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Deforestation and environmental (ecological) security

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Abstract— **The article outlines the problem of deforestation and its relationship with national security. Deforestation is one of the aspects of environmental security. In the first decades of the 21th century, the problem of deforestation is one of the most serious threats to humanity. The threats it entails occur on a regional, national and global scale. Deforestation is a very serious threat to national security. Acquisition of forest land, timber, mining or mineral resources, the development of communication network and industry are the most important anthropogenic factors of deforestation. Desertification, soil degradation, imbalance of the circulation of oxygen and CO2 are the effects of deforestation for national security. Forests have a significant impact on safety by cleaning the air, carbon storage, water filtering, and flood and erosion reduction. One of the most important measures to reduce the risk of deforestation is proforestation. In matters related to national security, it should occupy a special place.**

Keywords— national security, internal security, environmental (ecological) security, deforestation, proforestation

I. INTRODUCTION

One of the components of national security is environmental security in Poland known as "ecological safety" (Ciszek, 2012, 2016). It examines the threats posed by environmental events and trends for individual, communities or nations (https://en.wikipedia.org/wiki/Environmental_security; Śladkowski, 2004, p.12). May be defined as the intersection of environmental and national security considerations at a national policy level. Environmental security is a process aimed at achieving the desired ecological state, securing a peaceful and healthy existence of all elements of ecosystem, using various means consistent with principles of internal coexistence of the state and international communities (web.archive.org/web/2011…).

Environmental security is very important to national security. Changes in the natural environment are conducive to undermining national security in many different ways. They can undermine economic development, which plays a significant role in economic and military potential of the country. In most developed countries and some developing countries, natural resources and environmental protection are important factors in economic growth. As a result of environmental changes, there may be perturbation in the basic sectors (agriculture, forestry, fishing and mining) and environmental services (tourism). Changes in the state of the environment can also pose a threat to human health. This contributes to the weakening of the health and vitality citizens, important for the development of the economy and the condition of the nation. Changes in the environment (e.g. climate caused e.g. by deforestation) may also, due to extreme weather events, have a more direct impact on national security, damaging basic infrastructure such a military bases, naval shipyards and training grounds, thereby seriously threatening the basic resources of national defence.

II. DEFORESTATION

Deforestation is one of the aspects of environmental security. In the first decades of the 21th century, the problem of deforestation is one of the most serious threats to humanity and its security. The threat it entails occur on a regional, national and global scale. It should be emphasized that deforestation is one country is reflected in neighbouring countries and often on the scale of the entire continent. Most tropical rainforests are located in several countries. The destructive economy of these forests (Brazil, Congo, Indonesia) poses a threat not only to South America, Africa and Asia, but also to entire planet.

Deforestation is the process of reducing the share of forest areas in the total area of given area. Deforestation is the result of human pressure. It should be distinguished from natural factors causing losses in vegetation (fires, droughts, climate changes). It is a process of mass deforestation for commercial purposes. By deforestation space is obtained for agricultural and breeding areas buildings and the extraction on natural resources. Because certain areas of the economy require development and expansion (acquisition of minerals, new communication investments) certain parts of the forests must be

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destroyed. It is only important that there are as few of them ass possible in order to do ass little damage as possible. Deforestation is a very serious threat to national security. Individual sectors of the national economy, populations inhabiting a given area and the natural environment, lose out through deforestation.

III. THE MAIN ANTHROPOGENIC CAUSES OF DEFORESTATION

1) Agricultural activities are one of the significant factors affecting deforestation. Acquiring land for farming accounts for 29% of deforestation, a further 14% is the farming. Conversion of land for agriculture is threatening more tree species than any other known threat. It can take place at many different scales: from small scale slash-and-burn farming, to medium-scale conversion of habitat for cash crops (such as coffee and tea), to large scale commercial crops (such as oil palm, soybean, cocoa, rubber) (State of World Trees. September, 2021, p. 18).; The greatest problem is in the plantation of oil palms. Livestock is believed to be responsible for about 14% of global deforestation.
2) The second major threat to tree species, is direct exploitation (27%). It is the acquisition of wood as a raw material for industry and construction (13%) and for fuel (mainly in developing countries in Africa and Asia)
3) Extraction of natural resources, a specially oil and coal
4) Development of road infrastructure
5) Development of housing and industrial construction (State of World Trees, 2021, p. 17). Many industries in petrochemicals release their waste into rivers, which results in soil erosion and make it unfit to grow plants and trees.
6) Overpopulation directly affects forest covers, as with the expansion of cities, more land is needed to establish housing and settlements. The overpopulation requires more land to establish housing and settlements. It automatically requires many more roads and highways for transport and communication. All these results in deforestation. Logging industries cut down trees for building materials, paper, furniture and many more products.

