Human Evolution/Extermination up to Present Anthropocene: India

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Abstract:

Northwest corridor of Indian subcontinent for hominin migration from Africa to whole world during post/upper Pleistocene is under debate. The journey from the monkeys to the modern man started from 2mn -3mn years BP. The Apes; in Africa transformed to Homo-erectus and were widespread throughout the globe. They dispersed and settled in all parts of India from NW direction 70-80ky BP as hunters and gatherers. The Pleistocene to present Anthropocene; the impact of climatic anomalies on Human health in terrestrial environments of India is investigated. The modern man can have control over biosphere, hydrosphere, geo-sphere by shifting to agriculture, herding animals and managing water flow and diseases to live long. But Slum-habitats and the financially backward community were the vilest hit and add top and premature deaths in mass. The SW (primarily), Westerly and NE Monsoon are the deciding factor in history of Indian's health. The COVID-D pandemics are in progress and the deciding factors to accelerate human extinction. Homosapiens are most adaptable species among other species so it is the most dominating species of the Anthropocene Epoch and their intelligence shall probe the future a sustainable human life against present 6th mass extinction..

Key words: Pleistocene, Holocene, Anthropocene, Paleo climate, Climatic Change, Pandemics

I. INTRODUCTION:

The geographical time scale (GTS); is chronological compartmentalization of the globe in earth science and geology that narrates the history of the planet. They are subdivided as EON, ERA, PERIODS and EPOCHS. As per GTS, the globe is running at present in the GTS time phase as the Phanerozoic EON- Cenozoic ERA-Quaternary PERIOD – Anthropocene EPOCH. The boundary events to all geological scaling are accompanied with global climatic, geological changes with faunal evolution, transformation or mass extinctions (Mishra S. P. 2017[1]).

The Quaternary period is the most recent; dating back to 2.588mya BP which isotopically and chronometrically concerned for Hominids evolution, https://www.sciencedirect.com/topics/earth-and-planetary-sciences/quaternary-period. The Pleistocene was succeeded by the Holocene 11800 years back with a much stable weather. The Holocene is subdivided in to 3 partitions (11800 to 8200ybp) as pre-Holocene; 8200- 4200 as mid-Holocene and (4200 -75) yBP as post Holocene. Since last 75 years (from 1st bomb explosion at Alamogordo, New Mexico at 5:29:45 a.m. 16th July the Anthropocene epoch has succeeded the Holocene, (Zalasiewicz et al., 2011[2]).

1.1 *The six mass extinctions*

The GTS boundaries are fixed basing upon proxies and fossil records, Antarctica GISP ice core and carbon dating. Some major geospatial events, mass elimination of species or evolution of new species with transfer of dominance from one species to other indicate that the earth is in continuous move with formations and eliminations. Anthropogenic impressions on the Earth system have challenged the modern human health as man exploited the geo-hydro-bio and the atmosphere without knowing consequences of return. The globe faced big five extinctions in past due to global warming, cosmos attack & habitat loss (proxies and paleo records), Table 1.945.) a debated and much accepted epoch is the Anthropocene epoch; is waiting for official recognition Barnosky et al., 2014[3]; (Table 1).

Table 1: The different extinctions in history, geospatial time scale for the Quaternary period, as per IUGS, including both ratified and suggested/proposed GSSPs

Extinction event	period (from-to)	Species loss in %	EPOCH	AGE	Dated back to	Age designated by/due to
The Known extinction events			The compartmentalization of the Quaternary Period			

1st The Ordovician–Silurian event	443Ma BP	60-70%	Anthropocene	Unnamed	75 YBP	GSSA (informal) (Atomic explosion)
2nd The Devonian event (late)	359MaBP	75%	Holocene	Upper	4200YBP	Mawmluh cave; NE India proxy
3rd Permian-Triassic (P-T) (The great dying)	252Ma BP	96%		Middle	8200YBP	Greenland (N) GRIP-I Ice core study
4th Triassic-Jurassic,	8.3 Ma BP	80%		Lower	11800YBP	Greenland (N) GRIP-2 Ice core study
5th Cretaceous-Tertiary (K-T extinction)	2.5Ma-12Ka BP	76%	Pleistocene	Upper	130ka YBP	Last interglacial; Tarnsian Base
6th (A) Pleistocene-Holocene	12Ka - 75yrs BP	Yet to be assessed		Middle	770-773ka	Chiba; Montalbano; Valie diManche
6th (B) Anthropocene Extinction event	75yrs to present	40% till date		Calabrian	1.80Ma	Vrica; Calabria; Italy
				Gelasian	2.588 Ma	Monte San Nicola, Italy

Sources: Wikipidia; Raup D.M., 1982[4]; Barnosky A. D 2011[3]; Mishra S. P. et al., 2018[5];

The common reasons for last big five mass extinctions including Homosapiens are mainly flood basalt events (Volcanic), climatic changes (CC); MSL rise/fall, glaciation and vice versa, Cosmic impacts of Asteroids, Global warming/ cooling. The other events like break of food chain, heavy rains, big forest fires, or Y- ray burst (nova, supernova),continental drift, Plate tectonics and Tsunamis, continuance of vector/ virus chain, Courtillot et al (1996)[6], Hallam(1997[7]), Griever et al (1997[8]), Lewis et al., 2015[9]:& https://www.national geographic. com/science /pre historic-world/quaternary/

II. Review of Literature

Homo erectus; the aboriginal hominids had known the use of use fire and tools. They either coined in South Africa (Kenya) or later well disseminated in Eurasia and later to America and Australia. Homosapiens evolution in Indian subcontinent occurred as gradual migration of H-erectus species(9-8 Ma cal BP) from Eurasia on conversion of grassland from dense forest called the Pliocene migration/ evolution of homosapiens (Wikipedia). The south Indians are the species totally different. The Holocene climate changes associated monsoon rain that settled the nomadic haunters to agriculture and permanent settlements obtained from the genetic biodiversity. About 74,000 yrs cal BP, the super volcanic activity in Sumatra (Youngest Toba Tephra) forced the Homo sapiens to enter into India as called Middle and Upper Paleo-lithic assemblages Woods B 1996[10] & Patnaik et al 2009[11]. The oceans in the earth is the mothers lap to life sustenance and less prone to mass extinction due to widely dispersed dissolved, the storehouse for nutrients, less vulnerable to eutrophication, anoxic occasions; and less blocking of food chains Martin (1996)[12].

Li F et al., 2019[13] have mentioned that paleo-environmental studies were neglected as less archeological evidences as North and Central Asia's deserts and mountain ranges posed as barriers for migration of homosapiens and Hominins to migrate from NW and NE. Later they were forced the human species to temperate Siberia in arctic north. Early Asian Homo sapiens are ascertained (14C dating) to be present during 4600 ± 200 ka B.P as per archeological excavation at the Orsang River, Ratanpur (Chamyal et al., 2011[14], Malassé et al 2013[15]). The homosapiens evolution starting from Africa stratified in 1st pulse to America was between 17–15 ka B.P. and later to the launch of the LGM (Last Glacial Maximum) deglaciation. In this sense, the arrival of Homo sapiens into the Southern Cone at 14,000 years ago represents the last step in the expansion of modern humans throughout the world and the final continental colonization (Liamas B et al. 2016, & Politis et al., 2016[17]]. The oldest hominid fossil is found as early African Homo erectus in Africa of 2.0myrs cal BP and also in Indonesia and Asian mainland (woods et al., 1996[10]). All livings in universe has to fight for livelihood like air,food, water, light, shelter, sex and territory, shelter, reproduction i.e. struggle for existence. The present NW India arid zone formed during post glacial period (Pant et al, 1987[18]).

2.1 Evolution during Pleistocene:

Homosapiens; the modern man originated in South Africa (Ethiopia or Kenya). The shift from the Neo-Proterozoic to the Paleozoic era (500 my cal BP) is claims the evolution of animals. The hypotheses claim the Homosapiens are mutated gradually to Homo erectus geospatially hardly during 2.588my BP. The Indian subcontinent, a major part of is densely populated occupied by 1.4 billion people spread over an area of ≈4.4 mnkm2 (Fig 1.a and Fig 1.b)

The Neanderthals are transformed from the homo-erectus. Neanderthals; were skilled hunters hominine species; had roofs to live, leaves or bark to clad, tools of stones and bones as weapon. Recent findings disclose that they cook food for diet; buried the dead; used symbolic ornaments. No earlier hominid species before Neanderthals had use of speech as language. These Homosapiens matured faster as they could adopt better to (CC) and spread over the world in past.

