

„BABEȘ-BOLYAI” UNIVERSITY CLUJ-NAPOCA
COLLEGE OF POLITICAL, ADMINISTRATIVE AND COMMUNICATION SCIENCES
DOCTORAL SCHOOL OF POLITICAL AND COMMUNICATION SCIENCES

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(Summary)

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The link between environmental changes and security

Case study: The Sahel Region

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Keywords: environmental changes; climate change; desertification; deforestation; biodiversity loss; natural hazards; security; human security; interethnic conflict; the Sahel; food insecurity.

Summary

Accelerated environmental changes have occurred in the last decades and have had an impact on security. Climate change, desertification, deforestation and biodiversity loss influence the human security and increase the risk of violent conflicts, especially in sub-Saharan Africa.

The thesis starts with formulating the research questions:

- How do environmental changes influence security?
- How do environmental changes influence human security in the Sahelian states?
- How do environmental changes influence the triggering or amplifying of violent conflicts in the Sahel?

The hypotheses of the thesis are:

- Rapid environmental changes lead to increased human insecurity.
- Interethnic conflicts are the result of the decrease in the amount of renewable resources.
- Climatic hazards associated with climate change lead indirectly to interstate conflicts.

The approach of the link between environmental changes and security is interdisciplinary, crossing the areas of Environmental Science, Security Studies, Political Science, International Law, Geography, Archaeology, etc. On the one hand, the purpose is to identify/address the impact of environmental changes on human security. On the other hand, the purpose is to identify/address the role of environmental changes in triggering or amplifying of violent conflicts.

The thesis has two parts: a theoretical part structured in three chapters and the case study structured in three chapters.

In **the first chapter**, the main environmental changes are presented, namely climate change, desertification, deforestation and biodiversity loss. The layers of the Earth are interdependent and the environmental changes influence each other accordingly. Deforestation (biosphere degradation), for instance, contributes to increasing the amount of greenhouse gases in the atmosphere, such as carbon dioxide and methane, that contribute to global warming (changes in atmospheric composition). As a result, the rise in the average global temperature affects the natural water cycle (negative impact on the hydrosphere). Hydric stress induced by global warming, especially in areas away from ocean basins, is one of the factors that contribute to soil erosion and desertification (pedosphere degradation).

Climate change refers not only to the rise in the average rate of global warming, but also to the sea level rise, the increasing frequency and intensity of natural hazards (drought, floods, tropical cyclones, landslides, etc.) The rapid warming in the past few decades has been the result of the anthropic pressure (industrial, agricultural and transport activities, etc.) Furthermore, there are natural causes, such as volcanism, solar activity variation, the El Niño-Southern Oscillation (ENSO), variations in Earth's orbit, crustal dynamics.

The rise in the average global temperature leads to cryospheric mass loss. On the one hand, the ice sea has declined by around 10% in the last two and a half decades, causing a decrease in albedo, the amount of solar radiation reflected by Earth's surface back into space, and implicitly faster global warming. On the other hand, the surface and thickness of the ice cap (continental glaciers, especially the Greenland and Antarctic ice sheet, mountain glaciers) are decreasing. This is the primary cause of sea level rise, which leads to soil salinization in the coastal areas. The small islands, especially the atolls, are at risk of being submerged. Furthermore, global warming leads to thawing permafrost, the layer of frozen ground, causing the decomposition of organic matter and implicitly the release of millions of tonnes of carbon and methane into the atmosphere.

Due to climate change, the frequency and intensity of natural hazards, such as heat waves, drought, floods, tropical cyclones, tornadoes, locust swarms, are on the rise. Severe drought, a consequence of the change in the natural water cycle, contributes to soil erosion. As a result, the soil loses the capacity to absorb rainwater, increasing the risk of floods. The stagnation of water in desert areas - the consequence of floods and tropical cyclones - leads to locust eggs hatching. Then, the wind (tropical cyclones) blows the locusts in other areas, where they destroy the vegetation and the crops, sometimes hundreds of square kilometers (of vegetation). Furthermore, the rise in the average global temperature increases the rate of evaporation and implicitly the intensity of tropical cyclones.

