

Project *brief*

Thünen Institute of Forest Ecosystems

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Forest fires and the role of military contaminated sites on forest and succession areas in Brandenburg

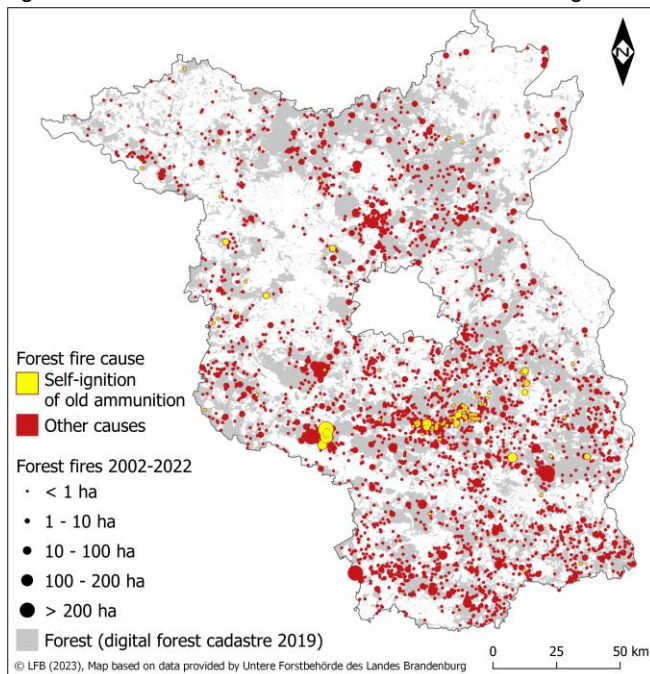
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- With a total area of 575,000 hectares and a third of the forest area, Brandenburg is the federal state with the highest contamination of old ammunition in Germany.
- The ten largest forest fires in Brandenburg since 2002 are all located in forest areas contaminated with munitions, each extending to more than 200 hectares and covering 3301 hectares in total.
- Self-ignition of old ammunition caused damage to 851 hectares of forest in 2019 - this corresponds to almost 63 % of the total burned area of all forest fires in Brandenburg in 2019.

Number of forest fires and burned area size in Brandenburg

For the years 2003, 2018 and 2022, more than 500 fires per year were registered in Brandenburg, respectively. This is nearly one third of all forest fires registered in Brandenburg in the period from 2002 to 2022. The sum of the forest fire areas from the extreme years 2018, 2019, and 2022 even corresponds to 59 % of all forest fire areas recorded in Brandenburg between 2002 and 2022. The month of June 2019 particularly stands out in the forest fire statistics: the highest monthly total to date was recorded at 1088 hectares, which alone corresponds to almost 46 % of all forest fire areas registered in the month of June from 2002 to 2022. Military contaminated sites on suspected explosive ordnance sites are of particular importance in the spatial distribution and extent of forest fires (Figure 1).

Figure 1: Area size and distribution of forest fires in Brandenburg

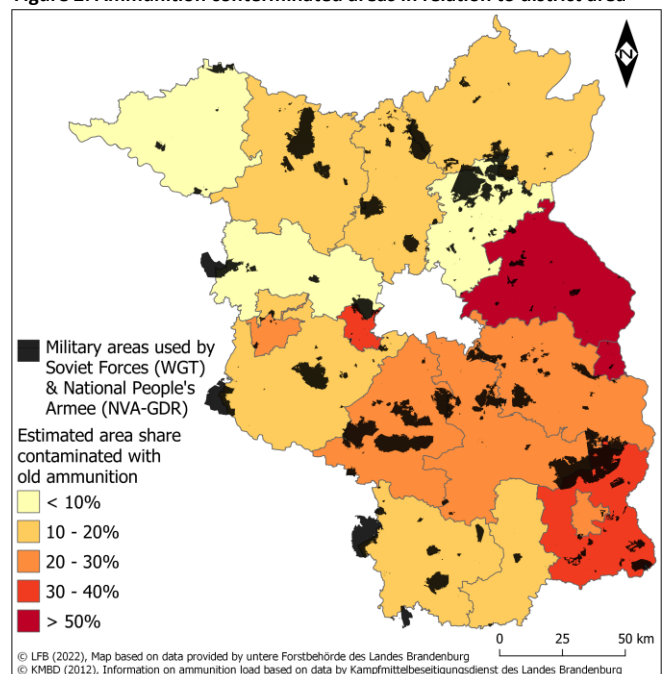


Source: © LFB (2023)

Military and armament contaminated sites in Brandenburg

"The terms military contaminated sites and military waste are not legally defined in Germany. Contaminated military sites are old sites and old deposits that are attributed to direct military operations after the Second World War" (UBA 2013). In the state of Brandenburg, contamination of soil, groundwater, and surface water caused by the armed forces of the former Western Group of Soviet Troops (WGT) and the National People's Army of the German Democratic Republic (NVA-GDR) are classified as military contaminated sites (LfU 2024). In addition, local focus areas such as Oranienburg and Potsdam, the Oder-Neisse line and areas south of Berlin were particularly affected by Allied bombing during the Second World War (Figure 2).

Figure 2: Ammunition contaminated areas in relation to district area



Source: © LFB (2022), © KMBD (2012)

The Kampfmittelbeseitigungsdienst (Explosive Ordnance Disposal Service, abbreviated as KMBD) was established in 1991 to determine the contamination of explosive ordnance and to keep records of cleared areas, the receipt, transportation, storage, and destruction of explosive ordnance in Brandenburg. The KMBD, for whose maintenance the state provides up to € 5 million annually has rendered more than 14,500 tons of explosive ordnance harmless by 2020 and recovered and destroyed over 32 million explosive ordnance units (MIK, 2022).