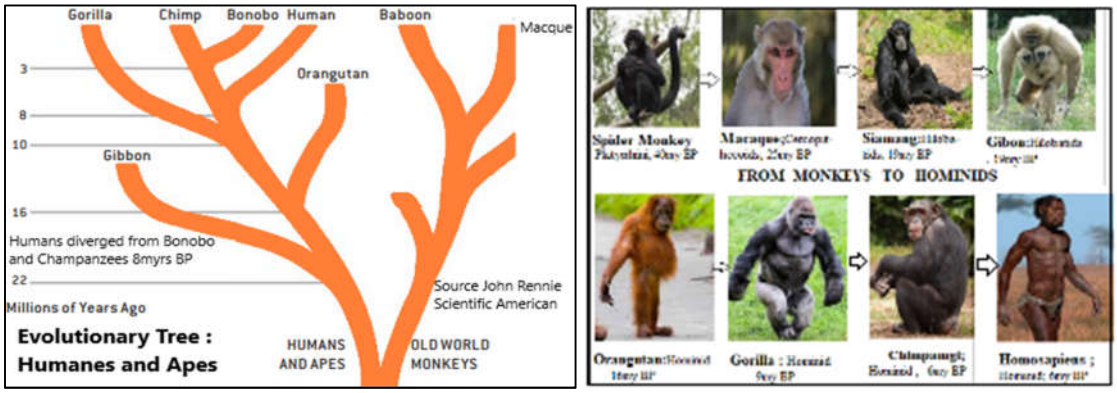


Fig 1(a): Evolutionary tree of hominid Origin from Monkey to Homosapiens Fig 1(b): Development in species

Dense forest, huge grass lands and favourable climate during the Pleistocene tempted many herbivorous mammals and the Homo erectus to migrate to India as immigrant. Invasive allied species (IAS) like rhinoceros, musk's, reindeer, mammoth's got migrated during ice age and bison, horse, wild hog, deer, elephant, hippopotamus, mastodon, giant beaver, and ground slot during warm period from Africa to India. The herbivores animals invited the carnivores animals like wild cats, tigers, lions, bears etc. to enter Indian subcontinent either from NW or from NE. The oceanic flora and fauna appearance and dispersion occurred with Pleistocene MSL rise / fall, SST, and change of strand line (Mishra S. P. et al., 2012[19]). Concurrently the indigenous ethnic species were repelled or became endangered. The warm climate made some existing species in endemic forms (from larger to dwarf variety). The driving factors are relatively CC with periodic fluctuations, new migrating routes at lower MSL (via Myanmar- India- Bangladesh- India) and (North western countries to India) and due uplift of some plateaus and building of mountain (Tatershall I., 1997[20]). Mammals living in cold areas are larger in size than they live in hot climate (Wright E., 2013[21]).

2.2. Quaternary climate changes (CC):

The sun earth geometry had many histrionic CC that transformed to present identical environment. In Paleo-environment; the flora and fauna is analogous to the present animal and plants. The only variance lies in climate induced changes due to large-scale migrations, evolutions, adaptations, and extinctions with creation of dominating predators; the homosapiens. The Pleistocene Epoch was much drier and colder than the present Anthropocene epoch with vast grass lands called mammoth steppes and higher nutritive productivity in from equator to mid-latitudes (Bagle M., 2014[22]). India had lost 20 acknowledged mammals since 100ky Cal BP but survived on adaptation with local extirpations under ecological stress in disjointed surroundings (Roberts P. et al., 2016[23]). The littoral drift and desertification of the north Arabian Sea displays vital role in migration of early homosapiens out of Africa into southern Asia (Field et al., 2007[24]; Dennell et al., 2012[25]; Augsta D Coasta 2019[26]).

3.0 MIGRATION AND ADAPTATION IN INDIA:

Modern people in India are up comings of H-erectus or Homo sapiens. These early Homo erectus originated from the Savanna of Africa and were the first species to walk with legs (bipedalism). Later they have mutated to modern humans during upper Pleistocene (Savanna Hypothesis), from ≈2.588million years (my) cal BP. They were capable of speech since 50ky BP only. These Homo erectus started migrating from Africa to Eurasia and India (after Toba Volcanic event, 74000yrs BP) in the different routes inland or through Arabian sea, when they became over-populated. They left their domicile area in search for food, habitation, haunting ground and comfort (≈ 70ky to 100kyBP). The early homosapiens are divided as Paleolithic (old), Mesolithic, (middle) and Neolithic (new stone age).

3.1 Post Pleistocene Migration

The migrated homosapiens gradually adapted to the hot (houses or caves) and cold climates (weathered skins clads and used to fire). For easy haunting and fishing they started making weapons of stone, wood and bones. They collected milk from chattels, fruit/ leaves of trees for eating. They used bark and leaves for cladding and medicines and utensils etc. These homosapiens used to hunt/kill wildlife or self-defense and used other the natural resources and finally settled in settlements. Finally from a continuous nomadic life they constructed building colonies mostly on bank of water bodies in communities and started agriculture for their sustainability. Homosapiens are most adaptable species among other species so it is the most dominating species of the Anthropocene Epoch.

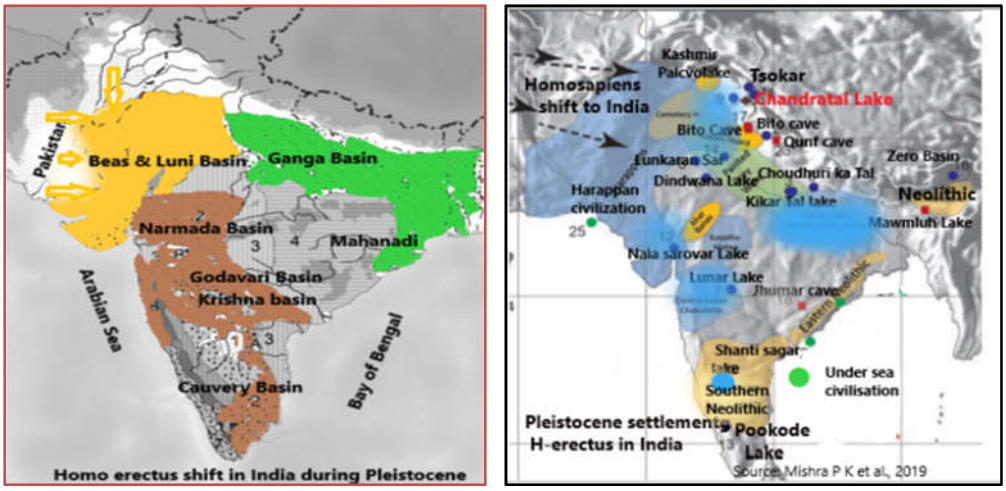


Fig 2: (a) The migration of Homosapiens from NW and settled in different river basins of India Fig 2(b) The shift and settlement locations at cave, lake and undersea during Pleistocene & Holocene epoch; https:// www. ncbi.nlm.nih. gov/pmc/articles/PMC2718386/;and http://www.episodes.org/journal/view.html?doi=10.18814

Immigration of Homo erectus from Africa to South Asia datable to 75ky to 50ky BP. Archeological findings reveal that west of Madurai, caves in Sri Lanka dates back to 34ky BP (Kennedy et al.,2000[27]; p-180, Blinkhorn. et al 2017[28]).) and Belan (Southern UP) of 18,000-17,000 years BP (Wikipedia),Son river valley (Dhaba) excavations and exhibits from lakes and caves prove homo-erectus were from Africa shifted to India about 60ky cal. BP related with the Toba super-volcano eruptions of 8.0ky BP https://earthsky.org/human-world/humans-india-survived-toba-super-volcano> The drying events inducing migration are associated with the periods of drying events concentrated around 9.8 ky, 9.2 ky, 8.2 ky, 4.7 ky, 4.2 ky, 3.7 ky, 3.2 ky, 2.8 ky, and 2.4 ky cal BP (Park et al., 2019[29]) (Fig 2.a &23.b).