Desertification is another major environmental problem to which climate change contributes. Deserts have been around for thousands of years. However, the soils lost their physical, chemical, biological and economic properties at an accelerated rate in the last decades. According to the United Nations, '12 million hectares of arable land [which means 23 hectares per minute] are lost to drought and desertification annually', mostly as a consequence of the anthropogenic impact: population growth, inappropriate farming practices (overgrazing, monoculture, forest fires started intentionally in order to obtain new agricultural land etc.)

Deforestation is an old process, which first arose with the discovery of fire by humans. However, the current rate of deforestation is unprecedented. Currently, the rate of deforestation is higher in the tropical zone, unlike in the past centuries, when Europe and North America (the

temperate zone) have been the areas most affected by deforestation. The main causes are the demand for wood which is used in industry and as a fuel for heating, cooking and the need to obtain new agricultural land, pastures etc. Deforestation contributes to global warming because of the increase in the concentration of CO₂ (carbon dioxide) in the atmosphere. The clearing of forests also leads to desertification because the cutting and burning of trees are among the main factors of soil erosion.

Deforestation, climate change and desertification contribute to the loss of biodiversity, which means the variety of living species on land and in the oceans. According to the International Union for Conservation of Nature (IUCN), 'more than 37.400 species are threatened with extinction'.

The second chapter intends to clarify the concepts of 'security' and 'human security' and highlights the main differences between 'human security' and 'state security'. Firstly, security is a complex and widely debated concept. The concept of security was related only to the military dimension until 1990. Two dominant theories were observed: realism and liberalism. In the first subchapter are listed and analysed the main definitions of security given by the representatives of the two main theories. Several authors, such as Westing, Ullman and Meyer, have highlighted the need to extend the concept of 'security' since the 1980s. The break from traditional approaches, based on a 'narrow' military focus, occurred at the end of the Cold War. For example, the Copenhagen School scholars identified five sectors of security: the military, the societal, the political, the environmental and the economic sector.

After 1990, the security approach represented a departure from state to human beings, the context of the emergence of the human security paradigm. One of the most commonly cited definition is given in the '1994 Human Development Report' by the United Nations Development Program (UNDP). According to this report, human security means 'the safety from the constant threats of hunger, disease, crime and repression' and 'protection from sudden and hurtful disruptions in the pattern of our daily lives-whether in our homes, in our jobs, in our communities, or in our environment.' (1994 Human Development Report, p. 3). Human security also has two main components: 'freedom from want' and 'freedom from fear'. In 2000, Kofi Annan, the Secretary-General of the United Nations, added another component to human security, 'the freedom of future generations to inherit a healthy natural environment'. And five years later, in 2005, he highlighted the three 'pillars' of human security: the first two pillars enunciated in the UNDP report (1994) and the 'freedom to live in dignity'. Hans Günther Brauch added another pillar, the 'freedom from hazards impacts', in the same year.

The Canadian, Norwegian and Japan governments also provided different definitions of human security. It is worth mentioning that the Japan government and Kofi Annan established the Commission on Human Security in 2001.

In addition, the topic of human security was also addressed by many scholars, as follows:

- those who generally reject the concept of human security, such as Roland Paris;
- those who adhere to a broader concept, such as Jorje Nef, Caroline Thomas, and Sharbanou Tadjabkhsh;
- those who adhere to a narrow concept, such as Taylor Owen, Gary King and Christopher Murray.

The **third chapter** tackles the link between environmental changes and security. The aim of the first subchapter is to identify the role of environmental changes in the collapse of ancient civilizations. According to paleontologist and paleoclimatic studies, the Rapa Nui (Easter Island) and the Maya (Mesoamerica), two notable examples of ancient civilizations, were faced with environmental changes, such as deforestation, soil erosion, changes in the natural water cycle, water stress and climate change at a regional level. In order to create magnificent buildings, various works of art and to ensure a high standard of living, natural resources - such as trees, fish - were irrationally exploited. As a result, environmental changes took place (soil erosion, severe drought). Therefore, agricultural productivity decreased, which led to severe food insecurity, rebellions against the political and religious leaders and civil wars. To summarize, environmental changes were one of the main causes of the decline and the collapse of the Maya civilization and the Rapa Nui (Easter Island).

