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Tartalom

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Water Security in a Changing World: A Case Study of Central and Eastern Europe

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Abstract

Every living creature on the planet depends on water consumption to survive. From plants to animals, microorganisms, and humans, water is the fundamental element of life that allows existence on Earth. That is why having access to clean water is considered to be a basic human right that is protected under the UN charter of Human Rights (Resolution A/RES/64/292). For developed regions, access to clean and drinkable water is not considered an everyday struggle, or at least it wasn't until a couple of years ago, with climate change affecting every corner of the world. For developing and least developed countries, water security issues are an ongoing problem that are threatening not only their well -being, but also their existence. Even though water security is considered to be a serious matter in the international arena of politics, there are a lot of difficulties regarding the research of this concept, due to the fact that water security is such an extensive topic. There are many approaches that can be considered when researching the subject of water security; transboundary water conflicts, international aid and water development or the role of international organisations, are just a few examples of water security perspectives. Throughout European history, Central Europe was, and still is to this day, the bridge between East and West, the border between Western and Eastern civilizations. Many of the most important water resources of the European continent are found in Central Europe, with rivers such as the Danube River, Rhine River and Elbe River being important social, economic and cultural elements of Central European countries. The importance of these rivers is great from a water security perspective; they are sources of fresh and clean water, thus they can influence the industrial sector and agriculture. From a geopolitical perspective they play a crucial role in key trade routes, connecting Central Europe with the Black Sea, and the European South and North. Of the eleven CEE countries, only four (Germany, Poland, Slovakia and Lithuania) have a direct access to the sea. Sea routes are important not only from an economic perspective but also from a geopolitical perspective as well. Next to gold, oil and gas, as well as other natural elements, water has been, is, and is going to be one of the most influential political and geopolitical tools of the political global stage.

Keywords: Central and Eastern Europe, water, security, conflicts, climate change

I. Introduction

A researcher, when conducting research on a topic in any academic field, must always have as focal point the following question: what will future scholars think or see when they study us? What will the generations to come think of our generation? Will they think of us as barbarians? If anything, we live perhaps in the most dangerous era of human history. Constant wars, misinformation, artificial intelligence, climate change, and many more factors outline the state of global society over the last hundred years. The annihilation of species and other living organisms is now, more than ever, a reality, and not some kind of science fiction action movie. From this perspective, we risk losing the title of the "Thinking Man" and, in the future, we may be labelled as "Homo fatuus destructor" (Foolish Destroying Human) How we present ourselves and the need to be remembered is a fundamental human need. The first and oldest record of this need can be found in Lascaux, France, with paintings of animals, human figures, and abstract signs that belong to Upper Palaeolithic humans; a living ecosystem that has persisted for millions of years. This need is not only a biological necessity, but a social one as well.

The first major revolution in human history came with the invention of agriculture and the mastery of fire. The entire structure of how humans shaped and understood their own existence changed, laying the foundations for a chain of pivotal developments. Societies began to emerge, and the creation of complex social structures became inevitable. With the use of fire, people learned not only how to protect themselves from predators, but also how to use it as an element that altered the physical anatomy of humans. One of the most famous myths (Theogony 507–616) in Greek mythology connected to fire is that of Prometheus. The two brothers, Prometheus and Epimetheus, were tasked with the creation of humans and other living things. Epimetheus started with the creation of animals, and by the time he got to humans, all the important and useful characteristics had been given to the animals; thus, humans were left with only hair and nails. This circumstance led Prometheus to steal the fire from the gods and give it to humans. This act resulted in the creation of human civilization and technological advancement. According to the myth, Prometheus was punished for his decision to give the fire to humans. This consequence

shows that even then, humans understood that the power they hold over nature is a dangerous one.

Throughout the centuries, the advancement of human civilization has been inextricably linked with technological innovation. Humans and technology have walked side by side for millennia, allowing for a steady and balanced progress. By the 20th century, however, this balance was disrupted, leading to the creation of a widening gap between technological development and human civilization. Technological maturity is not equivalent to human maturity. There are many reasons for this disparity, including socioeconomic factors, the laws of development, history, and politics. After the Second World War, the international community progressed toward a bipolar world order and entered the era of the Cold War, which lasted roughly 45 years. This period was characterized by the domination of the USSR and the USA. In this bipolar world order, the two sides were competing, which led to significant achievements. One of the many examples is the Space Race and the quest to conquer space, which has re-emerged in the second half of the 21st century (Robertson 2024). Furthermore, humanity's most recent achievement is the use of Artificial Intelligence in every aspect of our lives. Many demonize the use of AI, ascribing to it biblical characteristics of mass destruction and catastrophe. I would argue that artificial intelligence is a tool, just like fire or a knife, that plays an important role in our everyday lives. A tool in its natural state is skimpy a tool, without any inherent purpose; and by using the tool, we give it "life".

Yet, the crucial question is the following: how are the above-mentioned examples connected to water, and more specifically, to water security? The answer is simple: water is the fundamental element of life; it is the cornerstone of existence on Earth. Every living creature on the planet depends on water consumption to survive. From plants and animals, to microorganisms and humans, water is the essential resource that makes existence on Earth possible. That is why having access to clean water is a basic human right protected under the UN Charter of Human Rights. It is important to highlight that water scarcity is a consequence of climate change, and climate change does not affect only humans, but animals and plants as well. I would argue that animals and plants are affected even more than humans, since many species have already become extinct or are currently endangered (IFAW 2022). Anthropocentrism is a worldview that places humans at the centre of existence, and it has deep roots

in the Judeo-Christian canon as well as in the ideas of Aristotle. This worldview is, at the very least, a dangerous one, and unfortunately, it has been the dominant ideology shaping and moulding societies. The anthropocentric worldview has directed life towards a path where the sustainability of both human civilization and natural ecosystems is threatened. On the other hand, anthropocentrism is one of the main reasons for technological development and the creation of advanced civilizations. The coin always has two sides; there are pros and cons in every situation, and harmful as well as fruitful decisions. It is a matter of common agreement and scientific consensus that the balance between nature and mankind has reached a point where the existence of life itself is threatened.

