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Regional Peace Theory: A Base for Regional Natural Hazards Reduction and Environment Sustainability Increase—Case Study: Danube and Tigris-Euphrates Basins (Towards a Scientific Golden Map)

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ABSTRACT

Natural hazards manifest themselves in all scales of exploration. The Tigris and Euphrates basins in Southwest Asia and the Danube basin in the European continent are areas with dust and drought hazards. Therefore, to reduce vulnerability and manage drought and dust in the Tigris and Euphrates, regional peace must be established, and regional peace in the Danube basin must be strengthened. This article emphasizes establishing and strengthening regional peace as a systematic process to reduce vulnerability to natural hazards. The novelty of the article is that it: (A) emphasizes the regional scale to reduce the vulnerability of people and the environment to dust and drought hazards; (B) evaluates the adverse effects of political forces' actions in the realm of hazardous natural processes; (C) informs both the environment and political forces about the theory of establishing regional peace to reduce natural hazards; and (D) strengthens interdisciplinary research in natural hazards, environmental, and geo-political sciences. The research method used in this article is historical-experimental. Also, using the comparative method and one-to-one correspondence, the geographical territory of political forces' actions was matched with the territory of natural hazardous processes. The result showed that strengthening the efficiency and effective cooperation of regional political forces and strengthening regional peace reduce the vulnerability caused by natural hazards. Accordingly, the theory of regional peace to reduce natural hazards was confirmed as a scientific golden map.

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INTRODUCTION

It is better to start our article with two questions: (A) What is the responsibility of political forces and scientists familiar with political science toward natural hazards? (B) How can natural hazard scientists help political forces reduce natural hazards?

Sometimes, natural events such as dust storms (Darvishi et al.), droughts, earthquakes, or floods (Tipson, 2013; White, 1945) cause damage. These events and the damage they cause are discussed and analyzed in many sciences (Moghimi, 2014; Gyula & Huisingh, 2009), as the events and their damage exhibit significant diversity. Therefore, the diversity of damage can be divided into six groups (Table 1). However, risky natural events have valuable benefits. Sometimes, the damages caused by the six hazards (Table 1) correspond to the damages caused by wars. Therefore, there is a strong similarity between the damages of natural hazards and wars. The

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typology of damage is almost similar for natural hazards and wars, which is a reason for political forces, hazard scientists, and people to more consciously analyze ways to reduce the damages caused by natural hazards. To reduce natural hazards, based on a precise literature review rather than conferences in international forums, three approaches—(A) the Sendai Framework, (B) the Climate Change Conference, and (C) sustainable development—have received more attention (Peters et al., 2019; Peters & Kelman, 2020). The International Development Commission of the United Nations has fundamental and well-known achievements that have been recognized globally. So far, planning to reduce the damage of natural hazards has been based on these three approaches (UNEP, 2010; UNSD, 2013; UNDRR, 2020). These approaches are important but do not provide sustainable policies at the regional level. Many natural hazard events, especially, have a regional scale. For example, in the eastern Mediterranean, earthquakes are common among all the countries in the eastern part of the Mediterranean, including Israel, Lebanon, and Palestine. The eastern Mediterranean is a natural region with multiple hazards. This fact indicates the regionalization of natural hazards, vulnerability, peace, or war. Although some scientists have presented their concerns in numerous articles on natural hazards and the emergence of war, stating that natural hazards will cause numerous wars in the future, many articles have specifically focused on water wars. However, we emphasize natural hazards and the emergence of peace. We started from the regional spatial scale and called it regional peace based on the reduction of natural hazards. Peacemaking is an art. From the perspective of hazard science and natural hazard science, achieving "peace-friendliness" and "peace-thinking" is a golden step. When the damage caused by natural events and the damage caused by wars are similar, it is logical for political forces and people to cooperate and fight together to reduce the damage caused by natural hazards. Adhering to regional peace is the foundation of a superior social responsibility among natural hazard scientists, political forces, and people. We consider this a great strategy and a golden plan to reduce natural hazards.

Natural events occur at different times and geographical locations. Not all natural events are dangerous. When natural events exceed the average and common range of experience, when their intensity and impact area are wider, or when the distance of their minimum or maximum limit increases over time, they cause life or financial damage to people and harm the environment. Therefore, they become hazards. For example, with the relative and continuous increase in precipitation and the increase and maintenance of soil moisture, vegetation increases. As a result, the land resists the wind, and the amount of dust is reduced. The opposite causes an increase in dust (Figure 1; Moghimi, 2014; Knight, 2013).

The behaviors of people and political forces exhibit various diversities (Mirhaidar et al., 2022). These behaviors, along with lifestyles, have led to many spatial differences on the planet (Hogget, 1993, 1995). Some of these differences have developed and evolved in a confrontational manner. Allen et al. refer to the space that highlights these differences as "region" (Allen & Cochrane, 2014).

The most obvious form of spatial differences based on the new lifestyle is the creation of cities, towns, and service and industrial spaces. In examining urbanization, Harvey used the

Table 1. Diversity of damages from natural events (Moghimi, 2014), and war

A) Physical damage, such as the destruction of structures or buildings.
B) Social damages, such as immigration and population displacement.
C) Economic damage, such as loss of property and income, as well as high poverty and unemployment.
D) Health damage, such as the number of victims due to the event, injuries, and mental and psychological issues.
E) Environmental damage, such as creating pollution in the environment, reducing the quality of drinking water, and depleting environmental resources. This includes burning, destroying, and moving sediments and soil.
F) Spiritual injuries.

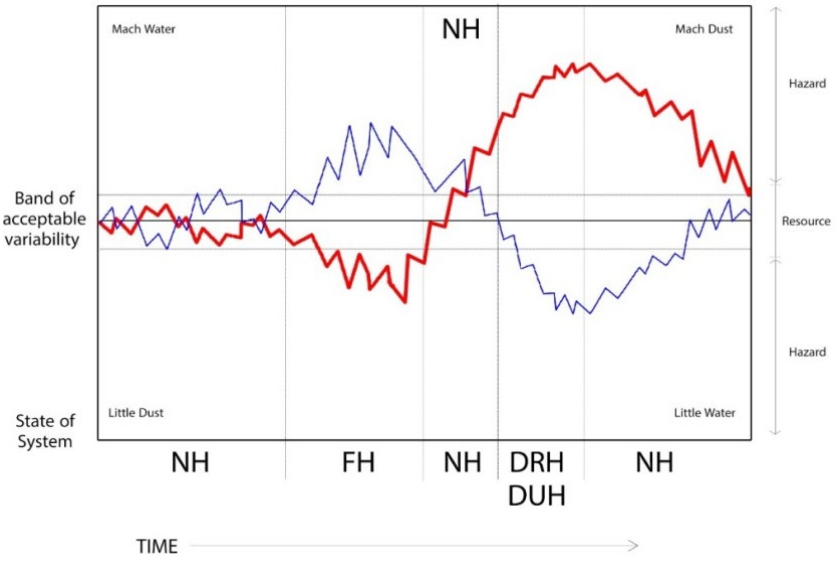

Fig. 1. Changing the scope of a natural event, such as precipitation, in three sequences: maximum limit, minimum limit, and average limit systematically. No hazard (NH), flood hazards (FH), increase in dryness (DRH), and increase in dust (DUH). The red line (thin) represents dust, and the blue line (thick) represents precipitation (Knight, 2013; Moghimi, 2014)

term "region" and mentioned urban areas for spatial analysis of changes (Harvey, 1996). A region may also consist of natural converging relationships of resources and energy in the natural environment. It may also have divergent resource and energy patterns.

Sedimentary energy flow systems, solar energy, and hydrological energy are prominent examples of this type (Chorley et al., 1984). Based on this, the new concept of a region with three fields of exploitation, diverging benefits, or converging capabilities is known. How it is formed, perpetuated, and changed again is possible through the continuous mechanism of energy in a geographical environment.

