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Historical Lesson: Environmental and Human Impacts of Cluster Bomb Use by the United States during the Second Indochina War

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Abstract

The legacy of United States cluster munition use in Laos and Cambodia during the Second Indochina War is residual bomblets that unexpectedly detonate years later, killing and injuring children, farmers, and other civilians. Cluster munitions release dozens of smaller bomblets that rain deadly ammunition on troops, armored tanks, and vegetation, effectively striking broad sections of war zone landscapes in one launch. While many bomblets detonate immediately, others fail to detonate and can lie dormant on the ground for years. The primary objectives of this study were to document the long-term consequences and impacts of the US Air Force bombing of Laos and Cambodia during the Second Indochina War (1959 to 1973). The historical lessons learned by United States should be shared with Russia and Ukraine governments and military. These countries need to discontinue the use of cluster bombs to prevent additional people living along the Russia-Ukraine border from having to live and die with the consequences of unexploded ordnance, including cluster bombs, for the next century.

Keywords

Cluster Munitions, Ordnance, Bombs, Laos, Cluster Bomblets, US Air Force, Air America, UXO

1. Introduction

During the Vietnam War, the United States Air Force used cluster munitions in

air strikes against targets in Vietnam, Cambodia, and Laos. Between 1964 and 1973, cluster bomblets were dropped and many failed to explode. There are several lessons to learn from the use of cluster bombs in the Secret Wars in Cambodia and Laos (1959-1973). 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 Vietnamese, Cambodians, and Laotians is even greater and maimed survivors continue to pay the price in a lifetime of disability and poor health. Unexploded ordnance (UXO) that remains in agricultural regions makes the land unsafe to cultivate and becomes dormant threats to farmers trying to make a living from the land and to feed their families.

The primary objectives of this study are to document: 1) the long-term consequences and impacts of the US Air Force bombing of Laos and Cambodia during the Second Indochina War (1959 to 1973); 2) the United States removal of unexploded ordnance and cluster munitions; 3) worldwide relief efforts to help the Laotians and Cambodians maimed by unexploded ordnance and cluster munitions; 4) environmental and human impacts of cluster bomb use by the United States during the Second Indochina War; and 5) share the historical lesson learned by United States during the 2nd Indochina War with Russia and Ukraine to discontinue the use of cluster bombs to prevent the people living along the Russia-Ukraine border from having to live and die with the consequences for the next century.

2. Study Site

2.1. Geology and Soils

Olson and Speidel [1] determined the *"Early Quaternary and older alluvial deposits reveal the tectonic and sea level adjustments, fold and fault lines, subsidence and uplifts that characterize the evolving Mekong River* [2]. *About 40 million years ago, its precursor drained into the sea near where the Red River now flows just south of Hanoi, Vietnam. Over time, earthquakes and volcanic activity of the Himalayas altered the mountain drainage southward via steep gorges that appeared about 13 million years ago and by 8 million years ago formed the present courses of three rivers: the Mekong, Yangtze and Yellow rivers which run in parallel sutures* [3] [4]. *Below this area was a wide inland sea during the Upper Mesozoic. It is likely that the Mekong River at that time flowed directly south and to the west of the Korat Upland, joining what has become the Chao Phraya River in Thailand* [4]. *There is evidence that subsidence in the Tonle Sap basin of Cambodia, perhaps during the last 12,000 years, drew the Mekong River eastward and away from its former Chao Phraya connection and the Tonle Sap basin. The modern-day river carries a large supply of fluvial transported fine sediments and sands that originated in the Tibetan and Himalayan mountainous region that have been weathered over time by glaciation, precipitation, and evapotranspiration* [2]."

