International Journal of
Frontier Science and
Multidisciplinary Research (IJFSMR)

Vol. 1, Issue 1 April-June (2026), 09-18
ISSN: 3139-647X

RESEARCH PAPER

Climate Crisis and Unlimited Growth: Pushing the Limits of the Planet

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Abstract

Climate Change and unlimited economic growth are increasingly pushing the planet beyond its ecological limits, threatening environmental sustainability and human survival. Rapid industrialization, population growth, urbanization, deforestation, and excessive dependence on fossil fuels have intensified greenhouse gas emissions, resulting in global warming, biodiversity loss, sea level rise, and frequent extreme weather events such as droughts, floods, heat waves, and wildfires. The study examines the historical development of climate change, major causes of the climate crisis, impacts on ecosystems, agriculture, biodiversity, and human health, as well as the role of international initiatives and policies in mitigating environmental degradation. It highlights how the concept of unlimited growth on a finite planet has accelerated resource depletion and ecological imbalance. The paper further discusses global climate agreements, including the Intergovernmental Panel on Climate Change and Paris Agreement, and emphasizes the importance of renewable energy, sustainable development, carbon reduction, climate-resilient infrastructure, and nature-based solutions. The study concludes that immediate global cooperation, sustainable resource management, and transition toward low-carbon economies are essential to protect the planet and ensure a secure future for coming generations.

KEYWORDS:
Climate Change, Global Warming, Sustainable Development, Greenhouse Gas Emissions, Renewable Energy

ARTICLE HISTORY
Received: 12 April 2026
Revised: 05 May 2026
Accepted: 18 June 2026
Published: 30 June 2026

CITATION
Singh, D. P., (2026). Climate Crisis and Unlimited Growth: Pushing the Limits of the Planet. *International Journal of Frontierscience and Multidisciplinary Research (IJFMR)*, 1(1), 09–18. https://doi.org/10.71371/ijfsmr.1109-18

Introduction

The nature and man relationship has history of human civilization, the progress and historical development jointly promoted by interaction between man, nature, economy and society. The environment is made of composition of land; water and atmosphere, it surrounded within human exist. The living organism like plants, animals and microorganism occur on earth, the organism combination and relationship with physical, chemical and cultural influence on human health and well begins. The environment composed by different spheres in which biosphere is important sphere, it consist harbors and living organisms. This living organism interacts with each other and non-biotic factor like soil, air and water. The earths 75% land based environment severely alters due to human activity (William D. F. and Craig B. S. 2024). The wetlands presents before 300 years today lost completely. In the world poor developing countries often depend on natural environment for their livelihood and continued existence. The human population growth impact has seen on earth from 1950 increasing pupation needs different things so its effect cutting down forest and land used for agriculture, industrialization and urbanization development. The climate change and greenhouse gas emission effect on species so that 20% comes in critical risk of extinction. The human population increases with development the extinction of resources from environment like fossil fuels oil, gas, coal, trees, water, minerals and wildlife (Col C. Muthanna 2022). The food production also affected by climate change in different area of the world, it effect on prices and market volatility and produce risk of protests, rioting and civil conflict. The healthy ecosystem provides 37% mitigation to the global temperature rise and damage ecosystem release carbon instead storing it due to climate change. In the global greenhouse emission about 25% come from land clearing, crop production and fertilization. The animal based food contributes 75% emission in nature. The global warming effect on species conservation it increase local species and with increasing risk of global extinctions. In the agriculture the use of fertilizer carbon emission is need to reduce for world food security. The production of

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fertilizer in global emits about 1.4% annual carbon dioxide emission. The use of fertilizer contributes non carbon dioxide greenhouses gas emission. In the production of ammonia high pressure and temperature is necessary for burning of fossil fuels like coal and methane gas used it help to climate change (Arun V. S. and Patel A. 2015). Today in the global ammonia manufacture contributes about 1-2% carbon dioxide emission. The industrial area also contributes greenhouse gas and carbon dioxide emission. In coral vulnerability the climate change projected decline to 1% to 2% warming and 10-30% former cover at 1.5°C. In the global greenhouse gas has emitted largely by industry, agriculture, forestry, land use and transports. In which transport emits 15% greenhouse gas in which road transports emits 69%, air transport 12% and shipping contribute 11%. The vector borne diseases illness like dengue, Zika and malaria is increase due to climate change and it related to life threaten maternal and neonatal outcomes.

Objectives:

1. To study the climate crisis and its impact on human
2. To focus unlimited growth impact on climate change
3. To study the climate change and pushing limits of planet
4. To aware young generation about climate change and environment

Analysis and results:

The climate change effect on global temperature made event like drought, hurricanes and floods. The planet has warmed by 1.1 degree Celsius from preindustrial area before 250 years ago. The climate change also occurs due to burning of fossil fuels like coal, oil and gases. The hot wave creates wildfire season's fire spreads faster and burn long time. The Nature has shown the threats for biodiversity on earth have due to exploitation 37% with hunting and fishing, the habitat degradation and change threat biodiversity 31%. The loss of habit both plant and animal 13%, the climate change 7% , the invasive species 5%, due to pollution 4% and disease threats for biodiversity 2%. These all issues related to climate crisis and unlimited growth pushing the planet limits (Ewert, A. D. M. and J. Overholt 2014).