Recently, in revising the concept of the region while explaining four indicators—(a) differences in lifestyle, (b) exploitation, (c) divergence, and (d) convergence of human activities—and referring to some natural events, the concept of the region has been defined with two indicators. "Territorialism" and "Juxtaposition" of people, activities, and energy have been exalted (Cox & Johnston, 1982; Hfeznia et al., 2014; Cox, 2023; Cochrane, 2018).

The concept and territory of the region, from the viewpoint of peace-based natural hazards studies, are manifested by the integration of people's activities, political forces, hazardous natural events, and governments. That means, what spatial territory do they have? How are they placed next to other areas (i.e., neighborhood), and for how long can it be stable in such a territory and neighborhood?

Natural hazards are an interdisciplinary science. The contributions of geomorphology, meteorology, ecology, and social sciences to the discovery of this science are significant. Modern scientists have discovered or analyzed only a small portion of this science. People, scientists, and policymakers have missed many opportunities to identify and use interdisciplinary knowledge (Simono, 2015). The opportunities used and the few reported data available in the field of hazards show that hazards have a wide diversity.

As part of the primary development measures of the Sendai Framework, the United Nations has classified 74 hazards out of 1,200 hazards reported internationally. This classification includes the definitions, classification, and integration of hazard risk (UNDRR, 2020). Among the 74 identified types, 57 of them are natural hazards, as shown in Table 2. This is a very valuable contribution.

Table 2. Typology of natural hazards (UNDRR, 2020; Zare & Moghimi, 2023)

Avalanche	Ash fall	Coastal erosion
Chemical spill	Blizzard	Convective storm
Cold wave	Coastal flood	Debris flow
Cyclonic rain	Cyclone surge	Cyclonic wind
Earthquake	Dust	Drought
Eruption	Extreme temperature	Extra-tropical storm
Flood	Flash flood	Fire
Freeze	Fog	Heat wave
Hail	Glacial lake outburst	Ice
Landslide	Insect infestation	Lava flow
Mud flow	Ponding flood	Riverine flood
Pollution	Pyroclastic flow	Radiation contamination
Rain	Sand	Rock fall
Space accident	Snow	Shoreline change
Subsidence	Structural collapse	Space weather
Tsunami	Tropical cyclone	Tornado
Wave action	Volcanic activity	Urban flood
Wind	Wildfire	

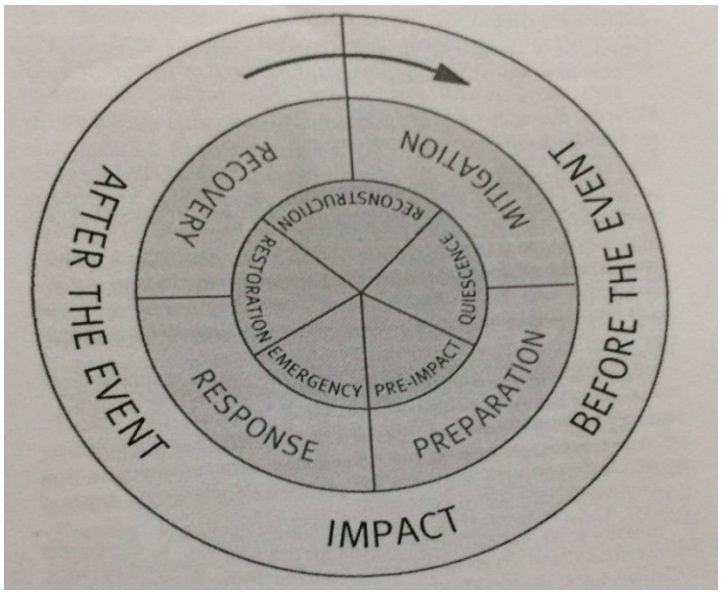

Fig. 2. Classification of the cycle of facing a natural disaster (Glade & Alexander, 2013)

Most natural hazards are a combination of climatic and geomorphological hazards (Glade & Nadim, 2014). Many natural hazards have a mixed nature and probably occur with high frequency, but they are not registered. Events without a database are probably of this type (Iodic & Greenacre, 2010). The typology of hazards, including the number of affected people, the severity of damages, and the frequency of occurrence, has also been conducted (Smith & Petley, 2009). Although many countries do not report data on affected people, or do not report the amount of damage and frequency of occurrence, or underreport or overreport the actual amount, these cases make exact taxonomy difficult.

According to hazard reports of natural events, the most damage caused by natural hazards on a global scale is related to water scarcity and desertification. On a regional or national scale, the hazards vary, with more damage occurring in specific areas. In Southwest Asia (in the Tigris and Euphrates basins), there is water scarcity, dust, and desertification. In Europe (in the Danube basin), there are floods (ICPDR, 2013) and water scarcity (due to the decrease in precipitation and the increase in environmental temperature).

Additionally, what turns a natural event into a dangerous situation and then into a disaster

is not the event itself, but the level of preparedness of societies and the response to that event (Glade & Alexander, 2013). In many dangerous natural events, communities and people have no role, such as when a meteorite hits a place on Earth. The role of political forces in the field of hazards can be analyzed in two situations:

A) How much do political forces contribute to the intensity, speed, or expansion of a natural hazard event?

B) What is the level of effective participation of political forces and natural hazard scientists in reducing hazards?

There is a systematic theoretical and conceptual framework at the international level in the field of disaster assessment due to natural events, based on the preparedness of people and governments (Figure 2). According to this framework, the four important policies that have been the focus of scientists so far in dealing with natural hazards, assessing the level of disaster, and reducing vulnerability are: A) the level of preparedness, B) the reaction of people and the environment, C) the improvement process, and D) the amount of hazard reduction risk (Glade & Alexander, 2013). When one or all of the mentioned policies do not exist or are weak in a society, the severity of vulnerability and the amount of damage to people and the environment increase. The necessary mechanism for applying these four policies in a regional political environment differs from that in a national political environment. In the national context, national political forces play a role, while at the regional scale, the active political forces of the region play a role. These political forces are diverse and complex. It is important to be hazard-aware and to take action. On the other hand, there are many natural hazards, and they are also very diverse (Table 2). The resilience of communities and individuals at risk is low. For this reason, the policies needed to reduce hazards, based on policy theory, become more important.

One of these theories is the theory of regional peace based on the reduction of natural hazards. This theory is proposed for the first time in this article and in the world of science, policy, and politics. The opposite of peace is war, which leads to increasing natural hazards. The experiences gained from wars and hostilities between many countries, such as the Vietnam War and neighboring countries like Laos (in the 1940s), demonstrate how conflicts can escalate natural hazards. Civil wars in some African countries, including Libya, and the hostility of political forces to each other, which exacerbate flood and drought damage, as well as the extreme drought and civil wars in Sudan, are further examples. The need for these countries to reduce natural hazards calls for the use of peace-based theory. People, political forces, and hazard scientists need to focus on three approaches: First, what measures are needed before the occurrence of a natural hazard in any region? Second, how is resilience realized so that people can "be and stay" in such a way that natural hazards are reduced? Third, how can we reduce the risk of natural events in the future? Based on these ideas, regional peace based on natural hazards is discussed as a theory. This theory is superior to other theories on risk reduction. The authors have researched and analyzed two regions: A) Southwest Asia (Tigris and Euphrates basin), and B) the Danube region in Europe.

