# Project: Summarizing and Analyzing Research Papers

## Submission Template

**Learner Name**: [Gagan Gawande]

**Learner Email**: [gagangawande5@gmail.com]

**Topic**: [Environmental science]

**Research Paper**: [https://www.bing.com/ck/a?!&&p=fb98f09fe74d27804aadab917132bf31bd84a1b248ce09b2f649bbd70bfb660eJmltdHM9MTcyNjI3MjAwMCZpbnNpZD01MjA4&ptn=3&ver=2&hsh=4&fclid=0dfb6c64-5e8c-64e8-38a3-7ff15f106509&psq=resesarch+paper+on+impact+of+climate+change+on+biodiversity&u=a1aHR0cHM6Ly93d3cucmVzZWFyY2hnYXRlLm5ldC9wdWJsaWNhdGlvbi8zNDE2NzYyNTdfSW1wYWN0X29mX0NsaW1hdGVfQ2hhbmdlX29uX0Jpb2RpdmVyc2l0eV9Bbl9PdmVydmlldw&ntb=1]

### Initial Prompt

**Description (50 words max)**: [summarize the given below text in less then 200 words covering all the important information

Biodiversity is the 'Full variety of Life on Earth'. It includes diversity within species, between species and of ecosystem. The term biodiversity is generally used for natural environment and its conservation. According to UNCED (United Nations Conference on the Environmental and Development), 'Biodiversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.' In the simplest sense, biodiversity may be defined as the sum total of species richness, i.e. the number of species of plants, animals and microorganisms occurring in a given region, country, continent of the entire globe. Broadly speaking, the term biodiversity includes genetic diversity (Diversity of genes within a species), species diversity (Diversity among species), ecosystem diversity (Diversity at the level of community/ecosystem) and habitat diversity. The genetic diversity acts as a buffer for biodiversity (Verma, 2017a). Biodiversity is the very basis of human survival and economic development. It helps in maintaining the ecological balance. There is a necessity of ecological balance for widespread biodiversity (Verma 2017b). It plays an important role in the function of an ecosystem by providing many services like nutrients and water cycling, soil formation and retention, resistance against invasive species, pollination of plants, regulation of climate, as well as pest and pollution. Biodiversity is also the source of non-material benefits like spiritual and aesthetic values, knowledge system, cultural diversity and spiritual inspiration. Each and every one should understand the levels and values of biodiversity (Verma 2016), for the larger interest of the world. It is source of inspiration to musicians, painters, writers and other artists (Sharma and Mishra, 2011). India is one of the 12 mega biodiversity countries in the world and divided into 10 biogeographic regions. Our country accounts for two hotspots out of the 35 global biodiversity hotspots: the Indo-Malayam which includes the Eastern Sadguru Prakash and Seema Srivastava 61 Himalayas, North-east India and Andaman Islands, and the Western Ghats. Biogeographically, India is situated at the tri- junction of three realms: Afro-tropical, Indo-Malayan and Paleo-Arctic realms, and therefore, has characteristic elements from each of them. This assemblage of three distinct realms makes the country rich and unique in biological diversity. It has a great wealth of biological diversity in its forests, wetlands and in its marine areas. It is estimated that over 46,000 species of plants and 81,000 species of animals are found in India. The flowering plants comprise 15,000 species of which about 7000 species are endemic. Among the animal species diversity more than 50,000 species of insects, 4,000 molluscs, 6,500 other vertebrates, 2,546 fishes, 197 amphibians, 408 reptiles, 1224 birds and 350 species of mammals are found in different habitats (Myers et al., 2000). India is equally rich in traditional and indigenous knowledge, both coded and informal on the use and importance of the biodiversity in the country. For generations, thousands of human communities have lived in the midst of this rich biodiversity and evolved sustainable lifestyles, of a symbiotic nature with the natural bounty around them. In the last two centuries, these equations have been radically challenged and threatened by various factors. Among them are a social and political mandate that favours maximum extraction of natural resources to achieve a certain paradigm of 'development' and a top-down model of conservation that ignores and threatens the very existence of the first allies of conservation–local people whose lives are deeply entwined with that of their surrounding for their physical, social, emotional and moral sustenance, in fact their very livelihood (Roy and Roy, 2015). With the current trend of globalization and Intellectual Property Rights (IPR) regimes there is an urgent need for proper and scientific quantification and documentation of our biodiversity and associated traditional and indigenous knowledge especially in the developing country. This traditional knowledge is critical to science and society for maintaining the nation's natural resources, for growing its agricultural economy, for sustaining and improving the human health and its life style. Large scale development and construction have posed significant threat to biodiversity. It has lead to destruction of various fragile ecosystems. Human activities significantly contribute towards destruction of natural habitats. The construction of road, dams, mining activities and other development projects have led to destruction of biodiversity of that region. All these factors related to large scale development are one of the major contributors of threat to biodiversity. In the recent times India's biodiversity is severely threatened. The important causes of threats to biodiversity are the habitat destruction, invasive species, pollution, population and overexploitation of natural resources. Other prominent factor for the depletion of biodiversity is the rampant poaching. Though stringent laws have been enacted by the government regarding poaching and Wildlife Protection Act (1972) has been passed, which ensures the protection of wildlife and effectively deal with poaching related issues and also many arrests have been made regarding that in recent few years, it is still prevalent and is a cause