

Review and Analysis: United States Cluster Munitions and Unexploded Ordnance Left in Laos after the Second Indochina War

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Abstract

Cluster munitions release dozens of smaller bomblets that rain deadly ammunition on armored tanks, vegetation and troops, effectively striking broad areas of war zone landscapes in one launch. However, only about 60% of bomblets detonate immediately and those that fail to detonate fall to the ground and can lie dormant for years. The legacy of cluster munitions in Laos from the Second Indochina War is unexploded bomblets across the landscape that unexpectedly detonate years later, injuring and killing children, farmers, and other civilians long after the war is over. In Laos, the United States (US) military operation against the Ho Chi Minh Trail, a network of foot and bicycle paths, waterways, and truck routes along the Laos, Cambodia and Vietnam borders linking North and South Vietnam began in 1959. By the 1960s, as the war escalated, trail traffic was interdicted frequently by CIA and US Air Force using tactical herbicide spraying to defoliate dense vegetation and bombing to disrupt supplies and North Vietnamese troops dispersed along the 16,000-kilometer trail. Unexploded ordnance (UXO), including cluster munitions, from U.S. bombings continued in recent years to detonate, kill, maim and injure Laotians and render agricultural lands too hazardous to cultivate. The primary objectives of this study are to document: 1) the long-term consequences and impacts of the US Air Force bombing of Laos during the Second Indochina War (1959 to 1973); 2) the United States removal of unexploded ordnance and cluster munitions; and 3) worldwide relief efforts to help the Laotians maimed by unexploded ordnance and cluster munitions.

Keywords

Cluster Munitions, Ordnance, Bombs, Laos, Cluster bomblets, US Air Force, Air America

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1. Introduction

Eighty million bombs failed to detonate and remain scattered throughout Laos (**Figure 1**) after the Second Indochina War. Unexploded ordnance in Laos (**Figure 2**) has injured or killed over 20,000 Laotians. Currently, 50 to 100 people are killed or maimed annually [1] [2]. It is estimated that the unexploded ordnance that remains buried will not be removed entirely within the next century [3] [4]. Unexploded ordnance, including cluster munitions from U.S. bombing, continues to detonate, injure and kill Laotians and has idled agricultural lands that are too dangerous to cultivate.

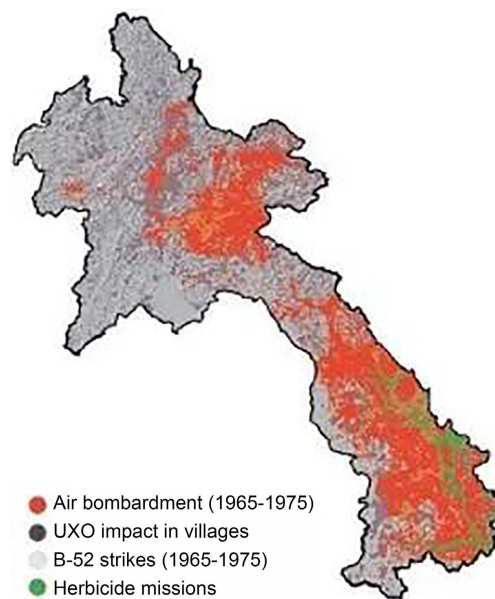


Figure 1. Bombardment and tactical herbicide missions in Laos. Photo Credit: Hatfield Consulting. Published with Copyright permission of the Editor of Open Journal of Soil Sciences.



Figure 2. Ordnance removal by the United States in Laos. Photo Credit: United States Army.

During the Second Indochina War, the United States Air Force used cluster bombs in air strikes (**Figure 3**) against targets in Cambodia, Vietnam, and Laos [5]. Between 1964 and 1973, 260,000,000 cluster bomblets (**Figure 3**) were dropped on Laos, particularly in Xieng Khouang province (**Figure 4**) [6]. Since the war



Figure 3. B-52s bomber dropping bombs. Photo Credit: United States Air Force.



