

## A Review on importance of Samanya-Vishesh Siddhanta in Climate change induced biodiversity depletion.

Sakshi Patil<sup>1</sup>

Jaikrishna Chhangani<sup>2</sup>

Pramod Garje<sup>3</sup>

Ashish Gotmare<sup>4</sup>

*1PG Scholar*

*2Guide and Associate Professor*

*3Professor and HOD*

*4Assistant Professor*

*Department of Rognidan Evum Vikriti Vigyan, Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra, India.*

*Corresponding Author: Sakshi Patil*

Date of Submission: 04-07-2023

Date of Acceptance: 16-07-2023

### ABSTRACT:

#### Background-

Biodiversity has been crucially affected due to climate change resulting in its depletion. To maintain the balance of ecosystem, interaction between the plants, animals and biodiversity needs to be understood, hence promoting its conservation and protection by designating the hotspots as biosphere reserves, increasing afforestation, reforestation and agro-forestry practices. This can be well explained by Samanya Vishesh Siddhanth. The word Samanya denotes growth in Bhavpadarth while Vishesh leads destruction in Dravya, Guna and Karma. The motive behind this growth or depletion of Bhavpadarth is to achieve original Prakruti or state of equilibrium.

#### Methodology-

Climate change science points to an increase in sea surface temperature, increases in the severity of extreme weather events, declining air quality, and destabilizing natural systems due to increases in greenhouse gas emissions. (i.e.Samanya) This challenge requires strategies that are capable of countering the negative impact of climate change in ecosystems and biodiversity therein (i.e. Vishesh)

**Result-** Biodiversity-based adaption and mitigation strategies(i.e.Vishesh) will enhance the resilience of ecosystems.

**Conclusion-** The principle of Samanya and Vishesh has applicability not just in Ayurveda, but beyond as well.

**Key words-** Samanya, Vishesh, Climate change, Biodiversity, Depletion

### I. Introduction

There is a fundamental principle in Ayurveda, known as the principle of Samanya (similarity) and Vishesh (difference). While the principle was essentially propounded in the context of yuktivyapashraya (rational medicine) in Ayurveda, here we would like to argue that it has universal applicability in Ayurveda and beyond, across systems and domains of knowledge, including science, technology and humanities, as well as scientific, experiential and traditional knowledge systems. Taking examples of some of the most well-known problems of ecology, economy and society, we demonstrated the universal significance of the principle of Samanya and Vishesh.<sup>1</sup>

The trends towards more dangerous fire-weather conditions are likely to increase, due to rising concentrations of atmospheric greenhouse gases and the attendant escalation of wildfire risk factors. The next decade will be critical in building greater resilience and adaptive capacity to wildfires – including on the wildland-urban interface.

Plants and animals often use temperature, the arrival of rains and daylength as cues for the next stage in a seasonal cycle. Yet climate change is accelerating too quickly for many plant and animal species to adapt, causing disruption to the functioning of ecosystems. Rehabilitating habitats, building wildlife corridors to enhance habitat connectivity, shifting boundaries of protected areas and conserving biodiversity in productive

landscapes can help as immediate interventions. However, without strong efforts to reduce greenhouse gas emissions, these conservation measures will only delay the collapse of essential ecosystem services.

The 2019-2020 massive fires destroyed critical habitats for hundreds of species, including those already threatened with extinction. 2 (Frontier report)

### Climate change disrupts natural rhythms in plants and animals<sup>3</sup>

- Phenology is the timing of recurring life cycle stages, driven by environmental forces, and how, within an ecosystem, interacting species respond to the changing conditions. Plants and animals in terrestrial, aquatic and marine ecosystems use temperature, day-length or rainfall as cues for when to unfold leaf, flower, bear fruit, breed, nestle, pollinate, migrate or transform in other ways.
- Phenological shifts occur when species shift the timing of life cycle stages in response to changing environmental conditions altered by climate change. The concern is that interacting species in an ecosystem do not always shift the timing in the same direction or at the same rate.
- These phenological shifts are increasingly disturbed by climate change, pushing plants and animals out of synch with their natural rhythms and leading to mismatches, such as when plants shift life cycle stages faster than herbivores.
- Long-distance migrants are particularly vulnerable to phenological change. Local climatic cues that normally trigger migration may no longer accurately predict conditions at their destination and resting sites along the route.
- Phenological shifts in crops in response to seasonal variations will be challenging for food production in the face of climate change. Shifts in the phenology of commercially important marine species and their prey have significant consequences for stock and fisheries productivity.
- The full impacts of phenological mismatches require further research. Maintaining suitable habitats and ecological connectivity, strengthening the integrity of biological diversity, coordinating international efforts along migratory routes, supporting resilience and maintaining genetic variation within species are crucial conservation goals. Above all, limiting the rate of warming by reducing CO<sub>2</sub> emissions is essential.

