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Environmental and Human Health Impacts of Agent Blue Herbicide Use during the Vietnam War (A Conversation with Kenneth R. Olson)

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Abstract

Kenneth R. Olson's book, Environmental and Human Health Impacts of Agent Blue Herbicide Use during the Vietnam War, examines the history of Agent Blue, its environmental consequences, and its long-term effects on human health. Agent Blue was a tactical herbicide based on cacodylic acid and sodium cacodylate. It was used primarily to destroy rice crops and implement food-denial policies during the Vietnam War and the Second Indochina War. Across eleven chapters, the author traces the substance's entire life cycle—from scientific research and political and military decision-making to production, transportation, spraying, storage, disposal, and the subsequent remediation of contaminated sites. Particular attention is given to the Mekong Delta, the Central Highlands, the Cu Chi and Iron Triangle areas, as well as operations in Vietnam, Laos, Cambodia, and Thailand. Manufacturing sites along the Menominee River, Davis-Monthan Air Force Base in Arizona, and the Panama Canal Zone are examined as comparative case studies. The research draws on military documents, scientific publications, testimony from veterans and chemical-industry workers, and media reports. The author emphasizes the difficulty of reconstructing operations that were secret, poorly documented, or remain partially classified. According to the combined estimate presented in the interview, approximately 7.8 million liters of Agent Blue, containing about 1.13 million kilograms of arsenic, were sprayed across the South Vietnamese landscape. Although the organic components of the herbicide can transform relatively quickly, arsenic, as a chemical element, does not degrade. It can change chemical form and move among soil, sediment, surface water, groundwater, agricultural crops, and food webs. Agent Blue should therefore be understood not only as a historical crop-destruction weapon, but also as an ongoing problem involving environmental safety, public health, drinking-

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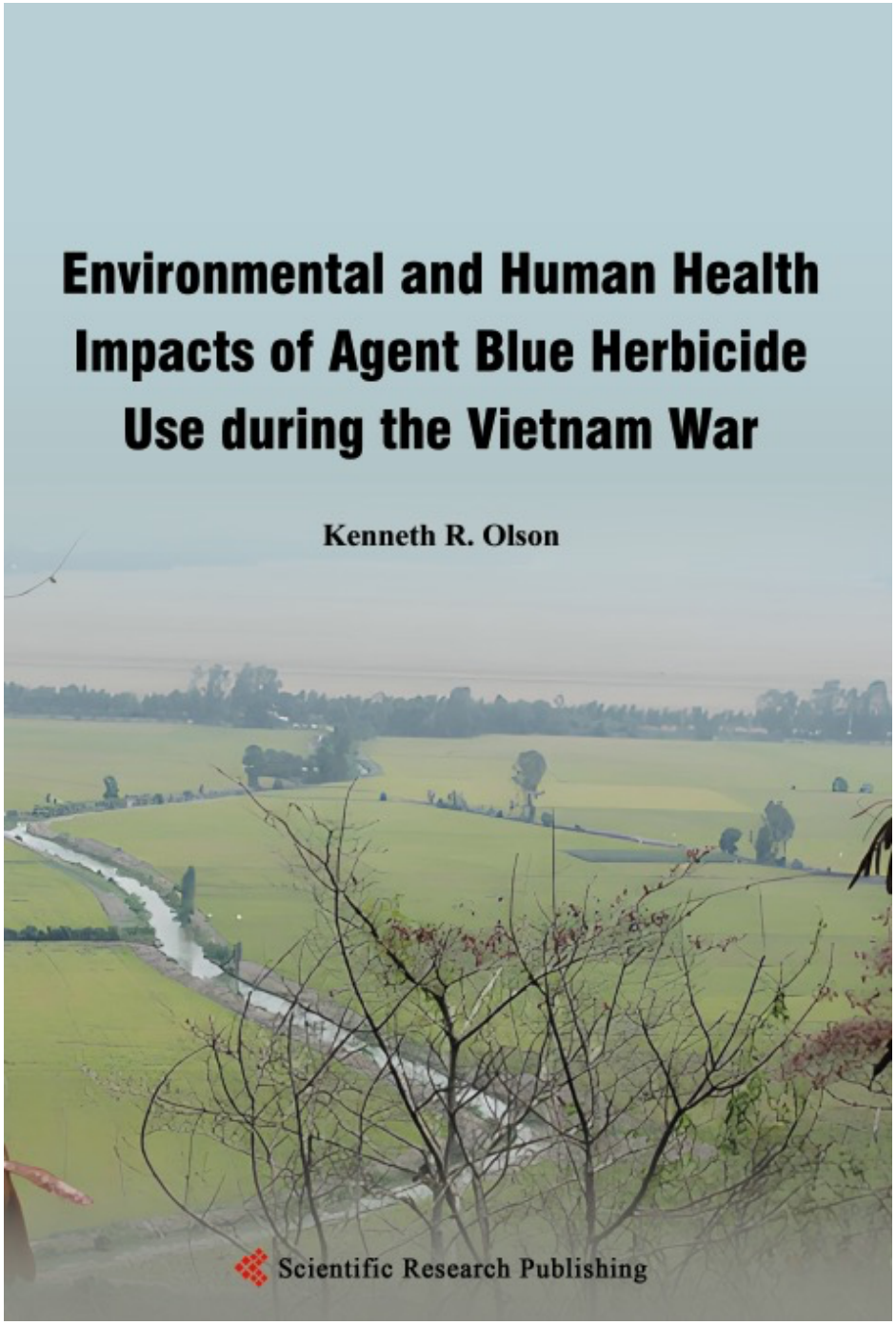
water quality, and food security. The book demonstrates that practical measures should focus on identifying contamination hotspots, controlling exposure pathways, ensuring access to safe drinking water, and remediating contaminated soils, sediments, and water systems. Such measures are necessary even when it is impossible to distinguish precisely between natural and anthropic sources of arsenic.

