



Impact of the Israeli military activities on the environment

Mazin B. Qumsiyeh

To cite this article: Mazin B. Qumsiyeh (07 Mar 2024): Impact of the Israeli military activities on the environment, International Journal of Environmental Studies, DOI: [10.1080/00207233.2024.2323365](https://doi.org/10.1080/00207233.2024.2323365)

To link to this article: <https://doi.org/10.1080/00207233.2024.2323365>



Published online: 07 Mar 2024.



Submit your article to this journal [↗](#)



View related articles [↗](#)



View Crossmark data [↗](#)

ARTICLE



Impact of the Israeli military activities on the environment

Mazin B. Qumsiyeh

Palestine Institute for Biodiversity and Sustainability, Bethlehem University, Bethlehem, Palestine

ABSTRACT

Many conflicts in Western Asia over the past 75 years left devastation and refugees and the last war on the Gaza Strip is a good example. Our interests as environmentalists are the effects of conflict (including active conflict, pre-conflict activities, and post-conflict impact). Here, we review the impacts on the Palestinian environment of activities since 1948 (establishment of the state of Israel): pre-conflict (such as training sites, military bases, military installation), during conflicts (use of different munitions, pollution, altering habitats), and post-conflicts (unexploded munitions, ground water pollution, devastated landscape). The data show significant environmental damage that operates short-term and long-term. More studies are needed and encouraged, but the data do suggest that environment and human health impacts need to be highlighted in public discourse and remedial actions must be taken in protracted conflict situations like the Palestine/Israel conflict.

KEYWORDS

Gaza Strip; Palestine; conflict resolution; sustainability; war

Introduction

Direct conflict and its attendant use of modern weapons, pre-conflict military activities (preparation for wars), and post-conflict situation (like scarred landscape or left-over munitions) negatively and severely affect biodiversity and ecosystems [1–5]. Studies to measure effects of such activities in each case are required for proper response and management: effects can be heterogeneous and influenced by many factors including geography and degree and nature of use of weapons whether in training or in direct combat [6–8]. A number of conflicts afflicted historic Palestine starting with the 1948 war that created the state of Israel and in many cases these conflicts were driven by geopolitics and even spread regionally. Yet, there is scant information about the environmental impact of military activities during active conflicts (and there were several wars in the 75 years) as well as between active flare-ups. Some papers discuss the impact of things like Israeli settlement and urbanisation [9,10], the apartheid wall on biodiversity [11], the exploitation of natural resources [12], and Israeli industrial settlements including military industries [13]. But, these studies are limited and no study reviewed the full spectrum of impacts caused over the past 75 years [14,15]. Considering the level of

CONTACT Mazin B. Qumsiyeh  mazingq@bethlehem.edu  Palestine Institute for Biodiversity and Sustainability, Bethlehem University, Bethlehem, Palestine

© 2024 Informa UK Limited, trading as Taylor & Francis Group

military activities in our region since 1948, we explore here aspects of conflict relating to the environment in a more comprehensive way. We consider ‘preparations for war’, ‘violent conflict’, and ‘post-war activities’ as all related to armed conflict [4]. We also must consider the value of these studies in shaping public discourse relating to conservation of the environment.

History of military activities in our region

When the Zionist project was started in the late 19th century, the founders knew that their activities cannot take place by peaceful means. Early Zionist colonial settlements developed militias especially in the 1920s, under British control after WWII. Since 1948, the nascent state of Israel became one of the most militarised societies on earth and engaged in at least a dozen active conflicts [16–21]. In the 1920s, Zionist militias like the Haganah, Stern Gang, and Irgun were established and acquired arms. In the 1930s, these groups engaged in attacks both on local Palestinians and later against British forces in Palestine. The Palestinian natives also developed militias during the 1936–1939 uprising against the British occupation and mandate. The British used collective punishment including bombing Palestinian villages and cities where resistance happened. Yet, all the activities prior to 1948 pale compared to what happened after and in the past 75 years.

The campaign of 1948 (called War of Independence by Israel and the Nakba or Catastrophe by the Palestinians) entailed removal of over 530 villages and towns to make space for the new Jewish state. Millions of Jews then flocked to the state [22]. Over these 75 years, some 8 million Palestinian refugees were created especially during periods of increased conflicts. Wars and conflicts flared up in 1956 (Israel’s invasion of Sinai and Gaza), in 1967 (Israel’s occupation of the West Bank, Gaza, Sinai, and the Golan), in 1973 (Egypt and Syria try to reclaim their lands from Israel), in 1982 (invasion and subsequent occupation of South Lebanon), in 1987–1991 (first major Palestinian uprising or Intifada), in 2000–2005 (second uprising), in 2006 (Israel’s attack on Lebanon). Gaza was subjected to a program of de-development for decades rendering the coastal strip very vulnerable to environmental damage [23]. There were four conflicts centred on Gaza after 2006: 2008/2009, 2014, 2020, 2021, and the current one that started 7 October 2023. The last attack was by far the bloodiest because as of this writing date (7 December 2023), 1200 Israelis (Soldiers and Civilians) and 21,000 Palestinian civilians and an unknown number of resistance fighters were killed and some 1.9 million Palestinians became homeless (<https://www.ochaopt.org/>).

Israeli society is highly militarised from its inception 75 years ago where it remained in a state of emergency and no prospects for peace. But it also has one other unique feature and that is that the military is not merely to defend the state but is also to engage in the state’s colonial activities, land acquisitions and expansion at the expense of the local Palestinians [24–27]. Israel is in the top 10 countries in military expenditures, and this is directly related to CO₂ emissions in those 10 countries [28,29]. Thus, it is really ‘Guns versus Climate’ as pointed out for OECD countries including Israel [30]. As shown above, Israeli military activities both before, during, and after conflicts have resulted in significant and lasting degradation of the local environment throughout historic Palestine. The results are felt on the ground in many areas. For example, roughly a third of the plant species in the West Bank are now rare or threatened [31].

Pre-conflict military activities

Israel is built via settlement on both the 1948 areas and the 1967 occupied areas replacing Palestinians and open areas with urbanised residential, industrial, or agricultural settlements [32,33]. This has required a robust military that is now ranked fifth strongest army globally. Sustaining the army and engaging in many wars (see section above) entailed preparing a robust infrastructure related to a military industrial complex. For example, the military industrial facility Taas Haagen operated near Tel Aviv on an area of 44,000 m² and produced significant levels of pollution including with Trichloroethane and heavy metals [34]. There was also the early development of **nuclear facilities** centred at Dimona with French and (Apartheid) South African help that resulted in an estimated 200–300 nuclear weapons [35–38]. The Dimona plant is close to Hebron beyond the green line, and there are suspicions of increased cancer rates in the area owing to drift in polluting material [39]. There is also impact on workers in the nuclear industry [40].

