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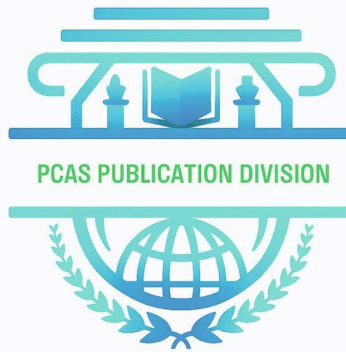
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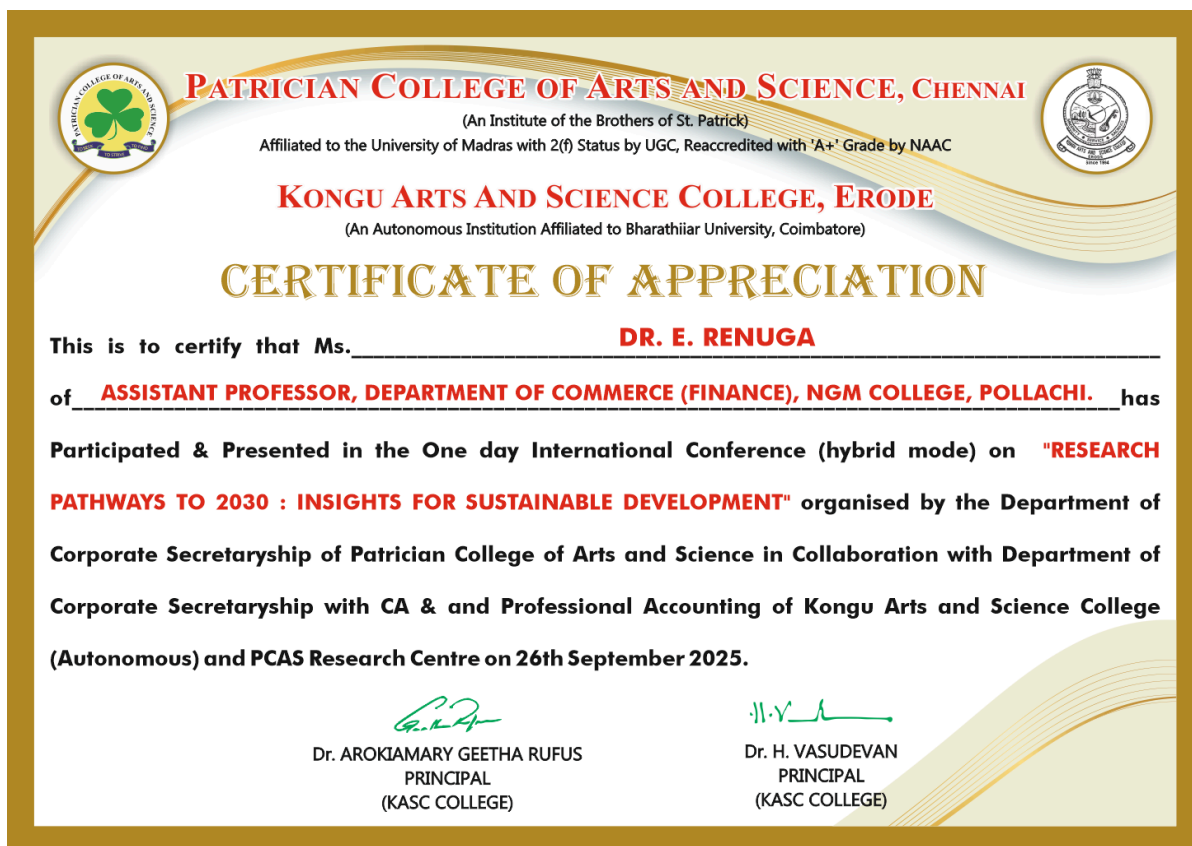
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ENVIRONMENTAL SUSTAINABILITY & CLIMATE PATHWAYS

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ABSTRACT

Environmental sustainability and climate resilience are central to achieving the 2030 Agenda for Sustainable Development. With the world facing unprecedented challenges of global warming, biodiversity loss, and resource depletion, it is imperative to reimagine pathways that balance economic growth with ecological integrity. This sub-theme explores innovative strategies and research insights on renewable and clean energy transitions, climate change mitigation and adaptation, sustainable agriculture, water and land-use management, as well as biodiversity conservation. It emphasizes the role of science, technology, and policy integration in fostering low-carbon development and building climate-resilient communities. The discussions aim to identify actionable frameworks that can bridge the gap between research and practice, ensuring a just, inclusive, and sustainable future. By drawing from interdisciplinary perspectives and global best practices, this track highlights solutions that not only address environmental challenges but also contribute to social equity and long-term planetary well-being.

Keywords: Environment, Sustainability, Climate Change, Climate Resilience, Renewable Energy

INTRODUCTION

Environmental sustainability has emerged as one of the most pressing global challenges of the 21st century. Rapid industrialization, urbanization, and unsustainable consumption patterns have contributed to escalating greenhouse gas emissions, biodiversity loss, deforestation, and resource depletion. Climate change, with its far-reaching impacts on ecosystems, human health, food security, and economic stability, has become a defining issue that requires urgent and coordinated global action.

The concept of climate pathways provides a scientific framework to understand and project the possible trajectories of climate change under different socio-economic and policy scenarios. These pathways emphasize the importance of transitioning towards low-carbon

development, renewable energy adoption, sustainable agriculture, circular economy practices, and nature-based solutions. They also highlight the role of international agreements such as the Paris Agreement in setting targets for limiting global temperature rise and achieving net-zero emissions.