Figure 4. The named and located Laos providences. Published with Copyright permission of the Editor of Open Journal of Soil Sciences.

officially ended ordnance has killed over 42,000 people [4] [7]. As of 2009, about 7000 people have been killed or injured by explosives left in Vietnam's Quang Tri province from the Vietnam War [8].

The primary objectives of this study are to document: 1) the long-term impacts and consequences of the US Air Force bombing of Laos during the Second Indochina War (1959 to 1973); 2) the removal of unexploded ordnance and cluster munitions; and 3) worldwide relief efforts to help the Laotians maimed by unexploded ordnance and cluster munitions.

2. Findings

2.1. Unexploded Ordnance in Laos

Unexploded ordnance (UXO) including cluster bomblets (**Figure 5**) left behind after air strikes in Laos, including the Plain of Jars (**Figure 6**), is a very serious problem. These bomblets were designed as weapons to explode over time with some detonating immediately and others sequentially later. The surviving bomblets can explode when handled, making them a potential threat to military personnel and civilians. In effect, these UXOs function like land mines. In Vietnam, people are still being killed or maimed as a result of ordnance left by the Vietnamese and US military forces after the Vietnam War. Hundreds of people are injured or killed yearly by unexploded ordnance left from the Second Indochina



Figure 5. Cluster munitions used in Laos. Photo Credit: REUTERS.



Figure 6. Plain of Jars. Photo Credit: cdn.tourradar.com.

War [6]. In the 1960s and 1970s, 260 million cluster submunitions were dropped on Laos. One-third of these bomblets failed to detonate and continue to pose a danger [7].

2.2. Cluster Munitions

Cluster bombs are designed to spread smaller munitions over a wide area [8]. They are known as bomblets or submunitions. Cluster bombs can be launched from the sea or ground or dropped from the air releasing over a wide area hundreds of bomblets. They were previously used in World War II for the purpose of destroying combatants or multiple dispersed military targets.

When a cluster bomb is detonated, anyone in the area can be seriously hurt or killed. Many of the bomblets fail to explode immediately and annually can kill or injure people [9]. A significant number of bomblets do not detonate on impact. The submunition failure (dud) rate, according to the International Committee of the Red Cross, varies from 10% to 40%.