Where the local Palestinians are still present, they are restricted to enclosed areas and their infrastructure remains outdated but new infrastructure (road, bridges, railway) is built connecting new Jewish settlements. This infrastructure is militarised in the sense that it segregates the local Palestinians (considered hostile) from the new Israeli development. This creates redundancy and much damage to the environment by altering landscape and impacting biodiversity [41–43].

Inside the occupied West Bank, Israel has established 151 colonial settlements, 150 settlement outposts, 210 military bases, and 144 classified as other restricted sites such as industrial zones, closed military zones, and ‘nature reserves’ that restrict local people and damage the environment [44–46]. Two-thirds of the nature sites in Area C were simultaneously declared military firing zones [47,48]. In recent studies, it is shown that half of the so-called ‘nature reserves’ set-up by Israel in the West Bank are designated for military and colonial settlement use [46,49]. The impact of the military bases built all over historic Palestine is associated both with the building/infrastructure and with the actual operations which impact wildlife (biodiversity) for example on movement of large animals. Israel has a very large military aircraft fleet composed of a minimum of 251 attack jets of the US F-class, over 330 support jets, 128 helicopters, and 15 transport planes [50].

When not in direct combat, these consume a large amount of fuel producing greenhouse gas emissions. When in combat like the recent attacks on Gaza strip with over 110,000 bombing sorties over 6 weeks, the impact on the environment is incalculable. More than 70% of residential buildings have been destroyed and half the aerial bombs used are non-targeted and cause wide damage [51]. The same can be said of the 2500 tanks and 5000 armoured personnel carriers [52]. A third of them were used in the October–November attacks on Gaza. Military training sites also produce large amounts of lead and other heavy metals which contaminate soil and water and negatively impact biodiversity [53].

The first military order given by the state of Israel at the conclusion of the so-called Six-Day War was military order number 92 on 7 June 1967 regarding the issue of water in the occupied territories, *giving exclusive military authority* over all water sources, and even controlling rainwater harvesting. This sequestering of water for military and colonial settlement activities had a very negative impact on the environment and on

viability of the local Palestinian population. Israeli authorities have used walls and fences and other barriers around Palestinian communities as a form of land grab and annexation [54]. Israel says these are for security. Palestinians reply that they are for annexation of land and to make their lives so difficult that they leave.

In either case, they all disrupt the contiguity of natural water flow of streams and springs and this affects local flora and fauna [11,55]. The Wall caused changes and damage to the local environment endangering many local animal species. Disruption of the natural habitat for many wild species has affected population size and prevented normal movement of wildlife including being trapped by the electric fences [56]. The wall also damages agrobiodiversity [57]. And for large mammals, such as Hyenas with large foraging areas, the wall has restricted movement in ways that has reduced the availability of food as well as impact on overall biodiversity [58].

The restrictions on movement imposed on the Palestinian people by the wall and checkpoints, severely limit their ability to protect rich biodiversity areas [59,60]. Aside from the detrimental ecological footprint of the wall (Figure 1), fertile Palestinian lands behind the wall are now no longer accessible to Palestinians. The uprooting of trees to construct the wall led to negative impacts on the hydrology of watersheds and shifted the morphology of the water flow, leading to further erosion of land [61].

The Israeli declaration of firing zones in the West Bank in 1980 has also an impact on biodiversity. Firing zones in the Jordan valley and the Eastern slopes impact wildlife like wolves, gazelles, hyenas, and other species which abandon the highly disturbed areas (shelling and shooting). We directly observed that visually. This has a severe impact on the biodiversity and the environment. Firing zone 918 was declared in the South Hebron Hills in the 1980s overlapping an areas declared earlier as a 'nature reserve' and this required removal of hundreds of Palestinian residents of the area [62–64] (Figure 2). The remaining shepherding community is harassed and ordered to move out, but military training proceeds destroying the environment and leaving military material (Figure 3). Al



Figure 1. A section of the wall (creative Commons).

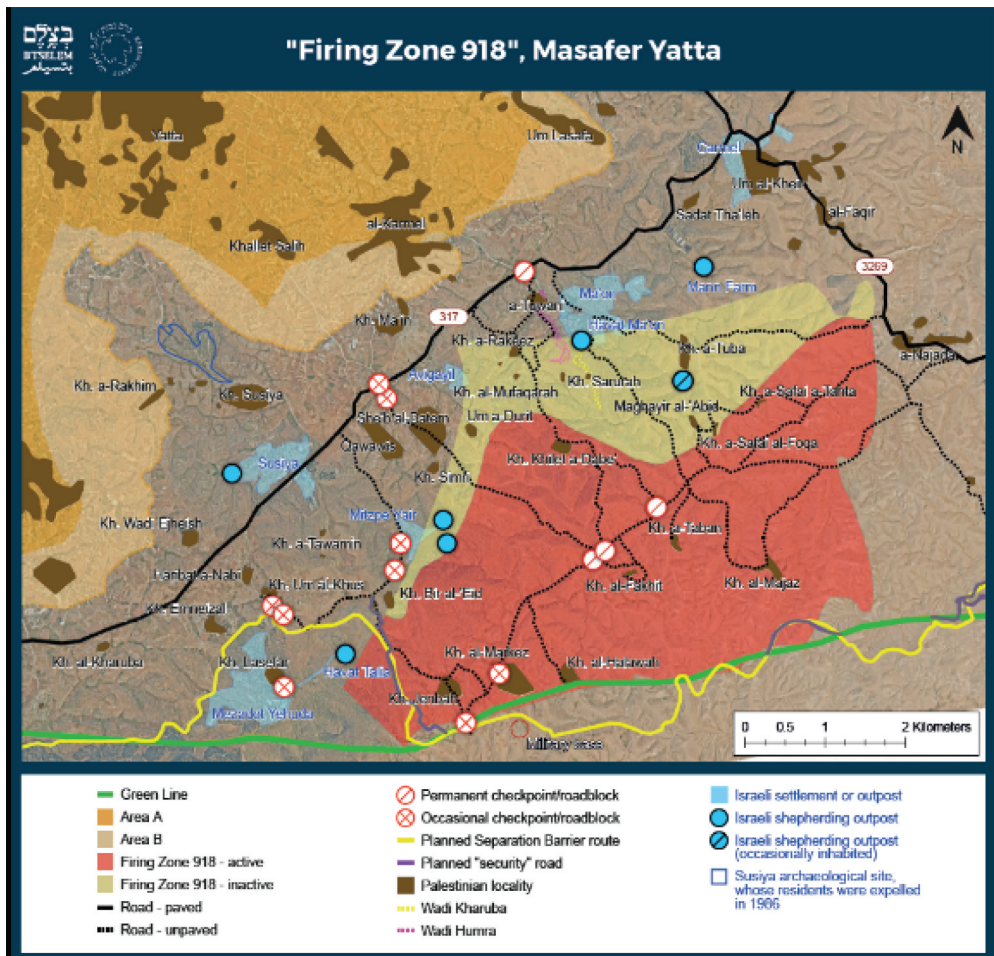


Figure 2. Firing zone 918 in Masafer Yatta (B'Tselem).