History climate change:

The history of climate change began in early 19^{th} century with recognition of natural climate changes and greenhouse effects. The greenhouse gas emission scientifically understands of human caused climate change in 19^{th} and 20^{th} centuries. The scientific consensus firmly establishes that human activities were primary driver of global warming. A Joseph Fourier in 1824 proposed natural greenhouse effect where in atmosphere gases trap heat. Later Eunice Foote identifies carbon dioxide and water vapor as heat trapping gases by experiments. The increased carbon dioxide potential levels warming calculate by Svante Arrhenius. The carbon dioxide levels measured and linked with global temperature rising in mid-20^{th} century (Haque M. A. 2021). Charles Keeling's measurements at Mauna Loa Observatory demonstrate increasing concentration of atmospheric carbon dioxide. In the year 1938 the planet warming discovered by steam engineer Guy Callendar, he decided to break day job and began painstakingly collect record from 147 weather stations across the world. He discover after calculation global temperature risen 0.3°C, over previous fifty years. He says that carbon dioxide realized from industries responsible for global warming. The climate change impacts predicates by scientist by developing climate models include sea raising level and melting ice caps (Kate Hawkey 2023). The Intergovernmental panel on climate change (IPCC) establishes after the discovery of ozone hole and increase evidence of global warming. The scientific bodies of this panel confirm reality and severity of climate change with increase global temperature, rising sea level and melting ice. In New Jersey Bell Telephone Company in 1952 engineer Daryl Chapin solve problem. The network of telephones in rural area of tropical regions extent is aim of company but use of standard batteries unsuitable because they degraded too quickly in hot, humid condition (George L. and Jay L. 2015). The Chapin look for other power source and thought about solar power cell. The solar sell convert sunlight into current it made from selenium but it produced just five watts per square meter convert less than 0.5% of incoming sunlight into electricity. Calvin Fuller and Gerald Person develop transistors made from silicon. He used gallium to give silicon to boost its conductivity. The pair used gallium give silicon a positive charge and then dipped into hot lithium to great negative charge. The current and switched measuring the ammeter used on desk light. It recorded highest current flow yet seen in solar cell and Pearson told Chapin to focus on silicon for his solar cells. The technology unit has reliable cell that convert 6% of solar energy into electricity. Dr. Charles David Keeling provide first evidence that carbon dioxide level are rising in 1958. Some scientists in 19^{th} century argued that burn fossil fuels increase carbon dioxide level in atmosphere. Dr. Keeling in 20^{th} century has record longest continuous carbon dioxide concentration in the world.

The scientists create computer model of planets earth's climate which predict doubling concentration of carbon dioxide raise global temperature by 2°C. The first accurate computer model of planets earth's created by Syukuro Manabe and Richard Wetherald, It include atmosphere, ocean and clouds components and also adjust level of carbon dioxide to see impact on global temperature. From 1880 the CO2 increased 50% then temperature increased by 1.1°C. For the understanding complex system of earth's climate Syukuro Manabe awarded Nobel Prize in 2021. The supercomputer empower next generation of climate models the current Sentinel earth observation satellites produce 10 terabyte of data every day which is equivalent to data from 8.7 million. The Jasmine supercomputer comes and provides environmental scientists accesses to very large sets of environmental data which typically too large. It reduces time to take new tests and give results within hours rather than months. This computer operated by Science and technology facilities councils (STFC) RAL Space Centre for environmental data analysis (CEDA) and Natural Environmental Research Council (NERC) (S. K. Chatterjee 2009). Dr. John Mercer warns that global warming cause Antarctic ice sheets to collapse leads to disastrous rise in sea levels in 1968. He given evidence from entire West Antarctic ice sheet had melted away. He warn current atmospheric warming cause ice shelves to disintegrate causes sea level rise