METHODOLOGY

Research on natural hazards and peace may involve a wide range of methods. The selected methods used in this article are:

A) System method (Chorley et al., 1984). Natural hazards have a system. The hazard systems of water scarcity, dust, and engineering measures in the Danube region and Southwest Asia were investigated. The characteristics of the event and the impacts related to the hazard phenomena were analyzed. Two important and major indicators: (a) equilibrium (balance), and

(b) evolution were used so that we could achieve stability analysis. Using the balance index, the stability of natural hazard events over a certain period (contemporary time) was investigated in two drainage basins: (a) the Tigris and Euphrates, and (b) the Danube. Momentary balance, dynamic balance of increasing hazards, dynamic balance of reducing hazards, thresholds for hazard generation, and complex or combined responses were investigated. The evolutionary index was used to analyze the future perspective.

B) Historical method. Using this method, the environmental evidence related to floods, wetlands, wind erosion, movement of sedimentary materials, and climatic dryness was investigated. The sequence of historical and social events that were effective in intensifying each of the events and changing the surface landscapes of the earth, turning resources into threats, and creating combined hazards in the two regions of the Danube and Southwest Asia were analyzed.

C) Experimental method (Gilbert, 1914; Hagget, 1993). Using this method, the Danube region and Southwest Asia were investigated based on the existing natural hazard events and the construction experiences of the ruling political forces. Also, measures to reduce hazards in the Danube region and measures to transform processes and turn them into bigger hazards were evaluated.

D) Comparative method (Iodice & Greenacre, 2010). By using this method, the hazards and actions of the political forces of each district were matched. Also, by using the method of multifactorial analysis, adaptive measures were analyzed. The variety of actions of political and civil forces and hazards in each area were compared. As a result, the strengthening of regional peace for the Danube region and the creation and strengthening of regional peace for Southwest Asia were identified as the most important strategies for reducing natural hazards.

MATERIAL AND DISCUSSION

Southwest Asia (dusty and drought)

In Southwest Asia, there is a natural homogeneous basin area. There are many natural hazards in this region (Table 2). Dust and drought are currently important natural hazards in this region. Assessing vulnerability to natural hazards without considering the quality of social activities is wrong (Glade & Alexander, 2013). In my opinion, the current social and political forces' activities in this region do not seem to align with the reduction of natural hazards. Therefore, the damage to people and the environment due to natural hazardous events has increased. Climatic drought, civil drought (dam construction) (Jones, 2019), agricultural drought, and the approach of war have caused an increase in risk. When the area of dry land increases, the intensity of the wind increases, and more dust will be produced. Therefore, more people will be exposed to dust (Figure 3). The natural basin of this region is affected by the conflicting activities of the political forces of Iran, Iraq, Turkey, Syria, Kuwait, and other countries on the southern coast of the Persian Gulf. During the past century, many short and long wars have occurred in this region. That is, the political forces have chosen the solution of war to solve the neighborhood issues in this region. In this regard, they may have used the capabilities of the natural environment and natural dangerous events to strengthen war thinking and superior dominance. In this case, natural events change into more hazardous. The increase in such hazards is caused by the thinking of active political forces. What should we do? Political forces must be peaceful and strengthen the peace approach to reduce the damage caused by natural hazards.

This natural basin has two important rivers: A) The Euphrates River, which is 2,800 km long. About 1,300 km of it is in Turkey and Syria, while about 1,500 km of it is located in Iraq. This river starts at the height of 4,140 meters on the Anatolian Plateau in Turkey (Türkiye) and

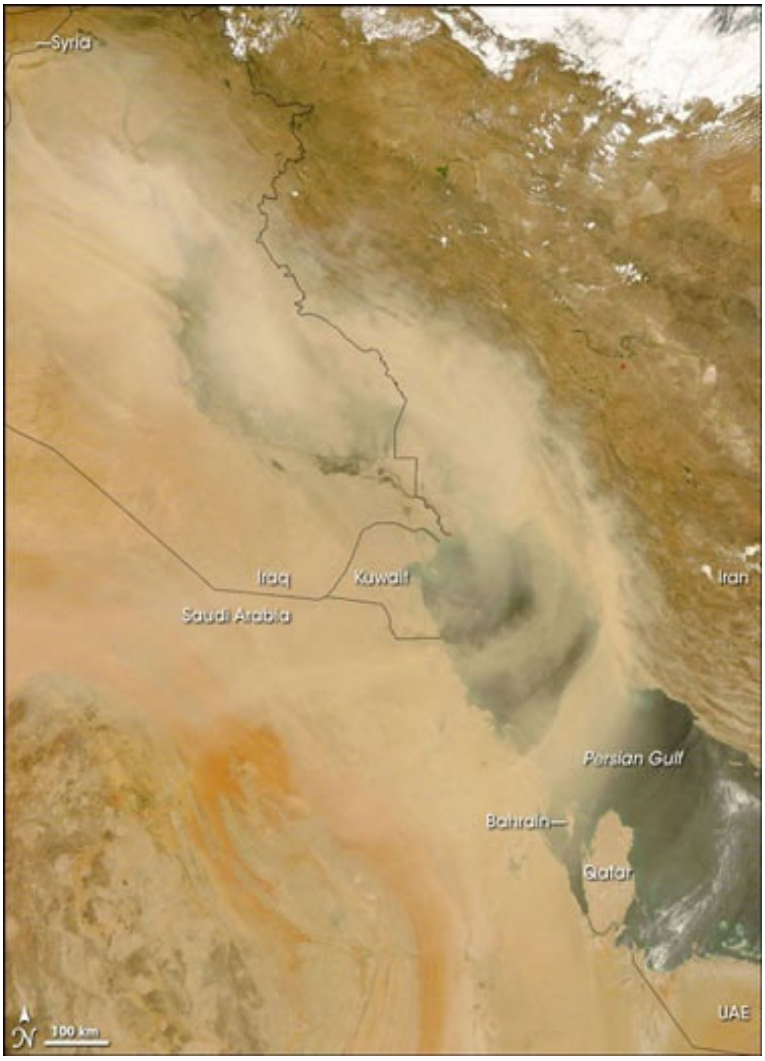

Fig. 3. A dust event in Southwest Asia

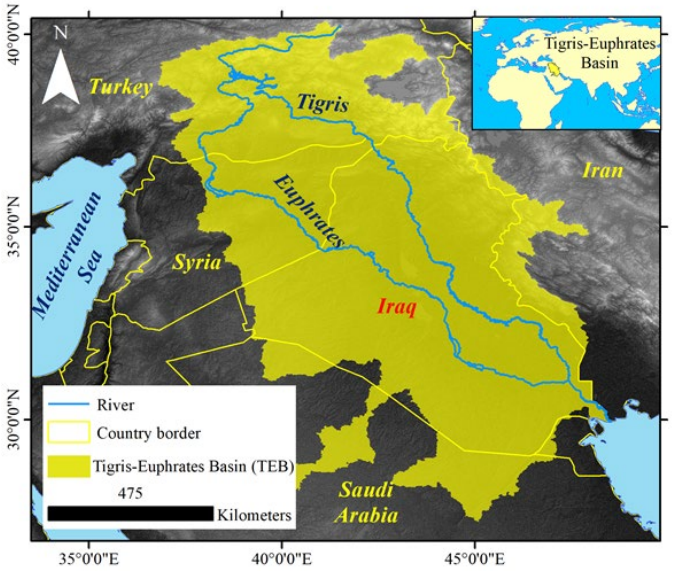

Fig. 4. The territory of the natural basin and the Tigris and Euphrates rivers (Al-Taei et al., 2024

ends at the Persian Gulf. B) The Tigris River, which is 1,850 km long. It starts from the high mountains of Taurus in Turkey, with its mountainous part at a height of 3,756 meters. About 600 km of it is in Turkey (Figure 4). Using a systemic approach, we have divided the area of natural hazards in this region into three parts. This division is for the systematic understanding of natural hazards according to political forces.