II. Water properties and water as an entity

There are many aspects of water and many ways of examining it. For example, water can be studied from an anthropological perspective, a meteorological one, or a political one. As stated in the abstract, this paper will examine the political and social aspects of water under the prism of water security and the securitization theory of water in Central and Eastern Europe. However, before presenting my arguments and theories regarding the subject, it is crucial to present water in its natural form, explaining what water is made of and how we can interpret water as an entity.

The chemical formula of water is H_2O, and a water molecule consists of two hydrogen atoms bonded to a single oxygen atom (Davie 2019:24). A water molecule can be described as dipolar, which means that there is a positive and negative side to the molecule. This polarity is an important property of water, as it leads to the bonding between molecules of water: hydrogen bonding (Davie 2019:24). Water is the most common substance on Earth, with oceans covering over 70% of the surface. Water is found in three states: solid, liquid, and gas. The liquid form refers to oceans, rivers and lakes. Regarding the gas form of water, we have water vapor, which is present in the atmosphere of the Earth and is a key component in the planet's weather and climate. These characteristics can be described as the physical properties of water, and they are critical for human survival on Planet Earth (Davie 2019:24).

In the above paragraph, the natural properties of water were mentioned. In addition to its physical properties, water holds significant philosophical and spiritual meanings (Oestigaard 2021). It is often used as a symbol of life and rebirth, a source of wisdom and reflection, and a means of cleansing and purification, as well as having emotional symbolism. Water plays a cosmological role in the human psyche and in human religions. Across all major worldwide religions, water has a central role in rituals. For example, in Christianity, water is used in the ritual of baptism and in the concept of Holy Water. In Islam, in Judaism and in Hinduism, water is a symbol of purification. The traditions of Wudu (Encyclopaedia Britannica n.d.a) and Mikveh (Encyclopaedia Britannica n.d.b) in Islam and Judaism respectively, are examples of these cleansing and spiritual rituals. In indigenous cultures, water is deeply connected to spirituality. Perhaps the most well-known ritual connected to water is the rain dance, which traditionally is considered to be a performance to invoke rain. All the above-mentioned examples illustrate that water has been, and still is, one of the foundations of human behaviour.

According to the Oxford Dictionary (Oxford Learner's Dictionaries n.d.), the definition of an entity is something that exists separately from other things and has its own identity. The origin of the word can be traced to the late 15th century; it comes from the French entité or medieval Latin entitas, from late Latin ens, ent- 'being' (from esse 'be'). In philosophy, the concept of an entity is fundamentally connected to the theory of ontology (Staab – Studer 2009:1–17), which is a branch of metaphysics. In legal terms, when we speak about a legal entity, we refer to anything that can legally own things, have rights, and be held responsible for its actions. This includes individuals (natural persons) as well as organizations and businesses (artificial persons). But why is it important to think about water, and more specifically, to think about water as an entity? I will present two different approaches regarding this question.

The first approach relates to the way we think about water. Currently, the dominating view of global affairs is based solely on the Western perspective. Over the last decade (2014–2024), and especially after the 2008 financial crisis, there has been a steady and linear increase in the influence of the Global East and Far East, with the People's Republic of China and the Russian Federation challenging the Western powers. As Henry Kissinger (1994) mentioned in his book Diplomacy, in each century, there is a country that shapes and influences

the entire international system in accordance with its own values. The 17th century belonged to France, the 18th century to the United Kingdom, and the 19th to the Austrian Empire and Germany. The 20th century was dominated by the United States. The conflicts of the 21st century have their roots in the transition of the "global power". Every empire has its peak, and after that, the natural course is the decline and, eventually, demise of the empire. All signs suggest that after this transition period we are currently experiencing, Asia will be the dominant power of the 21st century. The cultural and social structures of Asian countries are often a contrast to Western ones. Thus, norms and ideas such as democracy, freedom, and the economy, will be approached and interpreted differently than they have been until now. That is why I argue that our interpretation and approach regarding water and water related issues will change and adapt to the new circumstances.

The second approach concerns the legal entity of water. There is an interesting legal case in New Zealand regarding environmental law. In 2017, the country passed legislation (New Zealand Legislation 2017) in which it granted legal personhood to the Whanganui River. By making this decision, the act recognises the river as a living entity with its own rights and interests. This is also the second act in New Zealand that provides environmental personhood to a natural area. As the country is part of the Commonwealth, the political structure and system differ from to non-Commonwealth countries. In this case, the river is represented by two legal guardians: one appointed by the Māori iwi (tribes) and one by the Crown (New Zealand government). I would like to emphasise two main elements of the **Te Awa Tupua** (Whanganui River Claims Settlement) Act. First, this is a step that ensures the protection of the river for future generations. Second, this decision is a milestone in environmental law and a powerful example of how indigenous rights and culture can and should influence legal frameworks. Also worth mentioning are the following environmental law cases associated with the legal personhood of a river or watercourse: the Atrato River (Wesche 2021) case in Colombia, the Ganges River case in India (Eco Jurisprudence Monitor n.d.), and the legal framework for environmental rights in Ecuador(Constitution of the Republic of Ecuador 2008: art. 71). The significance of these laws will be discussed in the next chapters, with the focus being in Central and Eastern Europe.

My aim regarding the presentation of the natural properties of water, and the philosophical approach of water being an entity, is based on the thought that every element of life, natural or artificial, is connected to each other. There is a cycle that repeats itself, influencing and impacting all involved partied; because the world is so interconnected, everyone is affected, regardless of nationality, lifestyle, or personal preferences.

III. The political and social aspect of water and climate change

Traditionally, when there is a matter that affects the well-being of a society, political figures, academics and the public tend to use philosophical theories, political ideologies and norms to create solutions for the problems that poor governance has created. The 20th century is one of the most important and defining centuries of human history, marking the emergence of a truly globalized world, both politically and socially. This was the period when ideas with roots in the Enlightenment and the French Revolution were tested, implemented, or abandoned. For example, the concepts of the nation and national identity are only two of the many questions that were present throughout the 19th and 20th centuries. Moreover, it is interesting that environmental awareness was present even in the late 19th century with scientists like Svante Arrhenius (NASA Earth Observatory 2000) and Joseph Fourier expressing warnings about the connection between human behaviour and the rise of global temperatures.

