

Technologies utilised to solve emerging environmental issues

Madina Esmurzaeva^{1*}, *Artur Bagov*², and *Ildar Safarov*³

¹ Kadyrov Chechen State University, Grozny, Russia

² Kabardino-Balkarian State University, Nalchik, Russia

³ Kazan State Power Engineering University, Kazan, Russia

Abstract. The article will look into the obvious issues of the modern days. The state of the environment in modern times is on the brink of an abyss. One can argue that the tendency of degradation is still going up. Although steps are being taken to slow this trend, at least for this decade. In reality, we are far from close. When we want to introduce new technologies to fight an environmental disaster, one needs to understand that the same technology with a positive goal can have another side. Technology is in the first place in terms of environmental pollution. However, they are by no means to blame, as they are guided by a human. Therefore, technology can be used for good, and in the same way, the same technology can be used for harm. The following article aims to identify technologies that are used to solve environmental problems or at least can be used in the future. In addition, this work attempts to outline the essence of the problem, as well as review some of the work done to understand the use of technology.

1 Introduction

Recent climate instability can be described as a time of environmental crisis. As we delve into this new realm of reality, it is obvious that some alterations need to be implemented to solve emerging crises. This is not the first time that the climate has been unstable, but this crisis, in this instance, is introduced by humans. The influence can be deliberate and, in some cases, inadvertent. The first thing that comes to mind when hearing about the climate crisis is mass production. But the issue occurred due to overpopulation. This issue is the main contributor to the unstable climate and, hence, to climate change. Right now, the population of the planet has reached 8 billion and is still growing each year. It is predicted that by the year 2050, the population of the planet will be approximately 10 billion, which leads to more production of goods. Therefore, more waste, energy, and resources are used, which has a detrimental effect on the environment that we live in.

The effect of global warming has been strongly felt in the last decade. There are some visible outbreaks that can be noted and analyzed. The most obvious and visible effects of this crisis include sea level rise, droughts, forest fires, and the movement and extinction of

* Corresponding author: zlayaf@inbox.ru

animals, etc. The listed phenomena are visible effects of climate change, and other unknown phenomena are likely to spread.

It is believed that big corporations and other industries are to blame for climate change. From my point of view, this is true. They are the main contributors to global warming. However, the demand is dictated by the people. More people mean more demand, and, hence, more goods to be produced. Another misconception is that technology is to blame for accelerating the process to this level. In this case, it is also true that technology has a great impact on global warming. However, technology is a tool used by humans to achieve as much profit and production in a short period of time.

Nonetheless, corporations and technology can solve the emerging problem by implementing new regulations, technologies, and methods. The problem can be slowed down by the use of more precise technology, clever techniques, and, most importantly, changing the mentality of people regarding overconsumption.

Overconsumption and overpopulation are in the same category for climate change. With clever marketing and the spread of communication technology, it has become easier for consumers to purchase goods without the need to leave their homes. It is essential to start solving the issue by including in the equation the main contributors, such as large industries, technology, humans, and so on.

This article will look through the solutions that are available to tackle the issue. Lately, due to the severe stage of the crisis, some solutions have been introduced. Henceforth, the article will look into available solutions such as carbon polygons, digital technologies, green energy, and human potential.

2 Solution for emerging environmental issues

The following section is devoted to the solutions available for environmental issues. It is well known that every problem can be solved sooner or later by applying the suitable approach. Each issue can be addressed, but the problem discussed in this work requires more than one solution. This issue requires a complex set of solutions that will tackle it in the most appropriate way. The following section will discuss new approaches emerging in different regions that can transform nature into a flourishing environment. The first solution discussed is carbon polygons. This approach or technology aims to understand nature and the influence humans and other factors have on it, and subsequently find solutions to fix the ongoing crisis. The second is a technological approach that will help the environment through the use of clever electronics.