Mountain area

The mountainous part of the Tigris and Euphrates rivers belongs to Turkey and Syria, with a very small area in Iraq and Iran. This part has a lot of rainfall, significant historical floods, and a large amount of river sediment. Three important water projects have been implemented or are being implemented in this area:

A) The GAP project is a strategic project for the management of water resources in the mountainous part of the Tigris and Euphrates rivers in Turkey. The initial idea for this strategy started in 1936. This idea was first proposed by Turkish hydrological engineers to the political forces of the time. For two decades, this major project was the subject of discussions between hydrological engineers, structural engineers, and advocates for social welfare and employment, and it was at the forefront of the political forces of that time.

B) Based on this, the construction of the Atatürk Dam began in 1983 in the province of Şanlıurfa, Turkey. This dam has a capacity of about 48.7 billion cubic meters and was put into operation in 1994 (Wikipedia, 2022). The dam is located in the mountainous part of the Euphrates River. In the 1950s, after the GAP project, the political forces focused on hydropower to apply the policy of superior governance over Syria, Iraq, and Iran. As a result, an illusion was created that Turkish political forces intended to turn hydropower into a regional domination policy for the long term. If such thinking persists among Turkish political forces, the current natural hazards in the region, including Turkey, will not decrease, and future natural hazards will increase. Is it not possible to shift this to a peace-based hydropower policy to reduce natural hazards in the region? This change requires peaceful political forces focused on risk reduction.

C) The idea of confronting the strategy of hydropower dominance, from the beginning, gained strength in the minds of the Tigris and Euphrates river dwellers (people) in the countries of Syria and Iraq. However, the political forces of the two countries of Iraq and Syria did not pay attention to it.

D) In Syria, hydraulic engineers were able to impose their ideas on political forces and build dams on the Euphrates River. Therefore, in addition to the fact that they did not want to confront the construction of dams in Turkey. They also started building a dam on the Euphrates. In the 2000s, Iraqi political forces also started dam construction. In Iraq, the construction of the Ileus Dam in Martin province of Iraq started in 2012 and lasted until 2018. Ileus Dam reservoir has a capacity of about ten billion, four hundred and ten million cubic meters.

E) The authors do not wish to pass judgment on dam construction. Dam construction is also very good. It is important that all the dams in this region were built competitively and in a state of war by political forces. The point of view of political forces in the construction of these dams has been to weaken the neighboring country. The war between Iraq and Iran in the 1980s, Iraq and Turkey in the 1990s, Syria and Turkey in the 2010s, and the Iraq-Kuwait war, as well as the fear and concern of the countries on the southern coast of the Persian Gulf, have increased the hazards. The tensions of political forces, the American military-political occupation of Iraq, and the ISIS war in Iraq and Syria have weakened the strengthening of regional peace. In such a situation, not only is it not possible to reduce natural hazards, but it has also increased the transformation of natural events into hazards. Therefore, the vulnerability to natural hazards has increased.

Middle area

The central area of this region, in terms of geomorphology, plays a key role in transferring floodwaters and sedimentary materials from the mountain basin to the floodplain (Figure 3). However, political forces have only constructed dams in the mountainous regions, and no risk assessment has been conducted for the downstream areas of these dams. With the construction of dams in the middle part of the Tigris and Euphrates, two dangerous behaviors have emerged in the land-use practices of the people in Syria and Iraq.

A) After the construction of dams, the discharge of the Tigris and Euphrates rivers in the downstream part of the dams was decreased. Therefore, many flooded lands around these two rivers were freed. The occupation and use of freed flood lands around the Tigris and Euphrates rivers in the downstream part of the dams by the people were carried out without planning according to hazard reduction.

B) No preparation against historical large floods that may occur has been foreseen, and the built dams cannot store them. Therefore, people operate in unstable areas and are not immune to major historical floods. As a result, the scale of hazards will shift from medium to large and catastrophic in the future. This change in behavior and dangerous competition is caused by the influence of war-like political forces. Political forces should be peaceful to reduce natural hazards. Big dams will also have big risks. The bigger they are, the bigger their hazards are (Moghimi, 2006). Especially the fact that Turkey and Syria have also experienced large-scale historic earthquakes.

Lower area

The lower part of this region starts from the foothills, connected to the Kurdistan plain of Iraq and Syria, and continues to the west coast of the Persian Gulf (delta region). This area is a vast floodplain that covers about 70% of Iraq. This large floodplain was formed due to the transfer of flood and sediment from the mountains of Turkey and Syria (regions one and two) to Iraq in the Quaternary. This plain is the place where mountain floods spread and subside. It is also the place of sedimentation and relaxation of sedimentary materials (Figure 5). Floods and sedimentary materials, depending on the magnitude of the flood and the amount of soluble and insoluble sedimentary materials in it, can continue until, the Tigris and Euphrates deltas. About a thousand kilometers of the Tigris and Euphrates rivers are affected by this flood-sedimentary plain. About sixty percent of Iraqi urban, rural, and agricultural settlements are located on this floodplain. Now this area is heavily affected by wind erosion (Figure 6). The nature of the danger posed by wind erosion and the formation of dust is significant because it affects many people in Iraq, Iran, Kuwait, and other countries around the Persian Gulf. It disrupts some activities. It harms people's health. It causes damage to farmers. The abundance of dust causes population migration.

Political forces started the GAP project in Turkey and dam construction in Syria when the effects of drought hazards caused by climate change and the warming of the ambient temperature had not yet appeared in the region. Now, with the appearance of the dangerous effect of climatic drought (reduction of precipitation and increase of evaporation and irregularity of floods) due to climate changes, more dust has been created. Dam construction has also contributed to the reduction of soil moisture and the shrinking of lakes in the lower areas. The emotional and unplanned behavior of the people of Iraq and Syria due to the entertainment of political forces in various wars has also helped to increase the soil aridity. Two important wind currents, one from the Mediterranean side and the other from the Caucasus mountains, flow to this region (Fig. 6).

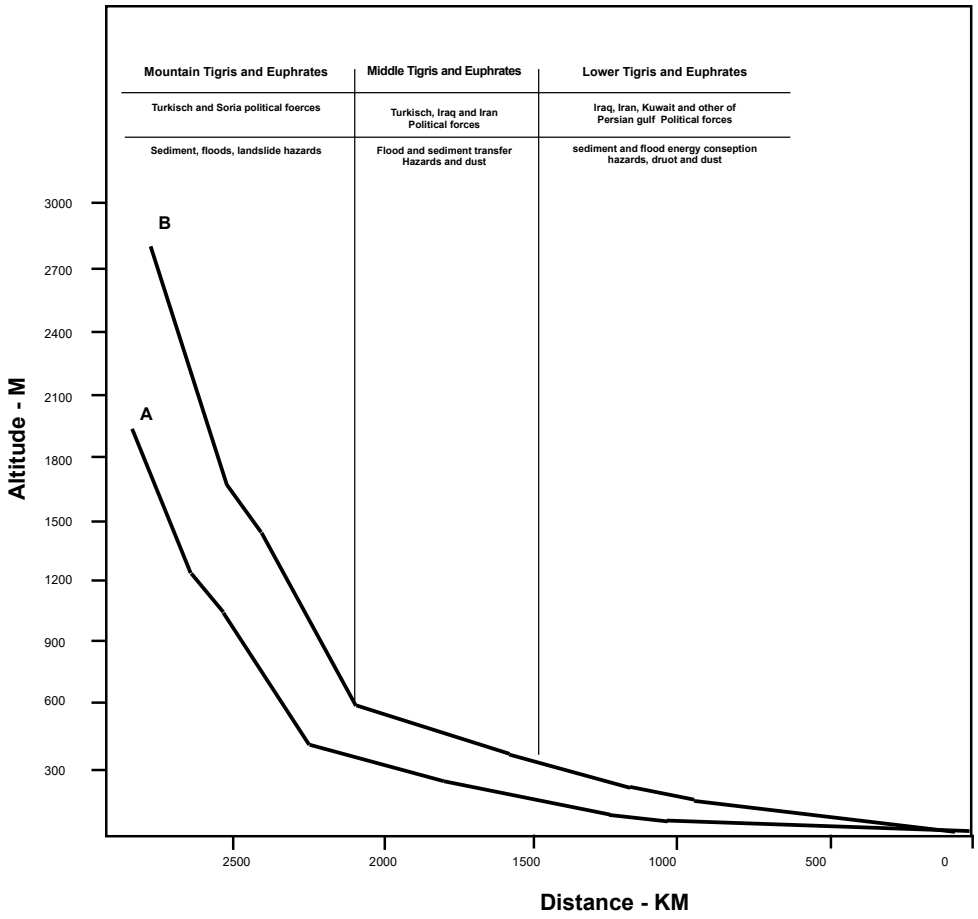

Fig. 5. Political forces, geomorphic processes, and longitudinal morph profile of the Tigris (A) and Euphrates (B) regions