Keywords: Agent Blue; Vietnam War; Second Indochina War; arsenic; cacodylic acid; sodium cacodylate; tactical herbicides; rice-crop destruction; food-denial policy; Mekong Delta; anthropic contamination; groundwater; food security; public health; environmental consequences of war; remediation.

Key Points

1. The book examines Agent Blue as the result of an interaction among agricultural science, military objectives, and political decision-making. It shows how a herbicide developed for civilian agricultural purposes became a crop-destruction weapon and left a long-lasting toxic legacy.
2. For more than fifty years, most attention was directed toward Agent Orange, while Agent Blue remained far less widely known. The author stresses that Agent Blue was not merely a secondary companion to Agent Orange. It was a distinct arsenic-based herbicide with its own military objectives, pathways of environmental movement, and long-term consequences.
3. The interview gives a combined estimate of approximately 7.8 million liters of Agent Blue and about 1,132,400 kilograms of arsenic applied to the South Vietnamese landscape. However, records of early operations conducted by the Republic of Vietnam military, the US Army, the US Navy, and the CIA are incomplete. The actual scale of use may therefore not have been fully documented.
4. Vietnam, Laos, Cambodia, and Thailand are central to the book. Within Vietnam, the principal case studies include the Mekong Delta, the Central Highlands, Cu Chi, the Iron Triangle, and the Saigon River Valley. The production, transportation, storage, use, disposal, contamination, and remediation of Agent Blue are also examined through sites in the United States and the Panama Canal Zone.
5. The author had to reconstruct activities that were secret, poorly documented, or recorded differently by separate government agencies. Military documents, scientific studies, veterans' accounts, and media reports sometimes provided inconsistent program names, dates, and quantitative estimates. Claims therefore had to be cross-checked against multiple independent sources.
6. Cacodylic acid can transform relatively quickly, but the arsenic it contains remains in the environment. Water-soluble arsenic species can enter plant root zones and groundwater, be pumped back to the surface through wells, move with floodwater, and enter food webs.
7. Arsenic may enter rice, fish, shrimp, birds, and other components of the food-production system. The author considers the combined effects of natural and anthropic arsenic and emphasizes that monitoring and exposure reduction

are necessary regardless of which source predominates at a particular location.



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8. Military authorities sought rapid methods of defoliating forests and destroying food crops, while scientists attempted to document the environmental consequences while the conflict was still under way. Scientific protests and field studies contributed to the termination of the US tactical herbicide spraying program in 1971. The book demonstrates the importance of evaluating the environmental effects of new technologies before they are introduced on a large scale, rather than only after damage has occurred.
9. It connects wartime herbicide use with the present condition of groundwater, a network of approximately 700,000 tube wells, and the possibility of applying lessons from remediation work at the Menominee River manufacturing sites to monitoring and mitigation efforts in the Mekong Delta.
10. Contamination cannot be considered eliminated simply because a substance has been diluted in water or transported downstream. Contamination hotspots must be identified, contained, and remediated. Sources must be controlled, and drinking water must meet established safety standards before it is used.

Introduction

Interview conducted on July 15, 2026.

Prepared for the journal "Pollution and Diseases."

Interview conducted for the journal Pollution and Diseases. This text is part of the Kenneth R. Olson book-interview series. The purpose of the series is to make Professor Olson's long-term research on soils, rivers, floodplains, deltas, freshwater systems, environmental change and public policy accessible to a wider interdisciplinary audience.

Professor Kenneth R. Olson is an American soil scientist, environmental researcher and author whose work connects field-based soil science with geomorphology, environmental history, hydrology, agriculture, public policy and landscape management.