The Industrial Revolution led to a rapid increase in urbanisation, escalating the demand for water. This trend increased the demand for not only for industrial water use, but also for clean and accessible water in growing cities. Consequently, this led to the extensive development of urban water infrastructure. However, there remains a significant difference between major cities and the rural areas. In Hungary, for example, the drainage project on the Great Hungarian Plain began in the 19th century and continued throughout the socialist era. By 2024, climate change and mainly human activity have resulted in the desertification of the Kiskunság (Kertész 2016) region, severely affecting

the ecosystem of the area. Another example with roots in the 20th century, is the Zuiderzee Works in the Netherlands (Cassidy, 2021).

Soft power exerts a longer influence over a nation or region, whereas hard power is more effective in the short run. Soft power is a term that was coined by political scientist Joseph Nye (1990), and it can be identified as a method of political influence without armed intervention or the threat of it. Soft power can be applied through diplomatic channels, the export of culture (such as Hollywood and Bollywood films, K-Pop), and education (Ivy League universities, Oxford, Sorbonne). In simple words, soft power is about making others want to do what you want, without the element of force. On the other hand, the term hard power (Klare 2015) refers to the use of force or the threat of force, in order to influence the behaviour of a state, organisation, or individual. Most often, hard power equals military interventions, economic sanctions, or any other form of coercion used to achieve an agenda or set of goals. In essence, hard power is about using force to get others to do what you want.

Financial interventions are a form of intervention that can immediately cause political and social unrest within a country. Imposing financial sanctions and trade restrictions can lead to the isolation of the targeted country and to the creation of new alliance between opposing parties. For instance, financial sanctions imposed on Russia have prompted the nation to develop stronger bilateral relations with China (Notte 2023) and Iran (Esfandiary 2023). Additionally, aid and development assistance can also be considered a form of intervention when they are used as a means of coercion.

Cultural interventions are the types of interventions that are not necessarily perceived by the public as interventions. On the contrary, these efforts are often the most influential and long-lasting. They are closely tied to propaganda and are used to shape public opinion and influence political behaviour. The film industry plays a crucial role regarding in the spread of cultural intervention. More specifically, movies and TV series created in the United States (Bergman Wells – Nordyke 2024) promote the idealisation and the strength of the US military.

Military or armed interventions are the most direct type of intervention. They can be categorised into two main branches: humanitarian intervention

and peacekeeping (or peace enforcement). The first is often imposed, while the second is typically the consequence of such an imposition.

Depending on their nature and execution, these types of interventions can manifest as both soft and hard power. In any case, diplomacy is the most important element of any political, financial, or cultural issue within the international community. Diplomacy must be the core operating principle of bilateral and multilateral relations. If an intervention occurs, it means that diplomatic solutions have failed.

In relation to the control of water sources, it is my opinion that financial and armed interventions will be the solutions many powers and actors in the global community will choose. Furthermore, water can be used as a geopolitical tool of force and influence. It is interesting to observe that countries are relinquishing control of water supplies, in a time when most of the conflicts around the globe have a focus on the dominance of natural resources (Naziz 2020). The privatisation of water supplies is an alarming phenomenon that will, in the future, impact not only the relations between states and private companies, but also lead to violent movements across the globe. There is a wide gap between the privileged elites and the general population; the notion that one must pay an exorbitant price for an element necessary for its survival, is at the very least provocative, if not inhuman. Of course, one could argue that water in its natural form is free, the price reflects the infrastructure and the treatment of water. Yet, as water is considered a basic human right, its exploitation goes against the fundamental purpose of water supplies.

On the other hand, even though access to water resources is considered a basic human right, the responsibility for protecting water sources is not rest solely with one state or one government. First and foremost, the responsibility to protect water lies with humans themselves. Individuals are those who have the first contact with water in their everyday lives; thus they need to treat it with care and respect. Overconsumption, pollution and abuse are examples mainly found in Western societies. Responsibility is even more significant for developed countries, because, in theory, there should not be any water-related issues in the developed part of the world. An even more irresponsible behaviour is the watering of lawns and gardening, in regions where summer drought is the new normal. In Spain, for instance, mass tourism (Wilson 2024) and illegal wells (Piquer 2022), usually connected to agricultural use, worsen the already

serious situation. One of the main elements needed to reduce of the consequences of climate change and ensure water security is education. Societies must educate their citizens about water problems and provide tools that can serve as mechanisms for reduced water consumption or the recycling of used water. This idea presumes that the decision-making process involves the active participation of citizens and that power holders, both private and state, are willing to prioritise the well-being of society and nature. With the combination of individual efforts, technological advancement and nature-friendly government policies, societies can ensure a sustainable water and environment solution for the generations to come. The key behaviour is cooperation, both in a local sense and a global one.

Another political aspect of water and climate change is migration, specifically migration related to climate change. Defining this norm is hard due to its complexity, but in general, environmental migration refers to any movement of people caused by environmental factors, such as natural disasters or pollution (Durieux 2009). Climate migration is a subcategory of environmental migration, referring to the movement of humans who are affected by climate change. Notable examples include the rising sea levels, extreme weather events, droughts, wildfires, and floods (IOM 2021). Changes in the environmental sphere have a direct impact on humans and societies. The recent floods in countries of Central and Eastern Europe, as well as the floods in Southern Spain, demonstrate that as a human society we are ready to handle neither the aftermath of these extreme events nor the socio-economic imbalances that are likely to follow.

IV. Water Security and the securitization of water

Water security and the securitization of water are two interrelated concepts. As previously mentioned, access to clean and drinkable water is a fundamental human right, protected by the United Nations. The definition of water security refers to four main pillars: sustainability, accessibility, the quality and the quantity of water (United Nations 2013). These four points

ensure and prioritise security, protection, responsible management practices and conservation around water.

Accessibility indicates equal distribution and access to water resources, regardless of the socioeconomic status of a community. Sustainability refers to the effective and secure management of water that preserves its availability and access to water for the current population and future generations. Quantity of water is connected to the adequate distribution of water for domestic, industrial and agricultural use. Quality refers to the sustainability of water for environmental health and safe human and animal consumption.