of concern for the biodiversity and despite the government spending cores on the conservation of animals, the effective implementation of poaching related laws is yet a cause of concern. Similarly overharvesting of forest also depletes the biodiversity of the region. Another important factor is the conversion of land under forest and grasslands into residential lands and using them for other developmental activities which lead to depletion of biodiversity. Deforestation has a huge impact on the biodiversity and clearing of forests for developmental activities lead to reduced forest cover and also contributes to climate changes affecting ecosystems around the globe. The biodiversity loss has ecological impact (Kumar Ajay et al., 2017) and its main cause is the changes in the environment. Environmental conditions play a key role in defining the function and distribution of organisms, in combination with other factors. Environmental changes have had enormous impacts on biodiversity patterns in the past and will remain one of the major drivers of biodiversity patterns in the future. Environmental changes are studied under the change in climate or changes due to overpopulation, overexploitation of natural resources and deforestation. Figure: Link between climate change and its impacts on loss of biodiversity and ecosystem. 62 International Journal of Biological Innovations 1 (2), (DEC. 2019) Climate Change and its Impact The word climate refers to the weather variation of any specific area over a period of time. Climate includes the average temperature, amount of precipitation, days of sunlight, and other variables that might be measured at any given site. However, there are also changes within the Earth's environment that can affect the climate. Climate change refers to any change in the environment due to human activities or as a result of natural processes. Climate change refers to significant and long-term changes to a region's climate. These changes can occur over a few decades, or millions of years. Climate change alters entire ecosystems along with all of the plants and animals that live there. Plants and animals are sensitive to fluctuations in temperature and climate. Evidence of organic evolution clearly indicated that rapid climate changes have been associated with mass extension of plants and animals. Rapid climatic changes could lead to increased diseases, land slide, forest fire which result in destruction of animals and plants. All organisms are adapted to a particular range of climatic conditions. Change in the climatic condition has a danger of extinction of several plants and animals species. Although all species are not directly influenced by changes in environmental conditions but also indirectly influence through their interactions with other species. Indirect impacts are equally important in determining the response of plants to climate change. A species whose distribution changes as a direct result of climate change may 'invade' the range of another species for example, introducing a new competitive relationship.Thus climate change is likely to affect minimum and maximum temperatures and trigger more extreme rainfall events and storms. For the Indian sub-continent, less rainfall in winter and increased precipitation in the summer monsoon are predicted; and in 2050, decreases in winter precipitation by 10-20% and summer by 30% have been projected (Kumar and Chopra, 2009). Climate change results due to both; natural and anthropogenic driver. Natural drivers involves earth's climate variability caused by changes in the solar radiations, Milankovitch cycle, volcanic eruption, plate tectonics, ocean circulations, earthquakes and so on (Kunzing, 2008). Anthropogenic drivers involves the contribution of human activities to increasing the emission of green house 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%) (Rathore and Jasrai, 2013). IMPACT OF CLIMATE CHANGE ON ENVIRONMENT Global warming: The impact of the greenhouse gases is the warming near surface global temperature through the green house 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. The means sea level has risen by 10 to 20 cm and may further rise to 88cm (Rathore and Jasrai, 2013). 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, walruses, seals, emperor penguins, krill and ringed seal). Coral bleaching: Another important phenomenon associated with temperature rise is coral bleaching. When corals become affected by the rising temperature and other climatic issues they lose their beautiful colours turning white. 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. Water resources: Climate change affects the water resources thought increased evaporation rate. Increased evaporation rates are expected to reduce water supplies in many regions. The greatest deficits are expected to occur in the summer leading to be decreased soil moisture levels and more frequent and severe agriculture drought. More frequency and severe droughts arising from climate change will have serious and management implication for water resource users. Such droughts also impose costs in terms of wildfires both in control costs and lost timber and related resources. IMPACT OF CLIMATE CHANGE ON BIODIVERSITY Only a small change in pattern of climate has severe impact on the biodiversity, altering the habitats of the species and presenting a threat for their survival, making them vulnerable to extinction. Millennium Ecosystem Assessment (MEA) predicts climate change to be the principal threat to the biological diversity (Anonymous, 2007). Due to increase in temperature several plant species like Berberisa 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. According to Gates (1990) 3°Cincrease in temperature may leads to the forest movement of 2.50 km/ year which is ten times the rate of natural forest movement. 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. Variation in temperature and precipitation patterns can result in more frequent droughts and droughts and floods making indigenous plants more vulnerable to pests and diseases (Tibbetts, 2007). Slight change in climatic condition leads to the extinction of animal species. F]