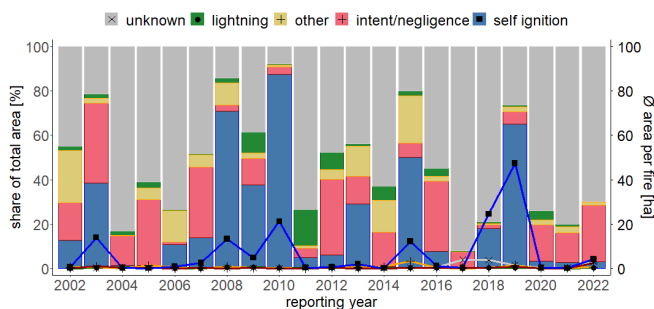
Status quo

With around 575,000 hectares with suspected munitions - almost 20 % of the state's area - Brandenburg is the federal state most heavily contaminated with old munitions. Around a third (300,000 ha) of all forest areas in Brandenburg are currently classified as suspected munitions sites (Herold & Puttins 2019). The actual contamination with old munitions, their distribution and the potential risk they pose varies greatly from area to area: only a very small proportion of the affected areas are considered inaccessible or with restricted access, while the majority of the forest areas classified as suspected areas have been used for forestry since 1945 and even after reunification.

Self-ignition of old ammunition

The forest fire statistics for the state of Brandenburg illustrate the potential damage caused by forest areas contaminated with ammunition: a total of 18 forest fires were triggered by self-ignition of old ammunition in 2019, which corresponds to 4.3 % of all fires in this year. The resulting forest fire area totaling 851 ha corresponds to almost 63% of the total area in Brandenburg in 2019. The average area of fires caused by ammunition remnants is a good 47 ha. By comparison, 45 forest fires were caused by lightning strikes in the same year, with a total area of 13.5 ha (1% of the total area in 2019) and an average area of 0.3 ha per fire (Figure 3).

Figure 3: Burned areas in Brandenburg grouped by ignition cause



Source: © LFB (2002-2022)

In evaluations of the long-term development of forest fires since 1975, Müller (2019) attributes the increase in forest fire areas in Brandenburg, despite a downward trend in the number of forest fires, to the fact that forest fires could not be fought sufficiently due to the danger posed by old ammunition. Between 2002 and 2022 the ten largest burned areas covering

3301 ha in total - occurred on areas formerly used by the military. The former military training area near Jüterbog alone accounts for 57 % of these damaged areas. Since 2010 the self-ignition of old munitions led to three major fires in the Forst Zinna Jüterbog-Keilberg area with damage to 1236 ha of forest and succession areas. At 744 ha the largest single area burned in 2019 accounts for nearly 23 % of the overall area burned by the ten largest forest fires (Table 1).

Table 1: Top ten forest fire burned areas in Brandenburg since 2002

| Forest district | Tree species | Cause | Area | Date |
|------------------------------|--------------|---------------|--------|------------|
| Jüterbog Keilberg | scots pine | self ignition | 237 ha | 2010-07-11 |
| Lieberose | scots pine | unknown | 250 ha | 2017-05-29 |
| Jüterbog Keilberg | | self ignition | 255 ha | 2018-07-25 |
| Jüterbog Keilberg | | unknown | 300 ha | 2018-08-23 |
| Dippmannsdorf Treuenbrietzen | scots pine | unknown | 334 ha | 2018-08-23 |
| Lieberose | silver birch | unsolved | 230 ha | 2018-09-10 |
| Jüterbog Keilberg | | self ignition | 744 ha | 2019-06-03 |
| Herzberg Uebigau | | arson | 316 ha | 2022-06-23 |
| Herzberg Falkenberg | scots pine | unknown | 422 ha | 2022-07-25 |
| Potsdam Beelitz | scots pine | unknown | 213 ha | 2022-06-19 |

Source: © LFB (2002-2022)

Summary

Self-ignition of weathering phosphorus ammunition in conjunction with extreme heat and prolonged drought led to several large fires near Jüterbog and Lieberose in 2018/19. In addition to unfavorable wind conditions, two other factors facilitated the spread and development of the forest fires:

- On the one hand, the munition posed a danger to the emergency services. According to the fire brigade regulations (FwDV500 2022), the prescribed distance of at least 500 m from the source of danger for large quantities of military munitions at the scene had to be maintained, which severely restricted the measures for containing the fires in the area and from the air.
- On the other hand, due to the history of military use, fire-promoting vegetation structures had developed on the mostly nutrient-poor sandy soils of the affected forest areas, consisting mainly of single-layered, even-aged pine stands (see Table 1).

Conclusion

In most cases munitions pose a hazard due to ground displacement or mechanical effects. The hazard potential of ammunition remnants varies depending on the type of ammunition and depends on factors difficult to assess, such as the respective age and degree of weathering. In addition, munitions with a long-term chemical detonator can explode without any external influences. Major fires on former military training areas in 2018 and 2019 showed the enormous damage potential of old munitions. As the material ages and the corrosion processes progress, the probability of spontaneous combustion and thus the risk of large fires developing on areas contaminated with munitions that are difficult to fight will continue to increase.

Further information

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Project

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