The Cataclysm of Geo-Bio-Climate in Short-Lived Holocene and in Anthropoceneepochs: A Critical Review

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Abstract: The earth is passing through global warming: Mean sea levels rise, glacial melting, Icy sea depletion and frequent seismic activity. The climate change is regulated by the solar radiation, Milankovitch effect, contamination and pollutions, GHG gases, mineral and material remediation, Greenhouse effect, El Niño, La Nada and La Niña (ENSO) and North Atlantic Oscillations. The controversy of succeeding Anthropocene epoch is accepted from all corners. In the Anthropocene epoch, hominids have prompted to have a dooms day by biotic annihilation which is faster than expected in the present sixth extinction. The globe shall encounter depletion in population and species. Earth had experienced episode of extinction and extirpations by bio-annihilation of species whichwere location specific in 19th century. Due to negative cascading consequences, modern mass extinction in earth process is widespread and expedited. The implications of human-induced geo-chemo-biological changes have been studied in this paper and tried to establish that Anthropocene epoch is an issue of stratigraphy but not a pop-culture.

Keywords: Anthropocene, Holocene, extinction, Epoch, stratigraphy

1. Introduction

Geologists classify the time, basing upon the earths biotic composition or stratigraphic divisions aseons, eras, periods, epochs and ages.Presentlywe are inPhanerozoic Eon, Cenozoic era, Quaternary period, Anthropocene epoch and the ages of great acceleration. The development and ride over the other habitats by humans are the signatures of the location, physics of the natural topographies, geomorphic agents, land form and result of human environment interactions. The physics of the land form is dominated by the water bodies including the ground water, climate, soils, flora, fauna and ecosystem. But the human interventions can change the physics and anatomy of landscape, biota by application of modern technologies, infra-structures, Science, nutrient cycling, agriculture, architecture and socio-politiceconomic claims. Though Homosapiens were not physically strong before in comparison to other species but their completemental and intellectual growth has made them dominating the biota. Homosapiens being a part of nature, can alter, modify and adapt to the new changing environment. They have invited the Anthropocene epoch by making the Holocene epoch shortlived. But the nature has overruled these advances of Human and leading the globe to face great challenges of the sixth extinction, however literature tells 99% (some says 90%) of total mass of species have been extinct by today.

2. Review of Literature

Charles Lyell 1833^[1], claimed humans are tenant of the mother earth had succeeded the nature via his Law "The uniformitarian", with intermittent catastrophism gave the idea and origin of Anthropocene https:// www. Bri tannica.com/science /Anthropocene-Epoch. 59. Arrhenius's $1896^{[2]}$ had quantified the significance of CO₂ and the HCO₃ are in G.P. whereas the greenhouse effect and long term

effect on global warming are in AP. Changes in climate is the probable cause of the ice age. Langley S. P (1891-1906)^[3] calculated the heat of sun and moon and highlighted significance of fossil fuel burning produces CO₂. The concentration of f CO2 in Earth's atmosphere beginning from 1958, and was the world's largest burning issue Lorius et al, 1985^[4], Chamberlin T C, 1897^[5]narrated that how the Homosapiens have changed the atmospheric chemical composition being influenced by the meteorological activities of the earth. Charles Fabry et al., 1913^[6]were the first to report hole in ozone layer which is the cause of all destructions but it's the impact of humane activities. Antarctic ice logs have retreated back by 150,000 years to exhibit the vacillation of glacial and interglacial events. Arie Jan Haagen-Smit, 1952^[7] reported the special effects of large quantities of hydro carbons and oxides of nitrogen left to the air. Smog archives in the Los Angeles, 26th July 1943 cut down visibility, attacked lungs and throat of the L.A. people and crop damage, eye irritation, objectionable odor, and rubber deterioration was due to effects of large volumes of carbondioxide exhausts.Molina M. J.,1974^[8] intimated that slowly CFC shall accumulate 10 to 30times and release enormous Cl₂ in future by photo-dissociation.She also found that the aerosol propellants and refrigerants produce chlorofluorocarbons (CH₂ClF, CFCl₃, and CF₂Cl₂) undergo stratospheric photolytic dissociation produces a huge amount of Cl₂ atom which break the Ozone atom and destroys ozone layer and photolyze the stratosphere. Farman et al., 1985^[9] reported that the Ozone layer is depleting by human activities from 1970's at very low temp. in austral spring by inducing growth of growth of inorganic chlorine, CIX and NASA has confirmed the ozone hole is closing slowly.

Erisman et al., 2008^[10]reported that, human supported per hectare 1.9 persons in 1908 and has been raised to 4.3 people in 2008 due to human produced Nitrogen fertilizer. Cosmogenic nuclide dating (10Be and 26AI) is applied to boulders

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on two moraine ridges at the type-site of the early-Holocene Erdalen Event, southern Norway and dated previously using radiocarbon. Mathew's et al., 2008^[11]reported fromQuartzrich rock samples study yielded 10Be age estimates between 9.8 ± 1.2 and 10.1 ± 1.1 ka (external uncertainties, $\pm 1\sigma$), with an average of 9.95 ka. Raup et al., 1982^[12], Sepkoski 1996^[13] and 2002^[14]in their compendium of the first and last stratigraphic of 36,380 marine genera, a strong 62 to 6 3million year cycle was evident about six distinct extinction phases including both the shorter-lived and long lived genera.Dockerry et. al., 1993^[15]made risk analysis between spm matter in and mortality rate and found air pollution is the 2nd cause for death whereas Cigarettes smoking is the first. Petit J. R. et al, **1999**^[16] claimed from Volstok exploration of 3623m core data covering four glacial to interglacial periods of 4.2MYBP. They inferred that the present and past climates have correlations during the epochs and oscillates between two extreme ranges. Hooke R. L. 2000^[17]reported that Homosapiens are the geomorphic agents who have sculpted the landscape @ of 40-45 GT/year by changing from hunting cultures to agrarian modern societies. A strong correlation was established between GHG concentration and temperature.Barnosky et. al., 2011^[18]reported that out of the 4000 million species expected to have evolved during the last 3.5 billion years, about 99% are lost by present. But they are balanced by speciation. Carey J., 2016^[19] reported that the ample generation of CO2 had invited Holocene but 120 times increase of CO2, the layer of ash particles, doubling of N2 & P in soil by fertilizer in a very short span have established the Anthropocene concept. Dunhill A., $2017^{[20]}$ reported that, > 99% the species those ever lived are presently extinct and current loss rates are 50 times higher than previous implies that present mass extinction event is ongoing.

Crutzen P., 1970^[21], and 2002^[22]was the first to report that the epoch "Anthropocene," have succeeded the 11500'years old Holocene and predicted unless a global cataclysm or devastator meteorite impact, pan-demic or world war, the Homosapiens shall remain the dominating agent on the earth. Jackson et al 2001^[23], claimed that inexorable overfishing and eutrophication in reefs and offshore region have synergistic impact from anthropogenic commotion are the lowering factors of offshore benthic communities and shall lead to aqualife extinction.Zalasiewicz et al 2010^[24], pointed out thatGlobal events like mass extinctions, the start of Ice Ages and geochemistry changes can be linked to space chemistry. They are timeposts in geological strata, mass extinctions, changes in chemistry, and terrestrial features with declaration of Anthropocene as a new epoch and 1stApril, 2010 to be considered as 40th Anniversary of Earth Day. Stacy L et al., 2013^[25] reported that knowledge of the impact of climate change on individual species, one can have

information which play pivotal role on conservation of the eco-system. Smith et al, 2013^[26], argued thatthe Anthropocene epoch should start from 10000 year BP with the domestication of plants and animals.Wolf et. al., 2013^[27] reported that there is stratigraphic imprints in the sediment core recorded as seen after AD 1850 (Industrial revolution), but pulses accelerated between 1950 and 1970 AD and recurred after 1980 AD till date indicating human dominance with meteorological signatures.Corcoran et al, 2014^[28], have told Plastics or synthetic polymers are reusable, lightweight and durable products but nondestructible. They make plastiglomerate which are anthropogenic influenced materials deposited for future. Lewis et al 2015^[29], proposed two dates for the beginning of the Anthropocene i.e. 1610 and 1964after careful study of the human and earth system inter action whereas Braje T. J. 2015^[30] proposed the date of commencement as 1800 from archeological prospective. Monastersky R., 2015^[31]reported that the decision of declaration of Anthropocene epoch need further study and final unanimous agreement from all corners like stratigraphy, geology, sociology and many other sciences. Hansen et al $2016^{[32]}$ inferred that fossil fuel burning in Anthropocene will increaseC02 and shall cause global warming, MSL rise. It will be prominent in Southern hemisphere. North Atlantic shall cause SST of ocean surface to recede. The imbalance in Earth's energy and rise in heat flux shall rise the temperature of global ocean's surface near equator. Lower latitudes shall warm up to increase precipitation. There shall be less control over atmospheric CO2. The sea level may rise to +6 to +9 m causing severe storms.Harvey C. (2017)^[33]have estimated 2% rise in CO₂ (reaching 41 BMT) in after a stagnation from 2014 to 2016 from burning of fossil fuels. Torben R. et al., 2014^[34]mentioned that ecological disorders are demarcating between the Pleistocene, the Holocene and the Anthropocene epoch.Swadel et al 2015^[35] reported that light and sound can be a stimuli and functionsynergistically for global change during Anthropogenic. Walker 2012^[36] and Wolff 2014^[37] had reported that all other epochs were declared after its completion and recommended that let us wait and watch the Anthropocene epoch before putting the stamp and legalizing it.

The Six extinctions:

It is believed that the five extinctions that the globe conceded due to giant ice ages (glaciations) in Paleo records in different phases are, the Huronian (2.4 to 2.1 billion years BP) Anderson et al., 2007^[38], the Cryogenian (850 to 635 million years BP) Smith A., 2008^[39], the Andean-Saharan (450 to 420 million years BP), the late Paleozoic (Karoo) ice age (360 to 260 MYBP) and the Quaternary (2.6 MYBP to 72Y BP) http://www.livescience.com /5840. The mass extinctions events given by Bronsky et al (2011)¹⁸are:

Table 1: The biological annihilation events of the globe with % of species/ genera loss with cause and impact

The event	Ended	Period of	Gener	Species	Cause/Impact	Remarks
	in	extinction	a loss	loss in %	SH: southern Hemisphere and NH: Northern	
			in %		Hemisphere	
The	C- 443	3.3 to 1.9Ma	57%	60-70%	Glaciation and de-glaciations, rise/fall in MSL in	.http://www.newsweek.com/f
Ordovician-	MYBP		(14-		SH, Brachiopods/corals Trilobites /graptolites ive-mass-extinc	
Silurian			84 %)		vanished. Eruption in Vilutrip in Siberia. Life was in	history-630314Raup
event(End:3 rd					sea and destroyed mostly marine species, Glaciation	&Jablonski, 1993 ^[40] ;
largest					leading to MSL fall 100m.Mishra S. P. 2018	Benton, 1995 ^[41]
The Devonian	c-360	extinction	35%	75%	Global cooling followed by warming, Change of	50% of marine genera lost