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about five meter. In 1995 massive Larsen ice shelf collapsed in 2002 B ice shelf and then 2017 major rift occur in Larsen C. The NASA launched satellite Nimbus II in orbits it given world's first accurate global atmospheric temperature. The satellite Nimbus first launched in 1964 it provides more valuable data about global temperature. It informed about concentration of greenhouse gases in atmosphere ozone layer and sea ice thickness. It allows scientist to develop computer models that forecast weather week in advance. It also provides independent satellite record confirm that earth's lower atmosphere was warming (Tony Juniper 2021). The world class science research and technology development carry out by British scientists at RAL space. They work using about 210 instruments in this mission. In 1980 RAL space and Along-Track Scanning Radiometer (ASTR) consider one of remote sensing instrument in the world. The ASTR Measure Sea and land surface temperature and RAL develop sea and land surface temperature radiometer for Sentinel satellites. It given extra ordinary picture about earth how its climate change, the ice core extracted from Antarctica confirm CO2 and temperature rise up and down together over past 150,000 years. It also provides information about earth's climate like in past. In 1998 French scientists extracted ice core 2,000 meters long it extending record back to 420,000 years ago both shows clear relationship between atmospheric greenhouse gases and Antarctic temperature over time. The present level of CO2 and methane in atmosphere shown by it, the British Antarctic Survey (BAS) 2004 team extract three kilometer ice core. The ozone layer hole above Antarctica discover by scientists which naturally protect from harmful ultraviolet light**.** The British Antarctic Survey reported they detect abnormally low level of ozone at South Pole and they suggest chlorofluorocarbon often used in aerosol cans and fridges is responsible for it. The finding led to Montreal Protocol in 1987 it called for reduction and total ban of CFCs (Richard B. P. 1995). The assessment reports include several thousand scientific published papers written by expert of their field. In last three IPCC (Intergovernmental Panel on Climate Change) special reports author assesses 20,000 publications around the world with 100,000 comments more than 2,500 experts. The climate history, loss of ice from ice sheets and glaciers, ocean circulation and ocean warming, climate modeling and sea level rise these subjects covered in the publication by experts. These reports with data from key figures of summary for policymaker section of latest IPCC report available for access to everyone from CEDA (Comprehensive Environmental Data Archive) archives (Nicolas D. 2021). The UNFCCC (United Nations Framework Convention on Climate Change) was first international treaty design to limit greenhouse gas emission and prevent climate change it ratified by 197 countries starts his work from 21st March 1994. The Kyoto protocol committee in 1995 says industrialized countries and economics to limit and reduce greenhouse gases emission in their agreed industrial target. It superseded by Pairs Agreement in 2015 it legally require countries to reduce their carbon emission in order to limit global warming to 1.5°C compare to pre-industrial levels. It is most successful global environmental policies of 21st century and help raise public awareness of climate change. For the climate change World Meteorological Organization, Intergovernmental Panel on Climate Change, United Nations Environment Program and United Nations Environment Programme work for climate change.

Climate crisis:

In the atmosphere every year billions of CO2 released as result of coal, oil and gas production. The human activity produce greenhouse gas emission record high with no signs of slow down. The United Nations Environment Program emission gap report track to maintain global temperature. The World Meteorological Organization report state the September 2019 rise temperature at least one degree Celsius above preindustrial levels. The Paris Agreement on climate change in 2015 call holding eventual warming well below two degree Celsius. The temperature raise above three degree Celsius by 2100 causes irreversible damage to our ecosystem. The glaciers and ice sheets in polar and mountain region already melt fast than ever cause's sea levels to rise. In the world two third cities which cover five million populations locate in risk area of sea level rise. The world's 40% population live within 100km of coast if no action taken entire cities like New York, Abu Dhabi, Shanghai, Mumbai, Osaka, Rio de Janeiro like many cities find themselves under water. The global warming impact occur on everyone's food and water security it also direct cause soil degradation it limits the amount of carbon earth is able to contain. The people lives area affects by erosion is about 500 million it lost 30% food. The quality and availability of water for drinking and agriculture in climate change (Dr. Mago 2014). The economic output between world's richest and poorest countries global warming made grows wider. The crops thrived in many region, it struggle for survive makes food security and more precarious. The disasters related with climate and weather extreme always part of our earth's system, it become more frequent and intense as world's warm. The heat waves, typhoons, droughts and hurricanes cause mass destruction around world.

The weather and climate related disaster classed in world is about 90% and each year they lost about 520 billion USD. The climate change is major threat to international security and peace, the climate effect change highlight competition for land food and water. It fuels socioeconomic tension and increasingly often leading mass displacement. The climate is risk multiplier make worse already existing challenges. According to World Bank more than 140 million people in Sub-Saharan Africa, South Asia and Latin America force to migrate within their region by 2050. The technology contributes to climate change new technologies reduce net emission and create cleaner world. In many places renewable energy now has used as cheapest energy resource. The nature based solution provides breathing room tackle de carbonization of economy (Sharma S. S. 2022). The solution allows to us mitigate portion of our carbon footprint also support vital ecosystem services, biodiversity, access to fresh water, improve livelihood, healthy diet and food security. The greening of food supply chain, agricultural practice, conservation and land restoration is natural based solution. For the more resilient world leapfrog to cleaner the nature based solution is unable.

Effect of climate crisis:

If we not cross limit of greenhouse gas emission from burning fuels the climate change not become our planet's great existential threats. The consequences of rising global temperature include fishery collapse and massive crop disappearance of hundreds and thousands species and entire communities become uninhabitable. In suffering and death the climate changes outcomes still avoidable. Today it shows its compounding effects from raging wildfire and supercharged storms. Everyone is affect by climate change those living in world's poorest countries which contribute many problem are most climate vulnerable.

