II.
After 1955

Impact of American Large Scale Destruction of Forests on Natural Environment and Ethnic Minorities in South Vietnam during the Vietnam War (1954-1975)

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1. Introduction

This article aims at investigating the US defoliant warfare in South Vietnam (SVN) during the Vietnam War and its utter devastation over the environment and people in sprayed areas.

Through the American War in Vietnam, the United States (US) Army launched many new technologies. Of those, some contributed to Vietnam's ecosystem change from a once-pristine habitat to an almost apocalyptic after the war. These techniques included toxic chemical deforestation, Rome plows[1] and napalm bombs. Among large-scale destruction of forests, an herbicide spraying program named Ranch Hand lasting between 1962 and 1971 is popularly supposed to be the most destructive. Within the nine years of Operation Ranch Hand, the US Air Force was supposed to spray about 19 million gallons of defoliants[2] over 20 percent tropical forests and 36 percent mangrove-forests in southern Vietnam. The spraying density

1 Rome plows were large, armoured, specially modified bulldozers used in SVN by the US Military during the Vietnam War. The machine was made by the Rome Plow Company of Cedartown, Georgia. It was simple in design with an eleven-foot wide, two and a half ton blade attached to a 20-ton tractor, but caused massive destruction. A fleet of 150 tractors could remove up to 1,000 acres of land per day. Westing, Arthur H. (1972): Herbicides in War: Current Status and Future Doubt. In: Biological Conservation 4, 5. 322–27.

2 Those included several types of defoliants such as Agent Orange, Agent White, Agent Blue, Agent Purple, Agent Pink, etc. In fact, all these chemicals were colourless. People named them after the colour bands on the drums in which each category of chemicals was stored. Letter from Department of Army to John J Carhey Regarding Herbicide Status Report and Maps. In: Texas Tech University, Vietnam Center, Virtual Archive (TTU, VC, VA) 13520101003. 1–2, 11. Effects of Herbicides in Vietnam and Their Relation to Herbicide Use in the United States. In: TTU, VC, VA 2520313001. 7.

reached approximately 37 kg/ha which was equivalent to 17 times the dose used in agriculture according to the guidance of the High Command of the US Army in 1969.[3] Of the sprayed chemicals, Agent Orange accounted for approximately 60 percent (11/19 million gallons).[4] It is evident that Agent Orange contained in herbicides shared a common deadly characteristic, especially a significant amount of an extremely toxic chemical, dioxin. Dioxin can destroy forests, cause exposed people and animals to give birth to offspring with many defects as well as diseases such as lung cancer, blood cancer, diabetes type 2, etc. which can be inherited from parents to children.[5] So far, at least three Vietnamese generations have suffered the tremendous impact of dioxin reflected by sequelae of physical and psychological health.[6]

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3 Buckingham, William A. (1982): Operation Ranch Hand-The Air Force and Herbicides in Southeast Asia, 1961–1971. Washington. Hong, Phan Nguyen (2001): Reforestation of Mangroves after Severe Impacts of Herbicides during the Viet Nam War: the Case of Can Gio. Unasylva. Schuck, Peter H. (1987): Agent Orange on Trial: Mass Toxic Disasters in the Courts. Harvard. Thắng, Vũ Chiến (2008): Tác động của chất độc hóa học của Mỹ sử dụng trong chiến tranh đối với môi trường và con người ở Việt Nam (The Impacts of US Toxic Chemicals Used in the Vietnam War on the Environment and Humans in Vietnam). Ministry of Natural Resources and Environment. Hanoi. 19.

4 According to the US Academy of Science, 90 percent of the Agent Orange was utilized for forest defoliation; 8 percent was for crop destruction missions; and the last 2 percent was sprayed nearby base perimeters, waterways, cache sites, and communication lines. Report by the Comptroller General of the United States- US Ground Troops in South Vietnam was in Areas Sprayed with Herbicide Orange. In: TTU, VC, VA 6150205010. 5. Effects of Herbicides in Vietnam and Their Relation to Herbicide Use in the United States. In: TTU, VC, VA 2520313001. 6. Project CHECO Southeast Asia Report # 171 – Ranch Hand Herbicide Operations in Southeast Asia – 01 July 1961 to 31 May 1971. In: TTU, VC, VA F031100030169. 16.

