ENVIRONMENT AND DISPLACEMENT MITIGATION STRATEGIES BY TECHNOLOGY AND GREEN ENERGY

Wania Tahir[1], Dr. Raja Asif[2], Bushra Tahir[3], Muhammad Ismail Memond[4]

[1] Graduate School of Science and Technology, Gunma University Kiryu, Japan

[2] Balochistan University of Information Technology, Engineering and Management Sciences, Pakistan

[3] Department of Oral and mexillofacial Surgery, Ziauddin University, Karachi, Pakistan.

[4] Department of Oral and mexillofacial Surgery, Indus Medical College Tando Mummad Khan, Pakistan.

ABSTRACT

Climate change has a wide range of varied, extremely unclear socioeconomic repercussions that vary with time and geography. A vital response to the practical and achievable adaptation and lessening of the difficulties presented by the changing environmental condition is groundbreaking technology. Adaptation of the goals, strategies, and tactics for promoting and creating innovative technologies to solve these disparities or uncertainties regarding climatic changes is therefore regarded as a worthwhile endeavor. This study aims to provide a concise and detailed overview of recent technological advancements in the context of mitigating climate change. While technological innovation has its role, some argue that addressing climate change should come first. This requires a comprehensive approach that takes a nontechnical stance and involves collaborations between the public and commercial sectors. The authors conclude that important adaptation projects that could lessen the devastating effects of climate change would be driven by development in technology when it is anchored by political will.

Keywords: *Climate Change, Smart Vehicles System, Sensors, Technology. Digital meters.*

1. INTRODUCTION

The impact of climate change, that has been rapidly upsetting ecosystems, raising temperatures worldwide, and raising the intensity and frequency of extreme weather events, is one of the most urgent issues confronting humanity today (Matos, et al., 2022). Global well-being of people, sustainability of the environment, and economic stability are all at risk from these developments. There currently exists little agreement on how technologies interact with social vulnerabilities, governance capacity, and human displacement – a crucial research gap – despite the fact that technological progress is often touted as the key to reducing and adapting to global warming.

"Global climate change" alludes to the ongoing increase in Earth's average temperature caused by increasing greenhouse gas concentrations.

The combustion of fossil fuels and destruction of forests, especially, have contributed significantly to rising atmospheric levels of carbon dioxide due to human activities, which resulted in melting glaciers, rising sea levels, destruction of ecosystems, and enhanced fluctuations in the climate. A growing threat to existence, especially in warm areas, such as climate change, aggravate forced migration and dispersion. Meanwhile, there are not enough integrative theories that link technologies adaptation, governance in institutions, and the impacts of moving in particular in cases when collaboration between policies and conflict exposure are insufficient.

The level of research on mitigation techniques is growing, but much of it focuses on reducing emission and technical effectiveness, sometimes ignoring the wider social and political elements through which climatic impacts cause conflict, immigration, and human relocation. The gap across technological mitigation strategies and their ability to lessen the displacement of people brought on by warmer temperatures is the primary focus of this essay, particularly in areas where organizational division, regulatory constraints, and violence obstruct effective mitigation. Even if innovations like environmentally friendly agriculture, smart infrastructure, and energy efficiency are developing quickly, little is known about how they could lessen forced migration and boost social resistance.

1.1 Research Questions

The following research questions serve as the study's compass in order to close this gap:

1. What role do technology adaptation techniques play in reducing the effects of climate change and fostering resilience?
2. What governance and institutional obstacles prevent climate technology from being implemented effectively?
3. How are migration and human displacement caused by climate change, conflict, and poor governance?