Forests are essential for our planet's ecological balance and for our economy.<sup>1</sup> Several industries depend on healthy forests as they provide critical ecosystem services such as water- and climate-cycle regulation, erosion prevention, crop pollination and soil fertility. Forests absorb greenhouse-gas (GHG) emissions and their loss negatively affects the net-zero goals of companies that rely on them for carbon offsets. Ongoing deforestation therefore poses significant risks to companies and investors. 4

A quarter of existing animal and plant species could face extinction over the next several decades,<sup>5</sup>

## II. Methodology

- The literally material related to Climate Change induced Biodiversity depletion has been collected from several Articles from International Journal of Biological Innovations, Ecosystem Health and Sustainability, UN ENVIRONMENT PROGRAMME FRONTIERS 2022 REPORT. Other literature available from websites of United States Environmental Protection Agency, frontiers, Science direct was also collected.

- The literally material related to Samanya-Vishesh Siddhant has been collected from several ayurvedic texts like Charaka samhita, Asthang hridayam, Tarka Bhasha, Amarkosha. And other literature available from Search engine like PubMed, Google Scholar was also collected.

- These references from both streams of knowledge were compared and analysed critically.

### CONCEPT OF SAMANYA-VISHESHA SIDDHANTA WITH RESPECT TO CLIMATE CHANGE-

Globally, many types of extreme weather events are now more intense and occurring more frequently than in the past due to anthropogenic climate change. Anthropogenic Activities like Burning of Fossil Fuels, Pollution, Deforestation, Industrialisation, etc. are the anthropogenic activities which are responsible for CO<sub>2</sub> emission in Atmospheric Air.<sup>6,7</sup>

Climate is defined as the average weather conditions, characterized by long-term statistics for the meteorological elements in a given area<sup>8</sup>. While climate change (CC) is described as the change in the climate of an area as a result of anthropogenic and natural disorders such as the depletion of the ozone layer, and greenhouse effects.<sup>9</sup>

- Climate Change includes Global warming, more frequent & Extreme weather events (like hurricanes, monsoon and bizarre weather pattern)

- Increase in Green House Gases emissions (especially CO<sub>2</sub>)
- Extreme Temperature
- Extreme Weather
- Heavy Rains
- Forest Fires
- Ocean changes
- Changes in Cryosphere (snow, sea ice lake and river ice, iceberg, etc.)

The similarity and dissimilarity of substances or activities increases and decrease the property of Bhavpadarth respectively as per charak Samhita, "samanyamektvakaram, tulyarthata hi samanyam" (cha. Su. – 1/45)<sup>10</sup>

Anthropogenic drivers involve the contribution of human activities to increasing the emission of greenhouse gases like carbon dioxide, methane and nitrous oxide into the atmosphere at an alarming rate in different sectors such as in energy supply (25.9%), industrial sector (19.4%), deforestation (17.4%), agricultural (13.5%), transportation (13.1%), urbanization (7.9%) and waste (2.8%).<sup>11</sup>

#### **IMPACT OF CLIMATE CHANGE ON ENVIRONMENT<sup>11</sup> –**

Global warming: The impact of the greenhouse gases is the warming near surface global temperature through the greenhouse effect. The average global temperature has increased by 0.6°C since mid 1800s and is predicted to rise by 1.4-5.8°C by the year 2100. The global warming affects plants, animals and microorganisms both by changing their habitats and by directly affecting their physiological processes. Climate change has resulted in an increase in the temperature to about 5°C to the normal and has resulted in the melting of the ice, increase in sea level which is threatening the endemic species (polar bears, walrus, seals, emperor penguins, krill and ringed seal).

Coral bleaching: Another important phenomenon associated with temperature rise is coral bleaching. The rising temperature results into increase in sea temperatures which negatively impacts the corals resulting in vanishing of the reefs which are considered to be one of the most bio-diverse ecosystems.

#### **IMPACT OF CLIMATE CHANGE ON BIODIVERSITY<sup>11</sup> –**

Due to increase in temperature several plant species like *Berberis siatica*, *Taraxacum officinale*,

*Jasminum officinale* etc. have shifted towards higher altitude in Nainital.