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event (Late)	MYBP	spread over 20Ma, 29 to 2Ma			flora, climate extremes, paedogenesis, and drawdown in global CO ₂ . Spread deep-water anoxia by transgressions. Timing and importance of Bolide impacts.	and 70% sea biology.Barnosky et. al., 2011 ^[18]
Permian- Triassic (The great dying) P- T extinction	C-252 MYBP	2.8Ma to 160Ka (terrestrial plants and insects & others)	56%	96%	Impact of flood, asteroid, basalt eruption, Oxygen deficiency, MSL fluctuations/ combinations. Siberian volcanism. Global warming. Spread of deep marine anoxic waters. Rise in H2S and CO2 Conc. Ocean acidification. Bolide impact anticipated	http://ib.berkeley.edu/labs/ba rnosky/Barnosky%20et%20a l%20Sixth%20Extinction%2 0Nature.pdf
Triassic- Jurassic,	c- 200 MYBP	8.3 Ma to 600 Ka	47%	80%	Asteroids, mass volcanism or other physical factors, Activity in the Central Atlantic Magmatic Province (CAMP) caused elevated atmospheric CO2 levels and global temp. & led to a calcification crisis in the oceans.	http://www.iflscience.com/pl ants-and-animals/which- species-will-survive
Cretaceous- Tertiary (poorly documentedK- T extinction)	C-65 MYBP	2.5Ma to present (mostly reptiles & marine in- vertebrates)	40%	76%	Huge bolide impact in the Mexico, Yucata, rapid warming and cooling. Deccan Volcanism affected India; tectonic uplift, accelerating erosion, ocean eutrophication and anoxic episodes. CO ₂ rise spike just before extinction, drop during extinction.Dinosaurs, ammonites & Mammals were extinct & privileged Humanflourishment.	http://ib.berkeley.edu/labs/ba rnosky/Barnosky%20et%20a 1%20Sixth%20Extinction%2 0Nature.pdf, Retallack, 1995 ^[43]
Pleistocene- Holocene- ne(well documentedP- H events)	117 00 MYBP to 73 YBP	11500 years from Holocene and 73years YBP (Extinction of plants not inclusive)		>100 birds &mamm als in USA	Earth's 6 th mass extinction is under way.≈ 177 mammal species were extinct, > 80% of their dispersal amidst 1900 and 2015 and the highest in Asia, Australia and Africa due to habitation loss, effect of techno-sphere and anthropogenic activities. Out of 27,600 species of fauna, avifauna, amphibians, mammals, and reptiles, 50% of world's global vertebrates vanished 6.3% of 500-year bins per million years 126 out of ≈ 2,000 and 80 extinct out of≈5,570 species living in 500 years	https://www.cbsnews.com/ne ws/sixth-mass-extinction- biological-annihilation/ https://www.populationmatte rs.org/about/campaigns-and- projects/ welcome-to-the- anthropocenehttps
Anthropocene events en.(wikipedia. org/wiki/Holoc ene_ extinction)	73YBP to Present	Extinction of all marine, inland and anthropogenic species	Wild life 58%	30% in last 40 years.	100 times faster than they would without human impacts/Populations of wild animals have more than halved since 1970, while the human population has doubled/five times before in our planet's history have so many species and Wild life lost predicted 67% by 2020 (WWF-2016).	://www.wwt.org.uk/support/ pioneering- onservation/?gclidhttps://ww w.wwt.org.uk/support/pionee ring-conservation/gclid

This 6th extinction is a combined upshot of anthropogenic – climatic, hydrologic and geomorphic catastrophes claimed by Elizabeth Kolbert in 2014^[44]. The causes in Anthropocene is due to over haunting, poaching, pollution, habitat loss and climatic changes. *Raup and Sepkoski in 1982^[45]*, have classified different eras of extinction as TEM (*Templetonian* 600 to 550 x10⁶ MYBP); *Ashgillian* (ASHG 450 to 400 x10⁶ MYBP), SIEG (*Siegenian*), Givetian (GIV); *Frasnian* (FRAS) all the three periods between Famennian (FAME), Moscovian (MOSC), all between (400 to 350 x106 MYBP); Guadalupian (GUAD); Dzhulfian (DZHULF); Norian (NOR); are within time (300 to 200 x106 MYBP); Tithonian (TITH, 100 x106 MYBP); Maestrichtian (MAEST, (65 to 45 x106 MYBP).

Reasons for study

Homosapiens, the most protuberant agents, have constructed the topographic signature on the crustal floor altering land scape by urbanization, industrialization, agriculture, waste disposal, and miningby not leaving any corner of geo, hydro, bio and atmosphere. It was initiated in Holocene epoch and accelerated in Anthropocene Epoch. The present cataclysmic disappearance of many species like golden frog from Africa, migration/ extinct of some rainforest species like rhinos, elephants, royal Bengal tigers in east India are the examples. Meteorological extremes and tectonic havocs tagged with anthropogenic advancements have imprints of the signs of the sixth extinction from post Holocene period. The current study presents the understanding and targeted mitigation of the human processes driving geo-chemobiologic changes with a critical review. During the development of the epoch, the alterations help to guide for future research directions to alarm the human development in the field of geochronology, mineralogy, stratigraphy and biota leading to human cataclysm.

Methodology:

The chronology and stratigraphy are the indicators of changes in epoch/period. The geochronology of the Holocene covers direct or indirect changes in geology, biology, limnology, paleontology and paleo-climatic sedimentology and many other fields. The Archaeology, geomorphology, geophysics, glaciology, hydrology, oceanography, paleo-ecology, pedology, modeling and simulation can predict and forecast the past/present trend and future prospective of the epoch. These include changes in: erosion and sediment transport associated with a variety of anthropogenic processes, including Damming, colonization, agriculture, urbanization and global warming etc. The chemistry of the atmosphere, ocean and soil can alter with significant anthropogenic distresses basing on the cycles of elements such as carbon, oxygen, nitrogen, phosphorus, Hydrogen, metalsminerals and alloys. Environmental chaos includesglobal warming, MSL changes, oceanic acidification and deaths of inland/marine species are the results. The indicators are habitat loss, predation, and species invasions,

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physical and chemical changes. Holocene commenced with early overall development of Homosapiens and extinction of large mammals of the Pleistocene erabefore 11700 YBP from the age of early anthropogenic civilizations on the earth. It has been established from ¹⁴C dating, Pollen grain analysis and study of undisturbed pedology/limnologycore

logs. Geochronology can help of accelerator mass spectrometry, radiocarbon calibration and age modeling. U– Th and luminescence dating can provide knowledge geologically scaling of time. The ice core data and clastic sediments can easily construct the dating of age.



Figure 1: The geological time scale in quaternary period including the unstamped Anthropocene epoch

Geological time scale

It is accepted by Global Stratigraphic Section and Point (GSSP) that the designated time boundary colloquially 'golden spike' that Holocene started 11700 YBP and the Anthropocene from 1945 onwards after the explosion of nuclear bombs, more activities in aircraft and increase in uses of more fossil fuels. The GSSP has located at 1492.45m in the Greenland NGRIP2 ice core and decided that 11700yearsis the age of the Holocene epoch Walker et al., (2009)^[46]. The AWG at the IGC International Geological Congress formally accepted the Anthropocene as coming epoch succeeding the Holocene on 29th Aug, 2016. <u>https://ally</u>

ouneedisbiology.wordpress.com/2016/10/11/Anthropocene.

Chronology

Radiocarbon years, obtained by radio carbon dating from various deposits tell about the Holocene/Anthropocene stratigraphy and chronology. The anomaly of half-life period of 12C of 5730 or 5570 years can predict the age of the deposit. Varve chronology can also be used to predict age of the soil layer thickness which varies with vagaries of climate, geologic, Aeolian, glaciation activities by using obsidian rock formation (at a Uniform rate of Volcanic origin, black glassy rock called obsidian) analyzed microscopically and gauged against known standards to find the aborigine of the sample. Paleo magnetism uses the bi-millennium secular shift of the earth's magnetic field which are used for dating. Tephro chronology is also used for geo dating of the ashes of the volcanic eruption.

The modern methodology for geo-dating, the measurement and tree rings analysis, is known as dendrochronology. The tree ring formation is not annual and at places it is seasonal. The Bristlecone pine tree, the 4000 years oldest living organism, of the White Mountains in California is long-lived and suitable for dendrochronology.

Stratigraphy

Lithological, biological (Novel), mineralogical, chemical and sequential stratigraphy has been proved to be influenced by Homosapiens. The geological events are the exhibits of its rock layers, volcanism and tectonic activities. The oldest layers are at the bottommost and the youngest are at the top. With this understanding geologists could determine the ages of rock relative to one another. The stratigraphic column represents the ages of the rock. Geologists have collected the 4.6 BYBP

(<u>http://scienceviews</u>.com/dinosaurs/geologictime.html) record of Earth's history.

Journey from Holocene to Anthropocene Epoch

The epoch Holocene was proposed during 1867 and submitted to IGC http: //science views.com/dinosaurs /geologictime.html, Geological Congress, Bologna, Italy, 1885) and was accepted by the U.S. Commission on Stratigraphic Nomenclature (1969).Zalasiewicz et al., 2008^[47], the Anthropocene working group (AWG) proposed about the Anthropocene Epoch after Cruzen in 2000. AWG (IUGS) International Union of of the Geologic Sciences recommended the Anthropocene epoch at the 35th (IGC) Cape Town, South Africa -2016. The years of start of the epochs are given Fig.1. The global acceptance of welcome to the Anthropocene is the date of nuclear weapons testing at Alamogordo, New Mexico on 16th July, 1945 without defining the stratigraphy and chronology.

The Milankovitch cycles

The climate of the Earth has gone through frequent oscillations in different epochs including the current. The Holocene oscillations were initiated at global obliquity (22.1 and 24.5 degrees in a cycle of 41000 years), eccentricity (e=0.0167, reverses in 100,000 years) and precession (periodicity of 23000 years) of the equinoxes as per the Milankovitch cycles. The oscillation can be triggered or

Volume 7 Issue 9, September 2018 www.ijsr.net Licensed Under Creative Commons Attribution CC BY slowed down by volcanic eruptions, earth's radiation, chemistry of the earth have impact on the progradation and retreat of the glaciers. The present position of the earth is at maximum distance from sun. Summer solstice (ayanaant) in the northern hemisphere has cool summer and mild winter when the Earth is positioned near aphelion (Maximum distance) and winter solstice facing cold winter and hot summer occurs at perihelion (Minimum distance) in the elliptical orbit of the earth. The weather felt in southern hemisphere is vice versa. Interpreting Milankovitch Cycles McClure, B. (2011)^[48] reported that the precession of slow wobble of the Earth's as it spins on axis shall reverse in 10500 years and the precession depends on the insolation (NOAA 2009) http://www.ncdc. noaa.gov/paleo /milankovitch.html in (Fig 2). However it is observed the earth is getting a half warming cycle and one cooling cycle of 10 years. It may be due to solar cycle or elliptical orbit of the earth.



Figure 2: The Milankovitch Cycle of Sun-earth geometry

Geo-chronologic studies

The Pleistocene Epoch began around 2.59 MYBP and persisted till nearly 11,700 YBP. The glaciers shielded the globe with recurrent and severe cycles of cold as the Ice age was started then. The glaciation was the major geomorphologic feature during the start of Holocene Epoch (the age of man), the 2nd phase in the present Quaternary Period. Major population growth in civilizations occurred in the mid-latitudes during Holocene where the monsoon rain prevailed. But the population had no selection of latitude to settleduring the Anthropocene epoch. The warm periods were the initial favorable signatures that developed agrarian societies, demographic fission, migration, economic growth, survival and social security for the humans during the Holocene epoch. They developed trades which were ascertained from the increased architectural monuments, anthropology and history. The cold and dry periods provide high mortality, social insecurity, migration and economical stress, fight for the survival and existence. The Holocene epoch had two Holocene climate optimums (7500-3500YBP), Roman climate optimum (900 to 1300 YBP). The geo-chronology, geomorphic and climatic study results are in table2.