Why This Book Matters Now

The significance of Kenneth R. Olson's book lies first of all in its restoration of historical balance in the study of herbicide warfare during the Vietnam War. For decades, public and scientific discussion of this subject was almost entirely associated with Agent Orange and dioxin TCDD. Despite its extensive use in the destruction of rice crops, Agent Blue remained at the margins of research and public debate. This book establishes Agent Blue as an independent subject of scientific investigation and shows that the policy of destroying food supplies produced its own environmental, social, and humanitarian consequences.

The book's scientific value lies in its explanation of the long-term behavior of arsenic in the environment. The herbicide's organic formulation may have changed over time, but the arsenic itself did not disappear. It continues to move among soils, sediments, surface water, groundwater, agricultural plants, and living organisms. The consequences of Agent Blue use therefore cannot be confined to the period of active

warfare. They must also be considered in relation to present-day concerns involving drinking-water quality, the safety of rice and other foods, the condition of aquatic ecosystems, and human health.

Another important feature of the book is its interdisciplinary character. The author brings together the history of science, political and military history, soil science, hydrology, environmental chemistry, toxicology, and public health. The investigation is not limited to the locations where Agent Blue was sprayed. It traces the herbicide's path from the rooms in which policy decisions were made and the factories where cacodylic acid was produced to transportation routes, military bases, rice paddies, storage facilities, and disposal sites.

As a result, environmental damage is presented not as a single isolated event, but as the consequence of an entire system of decisions and actions involving military institutions, government agencies, industrial companies, and scientific organizations.

The book also has methodological importance. It demonstrates how difficult it is to investigate the consequences of secret operations when records are incomplete, contradictory, or still classified. Professor Olson does not offer an oversimplified explanation that attributes every present-day instance of arsenic contamination exclusively to Agent Blue. Instead, he stresses the need to distinguish between natural and anthropic sources while recognizing that they may overlap.

This approach makes the study's conclusions more cautious and scientifically grounded. Practical decisions should be based on measured concentrations, identified hotspots, and actual exposure pathways, rather than postponed until the origin of every quantity of arsenic can be established with absolute certainty.

The book's social and ethical significance is connected with the question of responsibility for the environmental consequences of war. A short-term military objective—such as destroying vegetation or food supplies—can create consequences that persist for several generations. These consequences affect not only military personnel, but also civilians, chemical-plant workers, aircraft maintenance personnel, transportation crews, and future residents of contaminated areas.

The book reminds readers that incomplete toxicity assessments, the withholding of information, and the deployment of insufficiently studied technologies can transform a temporary tactical decision into a long-term environmental and public-health crisis.

Finally, the book matters because of its continuing relevance. The problems it examines are not limited to the history of the Vietnam War. They are directly connected with contemporary questions of persistent contamination, water and food security, the environmental consequences of military technologies, and responsibility for restoring damaged environments.

The author also notes that climate change may further complicate the problem. Simultaneous increases in temperature and atmospheric carbon dioxide may influence biogeochemical processes in rice paddies and increase inorganic arsenic concentrations in rice grain. The problem will therefore not disappear on its own. It requires

long-term monitoring, safe drinking-water supplies, improved water and rice management, and targeted remediation of identified contamination hotspots..

INTERVIEW

Q: What is this book about?

A: It is difficult to imagine a scientific investigation becoming an epic story, yet all the elements are present in the history of Agent Blue. The book follows a quest to understand the environmental consequences of chemical use and the human factors surrounding it: political ideology, economic interests, and the recurring failure to evaluate new technologies fully before introducing them into the environment. During the conflicts in Southeast Asia, political and military leaders seized on research by weed and soil scientists as a rapid, inexpensive means of clearing jungle vegetation and destroying crops. Toxicity information was incomplete and, in some cases, withheld for economic reasons. Agent Blue, a substance developed from agricultural science, therefore became known for its poisonous legacy (1).

The eleven chapters were developed over many years and reviewed by numerous specialists. The investigation moves from senior decision-making rooms to rice paddies, manufacturing plants, transport routes, military bases, and disposal sites (2,3). It examines the consequences for non-combatants in Vietnam; military personnel who waded through rice paddies, flew or serviced spray aircraft, or handled barrels; chemical-plant workers; and crews who transported herbicides through the Panama Canal. Scientific objections helped bring the spraying program to an end, and President Nixon ordered the cessation of US tactical herbicide operations in 1971. Agent Blue nevertheless remained in the supply chain and had to be repurposed or disposed of. Some remaining stocks were sold for commercial agricultural use, while excess barrels returned from Vietnam via Johnston Atoll were taken to Davis-Monthan Air Force Base in Tucson, Arizona, where Agent Blue was used to control vegetation around perimeter fences and stored aircraft (Figure 1). Only by understanding this history can we prevent the misuse of future technologies.

Q: Why did you decide to write this book specifically?

