour (besan). Both are steam cooked. **Dhokla** can be taken at breakfast, as a main course, as a side dish, or as a snack.

Khaman Dhokla is the most common type of dhokla that you find in shops or restaurants. Khaman Dhokla is delicious, sweet and sour in taste, and if well made is soft and fluffy. It is easy to make and can be prepared in about 30-minutes. It is considered a good source of protein. Steaming makes it easy to digest. Here is an easy way to make Khaman Dhokla.



Ref: en.wikipedia.org



Ref: Ruchi,s kitchen

<https://www.bbc.com>

Khaman-Dhokla Instant Dhokla

TOTAL TIME :30m; PREP TIME:15 m; CALORIES:285:

Ingredients: 1 cup gram flour (besan); 1 teaspoon sugar; 1 teaspoon salt; 1 tablespoon refined oil; 1 teaspoon mustard seeds; 1-1/2 cup water; 1-3/4 teaspoon lemon juice; 3/4 teaspoon baking soda; 15 curry leaves; 1 teaspoon coconut powder

For Garnishing: 4 sliced green chilies; handful coriander leaves

1. Take a bowl and mix gram flour, salt, water, lemon juice and baking soda in it. Mix the ingredients well. Ferment the

batter for 1-2 hours. In the meantime, boil water in a steamer and grease the utensil (or mould) with oil.

2. Pour the dhokla batter in the utensil and cook (steam) on low flame for 15-20 minutes. Check with a prick after 15 minutes. If it comes out clean, remove it from the stove. Allow the dish to cool and then cut into pieces.

3. Add 1/2 cup of water in the pan and allow it to boil. Add squeezed 1/2 lemon, sugar; pour over the dhokla.

4. For the tempering, heat another pan with oil in it over moderate flame. Once hot, add mustard seeds, curry leaves and split green chili.

4. Turn off the heat and pour the tempering on the dhokla. Transfer the dish to a serving bowl and garnish with fresh green coriander leaves; finely chopped green chilies can be placed at the top and serve it with green coriander chutney. Dhokla is eaten at room temperature. No need to cool or heat it before eating (Ref: www.eternity.org/meals).

11. Mulligatawny soup is a traditional South Indian dish which is very easy to make.. The name originates from the Tamil words 'miḷagu' ('pepper'), and 'taṇṇi' (water) meaning 'pepper water' or 'pepper BROTH'. It is thick like a stew and is most often served with rice.

INGREDIENTS:-

- 1/2 cup red lentils
- 1/4 cup butter (or olive oil for vegan); 1 onion, chopped; 1 carrot, peeled and diced; 1 red jalapeno (pepper), seeded and diced; 2 small firm apples, peeled, cored and diced
1 (14.5 oz) can diced tomatoes
3 garlic cloves, minced; 2 teaspoons peeled and minced ginger root
- 1 tablespoon curry powder; 1 teaspoon ground cumin; 1/2 teaspoon paprika; 1/2 teaspoon ground cinnamon; 1/2 teaspoon ground turmeric; 1/4 teaspoon ground cardamom; 1/4 teaspoon freshly

ground black pepper

- 3 cups chicken or vegetable broth; 2/3 cup canned/fresh coconut milk
- Salt and black pepper to taste
- Chopped coriander leaves for garnishing



www.bbc.co.uk/food/recipes

Cooking instructions

1. Melt the butter in a large pot. Add the onion, and sauté for 4 to 5 minutes or until they have softened.
2. Add the garlic, ginger, diced apples, and tomatoes to the pot. Saute for another 3 minutes, then add in all of the spices and toss to coat. Add in the lentils and broth and let the contents come to a boil. Turn the heat down to medium-low and simmer uncovered for 30 minutes.
3. Puree about 75% of the ingredients using either an immersion blender or by transferring a portion of the contents to the bowl of a standard blender. Leave some of the chunks whole, as it adds a nice texture and consistency to the soup. Return the soup to the pot if needed, then stir in the coconut milk. Taste, and adjust salt and black pepper as needed. Serve with a dollop of tangy sour cream. (Cooking time: **30 mins to 1 hour**---Serves **Serves 4-5**).

(Ref: en.wikipedia.org
www.bbc.co.uk/food/recipes/food.ndtv.com)

I always want only two things: loose weight and eat!

ASTRONOMY: SPACE AND CLIMATE CHANGE



Sun spots & solar flares (credit: space.com)

In this write up we try to answer three important questions noted below with the help of information provided by NASA:

1. Is the climate on earth influenced by solar activity?

2. What is space climate?

3. How does space technology help in managing climate caused disasters?

Solar activities: According to NASA, Sunspots are storms on the sun's surface that are marked by intense magnetic activity causing solar flares and hot gassy ejections from the sun's corona. Some of these are visible to humans on Earth in the form of Aurora Borealis and other distant interplanetary light shows. The number of spots reach a peak - called Solar Maximum in a cycle, once in every 11 years or so. Solar wind, on the other hand, consists of magnetized plasma flares emanating from the sun and in some cases is linked to sunspots. By influencing galactic rays solar winds affect atmospheric phenomena on Earth.