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They have fewest financial resources to respond crisis or adopt, they are closely depend on healthy, thriving natural world for food and income. The climate change and rising inequality are interconnected crisis; decision maker must take action to combat both and all must for climate justice. The global temperature climb, widespread shift in weather system occurs, makes events like droughts, floods and hurricanes. The climate change cause serve drought in one region while make flood more likely in another. The earth warmed by 1.1 °C (1.9 degrees Fahrenheit) since preindustrial era begins 250 years ago according to IPCC, the scientist warned it become 4°C (7.2 degrees Fahrenheit) by 2100, if we not controlled greenhouse gas emission The global average seemingly small but consequential and climbs means that each summer we experience increasing sweltering heat waves (Steffen B. and Sian S. 2021). The heat waves leads cause of weather related fatalities in many places, hot temperature increase rate at which water evaporates from air leads to more serve and pervasive droughts. The faster evaporation less plant cover cause, the drought create positive feedback loop in drier soil. The dry and hotter climate create condition that fuel more vicious wildfire seasons which fire that spread faster and burn longer putting millions of additional lives and homes at risk**.** In Western United States in the period 1984 to 2015 the wildfire number doubled, the California annual area burn due to it increase 50% in the period 41972 to 2018. The warmer air holds more moisture makes tropical cyclones wetter, stronger and more capable of rapidly intensifying. The global warming increase dangerous floods the daily rainfall during extreme precipitation events increase by 7% for each degree Celsius according to IPCC report (Antonio R. J. 2009). In the Houston era many deaths results due to Harvey Hurricane devastating category four storms dumped in 2017 and recorded 275 trillion pound rain. In the world from pole to tropics climate change disrupt ecosystem, even seemingly slight shift in temperature cause dramatic change that ripple by food webs and environment. The climate change effect appear mostly on coldest region the pole, Arctic is heats by twice as fast as anywhere else on earth, it leads rapid melting of glaciers and polar ice sheets where massive water stored. The sea ice melt darker ocean water absorb more sunlight become exposed create positive feedback loop which spreads melting process. The melting sea ice and glaciers and warmer water expand in volume so cause sea level rise as much as 6.6 feet by end of century. This extent change devastate low-lying region including island nation and dense populated coastal cities like New York and Mumbai. In United State foot of sea level rise by 2050 according to Sea level rise technical report from National ocean service. The rise of sea level damage power plants, swage treatment plants and infrastructure, it harm environment as encroaching sweater both erode costal ecosystem and invade freshwater inland aquifers which rely on drinking and agriculture water. The ocean take brunt of our climate crisis, it cover more than 70% planet's surface and adsorb 93% all heat which trapped by greenhouse gases and 30% all carbon dioxide emitted from burning fossil fuels. The fishes and marine life which is temperature sensitive has change migration pattern towards cooler and deeper water for survives, it send food web and important fisheries into disarray. The increase of marine heat frequency, it spikes led to mass die-offs of plankton and marine animals. The elevated absorption of carbon dioxide by ocean lead to its gradual acidification, it alters fundamental chemical makeup of water and threats marine life which evolved to live in narrow band pH band. The animals like oysters, corals and mussels feel these effect first as acidification disrupts calcification process required build their shells.

The climate change increases outbreak of pests and invasive species and pathogen infection in agriculture and forest (Dr. Nandini N. 2018). The changing kind of vegetation thrive given in region and disrupts life cycle of wildlife and change ecosystem composition it makes them less resilient to stressors**.** The climate change not appears in triggering series between series of cascading ecological series. The ecosystem destabilization appear when it come keystone species that outsize role holds ecosystem structure. In warming region farming crops is more unpredictable and livestock it sensitive to extreme weather becomes hard to rise. The precipitation pattern shift due to climate change it causes unpredictable flood and longer lasting droughts. The healthy soil has good moisture and minerals content it teeming with bugs, bacteria, microbes and fungi it contributes to healthy crops. The climate change particularly extreme heat and changes precipitation degrade soil quality. In those area industrial, chemical dependent monoculture farm has made soil and crops less able to withstand environment changes. It ultimately impact to agricultural system poses direct threat to global food supply. The climate change not affect everyone quality the food shortage and price hikes. The climate change threats species that already suffer from biodiversity crisis, which is primarily by changes in land and ocean use and direct exploitation of species. In the climate change more than 500,000 species has not insufficient habitat for long term survival it poised to push millions over the edge. The climate change alters fundamentally and rapidly the habitat that wildfire incrementally adapted to over millennia. It is harmful for species habitat that currently under threat from other causes (Jagbir Singh 2018), the ice dependent mammals like penguins and walruses not fare well as ice sheet shrink. The algae nourish coral reefs, causing reefs to starve increase common phenomenon called coral bleaching due to rapid shift of ocean temperature. The sea level rise inundates or erodes away many costal habitats where hundreds of bird species, invertebrates and marine species live. The behavior of species mating, feeding and migration is closely tied to subtle seasonal shift as temperature, foliage and precipitation level. The types and quantity of plant life change across region or certain species bloom or hatch earlier than past it impact on food and water supply and reverberate up food chains. The climate change impact weather, environment, and animal and agriculture affects humanity. In the world our way of life from how get our food to industry around which our economies are based all developed in context of relatively stable climate. The global warming shakes this foundation and alter very fabric society, at worst leads to widespread famine, disease, war, injury, displacement and death. The climate change worsens air quality increase exposure to hazardous wildfire smoke and ozone smoke trigged by warmer condition both harm to our health mostly in pre-existing illness like asthma and heart diseases. In warming area insect born disease like malaria and Zika more prevalent, their carrier are able exist in more region for longer season. At 2 degree Celsius rise in global average temperature estimated one billion people will face heat stress risk. The climate crisis exacerbates existing inequities, in developing countries that lack resources to adopt and now bear brunt of climate crisis (Srivastava S. and Rani K. S. 2016). The impact like food and water scarcities, sea level rise and economic instability already happen due to climate change drive displacement. The global impact on refugee that climate change, environment degradation and disaster increasingly has interacted with driver of UN refugee movement. The World Health Organization says that in near future