"The Mekong River channel has several distinct hydro morphological reaches

as it flows south. In some places, the channel is straight; but in other locations, it becomes sinuous with high radius bends as it follows bedrock carved fault lines and tectonic lineaments [2]*. As the bedrock walled single channel flows into alluvial lowlands, the channel meanders with low radius bends. When the single alluvial channel at high flows takes a short cut across the neck of a bend, the river becomes braided and divided creating islands and multiple channels with water levels that vary with the season. From Vientiane to the Mun River confluence, natural levees composed of silt and clay about 8 - 10 m high line both riverbanks, evidence of historical overtopping. However, topping of these levees is not common today* [2]*."*

"Many wetlands beyond the levees are artificially drained for rice paddies, corn, vegetables, and other crops. Where the riverbanks are not steep, they are cultivated for flood recession agriculture, that is, planted according to the river level as it transitions from wet to dry season. The riverbed in this reach is fine sand with occasional outcrops of fluvial pebble beds with about 30 - 50 cm of organic rich or black inorganic silts [2]*. Cretaceous volcanics occurred throughout southern Lao and eruptions of basalts in the Miocene and Quaternary were widespread. The modern-day Mekong River near the town of Muang Khong is locally controlled by basalt outcrops and fault patterns that give rise to the spectacular Siphandone (4000 islands) and Khone Falls on the Lao-Cambodia border* [2]*. The river in this reach has bedrock-anastomosed channels overlain by alluvial deposits. The term anastomosed means the river flows are separated by many large islands about 5 - 10 m above the low water mark that sustain mature vegetation and are stable* [5] *or may migrate slowly from bank erosion*" [1].

2.2. Ho Chi Minh Trail

Olson [6] found "*In Laos, the United States (US) military operation against the Ho Chi Minh Trail, a network of foot and bicycle paths, waterways* (**Figure 1**)*, and truck routes* (**Figure 2**) *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 ordinance, including cluster munitions, from U.S. bombing continue in recent years to detonate, kill, maim, and injure Laotians and render agricultural lands too hazardous to cultivate."*

"Eighty million bombs failed to detonate and remain scattered throughout Laos (**Figure 3**) *after the Second Indochina War. Unexploded ordnance in Laos* (**Figure 4**) *have injured or killed over 20,000 Laotians. Currently 50 to 100 people are killed or maimed annually* [7] [8]*. It is estimated that the unexploded ordnance that remain buried will not be removed entirely within the next century* [9] [10]*. Unexploded ordnance, including cluster munitions from U.S. bombing, continue to detonate, injure, and kill Laotians and has idled agricultural lands that are too*

dangerous to cultivate."

"During the Second Indochina War, the United States Air Force used cluster bombs in air strikes (**Figure 5**) *against targets in Cambodia, Vietnam, and Laos* [11]. *Between 1964 and 1973, hundreds of millions of cluster bomblets* (**Figure 5**) *were dropped on Laos, particularly on Xieng Khouang province* (**Figure 6**) [12]. *Since the war officially ended ordnance has killed over 42,000 people* [10] [13]. *As of 2009, about 7000 people have been killed or injured by explosives left in Vietnam's Quang Tri province* [14] *from the Vietnam War*" [6].

Figure 1. Stream crossing used during the 2nd Indochina war in Laos. Published with copyright permission of the editor of Open Journal of Soil Sciences.

Figure 2. Ho Chi Ming trail in Cambodia. Published with copyright permission of the editor of Open Journal of Soil Sciences.

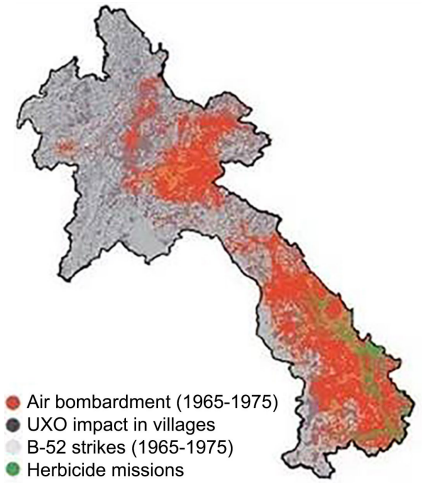

Figure 3. Bombardment and tactical herbicide missions in Laos. The red areas were bombed and the green areas were sprayed with herbicides. Photo credit: Hatfield consulting. Published with copyright permission of the editor of Open Journal of Soil Sciences.

Figure 4. Ordinance removal by the United States in Laos. Photo credit: United States Army.

Figure 5. B-52s bomber dropping bombs. Photo credit: United States air force.

Figure 6. The named and located Laos provinces. Published with copyright permission of the editor of Open Journal of Soil Sciences.