3.2 Holocene Homo-sapiens Migration;

Holocene CC allured African and Eurasians to immigrate to India with knowledge of hunting and domestication of pets (Dogs and cows). Latter the homosapiens settled in communities and thrived with their own culture with agrarian background. on the banks of rivers, lakes or large water bodies in Northern India. They formed sedentary societies under monarchy. During cold period they migrated to southern or peninsular Indian River banks. Latter they were diversified spatially and developed technologically in metallurgy, art, literature and architecture. They had lastingly settled in southern India. The prolonged droughts, earth quakes, volcanic activities, meteorological extreme periods and climatic emergency forced them for migration to a new area or facing mass deaths end to civilization (Table 2).

Table 2: The Climatic Change and allied causative factors for human expatriation in India from 13000 to present

Cal Years BP	Period	Age	Climate change/ MSLR/MSLF	Proponent/ Remarks on Extinction
12800-10500 (late Glacial)	Pleistocene -holocene transition	Younger dryas	Lithic ice age deglaciation; cool & dry; global warming; glacial retreat Asia; (Neo-lithic age)	Megafauna; death of dinosaurs; lived in caves or huts or tepees and were hunters and gatherers
10500-9000 (Late glacial) (old stone age)	Early-Holocene (Natuflan Culture)	Boreal; Neo-lithic age	Glacial retreat in India; Cosmic impact; warm/wet climate; R/F shifted West;Weak monsoon and Younger dryas event; (meso lithic period)	Massive forest fire; MSL rise; Domestication plants and pets; agrarian settlement; Arid NW ITCZ,R/F zone shift west (250mm/yr); people India 0.1mn ; hot humid and frequent floods

9000-5000 (Post glacial) Holocene cli mate Opt- I mum (HCO)	Early-Holocene; Boreal (New stone age)	Boreal; Meso to Neo-lithic age;	Global warming, deglaciation, High SW monsoon rain; MSLF 40m; Av. Temp rise by 2 °C and short cooling 8800 to 8600yrs BP	People spread Mid-East to India; (Pothohar Plateau, Punjab, Siwalik Hill); Painting, writing & smelting copper/tin (Pinjore); Saraswati R. existed, people left S-India,(abortion, infanticide, war deaths)
7500-5000 (Pre-Harappan) Atlantic	Mid Holocene; 2 to 4.2 ky BP; HCO	Atlantic; (Neolithic to Chalcolith ic)	lake level high; westerlies R/F high(□7.2–6.0 ky BP); onset aridity in NW India early □5.3 ky BP; mixed broadleaf/conifer forests in high altitudes; wet events of short duration	Mehrgarh excavation; Permanent settlement; kingship & civilizations; Use of pottery and salts started; population increase in Sahara ; Gangetic civilization started; cool &dry; frequent droughts; Epidemic Cholera
5000-3500 yr BP (Neolithic to Chalcolithic) &HCO ,	Ramayan Era; India (Mid Holocene warm period) Atlantic	Atlantic;N eoglacial (MHT from 4.2ky BP)	late Holocene abrupt cooling; warm and humid climate; light mixed broad-leaved/conifer forests with heavy monsoon and active SW monsoon, ITCZ moving east; more grass land vegetation; Jainism in India	Populous South India;~ 5.5ky BP; warm-wet and cold-dry climate; Little Ice Age; 3.2 ky mega drought; collapsed (Indus valley & Mehrgarh); 3500BP; Gangetic civilisation in full bloom; Warm, moist & seasonal floods; 4000 to 3000 (warm-moist & seasonal floods);
3500-200BP (Roman warm period);	Bronze age; Early Harppan)	Subboreal; sub-atlantic	Lakes level oscilation; dry & less rainfall; Desication Saraswati R., Neo glacial period.	Many civilizations declined; Droughts; Pandemics; wars; warm & moist; dominant seasonality (Epic period)
Medievalwar m Optimum (MWO);Iron age	Post Holo cene ((1200 BP– 1300 AD),	Sub Atlantic Middle age)	Rise in MSL; warm sea; dented corals; intense storms; more drought and wild fire; less snow & ice, change in migration;	Irreversible biome; 2.0ky to 1.4 ky B.P; warm & moist with dominant seasonality; 1.4 to 1.1ky B.P.; cool & dry; frequent droughts; 1.1ky to 750 B.P. - MWO
Little Ice Age (LIA)-(1300AD - 1850 AD)	Post Holocene	Sub Atlantic	1400 to 1450 extreme -ve ISM; mixed broad-leaved/ conifer forests by mixed conifer/broad-leaved forests; Industry started more GHG gasses	Weak ISM (300 to 1850 AD), population rise to ~62.6mn to 200 mn. Urban spread ; many droughts, famines and epidemics; many dynasty collapsed; Muslim British Raj in India
Modern warm period;1850 to 1945AD (Industrial age)	Post Holocene period; Industrial revolution	Sub Atlantic (modern times)	Contemporary climate; ISM variability with proxies of solar variability; shifting of ITCZ to east from west; westerlies erratic monsoon; geological and meteorological extremes	Mixed Asian, Europe & African cultures in India; earth quakes, human deaths due to pandemics like cholera, influenza, small pox, plague and Cholera; _ve rate of population growth;human losses world war I and II and wars British and Indians
Anthropocene Epoch (1945 to 2020 Modern age	Golden spike and modern climate	Sub – Atlantic (Age of Human)	Monsoon remained dynamic; The SAT and SST rising; the extreme temp rise. MSLR and ISM rise, frequency of CS in BoB shall be less but intensity high. Pre and post cyclones shift south; intensified	Global warming; GMSL and RMSL; more coastal flooding, seasonal variability. (GHG) and Land Use (LU) rise; rise in Arabian sea dust storms; cyclones intensify; More geological activities earth quake, tsunamis; landslides; epidemics; floods & droughts

Source: Mishra et. al., 2018[31]; Naidu P. D. 1999[32]; Prasad S. 2006[33]; Szczęsny T J., 2016[34], Swapna et al 2020[35];https://shodhganga.inflibnet.ac.in/bitstream/10603/126409/14/11;Mishra S. P. 2018[36]; Basha G etal 2017[37]; Chauhan et al., 2012[38]; Zebroni et al., 2016[30]; Quamar et al., 2018[39]

The Pleistocene megafauna's extermination and intrusion of Homosapiens to India occurred from NW and NE direction. There was growth in population size of cattle, bovines, poultry, and pigs increased by 60%, human growth was 36 % whereas the wild animals had reduced to 4% (Sandom et al., 2014[40], smith et al 2018[41]).The migration of homosapiens from Africa occurred through many inlets during different ages like after pre and post Toba volcanic incidence 60 to 80ky BP. There is mentions of Ancient Ancestral South Indian; Andamanese (AASI), Indo Aryans arrived India 59–34ky BP. The major inlet was Africa – Eurasia- Indian subcontinent from Mesopotamia (near Caspian sea). They were known as Aryans; much civilized. They were the Iranian hunter gatherers or Neolithic farmers. The 2nd inlet was the Neolithic farmers from the Fertile Crescent, most likely from Zagros mountains (Iran), to Indian

subcontinent before 10,000 years BP (Narasimhan et al., 2018[42], 2019[43], McAlpin DW (1979)[44]) and Science daily 2020. The chronology of human growth was in two phases in India. The 1st was during 8200years BP due to agricultural revolution and the 2nd was the Industrial revolution from 1850 onwards. In combination both the growths have changed human life style, method of livelihood converting jungle mammals for domestication. As a result the zoonotic animals have brought the humans the bacteria's and viruses and leading to loss of life of the modern man.