According to estimated data, 12-15 million hectares of forests areas cut down every year. With deforestation conducted in this way, it is impossible to maintain the natural balance of the Earth. It will be very difficult to stop this practice, because in some countries (Africa) about 70% of inhabitants are daily involved in logging forests. For them, deforestation is the main source of income.

IV. DEFORESTATION EFFECTS FOR NATIONAL SECURITY

Desertification of areas and disturbance of water management. Deforestation prevents trees from capturing rainwater. It does not protect against flooding, does not clean the air.

In areas devoid of trees, the soil quickly dries out. Without trees, erosion often occurs and sweeps the land into nearby rivers and streams. The result is drought, desertification and the loss of biodiversity. loss of trees allows for flooding, soil erosion, desertification, and higher temperatures to occur more rapidly and exponentially. Free runoff of water in deforested areas causes rapid landslides and mudslides. Trees are crucial for local water cycles as they keep on returning water vapor to the atmosphere. Forest store water. After cutting them the excess water flows into the river network. Expensive dams and reservoirs must be built to protect inhabited areas from flooding.

Drying water intakes and the progressive loss of organic matter from exposed soils reduce agricultural productivity. Less organic matter ends up in the waters in deforested areas, which disrupts the trophic network. There is rapid process of soil erosion. Soil erosion makes soil exposed to contaminants that leach into the water supply, which damages the quality of drinking water.

A. Climate imbalance and climate change

In addition to the oceans and marine organism, trees play a special role in the exchange of carbon dioxide. Forests influence the amount of oxygen released into the atmosphere and the amount of stored CO2. Trees are natural carbon stores that help keep the carbon cycle in balance. By deforestation, plant biomass is removed in a very short time, which loses the ability to store carbon. In forest in a state of equilibrium, the amount of carbon dioxide absorbed and oxygen released is similar and does not have a large impact of the global CO2 balance. Deforestation contributes to the disruption of this balance. A hectare of forests annually absorbs about 250 tons of CO2 and produces almost 10 times more oxygen than the same area of arable land. At present, there is 30% more carbon dioxide in the atmosphere than before the industrial revolution, when deforestation began on a massive scale. Forest monocultures and tree plantations constitute very poor ecosystems compared to the primary forest. Fewer species and layers of vegetations means less capacity for carbon uptake and storage. Absorption of CO2 from atmosphere, even from centuries, does not compensate for the less of carbon accompanying the removal of the natural system. This is leading to climate change and is accelerating global warming.

- Increase in Global Warming

Forest can mitigate climate change. It has the ability carbon and other toxic greenhouse gas emissions absorption and storage in wood and soil. It's estimated that deforestation is responsible for around 20 percent of greenhouse gas emissions, and due to tropical deforestation. Woods play a major role in controlling global warming. The trees utilize greenhouse gases, restoring the balance in the atmosphere. With constant deforestation, the ratio of greenhouse gases in the atmosphere has increased, adding to our global warming woes.

- Gas emissions

Deforestation is responsible for around 10% of current global greenhouse gas emission and around 30% of cumulative emissions since 19th century.

- Loss of biodiversity

Deforestation is the reduction of the number of flora and fauna species present in forests ecosystems. This is a significant problem as many of these species are threatened with extinction.

- Deforestation and cultural security

Deforestation leads to the loss of livelihoods for many people for whom the forest in their habitat, leading too the loss of cultural identity.

- Food Insecurity in the Future

Deforestation for food may result in food insecurity in the future. Currently, 52% of all the land used for food production is moderately or severely impacted by soil erosion. In the long term, the lack of fertile soil can lead to low yields and food insecurity (https://www.conserve-energy-future.com/causes-effects-solutions-of-deforestation.php).

V. The importance of forests for national security (selected examples)

Natural forests make up one of the most diverse ecosystems on our planet. They characterized by much greater biodiversity than secondary forests planted for industrial purposes by man. Forests have a significant impact on safety by cleaning the air, storing carbon, filtering water and reducing flooding and erosion. Clean air affects not only the condition of society but the entire environment. For decades, more and more CO2 has been accumulating in the atmosphere, this is an exceptional threat. Forests are one of the largest sources of CO2 absorption from the atmosphere. The accumulation of rainwater promotes its accumulation and prevents water. Excessive erosion damages all sectors of the economy and threatens people's livelihoods. Forests provide food and materials as well as opportunities for recreation and education. They independently reduce the rate of extinction of individual species. Healthy forests ecosystems, interdependent networks of living organism, and their physical environment are essential to all life on Earth. Forests ecosystems provide clean air, fresh water, food, resources and medicines.