4. How might adaptation that is made possible by technology lessen the dangers of displacement and vulnerability?

1.2 Climate Change

Climate change is one of the most important issues of our day because it threatens ecosystems, human well-being, and global economy. "Climate change" basically refers to long-term changes in temperature, precipitation patterns, and other climatic variables that are mostly brought about by human activity, such as industrial activities, deforestation, and the burning of fossil fuels (Axon, 2010). The wide-ranging and complex consequences of climate change affect both human and environmental systems (Dwivedi et al., 2022). For example, by increasing the frequency and intensity of heatwaves, rising global temperatures have changed long-standing weather patterns and made extreme weather events like storms, droughts, and floods worse (Richard & Newell, 2022). Rising temperatures also disproportionately impact vulnerable groups, such as the poor, indigenous peoples, and developing countries, widening already-existing social and economic divides. Those who live in these areas are more vulnerable to the effects of climate change and typically suffer from being in poverty and moving from their homes as well as experiencing instability in their social environments because of the lack of resources & infrastructure to adapt to the current climate.

In addition to putting people's lives and infrastructure at risk, these shifts in temperature and precipitation patterns also affect the Ecosystem by impacting the Plant and Animal species, Water resources, and Crop production which will result in significant threats to ecological stability and nutrition and therefore humans.

Climate change is a global problem that will require action at both the local and international level to address it today and in the future. Local communities, especially those that are most vulnerable to the impacts of climate change, need access to solutions that will allow them to be able to cope with the effects of climate change. An example of a solution would be an investment in a social safety net; investment in early warning systems; and development of climate resilient infrastructure required to minimize exposure to risks and to sustain their livelihoods in an ever-changing climate (Alestra, et al., 2024). The global community largely embraced the Framework Convention on Climate Change as a large multilateral initiative to advance the goal of limiting the average global temperature rise to no more than 2 degrees Celsius over pre-industrial levels with the signing of the 2015 Paris Agreement (United Nations Department of Economic and Social Affairs, 2008).

Still, alternative energy sources and improvements to overall energy efficiency to minimize impacts will require significant amount of investment or mitigative policies through land use regulations.

The way people make choices and act every day, influences climate change as a global crisis. Individuals can decrease greenhouse gas emissions while building a sustainable future for all of us by reducing their energy consumption, disposing of their waste responsibly, encouraging environmentally friendly transportation, and supporting laws aimed at reversing climate change. The phrase "climate change" describes significant and long-lasting changes in regional and global climates over time – usually measured in terms of decades or longer (Matos, et al., 2022) and can include changes to temperature patterns, precipitation patterns, sea levels, and destructive weather systems such as flooding and drought.

There has been an increase in the level of greenhouse gases in the atmosphere as a result of many human activities, such as burning fossil fuels, logging, making things, and farming, all of which have contributed toward warming our planet's surface.

Climate change poses a global threat to biodiversity, ecosystems, water resources, agricultural production, and human health, as well as to the economic viability of our planet (Dwivedi et al., 2022). Climate change also incorporates several global phenomena, including the increasing levels of water vapor in the ocean, the melting of glaciers at the polar regions, increasing sea levels, and changes in biota or habitat due to climate change.

In order to combat the existential threat of warming planet temperatures, every segment of our society must take immediate and aggressive action.

1.3 Green Energy

Implementing the adjustment Moving away from coal and petroleum and toward renewable energy sources like wind, hydropower, and solar power is one of the best ways to fight climate change.

Our carbon footprint has decreased since these sources provide energy without releasing greenhouse gases into the atmosphere (Richard & Newell, 2022). The cost of renewable energy has drastically decreased recently due to technical advancements, increasing its accessibility and competitiveness (Richard & Newell, 2022).

1.4 Energy Efficiency

Increasing energy efficiency is a carping component in the fight against climate change. Here, technology is crucial because it has created smart grids, energy-saving appliances, and cutting- building materials. Sensors and smart meters monitor and optimize energy use, cutting down on waste and pollutants (Khor, 2012).

1.5 Carbon Capture and Storage (CCS)

Carbon Emission can completely stop releasing carbon dioxide into the atmosphere; it will always happen to some extent. With the use of CCS technology, Emissions of Carbon Dioxide (co2) from power industrial plant and industrial processes are captured and stored underground, halting their contribution to climate change (Axon, 2010).