Water security is a delicate social and environmental issue that can be easily disrupted, with human behaviour and climate change being the main threats to its stability. Climate change is a global phenomenon that affects every region and every community, but not to the same degree. Statistics (Islam – Winkel 2017) have shown that, because of climate change, social inequality has risen in both the developing world and the developed world, with the lower classes being the most affected. The concept of climate-based social inequality is multi-dimensional, with serious socioeconomic consequences that require institutional protection.

Another important factor that can be characterized as an obstacle regarding actions against climate change, is climate change denial. This denialist theory is based on the premise that the climate change crisis is a fabricated narrative, founded on data manipulation by the scientific community (La – Nguyen – Vuong 2024). According to this view, the purpose of this crisis is political control and economic power over societies. On the opposite side of the spectrum, there are global movements, sometimes radical ones, that support the idea of climate justice (UNDP 2023) and climate action. The fundamental idea behind the concept of climate justice is that climate change is a human rights issue that directly affects the lives of billions of people. Vulnerable populations, with limited access to mechanisms that could help adapt to the impact of climate change, remain exposed and unprotected.

The political consequence of water security is the securitization of water. The securitization theory is an international Relations theory that was developed by the Copenhagen School of security studies, mainly associated with Barry Buzan, Ole Wœver and Jaap De Wilde. According to this theory, “the

concept of security should be seen as a speech act where the central issue is not if threats are real or not, but the ways in which a certain issue (troop movements, migration, or environmental degradation) can be socially constructed as a threat" (van Munster 2012). The examination of securitization theory is based on five social concentrated sectors: the military, the political, the economic, the environmental, and the societal sectors (Buzan – Wæver – De Wilde 1998:7).

Water securitization refers to the process of framing water as a security issue, prioritising military and national security concerns over other aspects of water management. This approach often involves the militarisation of water resources and their use as a tool of power and control. The consequences of water securitization are manifold and have a significant impact on both ecosystems and humans.

First, when the issue of water becomes securitized it can lead to escalations and conflicts between countries or even between communities. Traditionally, when diplomatic routes are no longer an option, intervention becomes the political solution. As a result, human rights are violated, as access to water is restricted by the intervention itself. Last but not least, by prioritising military and security concerns, the sustainable management of water resources and cooperation between parties are neglected.

Currently, the focus of the global community is on nuclear power. Humanity has already experienced the magnitude of a nuclear disaster three times; first in Hiroshima and Nagasaki, second is Chernobyl disaster, and third is Fukushima. Of these three examples only the first one was a deliberate political act against a sovereign country. Chernobyl was the result of human error and Fukushima was a result of natural disaster. For now, water is not considered a political tool on an equal scale to nuclear power. However, there are numerous examples of how water can become a tool for terrorism or the suppression of resistant movement. A recent example of the endangerment of national water supply is the German Air force base (Nöstlinger – Lau 2024) next to Cologne airport, where authorities suspected a water supply sabotage. Some could argue that this is a sign of bioterrorism, an extremely important matter that is either overlooked or seen as a science fiction scenario. A bioterrorism attack in Europe should be viewed as an expected political move, which could be considered a "Black Swan" or a "Grey Rhino" event. Historically, water sources

have been used as weapons during wartime. From poisoning wells and diverting water supplies, to targeting dams and reservoirs, targeting water infrastructure is a strategic way to cause the destruction of an area or a nation. It is important to state that targeting water infrastructure is a violation of international humanitarian law (Tignino 2023). Such actions can have devastating consequences for civilians, leading to water shortages, disease outbreaks, and displacement.

V. Water-related catastrophes in Central and Eastern Europe

The Chernobyl disaster remains one of history's most significant man-made ecological catastrophes, with its effects still felt today. This catastrophe has profound significance in the region, impacting not only human life, but also the delicate balance of local ecosystems. Radiation contaminated soil and water resources, such as rivers and wetlands. The consequences of such a disaster are far reaching and long-term, affecting areas well beyond the immediate vicinity of the nuclear plant. This incident prompted the international community to become more vigilant regarding the use of nuclear power, leading to the implementation of stricter restrictions and safety measures.

The example of the Chernobyl disaster is not the only instance of an environmental disaster. More closely related to water and Central Western Europe are the examples of the Oder River environmental crisis, the accident near Baia Mare in Romania and the Ajka alumina plant accident. In the following sections, I will present these three cases, examining their similarities and key differences.

The Oder River ecological disaster took place in Poland, in the summer of 2022. The ecosystem of the Oder River was heavily impacted by a toxic algal, named Prymnesium parvum, which caused a mass die-off of aquatic life. More than 360 tons of fish, mussels, and snails perished. This disaster affected Germany as well. According to the EU report (Free et al. 2023) regarding the Oder River ecological disaster, three main factors contributed to the event; high salinity linked to industrial wastewater discharges, high water temperatures

combined with low water levels due to drought, and high levels of nutrients. Together, these conditions triggered the bloom of the Prymnesium parvum phenomenon.

Furthermore, the next important water related disaster is the Baia Mare spill in Romania (Greenpeace 2000). It occurred in January 2000 following of the rupture and collapse of a dam at a gold mine. As a result,100,000 cubic meters of highly toxic, cyanide contaminated wastewater were released into the Someş River, which subsequently flowed into the Tisza and Danube Rivers. Due to the transboundary nature of the Danube, several Central and Eastern European countries were affected. The Hungarian government filed a lawsuit against the mining company, demanding compensation for damages; however, due to the bankruptcy of the mining company, no payments were made. At the time, the pollution of the Tisza and Danube Rivers was labelled the "worst environmental disaster since the Chernobyl nuclear leak" (BBC News 2000). Moreover, the next example of water related catastrophe is a Hungarian case. The Ajka (IFRC 2020) alumina plant disaster is a major industrial accident that occurred on October 4, 2010, in the town Ajka, in Hungary. This environmental catastrophe was the result of the collapse of a dam wall on a reservoir containing red mud, a highly toxic byproduct of alumina production. Approximately one million cubic meters of this material were released into the surrounding area and local water systems. This caused a massive environmental disaster resulting human casualties and numerous injuries.

In an attempt to compare these cases, several common patterns and recurring elements emerge, alongside key differences between the Ajka alumina plant disaster, the Baia Mare cyanide spill, and the Oder River ecological disaster. The following section presents the shared characteristics and the key differences between these cases.