There are 17 m2 of leaves and needles in the treetops per square meter of forests. Precipitation settling there evaporates immediately. In addition, in summer trees use up to 2500 m3 of water per square meter, which that breathe into the atmosphere. The water vapor reforms clouds that flow inland and cause rainfall there. Evaporating water in the oceans is carried inland through the clouds. There is falls into the forests, which evaporates and passes the water on. A prerequisite such a water cycle is the presence of forests in the coastal zone (Wohleben 2016, 164). Trees also provide shade that keeps the soil moist. When a forest is cut down, the humidity levels come down and cause the remaining plants to dry out. The forests of the north have an additional influence on the climate. They secrete terpenes, substances that protect against disease and parasites. If their molecules are in the air, moisture condenses around them. This creates clouds and allows precipitation

Old forests with a varied tree stand and rich undergrowth are more resistant to the effects of climate change. The reason is their deeper root system and greater biomass. Old trees have a increased resistance to drought, they better capture and retain water. Therefore, even during prolonged droughts, they continue to photosynthesize at a faster pace than younger trees (Giardina F. et al., 2018). Old forests are more resistance to fire than young forests. These trees have thinner bark and burn faster or suffer damage from fire (Binkley et al., 2007). Afforestation can help reduce the fire risk of forests and surrounding communities. This is directly related to security both on a regional and national scale. In large fires, fumes and other pollutants cover large and very large areas.

Protective forests play an important role. They protect many elements of natural environment. Most protective forests, natural filters protecting against pollution should be in the industrial impact zones. Water-proof forests are equally important as they protect the springs or shores of rivers and lakes against sludging. Forests also play a windproof role, by reducing the strength of the wind several times, they protect human settlements and agricultural corps. Field plantings are of significant importance, as they are, for example, a breeding place for birds that destroy harmful insects in agricultural corps.

Forests air is synonymous with health. Coniferous forests significantly reduce the microbial content in the air (Wohleben, 2016, p.325). There are about 70 times less pathogenic germs in forest air than in the air of cities. Conifers gives off essential oils. About 1,500 chemicals have been found in them, with either bacterial, calming or anti-inflammatory effects.

Very few people are aware of the fact that in many respects we are dependent on insects (e.g. pollination of fruit orchards, production of materials, silk). Deforestation deprives us of many insects species, especially those living in the ecotones of the border between forests and open spaces. It should also be emphasized that insects ensure the biocenotic balance in the natural environment, thus ensuring its proper functioning (Boczek, Pruszynski 2015, pp. 98-105). As you know, the right natural environment is the basis of a healthy society and its development.

The role of forests in the economy is considerable. According to the latest research, the most common uses of trees are:

- 3,716 species in construction
- 1951 species in medicine
- 1,646 species in agriculture
- 1444 species in the energy industry
- 1,382 specie in the food industry
- 1,302 species in the household (State of World Trees. September 2021, p. 25).

VI. Conclusion

One of the most important measures to reduce the risk of deforestation is proforestation. In matters related to national security, it should occupy a special place.

Afforestation (proforestation) is the cultivation of the existing forest intact. Allowing it to grow continuously. The task is to restore the original forest ecosystem. The aim is to maximize the effect of CO2 binding (absorption) of carbon dioxide and structural and ecological complexity (Bastin et al.,

2019). Afforestation is not agroforestry or forest plantation. These are forests complex of none or two species of similar age. They provide large amounts of wood but are very poor in terms of biodiversity. They lack old trees, dead plants or undergrowth. Plantations absorb 40 times less carbon dioxide than natural forests (Lewis et al., 2019). By afforestation, we obtain a much greater absorption of carbon from the atmosphere, maintenance of biodiversity, preservation and development of ecosystems. It is equally important to maintain a healthy soil condition, store and filter rainwater. The latter is of particular importance for safety as it provides water for food and industrial purposes. In addition, it prevents floods after rivers rainfall and floods.

At present, afforestation is considered the most important forest strategy that can definitely help solve global climate and biodiversity crisis (Di Marco et al., 2019).

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