Kuweiyis protected area is located within the borders of the governorate of Hebron and covers an area of 12.69 km². This is a transition zone between the Irano-Turanian and the Saharo-Arabian zones and has a very rich fauna and flora biodiversity. The community of shepherds also engage in simple farming of wheat and barley and some olives and almonds at edges of wadis. In May 2022, the Israeli high court authorised the Israeli military to expel the Palestinian residents of Masafer Yatta as both a nature reserve and a firing zone [65,66].

Activities during conflict

Globally warfare leaves craters, damaged terrain, shrapnel, and contamination [67,68]. The initial environmental impact assessment of the last Gaza war (2014) was assessed and showed significant damage/degradation [69]. But this war in 2023 and even in the first two months was at least many times worse. For example, the 2014 conflict lasted 51 days and Israel said they used 20,000 tons of explosives. Israel dropped 89,000 tons from



Figure 3. Military left-overs in Jenba area from firing zone 918.

7 October to 31 December 2023 [51]. This is bound to have an impact on the biodiversity. Further, many new types of bombs were used including the most advanced US made bombs that have higher destructive capacity per kg than the older ones. A recent study showed that most of the munitions Israel is using to bomb buildings in the Gaza Strip are US supplied 'Mark 80' aerial bombs ranging from those containing 907 kg ones with 429 kg explosives (Mk84) to those carrying 89 kg of explosive material (Mk82) and GBU-39 small diameter bombs [70]. Most have been fitted with GPS guidance systems. Although Israel has more precision bombs that could even destroy one apartment in a multi-story building, it has chosen to engage in more destruction of whole buildings. Over 1000 families were affected (multiple members of the same family killed) according to the Palestinian Red Crescent Society. With 70% of buildings in north Gaza damaged, the *Financial Times* reported that 'Military analysts say the destruction in northern Gaza in less than seven weeks has approached that by the years long carpet bombing of German cities during the second world war' [70]. The impact of this last Israeli attack on the Gaza Strip can be summarised as follows:

Solid waste and air pollution

Using ordnance with depleted uranium, high impact explosives, and incendiary bombs including white phosphorous leaves significant environmental degradation and impacts soil, air, and water. Israel also targeted and sank dozens of fishing boats in the harbour creating significant underwater solid waste pollution. Further solid waste accumulated over the first two months of the attack with no possibility of removing these from the streets (safety issues and Israel's embargo on fuel). This accumulation has created a significant environmental hazard. This is compounded by the debris from 46,000

residential buildings and thousands of other buildings (universities, hospitals, schools) bombed by Israeli forces. This huge amount of pulverised concrete, steel, and rock has created a major issue of safe disposal.

But the bombing also affected cars, trees, agricultural areas and much more. More than two thirds of the infrastructure, 70%, serving 2.3 million people, was levelled. This debris also includes hazardous waste including unexploded ordnance, depleted uranium containing shrapnel, cluster bomb munitions, flechette shells, fuel-air bombs (which explode twice, including after impact), white phosphorous and Dense Inert Metal Explosives (DIME bombs). All have either been shown to damage the environment or studies have not been done on their impact. For example, we do know that depleted uranium has toxic effects [71–73].

White phosphorous has been used extensively in Gaza in the last three wars but especially in late 2023 with the US supplying these bombs. The use in civilian areas was condemned by human rights organisations including Amnesty International [74] and Human Rights Watch [75]. In south Lebanon, since 7 October white phosphorus has destroyed over 4.5 million square metres of forest [76]. White phosphorus is highly toxic to the environment in addition to its production of fires and its direct impact on human beings [77,78]. The environmental damage in Gaza from the dropped ordinance was huge and some of it may be irreversible [79].

Noise pollution

As bombs were being dropped on average of one every 10 minutes in Gaza Strip (a very small area of 360 square km), noise pollution was very high during the study period of two months. Noise pollution from continuous drone and jet flights, rockets, bombardment from tanks and ships, and other military activities was noted to result in more than double the allowable limit (and the allowable limit is for short periods not for months as in this case) [69]. There is a need for more studies like that of Zuriel et al. [80] on the impact of submarine and other noise on marine mammals like Dolphins [81].

Water and wastewater sector

Most of the water and wastewater services were damaged causing rise in the level of pollution and the depletion of groundwater sources. Damages and destruction of water and sanitation networks caused leakage to streets and soil and into the sea in the western areas. Seawater was already polluted from the last war and with the Israeli navy activity and the bombing of seashore areas in this war, the situation has only become much worse. Israeli forces have also targeted sewage treatment facilities for example during their attack in the 2008/2009 conflict where over 100,000 m³ were spilled on an area of 55,000 sq metres [44]. In the 2023 conflict, the damage to water and wastewater infrastructure was near total. All wastewater treatment facilities were closed or damaged since late October 2023 resulting in over 130,000 cubic metres of sewage going to the Mediterranean. The situation got worse since the ground invasion and relocation of over 1.5 million people to a mere 5% of the Gaza Strip. No facilities exist to accommodate them. The human waste and the dead bodies have already caused spread of intestinal and skin disease among hundreds of thousands per the World Health Organization. Further,

Israel is pumping seawater to flood the resistance tunnels in Gaza. *This will pollute the underground water aquifer with salt and in many areas will cause collapse above it.* All of this is bound to affect the environment/biodiversity.

Soil erosion and destruction

Israel used massive, specially built, D9 Caterpillar bulldozers to bulldoze large areas of wild areas, agricultural areas and residential areas in an attempt to expose tunnels that the resistance fighters hide in and also to destroy means of life and force the population out. Thus, 1.8 million people were driven out in the first two months. Soil erosion is highly damaging to the environment around urban infrastructure and can impact biodiversity in the agricultural fields of the Gaza Strip.

Considering the fragile coastal areas with many endangered species, the damage together with resultant removal of plant cover causes significant ecosystem damage. We did not discuss above also the synergistic effects and impact of wars on climate change [30] nor the impact of arms industrial production for export [82].