First, the primary element that connects these cases is human error. These catastrophes occurred as a result of human activities, specifically those focused on industrial processes within the environment. Second, there was a profound impact on the environment and local ecosystem, characterized by severe water pollution and soil contamination. Third, the human population was deeply affected, raising critical concerns over public health and safety. Last but not least, there were significant financial consequences in the sectors of tourism

and agriculture, as well as long term economic disruptions within the industrial sector itself.

It is important to highlight the key differences between the three cases.

Table 1:

Type of Pollutant Released		
Oder River Ecological Disaster	**Baia Mare Cyanide Spill**	**Ajka Alumina Plant Disaster**
A toxic algal bloom, specifically Prymnesium parvum	Cyanide-contaminated water, a highly toxic substance	Red mud, a caustic alkaline waste product from alumina production

Immediate Impact		
Oder River Ecological Disaster	**Baia Mare Cyanide Spill**	**Ajka Alumina Plant Disaster**
Impact on the river ecosystem, leading to mass fish deaths and environmental damage.	Transboundary impact, affecting multiple countries along the Tisza and Danube Rivers.	Localized impact, primarily affecting nearby communities and waterways.

Long-Term Environmental Consequences		
Oder River Ecological Disaster	**Baia Mare Cyanide Spill**	**Ajka Alumina Plant Disaster**
The fish populations and other aquatic organisms were hugely affected by the algal bloom affected	The cyanide pollution had severe impacts on aquatic life and ecosystems.	The red mud contaminated soil and water, affecting biodiversity and agricultural land.

Source: Created by the author of this paper.

The above-mentioned examples are the primary water related incidents in Central and Eastern Europe. A major reason these disasters occur is the deterioration of infrastructure and the insufficient maintenance of these facilities. Decades of financial instability and the historically flawed political decisions, such as the irrigation projects initiated during the Communist era, have had a lasting impact on the environment, next to climate change.

The most significant water conflict in Central and Eastern Europe, one that has not escalated into an armed intervention, is the Gabčíkovo – Nagymaros Dams case (Hungarian: Bős – Nagymarosi vízlépcső, Slovak: Sústava vodných diel Gabčíkovo – Nagymaros). This dispute involves Hungary and Slovakia. The roots of the conflict trace back to the 1970s, when both countries were still part of the Soviet Bloc, known then as People's Republic of Hungary and Czechoslovak Socialist Republic. In 1977, the two countries co-signed a treaty regarding hydroelectric engineer projects in the Danube River. The negotiations between the two countries started in the 1950s (Earle – Jägerskog - Öjendal 2010:228). These projects involved the construction or barrage type dams designed to prevent floods and improve river navigability. The agreement stated that two dams would be built: one on Hungarian and one on Czechoslovak (now Slovak) soil. The disagreement escalated when Hungary, driven by environmental concerns voiced primary by the Danube Circle (Global Nonviolent Action Database n.d.) (Duna Kör), expressed doubts regarding the ecological impact of the project. Eventually, the Hungarian government suspended construction of the dam on its side in 1989. In the meantime, the region experienced the collapse of the Soviet Union and the "Velvet Divorce" of Czechoslovakia; subsequently, the project was continued by Slovakia, via an alternative solution known as "Variant C" (ICJ 1993). This disagreement led both countries to appeal the case to the International Court of Justice (ICJ) (ICJ 1997) in 1993. Slovakia accused Hungary of breaching the treaty that was signed in 1977. Conversely, Hungary argued that the project would have a devastating environmental impact on the Danube River and the surrounding ecosystems, claiming that the project violated international environmental law. Furthermore, the Hungarian side argued that while they had stopped the construction of the dam, the Slovak side's continuation of the project through Variant C constituted a material breach of the 1977 treaty (ICJ 1993).

After the court's investigation and the collection of evidence by the ICJ agents, the ruling was moving forward. The evidence was collected by the visit of the court to the source of the dispute. This historic visit took place from April 1 to April 4, 1993. After that, on September 25, 1997, the International Court of Justice ruled that both parties had violated the original agreement. Regarding Hungary, the court found that it was not justified in suspending and abandoning the project in 1989. As for Slovakia, the court said that it was not justified in

unilaterally implementing a modified version of the project (Variant C [ICJ 1993]) in 1992. The court ordered both parties to negotiate in good faith to find a solution. This ruling carries a symbolic weight; it emphasizes the necessity of international cooperation and the involvement of third parties. In this specific case, the role of the European Union (Earle – Jägerskog – Öjendal 2010:228) was important as well, as it utilized political leverage while both Hungary and Slovakia where seeking EU membership. The case was officially closed in 2017 when Slovakia requested for the case to be discontinued, which Hungary supported. This request was accepted by the ICJ (ICJ 1993), with the note that both countries retained their right to request further legal clarification or decision rulings by the ICJ. This means that there is an open option for further legal action in the future. The significance of this case is extremely important: this was the first time that the International Court of Justice ruled over an environmental dispute (Köböl-Benda 2023). The Gabčíkovo–Nagymaros Dams Project case is the fundamental base for other environmental rulings of the International Court of Justice.

VI. Law and water: the aftermath

One of the fundamental needs of any society is connection. Human beings are social animals with an inherent need to belong to a collective. Throughout history, despite the exponential explosion of the global population, this need remained the same, though its characteristics evolved. Globalization is a phenomenon that has been present for centuries, from the Silk Road to the colonization of new continents to the 21st century, were trade, financial stability and cooperation are the primary elements shaping global connectivity. To guarantee this cohesion, there is a vital need for the establishment of a framework of enforcing rules, laws and communication. Such a framework is essential to prevent phenomena such as genocides, environmental catastrophes, situations that could endanger the entire global population. International law serves this critical purpose, providing the legal foundation for the examples and arguments presented in this paper.