Table 2: The climatic changes and socio human advances during the Holocene epoch in the world

ш	VDD/Characteria	Climentia alternation	Clabel Changes	D l / t t'
#	Y BP/Chronology	Climatic changes	Global Changes	Remarks/pretentious species
	LATE GLACIA	L (From 12000 YBP)		
1	20000-12700	short but severe cold spell,	Baltic Ice Lake de-glaciation. Slow	Mega fauna, including Homo
	Late- Pleistocene	Paleo- lithic Ice Age,	summer monsoon intensified initially	neanderthalensis in America and
	Windermere	Bølling-Allerød interstadial	but slowed down gradually.	Europe, "demise of the dinosaurs."
	(The old dryas)			
2	12700 -10500	Global warming fast ice	Cosmic impact, Neolithic revolution,	https://phys.org/news/2013-08-
	(Younger Dryas)/	melt, Holocene glacial retreat	massive wild fires, Mega fauna	evidence-cosmic-impact-younger-
	Bølling-Allerod	in Asia till at close of warm	extinction, fresh water of lake Agassiz	dryas.html#jCp
	interstadial,	glacial stage, Europe, Pre-	discharged to change Arctic Ocean	https://www.elementascience.org/arti
		Boreal sharp rise in temp. for	currents. Laacher Sea	cles/10.12952/
		50years.	volcanoeruption.Fishing toolsstarted.	
	(Post Glacial	from 10000YBP)		
3	10500 to 9000	Global warming rapid ice	Temp rise2°C in 50 years, arctic /alpine	Grew in Middle east & spread to
	(Boreal) Neolithic ages	melt & MSL rise, glacial	flower Dryas Octopetald reappeared.	India, North Africa& Europe. Forest
	(Younger Dryas- cold	retreat, Heavy SW monsoon	Huge cold fresh water spreading into the	replaces tundra in northern Europe
	upto 10000 YBP)/Dry	rain in Indian subcontinent	North Atlantic. Ocean circulation	
	and Warm later		controlled by temp. & salinity. Yoldia	
			Sea stage(USSR)	
4	9000 to7500	Temp. drop $(3.3^{\circ}C)$ Settled	SW monsoon strengthened,& rainfall	Mount Etna in Sicily erupted
	Holocene Climate	agriculture & societal	was greatest. Permanent settlement,	Neolithic Sub-pluvial in North
	Optimum (HCO) Bond	political growth, Fertile	migration to the Levant from the Black	Africa, Wet period, Pottery and use
	climatic event	Crescent Indo/ European	Sea area (8400 to 8200BP) as black	of salts started
		world	fresh water lake joined Mediterranean	
			Sea, Joceylin et al., 1977 ^[49]	
5	7501 to 5000	average global temperatures	Earth's ancient civilizations, Fertile	Giant ground sloths, monkeys;
	AtlanticHolocene	$1-2^{\circ}$ C higher than present	Sahara with large herds of animals.	tortoises in Caribbean islands,
	Optimum. Antev's	&cold in winter, drying trend	Ramayana era, Strong SW monsoon	wheels are used.
	Altithermal		with intermittent weakening, crops	
			cultivation started.Naidu P. D., 1999 ^[50]	

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6	5001-3500 (5000 to 4000 cooling trend) 4000 to 3500 (Sub Boreal) Bronze age	Dry and warm. Short cooling initially caused drops in MSL but >present, (Indus valley Civilization (4600 BP), Mesopotamia(4400BP), Kingdom in Egypt, and the Akkadian Empire in Mesopotamia ended, archaeological cultures in Persia and China	Many islands arose, Climate changed, Mahabharata Era, Saraswati R. dried, River mouth shifted from SW to NE to present by canceling paleo-channels, R. valley civilizations grew, First Writing (Cuneiform Clay tablets/ reed stylus) oldest poetry,The Epics of Ramayana, Mahabharata&GilgameshMishra S.P. et al., 2015 ^[51] , Naidu P. D., 1999 ^[50]	Tools making, writing started, mathematic, astronomy, geometry, philosophy taught (Vedic Era, India), Kingship, pro- perty rights, Agriculture using manure. Courts, trade started.Dwarf megafauna, including elephants in Mediterranean Islands
7	3501-2000 YBP,	Climatic optimum, Dry and warm.	Collapse of Indus Valley&start Egyptian civilization, Mammoths in Siberian arctic, bronze age, city of millions & iron ploughs.	Elis et al 2013 ^[52] https://en.wikipedia.org/wiki/List_of _periods_and_events_in_climate_his tory
8	2500-1500YBP (Sub- Antlatic Holocene) Priming Anthropocene	250 BC–400AD Roman Warm Period, 535–536 AD, sudden Wet and cool	Cooling trend, failure of harvestsPriming stage of Anthropocene, Human intellectual and societal, economic development	Some birds in Pacific islands became extinct
10	2000-716 YBP Little ice age: (1250 -1700 AD)	Medieval warm period	wet in Europe, arid in North America, Great Famine of 1315–17 in Europe, coal used	Madagascar, the endangered species are huge birds, large tortoises, lemurs, small hippos, Moas, other
12	717 - 417	1460–1550 Spörer Minimum cold	Cool & more extreme weather, Abandonment of settlement in SW United states	flightless birds in Newzeland, Little climatic optimum/ medi- eval optimum. Sea mammals, shellfish,
13	467-167	Little ice age Maunder Minimum low sunspot activity,	Cold, Sixth extinction started, crop failure and famines, GI diseases more	and many fishes. All taxa everywhere. Sea mammals, shellfish, and many fish excess catches. IUCN
	167 to 73YBP (Warming period)	The margin stage of Anthropocene	Contemporary climate, Industrial growth,	endangered species Indian elephant, Bengal tiger, lion, Rhino, Gaur, lion
	72-36 YBP (Warming period)	The fundamental shift	Nuclear explosions, species invasions, mass extinction, predation, damming, GDP changes, energy consumption	tailed macaque, Tibetan Antelope, Ganga river dolphin, the Nilgiri Tahr, snow leopard, dhole, black/red
	37 to present (Warming period)	Anthropocene (Great acceleration stage)	Emphasis on technology, geo- engineering, green engineering, Nano science, genome, dechroni fication have changed the human decree over nature	buck, great Indian bustard, forest owlet, white – winged duck etc.

- 1) https://link.springer.com/chapter/10.1007/978-3-319-16006-1_2
- Mid- East Neolithic culture (10800 YBP) large farming,domesticating cattles http://www.atmo. arizona. edu/student/course links/fall12/atmo33/lectures/sec5 /dryas.html
- 3) www.rewilding.org/thesixthgreatextinction.htm
- 4) https://archaeologywordsmith.com/lookup.php?terms=st adial
- 5) http://www.cru.uea.ac.uk/documents/421974/1295957/I nfo+sheet+%231.pdf/c612fc7e-babb-463c-b5e3-124ac76680c5
- 6) www.journalijar.com/.../the-apocalyptic-anthropoceneepoch-and-its-management-in
- 7) "Holocene Epoch." World of Earth Science.Encyclopedia.com. 9 Jan. 2018 < http://www .encyclopedia.com>.
- 8) https://www.ncdc.noaa.gov/global-warming/midholocene-warm-period

The Pleistocene–Holocene boundary

The boundary of Holocene and Anthropocene is dated around $10,300 \pm 200$ years BP (in radiocarbon years). This boundary marks the very beginning of warmer climates that occurred after the latest minor glacial advance in Scandinavia in North America. The subsequent warming trend was marked by the Fini-glacial retreat in northern Scandinavia, the Ostendian (early Flandrian) marine transgression in northwestern Europe.

Evidences of Holocene

The glaciers retreat and the steady climactic fluctuations during Holocene Epoch in the N- Hemisphere exhilarated migration, biotic changes or annihilation in species. The marine incursion with glacial depression is the imprints of Holocene. The development of intellect and consciousness of adapting to geophysical, climatic topographic changes induced the Homosapiens to explore lithosphere, hydrosphere, biosphere and atmosphere during the Holocene epoch. The evidences of presence of Holocene are:

- 1) The presence of mollusks and desert-loess in Peru coastal desert around Palpa indicates the past hydrologic changes and development of semi-desert/ grassland ecosystems existed 1, ~ 13.5 ka YBP., The mollusk fauna became extinct due to increasing humidity and the expansion of grasslands and formation of desert loess Ingmar et al., $2010^{[53]}$
- 2) The grain-size and elemental distribution data for the cores received from the south Odisha river mouth infers heavy rainfall from 6800 to 3100 YBP followed by dry spell from 3100 YBP to present portentous to weak summer and SW monsoon during post Holocene with change in solar insolation Yadav et al., (2017)^[54].Sarkar et al., 2012^[55]confirmed the variation in rainfall and increase in aridity in southern peninsular India after studying the sediment core of alkaline Lonar Lake.
- 3) The patches of short-lived sweet water back swamps of 10.000 YBP along the Carmel Israel coast during rapid MSL rise in the post Pleistocene–early Holocene shift

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period. These swamps had dried up and disappeared during post Holocene period (1000YBP) due to sedimentology reconstructions along the coast line. Similar coastlines with back swamps, back water zone and lagoons were existed along 7500km length of Indian coasts.

- Alexanderson H. et al., 2015^[56]reported that early- midpost Holocene evidences of short lived Aeolian events (Starmoen dune field, in the Jømna and Glomma river valleys Norway were found ~10 KBP and lasted till deglaciation.
- 5) Average decline of precipitation over the rainforests in the Congo Basin in the heartland of tropical Africa. As the graph shows the rainfall decline is small, less than 1 millimeter per day. (For comparison, under 21st century climate change daily average rainfall in Central American rainforests may decline by 3-6 millimeters http://www.bitsofscience.org/climate-change-congoforest-degradation-drying-trend-7560/
- 6) The Gangetic civilization, the Nalanda University (427 to 1197 AD), The Mississippian civilization (800 to 1600AD), Babylonian Civilization (3200Bc to 539Bc), Tigris and Euphrates civilization (The Fertile Crescent Mesopotamia, 10,000BCE) and many other river valley civilizations grew in the Holocene Epoch and brought Homosapiens wise, strong, intelligent and prosperous. Tibetans settlement on Himalayas started from 12600 to 7400YBP (Glacier shift)
- 7) Increased Coastal/ soil erosion from intensive agriculture and land-use conversion will leave a mark in rock strata, whereas others contend that such a mark will be barely noticeable and that other changes will be more apparent.
- 8) Deep oceanic deposits with boundary layers of different colors soil are prominent evidences in the marine sediment cores. Globigerina ooze is pink in colour due to presence of recent iron oxideof Holocene deposits whereas in older period it was greyish due to presence of clay and organic deposits.
- 9) During MSL rise and fall, there is increased/reduced evaporation causing formation of high /low octal coverage and resulting in higher/lower rainfall which can augment/deplete vegetation. The lowering of MSL accelerates eustatic erosion due to turbidity currents in coastal region which were more frequent than the rise of MSL during the Holocene.
- 10) Fossils in the globigerina oozes in the deep water marine core (10,000–11,000 BP) shows that the number of warm-water planktonic foraminifera's increased markedly with change with their coiling direction (left to right) during change of cold to warm water in the Holocene. The unknown mystery of pole ward migration of some foraminifera ions to a distance 1000-3000 Km to live in their optimal temperature.
- 11) The oceanic distributionCocco-lithphoresexhibits maximum productivity in oceanic upwelling zones (subpolar convergence and the equatorial divergence). In the latest glacial stage the subpolar zone was displaced toward the equator, but with the subsequent warming of waters it shifted back to the borders of the polar-regions.