5 Young, Alvin Lee (2009): The History, Use, Disposition and Environmental Fate of Agent Orange. Springer Science & Business Media. 4. Lê Thị Hòe. Nỗi ám ảnh chất độc màu da cam (Obsession of Agent Orange). Hội Khoa học lịch sử Bình Dương. Http://www.sugia.vn/news/detail/2/noi-am-anh-chat-doc-mau-da-cam.html. (Accessed 4th February 2017).

6 Hảo, Lê Văn/Larsen, Knud S. (2010): Chất độc da cam và stress liên quan đến chiến tranh: những rối loạn thể chất và tâm lý (Agent Orange and Stress Related to Warfare: the Physical and Psychological Disorders). University of Social Sciences and Humanities-Vietnam National University. Hanoi. 3.

There was the fact that majority of ethnic minorities in SVN dwelled in the Central Highlands[7] which the American strategists considered a strategically important region for the whole of Southeast Asia. As the Vietnam War intensified in the early 1960s, the Central Highlands became one of the main battlefields because the North Vietnamese Army and the Vietcong[8] were able to lead a guerrilla war in the rain forests there. For this reason, many villages of the minorities accidentally became targets of the US herbicidal spraying missions.

2. The Ranch Hand Program

As previously mentioned, Ranch Hand is the codename of a defoliant program conducted by the US Military in SVN for almost a decade, since the early 1960s. To prepare for the Ranch Hand project, since 1959, a research agency located in Fort Dietrick held a defoliant rehearsal in Fort Drum (New York). In this practice session, aircraft sprayed the compound of Butyl esters 2,4-D (Dichlorophenoxy acetic acid) and 2, 4, 5-T (Trichlorophenoxy acetic acid) on an area covering 4 square miles. Military scientists found out that a certain amount of chemical 2,4-D could cause sudden, uncontrolled developments in vegetation which quickly led to defoliation. And, a mixture of 2,4-D and 2,4, 5-T was able to defoliate almost immediately.[9] Based on results of the drill, the US Department of Defence ordered that research institute to set up scheme spraying herbicides in South Vietnam. After the first time, this organization continued to hold 18 other defoliant spraying tests.[10]

Before the project got the approval of US President, a fierce debate between the Defence Ministry and the US State Department had been trig-

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7 During the existence of SVN (1954–1975), the Central Highlands was a northwestern territory of this country. The region consisted of seven provinces of Kontum, Pleiku, Darlac, Phu Bon, Tuyen Duc, Quang Duc, and Lam Dong. With a central-Indochinese location and an exceptional altitude, the Central Highlands was considered as "the roof of Indochina" which played a strategic role in controlling not only Vietnam but the whole Southeast Asian region.

8 The term used by the government of SVN to refer to members of the National Front for the Liberation of South Vietnam (NLF).

9 TTU, VC, VA 6150205010. 5. The Story of Agent Orange. Http://www.usvetsp.com/agentorange.htm. (Accessed 9th February 2017).

10 TTU, VC, VA 13520101003. 2. Thắng (2008), 119.

gered in the White House. A representative of the Pentagon supported the plan of destruction of crops and trees, which benefited the Northern Vietnamese Army and the Vietcong, by using herbicides. This agency argued that use of defoliants was the most efficient and economic war tactic to deny food and shelter to the communists. Meanwhile, some of the influential figures in the US State Department, notably Roger Hilsman and Averell Harriman firmly opposed to that intention. They doubted the effectiveness of the defoliation tactic, and simultaneously concerned that the campaign could adversely affect relations between the people of Vietnam and the US.[11] According to these statesmen, the usage of toxic chemicals could make the US of being accused of conducting a form of war against the ecosystem and humanity. There is no doubt that during the process of spraying herbicides, crops and water sources used by the non-combatant peasants could also be hit.[12] Nevertheless, finally, the arguments of diplomatic representatives fell on deaf ears. The US Defense Department had no hesitation when decided to spray Agent Orange/Dioxin, over 25 percent of SVN's territory.[13]

