

The impact of wildfires in Vietnam on climate change

Vu Van Thuy

**The University of Fire Prevention and Fighting,
243 Khuat Duy Tien, Hanoi, Viet Nam**

(Received 23 October, 2020; Accepted 25 November, 2020)

ABSTRACT

For the recent years, due to global warming, the global average surface temperature has increased, accompanied by natural disasters happened to Vietnam like flood, drought, thunderstorms, river bank erosion, rise of sea level, saline intrusion occurred not according to the operational cycle, especially the current historic saline drought taking place in the provinces of the Mekong Delta, proving that the situation of climate change is becoming more and more complicated. One of the reasons affecting such change is the serious problem - forest fire and its relevance to climate change.

Key words : Wildfire, Forest fire, Climate change, Greenhouse effect, Reason, affect.

Introduction

The data of General Statistics Office of Vietnam show that, for 10 years of the period of 2010-2020, the disaster of forest fires has destroyed nearly 30 thousand hectares of Vietnam's forests, causing great economic losses to the country. The peak of this period was in 2010, about 6,723 hectares of forest were burned down by large fires. In 2010, 749 forest fires occurred damaging 4,188 hectares of forest. For the recent years, although the area of burnt forest has decreased sharply, there have still been unexpected, complicated and unforeseen developments.

The total number of forest fires over the years has not increased significantly, but the number of destroyed forest areas increased sharply.

According to a report by the Vietnam Fire Prevention and Fighting Police Department. In 2017, rainfall increased strongly, which made the weather less dry and hot, contributing to reducing the burnt forest area to the lowest level within the last decade, the damage level was only 339 hectares, with a reduction of more than 80% compared to 2016 (3,320

ha) (Figure 2). In 2018, the damage caused by forest fire increased compared to 2017 (1067 hectares), but in general, the damage was still at low level compared to the other years. However, in 2019, the burnt forest area had increased to 3952 hectares, 3.7 times as much as in 2018. In particular, in the peak months of the dry season, due to hot and sunny weather, many forests of Vietnam are in the state of

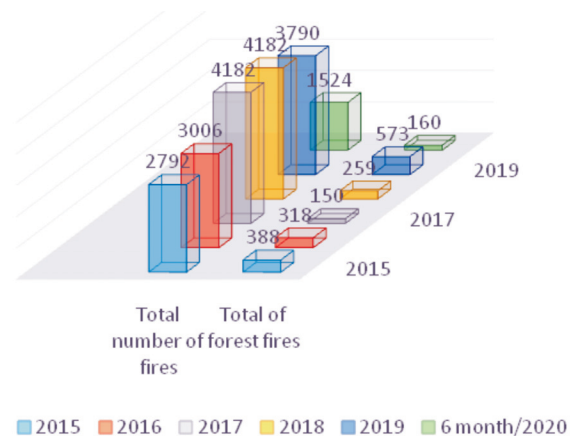


Fig. 1. Statistics of forest fires from 2015 to 6 months 2020

alerting to the risk of forest fire level V (the extremely dangerous level). The risk of forest fire is very high, which makes the Government and Ministries, Branches regularly send out urgent messages to direct the prevention of forest fires.

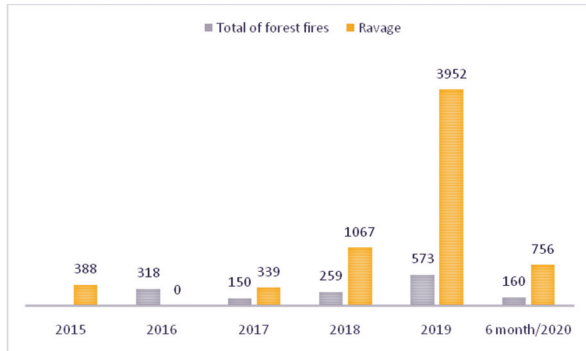


Fig. 2. Statistics of forest fire area from 2015 to 6 months 2020

According to statistics of the Vietnam Forest Protection Department, the situation of forest fires appeared uneven; it happened mainly in February and May of the year with extremely terrible devastation in the remaining months.

Due to the influence of the dry season in South Vietnam (temperature in the South tends to remain fairly stable throughout the year, between 25 and 35 °C). The dry season starts in November and ends in

May. The hottest (and also the driest) months are usually February, March and May, led to an increase in the total number of forest fires and the number of destroyed forest areas in these months compared to the month with the average index (June).