3.3 Anthropocene human migration:

The top 10 nations that had ethnic migrant nationals 33.33%; where India was leading the list of 17.5mn in FY 2019 followed by other nations were Mexico; the 2nd largest dispersion was 11.8 mn. The other countries were China (10.7mn), Russia (10.5 mn), Syria (8.2 mn), Bangladesh (7.8 mn), Pakistan (6.3 mn), Ukraine (5.9 mn, Philippines (5.4 mn) and 10th is Afghanistan (5.1mn).Continent wise the statistics was Europe (82mn), followed by Northern America (59 million) and Northern Africa and Western Asia (49 million)https:// economictimes.indiatimes. com/nri/nris- in-news /at-17-5-million-indian. The immigrants, migrants of different communities of Indians within and foreign countries are high-skilled mavens to mainly USA and low-skilled technicians/workers to the developing Middle East. Gradually they have settled in those countries. They shall get genetically amalgamated in those countries in future. (Roberts et al., 2015[45])

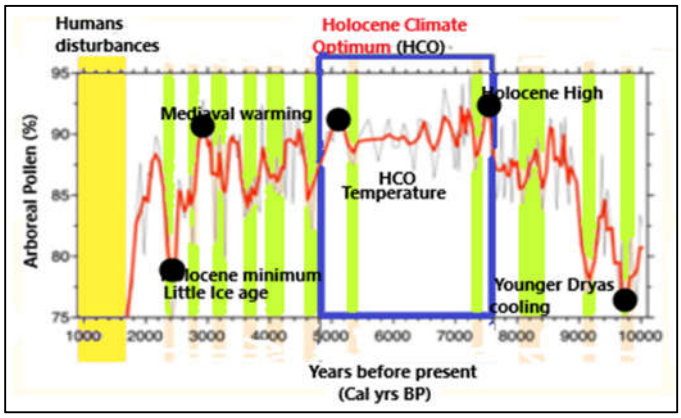
4.0 HUMAN EXTICTION

4.1 Pleistocene Homo-erectus Extinction:

Paleontologists reveals the mega faunal extinction of large mammals like mammoths, giant sloths, mastodons and saber-toothed cats (about >35 species) occurred before younger Dryas cooling event or strike of cosmic asteroids or comets or vast forest fire and hunting before 12.8 mny BP in Asia. The Big Five had gone in past and the Pleistocene sixth mass extinction is in vogue since 41000yrs BP during Pleistocene (PTI Washington; 26th Oct., 2019) which is mainly for lack of food and habitat. Transmittable diseases had catastrophic impact on human hunter-gatherer in post Pleistocene and pre-Holocene periods. During agrarian shift the spread of pandemics/epidemics likely malaria, influenza, tuberculosis (TB), smallpox, leprosy, and many others killed them in mass beyond natural deaths.

It is estimated that the ratio of Homosapiens and wild animals were 1:99% before Holocene. Amazingly at present the ratio is Human (32%), livestock (67%) and wild animals (1%) https://populationmatters.org/campaigns /anthropocene. Paleontologists records from Gopinath and Madhuban, Gujarat; gulf of Cambay exhibits reveal that some species of Paleo environment were of upper Pleistocene origin but had gone extinct at present like antelopes, Indian Rhino, wild Asian water buffalo, Indian auroch, Siwalik horse, Nillagiri cow, Gaiasiatic ass and many others. The earthly "megafauna" of mammals (>44 kg), of about 97 of 150 genera had become extinct globally before Holocene Koch et al., 2006[46]. Out of migrant faunal diversity of 24 from 49 taxa were belonging to Pinjor Plio in early Pleistocene formation and about six were Mid- Pleistocene in the Indian Peninsula and plains of Ganga, (Pattanaik et al 2010[47]),.

4.2 Holocene Extinction



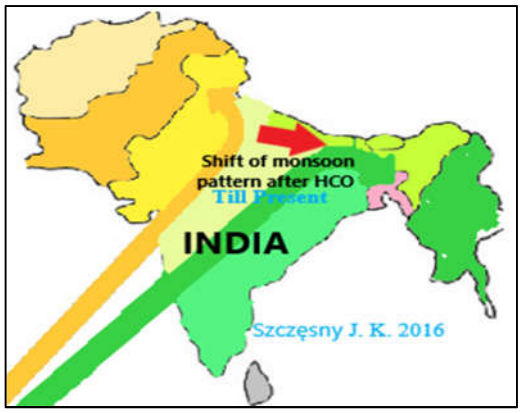


Fig 3.a: Drying events in Mid Holocene climate Optimum; Max deaths in the green box; (AP) diagram; Park et al; 2019[29] & 3.b: Shift SW monsoon from 4.2 ky BP (Source: &https://www.ncbi.nlm.nih.gov/pmcPMC 6658 530)

The cultural transitions during the Holocene were (i) Mesolithic to Neolithic at ~7000 BC (~8950 yr BP), (ii) Neolithic to Chalcolithic at ~4000 BC (~5950 yr BP), (iii) Chalcolithic to Iron Age at ~1500 BC (~3450 yr BP) (Misra, 2001). The Little Ice Age (1200 to 1700AD) had peak being 1300-1600 AD was relatively warm period, (https://ucmp.berkeley.edu /quaternary /holocene.php). The large mammalians had gone extinct were giant (>1000Kg), huge (400kg -1000kg), large (150-400kg), medium sized (50-150Kg) and medium (10kg to 50kg) during Pleistocene to Holocene. They were 97 species (8.2%) in Indian sub-continent, Malay, China, and SE Asia (Smith et. al., 2018[41], Wiki pedia).

Park et al., 2019[29] mentioned about drying events during cal. 9.8 ky BP, 9.2 ky BP, 8.2 ky BP, 4.7 ky BP, 4.2 ky BP, 3.7 ky BP, 3.2 ky BP, 2.8 ky BP, and 2.4 ky BP. The global maximum warming events and natural extremes had forest losses from 8.4 ky BP to 8 ky BP. The HCO lasted from 7.6 ky BP to 4.8 ky BP (Fig 4.a and 4.b). During the early and the mid Holocene climate optimum (HCO) period there were less human casualties due to strong SW monsoon and temperate by 2-30C (Rosalesa. Et al, 2014[48]). Four major flood phases were reported around 13.4ky–10.4ky, 8ky–3.6ky, 2.2ky–1.4ky, and after 1.4 ky BP (Sharma S et al., 2017[49]) (Fig 3(a) and Fig 3(b)

4.2.1 The 4.2 ka Climatic Event:

In last 4.2ky BP was a distinct age over India called as Meghalayan Age due to onset of poorest monsoon caused mega-drought that demolished different civilizations in India (Mehrgarh, Mohenjo-Daro and Harappa) nad fall of many dynasties due to weak monsoon and reduced food production. The Earth passed through a warm period with poor monsoon, with retreating of the glaciers during 10.8 ky BP. The cold climate returned for a short period but not so intense enough for the return of the old glaciers. The MSL rise/fall left lakes (Aral, Black sea in Asia, Dal in Kashmir etc.), till (sediment of glaciers) and drumlins (streamlined hills formed by ice movement).Just after HCO during 4.2ky BP, there was weak monsoon pattern causing desertification, arid and dry areas in north Africa and Arabia (collapse of Mehrgarh, Harappa and Mohenjo-Daro Mesopotamia Civilization) and shifted ITCZ.(Intra-tropical convergence zone)) towards Indian peninsula and NE India due to earth's larger axial inclination to the Sun along the tropic of cancer (Szczęsny J. K. 2016[34]). The shift had given Indians the cultivated cotton, sesame. They started domestication of pets & cattle's for food, medicine and milk. During HCO; India's west coast had mangroves growth due to MSLR. The Konkan coast faced MSLR and the mangroves deteriorated gradually.

4.3 Anthropocene Extinction

The Anthropocene presumably commenced from 1945 in India after atomic explosion and was accelerated by population explosion, industrialization and wild migration from rural to urban since 1970. The healthy air, water and light have been polluted particularly in slum areas of the urbans. Since the years; the procrastination and prevarication have unfolded many back geared crises like vector/ bacterial and viral impacts.. The Covid-19 pandemic in 2020 has warranted both health emergency and economic collapse (life and livelihood), by drowning the occupations of the migrant people due to collapse of industrial activities. The looming disasters like earthquake, storms, heat strokes, pest attack (Locusts), lightening, floods and has waved red flag to all the Indians and calling 6th mass extinction in India. Homosapiens are best adopted to geo and climate changes among other mammals on earth. Any change in abrupt strategy shall deluge distress to human life. The huge animals (mammals <40kg) have been downsized during adaptation to CC and the large to vanish in the process of mass extinction during pre-Holocene. The growth in population size of modern human has reached the apex.