3. Findings

3.1. Unexploded Ordnance in Laos

Olson [6] found "*Unexploded ordnance including cluster bomblets left behind after air strikes in Laos, including the Plain of Jars* (**Figure 7**) *and* (**Figure 8**)*, 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 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 War* [12]*. In the 1960s and 1970s, 260 million cluster submunitions were dropped on Laos. One third of these bomblets* [13] *failed to detonate and continue to pose a danger* [15]."

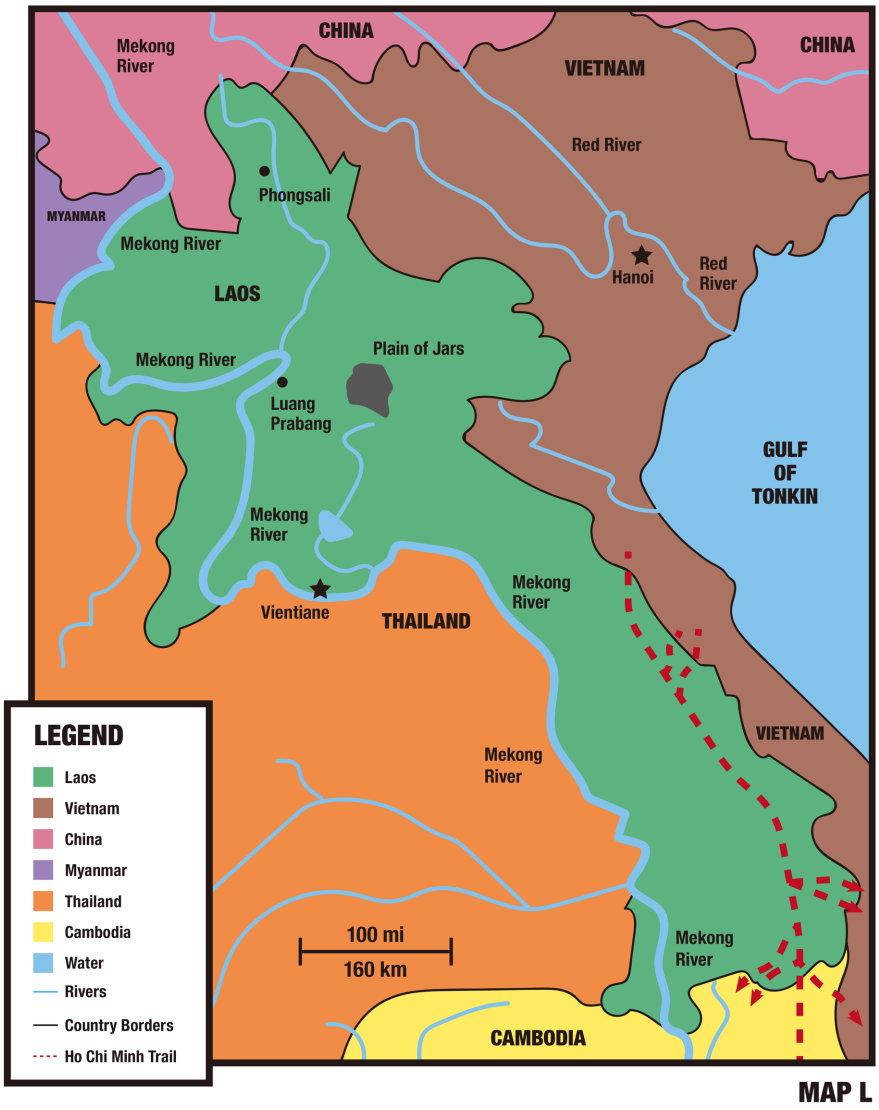

Figure 7. Ho Chi Minh Trail in southern Laos. Map by Cruz Dragosavac.

Figure 8. Plain of Jars. Photo credit: cdn.tourradar.com.

3.2. Cluster Munitions

Olson [6] noted *"Cluster bombs are designed to spread smaller munitions over a wide area* [14]*. 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 [15]*. 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 9**)*, resulted in thousands, and sometimes millions, of highly unstable and unexploded submunitions* [15]*. Cluster munitions, pose a potential danger to civilians living in areas* (**Figure 10**) *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 11**) *and curious children often pick them up and are killed or maimed"* [6].

Figure 9. Cluster munitions used in Laos. Photo credit: REUTERS.

Figure 10. Hill tribe huts. Photo credit: Neil Mishalo.