To justify the use of chemical weapons, in 1961 Washington announced to the world that President Ngo Dinh Diem had requested the US to conduct aerial herbicide spraying in critical areas over SVN.[14] The first flight which sprayed defoliants along the Route 14 in the north of Kontum town was carried out by helicopter H-34 from August 10, 1961, but until early 1962, President John F. Kennedy officially green-lighted the use of herbi-

11 TTU, VC, VA 13520101003. 2. Đình Chính (2005). Bí mật chiến dịch rải chất diệt lá của Mỹ tại Việt Nam (Defoliant campaign of the US in Vietnam). Vnexpress. March 13. Https://vnexpress.net/tin-tuc/the-gioi/tu-lieu/bi-mat-chien-dich-rai-chat-diet-la-cua-my-tai-viet-nam-2-1979715.html. (Accessed February 2nd, 2017).

12 Tucker, Spencer (2011): The Encyclopaedia of the Vietnam War: A Political, Social, and Military History. Santa Barbara. 480. In fact, not only civilians became victims, but spraying did occur even over US troop positions. TTU, VC, VA 13520101003. 2.

13 We should not forget that during the World War II, when the US Military proposed to be entitled to use herbicides against the Japanese on some islands in the Pacific, the Supreme Chief Justice at that time was entirely correct to use his veto power for this proposal. According to his view, it was a war crime. Ironically, not long after, that *act of evil* was put into practice in the Vietnam battlefield.

14 Buckingham (1982), iii.

cidal chemicals in SVN battlefield.[15] Triggered the herbicidal sprayings in the SVN, the Americans sought to achieve three following objectives:

- Removing dense forests which had been used as a natural camouflage layer of Vietcong guerrillas and the Northern Vietnamese Army;
- Creating *no man's lands* of hundreds of meters wide around military bases. Those vacant zones were to enhance observation of communist guerrillas' activities and to lessen the potential for ambush;
- Destroying crops to cut off food supplies of the enemy forces.[16]

After spraying herbicides, US forces continued to drop napalm[17] to burn down wherever they deemed necessary to be destroyed. This brutal war tactic devastated many dense jungles in SVN. Furthermore, the high temperature of napalm also created secondary dioxins in areas sprayed with defoliant substance containing 2,4-D and 2,4,5-T.[18]

On the battlefield of Laos, US defoliants were also used to devastate all forests in which transport networks, as well as the communist forces, were hiding.[19] It was thought that burning forests would make the Liberation Army lose their hideouts and quickly be attacked from the air. Therefore, all suspected bases of Northern Vietnamese troops and the Vietcong were sprayed with herbicides densely and repeatedly.

Because the use of Agent Orange was inhuman, this tactic also could be considered illegal in the US and was hardly accepted by any American al-

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15 King, Pamela S. (2010): The Use of Agent Orange in the Vietnam War and Its Effects on the Vietnamese People. Washington. 12.

16 Together with using herbicides, since early 1962 Diem government began deploying the Strategic Hamlet Program with the tactic of *slapping the water to catch fish*. With these efforts, Saigon wished to isolate the communists and pacify SVN within 18 months according to the Staley-Taylor operational plan. Young (2009), 98. TU, VC, VA 13520101003. 2. TTU, VC, VA 2520313001. 4. Department of Defense (DOD) Herbicide Orange Status Report. In: TTU, VC, VA 2520210005. 1.

17 This adhesive material was dispersed onto plants and ignited quickly. It burned as potent as gasoline and destroyed all nearby vegetation in a while. It is calculated that Napalm-B used in the Vietnam War could heat at about 850 degrees centigrade and burn up to 15 minutes. Victims of napalm attacks usually had little defense and died not only by burning but also from asphyxiation caused by carbon monoxide poisoning. This new type of bomb was responsible for the destruction of much of the landscape. Tucker (2011), 788–789.

18 Thắng (2008), 120.

19 Buckingham (1982), iv.

lies. The base of the Ranch Hand Program was secretly built next to Unit 62 of SVN Air Force at Nha Trang Air Base and was given a disguised name, Air Force Unit 14. At first, to avoid responsibility, aircraft of the US Air Force, those conducted chemical spraying missions always painted the flag of the Republic of Vietnam; pilots got the order to wear plain clothes when flying.[20]

The White House also pushed responsibility to the government of SVN by asking President Diem to declare that "herbicide usage is harmless to human health." And, "Herbicides spraying was the most effective measures" to cut off the food supply to the Northern troops and the Vietcong; then to gain control of mountainous areas and countryside.[21] The SVN government disclaimed all information related to congenital disabilities appeared in the Saigon presses. Authors of those articles were alleged to be communist sympathizers. Complaints about dangerous diseases from peasants were also disregarded. Soldiers reported to doctors about symptoms of skin burns, headache, vomiting, and many other signs of exposure to toxic substances, but they all got the same answer that their illness was unrelated to the sprayings of herbicides.