1.6 Rainforest deforestation and Afforestation:

By removing carbon dioxide from the atmosphere, forests are essential to reducing climate change. Technology can help with afforestation and reforestation project implementation as well as monitoring deforestation (Nwankwo, Ukhurebor, & Aigbe, 2020). To increase the efficiency of these initiatives, drones, satellite imagery, and machine learning algorithms can be used to pinpoint locations for tree planting and track the health of the forests (Tahir, et al., 2024).

1.7 Education and Awareness:

A further significant purpose that technology has is to educate and increase public understanding of the effects of climate change. A wide range of audiences may be reached and conversations on environmental issues can be sparked by online platforms, social media, and interactive teaching methods. Immersion strategies that illustrate the consequences of climate change and promote empathy and action include mixed reality and augmented reality (AR).

2. THE WAY CLIMATE CHANGE EFFECTS LIFE

Climate change has a wide range of effects on life on Earth, including not only the planet's ecosystems but also many aspects of human existence. Among the notable results are:

• Coastal erosion, flooding, and saltwater intrusion into freshwater sources are all consequences of rising sea levels that have an impact on agriculture, marine ecosystems, and human populations.

• Extreme weather occurrences include heatwaves, droughts, storms, and wildfires that occur more frequently and intensely and cause property damage, fatalities, and displaced people.

• Water scarcity: Patterns of precipitation changing and evaporation increasing as a result of rising temperatures, impacting farming, agriculture, and consumption by humans.

• Factors influencing agricultural production, food quality, and distribution lead to inadequate nutrition, monetary losses, and social instability.

• Human health: Warmer weather increases heat stress, the spread of sickness, and other health issues, especially for vulnerable populations including the elderly, small children, and those with underlying medical conditions.

• The loss of biodiversity results in ecosystems changing, species going extinct, and sensitive biological balances being upset, endangering the health of wildlife, forests, and oceans.

• Economic repercussions: Trade, international markets, and economic growth are all impacted by climate change, which raises expenses, reduces economic stability, and results in job losses.

• Impacts on society and culture: Migration, displacement, and cultural deterioration are brought on by climate change, endangering the way of life and cultural legacy for people all over the world.

• Increased risk for environmental disasters: Landslides, tsunamis, and other natural catastrophes become more frequent and severe as a result of climate change, endangering infrastructure and human lives.

Psychological and emotional toll: Stress, anxiousness, and trauma brought on by climate change have a negative impact on mental health and wellbeing, particularly in areas where the events are immediately felt by the community.

3. TECHNOLOGY IN CLIMATE

Although there are many technologies available to mitigate climate change, we believe that the following are the most effective: methane loss; cement that is climate-friendly; electric and hybrid vehicles; lighting that uses less energy; renewable energy technologies "wind, solar, geothermal, marine energy, hydropower, biomass, and waste to energy"; and concrete that is climate-friendly (Khor, 2012).

Figure 1. Diagrammatic Representation of Technologies Mitigating Climate Change.

3.1 Smart Traffic Infrastructure

Increased risk for environmental disasters: Landslides, tsunamis, and other natural catastrophes become more frequent and severe as a consequence of environmental condition , endangering infrastructure and anthropomorphic lives (Richard & Newell, 2022).

Psychological and emotional toll: Stress, anxiousness, and trauma brought on by climate change have a negative impact on mental health and well-being, particularly in areas where the events are immediately felt by the community.

Smart roads employ Internet of Things (IoT) tendency to improve dynamic safety, efficiency, and environmental sustainability in accordance with government goals. Smart highways integrate software structures like artificial intelligence and big data with physical infrastructures like sensing element and solar sheet (Nwankwo, Ukhurebor, & Aigbe, 2020).

Smart road technologies are built into roadways and have a variety of uses, including energy generation, communication with connected and autonomous vehicles, visibility improvement, condition monitoring, and more (Richard & Newell, 2022).

A network of sensors and communication systems are used by smart road technology, which is like an upgrade for our roads, to gather data and enhance our travel experience. Imagine if the automobiles and the roads could communicate with one another! This is an explanation of how it operates (Khor, 2012).