5.0 THE EXTINCTION CAUSES

5.1 The reasons for Extinction in India

Pleistocene H- erectus were efficient hunter gatherers and they were less in number with ample space for livelihood. Their deaths were might be due to meteorological, geological extremes or cosmic impact or internal fights in India. The life span was less and mass deaths were rare and may be due to outbreak of pandemics or prey to carnivores. The community loving and intelligent H-erectus were strong and well-built enough to fight to escape any adverse conditions. The cause of death was the rapid alteration of the earth's ecosystem due to nuclear weapon tests, micro-plastic pollution,

agriculture, carbon emissions and other human contributions to the changing environment, (Anthropocene Working Group).

The Intergovernmental Panel on Climate Change (IPCC), 1st to 4th AR (Assessment Report; 2001[51], 2007[52], 2010[53] & 2014[54]) reported that the global sea surface temperature (SST) shall continue. The av. surface air temperature (SAT) have gone up by about 0.65°C in last 50 years after Anthropocene epoch. It is projected to rise by 1.1–6.4° C, in 2100. The temperature have ranked highest during last decade reaching apex 500C in India. There is rise in high altitude extreme rainfall, heat waves, geologic, meteorological extreme events and intensified of cyclonic storms both in Bay of Bengal and Arabian Sea.

5.1.1 Heat prompted climate:

Holocene is designated in average as the global warm period split into Greenlandian (11.7 to 8.2ky BP), Northgrippian (8.2 to 4.2ky BP) and Meghalayan (4.2ky BP to 1945AD)https://en.wikipedia.org/wiki Holocene. From the year1900 to 2018, the average (av.) temperature is endorsed to GHG emissions, LU/LC and global warming. India has risen by 0.7°C. today. The 21st century global warming has four dead line years (Year 2025 as climate cliffs ; Years 2042-2067 as extinction years including Homo-sapiens groups for highest ice melting); 2063-2072; human extinction due to immense GHG release. Year 2073 onwards the global warming shall be tippling point https://www.joboneforhumanity.org/the_4_most_critical_global_warming_deadlinesandtipping_points.

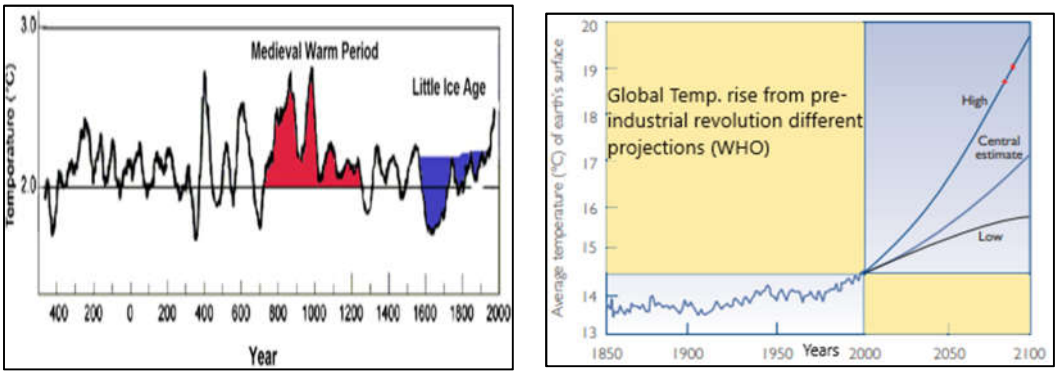


Fig 4(a) : The global temperature rise with prediction; Source; Anthony J. McMichael, 2012[62]; andFig 4(b) WHO http://www.impactlab.org/wp-content/uploads/2019/10/India Mortality _webv2.pdf

The use of fossil fuel use shall be doubled by 2040 and the average temperature may rise from present 240 C to 280 C by 2100 (varying in regions in India). Numbers of hot days shall increase and some shall be of extreme hot days (>450 C) (IPCC,AR-1[50], AR-2[51], AR -3[52] , AR-4[54]).. Greenstone et al., 2019[54] estimation, many states of India shall rise in deaths 1.5mn people/year induced by CC and projected to 60deaths per 100thousand people. The golden spike has summoned in summer more heat and hot days where six states of India got heat wave deaths are UP (402280), Bihar (136372), Rajasthan (121809), AP (116920), MP (10,370), and Maharashtra (106749) are projected to add 64% of the entire extra mortalities which is >1.5 mn fatalities/year induced from temp. rises caused by CC (Fig 4.a and Fig 4.b).

5.1.2 Glaciers retreat and MSLR effects:

MSLR shall cause flooding, paucity of drinking and irrigation water due to intrusion of salt water; loss in agriculture, food scarcity, affect marine fish catch; coastal water pollution of ground water, garbage dumps along sea coast and shall augment migration, loss in income; closure of industry, unemployment and loss of family life. States adjoining Himalayas are reliant on glacier water indirectly through emerging rivers of Himalayan glaciers. When glaciers shall retreat there shall be less water in rivers and carry more sediment laden water to the downstream which shall deplete the reservoirs downstream. Loss of irrigation shall inculcate food shortage and starvation for the rising demography. The large glaciers, G1 and G2 in Himalayas has retreated @ 18.3 m/year and @16.4 m/year, respectively, from 1962 to 2018, projected accelerated deglaciation after 2000 Rasid et al., 2020.[66].

5.1.3 Oxides of Carbon (CO & CO_2);

Greenhouse gases (GHG) constituting CO2, CH4 and oxides of Nitrogen are the players in atmosphere. Energiged by solar radiation the CO2 and other GHG's is warming the atmosphere. Present scenario is very high atmospheric temp. due to excess of CO2, GHG gases due to maximum burning of fossil fuel and energy consumption. Excess PM2.5 and PM10 in air add to upper atmospheric temp. causing dust storms, haze and more lightening etc.(Mishra S. P. 2018[55])

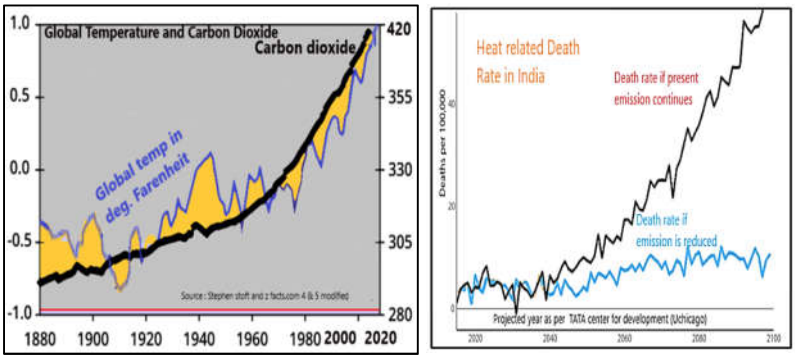


Fig 5.a : Global temperature vs CO2 curve from pre industrial revolution and Fig 5.b : Projected death rate status in India with and without present rising emission; (Source: Tata Centre for Dev, Chicago[54])

Methane, the captain of the GHG team (28-36 times as warming up activities than CO2 in the tropo and strato spheres (USEPA GWP). Oxides of Nitrogen (NOx) heighen the lightening process in thunder storms; a major killer during 21st century. Dust, Black caron and Sulphur hexafluoride or SF6 accumulated for long period in upper atmosphere enhances holes in Ozone layer. The UV of solar radiation have become threat for human health a silent killer and destroyer of human race, https://warmheartworldwide.org/climate-change/?gclid=. (Fig 5.a and 5.b)

Charles David, 1958 from Mauna Loa Observatory was first estimated CO2 on earth's atmosphere as 315 (PPM) and his son Ralph Keeling, 2014 (Keeling's curve), calculated the level to be 400 PPM. (Kandali S. K. 2020[56], Down to Earth). The Carbon level was maintained from Pleistocene was about 250ppm which had slightly increased to ≈280ppm during Industrial revolution (1880's). India receives about one million deaths/ year as part of air pollution diseases like Brain stroke (CVA), cardiac disease, lung cancer and COPD is the highest indexed level in the G20 countries. The use of fossil fuel, coal, agriculture and live stocks raised the CO2 level in India.