Figure 3 (a): The Apotheosis of War (1871) by Vasily Vereshchagin Pre Anthropocene (Holocene priming) https://en.wikipedia.org/wiki/War



Figure 3 (b): 1.4 to 1.6million Jewish killed in Ukraine World War II and buried in mass graveshttp://www.dailymail.co.uk/news/article-3205754/Blood-oozed-soil-grave-sites-pits-alive-secrets-Ukraine-s-shameful

Read more: http://www.dailymail.co.uk/news/article-3205754/Blood-oozed-soil-grave-sites-pits-alive-secrets-Ukraine-s-shameful-Holocaust-Bullets-killing-centre-1-6million-Jews-executed.html#ixzz55V4GVYyp Follow us: @MailOnline on Twitter | DailyMail on

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- The coastal area of southern New England, Indian Oceanis slowly subsiding at the present time (1-3mm/yr). The Mississippi, Rhine, Danube, Amazon, Nile, Tigris-Euphrates, Niger, Ganges, Brahmaputra, Mahanadi and Indus deltas (all in India) are under subsidence due to damming and other anthropogenic interventions.
- 2) The conodonts (sharp teethed species) living in water prior to Holocene became extinct. Their fossils are only found in Anthropocene. Many mammals become extinct by early Holocene. They were mammoths and mastodons, like saber-toothed Smilodon, Homotherium, and lazy giant sloths, some horses and camels mainly in America.

Holocene Biota:

Floral change:

Holocene climate was interrelated with palynology. Lakes, lagoons, swamps, or marine sediments, had preserved pollen and spores from trees, shrubs, or grasses. The subdivision is

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arboreal pollen (AP) and non-arboreal pollen (NAP) can reflects the climatic status of the epoch which built up the varve chronology being verified with the results of radio carbon dating. The Blytt–Sernander framework (pollen grain analysis) developed in Scandinavia couldestablish the age dating of Chilika lagoon, India. Similarly the excreta of large animals preserved in dry caves and alcoves of mammoths of huge species found in Siberia and Alaska can be used for reconstruction of Paleo and Holocene environment. It is accepted that the fungal diversity (Cianobacteria's) are responsible for K-T extinction. Present theory (yet to be established) that the enormous and diversified invisible harmful fungi in contact with the air propagating fungal and fungal-like diseases and threatening faunal diversity for extirpation and extinction.

Faunal change

75% of the animals (> 40 kg live wt.) that had become extinct during the late Pleistocene/early Holocene 10,800 to 10,000 YBP Mead et al., 1984^[57]. Martin P. S., 1984^[58], the overkill hypothesis, the global model for extinctions in the late Pleistocene is still in debate but 11700 back, the Holocene is universal time coincident with the sudden ending of the cooling phase of Younger Dryas. The bovines, pets and cattle's have increased during Holocene along with land transformation from natural to agricultural land.

Avi and aqua fauna

Mark Urban, 2017 rightly told glaciation shall reoccur but the extinction of marine and inland species shall not reverse. Habitat loss /haunting, Poaching of birds, Pollution and contamination of air, water, soil, sound and light, created imbalance between the number of predators and their prey animals are the causes of extinction in Asia during the Anthropocene. The major endangered species, extinct species are Indian elephant, golden toad, Indian lion, Indian Rhino, Gaur, lion tailed macaque, Tibetan Antelope, Ganga river dolphin, the Nilgiri Tahr, snow leopard, dhole, black/red buck, great Indian bustard, forest owlet, white – winged duck and many more. Some local species in South America has been migrated to Africa, Asia, some parts of Europe and North America due to limited oxygen, excess CO2, Ipomeas and water Hyacinth in rivers. The invasionsand migration have impacted aqua fauna and avifauna of their habitat loss, degradation, movements, navigationblocking and spreading water borne diseases.

Holocene climatic trends

Tropics and mid-Latitudes during mid-Holocenereceived increased precipitation raising lake levels all over the earth.Lake levels had reached peak during about $12,000 \pm 500$ BP (the start of Allerød Warm stage) and 9000 ± 500 BP (the pre Boreal Warm stage). The river discharges were reached maximum along with heavy sediment flow and laden with savanna-type vegetation all over the tropics. The Kalahari in South Africa, major areas of Brazil, India and Australia were having dry savanna or arid during the last glacial period. In the subtropics, people could harness water and had stationary settlements, agriculture by irrigation.

There is continuous collision of Indian plate and Eurasia from 50MYBP. Since then the south central Asia has minor tectonic activities but major climatic changes. Near 8 Ma, the relative abundance of widespread increase of species is due to heavy rainfall in the region. The Holocene climate started around 13 KYBP in the Indian subcontinent Naidu P. D., 2011^[47]. The strong SW monsoon started from 12KYBP. Lake levels started rising between 9 to 6 KYBP due to heavy rainfall as per Pollen records from sediments Chilika lagoon and Lakes of Rajasthan. The climate started shifting from humid to dry arid from 5 KYBP and reached arid phase during 3.5KYBP and SW moon soon remained weak. Drastic reduction in rainfall had led to the collapse of Indus Valley Civilization and conversion of Chilika Gulf to Chilika lagoon, desiccation of rivers in Indian Holocene Chronology. The time series in temperature change (data: Climatic Research Unit and the UK Met. Office, Hadley Centre) considered by Morrice et al 2012^[59]. Holocene vs. Anthropocene division of the temperature curve was drawn and smoothened for the period 1850 to 2016 It is given in the fig 4.



Figure 4: The curve of temperature anomaly of the globe from from pre-Holocene to Anthropocene

Claims for Anthropocene Epoch

Anthropocene is the period where the Homosapiens are globally strong bio-geophysical forces capable of lasting a strong imprint geospatially E. F. Stoermer (1980)^[60]. The

ecologist used the word "Anthropocene" in 1980's, but was solemnized by Paul Crutzen in 2000. The claim that the Homosapiens have ruled over the hydro- geo-bio and the atmosphere was debated unanimously. The claim of the shift

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www.ijsr.net Licensed Under Creative Commons Attribution CC BY of the geological time scale from Holocene to "Anthropocene"i.e. Cyanobacteria' activities by Andy Revkin's 1992^[61] and then accepted as Anthropocene.

The wood, fossil fuel and coal on burning generate PAHs (Polycyclic aromatic hydrocarbons), PCBs (poly chlorinated biphenyls), plastics are finally accumulated in the geosphere. The uses of cement, fertilizers, electronic parts and pesticides are (multi folded in the Anthropocene) for agriculture, construction and techno developments which are disposed as PAHs to the atmosphere. The nuclear tests, testing/use of missiles, from 1945 followed by a series of tests during the Cold War resulting in large amounts of carbon-14 and plutonium-239 join the atmosphere and sediment for years later.

At the equator, it began marking desiccation, with depletion in lakes and lagoons by decreased flow and alluviation. During priming stage of Anthropocene (1850–1950) warming stage had continued. Paucity in sediment from rivers due to anthropologic intervention is the critical juncture in climatic, sea level, glacial, and sedimentology records causing Anthropogenic acidification, and man-made desertification Fairbridge R. W. 1961^[62], Agenbroad L. D., (1998)^[63]

The legacy of Anthropocene

Allerød, reported that there was warm inter-stadial age for the last 12,000 BP which has two remarkable shifts periods i.e. 7500BP and 3500BP. There were worldwide changes in fresh feldspar grains and chlorite-rich particles in the deepsea sedimentation during Holocene. It is ascertained from soil strata that changes in Kaolinite are associated with cold and dry climate and warm and wet climate exhibit changes in the gibbsite. Marine transgression has been best preserved by the beach berms, dune ridges, marine deposits and legendary evidences etc. strandlines are some of the bestpreserved footprints of the of the epochs. The legacy of Anthropocene has signatures of (https://www.livescience.com/28219-holocene-epoch.html)

1) Developed Anthropocene activities by mediation of 208 minerals inclusive the expected widespread plastiglomerate. Resins and fibers have increased global production from 2 Mt (1950) to 380 Mt in 2015 annual CAGR growth rate of 8.4% Geyer et al, (2017)^[64].

- CO2, an important Earth-system driver has reached 180–210 ppm (ice ages), and 280–300 ppm (warm interglacial) but global average atmospheric carbon dioxide in 2016 was 402.9 ppm (NASA).Perturbation in N2 cycle was the greatest since the Holocene Canfield, 2010)^[65];
- 3) Aero ships, Coal/fossil fuel combustions, Nuclear activities, fertilizers in agro-system, Acid rain, Toxic lead pollution and increased GHG gases has polluted air, water and soil. CH_4 , a strongGHG which is ≈ 25 times potent/MT than CO_2 in warming the climateTorben R. C., $(2014)^{[34]}$
- Modernization, Industrialization, demographic explosion and toxic solid and liquid waste excesses have led more species to endangered, extinction to a doomed biota. The effects of
- 5) Species invasion stages are recordable in the history of the earth.
- 6) During Anthropocene there huge species extinction rate, if not maintained, shall lead to the biggest sixth extinction very soonBarnosky et al. (2011)^[18]
- 7) Snow cover in the Northern Hemisphere was also below average by about 414,398 kilometers, according to the NOAA report. Sea ice and glacial snow cover loss is accelerating global warming.
- 8) The geo stratigraphic signal due to sprawl of large cities, modernized agriculture, and resource exploitation is historical and unique in during Anthropocene epoch mainly in soils, mine areas, lakes, deltas and coastal regions and recruited by sea level rise.

Climate in Pre-Holocene and Anthropocene (1880–2017)

Aziziyah in Libya had the highest skin temp. of the earth everrecorded in Pre-Anthropocene (1922) as 58°C followed by Death Valley, California, USA as 56.7°C. The uninhabited deserts of Sahara have recoded maximum skin temp. of 70.7° Cas per satellite measurements (**Modis**) from 2003 to 2009.A historical ever recorded skin temperature of earth as 93.9 °C was in Furnace Creek Ranch on 15thJuly 1972.<u>https://en. wikipedia.org /wiki/ Highest temperature</u>_recorded_on_Earth The minimum skin temp of earth ever recorded was -126 Fahrenheit (-89.2 Celsius) at Vostok Station in Antarctica on 21st, July 1983 by ground measurements.

 Table 3: The lists of rank s and anomaly the global (land + ocean) annually-averaged temperature for successive 13 warmest

 vears on record

			jeu	15 011 100010	
#	Year	Peak temp./place	Anomaly (⁰ C)	country	Reference
1	29 June 2017	54 °C/Ahwaz port (Iran)	0.94	Famine in South Sudan, Somalia	https://en.wikipedia.
				& Nigeria	org/wiki/List of famines
2	21 Jul2016&	54 °C/Mitribah (Kuwait) &	0.94	Famine in Yemen, Min.50,000	https://en.wikipedia.org/wiki/List_of_fa
	22 July 2016	Tirat (Zivi)/53.9 °CBasra		children, Unknown number of	mines
		/(Iraq)		adults died.	
3	2015	Navrongo 43.3 ⁰ C	0.90	weaker El Niño warming	https://en.wikipedia.org/wiki/List_of_co
				influence but 0.2 [°] C higher than	untries_by_extreme_temperatures
				1998	
5	26 May 2010	53.5°C/Mohenjo-Daro	0.70	Mohenjo-daro, Sindh, Turbat,	https://en.wikipedia.org/wiki/List_of_co
				Pakisthan also on 28 May 2017	untries_by_extreme_temperature
8	2009	The Lut Desert, Iran	0.64	the MODIS infrared spectro	https://en.wikipedia.org/wiki/Highest_te
		70.7 °C,Sohar, Oman 50.8°C,		radiometer on the Aqua satellite,	mperature_recorded_on_Earth
				2004, 2005, 2006, 2007 and 2009	

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The Anthropocene fatalities in the globe

The number of War Deaths is declining since 1945 after World War II i.e. with the start of Anthropocene. But the number of conflicts and the corresponding fatalities were in the years 2008, 2010, 2012 and 2014 were 63 (56000 fatalities), 55 (49000 fatalities), 51 (110000) and 42 (180,000 fatalities) respectivelyhttps://www.the guardiancom/world/2015/may/20/armed-conflict-deathsincrease-syria-iraq-afghanistan-yemen.Death toll from 1945-2000 against war were 51 million people mainly from China, Vietnam, the Democratic Republic of Congo and Sudan.Out of them 9 million only died in war with USA.War death tolls more than one million and their long term impact are given in table 4.