In many cases, International Law is incapable of resolving disputes between countries because it has its own limits. The first step in understanding this field

is to categorize its many branches, such as International Criminal Law, International Trade Law, Law of the Sea. The topic this paper addresses is connected first and foremost with International Environmental Law. Because water is a transboundary entity, there is a critical need for mechanisms that protect all the parties involved, as well as nature itself. In simple terms, International Environmental Law deals with environmental protection and sustainable development. Often, there are intersections between these branches; for instance, the Erika Oil Spill (1999) and the Prestige Oil Spill (2002) are two cases that the intersection was International Environmental Law and Maritime Law. All legal cases presented as examples in this paper are all rooted in International Environmental Law.

In the previous chapter, I presented the causes and the results of the water-based catastrophes in Central and Eastern Europe. It is equally important to examine the aftermath of these cases, how they unfolded and whether any substantive change occurred following the legal decision-making process. The Gabčíkovo – Nagymaros Project legal battle concluded in 2017 with a mutual agreement between Slovakia and Hungary to end the conflict. However, the International Court of Justice (ICJ) ruled that either party may bring the case back before the Court to re-open the proceedings at any time. This case serves as a great example for primary two reasons. First, it represents the first case of the ICJ ruling on International Environmental Law without the parties being engaged in an armed conflict. The second reason is political: by declaring the case closed but open ended, the Court granted both sides the legitimacy to use the dispute as a source of political leverage and a strategic pressure point. This case forms the basis of my argument and hypothesis that water-related conflicts and issues can and will be utilized as political tools. As previously mentioned, the region of Central and Eastern Europe is positioned to become one of the most critical players in international affairs.

From a legal perspective, the Oder River ecological disaster remains an ongoing investigation of how and why the catastrophe occurred, alongside active legal proceedings. Potential lawsuits are emerging from affected communities and environmental groups against responsible entities such as government agencies and industrial polluters. However, this litigation faces significant challenges: it is difficult to isolate the exact source of pollution, and gathering the evidence to prove causation is time-consuming. Beyond the

ecological impact, the disaster has triggered substantial policy changes as well. Numerous organizations (Directorate-General for Environment 2023) and public advocacy groups have called for stricter environmental regulations, the monitoring of water quality and more cross-border cooperation in addressing environmental emergencies and mitigating potential conflicts.

The Baia Mare cyanide spill is perhaps the most complex case of all four presented in this paper. The primary parties involved were Hungary and Romania, with the former being directly affected by the environmental disaster. Hungary brought the case before the ICJ and the latter ruled in favour of Hungary, with Romania being ordered to pay compensation to Hungary. The disaster was mainly the responsibility of a mining company that was operating in the region. The mining operation, known as Aurul, was a joint venture between the Australian company Esmeralda Exploration and a Romanian state-owned entity. Hungary filed a massive lawsuit against the mining company; however, the company strategically filed for bankruptcy, leaving no assets to cover damages and in 2010, the Hungarian government (KvVM 2010) was forced to officially close the case without receiving compensation. This disaster impacted the mining industry in Romania, and resulted in environmental impact assessments, safety standards and operating mechanisms.

The last case is yet another Hungarian example. The 2010 Ajka alumina plant disaster resulted in significant legal and environmental consequences. The Hungarian government (Zeldin 2010) reacted immediately, initiating legal action against the responsible company, demanding fines and compensation. Unlike other transboundary cases, this disaster led to criminal prosecutions, were several executives and employees were sentenced to prison for negligence. The catastrophe led to a total overhaul of industrial safety standards (WWF Europe 2011), resulting to more frequent inspections, maintenance as well as the creation of emergency response plans.

Furthermore, it is important to recognize that International Law and international courts have their own limits. These limitations are rooted in a lack of centralized enforcement. States participate in the international legal system of their own free will, based on "voluntary" compliance; there is no such thing as global executive authority to enforce the decision of the court. A second critical factor is the lack of universality, as not all states participate in, acknowledge or follow international agreements. This lack of consensus leads

to the undermine of the effectiveness of international law. The previously mentioned examples regarding water related catastrophes and environmental law suggest that the applying methods for solving such conflicts remain rooted in diplomacy, mutual agreements and cross -border cooperation.

VII. In aqua veritas – Justice for Water: A Conclusion

The primary purpose of this paper has been to introduce the concept of the water as a geopolitical tool and the complexity around it. As established in the Introduction, the central hypothesis of this paper is that water related issues, while relatively new to the mainstream political field, will occupy the centre of the global community's focus in the near future. Increasingly, climate change and its consequences are being addressed not merely due to an abstract moral consciousness or scientific understanding, but rather because of the many tangible phenomena that have occurred these last years. Extreme floods, heatwaves, rush winters are just a few of the many examples of visible climate change.

Throughout this article, I tried to introduce the concept of water and its essential role in human existence. Next, I explained the reasons why I chose the region of Central and Eastern Europe as a primary focus, advancing the hypothesis that this region will become the epicentre of future global affairs, with Hungary playing a pivotal role in international water management. Furthermore, my research has examined the environmental challenges of water by analyzing global conflicts and specifically focusing on water disasters that have occurred in Central and Eastern Europe. As proposed in my hypothesis, I have analyzed all the above under the prism of water security and the securitization theory. This framework was selected for two reasons; first, to establish a new analytical approach for my further research upon the subject of water and the CEE region; and second, because securitization theory provides the necessary tools to examine how framing water as an existential threat, through speech acts and the identification of conflict catalysts, reshapes the landscape of International Relations.

The subject of water is a vast, offering unlimited research opportunities. From the socioeconomic impact of accessible potable water, to the consistency of atmospheric chemicals in rainwater, one can choose and combine any topic related to water and create something completely new. This potential for original thinking, without being strictly bound by traditional canons, is precisely why I chose this field. In my further research, I intend to focus on the politico-economic and geopolitical dimensions of water, analyzed through the lens of environmental challenges. As the 21st becomes defined by a global energy race, control over natural resources will serve as a primary catalyst for conflicts. There are notable examples that support this argument. The Taiwanese and the Ukrainian cases are just two of many. In the first case, Taiwan holds the production of more than 90% of microchips, and in the second case, the Ukrainian fields offer good quality and fertile soil which pose as agricultural opportunities. Both of those cases are strongly connected to water security.