Figure 11. Bomblets 2. Photo credit: CBS News.

The editor of the 2022 Cluster Munition Monitor [15], 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 [15], said: "*that of 141 casualties from cluster bomb remnants, 97% were civilians, and two-thirds of those were children*".

One hundred and twenty-three countries are members of the Convention on Cluster Munitions since 2008 [15], and it was no coincidence that the first meeting of the member states had been held in Laos, one of the countries most affected by the use of cluster munitions. This 2010 international treaty bans the production, stockpiling, transfer of cluster, and use munitions in all circumstances and requires relevant states to implement victim assistance measures.

Because cluster bombs (**Figure 11**) used released many bomblets over wide areas in Cambodia and Laos, they posed risks to civilians during and after attacks. Unexploded bomblets have maimed or killed Laos and Cambodia civilians and other unintended targets more than 50 years after the war ended. The cluster munitions have been costly to locate and remove [15]. The failure (dud) rate of cluster bomblets was approximately 40 percent during the Second Indochina War.

During the Vietnam Era a wide variety of bomblets were developed as cluster munitions. The variants (both the bomblets and the cluster bombs) which were used most often included: 1) a sub-variety of CBU munitions (CBU-14, CBU-25, CBU-58 and CBU-100/Mk-20 as the most often types of the cluster bombs dropped during the Indochina war); 2) a sub-variety of bomblets/submunitions divided into the spin-armed "family" (like BLU-26 as most wide spreading type—this ball-shaped bomblet is illustrated by two photos in the article [16], so I would add the type mentioned in the figure's capture) and the fin-stabilized "family" (like BLU-3b or BLU-24 as its examples, with the BLU-3b occasionally known as a "pineapple bomblet" in reference to its appearance with its stabilizing drag vanes

deployed) [16]. Some upon impact with the ground would send out trip wires and act as a mine exploding when stepped on and others were fused to penetrate vehicle armor. The majority were anti-personnel. Cluster bombs consist of a hollow shell canister (**Figure 12**) 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 [14] [17]. 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 [18].

Figure 12. Shell of bomb with bomblets. Photo credit: Brett S. Morris.

Cluster bombs leave behind a wide area with many unexploded bomblets and pose a risk to civilians. The unexploded submunitions can remain live for decades after the end of a conflict. For example, cluster bombing of Laos (**Figure 11**) by the United States stopped in 1973; however, unexploded ordnance and cluster munitions continue to annually cause between 50 and 100 Laotian civilian casualties [10]-[13].

4. Results

4.1. United States Aid to Removed Unexploded Ordnance from Laos

Olson [6] noted "*The US Air Force dropped 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* [19]*. Anti-personnel cluster bombs were the most frequently dropped munitions. Ten Laotian provinces* (**Figure 6**) *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* [19]*. 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."

"Long after a conflict ends, the unexploded ordnance poses a danger to civilians and are 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 [20] [21] *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* [21]*, 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 [21]*. 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"* [20] [21]*. After the President Obama's Vientiane announcement Director Read said "Now I am optimistic this can be reduced to decades"* [6].

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 who lives are still blighted by UXO"* [20] [21]. James Cowan said *"It will help them live and farm their land in safety, as well as creating 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"* [19].

Using newly available Pentagon bombing records, aid agencies can identify which areas of land, mostly the Ho Chi Minh Trail in the south. 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. 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 un-surveyed with limited data regarding the extent, scope and nature of the problem".*

During a 2016 visit to Laos, US President Barack Obama (**Figure 13**) 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 [19]**.** From 1996 to 2016, the US spent $100 million on the removal of cluster bombs and unexploded ordnance. President Obama proposed spending $90 million during the following three years [20]. 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."*

Figure 13. President Obama in 2016 in Laos addressing the unexploded ordnance situation. Photo credit: Hamodia.

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 Vorchit promised *"the government will step up its efforts to locate and return US servicemen missing in the war (MIA's)".* President Obama has made improving relations with Southeast Asian nations a foreign policy priority since Chinese influence has grown in the region. Chinese

investment in Communist Laos is important to the economy.