Use of these weapons during the Second Indochina War (Figure 7), resulted

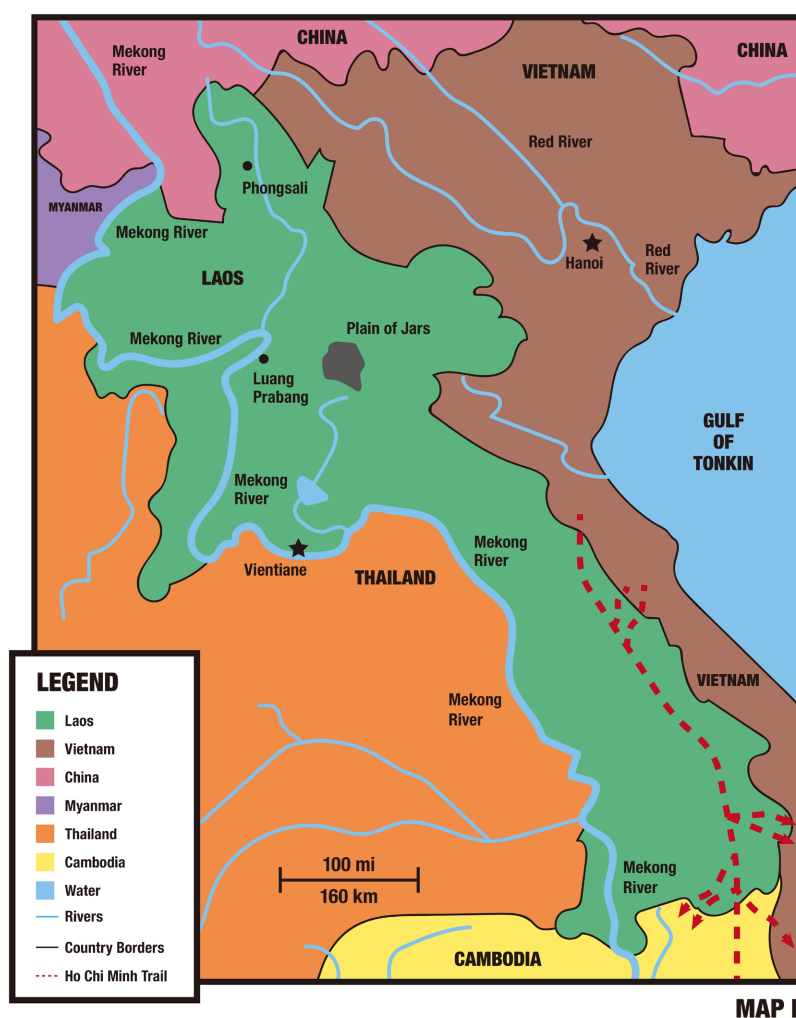


Figure 7. Ho Chi Minh Trail in southern Laos Trail. Map by Cruz Dragosavac.

in thousands, and sometimes millions, of highly unstable and unexploded sub-munitions [9]. Cluster munitions pose a potential danger to civilians living in areas (Figure 8) where cluster bombs were used. The cluster munitions that remain in the landscape are small, colorful and have unusual shapes. Unexploded bomblets appear to children to be toys (Figure 9) and curious children often pick them up and are killed or maimed [9].

The editor of the 2022 Cluster Munition Monitor [9], Loren Persi, said: *“It is a terrible reminder of the dire need for rapid clearance of contaminated areas, age-appropriate education on the risks of unexploded bomblets, and greater dedicated support to the victims and their families. Children were the primary victims of cluster bombs.”* In 2021, The Landmine and Cluster Munitions Monitor, a group that does research on behalf of the International Campaign to Ban Landmines-Cluster Munitions Coalition Civilians [9], said: *“that of 141 casualties from cluster bomb remnants, 97% were civilians, and two-thirds of those were children”*.



Figure 8. Hill tribe huts. Photo Credit: Neil Mishalo.



Figure 9. Bomblets 2. Photo Credit: CBS News.

One hundred and twenty-three countries are members of the Convention on Cluster Munitions since 2008 [9]. The 2010 international treaty bans the production, stockpiling, use and transfer of cluster munitions in all circumstances and requires relevant states to implement victim assistance measures.

Because cluster bombs (**Figure 9**) used released many bomblets over wide areas in Laos and Cambodia, they posed risks to civilians during and after the attacks. Unexploded bomblets have killed or maimed Laos and Cambodia civilians and other unintended targets more than 50 years after the war ended. Cluster munitions have been costly to locate and remove [9]. The failure (dud) rate of cluster bomblets during the Second Indochina War was approximately 40 percent.

A wide variety of bomblets were developed as cluster munitions during the Vietnam Era. Some on hitting the ground would send out trip wires and act as a mine exploding when stepped on. Others were fused to penetrate vehicle armor, but the majority were anti-personnel. Cluster bombs consist of a hollow shell canister (**Figure 10**) and contain up to 2000 submunitions or bomblets. The bomblets themselves may be fitted with small parachute streamers or retarders to slow their descent. This feature gave the aircraft time to leave the blast area [8] [10]. Anti-personnel cluster munitions use explosive fragmentation to destroy unarmored targets or kill troops. During the Second Indochina War, many thousands of tons of bomblets were dropped on Vietnam, Laos, and Cambodia [11].

Cluster bombs pose a risk to civilians since they leave behind a wide area with many unexploded bomblets. The unexploded submunition can remain dangerous for decades after the end of a conflict. For example, cluster bombing of Laos (**Figure 9**) by the United States stopped in 1973; however, cluster munitions and other unexploded ordnance continue to annually cause between 50 and 100 Lao-tian civilian casualties [4] [5] [6] [7].



Figure 10. Shell of bomb with bomblets. Photo Credit: Brett S. Morris.