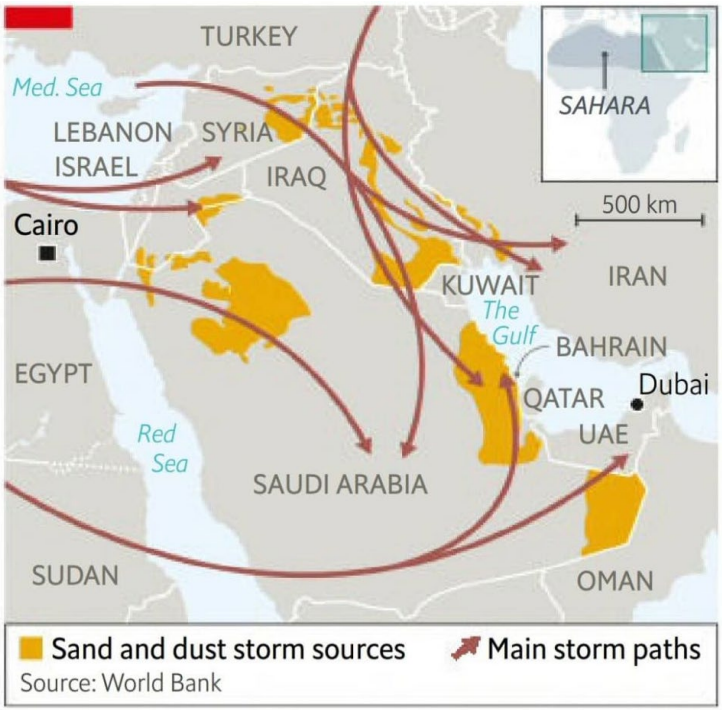

Fig. 6. The direction of wind movement in Southwest Asia and the distribution of wind-eroded lands (Source: World Bank, 2019)

These two streams pass over the dried floodplains. Depending on their intensity, speed, and duration, they carry sediments smaller than two microns into the air. These airborne particles cover a large part of the region (Figure 3), thereby causing hazards. While it is not possible to change the direction of the prevailing winds entering this area from an engineering perspective, it is possible to manage water and sediment resources across three zones: the mountainous areas, the transition area, and the lower area. Achieving this requires a systematic and holistic approach to natural hazardous events at the regional level. The prerequisite for such a systematic approach is regional peace rooted in the mitigation of natural hazards. This peace extends beyond national boundaries. A comprehensive, systematic approach, rather than a fragmented, nationalistic perspective, can more effectively address natural hazardous events and protect vulnerable populations. Political forces recognize the significance of this approach.

This area has stable natural structural integrity. Social cohesion and sustainable action to reduce hazards are not evident because conflict, hostility, and negative competition among political forces have dominated the social and natural space. With regional peace based on hazard reduction, this situation can be overcome. Through regional peace, the large dams built in Turkey, Syria, and Iraq can contribute to the development of the entire region. Low water and dust hazards would be significantly reduced—provided that the political forces possess the necessary understanding and competence. Otherwise, removing such political forces and replacing them with leaders who prioritize reducing natural hazards, supported by the people and social elites, becomes essential.

Regional peace, consistent with territorial structural integrity and risk management, makes competition and action more coherent, stable, less costly, and more prudent. In other words, it reduces vulnerability. This achievement fosters a regional identity rooted in peace and aimed at reducing natural hazards. The logic of peace based on natural hazards emphasizes that the political forces of these countries should not be warlike, nor should they use dangerous natural events to fuel conflicts or promote war. Instead, they should prioritize cooperation and sustainable joint action to mitigate natural hazards. The focus of political forces must extend beyond maintaining a Cold War-like state and shift toward establishing "warm peace." This forms the core of the regional peace theory based on natural hazard reduction.

Danube region

The Danube was and is one of the most important and influential regions in the natural, social, and political activities of the European continent. Many large European countries were formed in this region (Figure 7). During the past hundred years, most of Europe's political forces have lived in the Danube region, which has experienced many natural hazards (Table 2).

The hazards of ice movement in Alpine glaciers, snow movement and avalanches, floods, and slope processes (in the mountainous part), and the need for water, floods, and low precipitation (in the lower part) are among them. The Danube River is the most important and the largest in this region. The largest longitudinal line of this river is about 2500 km long (ICPDR, 2013, Jungwirth et al., 2014). This river drains about 55% of the European continent. Many urban and rural settlements have been developed around this river. Even the capitals of several countries have been developed along this river (ICPDR, 2005). These indicators show that water and the river are vital, sensitive, and important natural phenomena for political forces and people. Therefore, reducing its natural hazards is important. This area can be investigated and interpreted in three parts according to geomorphic systems and natural hazards.

Lower area

The Danube Delta is located in the lower part of the region and primarily in Romania.

Romanian political forces mostly use the lands of this delta for agricultural activities. This delta currently has no geomorphic changes because the floods of the Danube River rarely reach it. But the geomorphic changes of reservoir networks on the delta show that there were changes in the past, under the influence of high-flow floods. If the large Danube floods are not managed, they can disrupt and destroy the activities of people and political forces on this delta. How might large Danube floods be managed? Through regional peace based on reducing natural hazards.

On the other hand, due to the decrease in precipitation caused by climate change, the people of Romania, Bulgaria, and Moldova now have a strong need for water for their agricultural activities. In the future, this need will increase. Particularly, the hydrological flow of the Danube will be very important for them. But they currently do not get enough water.

This area has a general slope of a maximum of five percent. It is also the place where river and flood sediments settle. For this reason, the depth of hydrological networks, including the Danube River, in this area is less than the width of the river. This geomorphic feature has caused the Danube floods in Romania to flow more widely and with less depth on the ground. For this reason, in this area, only if a flood reaches Romania will the groundwater be replenished.

Due to the decrease in rainfall, the decrease in the flow of floods, and the decrease in the flow of the Danube River in this area, the intervention of people and political forces in the underground water around the waterway networks, and also around the Danube River, has become inevitable. It seems that this behavior will cause a gradual decrease in the underground water table and may result in land subsidence in the future. It also increases the likelihood of the political forces and people of Romania, Moldova, and Bulgaria demanding more rights from the middle and mountainous regions of the Danube soon. Regional peace would allow the political forces of the Middle Danube and Mountain Danube to give a peaceful response to this need. Otherwise, the approach of conflict and hostility may be strengthened.

Mountainous area

The mountainous area of the Danube region has a high frequency of floods with high intensity and speed and is rich in solid and transferable sedimentary materials. Many cities and villages in Austria, Germany, Switzerland, and the Czech Republic are exposed to the dangers of floods and sedimentary materials (Figure 8). The political forces of these countries alone cannot reduce the hazards. The storage of sedimentary materials in this section has been done to

Fig. 7. The Danube region (Source: www.danube.research.com)

lower levels in the past due to the occurrence of small floods and also the movement of glacial moraines from high natural glaciers. The important thing is that it causes severe and short-term floods. Depending on the duration and intensity of floods, the sediments that do not have the required stability will be transferred to agricultural or urban land such as the city of Linz and Vienna in Austria, which is developed along the Danube river (Figure 9).