Teak dominated forests are predicted to replace the Sal trees in central India and also the conifers may be replaced by the deciduous types.

Anonymous (2009) reported that changes in climate affects the normal life cycle of plant. He also reported that invasive species (*Lantana*, *Parthenium* and *Ageratum conyzoides*) are a threat to native species being more tolerant to climatic variations.<sup>12</sup> Slight change in climatic condition leads to the extinction of animal species. For example, climate change has resulted in extinction of animals like golden toad and Monteverde harlequin frog.<sup>13</sup>

Polar bears are in danger due to reduction in Arctic ice cover; North Atlantic whale may become extinct, as planktons which are its main food have shown declination due to climate change.<sup>13</sup>

Though the exact impact of climate change on India's natural resources is yet to be studied in detail, pioneering studies show that endemic mammals like the Nilgiri tahr face an increased risk of extinction.<sup>14</sup>

#### **IMPACT OF CLIMATE CHANGE ON ECOSYSTEM –**

Marine and Coastal ecosystem: Climate change is leading to sea level rise, increased coastal erosion, flooding, higher storm surges, sea salinity ingress, increased sea surface temperatures, ocean acidification and coral bleaching. The sea level rise recorded over the past 40 years is responsible for the loss of 28% of the mangrove ecosystem.<sup>15</sup>

Himalayan ecosystem: Temperatures in the Himalayan ecosystem are increasing at a rate of 0.9°C annually which is considerably higher than the global average of 0.7°C per decade. There are similar reports of flies at Mount Everest base camp in Nepal. The presence of these insects suggests the possible spread of vectorborne diseases, such as malaria and dengue fever, to areas where cooler temperatures previously protected people from these threats.<sup>16</sup>

Inland water ecosystem: Changing climatic conditions like rainfall and temperature lead to changes in the phenology, physiology and migration trends of some organisms like migratory fishes and birds.

Forest ecosystem: Greenhouse effect has led to increase in growth of some forest, migration of tree species towards high altitude, increased attack of pest, invasive species and wild fires, hence modifying the composition of forest. According to FAO (2000), due to these changes many animals,

primates and 9% of all known plant species are at verge of extinction.<sup>17</sup>  
 Anthropogenic activities lead to increase the level of carbon dioxide into environment which is one of the

greenhouse gases and the greenhouse effect results to climate change. This can be explained as per verse in charak Samhita.

Sarvada sarvabhavanam samanyam vriddhi Karanam| (cha.su.1/44)<sup>1</sup>

Ecosystem	Samanya(Similarity) (Samanyam vriddhikaranam)	Vishesh(Dissimilarity)(hrashetuvisheshachya)
Marine and Coastal ecosystem	<b>leading to sea level rise</b> , increased coastal erosion, flooding, higher storm surges, sea salinity ingress, <b>increased sea surface temperatures</b> , ocean acidification and <b>coral bleaching</b> .	• disturbance in habitat and patterns of survival of marine species•The sea level rise recorded over the past 40 years is responsible for <b>the loss of 28% of the mangrove ecosystem- 96% of suitable tiger habitat in the Sundarbans could be lost in the next 50–90 years</b>
Himalayan ecosystem:	<b>Temperature increasing at a rate of 0.9°C annually</b> which is higher than the global average of 0.7°C per decade.	<b>spread of vector borne diseases</b> , such as malaria and dengue fever, <b>to areas where cooler temperatures previously protected people from these threats</b> (Mount Everest base camp in Nepal & Tibet cities.)
Forest ecosystem	<b>Greenhouse effect has led to increase in migration of tree species towards high altitude</b> , increased attack of pest, invasive species and <b>wild fires</b> , hence modifying the composition of forest.	•alter migratory routes (and timings) of species that use both seasonal wetlands (e.g., migratory birds) and track seasonal changes in vegetation (e.g., herbivores) •wild animals that are unable to move or migrate are at risk.

III. DISCUSSION

- It is evident that the loss in biodiversity is due the change in climate. All these changes in environment, adversely affecting the biodiversity, are mainly due to the human activities. The increase in the greenhouse gases is leading to global warming at a faster rate and impacts on biodiversity, ecological balance and humans. Sarvada sarvabhavanam samanya vriddhikaranam| (cha. Su. -1/44)
- Even a small change in the climate can lead to the extinction of some vulnerable and sensitive species. Climate change results in the impact on the biodiversity like change in their distribution pattern, migration of species, invasion of invasive species, change in the phonological behaviour like breeding period, migration time etc., increase in the forest fires and pest attacks.
- To maintain the balance of ecosystem, interaction between the plants, animals and biodiversity needs to be understood, hence promoting

its conservation and protection by designating the hotspots as biosphere reserves, increasing forestation, reforestation and agro-forestry practices(i.e.vishesh). Biodiversity-based adaption and mitigation strategies will enhance the resilience of ecosystems and prevent damage to human and natural ecosystems.