A: When I visited the Cu Chi Memorial Park, northeast of Ho Chi Minh City, in 2016, more than 40 years after the spraying of Agent Orange and Agent Blue had stopped, the vegetation appeared dwarfed and stunted, and few large trees remained. I wondered why. The Cu Chi and Iron Triangle areas had been heavily defoliated and bombed as US forces attempted to expose and destroy tunnel entrances. After completing my 2017 research on the resilience of the Cu Chi soil tunnels (4), I decided to investigate the use of Agent Orange as a defoliant and Agent Blue as a food-denial weapon during the Vietnam and Second Indochina Wars. I assessed the environmental and human-health impacts of Agent Orange and 2,4,5-T contaminated with unknown amounts of dioxin TCDD, as well as Agent Blue containing cacodylic acid and arsenic (5-7). The Mekong Delta, one of the book's principal study areas, is shown in Figure 2.

Figure 1. Agent Blue was sprayed along perimeter fences and around aircraft at Davis-Monthan Air Force Base in Tucson, Arizona, where retired US Air Force aircraft are stored. Republished with permission of the Managing Editor of the Open Journal of Soil Science.

The original project became too large for a single volume: it grew to 22 chapters, more than 200 figures, approximately 500 references, and a projected length of more than 1,400 pages. It was therefore divided into two books. One addresses Agent Orange, 2,4,5-T, and dioxin TCDD. The other addresses Agent Blue, the arsenic-based herbicide used for food denial, and the associated Strategic Hamlet policies that displaced rural communities and restricted access to rice production.

Q: What makes this topic scientifically important?

A: For more than 50 years, US reporting on herbicide warfare during the Vietnam War focused largely on Agent Orange and its devastating effects. Agent Blue, however, was also used extensively to destroy rice, while public awareness remained limited. One of the earliest known US media reports appeared in a Washington Post editorial on May 26, 1964, based on reporting by Jim G. Lucas. Arthur H. Westing's 1971 letter to the editor, "Agent Blue in Vietnam," brought another brief moment of attention. Loana Hoylman revisited the issue in the VVA Veteran in 2014. In 2020, Kenneth R. Olson and Larry Cihacek published the first peer-reviewed article devoted specifically to Agent Blue, reconstructing its paper trail and environmental fate (1). The limited and intermittent coverage of this chemical weapon remains a central historical question.

Figure 2. Borders of the Mekong Delta in Vietnam and Cambodia. Map created by Mic Greenberg. Reprinted with permission of the Managing Editor of the Open Journal of Soil Science.

The scale of use is also scientifically important. The military research infrastructure behind the herbicide program included Fort Detrick (Figure 3). The Republic of Vietnam (RV) military, with support from the US Army, US Navy, and Central Intelligence Agency (CIA), reportedly sprayed approximately 3.2 million liters of Agent Blue, containing about 468,000 kg of arsenic, from 1962 to 1965. Operation Ranch Hand records document more than 4.712 million liters, containing 664,392 kg of arsenic, sprayed from 1961 to 1971. The combined estimate is approximately 7.8 million liters, or 1,132,400 kg of arsenic, applied to the southern Vietnam landscape (3,8). The recorded Agent Blue spray volumes are summarized in Figure 4. Records for the pre-1965 RV, Army, Navy, and CIA missions are incomplete, whereas the US Air Force Operation Ranch Hand records are much more detailed.

Figure 3. Headquarters of the biological-warfare laboratories at Fort Detrick, Maryland. Photograph courtesy of Andrew Dutton; source: YouTube. Reprinted with permission of the Managing Editor of the Open Journal of Soil Science.