Therefore, the hazards of severe floods with large volumes of sediment, the alteration and movement of sedimentary materials from high to low areas, and the significant threat posed to urban and rural areas exposed to floods and sedimentation are key characteristics of this region. Unlike the mountainous region of Southwest Asia, this region does not have much potential to build large dams. However, due to the possibility of decreasing precipitation and its change from snow to rain, it is necessary to build small dams that store and contain flood energy. Dam construction in this area should not lead to the supremacy of a particular political force like the Gap project in Turkey.

In this area, the political forces of Germany and Austria are more influential. Especially the fact that in the minds of the people and political forces of these two countries, the invasion of the German military forces into Austria in 1938 has not been forgotten. The authors hope that war will be forgotten in the minds of people and political forces with regional peace based on natural hazards. The most active and complex social, political, and natural hazards of the Danube region belong to this area. In this area, natural hazards are combined and multifactorial. There are also a lot of slope and sliding phenomena in it. The political forces of the region must have the necessary understanding of the natural hazards of this area and the changes. If the political forces of this region are in a state of war or cold war, their natural hazards will increase. It is necessary to be in a state of cold peace and better to be in a state of warm peace.

The middle area of the Danube region

In the middle area, the political forces must interact with the political forces of the mountain area and the lower area. To reduce natural hazards, they must have a basin balance argument. This area is more exposed to anomalies caused by natural hazards because it is not immune to large floods. It is also exposed to the hostility and social pressure of the people and political forces who are demanding more water from the Danube. This area has a more transitional role. It receives

Fig. 8. The Danube Mountain area, Note the territory of the surrounding countries.

Fig. 9. An image of the Danube River in Vienna

sedimentary materials and water from the mountain basin and transfers a portion of them to the lower area.

The result is that in the Danube region, from the point of view of natural hazards, there are grounds for the emergence of political conflicts in all three areas. Political conflicts are mostly caused by inequality in the use of water, imbalance in the distribution of space between each political territory, and lack of immunity against floods and sediments. For example, the country of Austria, in the mountainous area of the Danube, although it has an excess of water, is always exposed to the hazards of floods and sediment materials. The political capital of this country is Vienna. Part of this city has been developed on historical flood sediments. Therefore, it is prone to floods. The political forces of this country alone will not be able to reduce flood hazards. The country has numerous small drainage basins. Its basin extension is not homogeneous. About 50 percent of the country's population and its service and production activities are located in the mountainous area of the Danube basin, where combined natural hazards are more abundant. Therefore, the people of this country are vulnerable to natural hazards.

In such a situation, Austrian political forces must make more efforts to reduce natural hazards. The analysis of drainage-degradation-sedimentary-flooding micro-basins of this region (Danube region) as a process-response unit has been of interest to Danube scientists since the 18th century, but not to consolidate regional peace. Regional peace based on the natural hazards of the Danube includes a systematic look at the balanced hydrogeomorphological flow in the three lower, middle, and mountain areas (Figure 10).

This point of view will strengthen the policy of regional solidarity in the Danube system as a strategy for environmental engineers and political forces aimed at reducing natural hazards. Now the political forces of Austria consider one of the indicators of their success to be their focus on the basic construction works on the Danube in the city of Vienna (Jungwirth et al., 2014). The creation

of the flood transfer channel in the city of Vienna is a global example of river engineering with an eco-geomorphological view of the city river. The support and competition of political forces have been very effective in creating the "New Danube" in Vienna. The dynamics and natural hazards of this river have probably caused European society to reach a political equilibrium solution to better utilize the environment and reduce hazards, as well as to avoid social conflicts and historical hostility.

It seems that European political forces (European Union, 2016), with a systematic understanding of the dynamic balance of the natural-social environment centered on the Danube River, have realized the necessity of establishing the "European Union" institution. In the world, the reason for the coalitions of political forces so far has been defense, economic, or political. But in Europe and the Danube region, the ground for the emergence of a natural coalition is more evident. The political forces focusing on the convergence of the natural basin of the Danube and the consolidation of their natural thinking and social thinking view this as a natural-political solution for themselves and their natural environment.

The political forces of the Southwest Asia region do not benefit from this solution to reduce natural hazards. Although the Danube region is larger than the Tigris and Euphrates basin, the Danube region has achieved regional peace based on natural hazards as a process. But there is no

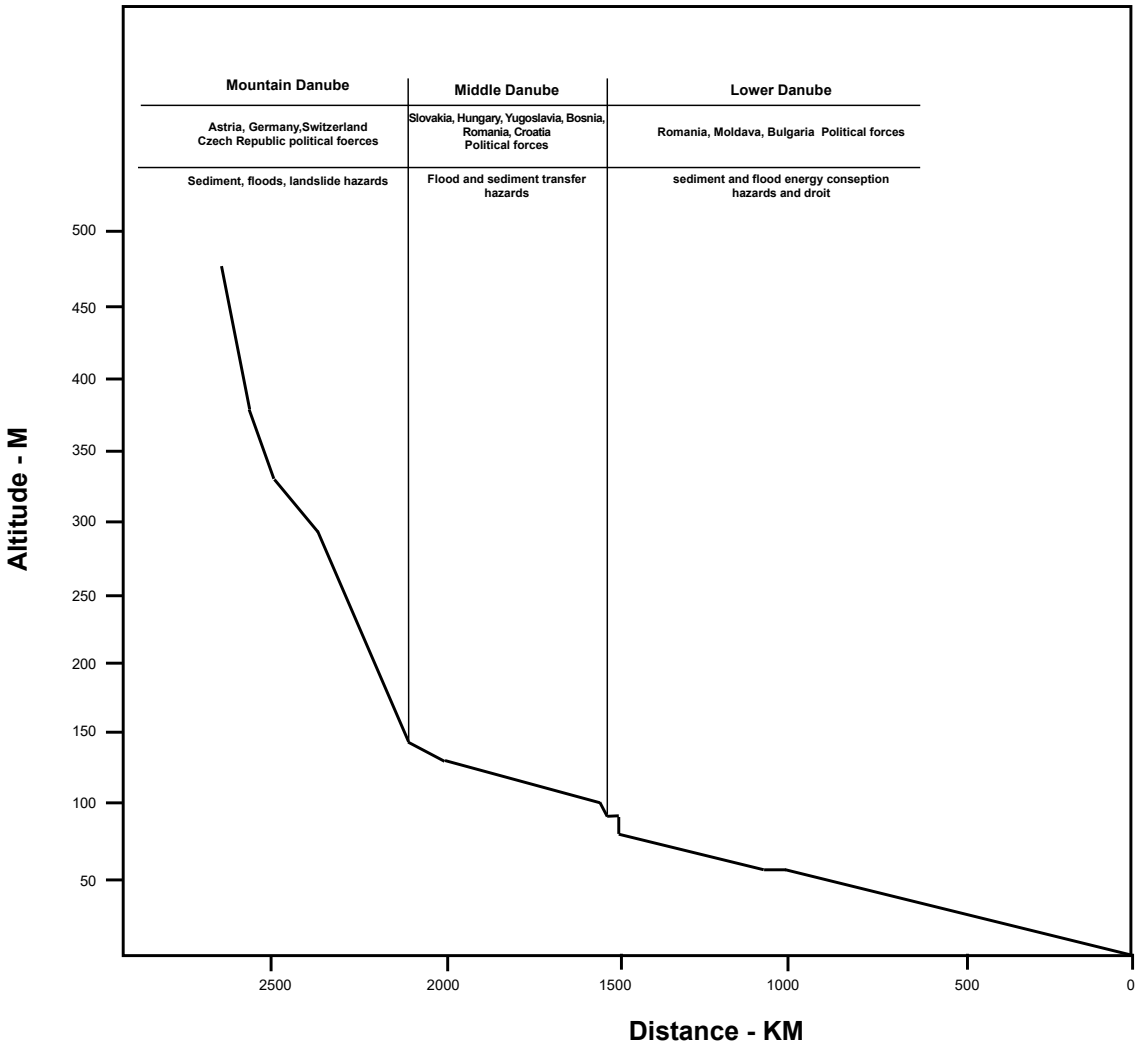

Fig. 10. Political forces, geomorphic processes, and longitudinal morpho-profile of the Danube region

war. Rather, it is in a Cold War situation. It would be better to be in a state of cold peace or warm peace. Conversely, in Southwest Asia, in the Tigris and Euphrates basin, a large part of it has been in conflict for the past half-century and is still in a state of war or a state of unstable cold war. Political forces should learn from the peace process in the Danube region.

