# **Project: Summarizing and Analyzing Research Papers**

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**Topic:** Environmental Science: Summarize and analyze research on the impact of climatechange on biodiversity

**Research Paper:** <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4572353>

### **Initial Prompt**

**Description:** Analyze and compile a summary of the following texts. In this prompt I asked the Gen AI tool to analyze and compile a summary of the texts of the research paper. Following this prompt I input a part of the research paper .

#### Generated Summary: 1. Study Objective and Scope

The study aims to analyze forest fire susceptibility in Nepal using a machine learning approach, particularly focusing on understanding spatiotemporal patterns and trends of forest fires. It leverages a range of environmental variables to estimate fire risk and assess the impact on carbon stocks.

**2. Study Area and Data**

* **Geographic Scope**: Nepal, spanning 147,516 sq. km with diverse geographic regions (Tarai, Hills, and Mountains) and climatic conditions.
* **Data Sources**:
  + **Forest Fire Data**: FIRMS NASA dataset, which uses MODIS satellite imagery to provide near-real-time forest fire information.
  + **Environmental Variables**: Rainfall-based, temperature-based, and terrain-based factors are used to assess fire susceptibility.
  + **Carbon Data**: Soil organic carbon (SOC) and above-ground woody carbon data are used to estimate carbon at risk.

**3. Analysis Methodology**

1. **Data Collection**:
   * **Forest Fire Locations**: From FIRMS NASA and additional covariates.
   * **Environmental Variables**: Selected through correlation analysis and feature selection methods.

### **Iteration 1:**

### **Description:** “I have more texts that I want you to summarize, please provide a summary for that text also. Following this prompt, I entered another big part of the research paper, as the word limit for prompt is quite short.

### **Generated Summary**:

### **Forest Fire Susceptibility:**

* + The study assesses forest fire susceptibility across Nepal over four sub-decadal periods (2001-2020).
  + It highlights significant variation in susceptibility across different provinces and time periods.
  + Regions like Lumbini, Madhesh, and Sudurpashchim have shown increasing susceptibility, while others like Koshi have decreased.

1. **Carbon Dynamics:**
   * Forest fire susceptibility is linked to changes in soil organic carbon (SOC) and above-ground woody carbon.
   * There is a clear trend: as susceptibility increases, both average and total SOC and woody carbon decrease.
   * High-risk areas hold less carbon, which suggests significant carbon release due to fires.

### **Iteration 2:**

**Description:** “Please generate a summary of the following text and the text I have already entered.” I then proceeded to enter the remaining text and asked the tool to generate a summary of it.

### **Generated Summary:**

### Potential Benefits of Forest Fires

1. **Nutrient Recycling:**
   * Forest fires help in the recycling of nutrients back into the soil. The burning of plant material releases nutrients like nitrogen and phosphorus, which can improve soil fertility and promote new plant growth.
2. **Pest Control:**
   * Fire can reduce the number of pests and pathogens by destroying their habitat and lifecycle stages. This can help in controlling pest populations and promoting healthier forest ecosystems.
3. **Climate Regulation:**
   * While forest fires release carbon dioxide (CO2), they can also contribute to climate regulation by influencing plant succession and forest composition, which impacts long-term carbon sequestration.
4. **Smoke-Induced Germination:**
   * Some plant species require the chemicals in smoke to trigger seed germination. Fire-induced germination helps in the regeneration

### **Final Prompt:**

**Description:** “Now, generate a summary of all the texts I have sent in this session in a maximum 100 words.” I then prompted the tool to generate a summary of the whole text passage in 100 words.

**Generated Summary:** “This study analyzes forest fire susceptibility in Nepal over two decades, revealing that climate change and topographic features significantly influence fire risk. Key findings include the increasing importance of climate variables and the substantial impact on carbon stocks, with about 200 million tonnes of soil organic carbon and 45 million tonnes of woody carbon at risk. Biodiversity in high-risk areas faces severe threats. The study calls for tailored fire management strategies and future research integrating advanced climate models and socio-economic factors to enhance fire risk mitigation and climate adaptation efforts.”

### **Insights and Applications**

Key Insights: The research provides insights into forest fire susceptibility in Nepal, highlighting the complex interplay between topographical, climatic, and anthropogenic factors. Key findings include variations in fire risk across regions and time periods, with increased susceptibility linked to factors such as northness and climatic variables. The study also reveals the impact of forest fires on carbon stocks, showing that higher fire susceptibility areas generally have lower soil and woody carbon. This underscores the need for targeted fire management strategies. Additionally, it emphasizes the role of climate change and human activities in shaping fire risks and suggests integrating socio-economic factors and advanced climate models for more effective fire management and conservation strategies.

Potential Applications: This research can be applied in several ways:

1. \*\*Fire Management\*\*: Develop targeted fire prevention and control strategies based on identified high-risk areas and susceptibility trends.

2. \*\*Conservation Planning\*\*: Prioritize conservation efforts and resources for high-risk areas to protect biodiversity and safeguard endangered species.

3. \*\*Climate Adaptation\*\*: Integrate findings into climate adaptation strategies by addressing the impacts of forest fires on carbon stocks and assessing how changing climate patterns influence fire susceptibility.

4. \*\*Policy Making\*\*: Inform policy and land management decisions by providing data on forest fire risks and carbon dynamics, guiding regulations and planning.

5. \*\*Community Engagement\*\*: Enhance community-based fire management by understanding local fire risks and incorporating traditional knowledge and practices into fire prevention strategies.

### **Evaluation**

Clarity: The final summary clearly explains the subject in brief given the strict word limit. I would say that the insights provided by the AI tool are on par with the insights a person would gain by reading the paper. The language of the summary and the insights is very clear and easily understood.

Accuracy: The summary is amazingly accurate and to-the-point offering precise and concise information about the topics in the research paper while giving optimum weightage to each of them as per the document. The insights also accurately elaborate the topics in the text without being lengthy.

Relevance: In view of the current scenario about climate change in the world, I would say that the summary and insights are very relevant to the stakeholders and common people. The insights can prove especially valuable when addressing similar problems in other areas of the Himalayas.

### **Reflection:**

As this was the first time I used Skillible to learn something, I was very excited and completed every goal before the deadline. The learning experience was honestly quite positive although I would like to mention a few challenges/inconveniences faced during this course. Firstly, I would like to say that even though the quality of the videos provided was fine, it would’ve been better if they were all either AI-generated or recorded by an instructor. Secondly, the learning interface required me to login every single time I wanted to access the site which is an unnecessary hassle. Third, during the initial days of the course, we were not aware that there would be an assignment to be eligible for a certificate. Many of the students might’ve stopped after completing the video lectures and missed out on gaining a valuable certificate. On a positive note, I learned many new things and about many useful tools which might come in handy in future based on my career path. I also learned about the different prompting techniques, types of generative AI models and how they work.

Lastly, I am really grateful to Skillible and AICTE for providing me the opportunity to pursue this course and I would like to thank everyone involved in making this course happen.