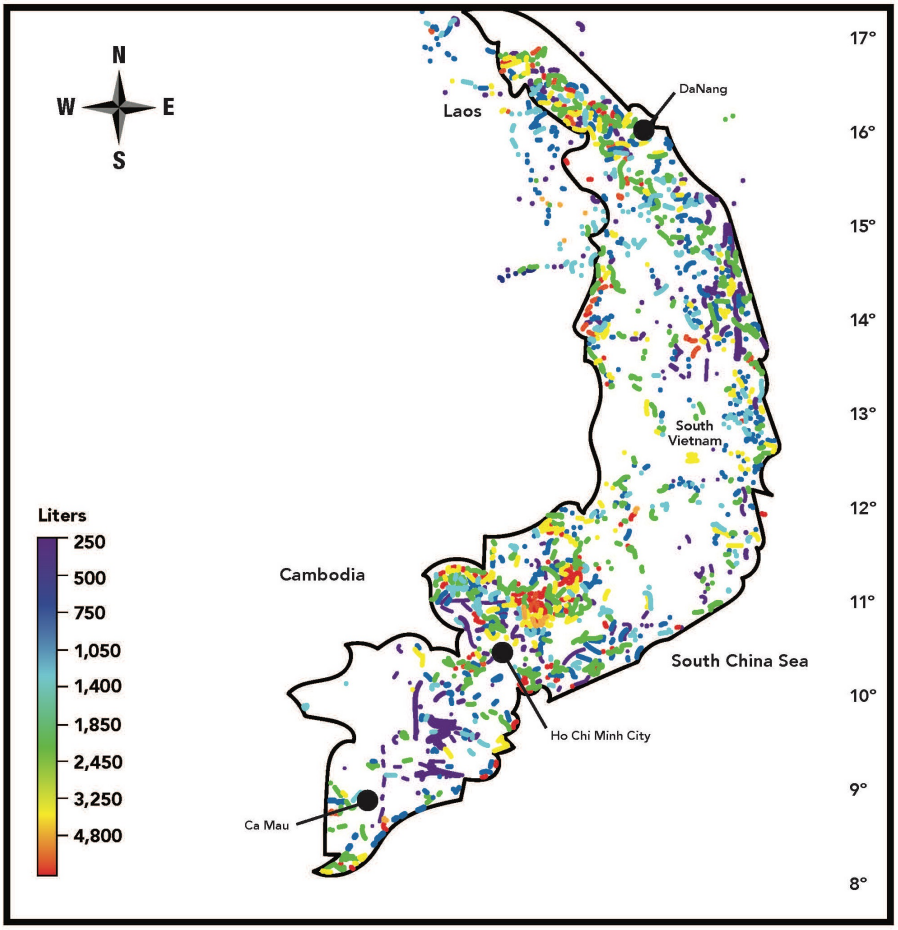

Figure 4. Volumes of Agent Blue (cacodylic acid, C2H7AsO2) sprayed by US military forces in the Republic of Vietnam (South Vietnam), 1961-1971.

This anthropic arsenic added to the natural arsenic burden in Mekong Delta soils, surface water, groundwater, drinking water, and food-production systems (7). Arsenic is an element and does not degrade, although it can change chemical form and move among soil, water, sediment, crops, and organisms. The book therefore treats Agent Blue not only as a historical weapon but also as a long-term environmental and human-health problem.

Q: Which regions or case studies are central to the book?

A: Southeast Asia is central, especially Vietnam, Laos, Cambodia, and Thailand (9,10). Within Vietnam, the principal case studies are the Mekong Delta and the Central Highlands, with the Cu Chi and Iron Triangle areas and the Saigon River Valley providing additional context (4,11). The Menominee River manufacturing sites in Wisconsin and Michigan, Davis-Monthan Air Force Base in Arizona, and the Panama Canal Zone provide comparative cases involving production, transport, disposal, contamination, and remediation (2,12).

Q: What were the most difficult aspects of the research?

A: The greatest difficulty was reconstructing activities that were secret, poorly documented, or recorded by different agencies. During the Second Indochina War, which began in 1959, the CIA, Air America, and the US Air Force conducted a secret and unconventional air war in Laos from bases in Thailand. Beginning in the early 1960s, Agent Blue was used in Laos and Vietnam and, to a lesser extent, in Cambodia (9,10). Operation Ranch Hand records are comparatively detailed, but records for the RV Khai Quang program and for US Army, Navy, and CIA support between 1962 and 1965 are incomplete or remain classified.

A second challenge was distinguishing documented operations from later recollections while comparing military files, scientific publications, veterans' accounts, and media reports. Different sources sometimes used inconsistent program names, dates, and estimates, so claims had to be cross-checked against multiple independent records. Because parts of the US war effort in Laos remain classified, some conclusions must necessarily be based on the surviving evidence.

Q: Did anything during the research surprise you?

A: What surprised me most was the scale of the program and the environmental mobility of the arsenic left behind. The RV and US militaries began destroying food crops in November 1962, before the major deployment of US combat forces in 1965. Spraying Agent Blue on rice paddies shortly before harvest destroyed the standing crop and introduced arsenic into soil and water (3,8). Agent Blue was particularly effective against rice and grasses. Cacodylic acid was manufactured at the Ansul Company plants in Marinette, Wisconsin, and Menominee, Michigan, and shipped in 208-liter barrels via the St. Lawrence Seaway to South Vietnam.

Arsenic occurs naturally in Southeast Asian deltas, including the Mekong Delta, but wartime applications added an anthropic source. Water-soluble arsenic species can leach into the soil root zone and groundwater and can enter rice, fish, shrimp, birds,

and other components of the food system. This persistence reinforces the urgent need to mitigate arsenic exposure from drinking water and food grown in flooded rice-production systems (7).

Q: Which environmental processes described in the book are the most underestimated?