Post-conflict damage

There is a huge amount of unexploded ordnance left after training exercises and after conflict. There are also unknown amounts of land mines scattered all along the area especially in environmentally critical areas like the Jordan Valley [44,83]. The 2006 Israeli war on Lebanon had significant impact on the environment on both sides of the border including air pollution, coastal pollution, forest fires, and altered natural landscape [84–88]. As water and sanitation systems were targeted, there is significant risk of human disease and other environmental and psychological damage to local residents [89]. Data are also available on significant socio-economic impact [90]. Other studies documented the conflict-related damage to groundwater [91,92]. This rendered groundwater damage irreparable by 2020 [93]. For a post-conflict scenario, there must be decolonisation and reversal of the trends including the exploitation of natural resources in destructive ways associated with this colonial conflict including the reduction of biodiversity [12,25,94–97].

Discussion

The status of the Palestinian environment is catastrophic [98] and this is directly related to decades of occupation and colonisation [42,55,99]. As early as 1950 Ives warned of future deterioration of the Palestinian environment. Although more studies are needed, the material gathered here gives a glimpse of one part of the problem: military activities. There are many research gaps in the field of understanding the effect of military activity on the environment because of the stochastic and unpredictable nature of such conflict and limitation of access to what becomes closed military zones during conflict [5]. Significant additional studies are needed here. For example, we wonder what the impact of the recent wars on Gaza on the coastal bird communities. There have been studies of coastal birds in Saudi Arabia and Kuwait after the Gulf war [100].

A key principle of international humanitarian law is that military occupation is temporary and that the occupying belligerent state must safeguard the lives, livelihoods, and natural resources, among others, that belong to the people of the area occupied [94,101–106]. Developing countries are disadvantaged because of their few economic resources; there is a direct correlation between the GDP of a country and level of environmental interest [107]. The GDP of Palestinians is 1/8th of Israel's, although these figures heavily fluctuate during cyclical uprisings against the occupation [108].

Al-Haq [97] reviewed three cases that could be of use in litigation on environmental justice issues

- (1) Kuwait–Iraq litigation: UK Courts accepted adjudication for entities harmed by the UK, even if the harm was done extraterritorially
- (2) Shell-Nigeria Insurance case: Again, UK courts based on international law adjudicated a case where both the harming entity and the harmed were extraterritorial
- (3) Applying article 6 of the European Convention on Human Rights: The European Commission of Human Rights also supported possibilities of invoking the article for extraterritorial litigation.

Gordon [109] showed that some Israeli communities resisted the presence of military bases or activities in their areas mostly in the form of ‘not in my backyard’ objections, not in the generalities of resisting militarism. But such resistance by a disfranchised Palestinian community is nearly impossible [27]. There are many other issues where the occupation can affect sustainable development and protection of the environment [41,110]. For example, Israel tries to destroy the livelihoods of semi-nomadic Bedouins using a mesh of ‘nature protection’ and military zoning [27,111].

Conclusions

There is a body of international environmental law, human rights law, laws of armed conflict, and other international legal instruments that show state responsibility to mitigate and even avoid doing environmental damage during conflicts [112–114]. The prolonged occupation does not mitigate state responsibility under international law [115]. The International Court of Justice ruled in 2004 that the segregation wall and settlements violate International law and should be dismantled and remedial actions taken [116]. Militarized colonisation and nature conservation are not compatible [117,118]. Indeed, working to demilitarise becomes part of the environmental justice campaign [119]. The recent war on the Gaza Strip is a case study of illegality [120] and arguably of environmental catastrophe. The limited data reviewed above tell us that 1) there is significant and long-term environmental and biodiversity impact from the numerous conflicts since the creation of Israel in 1948, 2) that more studies are needed (difficult but essential to do in situations of conflict and lack of available classified resources), and 3) there is a need for environment and human health impacts to be highlighted in public discourse and remedial actions and projects to be undertaken.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

- [1] Sadiq, M., 1993, *The Gulf War Aftermath: An Environmental Tragedy* (Dordrecht: Kluwer).
- [2] Austin, J. and Bruch, C., 2000, *The Environmental Consequences of War: Legal, Economic, and Scientific Perspectives* (Cambridge: Cambridge University Press).
- [3] Dudley, J.P., Ginsberg, J.R., Plumptre, A.J., Hart, J.A. and Campos, L.C., 2002, Effects of war and civil strife on wildlife and wildlife habitats. *Conservation Biology* **16**(2), 319–329. doi: [10.1046/j.1523-1739.2002.00306.x](https://doi.org/10.1046/j.1523-1739.2002.00306.x)
- [4] Machlis, G.E. and Hanson, T., 2008, Warfare ecology. *BioScience* **58**, 729–736. doi: [10.1641/B580809](https://doi.org/10.1641/B580809)
- [5] Lawrence, M.J., Stemberger, H.L., Zolderdo, A.J., Struthers, D.P. and Cooke, S.J., 2015, The effects of modern war and military activities on biodiversity and the environment. *Environmental Reviews* **23**(4), 443–460. doi: [10.1139/er-2015-0039](https://doi.org/10.1139/er-2015-0039)
- [6] Tang, Z., Engel, B.A., Pijanowski, B.C. and Lim, K.J., 2005, Forecasting land use change and its environmental impact at a watershed scale. *Journal of Environmental Management* **76**(1), 35–45. doi: [10.1016/j.jenvman.2005.01.006](https://doi.org/10.1016/j.jenvman.2005.01.006)
- [7] Warren, S.D. and Büttner, R., 2006, *Documentation of Disturbance-Dependent Threatened and Endangered Species on US Army–Europe Training Areas in Bavaria* (Fort Collins, USA: Center for Environmental Management of Military Lands, CEMML TPS), pp. 06–05.
- [8] Pearson, C., 2012, Researching militarized landscapes: A literature review on war and the militarization of the environment. *Landscape Research* **37**(1), 115–133. doi: [10.1080/01426397.2011.570974](https://doi.org/10.1080/01426397.2011.570974)
- [9] Tal, A., 2002, *Pollution in a Promised Land: An Environmental History of Israel* (Berkeley, CA: University of California Press).
- [10] Tal, A., Braverman, A., Hasid, N. and Zohar, A., 2006, Regulating Ramat Hovav’s industrial effluents: The anatomy of a mediation. Presented at National Ecology and Environmental Quality Conference, Haifa.
- [11] Husein, D. and Qumsiyeh, M.B., 2022, Impact of Israeli segregation and annexation wall on Palestinian biodiversity. *Africana Studia* **37**, 19–26. doi: [10.21747/0874-2375/afr37a2](https://doi.org/10.21747/0874-2375/afr37a2)
- [12] Sánchez, F.M., 2022, The exploitation of natural resources in area C of the West Bank as indicator of annexation. *Africana Studia* **37**, 27–47. doi: [10.21747/0874-2375/afr37a3](https://doi.org/10.21747/0874-2375/afr37a3)
- [13] Khlaif, N. and Qumsiyeh, M.B., 2017, Genotoxicity of recycling electronic waste in Idhna, Hebron District, Palestine. *International Journal of Environmental Studies* **74**(1), 66–74. doi: [10.1080/00207233.2016.1236650](https://doi.org/10.1080/00207233.2016.1236650)
- [14] Twite, R., 2003, A question of priorities: Adverse effects of the Israeli-Palestinian conflict on the environment of the region over the last decade. In: H. Brauch (Ed.) *Security and Environment in the Mediterranean: Conceptualising Security and Environmental Conflicts* (Berlin: Springer-Verlag), pp. 563–572.
- [15] UNEP (United Nations Environment Program), 2003, *Desk Study on the Environment in the Occupied Palestinian Territories* (Nairobi: UNEP).
- [16] Mintz, A. and Ward, M.D., 1989, The political economy of military spending in Israel. *The American Political Science Review* **83**(2), 521–33. doi: [10.2307/1962403](https://doi.org/10.2307/1962403)
- [17] Ben Eliezer, U., 1998, *The Making of Israeli Militarism* (Bloomington, IN: Indiana University Press).
- [18] Ben Eliezer, U., 2001, From military role-expansion to difficulties in peace-making: The Israeli defense forces 50 years on. In: D. Maman and E. Ben Ari (Eds) *Military, State, and Society in Israel* (London: Routledge), pp. 137–172.
- [19] Lomsky-Feder, E. and Ben Ari, E., (eds.), 1999, *The Military and Militarism in Israeli Society* (Albany, NY: SUNY Press).