**Generated Summary (100 words max)**: [Biodiversity encompasses the variety of life on Earth, including diversity within species, between species, and ecosystems. It is crucial for human survival, maintaining ecological balance, and supporting ecosystem services like nutrient cycling, pollination, and climate regulation. Biodiversity also provides cultural and spiritual benefits. India is one of 12 mega-biodiverse countries, hosting two global biodiversity hotspots (Eastern Himalayas and Western Ghats) and vast species richness with over 46,000 plant species and 81,000 animal species. However, biodiversity is increasingly threatened by habitat destruction, pollution, overexploitation, and climate change. Human activities, including deforestation, poaching, and large-scale development projects, significantly contribute to biodiversity loss. Additionally, climate change, driven by natural and anthropogenic factors, is altering ecosystems, causing species extinction, and shifting species distributions. Conservation efforts are essential, yet local communities and their traditional knowledge must be integrated into these efforts to protect biodiversity.]

### Insights and Applications

**Key Insights (150 words max)**: [ **Biodiversity** refers to the variety of life, including diversity within species, between species, and ecosystems.

 It plays a crucial role in human survival, ecological balance, and ecosystem functions like nutrient cycling, pollination, and climate regulation.

 India is among the world's 12 mega-biodiversity countries, with two global biodiversity hotspots: **Eastern Himalayas** and **Western Ghats**.

 India hosts over **46,000 plant species** and **81,000 animal species**, with high endemism in its flora and fauna.

 Biodiversity faces significant threats from **habitat destruction**, **pollution**, **overexploitation**, and **poaching**.

 Large-scale **development projects** (roads, dams, mining) contribute to biodiversity loss by destroying fragile ecosystems.

 **Deforestation** for residential and developmental activities reduces forest cover and worsens climate change.

 **Climate change** impacts biodiversity by altering ecosystems, leading to species extinction and increased vulnerability of native species to pests and diseases.

 Indigenous knowledge plays a vital role in sustainable biodiversity use, but is threatened by modern development and conservation practices.

 Conservation efforts are necessary but must include **local communities** and **traditional knowledge** to be effective.]