3.2 Significance of Smart Traffic Infrastructure

The role of smart road technology in contemporary transportation is significant because it promotes environmental sustainability, ensures infrastructure resilience, improves safety, increases efficiency, improves the user experience, and makes it easier for future solutions for mobility to emerge (Tahir, Wagan, & Naeem, 2021).

Figure 2. Smart Traffic Infrastructure

3.3 Primary Objective of Smart Infrastructure on Climate

Creating transportation systems that are safer, more effective, and environmentally sustainable is the main goal of applying smart road technology. It also aims to improve overall user mobility (Abbass, et al., 2022).

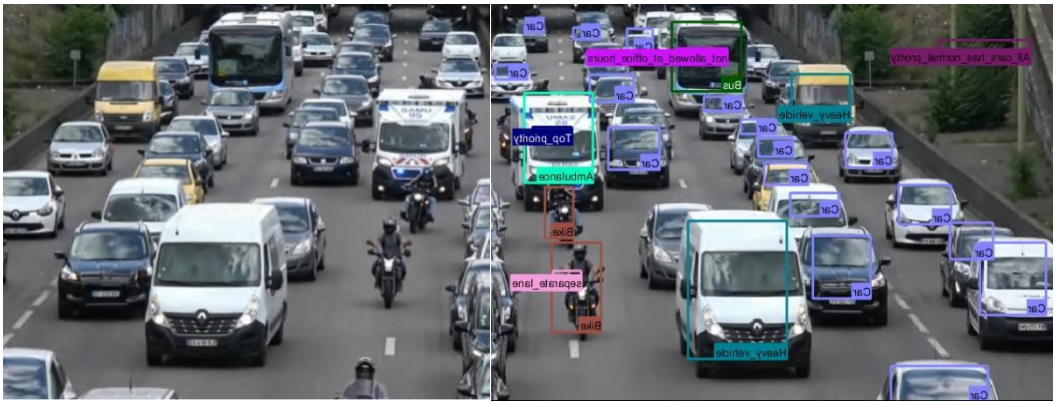

Figure 3. Smart Vehicles Priority

3.4 Potential applications of smart road technology in the future

• Self-driving automobiles and smart roadways will be able to communicate, making mobility safer and more effective.

• Roads equipped with technology to produce and store renewable energy, hence lowering reliance on conventional energy sources, are known as "energy-harvesting roads."

• Dynamic road surfaces are ones that adjust to the weather, increasing traction and lowering collision rates.

• Augmented Reality Navigation: Drivers can access real-time safety alerts and navigation using heads-up displays that are built into windshields.

• Roads with sensors and displays that communicate with bikes and pedestrians to improve convenience and safety are known as interactive infrastructure. These prospective developments show how smart road technology might completely transform transportation in a way that is sustainable, safe, and efficient (Tahir, Wagan, & Naeem, 2021).

3.5 Electric Vehicles:

Emissions of greenhouse gases are largely caused by transportation. Electric vehicles (EVs) that run on clean energy are a good choice. Battery technology advancements have made electric automobiles (EVs) cheaper and give them a greater range than normal fossil-fuel powered vehicles. Improved EV charging facilities will encourage widespread use of EVs.

3.6 Climate Change's Impact on the Environment: Regarding Smart Vehicles Infrastructure

The delicate balance of our planet is at risk due to the pressing issue of global warming. The use of electric transportation could reduce greenhouse gases and the negative environmental impacts associated with traditional combustion engines (Dwivedi et al., 2022). This is one of the many ways connected to the effects of climate change that electric transportation is lauded for addressing. To evaluate the degree to which electric transport successfully addresses these global problems, it is imperative to have an understanding of how electric transportation impacts climate and environmental change.