- [20] Mintz, A., 1985, The military-industrial complex: American concepts and Israeli realities. *The Journal of Conflict Resolution* **29**(4), 623–639. doi: [10.1177/0022002785029004006](https://doi.org/10.1177/0022002785029004006)
- [21] Qumsiyeh, M.B., 2004, *Sharing the Land of Canaan: Human Rights and the Israeli-Palestinian Struggle* (London: Pluto Press).
- [22] Pappé, I., 2007, *The Ethnic Cleansing of Palestine* (London: Oneworld Publications).
- [23] Roy, S.M., 1995, *The Gaza Strip: The Political Economy of De-Development* (Beirut: Institute for Palestine Studies).
- [24] Oren, A. and Newman, D., 2013, Competing land uses: The territorial dimension of civil–military relations in Israel. *Israel Affairs* **12**(3), 561–577. doi: [10.1080/13537120600745260](https://doi.org/10.1080/13537120600745260)
- [25] Gordon, N., 2008, From colonization to separation: Exploring the structure of Israel’s occupation. *Third World Quarterly* **29**(1), 25–44. doi: [10.1080/01436590701726442](https://doi.org/10.1080/01436590701726442)
- [26] Braverman, I., 2020, Silent springs: The nature of water and Israel’s military occupation. *Environment and Planning E: Nature and Space* **3**(2), 527–551. doi: [10.1177/2514848619857722](https://doi.org/10.1177/2514848619857722)
- [27] Braverman, I., 2023, *Settling Nature: The Conservation Regime in Palestine Israel* (Minneapolis, MN: University of Minnesota Press).
- [28] Isiksal, A.Z., 2021, Testing the effect of sustainable energy and military expenses on environmental degradation: Evidence from the states with the highest military expenses. *Environmental Science and Pollution Research* **28**(16), 20487–20498. doi: [10.1007/s11356-020-11735-7](https://doi.org/10.1007/s11356-020-11735-7)
- [29] Tarczyński, W., Roman, L., Rejman, K., Salahodjaev, R. and Azam, S., 2023, Military spending and CO2 emissions: Empirical findings from countries with highest per capita military spending. *Journal of International Studies* **16**(2), 211–221. doi: [10.14254/2071-8330.2023/16-2/14](https://doi.org/10.14254/2071-8330.2023/16-2/14)
- [30] Jorgenson, A.K., Clark, B., Thombs, R.P., Kentor, J., Givens, J.E., Huang, X., El Tinay, H., Auerbach, D. and Mahutga, M.C., 2023, Guns versus climate: How militarization amplifies the effect of economic growth on carbon emissions. *American Sociological Review* **88**(3), 418–453. doi: [10.1177/00031224231169790](https://doi.org/10.1177/00031224231169790)
- [31] Al-Sheikh, B. and Qumsiyeh, M.B., 2021, Imperiled ecosystems in Palestine: Rare plants as indicators. In: D. DiPaolo and J. Villella (Eds) *Imperiled: The Encyclopedia of Conservation, Reference Module in Earth Systems and Environmental Sciences* (New York: Elsevier), pp. 1–7.
- [32] Peace Now, 2017, 800 million shekel plan for bypass roads in the West Bank approved by Netanyahu. Available online at: <https://peacenow.org.il/en/800-million-shekel-plan-bypass-roads-west-bank-approved-netanyahu> (accessed 31 December 2023).
- [33] Peace Now, 2018, 99.8% of state lands allocated in the West Bank were given to Israelis; Palestinians were given almost nothing. Available online at: <http://peacenow.org.il/wp-content/uploads/2018/07/Lands-Allocated-to-Palestinians-1.pdf> (accessed 31 December 2023).
- [34] Lavee, D., Meller, A., Beril, R. and Becker, N., 2003, *The Economic Effects of Ground Contamination by Taas Magen Netanya (Israel)* (Israel: Pareto Engineering Ltd.).
- [35] Shahak, I., 1997, *Open Secrets: Israeli Nuclear and Foreign Policies* (London: Pluto Press).
- [36] Engelhardt, M.J., 2004, A nonproliferation failure: America and Israel’s nuclear program, 1960–1968. *The Nonproliferation Review* **11**(3), 56–69. doi: [10.1080/10736700408436978](https://doi.org/10.1080/10736700408436978)
- [37] Bahgat, G., 2006, Israel and nuclear proliferation in the Middle East. *Middle East Policy* **13** (2), 113. doi: [10.1111/j.1475-4967.2006.00253.x](https://doi.org/10.1111/j.1475-4967.2006.00253.x)
- [38] Khenin, D., Barakeh, M., Sweid, H. and Agbaria, A., 2009, *Bill: Closure of the Atomic Reactor in Dimona* (Jerusalem: The Knesset).
- [39] Sleiman, M., 2010, Shutting down Dimona: Israel’s nuclear programme, arsenal and environmental threat. *Contemporary Arab Affairs* **3**(4), 437–479. doi: [10.1080/17550912.2010.528203](https://doi.org/10.1080/17550912.2010.528203)
- [40] Richter, E., Ben-Michael, E., Tsafirir, T. and Laster, R., 1997, Cancer in thirty-nine nuclear industry workers: A preliminary report. *Environmental Health Perspectives* **105**(suppl 6), 1511–17. doi: [10.1289/ehp.97105s61511](https://doi.org/10.1289/ehp.97105s61511)

