

CULTURAL ECOSYSTEM SERVICES ENHANCE INVESTMENTS IN OTHER ECOSYSTEM SERVICES

Carbon credits in Haiti

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Introduction

Understanding the cultural ecosystem service (CES) value of land use, especially that of agriculture in the Global South, is key to understanding how the environment contributes to lifestyles, identity, a sense of place, and importantly, resilience to stressors (McElwee et al., 2022; Reed et al., 2017). In the Global North, CES such as recreation, aesthetics, and education are highly valued, while in the Global South, traditional knowledge, spiritual beliefs and sense of place are often critical to both identity and survival (Horcea-Milcu et al., 2013, Gould et al., 2020). This chapter examines opportunities for collaborative solutions between the Global North and South that can improve ecosystem services (ES) such as carbon sequestration and agricultural resiliency by also focusing on CES. A case study demonstrates how a partnership between a small liberal arts college (Sewanee), the Haitian non-profit Association Zanmi Agrikol (AZA), and 50 Haitian farmers continues to sequester carbon through a payment for ecosystem services program that places a concurrent emphasis on the CES of education, sense of place, and inspiration. Improved CES for all parties then strengthens the carbon sequestration through planting and maintaining trees that protect the soil and offer products to diversify and raise farm incomes (Figure 30.1). This is important because, while it has been noted that CES often overlap with other ES (Hernandez-Morcillo 2013), less has been written about how CES improvement can be instrumental in the long run success of other ES enhancement efforts (Nielsen-Pincus et al., 2017).

By strengthening the CES of education, sense of place, and inspiration, this ongoing project successfully provided additional carbon sequestration where many others have fallen short. The emphasis on CES strengthened project capacity to provide additional carbon while still offering sufficient compensation to offset opportunity costs for farmers. These features ensure the long run confidence in the carbon sequestered and address some significant challenges facing offset programs (Bremer et al., 2023, Microsoft, 2022). This approach also added an element of restitution between the Global North and South. That is, based on the history of colonial environmental degradation – and climate change caused by greenhouse gas emissions released by the Global North but suffered by the Global South – there is inherent inequity surrounding climate impacts. Carbon offsets can more equitably distribute the burdens and benefits of sequestering CO₂ emitted by the Global North in the forests and agricultural systems of the Global South (Loos et al., 2023).



Figure 30.1 Cultural ecosystem services strengthen carbon sequestration and other ecosystem services provided by trees.

Source: Haitian Tree watercolor by Eileen Schaeffer.

Carbon offset credits

Carbon sequestration in vegetation and soils offers a powerful tool to help mitigate greenhouse gas emissions (Griscom et al., 2017, Miltenberger et al., 2021). Carbon credits allow purchasers to pay for carbon sequestration that would not otherwise occur, and purchasers understand that the additional carbon sequestered balances their own carbon emissions. Offsets come from activities that reduce CO₂ emissions, such as switching to more carbon-neutral fuels, or by planting trees (Gurgel, 2022). Offset credit sellers gain income for sequestering carbon and as a result, other ES are also often enhanced (typically referred to as ‘co-benefits’) including services like watershed protection, soil fertility, and other provisioning products that can diversify income streams. Such co-benefits are particularly valuable in making smallholder farms more climate resilient (Anderson and Zerriffi, 2012).

The carbon offset approach is relatively easy to use, minimizes regulations needed to restrict emissions, and the credits can be traded to those who place the greatest value on them. The mechanism is most frequently implemented when governments use a cap-and-trade approach to emissions reductions but buyers can also voluntarily decide to purchase carbon credits (Corbera et al., 2009). In all cases, carbon credit offsets support the ES of climate regulation (MEA, 2005).

Criticisms of carbon offset programs include the potential for greenwashing and spurious carbon accounting, perverse incentives that can lead to leakage (e.g., planting trees to earn credits in one place while trees elsewhere are cut) and unintended social impacts (Miltenberger et al., 2021). An often-cited critique is that some or most of the sequestered carbon may have occurred anyway absent the payments (Haya, 2019, Temple and Song, 2021), meaning that the credit fails to meet the ‘additionality’ criterion for credits. Other criticisms identify negative social impacts like restricting land use by local people, and disenfranchising stakeholders by excluding them from the design process. Finally, it is difficult for smallholders to enter carbon markets and the payments are often meager due to transaction costs and low carbon prices (Defries et al., 2022). In general, carbon offset credit systems require that the credits be additional, permanent, show no leakage, verified by a third party, and ideally developed through a participatory process.