A: The most underestimated processes are chemical transformation and hydrologic redistribution. Cacodylic acid can transform relatively quickly, but its arsenic remains in the environment. Water-soluble arsenic species can leach through rice-paddy soils into groundwater, be pumped back to the surface, move with floodwater into adjacent waterways, and enter food webs. Natural and anthropic sources overlap, which makes precise source attribution difficult (7,13).

In parts of the Mekong Delta, groundwater arsenic concentrations exceed the World Health Organization provisional guideline value of 10 micrograms per liter for drinking water. High arsenic concentrations in water used for agriculture can also contribute to contamination of rice, shrimp, and fish. Monitoring and mitigation are therefore necessary regardless of whether the arsenic originated from Agent Blue, another anthropic source, or natural geological processes (7,13).

Q: How are environmental systems connected with political or military processes in this topic?

A: During war, it is rare to find a government willing and able to require the military to fund and support environmental-impact studies. In the 1960s, many US scientists expressed concern about the use of herbicides during the Vietnam War. The protest was led by Dr. Arthur Galston and eventually included scientists associated with the National Academy of Sciences. By 1970, the Department of Defense permitted scientific teams to visit South Vietnam and document environmental effects. In total, approximately 1,500 scientist-days were spent in the field, and the US government and military also funded studies of herbicide effects on animals (5).

The military objective was to defoliate forests and destroy food crops as a strategy for winning battles and the war. The scientific objective was to document the environmental consequences while the conflict was still under way rather than decades later. Studies without field validation can be inaccurate or misleading. The United States and other countries need to learn from this history when assessing environmental damage in contemporary conflicts, including the war in Ukraine.

Q: Which chapter is personally most important to you?

A: Chapter 2, "Agent Blue Spraying in the Mekong Delta during the Vietnam War: Fate of the Arsenic-Based Herbicide Weapon Used to Destroy Rice Crops and Mangrove Forests," is personally the most important to me (3).

Agent Blue was a mixture of cacodylic acid ($C_2H_7AsO_2$) and sodium cacodylate ($C_2H_6AsNaO_2$), used as a tactical arsenic-based herbicide to destroy grasses and rice crops. US Department of Defense records, including US Air Force Operation Ranch Hand records, are detailed and publicly available. The same is not true of records for

the RV Khai Quang program, which was supported by the US Army, US Navy, and CIA. This difference in documentation is crucial because it affects estimates of where and how much Agent Blue was applied. Figure 5 shows the distribution of herbicide-exposure scores in relation to North Vietnamese Army base locations.