2.1 Carbon polygons

Carbon polygons were created in response to global warming. Carbon polygons are unique territories designed to positively influence climate change. According to the official definition, "carbon polygons are territories with a unique ecosystem created to implement measures to control climate-active gases with the participation of universities and scientific organizations." These polygons are created to learn, analyze, and take action. Carbon polygons serve as areas and facilities that function as laboratories to study global warming and other related issues. They can be used by researchers as well as students. In Russia, there are many carbon polygons working on various tasks; however, the main idea behind them is to combat global warming.

For instance, the carbon polygon in the Chechen Republic focuses on selecting plants that are better suited to reducing emissions by absorbing hazardous gases from the atmosphere and releasing large amounts of oxygen. Most of the plants in this polygon are invasive species, brought to the region because they absorb more hazardous gases. The aim is to adapt

these plants to the region's ecosystem, and thereby use them as a method to capture greenhouse gases. The polygon also examines the environmental footprint of animals and their influence on greenhouse gases.

Simply put, carbon polygons are territories for researchers to investigate pollution problems and gather data from the surrounding environment. The carbon polygons project is an ambitious technological initiative.

2.2 Complex technological solution

The following paragraph is devoted to technologies that operate both from space and the ground. It is a well-known fact that satellites have been used for many decades and have found various applications. Their field of use is vast, and satellites play a major role in modern society. With the development of communication systems, lightweight materials, sensing devices, and artificial intelligence, we now have many tools at our disposal to protect our planet in the most effective ways. While satellites stay above the skies and the analytical work is done on the ground, there is one technology that can maneuver between these two: drones. Drones are an extremely useful invention that can perform different tasks and be applied to new areas that were previously unknown. The combination of these three technologies can positively impact the fight against global warming.

Satellites are used to identify potential areas of wildfires, while drones are used locally to track the progression of fires. Drones are equipped with built-in sensors that can easily detect fire hotspots and the spread of the fire. Additionally, these sensors can be used separately to monitor wildfires and address other environmental issues, such as the detection of hazardous gases, different kinds of pollution, and more. These sensors, integrated with IoT technology, can detect and measure CO₂ levels and check for unseasonably high temperatures, which may indicate the presence of fires in the area. [7, 8].



Fig. 1. UAV, maintenance and control

2.3 Green energy

Due to recent events, more people and industries are trying to implement more renewable or green energy in their daily lives and processes. Green energy is a type of energy that is created from natural sources, such as flowing water, wind, sunlight, and so on. This type of energy is harnessed without harming nature or the environment we live in. However, it would be incorrect to say that energy harnessed from nature has no impact on global warming. It has a minor influence, as energy is still required to build the mechanisms and structures to extract energy from the aforementioned natural phenomena. It also requires a large amount of resources to build some of these structures. Nevertheless, it has been proven to cause less harm than more traditional approaches.

Another issue with this approach is that the same methodology or technology will not work equally well in different regions, as each continent, country, and region has its own unique climate. For instance, it would be difficult to harness energy from the sun if the landscape is constantly covered by clouds. Similarly, if a place is surrounded by mountains and experiences little to no wind throughout the year, it would be in vain to try to build a wind turbine there. However, it is believed that renewable energy produces fewer greenhouse gases and less pollution compared to traditional methods [9].

2.4 AI

Artificial intelligence (AI) is one of the most promising technologies of the past few decades and those to come. This technology is revolutionizing nearly every industry or field it touches. Artificial intelligence consists of well-constructed algorithms designed to perform specific tasks. AI aims to mimic human capabilities, striving to be as clever as humans. At this moment, AI's capabilities in some cases surpass human abilities, while in other areas, they lag behind. It performs exceptionally well in systems where repetitive tasks are involved. AI can recognize patterns and analyze large datasets or complex environments with incredible efficiency, while humans would either fail or take more time to accomplish the same task.

Scientists recognize three stages of AI development. The first stage is when AI is less intelligent than the human brain and can perform only simple tasks. The second stage is when AI is on the same level as human intelligence. The third stage is when AI surpasses human intelligence. Right now, AI is closer to the second stage. Its ability to elevate any field it engages with is unprecedented. Therefore, the use of AI in solving global warming could be a significant part of the solution. As mentioned earlier, AI can process massive amounts of data and analyze it in a short period of time. It can be used to foresee unpredictable phenomena and address issues before they occur. AI can also be used to lower energy consumption in various ways. For example, it can reduce traffic in congested areas by using algorithms to intelligently manage and dissipate traffic. Due to the precision of AI, it also helps reduce waste and errors that could lead to system failures, among other benefits [10].