Sense of place

One commonly accepted definition of sense of place is the “emotive bonds and attachments that people develop or experience in particular locations at scales ranging from the home to the nation” (Foote and Azaryahu, 2009, p 96). We are unaware of research that identifies sense of place as a CES that specifically enhances carbon sequestration. However, strengthening sense of place has been identified as a key correlate with ecological conditions (Ryfield et al., 2019) that are connected with place-protective behavior (Rajala et al., 2020; Stedman, 2003) including both adaptation to ecosystem changes and improved environmental stewardship (Chapin and Knapp 2015; Masterson et al., 2019). For example, sense of place has been repeatedly and strongly linked to biodiversity conservation and human well-being (Hausmann et al., 2016). Others assert that strategies to “build place attachment could create a reservoir of potential stewardship” (Chapin and Knapp, 2015, p. 38).

Research on sense of place has been most often associated with high-amenity landscapes, but the need to include working lands, such as farms, has been recognized (Eaton et al., 2019). Other work has suggested that sense of place should be interpreted within the context of place meanings, such as ‘way of life’ and ‘heritage’ (Tekken, 2017) to assess attachment (Rajala et al., 2020) and corresponding impact on environmental stewardship (Lincoln and Ardoin, 2016; UNESCO, 2020) and willingness to pay for other ES (Nielsen-Pincus et al., 2017). For these reasons, Ryfield et al., (2019) refer to sense of place as a CES with “neglected economic value”.

Case study: Historical context: Land and sense of place in Haiti

One region exemplifying how sense of place is critical to both cultural identity and survival is Haiti's Central Plateau where farmers have adapted to and persevered with agricultural production on land degraded by centuries of deforestation and soil erosion. For Haitian farmers, land is their primary source of livelihood and a legacy of the Haitian revolution which overthrew French plantation slave owners to become the world's first free black republic (Dubois, 2012; Popkin, 2010). Recent scholarship highlights the pivotal role of the revolution in the anti-slavery movement across the hemisphere. Ferrer (2012, p. 64) writes about the new reality created for Black Caribbeans, "The resulting state of Haiti stood not only as a symbol of liberty, but literally as free soil, a place in which freedom, enshrined in the law, could be real for black persons in their own lifetimes". Yet centuries of colonial resource extraction and other foreign intervention have had profound and lasting impacts on Haiti's ability to develop as a nation, build an economy and foster sovereign resilient food systems. The resulting acute poverty, political chaos, and gang violence now (Di Blasi, 1992; Fuentes, 2010; Johnston, 2024; Moore and Koski-Karell, 2023) have also left Haiti vulnerable to global threats, such as climate change (Mosello et al., 2023, World Bank Group, 2021).

But farming in Haiti was not always unsustainable. Pre-Columbian farming systems on the island of Ay-ti (Taino-Arawak for land of mountains) included soil conserving raised beds and orchard gardens that resembled modern agroforestry systems (Bargout and Raizada, 2013). Throughout the 18th century the island of San Domingue (now Haiti) was so endowed with natural capital that it was called the "Pearl of the Antilles". Through brutal exploitation of enslaved Africans, the colony exported coffee, sugarcane, indigo, and timber to fill the coffers of France (Dubois, 2012; Popkin, 2012). The slaves and their Haitian descendants fought the French to win their independence in 1804 and in the same year, the new Haitian government attempted to slow tree cutting for the first time (Westberg, 2023).

Facing French warships and economic isolation, Haiti was forced to pay reparations over a period of 120 years (estimated to be as high as \$21 billion in today's dollars) using loans financed by French banks (Porter et al., 2022). These payments were later enforced by the U.S. military who occupied the country from 1915 to 1934 (Moore and Koski-Korell, 2023). To help pay this "double debt" Haiti exported timber (Tarter et al., 2018). Further U.S. interference included pressure to liberalize trade policies under structural readjustment, increasing the import of commodities, such as American-grown rice and food aid, which undercut Haitian farmers and undermined the nation's agricultural sector (Koski-Korell and Dortilus, 2023; Laguerre, 1987; McClintock, 2004).