3. Results

3.1. United States Aid to Removed Unexploded Ordnance from Laos

During a 2016 visit to Laos, US President Barack Obama (**Figure 11**) said: “*Given our history here, I believe that the United States has a moral obligation to help Laos heal.*” He referred to America’s secret and devastating bombing of Laos during the Vietnam War in the 1960s and 1970s [12]. From 1996 to 2016, the US spent \$100 million on the removal of unexploded ordnance and cluster bombs. President Obama proposed spending \$90 million during the following three years [13]. President Obama stated that “*Laos as the most heavily bombed nation in history. Eight bombs a minute were dropped, on average, during the Vietnam war between 1964 and 1973 - more than the amount used during the whole of World War II.*”

The US Air Force dropped 260,000,000 bombs, equating to 2 million tons of ordnance during 580,344 bombing missions over Laos. Many targets were repeatedly struck as part of efforts to isolate North Vietnamese Communist forces in the south and north [12]. Anti-personnel cluster bombs were the most frequently dropped munitions. An estimated 30% to 40% of these munitions did not explode. Ten Laotian provinces (**Figure 4**) were described as “severely contaminated” by unexploded bombs. Mine-clearing agencies estimate that about 75,000,000 unexploded bombs and about 288,000,000 cluster munitions were left across Laos after the war. Cluster bombs scatter bomblets across a wide area and often fail to explode on impact [12]. They pose a significant threat to civilians because of both their deadly legacy and impact at the time of use. Launched, from the air or ground, cluster munitions consisted of shells that open and dispersed bomblets over a wide area. Many explosive bomblets, failed to detonate as designed, becoming landmines that indiscriminately maim and kill.



Figure 11. President Obama in 2016 in Laos addressed the unexploded ordnance situation. Photo Credit: Hamodia.

Long after a conflict ends, the unexploded ordnance poses a danger to civilians and is difficult to locate and remove. Children are attracted to the toy-like appearance of the bomblets and are at risk. The Convention on Cluster Munitions [14] banned the stockpiling, transfer and use of virtually all existing cluster munitions and required clean-up of unexploded bombs. The cluster munitions ban was adopted by 108 countries; however, it was not adopted by the US. Between 1995 and 2013, the United States spent as much on clean-up efforts in Laos as it spent in three days of bombing during the Second Indochina War. Laos is likely to ask for an extension to its commitment to find and destroy UXO. The number of casualties from air-dropped explosive devices, mostly cluster bombs, in Laos, since 1964, is estimated by the Landmine and Clustering Munitions Monitor [14], to be approximately 50,000 Laotians. Of these about 21,000 were injured and 29,000 mostly civilian people were killed.

The threat posed by UXO stopped villagers from farming and idled vast tracts of agricultural land until they had been cleared of ordnance. [14]. President Obama's 2016 announcement was welcomed by UXO aid agencies working to address the problem in Laos. These agencies include the Mines Advisory Group, Halo Trust, UXO Laos, Handicap International, and Norwegian People's Aid (NPA). Simon Rea, the Mines Advisory Group country director, told the BBC *"Before the president's announcement I feared that the UXO operation in Laos would take hundreds of years"* [13] [14]. After the President Obama's Vientiane announcement Director Rea said *"Now I am optimistic this can be reduced to decades"*.

Likewise, Halo Trust CEO James Cowan said *"The President's announcement will have a profound effect on the Laotians. The president's announcement is extremely good news for us and for poor families in rural areas whose lives are still blighted by UXO"* [13] [14]. James Cowan said *"It will help them live and farm their land in safety, as well as create opportunities for development and infrastructure. Explosive remnants of war have blighted their lives for far too long. It is a momentous step in Laos's journey towards freedom from the deadly debris of war"*.

Lucy Pinches, NPA Senior Advocacy and Research Advisor, told the BBC *"Today more than ever we are getting a much better grasp of the scale of the contamination. We are using survey triangulation data to place contaminated land into blocks or boxes which can then be systematically cleared of cluster munition remnants"* [15].