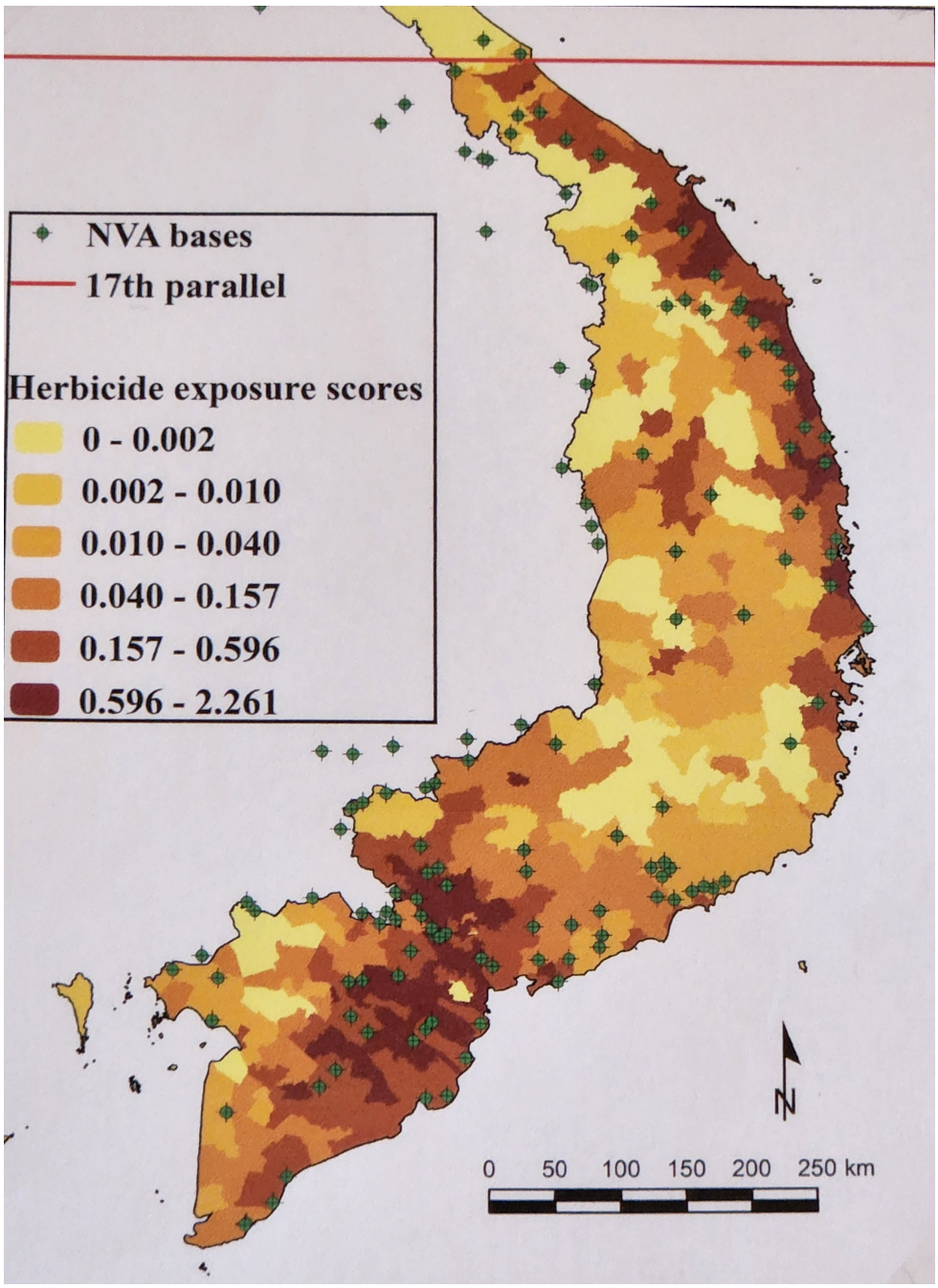

Figure 5. Distribution of herbicide-exposure scores and locations of North Vietnamese Army (NVA) bases in southern Vietnam below the 17th parallel. Map created by Mic Greenberg. Republished with permission of the Managing Editor of the Open Journal of Soil Science.

The chapter also connects wartime application to long-term environmental fate. Although cacodylic acid can transform relatively quickly, its arsenic can persist in water-soluble forms, leach into groundwater, and later be pumped back to the surface

through approximately 700,000 tube wells for urban and agricultural use. The chapter examines whether the RV and US spray programs contributed to the arsenic spikes found in the Mekong Delta today. It also considers whether lessons from remediation at the Menominee River manufacturing sites in Wisconsin and Michigan can help guide monitoring and mitigation in the Mekong Delta.

Q: What should readers understand after reading this work?

A: Readers should understand that Agent Blue was not simply a minor companion to Agent Orange. It was a distinct arsenic-based herbicide used primarily for crop destruction and food denial. Unlike dioxin TCDD, the organic cacodylic acid formulation can transform relatively quickly, but its arsenic can persist and move through soil, sediment, water, crops, and food webs.

The scientific challenge is to distinguish natural from anthropic arsenic while recognizing that both contribute to total exposure. The practical conclusion is that monitoring and remediation should focus on measurable hotspots and exposure pathways in groundwater, soil, sediment, and food-production systems rather than waiting for perfect source attribution.

Q: Who is this book intended for?

A: The book is intended for soil and water scientists, environmental chemists, toxicologists, public-health specialists, historians of science and military policy, veterans and advocacy groups, remediation practitioners, policymakers, and readers concerned with Southeast Asia, food security, and the long-term environmental consequences of war.

Q: How does this book relate to current global environmental challenges?

A: The environmental and human suffering associated with Agent Blue continues to be felt more than 50 years after the Vietnam War. The book is relevant to current global concerns about persistent pollution, food and water security, the environmental consequences of military technology, and responsibility for long-term remediation. Weapons designed to achieve short-term tactical goals can impose ecological and public-health costs for generations. Only by understanding the past can future misuse of new weapons and technologies be prevented.

Q: Are the problems discussed in the book improving or worsening today?

A: Both. Scientific awareness, analytical methods, and remediation strategies have improved, but arsenic-contaminated groundwater, rice, soil, and sediment remain serious concerns. Natural and anthropic arsenic can persist in environmental systems; water-soluble species can leach into groundwater, move with floodwater, and enter aquatic and agricultural food webs (7).

Climate change may intensify part of the problem. Recent experimental and modelling research found that simultaneous increases in atmospheric CO2 and temperature produced a synergistic increase in inorganic arsenic in rice grain, probably

through changes in soil biogeochemistry that favored reduced arsenic species (14). The problem will not improve automatically. It requires continued monitoring, safe drinking-water supplies, improved rice and water management, and remediation of identified hotspots.

Q: If readers remember only one idea from the book, what should it be?

A: The historical lesson is that "the solution to pollution is dilution" is no longer acceptable. Dilution may reduce a concentration locally, but it does not remove arsenic from the environment. Rivers, lakes, and oceans should not be treated as limitless sinks.