5.1.4 Milankovitch cycles:

The continuation of Earth's orbit's oscillatory change was given in Milankovitch cycles from the preceding last glacial period. The N- Hemisphere was in proximity of sun due to earth's obliquity (axial tilt 240) due to more solar radiation during early Holocene during ~ 11.0 to 9.0ky BP and persisted till ~4.0ky BP. It favoured formation of thunder storms and more death due to tornadoes, thunder storms and lightening due to shift of the Intertropical convergence zone to south. There seems to have been the predicted southward shift in the global band of TS, the Inter tropical Convergence Zone (ITCZ). The CC's shifting if rainfall from west to east had invited mass human loss. https://en.wikipedia.org/wiki/Holocene_climatic_optimum

5.1.5 Sunspot:

Cosmic rays have strong influence on the atmosphere and in biological exposure of Earth which is undervalued till date. Considering Sun earth geometry; the 8-11years solar cycle have major impact on the heliosphere. The solar Aurorae were observed for last 400years (1600 to 2000) by Hoyt et al., 1998 and was analyzed by NASA Astrophysics data system. There were lowest solar activity was the Maunder min^{m} (1645–1715) with minimum magnetic activity of the sun**(Fig 6).** Presently we are at the end of the modern maximum with more sun spots during 1998-2000 and minimum was during 2019.

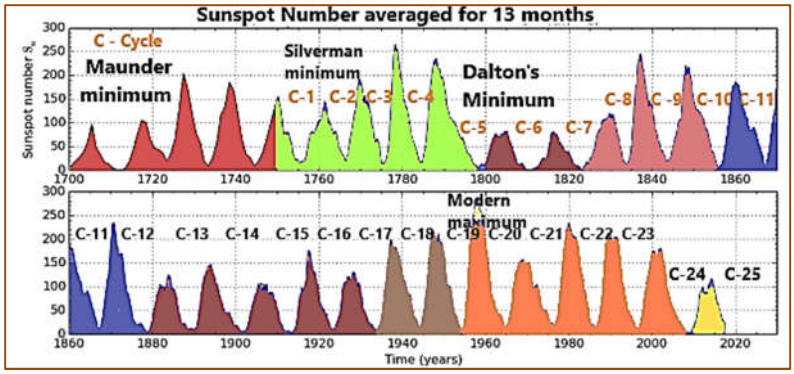


Fig 6 : The 300 years history of Sunspot number (Source: SILSO Graphic; Royal Obs., Belgium))

Cosmic rays degrade the magnetosphere and can develop mutation in human DNA/ RNA. Various researches report that the impact of minimum solar electromagnetic storms from solar aurorae can be the cause for cervical epithelial cancer, histopathologic changes suggesting malignancy and human physiological disorder. During the solar minimum human are less protected from the solar radiation and commonly affected by H1N1 flu, URTI infections during cycle 15 cycle (1918-1919) and Covid-19 during 2020 of present sunspot minimum.

5.1.6 The natural disasters:

Globally natural adversities had killed @ 60000 people/year which is about 0.1% of global mortalities https://ourworldindata.org/natural-disasters. The Famine and drought were the topmost in the list. The droughts in India were in 1917-18 in Kashmir valley, 2001-2002 droughts in whole India. The Mahanadi river had minimum flow (5005 cumec) in 2001 ever recorded. 1849 the floods in The Tapi River, The Ganga River flood (72900cumec) in 1954, Mahanadi R. peak flood 2008 (44750cumec) not only killer floods but reverse back the growths for few years. Other major tragic occurrence of destroy of the Machhu River (Aug 1979) due to Machhu-2 dam failure in Gujarat Rakhecha P. R. 2002[70]. Landslides are accompanied by outburst floods with torrential rains were disastrous phenomenon in past in India which have been classified as per time line major flood phases were 13.4–10.4, 8.3–3.6, 2.2–1.4, and < 1.4 ka. Before Famine; draughts and floods and cyclones were the major catastrophic events for death. But in the present Anthropocene the cyclonic storms, earth quake and tsunamis are the caused for human loss naturally.

5.1.7 MSL rise and Delta sediment paucity

India has 7500km coastline along east the Bay of Bengal and Arabian Sea in the West synchronizing the MSLR/ MSLF. The rise and fall of sea level was governed by sun earth geometry and oceanographic anomalies prior to industrial revolution and a little influence by human activities. Deltas are thickly populated and copiously cultivated. After 1850 onwards, Dams in inland rivers, estuary protection works, ports and constructions have changed the beach profile and the deltas are sinking, shrinking and subsiding at a much faster rate than sea due to paucity of sediments which contribute to food scarcity and deaths Syvitski et al., 2009[71], Mishra S.P., 2017[68]. The observations of IMD and NIO reports average GMSLR was 1.7 mm /yr for the 20th century which has risen to 3.3mm/yr between 1871993 to 2015 (Swapna et al 2020[35]). The Regional MSLR has been influenced by global MSLR due to global warming and deglaciation of glaciers formed during little ice age and ENSL, IOD events in North Indian Ocean may surge @ 20-30mm in coming 30years.

5.2 Post Holocene human health

It is under study that pandemics can be correlated with sunspots and cosmic rays that increases mortality (Hope-Simpson., 1978[60]). Wickramasinghe et al., 2017[61], reported pandemics like Small Pox, English Sweats, Plague and Cholera intensified during three grand minimum in numbers of sun spot were in record as the Sporer minimum (1450-1550 AD), Maunder minimum (1650-1700 AD) and the Dalton minimum (1800-1830). They were marked as the preponderance of pandemic years. Past literature reveals that the Wolf Minm (14th recorded) has exposed about a worldwide devastation of human and pets to deaths. Prolonged rainfall in (1314 – 1317) due to floods, failure of agriculture, drought and famine made the environment unbalanced. But people could survive as, nature can only recoup and regulates itself.

From 2018; it is observed that the monsoons have become erratic, the frequency/ intensity of cyclones has increased, the different manifestation of corona virus, attack of locust has directly or indirectly threat the modern human society especially the poorer group. The pandemic Covid-19 occurrences have made the globe challenging state of humans insecurity, https://www.downtoearth.org.in/blog/climate-change/multiple-crises-the-cost-of-wasted-time-71508;

Persistent food scarcities, starvation, virulent maladies have created due to Climate Change during the last millennium. Deaths and trauma had destabilized human health due to prolonged health issues, War and fights. Natural geological, climatic and meteorological extremes were also major causes for human health uncertainties. However the nexus floods, endemics /pandemics, droughts and famines had main causes for human extinction (Fig….) (McMichael A. J., 2012[62]).The famine in Orissa 1867, Maharashtra drought 1872, Bengal famine The siege at Kanpur; 5th June, 1857,, Satichaura Ghat massacre 27th June, The Jallianwala Bagh massacre 13th Apr., 1919 were the major political mass killings in India during 19th century.

5.2.1 Over exploitation of resources:

Homosapiens have multifold in numbers in India from pre golden spike i.e. 1970 onwards. They were about 1mn during pre-Holocene 11700yrs BP to 1380mn by June 2020 (Worldometer) with annual increase by 1% (at present) and projected to rise to ≈1650mn by 2050. With the land remaining constant; it will be highly impossible to provide drinking water, air, food and basic necessities for the very existence of human and other species. An only source left is the oceanic expanse which is polluted at present. Extinction risk have cumulated with global warming, carbon sequestration, MSLR, ocean acidification, and pollution, over exploitation of inland and marine resources. The agricultural land and the marine zone is overexploited along with the ground water sources for food and water. The war for food and water shall start under the natural and anthropogenic pollution. It is high time to conserve them and preserve and replenish them for future generation in India what our forefathers have destroyed.

5.2.2 Hyper virulent diseases:

The ancient physicians like Sushruta (9th or 8th ky BP, Vedic period India) Hippocrates (2480th–2399 yrs BP) and Galen (2129 years BP), Capdocea (1.0ky BP) had mentioned about an ailment like cholera Greece,https://www.history.com/topics/inventions/history-of-choleraandhttps://www.history.com/topics/middle-ages/ pandemics-. The Plague, a bacteria-led pandemic (1896 to 1939), caused 12 million deaths; Spanish Flu, caused by a virus, claimed 12 million lives in India within three months in 1918. https://www.indiatoday.in/india-today-insight/story/coronavirus-pandemics-of-the-past-1656730-2020-03-18.The Homosapiens faced sporadic mass death of human species and zoonotic animals by pandemics Ross MacPhee in 1997[57]. Pandemic along with the contamination of air (PM2.5 and PM10) is associated like PID's due to smog in cities caused mass death. At times virulent diseases or over population had invited deterioration of environments and had caused human extinction like west nile fever, tuberculosis, Plague, Malaria, sine flue H1N1 and present COVID-19 (Lyons et al. 2004[58] Mishra S. P. et al., 2020[59]).