4.2. World-Wide Relief Commitments

Landmine and Clustering Munition Monitor [21] determined *"The Lao People's Democratic Republic (PDR) is responsible for significant numbers of cluster bomb victims and other survivors of explosive remnants of war (ERW). The Lao PDR made commitments to provide victim assistance through Convention on Conventional Weapons Protocol V and victim assistance obligations under the Convention on Cluster. The Lao PDR ratified the Convention on the Rights of Persons with Disabilities (CRPD) on 25 September 2009".*

PDR's Action points based on findings [21]*:*

- *"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".*

Landmine and Clustering Munition Monitor [22] noted *"In 2015, a total of 42 casualties from unexploded bomblets and ERW was reported by the National Regulatory Authority (NRA) for Unexploded Ordnance/Mine Action Sector in the Lao PDR* [23]*. Of the casualties 39 were male and 19 were children. 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* [24]*. Of the 21,082 injured, only 583 received a prothesis. This is a huge shortfall. From 2008 to 2013, Lao PDR reported 702 victims, of which 41% were children* [25]*. Cluster bomblet caused 7628 casualties in the period 1964-2014* [26]*. In 2012, Lao PDR estimated there were some 15,000 mine/ERW survivors still living, including approximately 2,500 survivors of unexploded bomblets* [27]*."*

"Mine/ERW survivors [21] *often come from ethnic minorities in the poorer remote areas of Laos PDR. The main barrier to accessing healthcare has been financial constraints. The healthcare system has remained under-funded, underdeveloped and health workers have inadequate training in treating these kinds of injuries* [28]*. These shortcoming directly contributed to shortfalls in the quality of health system services"* [21].

The Lao PDR [28] 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*".

Lao PDR reported *"that there were limited resources available and that few*

donors made victim assistance a priority" [29]. As a result, the Lao PDR could not pursue its Dubrovnik Action Plan for the time period through 2020 [30]. The 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"* [31].

An 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 co-ordination"* [32].

In support the National Committee for Disabled and Elderly People (NCDE) and the victim assistance strategy the NRA [33] authorized to:

- *"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".*

In cooperation with COPE, the Ministry of Health provides orthotic and prosthetic services in the Lao PDR under the Centre for Medical Rehabilitation and associated physical rehabilitation centers (**Figure 14**) [21]. Clients are reimbursed for travel costs and a small living allowance during their rehabilitation stay [34].

Figure 14. Artificial limbs for victims of unexploded ordnance and cluster munitions. Photo credit: North Country Public Radio.

In 2015, World Education and QLA provided vocational training and economic support specifically for survivors [21] [35] [36]. 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 [21].

4.3. Use of Cluster Bombs before and during the Russia-Ukraine War

United States, Russia, and Ukraine have not learned these historic lessons since they are not member states of the Convention on Cluster Munitions [16]. United States has been involved in remedial action at sites of historical bombing but not because of being a member state of the Convention on Cluster Munitions. Not being a member usually means the country considers some obligation of the Convention excessively limiting and reserves the legal opportunity of using such munitions as effective weapons. The United States has applied cluster bombs off its territory exporting the postponed danger to areas outside its jurisdiction.

Human Rights Watch (HRW) and international watchdog has accused the Ukrainian Army of violation "the laws of War" through its use of cluster munitions in separatist-held areas of eastern Ukraine [37]. HRW group warned in its report that the use of cluster munitions "*may amount to war crimes*". A university building's wooden roof in Donetsk caught fire after Ukrainian shelling, according to an emergency official in the Russia-controlled city in eastern Ukraine [38]. Donetsk Mayor Alexei Kulemzin reported on Telegram that the University of Economics and Trad's first building was ablaze due to the recent attack. The emergency minister for Donetsk People's Republic (DPR), Alexei Kostrubitsky alleged that the shelling involved the use of cluster munitions, causing the extensive blaze. DPR acting head Denis Pushilin said 169 munitions have been launched including rocket and canon artillery fire with NATO-supplied munitions. According to the New York Times, there were "clear signs that cluster munitions had been fired from the direction of Ukrainian army-held territory, where misfired artillery rockets still containing cluster bomblets were found by villagers in farm fields.