**Potential Applications (150 words max)**: [**Potential Applications and Implications of the Given Text and Data:**

1. **Biodiversity Conservation Policies**:
   * The data on India's biodiversity and its threats can inform government policies focused on **biodiversity conservation**, **sustainable development**, and **habitat restoration**.
   * Strengthening laws like the **Wildlife Protection Act** and better enforcement against poaching and illegal wildlife trade are critical.
2. **Sustainable Land Use and Development**:
   * Insights on biodiversity loss due to large-scale development projects highlight the need for **eco-friendly urban planning** and **environmental impact assessments** before any developmental activity.
   * Promoting **green infrastructure** can mitigate biodiversity loss while allowing economic growth.
3. **Climate Change Adaptation Strategies**:
   * The information on climate change impacts could guide **climate adaptation** programs focused on protecting vulnerable species and ecosystems from rising temperatures, extreme weather, and habitat shifts.
4. **Community-Based Conservation**:
   * The significance of **indigenous knowledge** implies that conservation strategies should involve **local communities** who have a symbiotic relationship with their ecosystems, integrating **traditional practices** for sustainable resource management.
5. **Educational and Awareness Campaigns**:
   * The text underscores the importance of biodiversity for ecological balance and human well-being, which can be used to design **awareness programs** to educate the public about the need for **conservation efforts**.
6. **Biodiversity Databases**:
   * The vast data on species diversity could be utilized to create **national biodiversity databases** for tracking species populations, endemic species, and threatened ecosystems.
7. **Eco-Tourism Development**:
   * India's rich biodiversity can be leveraged for **eco-tourism** development, promoting **sustainable travel** that benefits both conservation efforts and local economies.
8. **Scientific Research**:
   * The data could inspire further research in **conservation biology**, **climate impact studies**, and **sustainable agriculture**, leading to innovations that help mitigate biodiversity loss.

]

### Evaluation

**Clarity (50 words max)**: [**Assessment of Clarity for Final Summary and Insights**

**Final Summary Clarity:**

* **Conciseness**: The summary condenses complex information into a clear, manageable length (under 200 words), retaining all key aspects of the original text without overwhelming details.
* **Comprehensiveness**: It covers all the critical points about biodiversity, including its importance, threats (e.g., habitat destruction, climate change), India's unique biodiversity, and the role of indigenous knowledge.
* **Flow and Readability**: The summary flows logically from the definition of biodiversity to the specific case of India, then to threats and finally the need for conservation. However, a bit more linkage between ideas could enhance flow (e.g., explicitly connecting threats like climate change to the role of indigenous knowledge in adaptation).
* **Use of Terms**: The terminology is clear and academic, but still accessible to a general audience. Important terms like "endemism," "ecosystem services," and "climate change" are used properly without over-complication.
* **Accuracy**: The summary maintains factual integrity by not oversimplifying the original points or omitting key data.

**Insights Clarity:**

* **Structure**: Insights are presented in **bullet points**, making them easy to read and scan. Each point is clearly labeled and thematically distinct, which makes it easier for the reader to follow.
* **Actionability**: The insights suggest concrete applications like **policy reforms**, **community-based conservation**, and **educational programs**, all of which are grounded in the original data. These suggestions show a clear connection between the content and real-world applications.
* **Specificity**: The insights are specific enough to provide guidance but leave room for further elaboration. For example, "Eco-Tourism Development" could include details on how it benefits conservation or a specific location in India, but the general suggestion is clear.

]

### Reflection

**(250 words max)**: [The data emphasizes the critical importance of biodiversity for ecological stability, human survival, and economic development. Biodiversity encompasses a vast range of life forms, ecosystems, and genetic diversity, providing essential services like climate regulation, nutrient cycling, and pollination. India's rich biodiversity, being one of the world's 12 mega-biodiverse countries, is a key asset, but it faces severe threats due to habitat destruction, pollution, deforestation, and climate change.

Human activities—especially large-scale development projects, resource overexploitation, and poaching—are primary drivers of biodiversity loss. These issues not only degrade ecosystems but also diminish the livelihood and traditional knowledge of local communities, who have historically coexisted symbiotically with their environments. The data calls for integrating these communities into conservation efforts, suggesting that top-down conservation models need rethinking to ensure better alignment with the people most impacted.

Furthermore, climate change exacerbates biodiversity loss by altering habitats, driving species extinction, and shifting species distributions. Its long-term effects, such as global warming and increased extreme weather events, pose additional challenges for biodiversity preservation.

Overall, the reflection stresses the urgent need for holistic, multi-faceted approaches to conservation, including enhanced **policy frameworks**, **community involvement**, and **climate adaptation strategies**. It also underscores the necessity of leveraging **indigenous knowledge** and promoting **sustainable development** to protect the world's biodiversity. Immediate and effective actions are essential to maintain ecological balance and safeguard biodiversity for future generations.

Top of Form

Bottom of Form

]