To conduct defoliated missions, US Air Force used aircraft as C-47, T-28, B-26, and C-123. The 12th Air Commando Squadron, which was established with six planes, was assigned to implement defoliant sprayings. At the peak of the Ranch Hand Project in 1969, the number of aircraft equipped the special squadron increased to 25. In some cases, herbicides were sprayed from motor vehicles and also hand sprayers by soldiers. However, these methods only accounted a modest proportion of about 10-12 percent of defoliants.[22] In terms of personnel and facilities, that program was a part of the US Air Force campaign in Southeast Asia named Trail Dust.[23]

Chemical sprayings were mostly conducted in the early morning. At that time, the air was usually quiet and in high humidity, so the toxic

20 Thắng (2008), 121.
21 Cecil, Paul Frederick (1986): Herbicidal Warfare: the Ranch Hand Project in Vietnam. Santa Barbara. 13.
22 Declaration of Mr. Richard S. Christian (Re: Civil Action No. 90-1808 SSH and 90-1809 SSH- The American Legion against Derwinski and Vietnam Veterans of America against Derwinski). In: TTU, VC, VA 6110209016. 5–6. Hảo/Larsen (2010), 3.
23 TTU, VC, VA F031100030169. 12.

chemicals often fell to predetermined coordinates correctly. By noon, when the temperature of a day reached its peak, herbicides would culminate with their most destructive power. A squadron sprayed toxic chemicals usually had 2-3 aircraft. To avoid fire from the ground, pilots often flew very high before reaching targets. Once approaching objectives, the planes suddenly descended, and within several minutes they discharged entire of chemicals to ground through nozzles designed at side wings.

Aerial Herbicide Spraying in Southern Vietnam

Source: Agent Orange Record, Associated Press/Worldwide Photos[24]

Soon after the news about U.S aerial herbicide sprayings in SVN was disclosed, a high wave of protests broke out and quickly spread worldwide. The human right and environmental activists required the US administration to halt the Operation Ranch Hand immediately. One article by journalist Richard Dudman published in the St. Louis Post-Dispatch accused the US and Saigon government of using "a dirty war tactic" against North Vietnam. The protest movement was considered reaching its peak in early 1967 when scientific advisors of the US President received a petition signed by more than 5,000 scientists including 17 Nobel Prize winners and 129 members of the National Academy of Sciences. They urged President Johnson to stop using toxic chemicals as lethal weapon and to destroy crops in SVN.[25] In the meantime, the US Senate was debating over the adoption of the Geneva Convention on banning the use of chemical and biological weapons in warfare.

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24 Http://www.agentorangerecord.com/agent_orange_resources/photos/cateo ry/collection_2/. (Accessed 20th February 2017).

25 Thắng (2008), 124.

Under the pressure of international public opinion, since the end of 1969, the toxic chemical spraying squad was ordered to reduce 30 percent of its activities despite the efforts of President Nixon.[26] Not long later, aerial spraying performed by C-123 aircraft on 07th January 1971 above rice fields in Ninh Thuan province marked an end of the US herbicidal warfare in Vietnam after a proximately one decade of operation.