- [41] MOPAD (Ministry of Planning and Development), 2014, *State of Palestine National Development Plan 2014-2016* (Ramallah: MOPAD).
- [42] EQA (Environment Quality Authority), 2022, *Sixth national report to the convention on biological diversity*. Available online at: <https://chm.cbd.int/database/record?documentID=257520> (accessed 31 December 2023).
- [43] EQA, 2023, *The National Biodiversity Strategy and Action Plan for the State of Palestine* (Ramallah: EQA).
- [44] Brophy, Z. and Isaac, J., 2009, *The Environmental Impact of Israeli Military Activities in the Occupied Palestinian Territory* (Bethlehem: Applied Research Institute–Jerusalem).
- [45] PCBS (Palestinian Central Bureau of Statistics), Available online at: <https://pcbs.gov.ps/site/512/default.aspx?lang=en&ItemID=4208#:~:text=By%20the%20end%20of%202020,other%20sites%20> (accessed 31 December 2023).
- [46] Qumsiyeh, M.B., Husein, D., Boulad, N., Albaradeya, I.M., Mahasnah, M., Abusirhan, M., Najajrah, M., Al-Shaikh, B., Handal, E.N. and Amr, Z.S., 2023, Updating and enhancing the protected areas network of the State of Palestine: A step towards biodiversity conservation. *Parks Journal* 29, 107–118. doi: 10.2305/UBEA6691
- [47] Oren, A. and Regev, R., 2008, *Land in Khaki: Land and Military in Israel* [in Hebrew] (Jerusalem: Carmel Press, Cited in Braverman 2023 [27]).
- [48] Etkes, D., 2018, *Seize the Moral Low Ground: Israeli Land Seizure for “Security needs” in the West Bank*. (Jerusalem: Kerem Navot). Available online at: <https://www.keremnavot.org/seize-the-moral-low-ground> (accessed 31 December 2023).
- [49] Allombert, C. and Qumsiyeh, M.B., 2023, Israeli designation of “nature reserves”: A tool of colonization. *Palestine Israel Journal* 29. (In press).
- [50] <https://www.wdmma.org/israeli-air-force.php> (accessed 31 December 2023).
- [51] <https://www.aljazeera.com/news/2023/12/31/israeli-bombardment-destroyed-over-70-of-gaza-homes-media-office> (accessed 31 December 2023).
- [52] <https://www.britannica.com/topic/Israel-Defense-Forces> (accessed 31 December 2023).
- [53] Goldsmith, G.S., 2010, *Environmental Impacts and Military Range use: An Investigation and Summary of What We Have Learned After 12 Years At Massachusetts Military Reservation (mmr) and Implications for the Continued use of Military Ranges in the United States* (Washington, DC: Army Environmental Policy Institute).
- [54] Bimkom and B'tselem, 2005, *Under the Guise of Security: Routing the Separation Barrier to Enable the Expansion of Israeli Settlements in the West Bank* (Jerusalem: B'tselem, The Israeli Information Centre for Human Rights in the Occupied Palestinian Territories).
- [55] Qumsiyeh, M.B. and Abusarhan, M., 2021, Biodiversity and environmental conservation in Palestine. In biodiversity conservation and sustainability in Asia. In: M. Öztürk, V. Altay and R. Efe (Eds) *Vol. 1. Prospects and Challenges in West Asia and Caucasus* (Geneva, Switzerland: Springer Nature), pp. 1–22.
- [56] Abdallah, T. and Swaileh, K., 2011, Effects of the Israeli segregation wall on biodiversity and environmental sustainable development in the West Bank, Palestine. *International Journal of Environmental Studies* 68(4), 543–555. doi: 10.1080/00207233.2011.608504
- [57] Isaac, J. and Hrimat, N., 2005, *Assessing the Impact of Israel's Segregation Wall on the Palestinian Agricultural Biodiversity* (Jerusalem: ARIJ.org).
- [58] Handal, E.N., Qumsieh, G.H., Hammash, S.Y. and Qumsiyeh, M.B., 2020, Status and conservation of the striped hyena (*hyaena hyaena*) in the occupied Palestinian territories (West Bank). *Jordan Journal of Natural History* 6, 11–18.
- [59] Qumsiyeh, M.B., Khalilieh, A., Albaradeiya, I.M. and Al-Shaikh, B., 2016, Biodiversity conservation of wadi Al-Quf area, occupied palestinian territories: Challenges and opportunities. *Jordan Journal of Natural History* 3(1, 3), 6–24.
- [60] Qumsiyeh, M.B. and Albaradeiya, I.M., 2022, Politics, power, and the environment in Palestine. *Africana Studia* 37, 9–18. doi: 10.21747/0874-2375/afr37a1
- [61] Salem, H.S., 2011, Social, environmental and security impacts of climate change on the Eastern Mediterranean. In: H.G. Brauch (Ed.) *Coping with Global Environmental Change, Disasters and Security* (Berlin, Heidelberg: Springer), pp. 421–445.