The challenges I encounter, and expected to face, through thus research are significant. Due to the fluid boundaries of my research topic, it is difficult not to be distracted by elements that could potentially be integrated into the research. I would like to use many different approaches with the help of different academic fields. The most challenging part of the research lies in my ability to build my arguments in a way that are logical and easily understood. I am excited and I have the best hopes and intentions regarding the presentation of my findings.

As water demands, one should flow with the flow. In aqua veritas.

Literature

BBC News (2000): Death of a River. *BBC*, 15 February 2000. Online: http://news.bbc.co.uk/2/hi/europe/642880.stm (Accessed 2024. 11. 11.).

Bergman, J. – Wells, K. – Nordyke, K. (2024): Declare Your Independence: Hollywood's Most Patriotic Movies and TV Series. *The Hollywood Reporter,* 3 July 2024. Online: https://www.hollywoodreporter.com/lists/best-patriotic-movies-tv-shows/mr-smith-goes-to-washington/ (Accessed 2024. 11. 09.).

Buzan, Barry – Wæver, Ole – De Wilde, Jaap (1998): *Security: A New Framework for Analysis.* Boulder: Lynne Rienner Publishers.

Cassidy, Emily (2021): Zuiderzee Works. *NASA Earth Observatory,* 6 September 2021. Online: https://science.nasa.gov/earth/earth-observatory/zuiderzee-works-148799/ (Accessed: 2024. 11. 09.).

Constitution of the Republic of Ecuador (2008): *Official Register.* Online: https://pdba.georgetown.edu/Constitutions/Ecuador/english08.html (Accessed: 2024. 12. 13.).

Davie, Tim (2019): Hydrology as a Science. In Davie, Tim: Fundamentals of Hydrology. London: Routledge, 1–13.

Directorate-General for Environment (2023): Zero Pollution: New report draws lessons from the Oder River ecological disaster. European Commission, 17 February 2023. Online: https://environment.ec.europa.eu/news/oder-river-report-2023-02-17_en (Accessed: 2024. 12. 18.).

Durieux Jean-François (2009): Climate Change and Forced Migration Hotspots. From Humanitarian Response to Area-wide Adaptation. *UNHCR*, 6 April 2009. Online: https://www.unhcr.org/media/presentation-climate-change-and-forced-migration-hotspots-humanitarian-response-area-wide (Accessed: 2024. 11. 09.).

Earle, Anton – Jägerskog, Anders – Öjendal, Joakim (eds.): *Transboundary Water Management: Principles and Practice*. London: Routledge.

Eco Jurisprudence Monitor (n.d.): India Supreme Court Case: Salim v State of Uttarakhand (legal personhood Ganga/Yamuna Rivers). Online: https://ecojurisprudence.org/initiatives/salim-v-state-of-uttarakhand/ (Accessed: 2024. 12. 13.).

Encyclopaedia Britannica (n.d.a): Wudu Encyclopaedia Britannica. Online: https://www.britannica.com/topic/tahara-Islam (Accessed: 2024. 12. 09.).

Encyclopaedia Britannica (n.d.b): Mikvah. *Encyclopaedia Britannica*. Online: https://www.britannica.com/topic/mikvah (Accessed: 2024. 12. 09.).

Esfandiary, Dina (2023): Axis of Convenience: Why Iran's Partnership With Russia Endures. Foreign Affairs, 17 February 2023. Online:

https://www.foreignaffairs.com/russian-federation/axis-convenience (Accessed: 2026. 05. 24.).

Free, Gary – Van de Bund, Wouter – Gawlik, Bernd – Van Wijk, Lorenzo – Wood, Maureen – Guagnini, Enrico – Koutelos, Konstantinos – Annunziato, Alessandro – Grizzetti, Bruna – Vigiak, Olga – Gnecchi, Marusca – Poikane, Sandra – Christiansen, Trine – Whalley, Caroline – Antognazza, Federico – Zerger, Benoît – Hoeve, Rolf-Jan – Stielstra, Hans (2023): *JRC Technical report. An EU analysis of the ecological disaster in the Oder River of 2022.* Luxembourg: Publications office of the European Union.

Global Nonviolent Action Database (n.d.): Environmentalist Groups Prevent the Construction of Danube River Dam, Hungary, 1984-1989. *Swarthmore College Peace Collection*, https://nvdatabase.swarthmore.edu/content/environmentalist-groups-prevent-construction-danube-river-dam-hungary-1984-1989 (Accessed: 2024. 11. 18.).

Greenpeace (2000): The Baia Mare Gold Mine Cyanide Spill: Causes, Impacts and Liability Analysis. ReliefWeb, 12 April 2000. Online: https://reliefweb.int/report/hungary/baia-mare-gold-mine-cyanide-spill-causes-impacts-and-liability (Accessed: 2024. 11. 11.).

ICJ (1993): Gabčíkovo-Nagymaros Project (Hungary/Slovakia): Overview of the Case. *International Court of Justice*. Online: https://www.icj-cij.org/case/92 (Accessed: 2024. 11. 18.).

ICJ (1997): Gabčíkovo-Nagymaros Project (Hungary/Slovakia) - Judgment. *International Court of Justice.* Online: https://www.icj-cij.org/node/101335 (Accessed: 2024. 11. 18.).

IFAW (2022): The Impact of Climate Change on Our Planet's Animals. *International Fund for Animal Welfare*, 28 February 2022. Online: https://www.ifaw.org/journal/impact-climate-change-animals (Accessed 2024. 11. 07.).

IFRC (2020): Case Study: Chemical Spill – Red Sludge. Technological and Biological (CBRN) Hazards. *International Federation of Red Cross and Red Crescent Societies,* 15 December 2020. Online: https://www.ifrc.org/document/hungary-chemical-spill-red-sludge-2010 (Accessed: 2024. 11. 13.).

IOM (2021): *Institutional Strategy on Migration, Environment and Climate Change 2021–2030. For a comprehensive, evidence and rights-based approach to migration in the context of environmental degradation, climate change and disasters, for the benefit of migrants and societies.* Geneva: IOM.

Islam, S. Nazrul – Winkel, John (2017): Climate Change and Social Inequality DESA Working Paper Np- 152. United Nations. Online: https://www.un.org/esa/desa/papers/2017/wp152_2017.pdf (Accessed: 2024. 11. 09.).

