Technology and Humanitarian Crises

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Abstract. In recent years, humanitarian crises have been observed which manifest themselves with incidents of inequality, violence, increased migratory flows, poverty, lack of education as well as the absence of social protection. More specifically, humanitarian crises threatens large groups of populations putting them at risk through various ways and situations. It is usually divided into two categories, natural disasters such as floods, earthquakes, fires, volcanic eruptions, tsunamis as well as human-made disasters such as global warming, war, violence, cyber-crime. However, the use of new technologies can aid in preventing natural disasters as well as collecting data correlating the influence of climate and migratory flows. In particular, the aim of this article is to highlight successful examples of the use of new technologies in these contexts. The digital recording of cultural heritage, Geographic Information Systems (GIS), Artificial Intelligence (AI), and drones, can ensure an environment of protection and recovery from both natural and human-made disasters and threats. Machine Learning (ML) can reliably analyze the role of weather shocks in a person's intention to migrate. The present survey papers aims in emphasizing ways to address humanitarian crises through (new) technologies. The goal is to delineate and quantify anthropogenic activities that, if left unchecked, can lead the earth to an interglacial state similar to the Holocene.

1 Introduction

The modern industrialized Western world reflects human's alienation from nature, an approach known as anthropocentrism. In particular, human is at the core and treats the rest only subordinately in order to serve human culture, development and prosperity. Intense urbanization as well as biodiversity loss leads to a significant qualitative and quantitative decline in human interaction with the natural world (Spannring, 2015). This implies that people perceive their existence as something separate from nature. They treat nature as an "object" exerting their will on it (Kellert & Wilson 2013). In this way, we are led to lack of unity with nature at the deepest level, as nature is treated as a "resource" to be exploited and ultimately destroyed (Berry 2013, 16 op. ref. in Tsevreni, 2020b).

At the opposite end is ecocentrism, which is based on the value of all elements of nature and focuses on ecosystems or the biosphere. The German psychoanalyst Erich Fromm coined the term "Biophilia", giving it the meaning of human's innate tendency to connect with elements of nature. The concept of love for humanity and nature, independence and freedom is also attributed to this term. In other words, it is an "instinctive bond between human and nature". (Willson, 1984 op. ref. in Kahn & Kellert, 2002).

Human-made disturbances of the global environment are treated as if they were separate issues (such as climate change, loss of biodiversity, environmental pollution). Of course, this does not take into account the non-linear interactions of these disturbances that can bring about additional harmful effects (Richardson, 2023).

2 Environmental Crisis: "An ecological proposal of Nicaraguans to tackle toxic gases"

It is necessary to define anthropogenic activities because there is a risk that the earth will be led to a state similar to the Holocene. This is due to the conservative functioning of global environmental systems that do not show much difference compared to older systems. The Holocene period begins after the end of the Ice Age and is characterized primarily by stable, warm planetary conditions. Because of human activities the earth moved from the Holocene to the Anthropocene era (Richardson, 2023).

However, through these disasters of various kinds there is also the hope of solidarity from different parts of the planet which in such situations appears determined to help the affected

populations. A typical example is that of the Nicaraguan people, who cook on hard surfaces to protect the environment, as well as for a healthier lifestyle. Volunteers also took part in this initiative helping the project, as well as sharing it on social media. A group of Canadian volunteers work with the Nicaraguan people and cook together over an open fire to reduce the use of the wood stove. Burning wood contributes particularly to the creation of toxic gases as well as intensifying the greenhouse effect, burdening human health (CBC, 2023).

Action volunteer Janice Rauser points out that during her work at the hospital she has seen several cases of respiratory problems, coughing, asthma, burning eyes and other symptoms. According to a study by the Clean Cooking Alliance at the United Nations burning wood as fuel is responsible for 1.9 to 2.3 percent of greenhouse gas emissions globally. In Nicaragua wood burning is estimated to contribute 5 to 20 percent of the total. In the year 2021 more than two billion people around the world do not have access to clean cooking. (CBC, 2023).

According to a recent study, Nicaraguan people do not have access to modern cooking machines, so they turn to the use and burning of wood. As a response to this phenomenon comes the Justa stove which produces less smoke and does not consume a lot of wood. Johnny Flores who is a trainee travels to help build stoves. He typically mentions the feeling he feels when he sees the faces of these people when they see the special cooking stove completed. In addition, they report that the symptoms they had, such as cough and asthma, were eliminated with the use of the Justa stove. This stove is an important achievement for the protection of the environment as well as for human health (CBC, 2023).

Furthermore, other cultures with an interactive experience or even nature-friendly cultural beliefs sharpen the anthropocentric perspective and perceive the world through a more ecocentric view (Kahn & Kellert, 2002). For example, the Japanese culture, which is considered one of the most technologically and industrially advanced, treats nature as a blessing and a friend to the Japanese people (Murota, 1986 op. ref. in Kellert & Wilson, 2013). Thus, cultural beliefs influence citizens' attitudes, and cultures of people who see themselves as an integral of nature lead to less anthropocentric attitudes.