Even now we know very little about phenomena like sunspots and solar wind. Some of those who question human-induced climate change blame global warming on natural variations in the sun's output due to sunspots and/or solar wind. Further,

"We are just an advanced breed of monkeys on a minor planet of a very average star. But we can understand the Universe. That makes us something very special" -Stephen Hawking

enhanced sunspot activity and global warming are inter-related. They argue that natural phenomena affecting solar activities have a greater impact on climate change than humans and industrialization? Majority of climate scientists although agree that sunspots and solar wind could be playing a role in climate change, view it as very minimal and attribute Earth's warming primarily to emissions from industrial activity. This view is supported by a large number of peer-reviewed studies .

What is space climate ?

Space climate is 'the long-term variation in solar activity within the helio-sphere, including the solar wind, the Interplanetary magnetic field (IMF), and their effects in the near-Earth environment, including the magnetosphere of Earth and the ionosphere, the upper and lower atmosphere, climate, and other related systems'. (NASA)

Solar minimum is the period of least **solar** activity in the 11 year solar cycle of the Sun. During this time, sunspot and **solar** flare activity are minimum as against the **solar maximum**, where there may be hundreds of sunspots.

111. How does space technology help in collecting data and managing climate caused disasters?



VISUALIZATION OF THE 2012 ARCTIC SEA ICE, THE LOWEST ON RECORD

Space technology has become critical in the understanding and managing climate change.

- It is an important tool for collecting land, ocean and atmospheric data on climate.

- It aids in monitoring climate changes and issues early warning, not possible with other techniques..
- Space technology delivers data with 'regular, uniform and global coverage, and reliable assessments of trends over time, for specific variables'.
- It also covers remote regions that are under-sampled by conventional networks.
- It helps predict agricultural outputs well in advance in regions affected by scarcity
- Space-based information on communities vulnerable to climate change can help monitor the effectiveness of adaptation strategies.



Maps Antarctic fires (credit: NASA)

What is SPIDER? It is the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (SPIDER). Created to provide satellite information linking disaster management with space communities, it facilitates capacity-building and institutional strengthening. The system had taken seven years to build. Resource assistance was received from 22 Member States; others had pledged their support. SPIDER helped to get inter-alia satellite images of Hurricane Katrina, earthquake in Peru, floods in Uganda and helped monitor those disasters in recent times..

European Space Agency (ESA) too is focussed on space technology. It has set up the Climate Change Initiative to respond to the need for climate-quality satellite data.

NASA-has been involved in collecting critical data in tracking high global temperatures, global

measurements of carbon dioxide over land and sea, monitoring Arctic /Antarctic /Greenland's melting ice sheets, forest fires in Brazil, ocean currents



THE DISAPPEARING SNOWCAP OF MOUNT KILIMANJARO, FROM SPACE.

and Monsoon, glacier melt and snow melt in Karakoram and Hindu Kush ranges in Himalayas, Plant stress in Costa Rica region, environmental changes and adverse events, besides water movement throughout the US. Using hydrology models along with satellite data and ground measurements, it assesses how climate change is affecting the distribution of water, such as in droughts and floods. NASA researchers propose to make use of advance technology that could help improve climate and weather predictions. NASA studies Earth's carbon cycle and photosynthesis. The images developed by NASA using space technology are mind-boggling; its studies provide a fast and clear account of natural disasters.



Republic of Maldives: Vulnerable to sea level rise (Image credit : NASA)

According to NASA, Space technology has not only 'revolutionized the way we perceive our planet, but it has also changed the way we comprehend our profound impact on the environment'. We couldn't agree more.

Ref: en.wikipedia.org/ spaceplace.nasa.gov > spaceweather/www.scientificamerican.com/



LIFE STREAM is a quarterly magazine on holistic life published by a group of people who are committed to spreading the message of living in harmony with nature.

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LIFE STREAM is a quarterly magazine on holistic life published by a group of people who are committed to spreading the message of living in harmony with nature.

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ABOUT US

The Life Science Foundation is a Not- for- Profit Public Charitable Trust registered on 30th December, 2009. It is a unique initiative by two officers belonging to the Indian Administrative Service (Bihar cadre) namely S. Jalaja and A.N.P. Sinha (IAS-1974) who have retired as Secretaries to Government of India. Their long experience with Governments at the National and State levels have instilled in them the will to continue to serve people, although from a different platform. Service through the medium of a public charitable Trust is in keeping with the Gandhi's ideal of Trusteeship.

OUR VISION

The term Life science encompasses all aspects of life from Right to life- an inalienable right of every human being- to the interconnectedness of the entire web of life. Our vision, therefore, is to promote holistic understanding of life and its purpose, and improvement of quality of life of all.

OUR MISSION

Our mission is to improve quality of life through policy formulation, applied research and real life action. The Gandhian ideals of Sarvodaya and Trusteeship will be the guiding spirit.

OUR AIMS AND OBJECTIVES

To accomplish the above vision and mission, the Foundation will initially have the following aims and objectives. In course of time, more could be included:

1. To promote strategic thinking and suggest policy interventions on holistic and sustainable development.
2. To promote holistic health care system based on simple living, preventive healthcare, and both modern and traditional health systems.
3. To undertake studies, research and action-oriented projects pertaining to holistic life.
4. To undertake pilot projects of good governance including e-governance and eventually support the governments in adopting and up scaling successful pilots.
5. To work towards promoting quality of life of vulnerable sections of population, including women and children.
6. To promote all- round human resource development.
7. To design self- sustaining livelihood projects which minimise subsidies and donor- dependency.
8. To undertake other activities which are conducive to pursuit and fulfilment of the vision, Mission and Objectives of the Foundation.
9. Network with institutions and agencies to achieve the above objectives..