Table 4: War deaths around the world from 1945 to present and the long term impact on the country

			deaths area	ind the world	from 19 to present and the long ten	in impact on the country
#	Year	Country	Name of war	Death tole	Long term Impact	Reference
1	1941-1945	Many	World War	7.376 million	Jews smashed. The Holocaust WWII:	https://ipfs.io/ipfs/QmXoypizjW3WknFi
		countries	II	dead (2005	forced women to workplace, nuclear	JnKLwHCnL72vedxjQkDDP1mXWo6u
				report)	impact japan, depression, diabetes, CV	co/wiki/World War II casualties.html
					diseases, Germany fell. Economy failed,	
2	1946 to	China&	China Civil	1.8 - 3.5	Both Nationalists and Communists went	https://ipfs.io/ipfs/QmXoypizjW3WknFi
	1950	Burma	war	million	mass atrocities, with millions killed by	JnKLwHCnL72vedxjQkDDP1mXWo6u
					both sides	co/wiki/Chinese_Civil_War.html
3	1950-53	Korea,	Korean War	1.2 million	Divided Korea into North and South	https://en.wikipedia.org/wiki/Korean_W
		Yellow Sea,			Korea, families separated	ar
		Japan sea				
3	1998-03	II Congo	Central	2.83 million	Congo, Zimbabwe, Sudan Chad	https://en.wikipedia.org/wiki/Second_Co
		War	Africa		Namibia, Angola, worst affected	ngo_War
4	1955–72	1st Sudanese	South Sudan	500000 dead	1/5 th population killed in the 17 th years of	https://en.wikipedia.org/wiki/First_Suda
		Civil War			war, manylost homes. The Addis Ababa	nese_Civil_War
					Agreement wasbreak.	
5	1955–	Vietnam	Vietnam	1.353 millions	Torture & poverty. cancer and	https://en.wikipedia.org/wiki/List_of_wa
	1975	War,(North			disabilities by defoliants, herbicide,	rs_and_anthropogenic_disasters_by_deat
		vs. South)			Agent Orange (Dioxin) affected 2lakh	h_toll
					children	
6	1978-89	Soviet-	Afghanistan	2.084 millions	1,405,111 causalities, 5–10 million	https://en.wikipedia.org/wiki/War_in_Af
		Afghanistan			Afghans fled to Pakistan and Iran,	ghanistan_(1978%E2%80%93present)
		War			another 2 million were displaced within	
7	1967-70	Biafran War	Nigeria	3million	Cost the Igbos a great deal in terms of	http://obindigbo.com.ng/2016/01/biafran
					lives, money infra- structure, hunger and	-war-10-important-facts-you-must-
					disease caused by Nigerian forces.	know-about-it
8	1983-05	Sudan, Blue	Famine/ war	2.5 million	Mostly civilians, due to starvation and	https://sites.tufts.edu/atrocityendings/201
		Nile, Nuba		people.	drought	5/08/07/sudan-2nd-civil-war-darfur/
9	1974-91	Ethiopian	Ethiopia	1.4 million	Corpses were publically displayed to	https://www.ncas.rutgers.edu/center-
		Civil War			families and to persuade them to support	study-genocide-conflict-resolution-and-
					the Red Terror.	human-rights /ethiopian-civil-war-1974-
						91

Apart from the above wars civil wars like Algerian War, War on terror, Iran–Iraq War,Angolan Civil War, Syrian Civil War, Somali Civil War, Burundian Civil War, Bangladesh war, West Papua conflict,Ugandan Bush War, Lord's Resistance Army insurgency, Colombian conflict, Iraqi– Kurdish conflict,Lebanese Civil War and Haiti war and many others have death toll less than one millions but these wars are mostly terrorism atrocities.The death toll in many wars after 1950 have not even exceeded more than 20000 in numberhttps://en. Wikipedia .org/wiki/List_of_wars _by_ death toll#cite note-33.

El-Nino/La Nina and ENSO activities

Ninety percent of the energy produced from fossil fuel are realized to air as GHGs, increasing the global temperature.El-Nino southerly Oscillation (ENSO) events are combined effects climatic cycles or oceanic and atmospheric fluctuations, marine earthquakes on the East Pacific and solar activity. It is inferred from the graph (Fig 5) that the anomalies in frequency is less in the period 1980 onwards whereas the s and 1990s intensity of El Niño events are high during the period of the great acceleration period than the pre-Anthropocene period. The elongated El Niño were observed from 1991 to 1995, The next intense El Niño succeeded 1997-98 which brought intense draught throughout the world (WMO, 1999).

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Figure 5: Global average ENSO activities in the Anthropocene epoch has maxm.peak in great acceleration

It has been found from the ENSO graph that El Nino invites high global temperature whereas Li Nina keep the globe cool. The La nada period maintains the trend of global warming or cooling.

Holocene and volcanic/plate tectonic linkage:

The most powerful ever recorded volcaniceruption of 60Km diameter beheaded1220m the mountain peak and caldera of 1110m deep, Tambora, Indonesia in1815 was the stringent

year without a summer. The sound was heard for 1400Km. The dustshrouded SE Asia into darkness for few months and chilled the area by 0.4°C to 0.7°C. The eruption contributed 70000 to 90000 fatalities, drought, harvest loss and famine suspected in China, Tibet and North America and epidemics in Europe.



Figure 6 (a): Hirosima -1945 (b)Largest TosarBomba,USSR 1961 (c) Polluted/toxic river water Rio-Tinto Spain http://themillenniumreport.com/2015/08/hiroshima-nagasaki-atomic-bombings

Volcanic eruption cause less fatality than Seismic Tremors, severe cyclones and starvation deaths due to famine. However deaths due to epidemics, pyroclastic flows, lahars and tsunamis are 30%, 27%, 17%, and17% respectively followed by crop loss, <u>www.volcano live</u>. com/fatalities.html)

Global emission of GHG gasses

As per IPCC (AR -5) report the findings are: There is decrease in ice mass in Greenland (150 to 250 cubic kilometers between 2002 to 2006) and Antarctica(152 cubic kilometers from 2002 to 2005), clear signatures of deglaciation (Alps, Himalayas, Andes, Rockies, Alaska and Africa and many others) and decline of extension of Artic ice . There is constant rise in GSL (200Cm) from the designated pre-Anthropocene period. CO2 level has risen by 40% since 1857 from different sources like land use, Industrialization. The ocean which is the greatest heat and CO₂ sink has already been suffering from acidification as 30% manmade CO₂ had been absorbed as the top 700m layer have been warmed by 0.302^{0} F since 1969. The SST have

been increased by 1.1° C and the extreme radiation received for last 17years, 2016 being the highest during the greatest acceleration from 1980 (<u>https://climate</u>. nasa.gov/evidence/). The oceans have absorbed much of this increased heat, with the top 700 meters (about 2,300 feet) of ocean showing warming of 0.302 degrees Fahrenheit since 1969.

CO₂ Sink:

The Indian Ocean acts as a huge carbon dioxide trap to capture. CO2 in air act with H₂O to give Carbonic acid (H₂ CO₃). sodium hydroxide in sea water act with H2 CO3 to give Na₂CO₃ and water. The related equations are CO₂ + H₂O \rightarrow H₂CO₃, NaOH + H₂CO₃ and Na₂CO₃ + 2H₂O. The atmospheric CO₂level at Mauna Loa Observatory Hawaii, in northern subtropics during Nov 2017 is 405.14ppm whereas in Nov 2016 it was 403.53ppm. . <u>https:// www .co2</u>. earth/. The rise @1.6 ppm/year is attributable to fossil fuels burning throughout the globe. Air bubbles stuck in ice core in past speculate about CO2 present in earth's atmosphere, and the climate of the past. The present figure of 400ppm is highest

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in the last 0.4 MYBP against past high of ≈ 200 ppm. (Seasonal variations excluded)

Glacial retreat

Glacial retreat due to global warming was from begun about 14,000 years ago (12,000 BC). The warming was shortly interrupted by a sudden cooling at about 10,000 - 8500 BC known as the Younger-Dryas. The warming was resumed by 8500 BC. The younger-dryas event is significant because it shows that even during an otherwise tranquil period (the current interglacial), rapid climate shifts with extinction still occurred.

The plant kingdom and animal s may adapt to slow changing climatic environment. Rapid changes in climate shall invite their destruction. Degradation of Congo rain forest for the last 40years, decrease of fish fauna in agricultural fields of India, Tigriopus californicus' portrait offers the first modern case study to confirm paleo-climatic warnings. Decline ofinvasive species and pollinatorshttp://dinopedia (wikia.com/wiki/Conodont).

The Biota

Indiaconstitutes 2.4% of the world's terrestrial area but have records of 7-8% of species, including over 45,000 numbers of flora and 91,000 species of fauna in four global hubs like the Himalayas, the North-East, the Western Ghats, and the Nicobar Islands. India had India has on IUCN 'Red List' 973 in 2014as of 988 species 2015 and The list contains critically endangered, endangered and vulnerable species. Bill Fraser has reported that the Adélie penguins, in Antarctica, have fallen from 32,000 breeding pairs to 11,000 in last 30 years. Sparrows, vultures, Pika, vultures, elephants, Irrawaddy dolphins, Bramble Caymelomys and Royal Bengal tigers that are susceptible for threatened species by 16% due to climate but the figure is much more due to anthropogenic activities like air, water, light, sound and plastic pollutions added by the loss of habitat, poaching, petting and domestication.

Stratospheric Nitrous Oxide (NO):

Michael B. et al, $1971^{[66]}$ reported that the photochemical action of nitrogen oxide on hydrocarbons form ozone. NO emitted by the Supersonic jets react with atmospheric ozone {[O](1D) + N₂O \rightarrow 2NO + energy)}. Assuming500 planes cruising @7 hr./day shall evolve2 × 10⁷ molecules/ cm²/sec is huge enough to punch the ozone layer.NO present in stratosphere can also be present due to downdrift diffusion (ionosphere) and up-drift(earth crust). The photochemical action of nitrogen oxides oxidizes the hydrocarbons to form ozone, the cause for rubber cracking.

Holocene/Anthropocene extinction

Decrease in rate of growth/decay of genera, species and join of alien and migratory species are continuous phenomenon.But there are difference in types of extinction in the Holocene and the Anthropocene epoch.

Holocene Extinction

1) Millions died infamine under food crisis during continuous deficit in rainfall, warm period or wars and administrative restrictions.