Foreign exploitation weakened Haiti's agricultural sector in other ways, initiating a trajectory of slash-and-burn subsistence farming, massive soil erosion and food insecurity. Following independence, plantations were dismantled, and land was redistributed to former slaves and their descendants to create small parcels farmed by families (Freeman, 2014). The parceled farm system is still the predominant model and smallholder farms, usually one hectare or less, occupy approximately 60% of land in Haiti (Eitzinger et al., 2014). To sustain household food production, crop fields, often located on marginal sloping land, are cleared once or twice a year using fire (Freeman, 2014). Continual cultivation combined with tree cutting for charcoal production (an important source of fuel for the

nation and income for rural farmers) has exacerbated soil erosion, contributing to lower yields and food insecurity. Charcoal production is so lucrative that it exceeds the value of the entire agricultural sector in Haiti (Tarter et al., 2018). Along with limited government support for agriculture, farmers' ability to raise food is hindered and climate vulnerability is heightened (Budry et al., 2007, Koski-Karell and Dortilus, 2023). Low farm productivity has also been linked to rural-urban migration (Laguerre, 1987; Westerberg, 2023) and declines in health, especially that of children (McClintock, 2004).

To address these challenges, there have been thousands of international NGO efforts in Haiti (Baptiste, 2015; Kidder, 2003; Schuller, 2007) including reforestation and agricultural development programs. Examples include a 20-year USAID Agroforestry Outreach Project that reached 300,000 families and planted 40 million trees (Bannister and Nair, 1990). Unfortunately, many families later cut and sold trees for income in response to political turmoil in the 1990's (Murray and Bannister, 2004). Other projects, like the Haiti Timber Reintroduction Program (Sprenkle, 2008) planted millions of multipurpose trees, integrating agroforestry and other practices through community-based participatory approaches. Since 2019, a surge of political instability and gang violence, exacerbated by the assassination of President Jovenel Moise and a 7.2-magnitude earthquake, made it very difficult for most NGOs to operate in Haiti, despite the fact that the humanitarian crisis continued to worsen (Nagpal, 2023).

Zanmi Kafe case study: Coffee, carbon, and climate justice

Association Zanmi Agrikol (Partners in Agriculture, or AZA) began in 2000 as a sister organization to Partners in Health (PIH). The group initially cultivated peanuts and other crops for Nouri Mamba, a nutritional supplement used to treat malnourished children in PIH hospitals. AZA grew to include two experimental farms, a vocational school named Centre de Formation Fritz Lafontant (CFFL) that trains agricultural technicians and entrepreneurs, a soil testing lab and a food security program that serves 15,000 families throughout the Central Plateau.

In 2006, Sewanee began spring break service-learning trips to Haiti's Central Plateau that included visits to the PIH hospital Zanmi Lasante, started by Father Fritz Lafontant and Dr. Paul Farmer in the community of Cange. The outstanding models of health care and community development work were very inspiring, but the benefits of the spring break trips (powerful experiential learning) largely accrued to college students. To address this inequity Sewanee and AZA developed a program that provided support for needs expressed by Haitians, while educating students about place-based approaches to address environmental injustices. One goal was to explore the idea that payment for ecosystem services (PES) offered tangible opportunities to transfer income from the Global North to the Global South and restore ES provision (Midler et al., 2010). Others were to build a long-term relationship with Haiti and inspire place-based climate action by Sewanee and Haitian students, through education about the global forces that contribute to poverty and environmental degradation.

The conversations produced a plan for a shade coffee-based agroforestry project that would pay farmers for carbon sequestered in new trees in the community of Bois Joly, where families had expressed a keen interest in growing coffee, as their parents once had. Selling carbon credits from these coffee agroforests could also enhance farmland by providing numerous co-benefits such as soil protection, reduced temperatures, enhanced nutrient cycling, and products such as coffee and

construction materials. Between the payments and the co-benefits, the program had the potential to improve overall farm resiliency. Haitian and Sewanee students would be trained to conduct household interviews and tree surveys for the verification process. The strategy paid farmers for carbon credits, gave students valuable skills and strengthened connections among all partners (McGrath, 2014; Hammon, 2020). As such, the project would help remove barriers to tree planting and smallholder participation in the carbon offset market, which normally include considerable set up, monitoring and verification expenses. Sewanee would purchase the carbon credits produced by Bois Joly farmers - utilizing a campus “Green Fund” targeted for sustainability projects.