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between 2030 and 2050 climate change expected because additional 250,000 deaths per year due to malnutrition, heat stress and insect borne diseases. In countries like South Asia, Sub-Saharan Africa and Latin America the climate change displace more than 140 million peoples by 2050. The climate change mitigation and ability of our reverse it and undo its widespread effect hinges on successful enhancement of polices that yield deep cut to carbon pollution. The dependence on dangerous fossil fuel and deadly air pollution generate and polarize people and ecosystem on frontlines (Robert T. W. 2013). The warning of IPCC following and limiting warming able to avoid pass some critical thresholds that one cross lead to potentially irreversible, catastrophic impact for the planet. The threshold called as climate tipping point and refers when natural system tips into entirely different stage. The warming every fraction of degree we prevent reduce human suffering and death, it keep planet more natural system intact. The world climate leader over on major political stages with grassroots community activists is offer up alternative mode to system that prioritizes polluter over people. Many solutions require major investment into clean renewable energy and sustainable technologies. It has shown intersection crisis like racism, gander inequality and poverty which compound and drive causes and impact of climate crisis.

Table1- CO_2 emission trends by sector and key years-

Sr. No	Sector	Globe 2019 vs. 1990 fossil CO2
01	Power industry	+87%
02	Other industrial combustion	+65%
03	Buildings	+2%
04	transports	+65%
05	Other sectors	+101%

Unlimited growth of planet:

The exponential growth in population, food production, resource depletion, industrialization and pollution continue indefinitely on planet with finite resources. The idea of unlimited growth on planet is widely considerable unsustainable. The limits of growth concept polarized by 1972 report, the specific prediction of report the core idea of unlimited economic growth is impossible on finite planet is widely accepted. The unsustainable growth leads different environmental problems like climate change, resources depletion and pollution (Jackson T and Webster R 2016). The growth is not equitable social inequality with some group benefits more than other. The alternative economic models propose like de-growth it prioritize well-being and ecological sustainability on continues economic expansion. The computer based simulation explored potential consequence of continued exponential growth in much area. Its prediction not fully realized the report underlying premise about limitation of growth on finite planet remain relevant concern about climate change, biodiversity loss and resource scarcity highlight need reconsider current growth models(Mishra R. K.. and et. al. 2018.). The planet reaches many of its tipping points a place of no return so sustainable growth is no longer option. The economic system redesigning fit planetary boundaries it becomes priority to ensure that address climate and biodiversity loss with highest urgency. The models emerge as potential roadmap for moving beyond growth, doughnut economic offer potential alternative policies for people and planet. The Agenda of 2030 of United Nations aim to promote inclusive and sustainable economic growth by achievement of eight Sustainable Development Goals. The target refer use of technological innovation and better resource management as key factors to dismantle link between way of living and their devastating effect on planet. On earth system the planetary bodies framework to describe limit to impact of human activities. The environment not able for self-regulate anymore beyond this limits, the Holocene the earth system period of stability leave in human society developed. The scientific based evidence framework of human action especially industrialized societies since industrial revolution. The transgressing planetary boundaries of framework are deleterious due to risk of crossing thresholds it trigger non liner abrupt environmental change within continental scale to planetary scale system. The human societies are normative component of framework it able to thrive under comparatively stable climate and ecological condition of Holocene (Kumaran N. and Damodara P. 2021**).** The earth system extent the boundaries not crossed, it make safe zone to human societies on planet. The planetary boundary framework proponents propose return to this environment and climate system as opposed to human, science and technology deliberate create more beneficial climate. It addresses how humans massively alter to ecological condition for better suit themselves. The climate and Holocene formwork consider safe zone not involve massive industrial farming, so framework reassessment of how to feed modern population (Singh S. P. and et. al 2021). The sustainable development conference of United Nation become influential in international community, it includes government at all levels, international organizations, civil society and scientific community. The framework add nine global change processes at Rockström in 2009 and three boundaries already crossed like climate change, biodiversity loss and nitrogen cycle other where imminent danger of being crossed. The climate change loss biosphere integrity, land-system change, alters biochemical cycles like phosphorus and nitrogen. The boundary loss name change by scientist in 2015 of biodiversity change in biosphere integrity to emphasize that not only number of species but function of biosphere whole as important for earth stability. The boundary like chemical pollution renamed for introduction of entities widening the scope for consider different kind of human generated materials which disrupt earth system processes.