3.7 Minimize Emissions of Greenhouse Gases:

The delicate balance between the world's ecosystems is threatened by Climate Change. One promising way to mitigate climate change and reduce the environmental impacts associated with traditional fossil-fueled transportation is through the use of electric vehicles (EVs) for transportation (Dwivedi et al., 2022). Many individuals tout that the transportation sector's adoption of EVs can halt or reverse climate change; however, one must fully comprehend both how EVs contribute to and influence climate change as well as the natural environment before assessing the ability of an EV-based transportation system to assist with solving climate change-related challenges on a global scale.

3.8 Minimize Emissions of Greenhouse Gases:

One of the greatest benefits of utilizing electric transportation is that they can drastically reduce GHG emissions. This is accomplished through using electric vehicles (EV's), which generate zero pollution from burning fossil fuel, including particulates, carbon dioxide (CO2) and nitrogen oxides (NOx). Shifting away from conventional gasoline and diesel-powered vehicles to EV's will result in a significant reduction in the air pollutants that contribute to poor health. Furthermore, when electric vehicles are powered by renewable sources such as wind and solar power, they have an almost zero-carbon footprint and will play an important role in reducing the negative effects of climate change (Abbass, et al., 2022). Buses and cars that run on electricity have a lot of promises to benefit the environment. Its ability to lower greenhouse gas emissions is one of the primary reasons.

Methane and carbon dioxide are examples of greenhouse gases that contribute to climate change. By retaining heat into the atmosphere, they raise the world's temperatures. Numerous issues result from this, including harsh weather, increasing sea levels, and damage to plants and animals.

These greenhouse gases are primarily released by conventional gasoline- or diesel-powered automobiles. We contribute to air pollution each time we drive. Electric cars, however, are not the same. Electricity, which powers them, can be produced cleanly and sustainably by the wind or the sun. This indicates that they don't contribute to any pollution when driving (Perga, et al., 2023).

There is a reduction in the amount of greenhouse gases released into the atmosphere as more people drive electric vehicles rather than conventional ones (Dwivedi et al., 2022).

4. CONTRIBUTION OF PAPER IN MITIGATING CLIMATE CHANGE BY USING TECHNOLOGY

4.1 Drip Irrigation Working Model to Mitigate Climate Change

Drip irrigation is an irrigation-efficient farming method that minimizes water waste and encourages sustainable farming practices by providing water directly to the root zone of plants (Klingelhöfer, et al., 2020). This assignment examines drip irrigation's significance in reducing climate change, as well as its functioning model, methods, and effects on agriculture (Klingelhöfer, et al., 2020).

Figure 4. Drip Irrigation system Working Model

4.2 Understanding Drip Irrigation System

The drip method of irrigation uses a system of emitters, tubes, and pipes to gently distribute water to the base of plants. Drip irrigation minimizes water loss by accurately delivering water where it is required, in contrast to conventional surface irrigation techniques, which may cause water runoff and evaporation (OECD, 2024). As a result, both crop yields and water usage efficiency increase.

4.3 Methodology

Determining crop needs, planning landscapes, and ensuring water-saving methods are applied and maintained correctly are all part of the drip irrigation process. Below is a list of the precise actions that come next.

4.3.1 Evaluation of Boundaries

Determine the kind of soil, crop requirements, terrain, and water availability by thoroughly inspecting the agricultural site (Abbass, et al., 2022).

Figure 5. Diagrammatic Representation of site Evaluation (Alestra, et al., 2024)

4.3.2 Arrangement and Design

Construct an efficient drip irrigation system that meets the needs of the crops and the landscape. To ensure uniform water transport, the pipe, emitter, and filter arrangement must be planned (Butler, 2018).

4.3.3 Water Resource Management

To maximize water utilization and adjust water schedules, it is essential to regularly assess soil moisture levels and plant water requirements. To increase efficiency even more, use water-saving methods like mulching and soil moisture sensors (Khor, 2012).

4.4 How drip irrigation works.

Controllers for an automatic watering schedule, emitters to decrease water waste, wells for water supplies, filters to remove sediments from water, and a network of pipes and tubes for water transportation to the crops are some of the components that make up the drip irrigation operating model.