The aim of the second subchapter is to tackle the link between environmental changes and the four 'pillars' of human security, namely: 'freedom from want', 'freedom from fear', 'freedom from indignity', and 'freedom from hazards impact'. Global warming, sea level rise, the increasing frequency and intensity of natural hazards related to climate change (floods, drought, tropical cyclones, locust swarms, etc.), desertification, deforestation and biodiversity loss lead to a decrease in the quantity of resources required for the satisfaction of basic human needs (water, food and shelter). Furthermore, climate change is the major cause of reducing water quality and quantity linked to higher morbidity and mortality rates. On the one hand, the lack of access to clean water associated with poor personal hygiene increases the risk of transmission of infectious pathogens, namely: viruses, worms, bacteria and protozoa. On the other hand, floods and tropical cyclones have a negative impact on water quality and increase the number of biological vectors, such as Anopheles and Aedes mosquitos, and therefore the incidence of vectors-borne diseases (malaria, yellow fever, dengue fever, etc.)

In addition, environmental changes reduce access to adequate shelter. Many houses are partially and totally damaged by sea level rise and natural hazards related to global warming (floods, tropical cyclones). Furthermore, the people living in areas affected by water scarcity, desertification and deforestation are forced to migrate voluntarily, especially from rural areas to urban peripheries.

The lack of sufficient renewable resources intensifies social tensions, contributes to the violation of fundamental human rights and triggers or exacerbates armed conflicts. Environmental changes also increase the vulnerability to natural hazards that are becoming more intense and more frequent, especially in developing countries.

The last subchapter tackles the link between environmental changes and violent conflicts. Firstly, the main approaches regarding the relation between environmental degradation and conflicts are reviewed, namely:

- neo-Malthusianism theory, according to which environmental scarcity, together with economic, political and social factors, especially population growth, triggers violent conflicts;
- Cornucopianism, according to which there is no environmental scarcity. As a result, environmental factors do not play a role in triggering or amplifying violent conflicts.

Secondly, the link between the major environmental changes (climate change, desertification, deforestation and biodiversity loss) and violent conflicts is tackled from various perspectives.

The second part of the thesis presents a case study of the Sahel Region, and examines the link between the main environmental issues (climate change and desertification) and security. It is a longitudinal study, which covers the 2000 to 2021 period.

I used the following secondary data:

- quantitative data provided by the Internal Displacement Monitoring Center (IDMC), the Armed Conflict Location & Event Data Project (ACLED), and the World Bank;
- reports released by several international organizations, including the Food and Agriculture Organization (FAO), the United Nations Commissioner for Refugees (UNHCR), the International Federation of Red Cross (IFRC) and the World Health Organization (WHO).

The study has several limitations, namely: the lack of primary data and the lack access to some data, especially for the 2000-2008 period.

The fourth chapter, in addition to the research of the design and the defining boundaries of the Sahel, includes a subchapter that briefly presents, based on the literature review and reports

released by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), the United Nations Development Programme (UNDP), the FAO, etc., the major environmental issues, namely: desertification and the increasing frequency and intensity of natural hazards related to global warming.

The Sahara Desert expanded southward in the last two decades because of global warming, the change in the natural water cycle and the anthropic pressure at the regional level (overgrazing, monoculture, rapid population growth, etc.). ‘Temperatures in the Sahel are rising 1.5 times faster than the global average.’ (OHCHR, Human Rights, Climate Change and Migration in the Sahel’, 2021, p. 4) As a result, the intensity and the frequency of natural hazards, especially drought, floods, tropical cyclones, and locust swarms, increased during the 2000-2021 period. The Sahel also was affected, to a lesser degree, by deforestation, for example, in the Lake Faguibine area (Mali).