In the case of a weakening of the peace-oriented thinking based on hazards among the political forces that make up the European Union, there is a possibility of the appearance of hostile behavior in the basin between the people and the political forces of the Danubian countries. In such a scenario, dangerous flood events and water shortages could create catastrophic hazards in this region, as has been seen in the Tigris and Euphrates basins. In such a situation, three scenarios are foreseen:

A) Political forces of the lower Danube area, due to climate change and a decrease in rainfall, resulting in the decrease in the flow of the Danube, will place pressure on the political forces of the middle Danube region. Political forces may demand more water. If it is not provided, they might instigate social violence.

B) The political forces of the mountainous Danube area may seek to emulate the procedure and model of the political forces of the mountainous area of the Tigris and Euphrates basin. Therefore, due to the decrease in precipitation and the change in the pattern of precipitation caused by climate change, and as a result of the decrease in the flow of the Danube River, they will seek to enhance the construction of dams and water storage facilities and increase the use of hydropower to assert their policies on the Middle Danube countries.

In these two scenarios, along with creating unforeseen political tensions, there is also a possibility of the appearance of dust production spaces in the lower area (Figure 4, especially in Romania). In this case, lands with loam or clay soil, as well as dry lands with river sediments, will be exposed to wind erosion. Therefore, the lower area of this region will become the center of dust production in Europe. The increase in abandoned agricultural land will further provide grounds for the emergence of dust, and therefore it will heighten the vulnerability of Danube farmers and people.

C) The political forces of the three Danube areas (mountain, middle, and lower) strengthen a regional peace strategy. According to the reasons given for the political forces of Southwest Asia, this is a unique opportunity.

This is an opportunity that natural hazards present to political forces. It is also an opportunity for political forces to reduce natural hazards. Moreover, it provides an opportunity for natural hazard scientists to cooperate with political scientists.

RESULT AND APPLICATION

Peace is realized when there is no violence and war (Galtung, 1995). Peace is individual, social, and political. Individual or social peace occurs when the physical or spiritual condition of individuals and communities is not harmed or exposed. Also, the capacity of people and the environment for spiritual or material growth should not be suppressed. Moreover, violence has a behavioral nature, but sometimes it depends on the structures created by the surrounding environment. Structural violence depends on the power relations of the states and their relations with their people. The political, social, and economic relations of governments with each other and with their people may cause the emergence of structures that lead to natural violence. Peace means the absence of behavioral and structural violence, both natural and political. Accordingly, natural hazards sometimes have behavioral or structural origins. Behavioral hazards depend on the relations between political forces and the power relations of neighboring states. The structural origin of natural hazards depends on the state and geomorphic nature of the land, as

well as climatic processes, territory, and actions of governments and political forces that are also neighbors.

Politicians have divided peace into two types: A) negative and B) positive (Czempiel, 1998). Both types are important for reducing natural hazards. Czempiel (1998) considers the absence of behavioral violence as negative peace and the absence of structural violence as positive peace. Negative peace is a peace that is more likely to return to violence and hostility. Positive peace is more stable than negative peace in reducing natural hazards. Positive peace will be more useful for reducing natural hazards because the structures for using the capabilities of the natural environment and social and individual behaviors aligned with "reducing hazards and strengthening peace" are built and promoted. In negative peace, the means of limiting defense or hindering national defense are stronger, and the possibility of returning to a state of cold war or war is higher. Regional peace based on natural hazards, because of its benefits from stable environmental structures such as natural systems and drainage basins, can be more stable than structures resulting from unnatural processes.

Political forces cause the emergence of violence and hostility because governments and political forces emphasize behaviors to manage their people and choose and create structures that will be confining and limiting (Weber, 1973). On the other hand, there will be many losses and damage to the natural environment and people. Governments manage the people in their territory through the laws, regulations, and structures that they create. If these laws and structures are contrary to the laws and structures of the natural environment, it will lead to hazardous events, and with the appearance of a natural event such as a decrease in precipitation, it will become a big hazard or a complex hazard. This is the result of the behavior and structure created by political forces' decisions.

Political forces, to exercise their power in accordance with the structure they have chosen and created, use military forces (such as the army) or law enforcement (such as the police) to control individual and social behaviors and prevent them from intensifying (Schneckener, 2003). This will not be sustainable sometimes, because it will not be sustainable if such a structure and care are not consistent with the processes of natural hazards. Therefore, the political forces and governments will be forced to flee from the territory of their rule. Or they will continue to protect their inappropriate behavior and structure. In this case, they will become dictators, and their losses and damage to the environment and people will increase. This group of political forces avoids peace. They give up peace for violence and enmity.

They form private police and private armies. They exploit the water, soil, forest, air, and lands of their country in the wrong way. They use the police and private army to continue their work. They deceive the people of their country. As a result, their natural hazards will increase, and the vulnerability of the population to these hazards will grow.

Sometimes, peaceful political forces want to be present in the long future. In the light of such an idea, they may form monopolistic private organizations. Around such organizations and forces, bribery, organized corruption, dictatorship, and power-seeking are formed. In this case, social law, human law, natural law, science, and research related to natural hazards are ignored.

They indulge in using the capabilities of the natural environment, such as water sources, rivers, wetlands, beaches, mountain slopes, and floodplains. They act wrongly. They lust for money and wealth. For this reason, not only do they fail to reduce the hazards of large-scale natural events with their continuity, but they also turn small-scale natural events into hazards. Most of the damage caused by floods, droughts, dust, or fires, as well as the destruction of buildings due to earthquakes in Southwest Asia and the Danube basin, are probably caused by such an approach by political forces. Therefore, the increase in natural hazards in these areas is due to the lack of political forces' strategy with the idea of regional peace. What's the solution?

A) For political forces, it is essential to become aware of natural hazards. They must gain awareness by learning the science of natural hazards. Additionally, they should develop education and research in this field.

B) The second solution is to reach regional peace based on natural hazards and strengthen peace.

C) The third solution for political forces is to leave politics and change political forces.

Nature and natural events do not discriminate against any political group. The increasing hazards of dust, water shortages, and floods in Southwest Asia and the Danube basin should be addressed by political forces and reduced through peace actions.

Although some political scientists consider peace as a tool for tranquility, benefit, and prosperity along with justice, prosperity, and democracy (Gartner, 1998; Gartner, 2023), beyond that, "peace" is a strategy to protect the natural environment. Regional peace based on reducing natural hazards is a major strategy for managing natural hazard events.

Peace also has a moral basis. Its action is to control people's behavior and normalize behavior among governments, governments and people, and individuals with each other, according to virtuous values (Werkner, 2017). It brings virtuous values to natural hazards. Thus, it is morally valuable.

