Role of Information Technology for the Improvement of Climate Change

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Abstract: The role of information technology in climate change is critical, and the usage of information technology and information technology-based applications is gaining more and more attention throughout the globe. Developing and developed nations are looking for greater chances to implement information technology and information technology-based applications in the areas of climate change monitoring, mitigation, and adaptation. This paper includes many case studies that demonstrate the significance of the role of information technology and the potential available in the climate change sector.

1 INTRODUCTION

We cannot disregard the effects of climate change in Europe. As the frequency of natural disasters rises due to climate change, we must be prepared to deal with the consequences of such a dramatic shift. There is a wide range of climate change factors, such as rising water levels in rivers owing to glacier melting and the loss of crops due to drought, that are causing flash floods as a result of climate change. Climate change has a direct effect on the environment and on human activity. The IPCC is in charge of defining climate change People's lives and the environment may be negatively impacted as a result of climate change. Major climatic changes, according to the "United Nations Framework Convention on Climate Change (2021)," include heat waves, bush fires, severe temperatures, droughts, and global warming. There has been an increase in the severity and frequency of floods as glaciers have melted. Seawater is constantly collecting CO2 and heat from the atmosphere, which is a key contributor to increasing ocean temperatures and acidity. Climate change brought on by air pollution is unsafe and destructive to the people who live there. The main causes of air pollution and noise pollution in large growing nations like Europe and Asia are fast population increase, heavy traffic, the burning of fuel and energy. Around five years of human life may be lost due to air pollution (Dwivedi et al., 2022).

2 MATERIALS AND METHODS

Information technology has a critical role to play in reducing the effects of climate change or at the very least monitoring the present changes in Europe and making suitable decisions based on the current situation. Climate change concerns may be monitored, mitigated, and adapted with the use of information and communication technology (ICT). Geospatial information systems, wireless sensor networks, mobile technology, web-based applications, satellite technology, and remote sensing are just a few of the cutting-edge IT tools available today (RS). Global warming is causing significant shifts in weather patterns. Climate change mitigation and adaptation activities may benefit from the use of ITs, which include knowledge centres, community radio, mobile phones, and interactive media. Educating and enabling vulnerable communities to lessen the danger of climate change by sharing practical and theoretical knowledge, as well as equipping them to access vital information that may

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save lives, is a key component of IT ability to support these communities. Developing nations are concerned about climate change and are searching for new technologies to monitor, mitigate, and adapt to climate change in order to lessen the region's susceptibility to the effects of climate change. There is a concern with GHG emissions in developing nations because of increased industry and transportation (Garlík, 2022).

Designing smart buildings with IT may be a reality in Europe. Information Technology may be used to govern the transmission and distribution of energy in the implementation of smart grids in Europe. Micro-sensor one of the most widely used and often praised technologies of the twenty-first century is the wireless network. There are a variety of uses for wireless sensor networks, including commercial and human-cantered monitoring of the environment, military applications, and robots. Networking wireless sensors are one of the most intriguing new technologies to emerge in the last several years. Compared to the rest of the planet, wetland ecosystems resemble kidneys. A wireless sensor network (WSN) based on digital video is presented in this research for monitoring the wetlands ecology in real-time. Presented It is possible to describe the Wetland Monitoring Ecosystem as a self-organized system with calculation and communication abilities made up of nodes with sensing capabilities and performing monitoring tasks autonomously under various situations using the Wireless Sensor Network (WSN) (Senadheera et al., 2021).

A solar energy-based environment monitoring system may save money on both power production and power consumption by reducing the overall cost of the system in the case of Europe. The provided Remote Sensing (RS) information system helps to capture more accurate, real-time, and wide-ranging data using remote sensors and also provides tremendous aid to relevant departments, helping in decision-making on the basis of a current and correct image. Web-based and sensor-based EM systems are discussed in this research, which includes an urban environment EM system. Data from sensors installed in the urban environment, such as temperature, air pollution, and humidity, is collected and archived by this system. It also monitors the emission of carbon dioxide, carbon monoxide, and oxygen. Groundwater and surface water are included in this category. Analysis of groundwater behaviour using remote sensing and GIS is discussed in this paper since freshwater is a critical resource for human survival (Zhao et al., 2019).