Aid agencies can identify which areas of land, mostly the Ho Chi Minh Trail in the south, using newly available Pentagon bombing records. The Lao communist party headquarters in the north was bombed and likely also contain unexploded bombs. NPA Laos Country Director, Jonas Zachrisson, told the BBC that *"More partnerships in the last couple of years among international clearance NGOs has greatly helped in pushing this process forward"*. At the same time, he cautions that *"much of the country remains unsurveyed with limited data regarding the extent, scope and nature of the problem"*.

The first US president to visit Laos, President Obama, adopted a conciliatory approach. He said: “*that the US bombings had destroyed villages and entire valleys, killing countless civilians*”. His approach was welcomed by Laotian President Bounnhang Vorachit who enhanced mutual trust between the two countries after the devastating war. In return, President Vorachit promised, “*the government will step up its efforts to locate and return US servicemen missing in the war (MIA’s)*”. Since Chinese influence has grown in the region, President Obama has made improving relations with Southeast Asian nations a foreign policy priority [13]. Chinese investment is important to Communist Laos’ economy.

3.2. World-Wide Relief Commitments

Lao People’s Democratic Republic (PDR) is responsible for significant numbers of cluster bomb victims and other survivors of explosive remnants of war (ERW). Lao PDR made commitments to provide victim assistance through Convention on Conventional Weapons Protocol V and victim assistance obligations under the Convention on Cluster [14]. Lao PDR ratified the Convention on the Rights of Persons with Disabilities (CRPD) on 25 September 2009.

PDR’s Action points based on findings [14]:

- *“Intensify efforts to improve access to rehabilitation services from remote and rural areas, including allocating resources to bring beneficiaries for rehabilitation and ensuring that transport is available.*
- *Hold regular disability sector coordination meetings and link victim assistance coordination with the development of disability strategies.*
- *Improve state support for psychological and social assistance, including peer-to-peer counseling and survivor-driven economic activities.*
- *Coordinate the rapid implementation of recently adopted legislation as well as existing policies and planning that could hasten developments in the availability and accessibility of services”.*

3.3. Casualties

In 2015, a total of 42 casualties from unexploded bomblets and ERW were reported by the National Regulatory Authority (NRA) for the Unexploded Ordnance/Mine Action Sector in Lao PDR [14]. Of the casualties 39 were male and 19 were children [15]. By the end of 2015, The NRA had reported at least 50,612 mine/ERW including 21,082 injured and 29,530 people killed since 1964 [16]. Of the 21,082 injured, only 583 received a prosthesis. This is a huge shortfall. From 2008 to 2013, Lao PDR reported 702 victims, of which 41% were children [17]. Cluster bomblets caused 7628 casualties in the period 1964-2014 [18]. In 2012, Lao PDR estimated there were some 15,000 mine/ERW survivors still living, including approximately 2500 survivors of unexploded bomblets [19].

3.4. Victim Assistance under the Vientiane Action Plan 2011-2015

Mine/ERW survivors [14] often come from ethnic minorities in the poorer re-

mote areas of Laos PDR. The main barrier to accessing healthcare has been financial constraints. The healthcare system has remained underfunded, underdeveloped and health workers have inadequate training in treating these kinds of injuries. These shortcomings directly contributed to shortfalls in the quality of health system services [20].

Lao PDR reported in 2014 that it still has: *“a long way to go to provide support to survivors and their families. Beyond meeting their immediate emergency medical needs, very few survivors received adequate physical, psychological, or economic support”* [21].

3.5. Victim Assistance in 2015

Lao PDR reported *“that there were limited resources available and that few donors made victim assistance a priority”* [22]. As a result, Lao PDR could not pursue its Dubrovnik Action Plan for the time period through 2020 [23]. Lao PDR also noted that it *“has a long way to go to fully achieve the victim assistance goals within the broader disability and development frameworks”* [24].

A NRA victim assistance strategic plan was adopted in February 2014. The strategic plan addresses seven sections of victim assistance implementation: *“data collection; medical care; physical rehabilitation; psychological support and social inclusion; economic rehabilitation and education; legislation and policy; and coordination”* [25].