Creating value model

Peace is a valuable human achievement and asset (Kelman, 2012; 2016). So far, it has been underutilized in the management and reduction of environmental hazards. However, its use is a fundamental strategy to reduce hazards. Although until now, the reduction of natural hazards has been based on the theory of adaptation, resilience, structural engineering, behavior management, and insurance, regional peace based on reducing natural hazards offers a new approach. This theory is more important than the other theories. Natural hazards can be reduced more effectively in the Danube region and Southwest Asia with this theory. The five important values of this theory are:

A) The value of thought: This is the reason for the emergence of a cognitive strategy in the cognitive, mental, and perceptual systems of people, political forces, hazard scientists, hazard engineers, and other engineers in the region.

B) Political value: This theory strengthens and stabilizes interactive programs between the political forces of neighboring countries. It increases the fulfillment of obligations. By utilizing a hazard situation or a natural event, hazards are reduced against each other.

C) Environmental value: This theory reduces the destruction of the environment and its resources. It increases the stability of the natural environment.

D) Scientific value: The theory contributes to a better scientific understanding of hazard reduction.

E) The value of less vulnerability: This theory reduces the vulnerability of the people of the Danube and the people of Southwest Asia to natural hazards.The process and pattern of regional peace based on hazard reduction.

Peace is a valuable human achievement. Its process is like a first appearance as a phenomenon in the cognitive, mental, and perceptive apparatus of man. Its typology shows its phenomenal nature.

Process approach

Regional peace based on reducing natural hazards is an innovative type of peace. It has different processes. The phenomenological approach to peace based on the reduction of natural hazards has made us have a process approach to hazards and peace (Table 3).

Realization of the peace process requires peaceful behavior and continuous cooperation of political forces to manage natural hazards. Convergence in the management of natural hazards is needed, not managerial divergence. Cooperation in identifying natural hazards is needed, not hostility and hatred toward each other. The synergy of existing regional facilities is essential to rescue the injured, not to obstruct, conceal, or misuse these resources. Creating common infrastructures and paying attention to the long term instead of the short term is one of the main components of this process.

Patterns

In terms of patterns of regional peace based on reducing natural hazards there are different patterns:

A) One of the models is the Cold War model. Many countries in the Danube basin and Southwest Asia are in a state of cold war. Although this model involves much less risk compared to the war situation, it causes more damage compared to the more sublime models of peace. Regional war may cause the collapse of natural and social structures and the separation of lands. One of the reasons is that war tools are more destructive and combined than before, especially

Table 3. Process Recognition of Regional Peace Based on Reducing Natural Hazards

A) Determining the space and territory of the region. The Danube basin in Europe and the Tigris and Euphrates basins in Southwest Asia, and the alignment of the political forces of countries with independent governance in these basins, will determine the region.
B) Carrying out the typology of hazardous natural events and opposing or favorable political forces in the region.
C) Determining regional legal frameworks based on hazard reduction.
D) Determining regional hazard reduction policies.
E) Strengthening coordinated regional measures.
F) Determining the regional monitoring system for natural hazards.
G) Forming a database and access to information and regional warning systems.
H) Development of regional scientific research and training centers in the field of risks and peace. Joint cooperation of research and scientific centers of the region.
I) Participation and cooperation of the political forces of the region and strengthening the monitoring of peace and hazards.

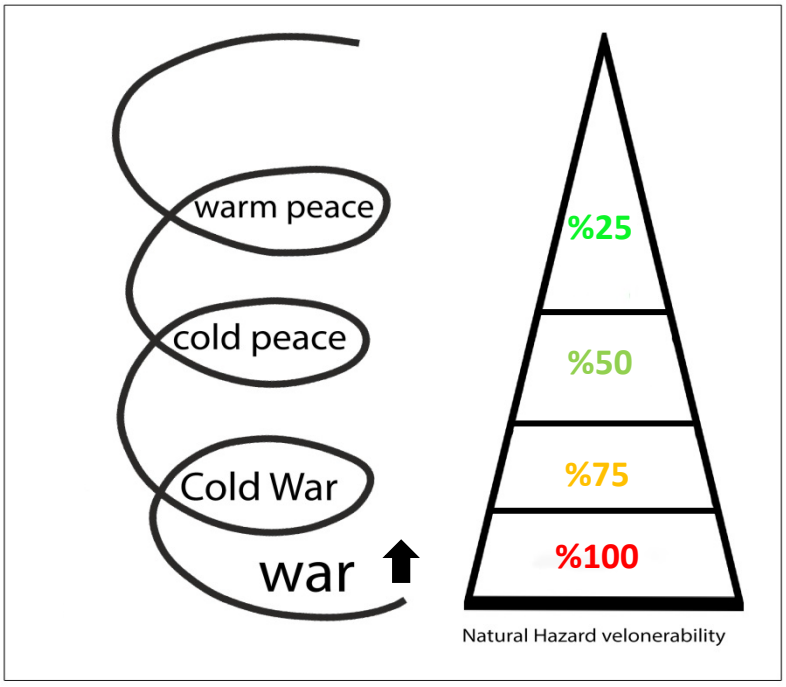

Fig. 11. Regional peace patterns based on hazard reduction

the use of chemical weapons. Many of the current territorial and country demarcations in the world are the result of regional war and social and political collapse. That is, it is a product of war. No socio-political peace without war. Political forces have made peace based on the results of the war. Such peace is not a sustainable peace. Rather, peace is a model of the Cold War. If the political forces are supposed to reach peace after every war, it is more logical to reach peace before every war. War involves terrible achievements. The world mechanism should be strengthened for peace. The transcendent model of sustainable peace based on the reduction of natural hazards is not a return to the state of war and violence or hostility.

B) The second model is the cold peace model. What has happened in the Danube basin to reduce risks is not based on the Cold War model. Rather, it is based on cold peace. A peace that has the possibility of returning to the Cold War situation, and then from the cold war situation to the war situation. In the case of Southwest Asia, in the Tigris and Euphrates basins, the pattern is sometimes a war and sometimes a cold war type. Therefore, until the cold peace or the Danube model is achieved, the political forces have to work hard. Senghaas and Senghaas-Knobloch (2017) have emphasized the negative and positive peace model for sustainable peace. Its processes include: a) protecting violence and reducing it, b) caring for freedom and strengthening it, c) caring for difficulties and bitterness and reducing them, d) protecting cultural diversity and strengthening it. This is not regional peace. In any of the processes, reducing natural hazards has no place. We used the cold peace model instead of the negative and positive peace model.

C) The third pattern is warm peace. Although the Cold War model and the Cold Peace model may be useful for reducing natural hazards, the grand strategy for reducing natural hazards is to establish and strengthen regional peace. This model will greatly reduce the vulnerability to regional natural hazards. In a warm peace, the exclusive power and negative competition of political forces will be greatly reduced. Regional natural balance and balance of natural hazards will be the basis for actions and decisions. Such peace is genuine peace. From this point of view, regional peace based on the reduction of natural hazards may lead to the emergence and formation of modern regional political forces and the formation of new institutions needed to reduce natural hazards (Figure 11). There is no better heritage for mankind than “peace” in the universe. Let’s strengthen it in every possible way.

CONCLUSION

Natural hazards with regional spatial scales may occur in different places, and their types are different in selected areas. The comparative analysis of natural hazards in the Danube region in Europe and the Tigris and Euphrates basin shows that in the Danube basin, more measures have been taken to reduce risks compared to the Tigris and Euphrates basin. More measures are needed in the Tigris and Euphrates basins. Neglect of political forces to regional peace will make the environment and people vulnerable to hazards. The present study concludes that the use of regional peace based on natural hazards can be a new theory to reduce vulnerability.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/ or falsification, double publication and/or submission, and redundancy have been completely observed by the authors.

LIFE SCIENCE REPORTING

No life science threat was practiced in this research.

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