- 2) The world's population is young. The total global present demography from 7.5 billion in 2017 predicted to rise to 9.7 billion in 2050, and 11.2 billion by 2100 (Current estimate UN) increasing exponentially.
- 3) In South Asia and Sub--Saharan Africa the number of people ages 15–24 has been steadily rising, to 525 million in 2015 (almost half the global youth population). Jobs for young people are important for the social, economic and political inclusion of individuals. Research reveals that aspiration has raised high to earn higher incomes with less effort than before. Access to the internet/ multimedia have increased (Africa alone need home to 1.2 billion people, 226 million smartphones were in use by 2015. Hence there shall be more atrocities, violence, drug trafficking and genocides.
- 4) Natural disasters have dominated the news. Recordbreaking meteorological extremes like hurricanes, heavy rains, floods (with historic urban and coastal flooding) have claimed lives all along the globe.
- 5) Education is most important but at present make the children have the crisis of learning. The 2018 World Development Report finds that the quality and quantity of education vary widely within and across countries. Hundreds of millions of children around the world are growing up without basic education & life skills as castism has been uplifted which deteriorated the economic mobility between generations. Nutrition affects learning, and millions of children remain stunted
- 6) The child's brain matures more rapidly during preadolescence than at any other time in life. Poor nutrition can have impact on a child's learning, health. The strong children are rarely seen in late 20th century as they are less strong. The process needs an immediate attention in Anthropocene.
- 7) Child marriage affects the up-comings and the family. Girls in secondary school marry and have maternityeven at the age of 15-18. Afterwards the poverty invitesdomestic violence. Child marriagecarries high personal and economic costs to society. In the21st century we have to eempower women to choose their family size, education, social change and economic development at their own will.
- 8) In 2017, renewable power shall be \approx 160 GW of solar, wind, hydropower, geothermal, and biomass. The renewable energy shall reduce thermal power and hence slow down the GHG's emission.
- 9) Deforestation shall invite loss to comprise the human,animal world, plant kingdom and marine vegetation and disrupt the entire biodiversity by disfunctioning the ecosystems and finally the economies,
- 10) Fight poverty, challenge blind beliefs and social norms. Excess countries should help under developed countries to fight the impulses of climate change.
- 11) A continuous monitoring of climate, GHG gases, MSL rise/global warming, other statistical parameters for future analysis and record. Finally Protect and preserve Extinct/endangered/ red listed species at all cost avoiding atrocities, genocides and war.

Anthropocene Extinction:

1) Yemenites have under the grab of famine by 2015 as they have food unsecured population of 29.3million, 18million

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are under food insecurity and 8.4million people depend totally on external assistance. Out of which 3million Yemenis were children, pregnant and nursing women. World have to rise its food production by 15-20% in next fifteen years to fill the lag. WFP assistance had reached in Yemen to feed 3.5 million people in January, 2017 to over 7 million in October, 2017. Only about half of these people are receiving full rations.

- 2) The world emitted historic amounts of carbon dioxide in the Anthropocene period. CO2 does contribute but not the sole cause like water vapor, Nitrogen, chlorine that affects the atmosphere, Ocean and geosphere. Moderation of CO_2 conc. May not be an effective tool to reduce global warming. Though from 2014 -17 (three years) the global emissions was constant but Global warming was least affected as 2016 was the warmest year in the globe.
- 3) Kolstee Y. G., 2017^[67]have clearly intimated the Anthropocenian about the impact of the Naples waste management crisis (2008), the rubbish crisis in Beirut and Lebanon and Rio de Janeiro, polluted open water after the Summer Olympics 2016 i.e. the turmoil of undisposed trashes, putrid refuge and plastics.
- 4) The humans have dominated the hydrosphere becomingcontroller of global Hydrologic cycle. From the start of Anthropocene the number of dams increased very rapidly along with use of stored water for mainly irrigation, hydropower generation and water supply (Fig 6). Indecisive management practices of the basin, water shed and the reservoir water may lead to mis-utilisation and water deficit for our future generation. Damming has made all large deltas of the globe sinking, shrinking and subsiding with exploitation of ground water..



Figure 7: Trend in Anthropogenic activities by dams, irrigation and NPK fertilizers used in Anthropocene Epoch

5) Annual dump of 2.12 BMT of waste has been recorded throughout the globe and extract 55 BMT of bio-mass, fossil fuel, metal and minerals from the earth's crust @ ≈ 10 MT/person. The western countries uses more than the east and shall increase by 50% till 2020.

http://www.theworldcounts.com/counters/shocking _environmental_facts_and_statistics/world_waste_facts . Anthropogenic impacts as on 25th/26th, Jan 2018 are given in the Tab 7 as per World meters.(http://www .worldometers.info)/

Table 7: The present status/trend of	f Anthropocene activities (.	Jan, 2018) and their ir	npact on the earth
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	Table 7. The present status, tend of 7 min oppeene deuvities (sail, 2010) and then impact on the earth								
#	The item	As on 25 th Jan 2018	Status	Impact/projections/references					
1	World Demography (1 billion in 1800,	7.597 (billion)around 1.09%/	increasing	@ 2.09%.in1960s Trend@ 0.53% in 2050.Projected					
	the 2^{nd} billion 1930, the 3^{rd} in 1960, 4^{th}	year (was 1.12% in 2017 and		10 billion in 2055.(UN, Dept. of Economic and					
	billion in 1974, the 5^{th} 1987, the 6^{th} in	1.14% in 2016)		Social Affairs, Population Division)					
	1999 and the 7^{th} billion in (2011).								
2	Land lost to soil erosion (ha)	477,017 ha	Decreasing	Dimensions of need: Restoring the land - FAO					
3	Forest loss (Net Reforestation) (ha)	362311ho	increasing	Global Forest Resources Assessment (2010) - FAO					
4	CO_2 emissions (tons)	2.715 BMT	Decreasing	(IEA) Statistics, CDIAC- US Dept. of Energy					
5	Desertification (ha)	817,633ha	Decreasing	UN Convention to Combat Desertification					
6	Toxic chemicals out (environment)	685069MT,(@10MMT/year	Decreasing	Toxic Release Inventory (TRI) Program - U.S.					
		&2MMT carcinogenic		(EPA)					
7	Under nourished People	0.824 Billion	Decreasing	FAO data					
8	People died in Hunger (on the date)	26900 on the date	Decreasing	WFP, WHO & UNICEF					
9	Water consumed this year (million L)	775,599,5 Billion ltr	Decreasing	IFPRI and (IWMI)					
10	Deaths by water diseases,2018	58954 people	Decreasing	WHO					
11	People: no access safe drinking water	580,372,566People	Decreasing	WHO					
12	Fossil Oil left (barrels)/ years to the end	1,589,3 billion barrels/ \approx 45	Decreasing	EIA - Oil & Gas Journal, World Oil, BP Statistical					
	of oil	years	_	Review, CEDIGAZ,					
13	Natural Gas left (barrel of oil eq.)	1,111,895,997,221boe	Decreasing	EIA &CEDIGAZ, and Oil & Gas Journal					
14	Days to the end of coal	149,690Days	Decreasing	EIA &CEDIGAZ, and Oil & Gas Journal					
15	Communicable disease deaths	909302 people	Decreasing	Global Burden of Disease (GBD) - &(WHO)					
16	Child death+Abortion	≈2.5million	Decreasing	WHO					
17	HIV/AIDS infected/death people (Since	39,671,060/117767 persons	decreasing	Sexual and reproductive health - (WHO) &					
	start 78 million have been infected and			AVERT					
	39 million have died).								
18	Deaths caused by cancer this year	575,382 persons	Decreasing	WHO					
19	Deaths caused by smoking this year	350,254 persons	Decreasing	Tobacco control, global health Observatory,					
		-	_	GHO/WHO					
20	Deaths caused by alcohol	175,257 persons	Decreasing	GIS on Alcohol and Health (GISAH) - WHO					

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Biodiversity

Climate change causes species redistribution and universal influences on ectothermic animals depending upon their physical and ecological status and adaptive strategies inheritance Kearney & Porter, (2009)^[68]. The climate change in Anthropocene involves monitoring of such redistributions by recording the data of invasive, extinct, threatened and protected species and genetically modified organisms. It should not be forgotten that Cyanobacteria has invited mass extinct in past. Different organizations monitoring and recording the biodiversity changes are International Union for Conservation of Nature (IUCN), South African National Biodiversity Institute SANBI, Convention on Biological Diversity (CBD), Custodians of Rare and Endangered Wildflowers (CREW) and EBVs (The Essential Biodiversity Variables)

IUCN Red List in India:

IUCN Red List India declared on 24th April, 2016 that Critically endangeredare nine and they are Himalayan Brown/Red Bear (Ursus arctos isabellinus), Pygmy Hog salvania), (Porcula Andaman White-toothed Shrew (Crocidura andamanensis), Kondana Rat (Millardia kondana), Large Rock Rat or Elvira Rat (Cremnomys elvira), Namdapha Flying Squirrel (Biswa moyopterus biswasi), Malabar Civet (Viverra civettina), Sumatran Rhinoceros (Dicero rhinus sumatrensis), Kashmir stag/hangul (Cervus elaphus hanglu). The endangered mammals in the list were Red Panda, Wild ass/ khur, Dhole/ Asiatic wild dog or Indian wild dog (Cuon alpinus), Eld's deer/ thamin or brow-antlered deer/ Hog deer/ White-bellied Musk Deer of the Himalayas, (Panolia eldii), Golden langur (Trachypithecus geei), Chita / Tibetian Antelope, Nilgiri tahr/ langur / leaf monkey (Trachypithecus johnii) and Assam rabit. The endangered aqua fauna are Fresh water/river dolphin and many others.

Also there are over 850 invasive alien species in the list of IUCN Global Invasive Species Database (GISD) which needs to be studied and their impact on the present species diversity. The popular vulnerable species plummeted through poaching are African elephants (1.3million in 1979 to \approx 400,000 at present) and critically endangered species are Black Rhinoceros (850,000, numbers reduced to 5000 at present), African lions, painted dogs, Vultures, Cross river Gorilla, Hawksbill turtle, mountain Bongo and 40 such in Africa Protecting Wildlife.htm TUSK.

The Anthropocene Biota:

The biosphere in Anthropocene is unique as (i). Uniform species resetting and distribution ecosystem in similar climate for easy invasion. (ii) Key changes in the energy budget based on by the expropriation of Homo sapiens the major contributor (25% to 40% in NPP) (iii) Human centric evolution of Biota and (iv) Effect of the Techno-sphere, Williams et al., 2015^[68]. The pivotal events are human transported neo-biotic species (priming impact), domestication and agriculture (Holocene impact), human expropriation of net primary production (Anthropocene techno-sphere impact) and modern advancements (Anthropocene impact)

Plastic pollution:

Present plastic production and its waste management trends lasts long \approx 12,000 MMT of plastic shall enter the landfills by 2050. The remediation of plastic to plastiglomerate (bionon degradable material) shall be a mineral in the mantle of the earth's crust inclusive marine zone. The increasing plastic pollution shall affect the wildlife, agriculture, forestry and fisheries stocks. The mass extinction shall be accelerated (fig 8)



Figure 8: The IUCN Red list of Extinct, Endangered, Vulnerable species inAnthropocene (2016)

Temperature climaxes

NASA scientists informed that 2016 is the hottest, 2015 is the 2^{nd} lowest and 2017 was the third warmest year reporting

global average temperatures as 0.84 degrees C above average from 1951 to 1980. It is denoted that the years were unusually uniform .and ubiquitous across the planet. The

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Arctic had warmed faster in 2017 and ice status had depleted (Jan to Mar) to 398858 km² less than 1986. The upper ocean absorbed radiation in excess. (Deke Arndt, chief of the global monitoring branch of NOAA's National Centers for Environmental Information)



1880 1900 1920 1940 1960 1980 2000 201 Figure 9: The land use and land cover in Anthropocene

Aerosols

During Holocene the Globally average CO2 had increased from 180 ppm to 300ppm till 1950. In Pleistocene epoch the CO2 and never exceeded the limit. But av. Conc. of CO2 had reached 403.3 ppm in 2016 (NOAA data), up from 400.00 ppm in 2015. It is due to release aerosols through industries or transportation. The conc. of CO₂ has increased by 30% since from the industrial revolution (1857). Water vapor, methane (NH₄) and nitrous oxide (N₂O) are the agents of global warming have risen by $\approx 145\%$ and $\approx 15\%$ respectively. The CFC Chlorofluorocarbons only existed after 1950 had added to the process. It is not only the CO2 that is favoring the global warming but also the presence of GHG gasses and aerosols. Also the excess use of NPK fertilizers, hormones and steroids added to augment agricultural production for the exponentially increased demography are the causes for biota deterioration.