IV. CONCLUSION

- The increase in the greenhouse gases is leading to global warming at a faster rate and impacts on biodiversity, ecological balance and humans.
- Increasing our understanding of the affects of climate change on biodiversity, developing ways of mitigating such effects and reduced anthropogenic activities are critical to limit such damage. Without conserving the biodiversity and minimizing the anthropogenic activities, it is almost impossible to get the inclusive and sustainable development. Thus, there is a growing realization among decision-makers

that biodiversity is not an optional bonus in human affairs, but the very foundation of our existence.

- Bringing an Ayurveda concept out from its premises is a new order of thinking. The path-breaking insights that were provided, have important implication for deciphering other basic principles of Ayurveda from the perspective of their wider applicability, and thus their robustness.

### References-

- [1]. Universal significance of the principle of Samanya and Vishesha beyond Ayurveda Deep Narayan Pandey, Neha Pandey Prakash, Journal of Ayurveda and Integrative Medicine 9 (2018) 308-311.
- [2]. Noise, Blazes and Mismatches – Frontiers 2022: Emerging Issues of Environmental Concern (UN ENVIRONMENT PROGRAMME FRONTIERS 2022 REPORT)
- [3]. <https://www.unep.org/news-and-stories/press-release/deadly-wildfires-noise-pollution-and-disruptive-timing-life-cycles>
- [4]. <https://www.msci.com/www/blog-posts/deforestation-risks-on-the-rise/03549423265>
- [5]. "The Global Assessment Report on Biodiversity and Ecosystem Services." Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, May 6, 2019.
- [6]. Hoegh-Guldberg, O., Jacob, D., Taylor, M., Bindi, M., Brown, S., Camilloni, I. et al. (2018). Impacts of 1.5°C Global Warming on Natural and Human Systems. In Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Masson-Delmotte, V., Zhai, P., Pörtner, H.O., Roberts, D., Skea, J., Shukla, P.R. et al. (eds.). In Press. <https://www.ipcc.ch/sr15/>
- [7]. The Intergovernmental Panel on Climate Change (2021). Summary for Policymakers. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/>
- [8]. WMO. WMO. Glob. Ozone Res. Monit. Proj. Geneva; 2006.
- [9]. Kotir JH. Climate change and variability in Sub-Saharan Africa: a review of current and future trends and impacts on agriculture and food security. Env Dev Sustain. 2011;13:587–605.
- [10]. Yadavji trikamji Acharya, Caraka samhita of Agnivesa. Ayurved Dipika Commentary by Chakrapani Dutta. Varanasi: Chaukhambha Surbharti Prakashan. edition 2014. Ch.Ni. 1/10; 2014.p.195.
- [11]. Rathore A. and Jasral Y.T. (2013). Biodiversity: Importance and Climate change Impacts. Inter. J. Sci. Res. Pub. 3(3): 1-5.
- [12]. Anonymous (2009). Impact of climate change on the vegetation of Nainital and its surroundings. NBRI Newsletter. 36:25-31.
- [13]. McCarthy J. J., Canziani O. F., Leary N. A., Dokken D. J. and White K. S. (2001). Climate Change 2001: Impacts, Adaptation, and Vulnerability. IPCC. Cambridge University Press, UK.
- [14]. Sukumar R., Suresh H.S. and Ramesh R. (1995). Climate change and its impact on tropical montane ecosystems in southern India. J. Biogeography. 22: 533- 536.
- [15]. Loucks C., Barber-Meyer S., Hossain A.A., Barlow A. and Chowdhury R.M. (2010). Sea level rise and tigers: predicted impacts to Bangladesh's Sundarbans mangroves. Clim. Change. 98 (1-2): 291-298.
- [16]. Food and Agriculture Organization (2012). Wildlife in a changing climate.FAO Forestry Paper 176.Eds (Edgar Kaeslin, Ian Redmond, Nigel Dudley). FAO, Rome.108p.
- [17]. Food and Agriculture Organization (2000). State of the World's forests, Rome, Italy.