2.5 IOT

The Internet of Things is not a new technology; it has been around for decades, although in different forms. Currently, the technology is at its peak, and its capabilities are vast. IoT is used in various fields such as automation (e.g., mass production), households, robotics, and more. In simple terms, IoT connects devices that can communicate with each other and with an operator who can monitor and control their actions. How can IoT be used today to combat global warming? It can alert operators when a dangerous or hazardous event is about to occur. For instance, IoT can detect the spread of a fire by analyzing data from sensors, which could

significantly contribute to environmental protection by preventing fires and the spread of dangerous chemicals, among other hazards. IoT technology can also be used in production chains to immediately send signals to operators to halt processes, which saves products, conveyor systems, and mechanisms from damage or deformation. This reduces errors, leading to less waste [11].

2.6 Human potential

There is no doubt that we, humans, are the ones, in this period of time, who created this situation, and, hence, we are the ones who can fix it. Right now, the issue is worsening each day. New, unknown phenomena are influencing our lives in unpredictable ways. It is in our hands to change this crisis by changing our way of living. The first and most effective way of addressing the issue is to reduce the use of unnecessary items and goods, which will directly impact the rate of production. We must also use technology and other available methods to fight the issue in the most effective ways. It is clear that no visible changes will occur in a short period of time, but with consistency, progress will be made.

3 Conclusion

To conclude, this work was done to illustrate that there are solutions to the climate change problem. This article delves into the issue by explaining how the problem arose. It shows that many contributors to the issue exist, such as big corporations, overpopulation, and the misuse of technology, among others. The main goal of this article was to demonstrate that solutions are well-established and capable of addressing the issue. The following areas were covered: carbon polygons, digital technologies, green energy, human potential, management, artificial intelligence, and the Internet of Things.

References

1. D. Foray, A. Griibler, Technology and the environment: an overview. *Technological Forecasting and Social Change*, Vol. 53, Number 1. pp. 3- 13, (1997)
2. H. Eren, *Impact of Technology on Environment*, chapter 1, pp. 1–3, (2002)
3. P. B. Bisong, S. Apologun, Technology Can Save the Environment. *International Journal of Humanities, Management and Social Science*, vol. 3, no. 1, pp. 11-19, (2020)
4. S. Zubrzycki, L. Kutzbach, E.-M. Pfeiffer, Permafrost-affected soils and their carbon pools with a focus on the Russian Arctic. *Solid Earth*. 5. pp. 595–609, (2014)
5. O.A. Fernandez1, J.L. Ordóñez-Ávila, I. Magomedov, Evaluation of parameters in a neural network for detection of red ring pest in oil palm, *AIP Conference Proceedings*, 2442.
6. Debangshi, 2021. Drones - Applications inAgriculture. *Chronicle of Bioresource Management*, 5(3). pp.115-120. (2021)
7. J. Shabbir & T. Anwer, Artificial Intelligence and its Role in Near Future. *ArXiv*. 14(8), pp. 1–11, (2015)
8. V. A. Gerasimov, M. G. Nuriev and D. A. Gashigullin, 2022 *International RussianAutomation Conference (RusAutoCon)*, pp. 75-79, (2022)
9. I.A.Magomedov, K.V. Mashukov, E.S. Kremleva, Future trends in artificial intelligence that could pose a threat to humanity. *E3S Web of Conferences*. Vol. 451, 05012 (2023)

10. I. Magomedov, E. Belashova and M.-D. Bersanov, Review article: enhancing the power of artificial intelligence in mechanical design, International Scientific Siberian Transport Forum – TransSiberia. Vol. 402 (2023)
11. W. James, C. Bill, Global Warming's Increasingly Visible Impacts. pp. 5-8 (2005)