Kertész, Adam (2016): Is Desertification a Problem in Hungary? *Landscape & Environment*, 10(3-4):242–247.

Kissinger, Henry (1994): *Diplomacy*. New York: Simon & Schuster.

Klare, Michael T. (2015): Hard Power, Soft Power, and Energy Power: The New Foreign Policy Tool. *Foreign Affairs*, 3 March 2015. https://www.foreignaffairs.com/articles/united-states/2015-03-03/hard-power-soft-power-and-energy-power (Accessed: 2024. 11. 09.).

Köböl-Benda, Vivien (2023): Gabčikovo-Nagymaros Project Case Judgment – 25 Years On. *Hungarian Yearbook of International Law and European Law*, 10(1):66–82.

KvVM (2010): IX. A Minisztérium és az alá tartozó fejezetek/intézmények folyamatban lévő peres ügyei. Online: https://adoc.pub/karteritesre-iranyulo-perek.html (Accessed: 2024. 12. 18.).

La, Viet Phuong – Nguyen, Minh Hoang – Vuong, Quan Hoang (2024): Climate Change Denial Theories, Skeptical Arguments, and the Role of Science Communication. Qeios, 25 March 2024. Online: https://www.qeios.com/read/9WXW9S (Accessed: 2026. 05. 28.). https://doi.org/10.32388/9WXW9S

NASA Earth Observatory (2000): Svante Arrhenius (1859–1927). 18 January 2000. Online: https://web.archive.org/web/20250314200832/https://earthobservatory.nasa.gov/features/Arrhenius/arrhenius_3.php (Accessed: 2026. 05. 24.).

Naziz, Arjuman (2020): The Privatisation of Water in Developing Countries: The Influence of Transnational Actors. *World Affairs: The Journal of International Issues*, 24(3):130–141.

New Zealand Legislation (2017): *Te Awa Tupua (Whanganui River Claims Settlement) Act 2017.* Online: https://www.legislation.govt.nz/act/public/2017/0007/latest/whole.html (Accessed: 2024. 12. 13.).

Nöstlinger, Nette – Lau, Stuart (2024): German Authorities Suspect Water Supply Sabotage on Military Base. *Politico*, August 14 2024. Online: https://www.politico.eu/article/water-supply-sabotage-military-bases-germany-nato-cologne-geilenkirchen/ (Accessed: 2024. 11. 13.).

Notte, Hanna (2023): Moscow Is Bringing Washington's Enemies Together. *Foreign Affairs*, 6 October 2023. Online: https://www.foreignaffairs.com/russian-federation/russias-axis-sanctioned (Accessed: 2024. 11. 10.).

Nye, Joseph S. Jr. (1990): Power and Influence after the Cold War. *Foreign Policy*, 80:153–171. https://doi.org/10.2307/1148580

Oestigaard, Terje (2021): Water and Religion. In Sammons, Steven J. (ed.): *The Oxford Research Encyclopedia of Religion*. Oxford: Oxford University Press. https://doi.org/10.1093/acrefore/9780190854584.013.477

Oxford Learner's Dictionaries (n.d.): Definition of Entity. *Oxford Learner's Dictionaries*. https://www.oxfordlearnersdictionaries.com/definition/english/entity?q=entity (Accessed: 2024. 12. 09.).

Piquer, Isabelle (2022): Thousands of Illegal Wells in Spain Worsen Water Shortage. *Le Monde*, 13 August 2022. Online: https://www.lemonde.fr/en/environment/article/2022/08/13/thousands-of-illegal-wells-in-spain-worsen-water-shortage_5993512_114.html (Accessed: 2024. 11. 18.).

Robertson, Derek (2024): Trump, Musk and the Second Space Race. *Politico*, 25 November 2024. Online: https://www.politico.com/newsletters/digital-future-daily/2024/11/25/trump-musk-and-the-second-space-race-00191548 (Accessed: 2024. 12. 30.).

Staab, Steffen – Studer, Rudi (eds.) (2009): *Handbook on Ontologies (International Handbooks on Information Systems)*. Berlin: Springer.

Tignino, Mara (2023): The Regulation of Crimes against Water in Armed Conflicts and Other Situations of Violence. *Revue Internationale de La Croix-Rouge*, 105(706):706–734.

UNDP (2023): Climate Change is a Matter of Justice – Here's Why. *United Nations Development Programme*, 30 June 2023. Online: https://climatepromise.undp.org/news-and-stories/climate-change-matter-justice-heres-why (Accessed: 2024. 11. 13.).

United Nations (2013): What is Water Security? Infographic. United Nations, 8 May 2013. Online: https://www.unwater.org/publications/what-water-security-infographic (Accessed: 2024. 11. 11.).

van Munster, Rens (2012): Securitization. In *Oxford Bibliographies*. Oxford: Oxford University Press. https://doi.org/10.1093/obo/9780199743292-0091

Wesche, Philipp (2021): Rights of Nature in Practice: A Case Study on the Impacts of the Colombian Atrato River Decision. *Journal of Environmental Law*, 33(3):531–555. https://doi.org/10.1093/jel/eqab021

Wilson, Joseph (2024): Catalonia Tourists May Soon Face Water Restrictions – but Swimming Pools Spared as 'Climate Refuges'. *Euronews,* 17 April 2024. Online: https://www.euronews.com/green/2024/04/17/catalonia-tourists-may-soon-face-water-restrictions-but-swimming-pools-spared-as-climate-r (Accessed: 2024. 11. 18.).

WWF Europe (2011): One Year After the Red Mud Disaster: WWF Warns Against Ticking Time Bombs, Calls for Action Plan for Central and Eastern Europe. *WWF*, 3 October

2011. Online: https://www.wwf.eu/?201848/One-year-after-the-red-mud-disaster-WWF-warns-against-ticking-time-bombs-calls-for-action-plan-for-Central-and-Eastern-Europe (Accessed: 2024. 12. 18.).

Zeldin, Wendy (2010): Hungary: Initiation of Criminal Investigation of Chemical Spill Disaster. *Library of Congress*, 12 October 2010. https://www.loc.gov/item/global-legal-monitor/2010-10-12/hungary-initiation-of-criminal-investigation-of-chemical-spill-disaster/ (Accessed: 2024. 12. 18.).