



# Impacts of Biological warfare on Environment

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## Abstract

Environment has major relation with the biological warfare in comparison to other war types (conventional, nuclear, chemical). It has a direct impact which will reflect in the future. Any changes in the environment interfere with many of the major determinants of biological warfare. The key issue of biological war is bioterrorism. The release of toxins or biological agents which affect human beings, animals, or plants and in other words, it is the intentional use of microorganisms to bring about ill effects or death to humans, livestock or crops. The essence of bioterrorism is a biological attack which brings the drastic changes in the livelihood. The important components which are required for a biological attack are perpetrators, agents, medium and targets. Covid 19 has devastated the world and had become pandemic. This was considered as one of the bioweapons.

**Keywords:** Environment, Health, Bioterrorism, Bioweapons, Biological warfare

## Introduction:

Environmental warfare includes tactics that target the natural landscape directly such as the use of herbicides and defoliants, river diversion, and the burning of croplands or use elements of the natural

landscape, including nonhuman animals, as a means of harming enemy combatants or civilians etc., The biological warfare agents include bacteria-single-cell organisms that cause diseases such as anthrax, brucellosis, tularemia, and plague. Rickettsia microorganisms that resemble bacteria but differ in that they are intracellular parasites that reproduce inside cells. One of the first recorded uses of biological warfare occurred in 1347, when Mongol forces are reported to have catapulted plague-infested bodies over the walls into the Black Sea port of Caffa (now Feodosiya, Ukraine), at that time a Genoese trade centre in the Crimean Peninsula.

## Effects on humans:

A biological attack is the intentional release of a pathogen (disease causing agent) or biotoxin (poisonous substance produced by a living organism) against humans, plants, or animals. An attack against people could be used to cause illness, death, fear, societal disruption, and economic damage.

## Threat to natural resources:

Bioweapons spread germs that contaminate air, food, water, and the environment, causing epidemiological diseases for different living organisms.

### 1. Air:

A wide variety of germs can contaminate air and are used in biological warfare. Fungi are the most common, and they travel by air over long distances to infect healthy plants.

### 2. Food:

Food contamination is also one of the most powerful methods used to carry out biological warfare attacks. Disease is transmitted either directly to humans through contaminated food or drink or indirectly by hosts.



### 3. Water:

Water can spread a number of lethal infectious agents as well. For example, one gram of *Clostridium tetani* poison is able to kill eight million people within six hours (Dudely and Woodhard, 2002).

#### **Threat caused due to invasive species:**

There are many examples of invasive species benefiting from their ability to carry pathogens or parasites that are harmless to the invasive host but lethal to indigenous species, therefore conferring a selective advantage on the invader even if the indigenous species is better adapted to the habitat. For example, native red squirrels (*Sciurus vulgaris*) have been replaced by the invasive gray squirrel (*S. carolinensis*) in the United Kingdom because the latter carry *Squirrel parapoxvirus*, which causes a fatal disease only in the red squirrel. Similarly, the decline of the noble crayfish (*Astacus astacus*) in Europe has been caused by the fungal pathogen *Aphanomyces astaci*, which was co-introduced with the signal crayfish *Pacifastacus leniusculus* from North America. In both examples, the invasive species has become more competitive by selectively weakening its opponent. A prerequisite for disease-mediated invasions is that the alien vector displays a higher tolerance than the indigenous species against the vectored pathogen or parasite. An intriguing example is the invasive ladybird *Harmonia axyridis*, which is native to central and eastern Asia but has been introduced to North America and Europe as a biological control agent against aphids and scale insects. This species, also known as the multicolored or harlequin ladybird, is now spreading around the world and has become a model in invasion biology because it can successfully outcompete native ladybird

species in diverse new habitats. It has recently been shown to carry abundant microsporidia, which are fungi-related obligate parasites that replicate within eukaryotic cells after penetrating the plasma membrane using an extruded polar tube. Microsporidia isolated from *H. axyridis* kill native ladybird species such as *Coccinella septempunctata* when experimentally transferred. The tolerance of *H. axyridis* against its associated microsporidia may be mediated by the chemical defense compound harmonine, which displays activity against a wide range of bacteria and parasites (Dudely and Woodhard, 2002).

#### **Covid -19 as bioweapon:**

To date, the corona virus disease 2019 (COVID-19) pandemic has taken more than 3.5 million lives. Many of these deaths have been attributed to misleading information that fragmented a coordinated effort to mitigate loss of life. Future pandemics will continue to be a threat, so it is important to lay bare the true cause of this devastation. From the beginning, the origins of the pandemic have been debated, even though a natural zoonotic transfer to humans has been determined as the likely cause; however, speculation around a viral bioweapon and laboratory leaks remains. The evidence for the origins of this current pandemic can be found in the science and history behind biological outbreaks and the signs of bioweapon use. This knowledge will help minimize the harm of future pandemics (Enan, 2000).

One microbe has just devastated our world. Severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2), the cause of COVID-19, has shattered economies, upended patterns of life globally, and already killed >3.5 million people. More



than 85 million cases were documented worldwide in <1 year,<sup>1</sup> and many people want to know how this happened and where the virus originated. The first reports in late 2019 indicated that an epidemic caused by a zoonotic virus was spreading from Wuhan, China, believed to have been transmitted from an animal reservoir at a live-animal market. Speculation remains that the blame lies elsewhere, however which seems surprising to scientists. For the public, the truth is easy to question because of the vast amounts of circulating misinformation (Ruma and Islam, 2020).

### Conclusion:

Combating the threat of biological warfare and bioterrorism can be achieved by some elements of preparedness include developing different methods for the rapid detection of biologically disease-causing agents, developing antimicrobial drugs that could be used to protect the public against disease causing agents and various kinds of medical managements like preventive, promotive and curative services. From the beginning, the COVID-19 epidemic has quickly become a pandemic. The damage still has no end in sight, but there is hope from the early successes of vaccination programs. Ironically, vaccine development received a head start from the same laboratory studying corona viruses in Wuhan that was suspected of leaking the virus. This laboratory had already sequenced the viral genome and shared its code, thus eliminating months of standard vaccine research. Ultimately, the country where the pandemic started could help to end it. More than ever, experts—physicians, healthcare workers, and community leaders—must continue to acknowledge the threat and encourage calm until the vaccine is available to everyone. Science must guide in a manner that

maintains hope and attains the shortest path to normalcy. This will permit coordinated efforts to minimize the current devastation and, in establishing where this pandemic came from, allow for the first step toward preventing such a pandemic from occurring again.

### Reference:

- Dudely, J.P. and Woodhord, M. 2002. *Bioweapons, Biodiversity, and Ecocide: Potential Effects of Biological Weapons on Biological Diversity* *BioScience*, 52(7): 583-592.
- Dudely, J.P. and Woodhord, M. 2002. *Bioweapons, Bioterrorism and Biodiversity.* Rev. Sci. tech.off. Int. EPIZ. 2002, 21 (1): 125-137
- Enan, G. 2000. *Inhibition of B. cereus ATCC 14579 by plantaricin UGI in vitro and in Food.* Nahrung / Food 44(2):, 364-367.
- Rume, T and Islam, S.M. 2020. Environmental effects of COVID-19 pandemic and potential strategies of sustainability. [Heliyon](#). 6(9): e04965.