At the Menominee River, arsenic from former manufacturing sites can move toward Green Bay and Lake Michigan, an important drinking-water source. In the Mekong Delta, natural and anthropic arsenic can move through groundwater, irrigation systems, food webs, and coastal waters. Saltwater intrusion can further alter groundwater flow and hinder freshwater flushing. Hotspots should be identified, contained, and remediated, and drinking water should meet the World Health Organization guideline before use. Persistent contamination requires source control and cleanup, not reliance on downstream dilution.

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The Editorial Board of the journal "Pollution and Diseases" wishes you continued scientific success, new discoveries, and inspiration in your work.

Conflict of Interest

The authors declare no conflict of interest.

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Data Availability Statement

No new data were created or analyzed in this study.

References

1. Olson, K.R. and Cihacek, L. (2020) The Fate of Agent Blue, the Arsenic Based Herbicide, Used in South Vietnam during the Vietnam War. Open Journal of Soil Science, 10, 518-577. https://doi.org/10.4236/ojss.2020.1011027
2. Olson, K.R. and Cihacek, L. (2022) How United States Agricultural Herbicides Became Military and Environmental Chemical Weapons: Historical and Residual Effects. Open Journal of Soil Science, 12, 13-81. https://doi.org/10.4236/ojss.2022.122002

3. Olson, K.R. and Cihacek, L. (2022) Agent Blue Spraying in the Mekong Delta during the Vietnam War: Fate of the Arsenic Based Herbicide Weapon Used to Destroy Rice Crop and Mangrove Forests. Open Journal of Soil Science, 12, 253-294. https://doi.org/10.4236/ojss.2022.127012

4. Olson, K.R. and Morton, L.W. (2017) Why Were the Soil Tunnels of Cu Chi and Iron Triangle in Vietnam So Resilient? Open Journal of Soil Science, 7, 34-51. https://doi.org/10.4236/ojss.2017.72003

5. Olson, K.R., Cihacek, L. and Speidel, D.R. (2025) Review and Analysis: Environmental and Human Health Impacts of Herbicide Use Studies Conducted during the Vietnam War and Historical Lessons. Open Journal of Soil Science, 15, 103-135. https://doi.org/10.4236/ojss.2025.152006

6. Olson, K.R. (2023) Agent Blue: A Secret Military and Environmental Chemical Weapon Used for Food Denial in South Vietnam during the Vietnam Civil War (1962-1965). Open Journal of Soil Science, 13, 151-186. https://doi.org/10.4236/ojss.2023.133007

7. Olson, K.R. and Chau, K.M. (2022) Natural and Anthropic Sources of Arsenic in the Groundwater and Soils of the Mekong Delta. Open Journal of Soil Science, 12, 541-570. https://doi.org/10.4236/ojss.2022.1211023

8. Stellman, J.M., Stellman, S.D., Christian, R., Weber, T. and Tomasallo, C. (2003) The Extent and Patterns of Usage of Agent Orange and Other Herbicides in Vietnam. Nature, 422, 681-687. https://doi.org/10.1038/nature01537

9. Olson, K.R. (2024) The Secret Toxic Legacies of Chemical Warfare: Agent Blue Use during the 2nd Indochina and Vietnam Wars in Laos, Cambodia, and Vietnam (1961 to 1971). Open Journal of Soil Science, 14, 689-725. https://doi.org/10.4236/ojss.2024.1411034

10. Olson, K.R. and Cihacek, L. (2023) Use of Agent Purple, Agent Orange and Agent Blue on Royal Thai Air Force Base Perimeters in Thailand during the Vietnam War. Open Journal of Soil Science, 13, 233-261. https://doi.org/10.4236/ojss.2023.135010

11. Olson, K.R. (2023) Saigon River Valley: A Navigation, Trade, Mitigation, Invasion, Liberation, and Unification Pathway. Open Journal of Soil Science, 13, 46-82. https://doi.org/10.4236/ojss.2023.132003

12. Olson, K.R. (2023) Review and Analysis: Fate of Arsenic Applied to Canal Shipping Lane Vegetation and United States Military Base Grounds in the Panama Canal Zone. Open Journal of Soil Science, 13, 391-413. https://doi.org/10.4236/ojss.2023.1310018

13. Olson, K.R. (2025) Review and Analysis: Agent Blue, the Arsenic Based Herbicide, Used during the Second Indochina and Vietnam Wars to Destroy the Rice Crop. Open Journal of Soil Science, 15, 320-360. https://doi.org/10.4236/ojss.2025.155015

14. Wang, D., Kim, B.F., Nachman, K.E., et al. (2025) Impact of Climate Change on Arsenic Concentrations in Paddy Rice and the Associated Dietary Health Risks in Asia: An Experimental and Modelling Study. The Lancet Planetary Health, 9, e397-e409. https://doi.org/10.1016/S2542-5196(25)00055-5