

Potential for agroforestry expansion on 10 million hectares in Viet Nam 185 to 349 million tonnes of carbon sequestered in biomass over 10 years

Photo: World Agroforestry, Viet Nam Country Program/Mai Phuong Nguyen

Viet Nam has committed to the United Nations Framework Convention on Climate Change to reduce its overall greenhouse gas emissions by 8 percent by 2030. Agroforestry can help Viet Nam live up to this commitment while simultaneously improving livelihoods and restoring landscapes.

Potential expansion of agroforestry in Viet Nam: 10 million ha

Agroforestry

Agroforestry is the integration of trees, crops and/or animals on the same land. For example, commodity crops with shade trees, forest enrichment and diversified homegardens.

World Agroforestry (ICRAF) estimates the total agroforestry area in Viet Nam to be about 900,000 hectares and that 10 million hectares are suitable for agroforestry. A recent ICRAF study indicates that the biomass carbon sequestration in agroforestry systems could reach 2.25 tonnes carbon per hectare every year based on a 10-year assessment.

Coffee production under shade trees

Viet Nam is the second biggest coffee producer and exporter in the world. Its coffee sector had an export value of almost USD 3.7 billion in

Coffee-based agroforestry

- Can fix 2 to 10 times more carbon in biomass and soil per hectare than coffee monoculture
- Improves quality of beans owing to longer maturing process, higher soil fertility and water retention
- Shade trees increase resilience to water and temperature stresses, some pests and diseases

2014. Currently, approximately 660,000 hectares are under coffee production, of which around 260,000 are coffee agroforestry systems. The remaining 400,000 are mono-cultural systems, mostly full-sun robusta coffee plantations.

Converting the 400,000 monocultural hectares into shade-grown production would increase the quality and, therefore, the value of the coffee as well as sequester an additional 20 to 40 million tonnes of carbon both above- and below ground.

Incorporating shade trees creates a cooler and more humid micro-climate, benefiting robusta production and reducing the need for irrigation.



Coffee with durian, avocado, black pepper growing on the trunk of the nitrogen-fixing *Cassia Siamea*, along with sweet potato and soy-bean in Buon Me Thuot. Photo: World Agroforestry, Viet Nam Country Program/Rachmat Mulia

Shade trees also moderate temperature extremes and diurnal temperature amplitude, making agroforestry particularly suitable for arabica production as well.

Sustainable forest management with agroforestry

Viet Nam has around 3.6 million hectares of planted forest and exported forestry products valued at over USD 2 billion in 2017. Only a few timber species make up the majority of planted forests, the main being acacia in short rotations.



Photo: World Agroforestry, Viet Nam Country Program/Tam Thi Le



Accumulated carbon stock from three acacia-based systems in Central Viet Nam. Source: Mulia et al 2018

Sustainable forest management enables a transition to more diversified tree stands with prolonged harvest cycles that build up more carbon in trees and soil.

Incorporating different and multipurpose species has cascading benefits. By enhancing the forest's resilience to weather stress, farmers' incomes can be secured and diversified.

Selective felling models and non-timber forest products can compensate financially, for the extended periods between the felling of trees.





Average carbon stock in homegardens.

Agroforestry homegardens

Agroforestry homegardens are a measure to preserve and enhance natural biodiversity. In three study sites alone, ICRAF found more than 70 different timber and non-timber tree species. High biodiversity improves crops' resilience to pests and diseases, and attracts pollinators.

Integrating agroforestry in homegardens diversifies smallholder farmers' incomes, enhances their economic and environmental resilience to natural disaster impacts.

Homegardens can also be a great carbon sink in soils and biomass.

Photo: World Agrolorestry, Viet Nam Country Program/Rachmat Mulia

The role of trees and agroforestry in climate change

Trees sequester carbon and nitrogen in their biomass, and contribute to build up of soil organic carbon.

This enhances to soil fertility, and thereby reduces the need for chemical fertiliser inputs (which is another source of greenhouse gas emissions).

Agroforestry reduces greenhouse gas emissions by

- integrating nitrogen-fixing plants and trees that reduce the need for inorganic fertilisers; and
- offering alternatives to deforestation and forest degradation through which 'leakage' can be addressed



Photo: World Agroforestry, Viet Nam Country Program/Ha My Tran



Photos: World Agroforestry, Viet Nam Country Program/Hung Van Do (left), Ha My Tran (middle and right)

References

- Catacutan DC et al. 2018. Asean guidelines for agroforestry development. Jakarta, Indonesia: The ASEAN Secretariat. http://www.worldagroforestry. org/region/sea/publications/detail?pubID=4392
- FAO. 2015. FAO Statistical Pocketbook Coffee. Rome, Italy: Food and Agriculture Organization of the United Nations.
- FAOstat. 2015. FAOstat. Rome, Italy: Food and Agriculture Organization of the United Nations. http://www.fao.org/faostat/en/#data/EL
- FAOstat. 2017. FAOstat. Rome, Italy: Food and Agriculture Organization of the United Nations. http://www.fao.org/faostat/en/#data/FO
- International Coffee Organization. 2018. http://www. ico.org/prices/p1-July2018.pdf
- Mulia R, Khasanah N, Catacutan DC. 2018. Alternative forest-plantation systems for Central

Viet Nam: projections of growth and production with a profitability analysis using the WaNuL-CAS model. Hanoi, Viet Nam: World Agroforestry Centre (ICRAF).

- Mulia R, Nguyen MP, Pham TV, Dinh TH. 2018. Potential mitigation contribution from agroforestry to Viet Nam's NDC. Project report. World Agroforestry Centre (ICRAF). Hanoi, Viet Nam.
- Simelton E, Catacutan DC, Dao TC, Dam BV, Le TD. 2016. Factors constraining and enabling agroforestry adoption in Viet Nam: a multi-level policy analysis. *Agroforestry Systems*, 90(1):51– 67.

Authors

Elisabeth Simelton, Rachmat Mulia, Philippe Vaast, and Tan Quang Nguyen

Correct citation

Simelton E, Mulia R, Vaast P, Nguyen QT. 2019. *Agroforestry for mitigating climate change in Viet Nam*. Brief no. 104. Ha Noi, Viet Nam: World Agroforestry (ICRAF) Viet Nam Country Program.



For further information please contact: Tan Quang Nguyen (N.QuangTan@cgiar.org) Elisabeth Simelton (E.Simelton@cgiar.org)

World Agroforestry (ICRAF) Viet Nam Country Program 13th floor, HCMCC Tower, 249A Thuy Khue street Tay Ho district, Ha Noi, Viet Nam Email: icraf-vietnam@cgiar.org Telephone: +84 (24) 3783 4644 www.worldagroforestry.org/regions/southeast_asia/vietnam blog.worldagroforestry.org

Layout: Riky Mulya Hilmansyah and Johanna Gammelgaard