3 The Role of New Technologies in the Environmental Crisis

3.1 Geographic Information Systems (GIS)

As a solution to the problem of the imbalance that exists in relation to the changing conditions, the use of new technologies is proposed. In particular, the digital recording of cultural heritage can ensure an environment of protection and restoration both from natural disasters and from human-made threats (Zafeiropoulos, Tzortzis, Ralis, & Doulamis 2023). This can be achieved through Technologies such as: Geographic Information Systems (GIS), Unmanned Aerial Vehicles (UAVs, a.k.a. drones), Artificial Intelligence (AI), Machine Learning (ML), to name just a few.

Geographic Information Systems (GIS) can ensure the preservation of cultural resources, promote tourism in local communities as well as contribute to sustainable development. Its database can update the current status of a cultural monument. Furthermore, it is capable of making correct and timely decisions concerning their protection. Cooperation with the Ministry of Culture, possibility of communication of the municipalities about the cultural routes through their websites, Reflection of cultural proposals for future visitors as well as highlighting the cultural wealth (Zafeiropoulos, Tzortzis, Ralis, & Doulamis 2023).

3.2 The Role /Contribution of Artificial Intelligence in the Prevention of Natural Disasters

Regarding the course of development of Artificial Intelligence technologies, it is considered necessary to set the definition of data and requirements, the goal of implementation and the method of implementation based on the security of its design. What is deemed paramount is the need to control the effects and impact of such a system. Furthermore, it is necessary to emphasize the possible risk of exploiting the "weaknesses" of a specific system. According to the European Union Agency for Cybersecurity (ENISA), categories of threats can be identified. In more detail, malicious software with the aim of damaging information systems, attacks on physical infrastructure resulting in natural disasters (floods, fires) as well as legislation issues such as falsification or destruction of data, privacy issues (Kikkos, 2023). Top worldwide AI experts caution that ``AI is a caterpillar that can become a tyrannosaurus".

3.3 Tree-based Machine Learning and Migration Flows

In the past ten years, researchers have taken advantage of the availability and quality of climate and mobility indicators, to study the extent to which climate events initiated (or even forced) individuals to migrate. Recently new insights were offered in this literature by adopting tree-based Machine Learning (ML) techniques (Aoga et al. 2023). These insights were not uncovered using traditional empirical approaches. Instead, Aoga et al. used tree-based Machine Learning to conduct thorough analysis of the role of weather shocks as to a person's intention to migrate. The research focuses on six African countries, namely Burkina Faso, Ivory Coast, Mali, Mauritania, Niger, and Senegal, whose economy depends on agriculture. Through the execution of tree-based algorithms (such as XGB and Random Forest) and using the train-validation-test workflow robust and noise-resistant models were built. The main characteristics that appear to have an influence on migratory intention were then identified. The recording was done using the Standard Precipitation – Evapotranspiration Index (SPEI) for various socioeconomic characteristics.

3.4 Drones in Wildfire Detection, Prevention and Management

The drones industry has witnessed significant growth in the past few decades. While in the early days, only very few countries (essentially the superpowers) shared the worldwide market, nowadays, several dozens of countries manufacture their own drones. This is because the huge potential for a wide spectrum of applications of drones was realized. One such application is in the detection, prevention and management of wildfires. To this effect, an entire special issue was devoted to this topic (Yfantis, Zamora Ramos, Harris, 2021).

3.5 Refugee migration networks via advanced mathematical modelling

The complex phenomenon of refugee migration networks can be modelled using advanced mathematical tools (such as variational calculus, network science and optimization), as exemplified in (Nagurney et al. 2020). The statistics are daunting: 258 million migrants (i.e. 3.4% of the global population) were recorded in 2017, according to the United Nations. One of the important major realizations in (Nagurney et al. 2020) was that the models that arise from refugee migration networks are isomorphic (i.e. mathematically equivalent) to traffic

network equilibrium models, which have been studied very extensively previously. (Mebelli et al. 2023) investigate a similar issue, using other mathematical tools.

4 Conclusions

Updates on the functional integrity of the biosphere through analyses as well as through modeling exercises reveal the effects of human intervention. In addition, various scenarios that violate the earth system as well as the limits of climate change are explored. According to (Richardson, 2023). In (Richardson, 2023) it is pointed out that the nine boundaries represent all the elements of the earth system, which are affected by anthropogenic actions. Furthermore, the statistics show that we will soon be led to an alteration and reshaping of the dynamics of the spatiotemporal patterns of the geosphere's interactions (Richardson, 2023).

There are indications that the earth system has exceeded the "safe zone" and evidence is emerging of a rapidly increasing risk. Six of the nine boundaries have been breached resulting in the earth potentially not being a safe place for humanity, in the foreseeable future. Judicious use of new technologies can be a very useful approach that can yield results. Therefore, modeling different levels of climate change boundaries suggests that anthropogenic impacts need to be taken seriously into account, in a more systematic technological context (Richardson, 2023).

Annex

Figure 1. Rapidly expanding forest fire

Figure 2. Severe flooding effects

Figure 3. Natural Disasters

Figure 4. Earthquake destruction

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