Plague was first detected in 165AD. Leprosy detected during 11th century AD, TB in 1492 on earth. The Measles Pandemic was reported to be in 1875. The 1330's, and 1350's there were the period of vilest outbreak of plague in India and China. The largest declines in population started during post Holocene were Great Bengal famine of 1770 (10mn deaths),followed by severe ones in 1783, Orissa Famine 1866-68 (1mn deaths),1873, 1892, 1897 and 1943-44 due to CC and spread of pandemics,(https://yourstory.com/2014/08/bengal-famine-genocide Mohapatra S, 2020[72]). From 1920 onwards, India's life expectancy has consistently increased, but it is still below the global average. Flu has been mutated in different forms in the time line Russian Flu 1889; Spanish flu 1918, Asian Flu 1957, SARS 2003, MERS in 2005 and COVID-19 in 2019. Apart from these pandemics like HIV AIDS from 1981 which have been reducing population.

About 9.652mn people died in India in the year 2017 out of which .486 mn DALYs (0.427mn children only) (Disability-Adjusted Life Year).The mortality and morbidity are from various diseases. This statistics tells main source of loss of life is from the infant stage. Further 75% of the DALY's are in the rural and slum areas than the urban areas. The comparative study between 2007 and 2017 scenario indicates the rise in the diseases are due to heart diseases, (Chronic obstructive pulmonary diseases) COPD, stroke, diabetes, CKD (Chronic kidney diseases), road accidents, Asthma, and self-injuries were 49.8%, 39.4%, 37.1%, 53.8%, 35.9%, 10.7%, 6.2%, and 10.6% and the diseases reduced

were Diarrhea, TB, Lower respiratory infection, and neonatal disorders by 11.5%, 12.2%, 11.3% and 29.9% respectively, (IHME report,(http://www.healthdata.org/india), The pandemics can bring population extermination. That can be controlled by border controls, identifying active cases, trace contacts, quarantine, lock outs, containments, isolation, protection and Vaccination.

5.2.3 Pandemics and deaths India

The pandemics like dysentery, cholera, small pox, Influenza, Malaria, plague etc., were reported in past literature during the years 187-24 (8.75mn deaths), 1829, 1852, 1863, 1866-67, 1881, 1896-97 and 1899 as ladder to the six major pandemics during the 19th century. The deaths due to Bubonic plague in Muslim period in Bihar has reported about 1548 to 1573.The chronological records about pandemics and the death toll in India are silent. However deaths due to plague in Calcutta city were 1899 to 1911 were 21264 only Rao S. R. 1938[63]. It is projected 60% of infectious diseases and 70% of human infections have zoonotic source.. Human viral mortalities and morbidities are conjuncture with habitat loss, slums in cities, and upsurge in interaction with pets and arthropods in contact. The virulent bacterial/ parasites diseases in the last millennia are malaria, cholera, chikungunya, dysentery, dengue, kala-azar, and Japanese encephalitis. The viral pathogens that cause viral diseases in the same period are Enterovirus (EVs), Reo-virus, and Herpes-viruses. The nosocomial transmissions from viruses are influenza, SARS COV; MERS COV, RSV and finally the COVID-19 are the most lethal to human species (Mourya et al, 2019[64]). There is almost insufficient chronological record for the deaths due to pandemics separately for India. So the deaths related to pandemics in the present study can be considered from findings of, Nicholas LePan, 2020[65]. Pandemics are the major killer for human extinction in past and present on the earth along with health related diseases (Table 3).

Table 3 ; The sources of death in India due to natural extremes (sourse: Wikipedia and Authors previous work).

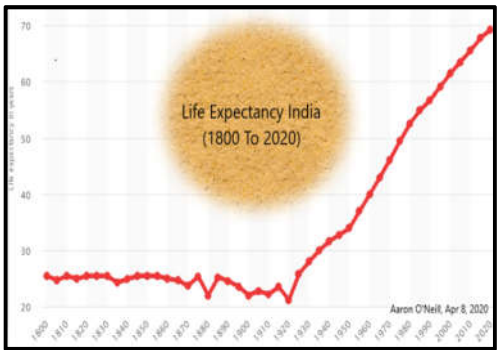
Famine	Climatic;Drought/ famine		Meteorological;Cylones, Flood/ rain			Geologic (Land slide; EQ, Tsunami			Pandemics/ epidemics (Global)		
Area	Year	Deaths	Area	Year	Deaths	EQ	Year	deaths	Pandemics	Year	death
Gr.Bengal	1769-70	10mn	North India(F)	1955	1700	Sardang)	1505	6000	Antonie lague	165-180	05mn
Chalisha	1982-84	11mn	East india (F)	1998	3838	Bombay	1618	2000	Justinian Plague	541-542	30-50mn
Doji-Bara	1791-92	11mn	Rajputana (F)	1943	10000	Srinagar	1885	3000	Japanese smallpox	735-737	01mn
Agra	1837-38	0.8mn	Bihar Flood	1961	1000	Kangra	1905	20000	Bubonicplague	1347-51	200mn
UpperDoab	1860-61	02mn	Rajsthan(F)	1968	4892	Nepal	1934	10700	Small pox	1520	56mn
Orissa	1865-67	01mn	North Ind(F)	1978	3800	And.&Ni	1941	8000	Plague 17th cent.	1600	03mn
Rajputana	1868-70	01.5mn	Gujarat Flood	1979	5000	Assam	1950	3300	Plague 18th cent.	1700	600mn
Bihar	1873-74	Least	S-. Ind. F&R	1993	3084	Uttarkasi	1991	2000	Cholera 6th	1817-23	1mn
South Ind.	1876-78	6-10mn	Odisha(Cy)	1999	10000	Lattur	1993	9748	Plague 3rd	1855	12mn
Indian	1896-97	05mn	East india(F)	2004	3076	Gujarat	2001	20023	Yellow fever	late 1800	100-150k
Indian	1899-00	03-10mn	Mumbai floods	2005	1503	Kashmir	2005	87351	HIV/AIDS	1981 cont.	25-35mn
Bengal	1943-44	1.5mn	Bihar (F)	2007	1287	Nepal	2015	8964	Swine Flu	2009-0	200K
Cyclone			NorthInd (F)	2013	5748	Landslide			Ebola	2014-16	11.3K
Bengal	1582	200k	Tamilnadu(F)	2015	381	Gauhati	1948	500	COVID-19	2019 conti….	
Calcutta	Oct	300-	India rain/	2016	8000	Kedarnat	2013	4190			

	1737	350k	flood			h					
AP (Nargis)	May 2008	138k	Kerala flood	2018	483	Tsunami					
Odisha (PDP)	Oct 1999	10k	India rain/flood	2019	1900	South coast	2004	10749			
AP	1977	14.2k									

5.3 Human population and extinctions:

The anthropogenic human loses in India from Anthropogenic events in India are due to Bhopal gas tragedy in 1993 killing 7928 persons. In the 1st and the 2nd world war during the periods 1919-20 and 74000 soldiers and 1939-45 about 87000 Indian soldiers (undivided India) reported martyrs from India. However there is continuous increase of death due to road/rail accidents which is anthropogenic in India. The Naxalite movement and homicides are also in increasing trend in independent India.