- [62] B'Tselem, 2012, State's response re firing zone 918 ignores the laws of occupation. Available online at: https://www.btselem.org/south_hebron_hills/20120827_firing_zone_918_state_response (accessed 31 December 2023).
- [63] Ben-Naftali, O. and Diamond, E., 2023, No place for Palestinians: The Israeli high court of justice fades out of the global community of courts-the farcical tragedy of the 2022 judgment on Masafer Yatta. *Boston University International Law Journal* **41**, 47–119.
- [64] ACRI (Association of Civil Rights in Israel), 2017, Update on petition regarding firing zone 918. Available online at: <https://law.acri.org.il/en/2017/01/12/update-on-petition-regarding-firing-zone-918/> (accessed 31 December 2023).
- [65] FMEP (Foundation for Middle East Peace), 2022, Available online at: <https://fmep.org/resource/the-people-are-devastated-demolitions-harassment-and-live-fire-idf-training-in-masafer-yatta/> (accessed 31 December 2023).
- [66] Awad, A., 2022, They're not arriving with trucks to deport us, but the goal is the same' from holding a mini-census to confiscating vehicles, the Israeli army is reminding the residents of Masafer Yatta who rules their lives, *972 Magazine*. Available online at: <https://www.972mag.com/masafer-yatta-army-census/>.
- [67] Westing, A.H., 1980, *Warfare in a Fragile World: Military Impact on the Human Environment* (London: Taylor & Francis).
- [68] Hupy, J.P., 2008, The environmental footprint of war. *Environmental History* **14**(3), 405–421. doi: 10.3197/096734008X333581
- [69] PENGON and FOE, 2015, *2014 War on Gaza Strip: Participatory Environmental Impact Assessment*. (Ramallah: Heinrich-Böll-Stiftung). Available online at: https://ps.boell.org/sites/default/files/uploads/2015/12/wareia_report_final.pdf (accessed 31 December 2023).
- [70] Rathbone, J.P., 2023, Military briefing: The Israeli bombs raining on Gaza, *Financial Times* 6 December. Available online at: <https://www.ft.com/content/7b407c2e-8149-4d83-be01-72dcae8aee7b> (accessed 31 December 2023).
- [71] Gudkov, S.V., Chernikov, A.V. and Bruskov, V.I., 2016, Chemical and radiological toxicity of uranium compounds. *Russian Journal of General Chemistry* **86**(6), 1531–1538. doi: 10.1134/S1070363216060517
- [72] Ran, Y., Wang, S., Zhao, Y., Li, J., Ran, X. and Hao, Y., 2020, A review of biological effects and treatments of inhaled depleted uranium aerosol. *Journal of Environmental Radioactivity* **222**, 106357. doi: 10.1016/j.jenvrad.2020.106357
- [73] Vellingiri, B., 2023, A deeper understanding about the role of uranium toxicity in neurodegeneration. *Environmental Research* **233**, 116430. doi: 10.1016/j.envres.2023.116430
- [74] Amnesty International, 2023, Available online at: <https://www.amnesty.org/en/latest/news/2023/10/lebanon-evidence-of-israels-unlawful-use-of-white-phosphorus-in-southern-lebanon-as-cross-border-hostilities-escalate/>.
- [75] Human Rights Watch, Available online at: <https://www.hrw.org/news/2023/10/12/israel-white-phosphorus-used-gaza-lebanon>.
- [76] Baaklini, S., 2023, Israel's phosphorous bombs destroyed over 4.5 million sq m of forest in southern Lebanon, *L'Orient Today*, 8 November.
- [77] Kallab, A. and Mouawad, L.R., 2023, *The Socio-Environmental Impact of White Phosphorous Ammunition in South Lebanon: Analysis and Mitigation Strategies*. (Beirut: AUB Nature Conservation Centre). <https://www.aub.edu.lb/natureconservation/Documents/Brief%20WP%20English.pdf> (accessed 31 December 2023).
- [78] ATSDR (Agency for Toxic Substances and Disease Registry of the U.S. Department of Health and Human Services). White phosphorous - ToxFAQTM. Available online at: <https://www.atsdr.cdc.gov/toxfaqs/tfacts103.pdf> (accessed 31 December 2023).
- [79] CEOBS (Conflict and Environment Observatory), 2022, Reverberating civilian and environmental harm from explosive weapons use in Gaza. Available online at: <https://ceobs.org/reverberating-civilian-and-environmental-harm-from-explosive-weapons-use-in-gaza/> (accessed 31 December 2023).
- [80] Zuriel, Y., Kerem, D. and Scheinin, A., 2016, *Long-Term Passive Acoustic Monitoring of Bottlenose Dolphins (*Tursiops truncatus*) in Haifa Bay*. *Environmental Report on the*

- Influence of Sub-Marine Noise from Haifa Port Expanding on Marine Mammals* (Michmoret, Israel: IMMRAC). (In Hebrew).
- [81] Spanier, E. and Zviely, D., 2022, Key environmental impacts along the Mediterranean coast of Israel in the last 100 years. *Journal of Marine Science and Engineering* **11**(1), 2–12. doi: [10.3390/jmse11010002](https://doi.org/10.3390/jmse11010002)
- [82] Opall, B. 2009, Israel 3rd among world arms suppliers: MoD numbers conflict with U.S. Report, *Defense News*, 5 October.
- [83] Heshmonai, A., 2010, Senior officer: Hundreds of minefields are unfenced, *Ma'ariv*, 7 February (Hebrew).
- [84] Baror, Y., 2006, *Assessment of Environmental Damage following the War in the North*. Israel Ministry of Environmental Protection (Tel Aviv: Chief Scientist's Office).
- [85] Heilman, U., 2006, War in north leaves deep scar on Israel's forests and wildlife, *JTO News*, 8 August.
- [86] Shevtsov, A., 2007, Environmental implications of the 2006 Israel-Lebanon conflict. *ICE Case Studies* **216**. <https://mandalaprojects.com/ice/ice-cases/lebanon-war.htm> ((accessed 31 December 2023).
- [87] UNEP (United Nations Environment Program), 2007, *Lebanon Post Conflict Environmental Assessment* (Nairobi: UNEP).
- [88] Hussein, S., 2010, Update on the environmental and legal consequences of the recent lebanon-israel war. *Sustainable Development Law & Policy* **7**(3), 19–27.
- [89] WHO (World Health Organization), 2023, *Risk of Disease Spread Soars in Gaza as Health Facilities, Water and Sanitation Systems Disrupted*. (Geneva: WHO). Available online at: <https://www.emro.who.int/media/news/risk-of-disease-spread-soars-in-gaza-as-health-facilities-water-and-sanitation-systems-disrupted.html> (accessed 31 December 2023).
- [90] UNDP (UN Development Program) 2023, Gaza war: Expected socioeconomic impacts on the state of Palestine. ESCWA, UNDP. Available online at: <https://www.undp.org/arab-states/publications/gaza-war-expected-socio-economic-impacts-state-palestine> (accessed 31 December 2023).
- [91] Ubeid, K.F., Al-Agha, M.R. and El-Turk, M.F., 2018, Heavy metals distribution and pollution in the sediments of the Wadi Gaza Mouth, Eastern Mediterranean Coast, Palestine. *Serie Correlación Geológica* **34**(1), 71–88.
- [92] Shomar, B. and Rovira, J., 2023, Human health risks associated with the consumption of groundwater in the Gaza Strip. *HELIYON* **9**(11), e21989. [https://www.cell.com/heliyon/pdf/S2405-8440\(23\)09197-1.pdf](https://www.cell.com/heliyon/pdf/S2405-8440(23)09197-1.pdf) ((accessed 31 December 2023).
- [93] CEOBS, 2023, *Country Brief: Occupied Palestinian Territories*. Available online at: <https://ceobs.org/country-brief-occupied-palestinian-territories/> (accessed 31 December 2023).
- [94] Al-Haq, 2012, *Pillage of the Dead Sea: Israel's Unlawful exploitation of Natural Resources in the Occupied Palestinian Territories* (Ramallah: Al-Haq). Available online at: <https://bit.ly/35LiSej> (accessed 31 December 2023).
- [95] Al-Haq, 2013, *Water for One People Only: Discriminatory Access and 'Water apartheid' in the OPT*. (Ramallah: Al-Haq). Available online at: <https://www.alhaq.org/publications/8073.html> (accessed 31 December 2023).
- [96] Al-Haq, 2015, *Annexing Energy: Exploiting and Preventing the Development of Oil and Gas in the Occupied Palestinian Territory* (Ramallah: Al-Haq).
- [97] Al-Haq, 2015, *Environmental Justice in the Occupied Palestinian Territories: Problems and Prospects* (Ramallah: Al-Haq). Available online at: https://www.alhaq.org/cached_uploads/download/alhaq_files/publications/Environmental.Injustice.Report.En.pdf (accessed 31 December 2023).
- [98] Qumsiyeh, M.B. and Abusarhan, M., 2020, An environmental Nakba: The Palestinian environment under Israeli colonization. *Science for the People, (Special Issue: Science Under Occupation)* **23**(1). <https://magazine.scienceforthepeople.org/vol23-1/an-environmental-nakba-the-palestinian-environment-under-israeli-colonization/> (accessed 31 December 2023).