Pushing limits of planet:

The global population is about seven billion today it become around nine billion by 2050 and desire of vast majority of these people, currently dragging them out of poverty to catch economically (Gorundier K. 2022). We waste talk about limit of growth while in Asia, Latin America and Africa attempt resize their dream of better life, modern home , sufficient food, fashionable cloth, television and computer in home and freedom of travel it fed pushing limits of planet. This enormous drive for more god and service will end in environmental collapse or it guided into more sustainable track its question. At the end of 18th century

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when industrialization in initial phase, the economist Robert Malthus prophesied that agriculture production no longer keep pace with rapidly growing population. As agriculture increase to expand to use less productive land, in order to meet growing demand for food, it means average acreage production inevitably sink as population continued to expand (Rayan S P. and Keith R. S. 2021). The rising of food prices and increase hunger would be unavoidable. The Malthus law shows one small error, it assumed status quo will continue into future. The systematic plant breeding and fertilizer contribution revolutionized agriculture and increase production in many folds. The bridge to solar power future with continuous productivity increased use of resources. It creates more wealth from fixed quantity of energy and raw material. The new technological advances will be support new and important growth cycle. The earlier slow wave of innovation this time use nature resources we decline while level of wealth will increase. The famous rebound effect says the gains in efficiency will be eaten up increasing consumption. The natural law the use of resource expands more quickly than resource efficiency. A natural factor use in price of scarce goods, we ensure that limit of resource become more expansive overtime. The energy price rise has at last line with energy productivity in order to discourage greater consumption. The technical innovation on its own is not sufficient, to attain desired goals of environment, it need to be political intervention in market (Shinha A. and Mitra S. 2018). The human population and material production grew only slowly. In industrial age breathing acceleration began, in between 1800 and 2000 there is six fold increases in population and 40 fold increase energy consumption and 50 fold increases in global economy. Whatever criteria used it is life expectancy, infant mortality, per capita food consumption, health care, education, women's right, material wealth gone hand in hand with social development. The competition for customer not just price but also about quality, The quantity of available good and service increase so did their quality. The qualitative growth is new leitmotiv but issue is anything is new. Since 1970 wildlife population decline on average by 73% hug number lost in decades and centuries before.

The passenger pigeons, Carolina parakeets and Floreana giant tortoises among many species human have obliterated. The biodiversity crisis is not about other species human also relying on natural world of food, clean water and air for breathe. In next few years this continued food crisis and real risk of multiple breadbasket failure in addition to much other risk that might impact by fresh water pollution, acidification of ocean, algal blooms and wildfire. The nature and species in global people notice disappearing in space little generation. The biodiversity crisis as must treat as urgently as climate, the COP (Conference of Parties) is opportunity for global leaders to meet and compare their proposed actions to protect biodiversity.

Different action plan for climate change:

The climate plan content different depends upon scale of community, it address and specific need of community it represents. The many section consistently apply in climate type action plan its outline making, tracking and meeting climate targets. The models for planned emission reduction and carbon offset within each sector cover by plan. The goals and target reach carbon neutrality and resilience implement like proposed regulation, community and business partnership and community guidelines. The government plans transition to electric and low emission vehicles and reduce number of vehicle miles travelled per person. In the renewable and resilient energy increase investment for carbon capture technology (Singh S. 2023). The building energy using upgrades existing structure and new infrastructure. The waste water recycling compost management of material system reduce and proper disposal. The sustainable development goals spell out to protect our environment and climate change. The greenhouse gas per person vary greatly among countries the United States of America and Russian Federation emission per capita are three times average of 6.6 tons of CO2 equivalent. Some plan and committee established for the climate change action they are as follows.

Intergovernmental Panel on Climate Change (IPCC) 1988- The World meteorological organization and United Nations environmental program establish the Intergovernmental Panel on Climate Change the membership given to all members. The scientists and experts contribute to understand human induced climate change and its potential impact for adaption and mitigation (Mridula R. 2018). The Intergovernmental Panel on Climate Change internationally accept authority for climate change producing reports the agreement of leading climate scientists and consensus from participating government. The first report of Intergovernmental Panel on Climate Change concludes that emission result from human activities is sustainably increase atmospheric concentration of greenhouse gases. It results additional warming of earth surface and calls for global treaty on climate change.

United Nations General Assembly Negotiation on framework convention begin- A United Nations General assembly establish Intergovernmental Negotiating Committee (INC) in 1990 for framework convention on climate change around timetable for emission reductions, financial mechanism, binding commitments, technology transfer and common but differentiated responsibilities on undeveloped and developed countries.

United Nations framework convention on climate change- The text of United Nations framework convention on climate change adopted in New York office on 1992. The objectives of it are stabilizing greenhouse gas concentration in atmosphere at level that prevents dangerous atmospheric interference with climate system. It provides framework for negotiating specific international treaties known as protocols it set bind limit on greenhouse gases.

Rio Earth Summit- The framework of convention on climate change of United Nation (UNFCCC) has open for signature in 1992 at Rio Earth Summit. The world curbs greenhouse gas emission and adapt climate change. It come force in 1994 the sign parties meet annually at Conference of Parties (COP) for negotiate multilateral response to climate change.

Berlin COP- In this conference delegates agreed commitments in climate change convention were inadequate and established process for negotiate strengthened commitments for developed countries thus laying groundwork for Kyoto Protocol in 1995 (Sands P. 2003). The third COP achieves historical milestone with adaption of Kyoto protocol is world's first greenhouse gas emission reduction treaty. The developed countries commit by limit and reduce greenhouse gases emission in accordance with agreed individual target. It place burden on them under principle of common but differentiate responsibility and capabilities.