The aim of **the fifth chapter** is to identify the way in which human security is affected by environmental changes, as presented in the previous chapter, in the Sahel Region. The four pillars of the human security have been taken into account: ‘freedom from want’, ‘freedom from indignity’, ‘freedom from fear’, and ‘freedom from hazards impact’.

The soil erosion, the temperature increase, and the natural hazards related to global warming affected the satisfaction of basic human needs (**‘freedom from want’**) during the 2000 to 2021 period, in the 14 Sahelian states.

Access to food in the Sahel. The prevalence of undernourishment across the region gradually decreased between 2000 and 2010, except in the Gambia, Chad and Mauritania. In the context of the increasing frequency and intensity of natural hazards (after 2010), the number of people affected by lack of adequate food increased. Droughts and locust swarms were the main causes of moderate and severe food insecurity. Due to severe droughts, the population of the Sahelian states faced nutrient deficiencies, and even hunger in 2004, 2010, 2012, 2015, 2018, and in the period between 2019-2021. The countries in the eastern region, especially Ethiopia, were the most affected in the past three years. In Ethiopia, water stress led to declining agricultural productivity. Furthermore, pasture degradation increased the risk of food insecurity among shepherds, which had to migrate much earlier than usual and were forced to change the transhumance routes.

Locust swarms, although less frequent than floods and droughts, played a major role in triggering food crisis. For example, in 2004, the crops and the pastures were completely destroyed by locusts in some areas of Niger and, as a result, more than a quarter of the state’s population faced severe and moderate food insecurity.

Despite increased frequency and intensity of floods, a correlation between this natural hazard and the prevalence of undernourishment was not found in the case of the Sahelian states. However, the negative impact of floods on food security cannot be excluded. Most states across the region were affected almost annually by floods between 2007 and 2021, increasing the risk of food insecurity because of crop destruction and livestock deaths. The shepherds were also the most affected by floods.

Tropical cyclones usually hit the countries of the western Sahel (The Gambia and Senegal), but this natural hazard has also increased in intensity and frequency in the eastern region since 2018, thereby affecting states such as Djibouti and Ethiopia (eastern part of the state). On the one hand, the tropical cyclones directly contributed to food insecurity, but to a lesser extent than other climate hazards. On the other hand, the tropical cyclones indirectly triggered the recent food crisis in Ethiopia (the wind blew the locusts).

The rise in the average regional temperature and soil erosion also decreased the agricultural productivity, thus increasing the risk of food insecurity in the Sahel.

Access to water in the Sahel. From 2002 to 2017 (the data provided by the FAO were available only for this period), a decrease of the internal freshwater resources per capita occurred in the Sahelian countries. The main causes were the environmental changes and the demographic pressure. More specifically, the rapid population growth and the decrease in the amount of precipitation, due to the change in the natural water cycle, led to a reduction in water volume. Furthermore, there were sources of water which have partially (for example, Lake Chad) or entirely (for example, Lake Faguibine) dried up. Deforestation also contributed to the disappearance of Lake Faguibine situated in northern Mali.

The decrease of the freshwater resources affected human security. Firstly, water scarcity restricted the access to food because of the negative impact on agriculture. Secondly, the lack of water prevented the inhabitants to carry out their household activities and to follow proper hygiene regulations, fact which favored the transmission of infectious pathogens. On the other hand, floods and tropical cyclones led to the deterioration of water quality which contributed to trigger infectious disease outbreaks, such as cholera and hepatitis E. In addition, the water stagnation favored *Aedes* and *Anopheles* mosquito breeding, and therefore, the incidence of several vector-borne diseases (malaria, yellow fever, dengue fever, Chikungunya etc.) increased.

Access to adequate shelter in the Sahel. From 2008 to 2020, floods, tropical cyclones and natural fires totally or partially damaged houses, crops and killed animals. As a result, millions of people were displaced in the Sahel region. The greatest threat was represented by floods which

led to about five and a half million of displaced people only in 2012, 3.894.000 of them being from Nigeria.