The use of cluster munitions during the Russian invasion of Ukraine has been recorded by a number of eyewitnesses and journalists, as well as representatives of the UN, humanitarian and public organizations [34] [39]. In particular, the head of the UN Human Rights Council, Michelle Bachelet, reported on March 30, 2022 at least 24 cases since the beginning of the invasion [40]. As of July 1, hundreds of attacks by Russian forces with cluster munitions have already been recorded cities of Dnipro, Donetsk, Zaporizhzhia, Kyiv, Luhansk, Mykolaiv, Odesa, Sumy, Kharkiv (**Figures 15-18** and **Figure 19**) [41]-[43]. A total of 215 civilians are known to have been killed in these shellings and 474 injured, many of which may go unreported [44]. Both Russia and Ukraine have used cluster munitions during the conflict, however, Russian use has been extensive while Ukrainian use has been more limited [44].

Neither Russia nor Ukraine are signatories of the 2008 Convention which would have limited the use of cluster munitions. The use of such weapons against civilians violates the principles of humanitarian law and therefore constitutes a

war crime [45] [46]. Reports of Russian attacks have prompted the International Criminal Court to launch an investigation into the commission of war crimes in Ukrainian territory [47] [48].

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. However, the world, including Russia and Ukraine, apparently did not learn a historical lesson from our 2nd Indochina War experience in Laos and Cambodia. News reports suggest cluster bombs have been introduced into the Russia-Ukraine War. If so, the people living along the Russia-Ukraine border will be paying the consequences for the next century.

Figure 15. Unexploded cluster shell in Kharkiv region, 2022. Photo credit: Wikipedia.

Figure 16. Un exploded cluster munition submunitions in Kharkiv region, 2022. Photo credit: Wikipedia.

Figure 17. An employee of State Emergency Service of Ukraine near a fragment of a Russian rocket in Kharkiv region, 2022. Photo credit: Wikipedia.

Figure 18. Cluster munitions collected by state Emergency Services of Ukraine in Kharkiv region, 2022. Photo credit: Wikipedia.

Figure 19. Hundreds of cluster bombs and munitions displayed by state Emergency Services of Ukraine in a Kharkiv region field. Photo credit: Encyclopedia of Britannica.

5. Conclusions

The primary objectives of this study were to document the long-term consequences and impacts of the US Air Force bombing of Laos and Cambodia during the Second Indochina War (1959 to 1973). During the Vietnam War, the United States Air Force used cluster munitions in air strikes against targets in Cambodia and Laos. The United States later removed part of the unexploded ordnance and cluster munitions. Worldwide relief efforts have been made to help the Laotians and Cambodians maimed by unexploded ordnance and cluster munitions and to mitigate environmental and human impacts of cluster bomb use by the United States during the Second Indochina War.

Since Russia's invasion of Ukraine, both Russia and Ukraine have used cluster munitions in the conflict. As Russia and Ukraine use cluster munitions, a 50-year-old lesson it must remember [49]. The 2008 Convention on Cluster Munitions prohibits their use due to indiscriminate effects and the long-lasting damage posed to civilians. The treaty requires the destruction of stockpiles, removal of areas contaminated by cluster munition remnants, and victim assistance. Russia and Ukraine are not among the 111 state signers of the treaty. However, the use of cluster munitions in civilian areas violates international humanitarian law which prohibits the use of weapons that cannot discriminate between combatants and civilians. However, the use of cluster munitions in civilian areas violates international humanitarian law which prohibits the use of weapons that cannot discriminate between combatants and civilians. Mitigation efforts included the United States removal of unexploded ordnance and cluster munitions were documented. Worldwide humanitarian relief efforts to help the Laotians maimed by unexploded ordnance and cluster munitions were recorded.

There are several lessons to learn from the use of cluster bombs in the Secret Wars in Laos and Cambodia (1959-1973) [1] [6] [50]. The United States cost to locate and remove the 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 Cambodians is even greater and maimed survivors continue to pay the price in a lifetime of disability and poor health. UXO that remains in agricultural regions makes the land unsafe to cultivate and becomes 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 including the Russia-Ukraine War. The world apparently did not learn the historical lessons from United States 2nd Indochina War experience in Laos and Cambodia. The historical lessons learned by United States should be shared with Russia and Ukraine governments and military. These countries need to discontinue the use of cluster bombs to prevent additional people living along the Russia-Ukraine border from having to live and die with the consequences of unexploded ordnance, including cluster bombs, for the next century.

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Conflicts of Interest

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

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