3. Impact of the Operation Ranch Hand on the Minorities in SVN

According to the accurate statistics, together with Agent Orange, 15 other herbicides were sprayed on approximately 25 percent of the land surface of SVN in the Ranch Hand Programme. These chemicals destroyed 260,000 hectares (8 percent) of agricultural land in South Vietnam. The defoliants sprayed on farmland also damaged immediately over 300,000 tons of food. Besides, about 30 percent of 135,000 hectares of rubber plantations were destroyed.[27] In addition, it was estimated that 20 percent tropical forests and 36 percent mangrove forests together with hundreds of plant species were among the victims of the defoliants; at least of 20 million cubic meters of timber were damaged.[28] The destruction was so great that environmental activists used the terms *ecological warfare* and, then, *ecocide* to refer to it; or as commented by Arthur H. Westing, "the Vietnam War of 1961-1975 stands out as the archetypal example of environmental war-related abuse."[29]

Studies conducted on laboratory animals pointed out that dioxin were extremely toxic even in tiny doses. Human exposed to the chemical could associate with serious health issues such as muscular dysfunction, inflammation, congenital disabilities, nervous system disorders and even the development of various cancers. To plants, within two to three weeks of

26 President Nixon supported the ratification of the Geneva Convention but wanted to ensure that it would not apply to the defoliants and other "chemicals counterinsurgency." Chính (2005).

27 Thắng (2008), 128. & TTU, VC, VA 2520313001. 12.

28 TTU, VC, VA 2520313001. 4.

29 Westing, Arthur H. (ed.) (2002): Long-Term Consequences of the Vietnam War, Ecosystems, Report to the Environmental Conference on Cambodia-Laos-Vietnam. Stockholm. 2–4.

spraying, the leaves should drop down, and the trees themselves would remain bare until the following rainy season.[30]

With dense forests in SVN, about 10-20 percent of plants belonged the top floor (representing 40-60 percent of forest biomass) died shortly after a single spray run. In order to defoliate the lower stories, one or more follow-up sprayings would be needed. The defoliated top floor led to changing the climate in lower storeys. When humidity reduced, the light intensity increased, young trees might survive but were difficult to develop well and could be burned during the dry seasons by fire generated by bombs or slash-and-burn cultivation method. Once the rainy season came, soil erosion was leading to gradual degradation. Only a few light-demanding species or plants with developed strong roots withstood the arid environment could grow in sprayed areas.

In the US, since 1963, i.e., only two years after President Kennedy approved the use of Agent Orange in SVN, the US Army reported an increased risk of skin conditions (chloracne) and respiratory infections. In the same year, the President's Science Advisory Committee reported to the Joint Chiefs of Staff on the possible health dangers of using these chemical compounds.[31] It is believed that these toxins could cause up to 28 different diseases to humans. However, it took decades since veterans from both sides made their first claims, the US government half-heartedly acknowledged responsibility; though, only for US veterans, so far.[32].

In Vietnam, doctors began recognizing unusual symptoms while treating for veterans who had been exposed to toxic chemicals on battlefields. In this group, diseases such as hepatitis, kidney failure, various kinds of cancer, diseases caused by declining immunity, and severe diarrhoea occur in much higher frequency than other patient groups. Veterans' wives also claim that they miscarried repeatedly. Their children were born prematurely or born with defects. And, a significant increase in infant mortality rate has also reported.[33] In contaminated areas, doctors reported that the rate of

30 Håo/Larsen (2010), 5.

31 King (2010), 15.

32 US veterans made the first compensation claim in late 1977. Until the end of September 1979, about 4,800 people requested treatment for herbicide-related health problems. TTU, VC, VA 6150205010. 5–6. See also Bruce Falconer (2009): Agent Orange: Treatment for Vets still lagging. In: Mother Jones. Monday, June 1. Https://www.motherjones.com/politics/2009/06/agent-orange-diagnosis-and-treatment-badly-lagging-says-report/.(Accessed February 2nd, 2017).

33 Dreyfuss, Robert (2000): Apocalypse Still. Mother Jones. San Francisco. 2.

defects was 2.4 percent compared with 0.6 percent of the reasonable rate in other regions.[34]

In 2008 Vietnam's Ministry of Health compiled a list of 17 diseases and deformities related to dioxin exposure including Soft tissue sarcoma, Non-Hodgkin's lymphoma, Hodgkin's disease, Lung and Bronchus cancer, Tracheal cancer, Larynx cancer, Prostate cancer, Primary liver cancer, Kahler's disease, Acute and sub-acute peripheral neuropathy, Spina Bifida, Chloracne, Type 2 Diabetes, Porphyria cutanea tarda, Unusual births, Birth defects, Mental disorders.[35] Vietnam also reported that about 4.8 million people affected by Agent Orange, some 500,000 children with birth defects, and 2 million others with cancer and other illnesses related to defoliants used during the wartime.[36]