5. INTEGRATION, GOVERNANCE, AND POLICY REFORMS IN CLIMATE ACTION

Notwithstanding significant technological advancements, governance shortcomings, poor institutional coordination, and policy misalignment continue to impede efforts to mitigate and adapt to climate change. A rising amount of recent research highlights the need for institutional, political, and regulatory structures in addition to technology to solve climate-related problems.

5.1 Restrictions of Former Institutions and Policies

In earlier times, social, economic, and environmental issues were seldom addressed in research and climate efforts, which were usually sector-specific and technology-centric.

Numerous initiatives failed to address structural injustices, undervalued local weaknesses, and disregarded native and local wisdom. As a result, underprivileged groups were frequently left out of the benefits of expenditure on climate change.

Scaling successful pilot endeavors is also hindered by institutional constraints such as insufficient finance, a shortage of appropriately trained staff, and strict formalities.

Inadequate coordination between national, regional, and local governments has also hindered policy consistency and reduced the effectiveness of climate programs.

5.2 The Function of Policy Changes in Resolving These Issues

According to current studies, comprehensive policy reforms can significantly boost the influence of climate technologies.

• Among the most important reform initiatives are integrated policy frameworks that link climate goals across industries including energy, transportation, agriculture, and urban development.

• Enhancing interdepartmental cooperation through shared data platforms, cooperative planning strategies, and cross-ministerial task teams.

• Developing institutional capacity by teaching government employees about climate governance, data-driven decision-making, and systems thinking.

• Performance-based budgeting and independent policy assessments are two reforms related to accountability and openness.

Governments can transition from dispersed reactions to coordinated, whole-of-government strategies that optimize the advantages of technology innovation thanks to such reforms (OECD, 2024; IPCC, 2023).

5.3 Climate Change, Conflict, and Displacement

Climate change has been increasingly associated with recent conflicts as a "threat multiplier" that intensifies pre-existing political, social, and economic problems. Stresses brought on by climate change, such as food insecurity, water shortages, land degradation, and extreme weather, increase competition for scarce resources and raise the risk of conflict, especially in vulnerable and conflict-affected areas (IPCC, 2023).

To combat displacement, policies that integrate development planning, peacebuilding, and climate adaptation are required. Current research emphasizes:

• Climate-resilient livelihood programs in conflict-prone regions

• Early warning systems linking climate risk and conflict indicators

• Inclusive governance mechanisms that reduce resource-based grievances

Such integrated approaches can reduce the risk of climate-induced conflict while enhancing social cohesion and long-term stability (UNHCR, 2024).

6. CHALLENGES

While there are many benefits to be gained from using electric vehicles (EVs) in efforts to reduce global warming, there is also a downside to these vehicles. One of the materials that are required to create EVs is rare earth metals that must be mined and processed. In addition to the mining and processing of rare earth metals, two major environmental impacts are created: pollution from water and destruction of habitat. In addition, when lithium-ion batteries have outlived their useful life, they may be improperly disposed of, creating both waste management problems and potential environmental hazards. The basic premise of the way that electricity is produced to charge an EV highlights the need for a shift to renewable sources of energy, as the environmental impacts of producing the electricity to charge EVs are highly dependent upon the energy supply composition of the source of production (Klingelhöfer, et al., 2020). Technology will play a critical role in addressing climate change; for exam, "smart" road technologies will improve the sustainability, efficiency, and security of existing transportation systems and renewable energy sources (i.e., solar and wind) will provide renewable and sustainable alternatives to fossil fuels.

7. CONCLUSION

Renewable energy vehicles may substantially mitigate negative environmental impacts of transport and aid in combating climate change. The use of EVs will decrease GHG emissions through both increased energy efficiency and resource conservation while moving us toward a more sustainable transportation system. In order to ensure the transition to electric vehicles aligns with the overall environmental goals of preserving ecosystems and biodiversity, we must address the challenges involved with the EV lifecycle of production, use, and disposal of EVs. Electric mobility can help create a safer, healthier and more resilient society for future generations through integrated policies, technological advances and increased public awareness.