The number of displaced people increased between 2017 and 2020, especially in Niger, Nigeria, Ethiopia, Sudan and South Sudan. In 2020, the number of people forced to flee their homes increased by about 50%, as compared to the year before. Landslides caused generally/usually by floods affected few people, especially in Ethiopia, Cameroon and Senegal. Compared with ‘sudden-onset disasters’, drought and desertification were associated with voluntary migration. Due to water scarcity and soil erosion, many people moved from rural areas into urban peripheries where they did not have access to adequate shelter. Furthermore, sea level rise poses a threat to the population of the coastal area, especially to the residents of Dakar (Senegal) and Banjul (The Gambia).

Environmental degradation also contributed to violations of human dignity and of fundamental human rights (**‘freedom to live in dignity’**) in all the Sahelian states. According to the analysis of the constitutions of the 14 states, the fundamental human rights are guaranteed in the Constitutions of the majority of the Sahelian countries, but in reality are not respected and are viewed as mere provisions. Renewable resource scarcity, as a result of environmental changes, contributed directly to violation of Article 25 (1) of the Universal Declaration of Human Rights (‘Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services [...]’) and indirectly to the constant violation of several other rights, such as the right to life, the right to education, the right to work or the right to freedom of movement.

‘Freedom from hazards impact’. The Sahelian states have limited capacity to respond to natural hazards. Millions of people were affected by climate hazards across the region between 2000 and 2021. Niger, Sudan, Chad, Mali and Eritrea were the most vulnerable states to natural disasters.

The last chapter tackles the link between environmental changes and violent conflicts in the Sahel. Firstly, based on data provided by the Armed Conflict Location & Event Data Project (ACLED), I presented the evolution of the number of violent events (battles, explosions/remote violence, violence against civilians, and riots) in the Sahelian states between 2000 and 2021. Secondly, based on reports, analysis, and data provided by the ACLED, the Uppsala Conflict Data Program (UCDP), the International Crisis Group, Amnesty International etc., I identified the main types of conflicts which explain the large number of violent events during certain periods. Thus, the purpose was to identify whether there is a correlation between various types of conflicts and environmental changes, namely: desertification, the changes in the natural water cycles, natural

hazards related to global warming (drought, floods, tropical cyclones and locust swarms). I proposed a complex approach, taking also into consideration economical, social, and political factors.

In the Sahel, accelerated climate change, desertification, deforestation, and, to a lesser degree, deforestation and biodiversity loss contributed to trigger or/and to amplify internal violent conflicts, namely conflicts between different ethnic groups/subgroups; conflicts between government and rebel groups/ jihadist groups; conflicts between militant islamist groups/rebel groups; conflicts between ethnic militias and militant islamist groups.

Environmental changes led to the escalation of violence after 2012, which saw the establishment or consolidation of several rebels groups and militant islamic groups which fought against governments, national and regional authorities, ethnic militias or/and against other rebel groups. These non-state actors also committed violence against civilians.

Environmental changes indirectly contributed to the consolidation of rebel/ militant islamic groups, such as the National Movement for the Liberation of Azawad/MNLA (Mali), Boko Haram (Nigeria, Niger, Chad and Cameroon). Therefore, desertification, natural hazards related to global warming (severe drought, floods, tropical cyclones, locust swarms), the drying up of several water sources (Lake Faguibine, Lake Chad) favored the recruitment by the rebel groups or the militant islamic groups. These non-state actors targeted the shepherds and the fishermen which were the most vulnerable to natural hazards, especially floods and drought.

Despite the religious arguments, the main purpose of militant islamic groups - with the exception of Ahlul Sunnah Jamaa (Nigeria) - was to get access to fewer quantitative renewable resources (water, fertile soils and pastures) due to environmental changes. This is demonstrated by the following facts: many attacks and other violent acts took place against members of several ethnic groups which are sedentary farmers (Jama'at Nasr al-islam wal Muslimin/JNIM targeted the Dogons in Mali; The Islamic State in the Greater Sahara/ISGS targeted members of the Mossi in Burkina Faso; the ISGS targeted the Djerma people in Niger etc.); the farmers were forced to give up part of the crops and the herders were constrained to give up the profit from the sales of agricultural products, especially animal products (meat, milk, furs etc.); the kidnapping of Cameroonian citizens which were forced to work lands owned by Boko Haram members in Nigeria etc.

