

It is known that carbon sequestration is a very important climate change mitigation tool, and to best execute our own small-scale project, Zanmi Kafe, it is necessary to understand the carbon market and its functions. Zanmi Kafe is an institutional partnership that allows Sewanee: The University of the South to quantify and offset carbon internally while reflecting the overall goals and objectives of the global carbon market. As our institution explores the benefits of agroforestry systems, other higher education institutions are doing similar work. We can examine and compare what has been achieved collectively, both on a larger scale and within academic models, in order to align ourselves with realistic and sustainable goals and methods.

In recent years, carbon sequestration initiatives have spread around the world in an attempt to combat climate change and its negative repercussions on people and the planet, such as a gradually increasing global temperature. Businesses, individuals, and universities have recognized the need to reduce future carbon emissions and to neutralize their current emissions via carbon sequestration processes like carbon farming and carbon offset schemes. Carbon farming can include a vast array of agricultural methods that aim to sequester atmospheric carbon in the soil, however our research will primarily focus on agroforestry as a means of sequestration (What Is Carbon Farming?). Carbon farming is a useful means for organizations to offset or neutralize their carbon footprint by monetizing their emissions elsewhere in the world via tree planting or rolling out clean energy technologies (Clark 2011). For instance, universities like Sewanee: The University of the South and the University of Georgia are investing in environmental projects in developing countries like Haiti and Costa Rica to offset the carbon footprints of their students' international travel. Some individuals even purchase carbon offsets to neutralise their pollution from their daily drive to and from work, and these carbon offset purchases prove to be beneficial for the carbon buyer and seller.

The carbon offset purchases prove to be highly beneficial for the environment and the carbon sellers. In some areas, connection to the carbon market provides financial security and diversification. This benefits low-income farmers by protecting their land and potentially fostering economic development (Houghton). There are numerous additional advantages, such as improved soil quality, biodiversification or protection of native species, and food security. In low-income communities, these ecosystem services are invaluable, and the sustainable nature of agroforestry is appealing in a situation where stable development and long-term security is desired. Connection to carbon markets also allows agroforestry projects to subsidize their own costs (Houghton). Financial support can be a very incentivizing factor in considering the birth of an agroforestry system or new project in carbon farming. In theory and principle, carbon farming effectively benefits both the consumers and their partners.

Although carbon offsetting has high potential to help developing countries and the environment, some people question its effectiveness and the logic behind it. A major issue that the carbon offset market faces is verifying the legitimacy of organizations carbon offset projects. Some organizations like Green Trees inflate their carbon sequestration to make a larger profit, but the inflation of carbon sequestration means that corporations buying offsets from GreenTrees are not reducing their greenhouse gas emissions by nearly as much as they thought. This issue illustrates that a lack of oversight and weak rules plague the carbon offset market and highlight that other organisations may be selling false carbon offsets as well to make a quick buck (Elgin & Mider 2020). This issue primarily affects large carbon offset schemes, since small scale carbon sequestration projects have less of an incentive to forge numbers and more supervisors tracking the numbers. Another discrepancy in carbon offsetting lies in the cost of carbon which varies worldwide anywhere from \$0.10 to \$50 (Energy Sage). For example, the Environmental Defense

Fund claims that the social cost of carbon is over \$50 per ton in today's dollars while CoolEffect.org sells carbon for \$8 per ton. Researchers ponder how carbon can be sold so cheaply by some organizations if the impacts of carbon in the atmosphere are so detrimental, however different equations lead to different costs for carbon. All of these inconsistencies have made it difficult to establish the carbon market as consistent and verifiable, but new regulations are being implemented to add security and eliminate fraudulence.

When used in an educational context, carbon forest models not only provide an important resource for learning and research, but their differences can allow for comparison that Sewanee's own project can draw from. Carbon markets are generally split between external and internal collaborations. Each has their benefits and drawbacks, and the distinction is usually made by the goals and resources of the institution. For example, Sewanee elected to keep their carbon market contained within the university's research, outreach, and funding capabilities. Due to our ability to purchase the carbon stocks from an internal 'green fee' and execute measurements and analysis with professors and students, there is little need to receive funding or external management at this stage. The program's goals are redevelopment and restoration of the environment, rather than monetary benefits of managing carbon emissions. Similarly, the University of Georgia has collaborated with several nonprofits in Costa Rica to restore an important biological corridor and offset the travel emissions of study abroad students. Like Sewanee, this institution has faculty and students to maintain and monitor the project internally. This model allows model projects to maintain a low cost and have access and control over each step of the process. This appeals to projects aiming to build an educational model and conduct their own research, so the informal and internal carbon market is best suited for Sewanee's goals (French). If an institution aspires to offset their own carbon locally, such as the University of

Florida Gainesville, it would be feasible to partner with an organization who has the experience and resources to quantify and analyze carbon sequestered. The University partners with Neutral Gator, a non-profit sustainability firm, to restore the local environment by offsetting carbon emissions from football games. The program is funded by the football department and low cost is maintained by the use of student volunteers (French). In either scenario, small-scale carbon offset projects often do not have the capacity to become certified carbon markets. However, with these specific and relatively small-scaled goals, the benefits of becoming certified are not necessary.

Contrastingly, Colgate University's goal of carbon neutrality requires verification, following the common Verified Carbon Standard, or VCS (French). As aforementioned, the certified carbon market does have inaccuracies and scams, but a new set of regulatory standards has created a reliable and well-directed process. The educational experience provided by this program is different, as it reflects real market values and methods. The certification allows Colgate to profit from this model and ensures that it will sustain itself. However, it has become clear that if the opportunity was given, most projects would become certified. The main difference lies in financial capacity, and Sewanee values eliminating additional costs so that the budget can be put towards carbon payments for the farmers. The existence of a network of institution-led carbon forest projects allows Sewanee to compare different avenues and analyze the benefits of certification and third-party collaborations as they occur in similar contexts.

Small scale carbon offsetting initiatives hold a lot of potential to mitigate carbon emissions while enhancing the carbon farmers' quality of life. Although large scale carbon offsetting corporations prove to need stricter regulations, small scale initiatives have helped farmers transition to more productive resilient agroecosystems while combating climate change. Through more research and experimentation, carbon farming initiatives have the potential to

incentivize and expand climate mitigation efforts to protect our planet from anthropogenic growth.

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