Fossil fuel combustion, deforestation, industrial activities and so forth are among the main reasons for climate change, which threatens ecosystems (habitats for all living organisms) throughout the world. Global warming already has two consequences: the rise in sea levels and an increase in the frequency and intensity of extreme weather events. These events threaten ecosystems (habitats) and threaten biodiversity, human health, and the global economy. To curb the effects of climate change, we must act rapidly to decrease greenhouse gas emissions; shift to renewable energy sources; preserve and protect resources; and promote conservation/sustainable practices. Through cooperation and prompt action to combat climate change, we can preserve our planet for present and future generations.

REFERENCES

Abbass, K., Qasim, M. Z., Song, H., Murshed, M., Mahmood, H., & Younis, I. (2022). A review of the global climate change impacts, adaptation, and sustainable mitigation measures. Environmental science and pollution research, 29(28), 42539-42559.

Alestra, C., Cette, G., Chouard, V., & Lecat, R. (2024). How can technology significantly contribute to climate change mitigation?. Applied Economics, 56(41), 4925-4937.

Axon, S. (2010). Addressing climate change and the role of technological solutions. Human Geographies, 4(1), 43.

Butler, C. D. (2018). Climate change, health and existential risks to civilization: A comprehensive review (1989–2013). International journal of environmental research and public health, 15(10), 2266.

Dwivedi, Y. K., Hughes, L., Kar, A. K., Baabdullah, A. M., Grover, P., Abbas, R., ... & Wade, M. (2022). Climate change and COP26: Are digital technologies and information management part of the problem or the solution? An editorial reflection and call to action. International Journal of Information Management, 63, 102456.

IPCC, (2023), Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi:10.59327/IPCC/AR6-9789291691647

Khor, M. (2012). Climate change, technology and intellectual property rights: Context and recent negotiations (No. 45). Research paper.

Klingelhöfer, D., Müller, R., Braun, M., Brüggmann, D., & Groneberg, D. A. (2020). Climate change: Does international research fulfill global demands and necessities?. Environmental Sciences Europe, 32(1), 137.

Nwankwo, W., Ukhurebor, K. E., & Aigbe, U. O. (2020). Climate change and innovation technology: A review. Renewable energy, 20, 23.

OECD (2024), *Unleashing Policy Coherence to Achieve the SDGs: An Assessment of Governance Mechanisms*, OECD Publishing, Paris, https://doi.org/10.1787/a1c8dbf8-en.

OECD, (2024). Climate Governance and Policy Coherence.

Perga, M. E., Sarrasin, O., Steinberger, J., Lane, S. N., & Butera, F. (2023). The climate change research that makes the front page: Is it fit to engage societal action?. Global Environmental Change, 80, 102675.

Matos, S., Viardot, E., Sovacool, B. K., Geels, F. W., & Xiong, Y. (2022). Innovation and climate change: A review and introduction to the special issue. Technovation, 117, 102612.

Richard, E. Newell, G. (2022). Literature Review of Recent Trends and Future Prospects for Innovation in Climate Change Mitigation, Paris: OECD Global Forum on Environment.

Tahir, W., Wagan, R. A., & Naeem, B. (2021, October). Intelligent Traffic Handling System Using Point Tracker Algorithm. In 2021 IEEE 18th International Conference on Smart Communities: Improving Quality of Life Using ICT, IoT and AI (HONET) (pp. 116-120). IEEE.

Tahir, W., Wagan, R. A., Naeem, B., Ahmed, A., Hussain, J., Baryalai, M., ... & Hussain, S. (2024). Enhanced vehicle detection mechanism for traffic management in smart cities. Wireless Personal Communications, 135(4), 1925-1945.

UNHCR, (2024), *No escape: On the frontlines of climate change, conflict and forced displacement. United Nations High Commissioner for Refugees*

United Nations Department of Economic and Social Affairs. (2008). Climate change: Technology development and technology transfer (Background paper for the Beijing High-level Conference on Climate Change: Technology Development and Technology Transfer, Beijing, China, 7–8 November 2008).