The herders joined the extremist Islamic groups, which triggered and amplified the conflicts between the ethnic groups composed of farmers and the ethnic groups composed of herders. Notable examples are the conflict between the Dogons and the Fulani and the conflict between the Mossi and the Fulani. As a result, the sedentary farmers and the hunters set up ethnic

militias, such as Dan Na Ambassagou, Dozos and Koglweago. These non-state actors targeted not only militant Islamic groups, but also civilians, the members of ethnic groups associated with extremist groups, especially the Fulani.

However, rapid climate change and desertification entail an intense competition for the already scarce renewable resources (water, pastures and fertile soils), which directly led to conflicts between the Sahel's ethnic groups. In addition, the increasing number of conflicts between subdivisions ('clans') of the same groups (Awlad Omran versus Awlad Serur, Agor Dinka versus Gok Dinka, conflicts between Misseriya clans etc.) in the 2000-2021 period emphasizes that the main cause of violent conflicts is not represented by ethnic differences, but by environmental degradation.

Interstate conflicts (Eritrea versus Djibouti, Ethiopia versus Eritrea, Nigeria versus Cameroon, Sudan versus South Sudan) were caused by border and non-renewable resources disputes. Therefore, environmental changes were not one of the main causes of interstate conflicts. However, climate change and desertification played a major role in triggering the proxy war between Sudan and Chad (2006-2010).

Compared with other Sahelian states, a few countries located in Western and Eastern region (Mauritania, The Gambia, and Djibouti) were characterized by low levels of violence, which were not associated with the absence of environmental changes. Among the factors which might explain the low frequency of violent conflicts are:

- religious homogeneity (of the total population, over 90% are Muslims);
- the scarcity of renewable resources (water and fertile soils) in Mauritania and Djibouti. As a result, the rebel groups, the militant Islamist groups did not have any reason to commit violence.
- the social assistance provided in Mauritania.

In conclusion, the first two hypotheses were confirmed. Environmental changes, especially desertification, the average temperature increase and the natural hazards related to climate change affected human security in the Sahelian countries. The environmental degradation was associated with the renewable resources scarcity (water, fertile soils and pastures) which contributed to triggering and amplifying of interethnic conflicts. However, the third hypothesis was not confirmed. There was no link between interstate conflicts and environmental changes. Nevertheless, there may be an indirect link, which should be analyzed for each violent conflict separately.

The originality of the thesis is represented by the comprehensive approach that links environmental changes and security. Among the main contributions are:

- providing an interdisciplinary approach to security;
- outlining a critical analysis of Neomalthusianism and Cornucopianism;
- establishing the link between environmental changes and violent conflicts tackled from a complex perspective;
- rethinking the concept of the refugee in the context of climate change and proposing a slightly more precise definition for the concept of the climate refugees which could be used in the international law of refugee protection;
- determining the limits of the Sahel based on climate and vegetation, which allow for a more precise identification of environmental changes and their impact on security in the transition zone between the Sahara Desert (north) and the African savannah (south), bordered by the Atlantic Ocean to the west and the Red Sea to the east. Therefore, the following states are totally or partially included in the Sahel region: Senegal, Mauritania, The Gambia, Nigeria, Cameroon, Mali, Niger, Burkina Faso, Chad, Sudan, South Sudan, Ethiopia, Eritrea, and Djibouti;
- analysing the main violent conflicts in the Sahelian states which took place between 2000-2021, from a complex perspective. The aim was to identify the relationship between ecological, economic, social, and political factors which contributed to triggering or amplifying of the violent conflicts;
- regarding the analysis of the impact of environmental changes on human security in the Sahelian states, the four ‘pillars’ of human security, including ‘freedom from hazards impacts’ have been taken into account.

Although there are a lot of studies on the environmental changes and security in the Sahel region, such a holistic approach on this topic does not exist.

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