Durban COP- The government commit new universal climate change agreement in 17th COP at Durban in the period 2015 for period beyond 2020. It leads to lunch Ad Hoc working group on Durban platform for enhanced action.

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Doha COP- In 18th COP at Doha in 2012 the government agree to speedily work on universal climate change agreement by 2015 and find way to scale up efforts 2020 beyond existing pledges to curb emissions. The Doha amendment has lunch second commitment period of Kyoto Protocol.

IPCC's fifth assessment report- The climate system warming is unequivocal evident from observation of global average air and ocean temperature (Gupta K. R. 2010). The report published in 2014 also show widespread melting of snow and ice with rising global average sea level.

The Sustainable development agenda 2030- The 17 interconnecting Sustainable Development Goals (SDGs) are call to action for poverty end, protect planet and improves live and prospects of everyone everywhere set out plan to achieve goals (Roy S. and Roy A. 2014). In which 13 number goal address for climate change with objective, take action to combat climate change and its impacts regulating emission and promote development in renewable energy.

Paris COP- In 21st COP at Paris in 2015 the agreement set out global frame work to avoid dangerous climate change by limiting global warming to well below 20°C and employ effort to limit to 1.5°C. For build capacity the agreement support to continuous able deal with impact of climate change.

Importance of 1.5°C goal by IPCC confirms- The special global warming of 1.5°C report in 2018 by IPCC make clear that climate change is happening, upgrade its risk warning from previous report. The warned every fraction of additional warming worsen the impact. The global warming rise 1.5°C above pre industrial levels in 2030 to 2052, the current rate continues increase current rate of warming below or close to 1.5°C. It requires decrease net emission around of 45% by 2030 and reach net zero 2050.

Katowice climate- In 24th COP at Poland in 2018 government adopts robust set of guidelines for implement landmark 2015 Paris climate change agreement. The Katowice climate package operate the climate change regime contain in Paris Agreement promotes international cooperation and encourage greater ambition.

Today the climate change become one of most urgent issue facing humanity, the action taken by global community to address climate change it not sufficient the recent report of IPCC made clear that act urgently to achieve significant reduction of greenhouse gases (Andrew, E. Dessler 2021). The longer time not possible to avoid catastrophic consequences meanwhile the massive flood, devastating wildfire and recorded temperature has endangering lives of human and existence of species worldwide. The climate change is inextricably linked to every aspects of our lives, it essential for countries laws in place that extent other social and economic domains impacted with climate change. In the world about 700 million people live in extreme poverty, leave their household and countries less prepared to cope with climate change most serve impact. So every country, community and person needs to protect planet from the climate crisis.

Future plans for climate crisis:

The future plan address the climate crisis involves both mitigating cause and adapt to unavoidable consequences. The main strategies include reduce greenhouse gas emissions and transitioning to renewable energy source adapt to change climate and climate resilient infrastructure.

The greenhouse gas emission reduction involves transitioning away from fossil and adopts carbon technologies across different sectors like industry, transportation and energy production. For the energy producing use renewable energy source like solar wind and hydro power is crucial for reduce reliance and emission. The improve energy efficiency in building, industrial process and transportation is important for reduce consumption and emission (Adam Aron 2022). The carbon captures development and implementation storage technology with CO2 emission from power plant and industrial source. The practice like reforestation and sustainable agriculture helps carbon and protect ecosystem. The government also play important role in implementing policies and regulation that incentivize emission reduction and support transition to low carbon economy. The infrastructure development like building climate resilient infrastructure such as flood defense, heat resistant building, and crops drought resistance helps to protect from climate change. For the natural disasters prepare and respond implement of early warning system for extreme weather is important. The water management strategies have developing and implementing to ensure sustainable water accesses and quality. The addressing health impact of climate change like heat waves, extreme weather events and infectious diseases require public health system and measure. The economic diversification support and job creation in climate resilient sector help reduce vulnerability of communities to climate change impacts. The achieve essential goal of climate change financial support providing to developing countries it help them to adapt mitigate impacts. The climate friendly technologies sharing to developing countries help to accelerate their transition to low carbon economy (Roy B. P. and M. S. Roy 2021). For the net zero emission 2050 the setting target require sufficient in emission and investments in clean technologies. For the renewable energy development government invests in wind farms, solar panels and hydroelectric power plants. The cities and region develop climate resilient infrastructure projects like urban forest, green roofs, and improved drainages to protect against extreme weather events. The nature based restoring ecosystem and implementing like mangrove reforestation and agroforestry absorb the carbon dioxide from atmosphere and protect biodiversity. In recent year many marine species like plankton, corals, shellfish and mollusks affects by ocean acidification. The ocean acidification increases availability of calcium carbonate it is building block for shells and skeletons of many organisms. In the atmosphere the concentration CO2 become double so coral calcification continue rise their rate with climate warming and acidification. It slows growth of corals about 50% by 2050 and warming temperature contributes for sea level rising. In 1870 the global sea level raised by 7.5 inches in next century it expected to rise at greater rather than past 50 years. The thermal expansion, ice caps and small glaciers raise sea level, the impact of climate change on ice sheets in Greenland and Antarctica are expands sea level rise. The greenhouse gases emission for future control is important to decrease global warming and climate change effect.