Other causes for deterioration of the Anthropocene biota are enhanced nighttime radiations, habitat loss, Haunting and poaching, use of excess fossil fuel, thermal industries, nuclear reactors and smart cities. At this juncture we may think of old caves, mud built houses and oxen driven bullock cartsMishra S P $2018^{[69].}$

3. Discussion

The present temperature has risen by 1 °C than before. Ice melt cooling of the North Atlantic and Southern oceans shall increases atmospheric temperature gradients, eddy kinetic energy and baroclinicity, thus driving more severe storms. Themodeling, paleo climate evidence, and ongoing observations together imply that there shall be 2 °C to 3⁰ C due to global warming above the preindustrial level could be dangerous.Increased fossil fuel emissions may yield (1) depletion of SST of the Southern Ocean (2) slowing the Southern Ocean overturning circulation resulting in warming of the ice layers and accelerate melting of ice. (3) The

Atlantic overturning circulation shall slow down and cool of the North Atlantic region; (4) Increasing trend in severe storms; and (5) nonlinear MSL rise to multi meters within 50–150 years.

EL Nino vs. CO₂:

El Nino is intricate periodic climate phenomenon of warming up water in East- central Pacific Ocean that controls SW monsoon in India, Africa and Asian sub-continent. The CO₂ generation due to El Nino are (i) Hot weather and drought (ii) extensive wildfires inSE-Asia (iii) reducing the plant growth Amazon rain forests and (iv) excessive fossil fuel burning. Severe El Nino from 2015 to 2017 have exponentially increased the growth rate of CO2 in the atmosphere was ever maximum 2.94 and 2.89 ppm/ year in 2015 and 2016 respectively. Particularly El Nino spell, 2014 to 2016,about 3 BMT of carbon (historical) was released to the atmosphere currentaffairs.gktoday.in/el-nino-2014-16aided-massive-carbon-dioxide-release-study-08201747294.html © GKToday

Le Quéré, C. et al. $(2016)^{[70]}$, studied the emission trend of CO₂ generation of the developed and developing countries and reported that China (29% of globe) and India (6.3% globe) have increasing trend whereas USA, the 2nd emitter(15% of globe)exhibit decreasing trend. The CO₂emitters are mainly anthropogenic from Industries, transportand burning of fossil fuel for usages.

The Killer smog:

Out of 9 million premature bereavements occurred from air pollution in 2015, about 2.5 million were in India. US Embassy's recorded, air in New Delhi reached PM2.5 concentrations of about 1,200 μ gms/cum on 8th Nov 2015 (48 times of WHO norms). Shenyang, China, had recorded 1,400 μ gms/cum on 9th Nov 2015 the highest ever recorded (56times WHO norms) as per the Lancet Commission on pollution and health. Organic peroxides form in the vapor phase oxidation of hydrocarbons (gasoline's) observed on smog days that gives eye irritation and crop damage, aerosols formed contribute to poor visibility.

The rise in Temperature:

The 21st century hashigh rise in mercury for 16years out of 17years.NOAA reported 2016 is the warmest in 137year series (1880 to 2016). The WMO has confirmed that 2011-2015 was the hottest five-year period confirming global warming on record.2015 was the 2nd hottest year. 16 out of the 17 years on record will have been warmest since 2000. Global average temperature has increased by 0.07° C since 1880 and @ 0.17° C if considered from 1970.

The existence of the Holocene covers direct or indirect changes in geology, biology, limnology, paleontology and paleo-climatic sedimentology basing on ground trothing, by paleo-climatic records and archeological evidences under historical perspective. The Archaeology, geomorphology, geophysics, glaciology, hydrology, oceanography, paleoecology, and pedology studies, modeling and simulation can predict the trend and future prospective of the epoch.

Holocene and the succeeding Anthropocene can be reckoned as a stadial within this interglacial. But the human impact on

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biota and atmosphere due to effects of pollution, biotic imbalances, GHG excesses, Nano technology, mineral remediation, desertification and de-chronification have forced the humans consider the ill effects of human slaughter on his own handMishra S. P. 2017^[71].

4. Conclusion

All the eons, Era and epochs are decided after their prevalence. It is now the time to record the new epoch Anthropocene for our forthcoming generation. The short lived Holocene is very complex though some recorded facts/figures are available. But the pulses of prompt but short time scaled changes in the Anthropocene epoch is so complex that only 73 years is not enough to conclude about the age of the Anthropocene.

References

- [1] Charles Lyell, 1833, Principles of Geology Vol I III, being an attempt to explain the former changes of the earth's surface,by reference to causes now in operation. http://www.newworldencyclopedia.org/entry/ Charles Lyell
- [2] Arrhenius Svante, 1896,, On the Influence of Carbonic Acid in the Air upon the Temperature of the ground, Philosophical Magazine and Journal of Science Series 5, Vol41, pp. 237-276http: //www.rsc.org/images/Arrhenius1896_tcm18-173546.pdf
- [3] Langley, S.P. The Langley Aerodrome, Crerar Ms 178, Special Collections Research Center, University of Chicago Library
- [4] Lorius C. Jouzel J., Ritz C., Merlivat L., Barkov N. I, Korotkevich Y. S. & Kotlyakov V. M., 1985, A 150,000-Year Climatic Record from Antarctic Ice, Nature, https://www.nature.com/articles/316591a0 doi:10.1038/316591a0,
- [5] Chamberlain, T.C. 1897. The method of multiple working hypotheses. Journal of Geology, Vol 6(5), pp-837–848, https://pdfs.semanticscholar.org/6789/ 6bc18ef044f4f781a1366cbea5a07b34a3dd.pdf
- [6] Charles Fabry and Henri Buisson, 1913, L'absorption de L'ultra-Violet par L'ozone et la Limite du Spectre Solaire, Journal de Physique Théorique et Appliquée
- [7] Haagen-Smit A.J., 1952, Chemistry and Physiology of Los Angeles Smog, Industrial and Engineering Chemistry, Air Pollution, Vol 44 (6), pp- 1342- n1346, https://pdfs.semantic scholar.org /1f18/64424a52955b607781d45f007ed8fd1b8002.pdf
- [8] Molina M.J., Rowland F.S., 1974, Stratospheric Sink for Chlorofluoromethanes: Chlorine Atom-Catalysed Destruction of Ozone, Nature, Nature, Vol-249 (5460), pp. 810-812, (Homepage), DOI:10.1038/249810a0
- [9] Farman J.C., Gardiner B.G., and Shanklin J.D., 1985, Large Losses of Total Ozone in Antarctica Reveal Seasonal ClOx/NOx Interaction, Nature, Nature, 315, pp. 207-210. doi:10.1038/315207a0
- [10] Erisman J. W., Sutton M. A., Galloway J. N., Klimont Z., Winiwarter W (2008). How a century of ammonia synthesis changed the world. Nature Geoscience, Vol 1 (10): pp- 636-639. DOI:10. 1038/ ngeo325.

- [11] Mathews, J.A., Shakesby, R.A., Schnabel, C. and Freeman, S.P.H.T. (2008) Cosmogenic 10Be and 26A1 ages of Holocene moraines in southern Norway I: testing the method and confirmation of the date of the Erdalen Event (c.10 ka) at its type-site. Holocene,Vol-18(8), pp. 1155-1164. (doi:10.1177/0959683608 096585)
- [12] Raup, D. & Sepkoski, J., 1982, Mass extinctions in the marine fossil record, Science, New Series, Vol. 215, (4539). pp. 1501-1503, http://www.jstor.org/stable/1688151?seq=1#page_scan_ tab contents
- [13] Sepkoski, J. in Global Events and Event Stratigraphy (ed.Wallister, O.) 35–61 (Springer-Verlag, Berlin, 1996).
- [14] Sepkoski J. A, 2002, Compendium of Fossil Marine Animal Genera (eds Jablonski, D. & Foote, M.) Bull. Am.Paleontol. no. 363 (Paleontological Research Institution, Ithaca.
- [15] Dockery D.W., Pope C.A., Xu X., Spengler J.D., Ware J.H., Fay M.E., Ferris, Jr. B.G., and Speizer F.E., 1993, An Association between Air Pollution and Mortality in Six U.S. Cities, New England Journal of Medicine, Vol; 329:pp-1753-1759, DOI: 10.1056/NEJM 1993 12093292401
- [16] Petit J. R., Jouzel J., Raynaud D., Barkov N. I., Barnola J. M., Basile I., et al, 1999, Climate and Atmospheric History of the past 420,000 Years from the Vostok Ice Core, Antarctica, Nature, https:// /www.nature.com/articles/20859
- [17] Hooke R. L., 2000, On the History of Humans as Geomorphic Agents, Geology, Vol- 28 (9); p. 843–846
- [18] Barnosky A. D., Matzkel N., Tomiya S., Wogan G. O. U., Swartz B., Quental T. B.,et. al., 2011, Has the Earth's sixth mass extinction already arrived?, A review paper, Macmillan Publishers Limited.pp-51-57
- [19] Carey J., Stromberg J., 2016, What Is the Anthropocene and Are We in It?, Proceedings of the National Academy of Sciences of the United States of America, https://www.smithsonian mag.com/ sciencenature/what-is-the-anthropocene-and-are-we-in-it-164801414 /#tic31Uc41 MAfGzbQ.99
- [20] Dunhill A., 2017, Five Mass Extinctions Wiped out 99 Percent of Species That Ever Lived—Are We Headed for the Sixth?, Palaeo-biology at the University of Leeds html ?id=GTM-5F22G6" height="0" width="0" style="display:none;visibility:hidden" ></ iframe>
- [21] Crutzen, P.J., 1970, The influence of nitrogen oxides on the atmospheric ozone content. Quarterly Journal of the Royal Meteorological Society, Vol- 96, pp- 320-325. doi:10.1002/qj.4970 9640815
- [22] Crutzen P., 2002, Geology of Mankind, Nature, Vol 415
 (3), pp-23, Jan 2002|www.nature.com, Macmillan Magazines Ltd
- [23] Jackson J. B., Kirby M. X., Berger W. H., Bjorndal K. A., Botsford L. W., Bourque B. J., et al., 2001, Historical Overfishing and the Recent Collapse of Coastal Ecosystems, Science, Vol. 293, Issue 5530, pp. 629-637, DOI: 10.1126/science.1059199
- [24]Zalasiewicz J., Williams M., Steffen W., Crutzen P., 2010, The New World of the Anthropocene, Environ. Sci. Technol., vol. 44 (7), pp 2228–2231, DOI: 10.1021/es903118