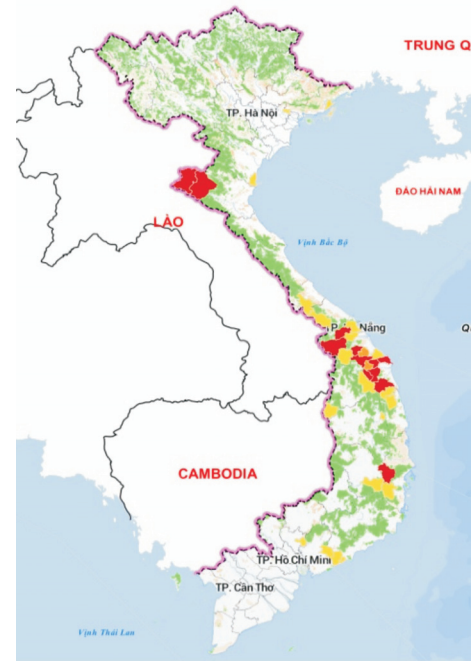


Fig. 4. The distribution of the dangerous levels of fire in Viet Nam in June 2020

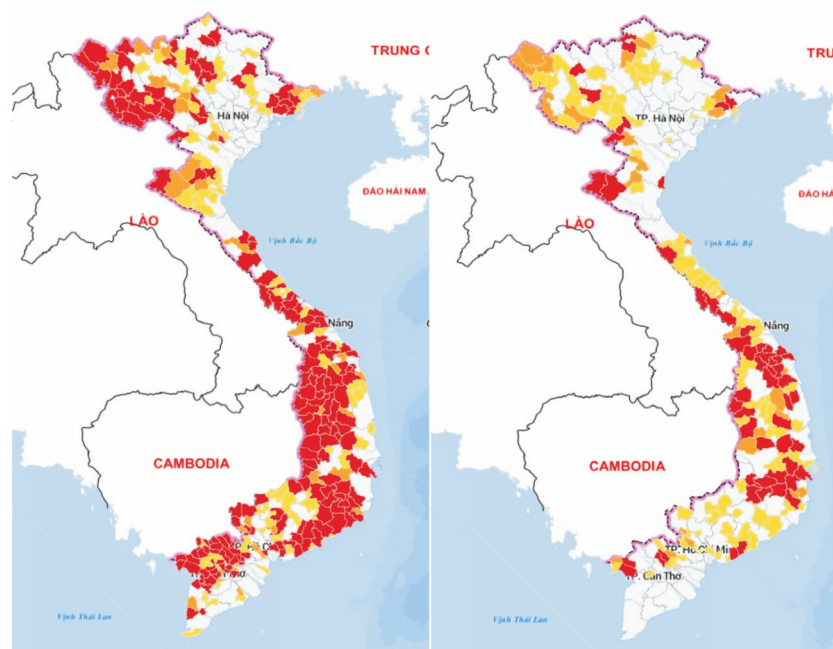


Fig. 3. The distribution of the dangerous levels of fire in Viet Nam in February, May 2020

Although the extent of the forest fires in Vietnam is not as large as the wildfire that hit Australia in 2019, about 10 million hectares of forest were destroyed following the fire. The total damage is estimated to be 19 billion \$ Australia and has released about 350 million tons of CO_2 - two-thirds of Australia's average annual gas (530 million tons in 2017). It is expected to contribute 5% to an increase in atmospheric concentrations of greenhouse gases, that are expected to reach 417ppm (parts per million) by 2020. The forest fires occurring at present with increasing scale and severity are one of the causes affecting global climate change. The heavy damages caused by forest fires are unavoidable, besides promoting the rise of global temperature, causing sea level rise due to melting ice, forest fires also "release" into the environment an extremely large amount of CO_2 . A special report on global warming of 1.5 °C in 2018 of the Intergovernmental Committee on Climate Change in Incheon, South Korea warned that the concentration of CO_2 in the atmosphere, which is higher than 450 ppm, is at risk of causing extreme weather events and temperature rise as high as 2 °C, far exceeding the the effects of global warming can become catastrophic with increasing risks for health, livelihoods, food security, water supply, human security and economic growth.

According to the calculations of the scientists, prior to the occurrence of the industrialization, the concentration of CO_2 in the atmosphere was reasonably stable (usually 278 ppm). Since the beginning of the twentieth century, concentrations of CO_2 have increased by more than 40%, it increased to 390 in 2010 and to 407.66 ppm in 2016. The growth rate of CO_2 in atmosphere at an average level is about 1.68 ppm per year. This was the seventh consecutive year recognizing the ppm increase, which was higher than the previous average level and was the fifth year since the 400 ppm threshold was broken in 2014. In 2016, the highest annual increase in the chain so far was recorded, from 404.10 in 2015 to 407.66 in 2016. In order to curb the increase of the Earth's temperature to a safe level of 1.5°C, countries need to strictly implement the roadmap of reducing 50% of CO_2 by year 2030, and down to 0% by 2050 and commit to have no more new gas emissions.

I. The impact of wildfires on climate change

For hundreds of years, forests have been regulating

the climate by absorbing about a quarter of the carbon released from human activities such as burning fossil fuels and exploiting and using land. Carbon absorption of forest reduces the rate of carbon accumulation in the atmosphere and thus reduces the rate of climate change occurred. Forest is considered a "carbon tank" if it absorbs more carbon from the atmosphere than carbon is released by itself. Carbon is absorbed from the atmosphere through photosynthesis process. Then it becomes "deposited" in forest biomass (stems, branches, roots and leaves), in dead organic matter (rubbish, firewood) and in the soil. This process of carbon absorption and deposition is called process of carbon sequestration. On a global scale, forests help to maintain the Earth's carbon balance. For the last centuries, forests have been significant carbon storage tanks. The continuous addition of carbon to such storage has helped to balance the ecosystem and maintain the climate balance. However, for the recent decades, the situation has been reversed, as burning forests have become a source of carbon supply, releasing more carbon into the atmosphere than accumulating it. Some factors have contributed to this variation: the total annual area burnt by forest fires has increased significantly, the outbreak of insect epidemics, which have not been seen before, have taken place.