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The Climate change effect in recent period-

In every year billions of tons CO2 has released in atmosphere, result of coil, oil and gas production. The greenhouse gases emission due to human activates record is high with signs of slowing down. According to the United Nation Environment Program the greenhouse gases emission summary of past ten year, we on track to maintain the business as usual trajectory. The World Meteorological organization recorded last four year hottest, September 2019 at least one degree Celsius above preindustrial level and scientist warn 'an unacceptable risk'. The Paris agreement on climate change in 2015 has holds eventual warming well below two degree Celsius and pursuit effect of effort to limit increase further to 1.5°C the global emission not slow then temperature could rise above 3°C by 2100. It causes ecosystem irreversible damage, glacier and mountain ice sheet and polar region melt faster than ever cause sea level rise. In the world about five million population located in risk area at sea level rising and 40% population live within 100 km of cost. The New York districts, Shanghai, Abu Dhabi, Osaka, Rio de Janeiro and other many cities find themselves underwater. The impact of global warming everyone's food and water security, it direct causes soil degradation which limit amount of carbon earth is able to contain. Today about 500 million people live in erosion affected area and 30% food lost or waste as its result. The climate change limit availability of quality water for drinking and agriculture. A May 2025 was warmer than average for United Kingdom, leads fifth warmest record about 1.3°C.higher than average temperature. It is third warmest in Northern Ireland and sixth warmest for Wales. In the Pakistan May become fifth warmest in his 65 years record, it become 2.12°C higher than average. In the Hong Kong it is tenth warmest record temperature was 0.9°C above than average. In Australia May temperature across much in Southern and Western Australia it was 0.84°C above in 1961 to 1990 average. In South Wales it recorded seventh warmest in nations 116 year record. In New Zealand it is 10th warmest May recorded above than average 0.8°C in 1991 to 2000 periods. The warmest April record in United Arab Emirates temperature often exceeding 40°C, it also led warmest May highest temperature 51.6°C. The Iceland has record heat wave in May and 20°C temperature higher. In the France heat intense occur in late May the temperature reach 30.5°C it higher it mark only second time from 1947. In Japan in month April temperature record 0.77°C higher than 1990 to 20120. In the Thailand many places record exceeded temperature 40°C and in Northern Thailand it reaches 42.3°C. In Germany temperature was higher 1.5°C than 1991 to 2020 averages. In the world the carbon dioxide emission from period 1990 to 2021 in matric tones has shown in the following table.

Table 2- CO2 emission from 1990 to 2021 period in the world-

Sr. No	Country	1990 (CO_2)	2021(CO_2)
01	Afghanistan	2.91	8.35
02	Australia	278.21	367.91
03	Bangladesh	14.41	106.87
04	Bhutan	0.18	1.98
05	Canada	443.26	563.54
06	China	2425.64	12466.32
07	Germany	1019.08	665.88
08	India	600.03	2648.78
09	japan	1171.76	1084.69
10	Mexico	291.04	418.35
11	Pakistan	65.35	219.79
12	Russia	2395.64	1942.54
13	Saudi Arabia	173.48	586.40
14	United States	5067.48	4752.08
15	Europe	3819.23	2774.93
	Global	22717.73	37857.58

The greenhouse gases is also responsible for the climate change and raising the level of temperature following sectors are shows its emission in the table.

Table 3- GHGs emission trends by sector and key years-

Sr. No	Sector	Percentage of GHGs emission
01	Energy	12.5%
02	Heat	29.7%

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03	Transportation	13.7%
04	Manufacture and construction	12.7%
05	Building	6.6%
06	Agriculture	11.7%
07	Industrial process	6.5%
08	Waste emission	3.4%
09	Land use change and forestry	2.7%

The climate change occurs due to burning of fossil fuel, emission of greenhouse gases and industrialization process. The control of these all responsible factors is necessary for sustainable and safe environment for the future generation.

Conclusion:

Today the earth climate is facing critical situation with rising temperature and extreme weather events caused due to human activities. The climate change occurs due to burning of fossil fuel, emission of greenhouse gases and industrialization process. This is exacerbated by economic growth, which relies on unsustainable consumption and resource extraction, pushing planet's ecosystem beyond their limits. The rising of global temperature from last few years has recorded hottest due to greenhouse gas release primarily from burning of fossil fuels like coal, oil and gas. The climate change causes more frequent and intense extreme weather events such as droughts, heat waves, floods and wildfire impacting both human population and ecosystem. The climate crisis direct impact on human population includes food and water insecurity, displacement due to extreme weather events with increasing human health risk. The current economic model it prioritize unlimited growth and consumption is unsustainable and put pressure on planet's resource and ecosystem. The growth often fueled by increased extraction of resource and production of good, leads to deforestation pollution and resource depletion. The climate crisis has move towards more sustainable future, fundamental shift needed in how we produce, consume and manage our resources. The reduction in greenhouse gas emission has using renewable energy source with adopting sustainable practice and prioritizing wellbeing of people and planet over unlimited growth. The practice like reforestation and sustainable agriculture helps carbon and protect ecosystem. The government also play important role in implementing policies and regulation that incentivize emission reduction and support transition to low carbon economy.

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