In support of the National Committee for Disabled and Elderly People (NCDE) and the victim assistance strategy the NRA [26] authorized:

- *“develop a sector-wide strategy for persons with disabilities, including ERW survivors;*
- *cooperate with the Ministry of Labor and Social Welfare to ensure adequate vocational and other training is provided; and*
- *cooperate with the Ministry of Health to ensure that the physical and psychological needs of cluster munition victims and other survivors are more adequately met”.*

3.6. Physical Rehabilitation, Including Prosthetics

In cooperation with COPE, the Ministry of Health provides orthotic and prosthetic services in Lao PDR under the Centre for Medical Rehabilitation and associated physical rehabilitation centers (**Figure 12**) [14]. Clients are reimbursed for travel costs and a small living allowance during their rehabilitation stay [27].

3.7. Economic and Social Inclusion and Psychological Support

In 2015, World Education and QLA provided vocational training and economic support specifically for survivors [14] [28] [29]. Survivors also received education scholarships through World Education. Laos Humanity and Inclusion (HI) initiated a project to support persons with disabilities, including survivors and their family members, with livelihood and income-generating activities [14].



Figure 12. Artificial limbs for victims of unexploded ordnance and cluster munitions. Photo Credit: North Country Public Radio.

4. Conclusions

During the Vietnam War, the United States Air Force used cluster munitions in air strikes against targets in Cambodia, Vietnam, and Laos. Between 1964 and 1973, 260 million cluster bomblets were dropped on Laos and 80 million failed to explode. According to the Vietnamese government, ordnance killed some 42,000 Vietnamese after the American-Vietnam War officially ended. As of 2009, about 7000 people have been injured or killed by explosives left from the Vietnam War era in Vietnam's Quang Tri province alone. Unexploded ordnance, including cluster munitions, from U.S. bombing continue to detonate and kill or injure Laotians and render agricultural land hazardous to cultivation. The primary objectives of this study were to document the long-term consequences and impacts of the US Air Force bombing of Laos during the Second Indochina War (1959 to 1973). Mitigation efforts including the United States removal of unexploded ordnance and cluster munitions were documented as were worldwide humanitarian relief efforts to help the Laotians maimed by unexploded ordnance and cluster munitions.

There are several lessons to learn from the use of cluster bombs in the Secret Wars in Laos and Cambodia (1959-1973) [30] [31]. The United States cost to locate and remove cluster munitions, during the last 50 years, is in the millions of dollars with additional funding required to complete ordnance removal. The loss of life cost to the Laotians and Vietnamese is even greater and maimed survivors continue to pay the price in a lifetime of disability and poor health. UXO that remain in agricultural regions makes the land unsafe to cultivate and become dormant threats to farmers that seek to feed their families and make a living from the land. These are good reasons to reconsider the manufacturing, distribution and use of cluster munitions in future wars and conflicts.

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Band of Retirees Research Committee. The team includes five US Vietnam veterans, two US Vietnam Era veterans, two US Army veterans, and four Agricultural College Professors. Our team mission is to conduct soil, water, agricultural and natural resource management scientific research; the synthesis and analysis of current and historical documents and scientific evidence relevant to the legacies of war, especially the US Vietnam War; and the preparation and publication of peer-reviewed papers of interest and value to those who lead and served in the US military, especially Vietnam Era veterans, their families and the general public. The legacies of the US Vietnam War had impacts far beyond front-line veterans; encompassing civilian and military personnel who manufactured, transported and handled the tactical herbicides--arsenic-based Agent Blue and Agent Orange (and other 2, 4, 5-T herbicides) contaminated with the dioxin TCDD; those who came in contact with contaminated aircraft and other equipment; and the residual effects of these chemicals on southern Vietnam soil and water and the health of people who continue to work these lands for their living. The human costs from cluster munitions and unexploded ordnance across the Indochina landscape are recognized as an extension of war-introduced hazards to non-combatants by leaving explosive remnants of war on the landscape.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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