Volume 7 Issue 9, September 2018

<u>www.ijsr.net</u>

- [25] Stacy L. Lorenz S., Culp L. A., T. Brandt Ryder, Tom C. Will, Marra P. P., 2013, A Blind Spot in Climate Change Vulnerability Assessments, nature climate change, PP- 91-93, DOI: 10.1038/nclimate1810, :https:// www.researchgate.net/publication/239884728
- [26] Smith, B.D., Zeder, M.A., 2013. The onset of the Anthropocene. Anthropocene. http://dx.doi.org/10. 1016 /j.ancene.2013.05.001
- [27] Wolfe A. P., Hobbs W. O., Birks H. H., Briner J. P., Holmgren S. U., Ingólfsson Ó., et al., 2013, Strati graphic expressions of the Holocene–Anthropocene transition revealed in sediments from remote lakes, Elsevier,Geomorphology,Earth-Science Reviews Vol-116, pp. 17–34https://doi. org/10.1016 /j.earscirev. 2012.11.001,
- [28] Corcoran P.L., Moore C. J., Jazbak K.,2014, An Anthropogenic Marker Horizon in the Future Rock Record, GSA Today, Vol. 24 (6), pp 4-8, doi10.1130/gsat-g198a.1
- [29] Lewis S., Maslin M., 2015, Defining the Anthropocene, Nature, Vol 519(7542), pp.171-80, DOI10.1038/nature14258
- [30] Braje, T. J., 2015, Earth Systems, Human Agency, and the Anthropocene: Planet Earth in the Human Age, Journal of Archaeological Research. Dec2015, Vol. 23 (4), pp- 369-396.
- [31] Monastersky R., 2015, Anthropocene: The human age, Nature, News Feature, Vol- 519 (7542), pp- 1-4, /www.nature.com/polopoly_fs/1.17085!/menu/main/top Columns/topLeftColumn/pdf/ 519144
- [32] Hansen J., Sato M., Hearty P., Ruedy R., Kelley M., Masson V. D., et al., 2016, Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2 °C global warming could be dangerous, Atmos. Chem. Phys., Vol-16, pp- 3761-3812, 2016, https://doi.org/10.5194 /acp-16-3761-2016
- [33] Harvey C., 2017, Global Carbon Emissions Are Rising Again after 3 Flat Years, https://www. Scientific american .com/article/global-carbon-emissions-arerising-again-after-3-flat-years
- [34] Torben R. Christensen, 2014, Climate science: Understand Arctic methane variability, Nature, 14.May 2014http://www.nature.com/news/climate-scienceunderstand-arctic-methane-variability-1.15196
- [35] Swaddle J. P., Francis C. D., Barber J. R., Cooper C. B., Kyba C. C.M., D.M.Dominoni et al, 2015, A framework to assess evolutionary responses to anthropogenic light and soundVol.30 (9), PP- 550-560, https://doi.org/10.1016/j.tree.2015.06.009
- [36] Walker M. J. C., Berkelhammer M., Bjo S. R., Cwynar L. C., Fisher D. A., Long A. J.,et. al., 2012, Formal subdivision of the Holocene Series/Epoch: a Discussion Paper by a Working Group of Intimate (Integration of ice-core, marine and terrestrial records) and the Sub commission on Quaternary Stratigraphy (International Commission on Stratigraphy), discussion paper, JOURNAL of Quaternary Science Vol- 27(7) pp- 649– 6, DOI: 10.1002/jqs.2565
- [37] Wolff E. W., 2014, Ice Sheets and the Anthropocene, Geological Society, London, Special Publications, Vol -395, p255-263, doi: 10.1144/SP395.10

- [38] Anderson D. E., Goudie A., Parker A., 2007, Global environments through the Quaternary, Oxford University Press, www.oupcanada.com/catalog/9780199697267.html
- [39] Smith Alan, 2008, The Ice Age in the Lake District, The Landscapes of Cumbria Series, Vol. 3, Rigg Side Publications
- [40] Raup D. M. and Jablonski D.,1993, Geography of End-Cretaceous Marine Bivalve Extinctions, American Association for the Advancement of Science, Vol. 260, No. 5110, http://www.jstor.org/stable/i341637,https:// www.jstor.org/stable/i341637?refreqid=excelsior%3Aa6 cf3135b99625427f9e8a4d1e34d26f
- [41] Benton, T. G., 1995. Biodiversity and biogeography of Henderson Island insects. Biol. J. Linn. Soc., Vol-
- [42] 56 (1-2):pp- 245 259.
- [43] Mishra S. P., 2018, Defaunation during Great Acceleration Period of Anthropocene Epoch: India, World Applied Sciences Journal, Vol. 36(3), pp. 506-518, DOI: 10.5829/idosi.wasj. Jan-2018.
- [44] Retalack G. J., 1995, Post-apocalyptic greenhouse paleo climate revealed by earliest Triassic paleosols in the Sydney Basin, Australia, Geological Society of America Bulletin, Vol- 111 (1), pp- 52-70
- [45] Kolbert Elizabeth, 2014, The Sixth Extinction: An Unnatural History, Henry Holt & Company, pp-1-329
- [46] Raup, D. & Sepkoski, J. 1982, Mass extinctions in the marine fossil record. Science Vol-215, pp-1501–1503, coleoguy.github.io/reading.group/Raup_Sepkoski_1982. pdf
- [47] Walker, M., Johnsen, S. et al. 2009. Formal definition and dating of the GSSP (Global Stratotype Section and Point) for the base of the Holocene using the Greenland NGRIP ice core, and selected auxiliary records. Journal of Quaternary Science, 24, 3 17,http://dx.doi.org/10.1002/jqs.122
- [48] Zalasiewicz J., Williams M., et al. (2008) Are we now living in the Anthropocene? Geological Society of America Today Vol-18, pp-4–8. https://www.geosociety.org/gsatoday/archive/18/2/pdf/i 1052-5173-18-2-4.pdf
- [49] McClure, B. (2011). Milankovitch Cycles & Ice Ages. from http://www.idialstars.com/jan2012.html.
- [50] Joceylin L. P., Judy L. p., 1977, Clff's notes, Praxis II, Elementary education, 0011, 0012, 0014, Test preparation, Wiley publishing Inc.
- [51] Naidu P. D., 1999, A review on Holocene climate changes in Indian subcontinent, Memoir geological Society of India, Vol 42, pp- 303-314, http://drs.nio.org/drs/handle /2264 /1782
- [52] Mishra S. P. and Jena J. G., (2015), "Morphological Reconstruction of Southern Mahanadi Delta and Chilika Lagoon, India – a critical study" Int. Journal of Advanced Research, Volume 3, Issue 5, 691-702
- [53] Ellis E. C., Fuller D. Q., Kaplan J. O., Lutters W. G., 2013, Dating the Anthropocene: Towards an empirical global history of human transformation of the terrestrial biosphere, Elementa: Science of the Anthropocene, pp-1-6, doi: 10.12952/journal.elementa.000018
- [54] Ingmar B. M., Eitela U.B., Schiegld B. K.S., 2010, Molluscs as evidence for a late Pleistocene and early Holocene humid period in the southern coastal desert of Peru (14.5°S), Elsevier, Quaternary Research, Volume

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1461

73, Issue 1, Pages 39-47 https://doi. org/10.1016/j.yqres.2009.05.007

- [55] Yadav A., Ambili P. Ku., Praveen A., Mishra K., Varghese S., 2017, Mid-late Holocene climate variability in the Indian monsoon: Evidence from continental shelf sediments adjacent to Rushikulya river, eastern India, Elsevier, Quaternary International Vol-443 (B), pp- 155-163, https://doi.org/10.1016/j.quaint. 2016.12.023
- [56] Sarkar S., Wilkes H., Prasad S., Sachse D., 2012, Biomarker evidence for increasing aridity in southcentral India over the Holocene, Conference: AGU Fall Meeting, At San Francisco, Volume: 1-07-PP51C-07
- [57] Alexanderson H., Henriksenb M., 2015, A short-lived aeolian event during the Early Holocene in southeastern Norway, Elsevier, Quaternary Geochronology, Vol- (30, Part B), PP- 175-180, https://doi.org/10.1016/j.quageo.2015.02.014
- [58] Mead J. I., and Meltzer D. J., 1984, North American Late Quaternary Extinctions and the Radiocarbon Record. In Quaternary Extinctions: A Prehistoric Revolution, edited by Paul S. Martin and Richard G. Klein, pp. 440–50. University of Arizona Press, Tucson.
- [59] Martin P. S., 1984 "Prehistoric overkill: the global model". In Martin (P. S.), Klein (R. G.) eds: Quaternary Extinctions, Tucson, University of Arizona Press:pp-354-403.
- [60] Morice, C. P., Kennedy J. J., Rayner N. A., and Jones P. D., (2012), Quantifying uncertainties in global and regional temperature change using an ensemble of observational estimates: The HadCRUT4 data set, J. Geophysics. Res., 117, D08101, doi:10.1029/2011JD017187
- [61] Stoermer E.F., Sicko-Goad L. & Lazinsky D., 1980. Synergistic effects of phosphorus and trace metal loadings on Great Lakes phytoplankton. In: Proceedings of the third USA–USSR symposium on the effects of pollutants upon aquatic systems, Theoretical aspects of aquatic toxicology, pp. 171–186, U.S. Environmental Protection Agency, Duluth.
- [62] Andrew Revkin,1992, Global Warming: Understanding the Forecast', New York: Abbeville Press, https://searchworks.stanford.edu/view/9599092.
- [63] Fairbridge, R. W. (1961). Eustatic Changes in Sea Level. Physics and Chemistry of the Earth, 4, 99-185. http://dx.doi.org/10.1016/0079-1946(61)90004-0
- [64] Agenbroad L. D., Fairbridge R. W. "Holocene Epoch, Geochronology" https://www .britannica.com /science/Holocene-Epoch.
- [65] Geyer R., Jambeck J. R., Law K. L., 2017, Plastics Production, use, and fate of all plastics ever made, Science advances, 3: e1700782, pp. 1-5, http://advances.sciencemag.org/content/3/7/e1700782.fu ll
- [66] Canfield D.E., Glazer A.N., Falkowski P.G. 2010, The evolution and future of Earth's nitrogen cycle: Science, Vol 330, pp-192-196. doi: 10.1126/science.1186120.
- [67] Michael B. McElroy and John C. McConnell, 1971, Nitrous Oxide: A Natural Source of Stratospheric NO, Journal of Atmospheric Sciences
- [68] Kolstee Y. G., 2017, The plastic waste problem- a pledge for volunteer activities, Kurdistan Journal for Applied Research kjar.spu.edu.iq, Vol 2 (3), pp.1-7,

Volume 7 Issue 9, September 2018 www.ijsr.net

DOI: 10.21275/ART20191537

https://www.researchgate.net/publication/319392601_ The_plastic_waste_problem-

- a_pledge_for_volunteer_activities
- [69] Kearney, M. & Porter, W. (2009). Mechanistic niche modelling: combining physiological and spatial data to predict species' ranges. Ecology Letters, vol. 12,pp-334–350. doi: 10.1111/j.1461-0248.2008.01277.x.
- [70] Mishra S. P., 2018, Photoperiodic bio-diversities under light pollution in India during Anthropocene epoch, Int. Journal of Advance Research, Vol- 5(12), pp-1090-1106
- [71] Le Quéré C., Andrew R. M., Friedlingstein P., Sitch S., Pongratz J., Manning A. C., Korsbakken J. I., et. al.,2017, Global Carbon Budget 2017, Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2017-123, in review, 2017.
- [72] Mishra S. P., 2017, The apocalyptic Anthropocene epoch and its management in India, Int. Jour. Adv. Research, Vol, 5(3),pp. 645-663