Although ethnic minorities in SVN were not interested in the war spread in their traditional territory, they have suffered considerable impacts of herbicide spraying. According to the environmental activists, of the upland forests sprayed, the hardest hit were dense forests of Ma Da (Dong Nai), Phu Binh (Binh Phuoc), Sa Thay (Kontum), A Luoi (Thua Thien Hue), along Route 19, and localities settled along the Ho Chi Minh Trail where weapons and other supplies from the North were supposed to be transferred to the South. Besides were rainforests surrounding War Zones D and Boi Loi (Tay Ninh) of the NLF.[37]

Habitat destroyed by herbicides and the war in general also affected wild animals profoundly. Many individual animals died of starvation, lack of refuge or drinking contaminated water. The results of ethnographic surveys carried out by Gerald Hickey reveal that after each single aerial chemical spraying many tribesmen living in Kontum found a lot of wild dead animals in the woods near their home. The remaining natural beings had to flee to other places; even the living conditions there were not utterly favourable to them.[38]

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34 Hảo/ Larsen (2010), 12.

35 Martin, Michael F. (2008): Vietnamese Victims of Agent Orange and US-Vietnam Relations. Congressional Research Report RL34761, November 21. Washington. Sơn, Lê Kế (ed.) (2011): 50 câu hỏi & đáp về chất độc màu da cam/dioxin (50 Questions & Answers on Agent Orange/Dioxin). Office of the Steering Committee No. 33 – Ministry of Natural Resources and Environment. Hanoi. 10–11.

36 Dreyfuss (2000), 2. Hảo/Larsen (2010), 8.

37 Sơn (2011), 8–9.

38 Hickey, Gerald Cannon (1982): Free in the Forest: Ethno History of the Vietnamese Central Highlands, 1954–1976. New Haven. 255, 314.

The fact is after the Operation Ranch Hand, a ragged, impoverished ecosystem entirely replaced the previous vibrant rainforest ecosystem in SVN. In new re-growing forests, shrubs and bamboos became excellent hiding places for rats and mice, earlier rare to these forested areas. The popularity of these rodents in the post-war period caused damage to crops and spread diseases out. Natural enemies of rats as civets, and foxes existed with a low number over sprayed areas. Their fecundity, on the other hand, could not compare with which of the rodents. Overall, herbicides caused the severe ecological imbalance in many forested regions over South Vietnam.

According to Hickey, most victims exposed to toxic chemicals reported abdominal pains and diarrhea, with vomiting, respiratory symptoms and rashes also developing. A few said that they experienced dizziness. Some witnesses confirmed that there were many unusual deaths, especially among children following sprayings. Children who exposed to dioxin often covered in rashes and died shortly after the onset of illness. Additionally, significant of respondents reported about the abnormal increase of deaths among domestic species, especially chickens and pigs.[39]

After being sprayed, dioxin not only directly caused the destruction of trees, animals, and humans but penetrated into the soil and groundwater resources. It then somehow became part of the food chain. Agent Orange devastated local agriculture and the harmonious relation between people and the environment within contaminated regions. Once humans ate plants or animals infected with dioxin, this toxic chemical would begin accumulating in fatty tissues. According to the scientists, at low concentration, some of the dioxins have the short half-life and can be degradable in 5 to 10 years. However, at more significant levels, it needs much more time for dioxin to decompose. When this chemical was absorbed into the earth, the time required for it to be detoxified increase significantly, up to decades.[40]

Local people also revealed that in contaminated regions, trees withered and died after being sprayed defoliants a few weeks; fish also died and floated on the stream. All Montagnards ate the dead fish getting diarrhoea. Most of the crops were destroyed. Some remaining paddy fields though were not burned but could not produce rice effectively as pre-war periods. Similar to poisoned fish, vegetables survived following spray missions

39 Hickey (1982), 255.
40 TTU, VC, VA 13520101003. 3.

caused diarrhoea, respiratory failure, or some other strange diseases for consumers. Many victims died after a few days of being infected, most of them were children.[41] Deforestation, thus, directly led to the shortage of traditional food sources which came from hunting and gathering methods. Besides, some of the watershed forests along Annam Cordillera (Vietnamese: Trường Sơn-Tây Nguyên) destroyed by herbicides resulting in the decline in their functions of water retention and flood protection. This not only made the soil dry out in sprayed areas but indirectly caused flooding for downstream regions during the rainy season. All of those consequences somehow contributed to the minorities' poverty during and after the war.