Schweizer-Ries points out that energy sustainability is typically reduced to a technical difficulty, and that renewable and alternative energy sources, as well as energy-efficient technologies, are being developed in order to solve the issue. Consumers at every level of society are responsible for deciding what kind of energy they use. Governments, businesses, and communities of all sizes must use a variety of mitigation and adaptation approaches as well as technical and social solutions to mitigate the negative effects of climate change, which are expected to get more severe as time goes on. According to Schweizer-Ries, society's demands and progress are the driving forces behind technology, and they are the ones who define its usage, and therefore they are the ones who produce consequences of employing technology, as opposed to the other way around. As an alternative, some individuals feel that technology is the "wrong path" to a sustainable future and that it should be avoided at all costs (Schweizer-Ries, 2007). Particularly if some technologies are used incorrectly, which might result in catastrophic or fatal results. Verbruggen argues that nuclear power and renewable energy sources are promising combinations of technologies for dealing with human-induced climate change (Verbruggen, 2008). Several factors impede the construction of new nuclear power plants, including fear of catastrophic and long-lasting consequences of an accident at a nuclear power plant, as demonstrated by accidents at Chornobyl in Ukraine and at Three Mile Island in the United States, as well as the proliferation of nuclear knowledge and weaponry and the disposal of nuclear waste into the environment (Middleton, 2008). If science and technology continue to work on developing new weapons, there will always be the possibility of an enormously destabilizing war.

Technology solutions are expected to play a big role in addressing the complex issues of our day and age such as increasing energy consumption and climate change, and research is now being conducted into these possible future courses (Omer, 2009). To put it another way, Shah asserts that new technologies may be a powerful instrument in the fight against poverty, illiteracy, and human-induced climate change, among other things, by helping poor countries to modernize their economy. Since the emergence of contemporary science and technology, advancements in society and economic success have been increasingly prevalent (Shah et al., 2021).

3 RESULTS AND DISCUSSION

We are living in the age of the technological revolution. Almost every aspect of human existence has been improved by technological advancements. Our everyday regular living activities are enhanced by technology, which serves humanity at its finest.

All of our everyday activities are being affected by the current technological developments. This includes everything from our shopping to our health care to our banking to our stock market to our public services to our transportation and logistics. In our pockets, we have the same computing power as Neil Armstrong had to travel to the moon. Humanity has access to a wide range of technologies, but computer science and telecommunication are the two most widely used and widely adopted. Computer, Internet, e-mail, and mobile devices were all covered by the technology. IT is a breakthrough technology that is rapidly becoming the most popular, fastest-growing, and widely used technology in almost every aspect of human existence. It's impossible to understate the impact of IT and mobile technology's (MT) rapid growth and progress. Because of the growing popularity of mobile technology (MT), there are more chances to provide a wide range of beneficial services through mobile devices.

Climate change's primary risks and how IT may help mitigate them

People's water and food supplies are at risk because of climate change. As a result, storms, heatwaves, droughts, and floods are becoming more frequent and more severe, and our air is becoming less healthy as a result. Poverty has the greatest effect on the world. A quarter of a billion Africans will be under greater water stress by 2020, and agricultural yields in certain African nations are predicted to plummet by half over that time period.

Because of these climate shifts, farmers tend to see lower yields. While El Nio and other human-induced and natural climate variability may be taken into consideration in long-term projections, farmers have enough time to prepare for shifting weather conditions by planting crops that would flourish in those settings. Even if text messaging and broadcast radio or TV networks are all that are needed to deliver warnings to at-risk areas, an internet connection is required to provide reference material, statistics, and adaptation strategies. Information on climate change adaptation is being sent to isolated communities using mobile phone networks that can access the internet via web surfing (Novikov et al., 2019).

Water irrigation may benefit from medium-term forecasts. Farming is more economical and sustainable when it is possible to monitor environmental and soil conditions with ITs. IT-assisted water management reduces waste and increases the long-term viability of water resources by allowing for greater efficiency in water usage.

4 CONCLUSIONS

Climate change is dramatic, and its repercussions are not insignificant; in the long run, these consequences may have ramifications for a wide range of destructive occurrences, such as natural disasters. Climate Change Monitoring, Mitigation, and Adaptation may be made more effective by the use and integration of technology. This can assist to preserve the environment from damage and deterioration. IT and MT may play a critical role in the monitoring, mitigation, and adaptation to the issues posed by climate change. The use of common, widely available, and affordable technology allows us to replace the standard CCM system with more complex and advanced systems, resulting in more accurate, faster, live, and multidimensional data at a lower cost and effort than the earlier methods. The rapid growth and progress of information technology and machine learning cannot be overstated. The widespread penetration and widespread acceptance of mobile technology (MT) in human life are generating potential for the provision of a number of valuable services through mobile devices. Climate change consequences are being tolerated in both developed and developing nations, with the emphasis on the use of information technology to overcome these issues. Europe is well-versed in the use of technology in climate change monitoring and disaster management, but Europe is still in the process of implementing these technologies in CCM and DM. Insufficient budgets, short-term planning, a lack of knowledge, an illiterate population, inadequate training, as well as a variety of social, economic, and political variables, are the most significant obstacles to the deployment and acceptance of information technology in developing nations. To summarize, Europe is to face gaps and possibilities in the integration of technology in climate change monitoring, adaptation, and mitigation efforts, as well as in other areas.

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