Addressing environmental sustainability and shaping effective climate pathways calls for a multi-dimensional approach involving policy innovation, technological advancement, community participation, and global collaboration. Governments, industries, academia, and civil society must work together to balance economic growth with ecological preservation, ensuring that development today does not compromise the needs of future generations.

Thus, exploring environmental sustainability and climate pathways is not only about mitigating climate risks but also about fostering resilience, equity, and a sustainable future for all.

CAUSES OF CLIMATE CHANGE

Generating Power

Most electricity is made by burning fossil fuels like coal, oil, and gas, which release harmful greenhouse gases that trap heat in the atmosphere. About a quarter of electricity worldwide comes from clean sources like wind and solar, which don't produce these gases.

Manufacturing Goods

Factories produce a lot of emissions by burning fossil fuels to make things like cement, steel, plastics, and clothes. Mining and construction also release greenhouse gases. Manufacturing is one of the biggest sources of emissions worldwide.

Cutting Down Forests

When forests are cut down to make farms or pastures, the carbon stored in trees is released into the air. Around 12 million hectares of forest are destroyed every year. Since forests absorb carbon dioxide, cutting them down also reduces nature's ability to fight climate change.

Using Transportation

Cars, trucks, ships, and planes mostly use fossil fuels, making transportation a major source of greenhouse gases. Road vehicles produce the most emissions, but emissions from ships and planes are growing. Transport accounts for about a quarter of energy-related carbon emissions globally.

Producing Food

Food production releases greenhouse gases in many ways: clearing land, livestock digestion, fertilizers, and running farm machines (usually on fossil fuels). Packaging and transporting food also add emissions. Overall, food production contributes a lot to climate change.

Powering Buildings

Homes and businesses use over half of all electricity globally. Heating, cooling, lighting, and appliances mostly rely on fossil fuels, producing significant emissions. Increased use of air conditioners and other devices has raised emissions from buildings.

Consuming Too Much

Our daily habits—how we use energy, travel, eat, and what we throw away—add to greenhouse gas emissions. The richest 1% of people produce more emissions than the poorest 50%, showing that wealthier lifestyles have a bigger impact on the planet.

EFFECTS OF CLIMATE CHANGE

Hotter Temperatures

As greenhouse gases increase, the Earth's temperature rises. The last decade (2011-2020) was the hottest ever recorded. More heatwaves and hot days are happening, making it harder to work outside and causing more heat-related illnesses. Hotter weather also makes wildfires start and spread more easily. The Arctic is warming twice as fast as the rest of the world.

More Severe Storms

Storms like hurricanes and typhoons are becoming stronger and more frequent. Warmer air holds more moisture, leading to heavier rain and floods. Warmer oceans feed these storms, causing more damage, loss of homes, and deaths.

Increased Drought

Some regions are getting drier, causing water shortages. Droughts harm crops and wildlife, and deserts are growing, making it harder to grow food. Dust storms also become worse during droughts, affecting large areas.

Warming and Rising Oceans

Oceans absorb most of the heat from global warming and are getting warmer faster. Warm water expands, causing sea levels to rise, which threatens coastal areas. Melting ice also adds to rising seas. The ocean absorbs carbon dioxide but becomes more acidic, harming fish and coral reefs.

Loss of Species

Climate change is causing many plants and animals to disappear. Species are dying off 1,000 times faster than normal, with about one million at risk of extinction. Wildfires, bad weather, and diseases also threaten wildlife.

Not Enough Food

Climate change and extreme weather are causing hunger to rise globally. Crops, fish, and livestock are less productive or destroyed. Ocean acidification harms fish populations. In Arctic areas, changes in ice and snow affect traditional food sources. Heat stress reduces water and grass for animals.

More Health Risks

Climate change is the biggest health threat to people. It causes air pollution, spreads diseases, increases extreme weather deaths, and harms mental health. Around 13 million people die each year due to environmental factors worsened by climate change.

Poverty and Displacement

Climate change worsens poverty by destroying homes, jobs, and food sources. Floods can wipe out entire communities. Heat makes outdoor work harder. Water shortages affect farming. Each year, about 23 million people are forced to move because of weather-related disasters, mostly in vulnerable countries.

UNDERSTANDING ENVIRONMENTAL SUSTAINABILITY

Environmental sustainability refers to the responsible management and use of natural resources to meet current needs without compromising the ability of future generations to meet their own. It involves maintaining the health of ecosystems, conserving biodiversity, and ensuring that human activities do not cause long-term damage to the planet.

Key Principles

Environmental sustainability is about balancing economic growth, social well-being, and environmental protection. The key principles include:

- **Resource Conservation:** Using natural resources like water, soil, and forests in a way that they can replenish naturally.
- **Pollution Reduction:** Minimizing harmful emissions and waste to protect air, water, and soil quality.
- **Ecosystem Protection:** Preserving biodiversity and natural habitats to maintain ecological balance.
- **Renewable Energy Use:** Shifting from fossil fuels to renewable sources like wind, solar, and hydropower.
- **Sustainable Consumption:** Encouraging responsible consumption patterns that reduce waste and environmental impact.
- **Intergenerational Equity:** Ensuring that future generations inherit a healthy planet.

CONCLUSION

Environmental sustainability and climate pathways are central to shaping a resilient and equitable future. As climate change intensifies, the need for sustainable practices, clean energy transitions, and adaptive policies becomes increasingly urgent. By aligning global development with low-carbon pathways, societies can balance economic growth with ecological preservation. Collaborative efforts among governments, industries, and communities are vital to accelerate innovation, promote renewable energy, conserve biodiversity, and strengthen climate resilience. Ultimately, achieving sustainability is not just about mitigating risks but also about creating opportunities for inclusive growth, social justice, and intergenerational equity. A strong commitment to climate pathways today will ensure a healthier planet and sustainable prosperity for generations to come.

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