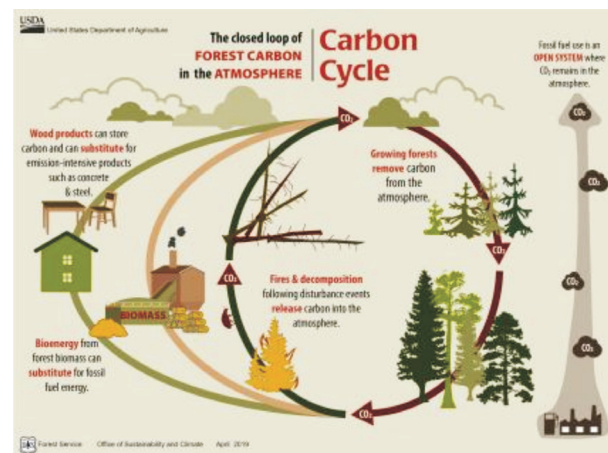


Fig. 5. Closed loop of atmospheric forest carbon

The impact of forest fires is not only confined to burnt forest areas, but it also affects many aspects of life, economy and society. Especially, when a big fire occurs, after only a few hours or days, Vietnam can lose hundreds of hectares of forest areas with the age of decades, even hundreds of years, causing the natural resources of the country to be exhausted.

And in order to regenerate those forests, besides efforts and money, Vietnam also needs the amount of time corresponding to the age of such forest to regenerate and develop the forests as before. Forest fires have a huge effect on global biochemical cycles, atmospheric composition and soil ecosystem properties... and all of which affect climate systems.

Forest fires reduce or lose the capacity of absorbing carbon (CO₂), filtering the air of forest. In addition, dust, carbon dioxide, the heat of forest fires released into the atmosphere make contribution to global warming, causing climate change, environmental pollution, air pollution, and water pollution... affecting the health of people living near burning areas in particular, and global people in general.

Forest fires also cause disturbance to the global and regional soil ecosystems and generate large amounts of greenhouse gases, especially CO₂. In addition to impacting on soil degradation, damaging ecosystems and promoting land use change, forest fires are also sources of toxic substances emission (hydrogen cyanide, black carbon and organic carbon) into the environment.

Black carbon, which is a short-lived pollutant for greenhouse, also promotes snow and ice melting and reduces rainfall; It has global warming potential. Carbon monoxide (CO) is released by incomplete combustion and exists for a few months in the atmosphere, affecting atmospheric composition at regional and global scale, through oxidative depletion in the main atmosphere. Nitrous oxides (NO_x), volatile organic compounds and black carbon (components of light-absorbing aerosols) can produce ozone and troposphere particles, which contributes to air pollution and affects the climate. At the same time, aerobic soil can act as a sink for other important greenhouse gases such as methane (CH₄), and fire can even increase the absorption of CH on these soils. Therefore, forest fires have a major impact on air pollution, atmospheric composition and climate.

Conclusion

The impact from wildfires is very huge, it directly impacts on climate change. Even in normal condi-

tions, fires burn down vegetation, animals living in the forest, in which there are precious species of plants, animals, which need to be conserved, making their numbers less and less, putting many species into the list of endangered species, causing biodiversity loss and ecological imbalance. For watershed forests and protection forests, due to having no more forests to keep the land, the subsequent consequences will lead to floods, erosion, landslides, flash floods ... The protection of forest, prevention of wildfires risks as well as the reduction of greenhouse gas emissions have become a problem paid great attention by Viet Nam, which is one of the measures to protect the Earth from climate change.

References

- Australian bushfires to contribute to huge annual increase in global carbon dioxide. *Guardian Australia*. 24 January 2020.
- Climate Milestone: Earth's CO₂ Level Passes 400 ppm. *National Geographic*. 2013-05-12. Retrieved 2017-12-10.
- Global Greenhouse Gas Reference Network NOAA Earth System Research Laboratory/Global Monitoring Division 2019.
- Hansen, J. 2005. A slippery slope: How much global warming constitutes "dangerous anthropogenic interference"? *Climatic Change*. doi:10.1007/s10584-005-4135-0.
- IPCC, 2018. Global Warming of 1.5 °C. An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty V. Masson-Delmotte.
- Marlon, J. R. 2008. Climate and human influences on global biomass burning over the past two millennia. *Nature Geoscience*. 1 (10) : 697–702.
- National Inventory by Economic Sector 2017. Australia's National Greenhouse Accounts. Department of the Environment and Energy. August 2019. p. 3.
- Report by the Vietnam Fire Prevention and Fighting Police Department 2014 – 6 month 2020.
- Watts, Jonathan (8 October 2018). "We have 12 years to limit climate change catastrophe, warns UN". *The Guardian*. Retrieved 8 October 2018