Together with causing environmental destruction, defoliant sprayings and bombings also destroyed many villages and cultivated lands belonging to the minorities. To avoid harm inflicted by American lethal weapons, Highlanders in contaminated zones had to evacuate to the border between SVN and Laos or to less dangerous zones. Their old villages then were deserted, and the land would no longer be cultivated. Also, the fire traditionally used for slash-and-burn cultivation, even to cook now was limited to avoid being located and targeted by the US and SVN Air Forces. This situation worsened the uncertain and insecure living condition of the ethnic minorities.[42]

Along with the physical damage, Vietnamese victims of Agent Orange and their families also have been suffering psychological pain. Those families, from their cultural beliefs, have been subjected to torment. Parents blame themselves that they might do something sinful in the previous lives and now their offspring receive punishment instead of them. In minority regions, it is commonly believed that children in a community born with defects because someone in their village had insulted the gods. The pain would be much more significant when the next children, to whom the exposed parents try to give birth, also suffered deformities like their older siblings. Many parents gave birth several times, but none of their children survived at all. This means they will have no one to continue the family line, worship ancestors, and care for their old age. Thus, besides physical

41 Hickey (1982), 255, 313–14.

42 Robert, Amélie (2016): At the Heart of the Vietnam War: Herbicides, Napalm, and Bulldozers against the A Lưới Mountains. Journal of Alpine Research/Revue de géographie alpine, 104–1. 13.

damage, the pressure from culture also contributed to the refractory pain of Vietnamese Agent Orange victims.[43]

4. Conclusion

It is over a half-century since chemical warfare in SVN was carried out but the wounds it left for the Vietnamese environment and people still unhealed. Or, as a French environmental activist commented: the usage of herbicidal compounds containing the high level of dioxin in SVN was a grave violation of human rights, a war crime, a crime against the environment and people, even a gradual genocide. It has become one of the biggest forgotten tragedies of the (20th) century.[44]

In the effort to overcome war consequences, for years the government of Vietnam has issued many national action plans to remediate of Agent Orange/Dioxin over the particular periods. Accordingly, some wide-ranging investigations have been conducted. The authorities also deployed programs aiming at handling contaminated lands or preventing the toxic chemicals from spreading. This country has been attempting to mobilize various domestic resources as well as collaborate with many international organizations to assist victims of Agent Orange in improving their livelihood, medical care, education, etc.

Despite the abundant evidence relating harmful effects of herbicides provided by scientists and veterans, the US National Academy of Sciences President, Philip Handler, concluded that there was no cause and effect relationship here.[45] According to him, the investigation committee had been "unable to gather any definitive indication of direct damage by herbicides to human health." And, though declared that the information on the destruction of herbicides should be re-verified, the National Academy of Sciences has not shown any attempt to visit Vietnam to reappraise the words of the Montagnards recorded in researchers' reports.[46]

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43 Hảo/Larsen (2010), 9–10.

44 Bouny, André (2007): The effects of Agent Orange and its consequences. Global Research. Http://www.globalresearch.ca/the effects-of-agent-orange-and-its-consequences/4490. (Accessed 10th February 2017).

45 Hickey (1982), 308–319. Pentagon ignored Agent Orange warnings. Http://www.vavadanang.org.vn/index.php/en/ archives/item/61-pentagon-ignored-agent-orange-warnings. (Accessed 16th February 2017).

46 Hickey (1982), 256.

On 31st January 2004, the Vietnam Association of Victims of Agent Orange/Dioxin (VAVA) sued the manufacturers whose toxic chemicals were used in the Vietnam War at the First Instance Law Court of American Federal Justice. After the case had been vetoed, VAVA continued filing the appeal to the Court of Appeal on 30th September 2005. There, the defense lawyers for 37 American chemical companies argued that Agent Orange was produced to protect US troops. Since then, not any judgment of the court about an official apology or compensations for victims of Agent Orange in Vietnam has been given. The story of the journey to find justice for those victims, therefore, has not come to an end yet.

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