The demographic rise is based on natural resources. The biosphere has a threshold capacity to supply food and water for human existence. When the demographic growth crosses these thresh hold capacity for human sustenance then the human become vulnerable to the Biome. The small number of Homo-erectus those arrived India 60-80tky BP with plenty of food, lean water and habitat land is over exploited at present in India and now are vulnerable (Fig…)



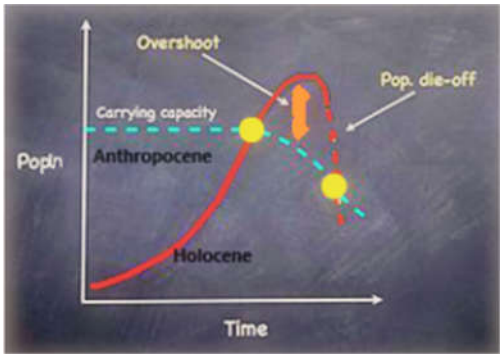


Fig 7.a : Life expectancy in India 1800-2020; Aaron O'Neill, Apr 8, 2020[67] Fig 7.b : Demographic growth has surpassed the sustainable threshold capacity; Source : (https://www.statista.com/statistics/1041383/life-expectancy-india-all-time/)(://www.biologicaldiversity.org/programs/population_and_sustainability/ extinction/)

From the date of invoke of the golden spike in India; 1980 onwards the population growth in India had surpassed the food grain increase causing stress on natural resources. From 1980 onwards; India had to face a number of natural and anthropogenic abnormal disasters. The year 2018 marks the centenary of the 1918 influenza pandemic. Then, India had the largest number of deaths in any single country (10-20 million) as well as highest percentage of excess deaths (4.39%) in the world Chandar et al., 2014[68];Kant et al, 2018[69]. Globally, about 3-5 mn cases and 290000-650000 deaths due to seasonal flu reported (WHO ; Kant et al 2018), Life expectancy in India 1800-2020; Published by Aaron O'Neill, Apr 8, 2020 in guardian have surged in 1920 from 25.4 to 70 years in India due to higher health care activities after independence. The climatic changes, the geographic and meteorological extremes, sun earth geometry provides human sustainability. The natural resources on earth has been exhaustive due to their over exploitation. The mass extinction of humans has no option for the nature to choose (Fig 7.a and Fig 7.b).

5.4 COVID-19 pandemic and human mortality India:

The most favoring path to human extinction is the Pandemic COVID-19. Starting from mid - March 2020, the pandemic has its monstrous grip over Indians covering 585k and deaths 17.41k on 1st July 2020 (Fig 8). The virulent virus does not mind for the position, cast, creed, age and economic condition of the prey around the globe. The 1st July 2020; have 19,459 new COVID-19 patients and death is 506 on the same day with a recovery rate of 59.4%. There are 10278k established patients of the pandemic COVID-19, with 507k deaths, (WHO on 28th June 2020[73]).

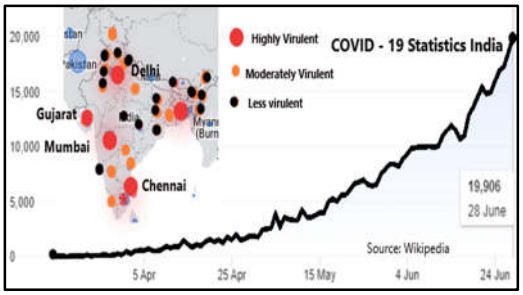


Fig 8 : The status of COVID Pandemic in India till 28th June 2020

6.0 SUMMARY

The extinction of 400 mammal and vertebrate which had been gone extinct during 19th century would have lasted for coming about 10 000 years without anthropogenic stress (IUCN). The global MSL rise (GMSLR) @ 1.7mm/year has been surged up during Anthropocene. Anthropogenic CC initiatives have contributed for global warming in last century from 1900 onwards. Swapna P et al., 2020[35]. The GMSLR in IO (Indian ocean) was 1.06 to 1.75mm/yr (1874 to 2004) but present record from 19993 to 2015 is 3.3mm/year is alarming because it will rise the meteorological extremes due to ocean thermal expansion and shall cause more devastation to the biosphere[74].

The SW, Westerlies and NE Monsoon are the deciding factor in history of Indian's health. The mid latitude areas near tropic of cancer in N- hemisphere have undergone vast desertification/ deforestation which shall increase albedo formation, boost trade winds, worsen desertification along horse latitudes. There may be 4.2ky BP climate recurrence causing destruction of modern human species in Anthropocene. The HCO monsoon shift shall be reversed (as in Fig 5) after passing through SE Asia shall become weaker and shall be driven to north and shall give more rain in winter. This phenomenon shall affect Indian monsoon and there shall be great chance for more precipitation in UAE, Arabia & Yemen. The under West India ocean (WIO) volcanic activities also aggravate the monsoon activities in the drought prone east African countries, like Somali and Mozambique etc. Szczęsny T. J., 2016[34]

6.1 Findings:

The major findings from study of the rise and fall of human specis in India are:

1. Present Indians are up comings of H-erectus or Homo sapiens and are the invasive allied species migrated from Africa to India during 70-80ky cal BP mainly entered from NW direction as hunter gatherers and with knowledge of domestication of pets after Toba Volcanic event and grew very fast and covered all over India..
2. The climate change in India during 8.2ky BP made them agriculturalists and invoked community settlements near water sources under headship of a ruler or a king. They only changed their dwellings under drastic extreme calamities like droughts, crop failures, epidemics and mass killing for territory invasion.
3. The agrarian shift encouraged domestication beyond some tree, plants, cows and sheep's to other zoonotic animals with advancement of speech, knowledge, societal and political inevitabilities.
4. These domesticated flora and zoonotic fauna's are the vectors those infected human species with bacterias and viruses became the main sources and reasons for endemics and pandemics that invited destruction of human growth under 6th extinction.
5. Geospatially, the climatic changes and shifting of ITCZ from west to east caused desertification and deforestation of the western India Fertile Crescent and forced the population to shift to south and eastern peninsula and ending the gargantuan civilizations like Mehrgarh, Harappa and Mohenjo-Daro and much Indus-valley civilization. Simultaneously many new civilizations grew up in Ganga-Brahmaputra valley, Mahanadi, Godavari, Krishna, Cauvery and Narmada valleys during 4.2ky BP warm climatic events.
6. Climatic changes, retreating of glaciers and weak monsoon or violent intensified storms were the killers of human species in past.
7. The sun earth geometry (the sunspots, Milankovitch cycles) and geological activities (plate tectonics and volcanic activities in NIO) of earth are the major players for human destruction during Holocene and Anthropocene.

8. From 1850 onwards the human species brought industrial revolution for modernization, Industrialization and urbanization. The modern man consumed more energy than before and increased the pollution of the atmosphere by GHG gases, hydrosphere by oil and effluents and the geosphere by solid wastes and excess fertilizers. The result was increase in human demises in diseases being affecting the longs, heart, kidney and multi-organ failures.
9. Among all the human killers; the epidemics are the major apocalyptic agent like cholera in 13th century, Plague in 18th century, H1N1 influenza during early 20th century and Corona virus-2 and HIV AIDS in 21st century are the prime causes of human destruction (Mohapatra S., 2020[75]).
10. Hydraulic interventions and anthropogenic activities across the rivers and coast has made the 7-8 major high yielding fertile deltas to sink, shrink and subside to convert them to a futile land with high salinity intrusion which is indicative signature of Anthropocene Zalasiewicz et al., 2019[76] ..

However under climatic catastrophe, the Homosapiens are best adopted to geo and climate changes among other mammals on earth (Rennie J., 2006[77]). The COVID -19 had infected about 10583 thousand people on earth in 215 countries and killed 5795th human species as on 1st Apr, 2020. India has 567 thousand confirmed cases out of which the death toll is about 17thousand covering all the states of India.

7.0 Conclusion

However present study reveals among natural causes of abrupt changes in the summer Indian monsoon during last millennium which is the deciding factor for the present human health in India. similarly the virulent microbial attack caused by anthropogenic activities in association with the vectors as zoonotic animals. It is estimated that 75% of diseases are due to eco health association. Pandemics are in full swing and the deciding factors to accelerate human extinction. Loss of habitat due to abrupt land use, attack of virulent COVID-19; food scarcity, locust attack, increased cyclonic storm intensity, earthquakes and atmospheric pollution are the players of the present day human loss from India. Human species are also under uncertainties of rising stress due to LU and CC. The modern homosapiens are within the 6th mass extinction. The present trend can be revoked only under planned policy implementations with proper record. However the homosapiens are the best and intelligent species of the present living beings to combat the present crisis and shall maintain sustainability for future generation.

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