- [99] ARIJ, 2016. Status of environment in OPT 2015. Available online at: <http://www.Arij.Org/Latest-News/779-The-Status-Of-Env-2015-2016> (accessed 31 December 2023).
- [100] Evans, M.I., Symens, P. and Pilcher, C.W.T., 1993, Short-term damage to coastal bird populations in Saudi Arabia and Kuwait following the 1991 Gulf war marine pollution. *Marine Pollution Bulletin* **27**, 157–161. doi: [10.1016/0025-326X\(93\)90020-K](https://doi.org/10.1016/0025-326X(93)90020-K)
- [101] Arai, Y., 2009, *The Law of Occupation: Continuity and Change of International Humanitarian Law, and its Interaction with International Human Rights Law* (New York: Brill).
- [102] Clagett, B.M. and Johnson, O.T., 1978, May Israel as a belligerent occupant lawfully exploit previously unexploited oil resources of the Gulf of Suez? *The American Journal of International Law* **72**(3), 558–585. doi: [10.2307/2200459](https://doi.org/10.2307/2200459)
- [103] Dinstein, Y., 2019, *The International Law of Belligerent Occupation* (Cambridge: Cambridge University Press).
- [104] El-Hindi, J.L., 1990, The West Bank Aquifer and conventions regarding laws of belligerent occupation. *Michigan Journal of International Law* **11**, 1400.
- [105] Roberts, A., 1990, Prolonged military occupation: The Israeli-occupied territories since 1967. *American Journal of International Law* **84**(1), 44–103. doi: [10.2307/2203016](https://doi.org/10.2307/2203016)
- [106] Scobbie, I., 2010, Natural resources and belligerent occupation: Perspectives from international humanitarian and human rights law. In: S.M. Akram (Ed.) *International Law and the Israeli-Palestinian Conflict* (New York: Routledge), pp. 239–262.
- [107] Mills, J.H. and Waite, T.A., 2009, Economic prosperity, biodiversity conservation, and the environmental kuznets curve. *Ecological Economics* **68**(7), 2087–2095. doi: [10.1016/j.ecolecon.2009.01.017](https://doi.org/10.1016/j.ecolecon.2009.01.017)
- [108] Hever, S., 2010, *The Political Economy of Israel's Occupation* (London: Pluto Press).
- [109] Gordon, U., 2013, *Olive Green: Environment, Militarism and the Israel Defense Forces* (Pittsburgh: University of Pittsburgh Press).
- [110] UNIFTFPA, 2012, *Toolkit and Guidance for Preventing and Managing Land and Natural Resources Conflict: Land and Conflict*. (Geneva: United Nations Interagency Framework Team For Preventive Action). Available online at: <https://reliefweb.int/report/world/toolkit-and-guidance-preventing-and-managing-land-and-natural-resources-conflict> (accessed 31 December 2023).
- [111] Weizman, E., 2012, *Hollow Land: Israel's Architecture of Occupation* (London: Verso Books).
- [112] Shelton, D. and Cutting, I., 2015, If you break it, do you own it? Legal consequences of environmental harm from military activities. *Journal of International Humanitarian Legal Studies* **6**(2), 201–246. doi: [10.1163/18781527-00602002](https://doi.org/10.1163/18781527-00602002)
- [113] Banda, M.L., 2018, Regime congruence: Rethinking the scope of state responsibility for transboundary environmental harm. *Minnesota Law Review* **103**, 1879.
- [114] Carpanelli, E., 2022, International human rights law and transboundary environmental harm: Trends and challenges. In: M. Arcari (Ed.) *Trends and Challenges in International Law: Selected Issues in Human Rights, Cultural Heritage, Environment and Sea* (New York: Springer), pp. 13–48.
- [115] Azarova, V., 2017, *Israel's Unlawfully Prolonged Occupation: Consequences Under an Integrated Legal Framework* (Brussels: European Council on Foreign Relations). Available online at: https://www.ecfr.eu/publications/summary/israels_unlawfully_prolonged_occupation_7294 (accessed 31 December 2023).
- [116] ICJ (International Court of Justice), 2004, Legal consequences of the construction of a wall in the occupied Palestinian territory, advisory opinion. *ICJ* **136**, 121. Available online at: <http://www.icj-cij.org/files/case-related/131/131-20040709-ADV-01-00-EN.pdf> (accessed 31 December 2023).
- [117] Adams, W.M. and Mulligan, M., 2003, *Decolonizing Nature: Strategies for Conservation in a Post-Colonial Era* (London: Earthscan).

- [118] Alatout, S., 2006, Towards a bio-territorial conception of power: Territory, population, and environmental narratives in Palestine and Israel. *Political Geography* 25(6), 601–621. doi: [10.1016/j.polgeo.2006.03.008](https://doi.org/10.1016/j.polgeo.2006.03.008)
- [119] Awad, S., 2019, Ecological justice for Palestine. In: A. Harley and E. Scandrett (Eds) *Environmental Justice, Popular Struggle and Community Development* (Bristol: Policy Press), pp. 117–133.
- [120] Samuel, M.T., 2023, The Israel-Hamas war: Historical context and international law. *Middle East Policy* 30(4), 3–9. doi: [10.1111/mepo.12723](https://doi.org/10.1111/mepo.12723)