In 2013 the Zanmi Kafé (Haitian Kreyol for Partners in Coffee) project was launched with the establishment of a small tree nursery that included coffee and multipurpose shade trees on land provided by farmers. All partners supplied materials and labor and Sewanee provided additional financial support for seedlings production. The initiative started with 22 Bois Joly farmers, but grew to include 36 and then 50 farmers between 2014 and 2015. During the same period, approximately 18,000 seedlings were distributed to the families. Participating farmers were interviewed, attended meetings led by AZA technicians, and allowed AZA and Sewanee to survey trees on their farms (McGrath et al., 2022).

The tree surveys began in 2015. Prior to implementing the project, trees already growing on the farms were surveyed to calculate the carbon in “pre-project trees,” so that the carbon credits accounted for losses of carbon with the cutting of some pre-project trees since 2013. Students were trained to measure tree diameter and height and other field sampling techniques. They hiked across the hillsides to conduct surveys over several days. Farmers were paid for only the new carbon added with project trees, representing truly additional CO₂ sequestration. To our knowledge, ZK project was the first payment for carbon sequestration program in Haiti (McGrath et al., forthcoming).

Case study: Zanmi Kafé case study outcomes and the role of CES

Over a decade, this partnership (1) provided additional income for smallholder farms in Haiti’s Central Plateau; (2) supported carbon sequestration and decreased charcoal making; (3) provided Sewanee with highly additional and verified carbon offsets; (4) offered Sewanee and Haitian students hands-on skill-building in monitoring carbon sequestration; (5) provided transformative cross-cultural educational experiences that inspire action to promote environmental and climate justice and (6) potentially decreased out-migration by supporting sense of place for farmers. In addition to the payments received by farmers from Sewanee, a partial list of ES supported directly and indirectly by the project is shown in Table 30.1.

Since 2013, the Sewanee Green Fund paid the 50 households over \$30,000 for carbon credits for the sequestration of over 600 tons of CO₂ (tCO₂-e) (McGrath et al., forthcoming). Over the ten years of the project, this represents an average price of \$51 per Mg CO₂-eq, in line with the “social cost of carbon” estimated at \$50 per tCO₂-e (Rennert et al., 2022). The CES of transformative educational experiences was bundled in the carbon price. The credits purchased in 2019 offset all airline-related CO₂ emissions from the project and those purchased in 2022 were allocated to offset student travel for environmentally-focused study abroad programs.

Table 30.1 Ecosystem services affected through carbon credit partnership in Haiti.

<i>Ecosystem service (ES)</i>	<i>ES type</i>	<i>Populations benefiting</i>	<i>Populations contributing</i>
Carbon Sequestration	Regulating	Global	Participants
Agricultural Production	Provisioning	Farmers	Farmers
Education	Cultural	Students, Communities	All partners
Sense of Place	Cultural	Farmers	All partners
Inspiration	Cultural	Students, farmers, Communities	All partners
Travel-related CO ₂ emissions offset	Regulating	Sewanee	Farmers
Soil Stabilization	Supporting	Farmers, Downstream Communities	All partners
Soil Fertility	Supporting	Farmers, Downstream Communities	All partners

In the early years of the ZK project, the payments were small but exceeded the mass of carbon sequestered in the new saplings and small trees. These “advanced payments” were intended to keep farmers engaged. In 2019, project trees were large enough to base the payments on the mass of carbon sequestered in tree biomass. As the trees grew, so did the payments. By 2022, the median carbon payment per farm was about \$250 which represented a 20–40% increase in household income for that year (McGrath et al., Forthcoming).

A 2018 survey of ZK households found that over half the families used the carbon payment to buy items such as school materials that would normally be afforded by selling charcoal made from trees. In 2018, many farmers began selling coffee which also added to their income. Some farmers cut, but replaced with seedlings, shade trees to use as construction materials, which represent a high value product that families can use, sell and continue producing over time.

From 2013 to 2018, an average of 15 Sewanee students and 10 Haitian students per year participated in survey work. Students also conducted summer research in Haiti, including work comparing biodiversity indicators (Fripp, 2016) and soil properties in coffee agroforests of different ages (Davis, 2017). A household survey showed that over half of project participants either made less charcoal from trees, or made none since joining the project (Ngo et al., 2020).

In 2019, when it became impossible for students to safely travel to Haiti, AZA took over program management. AZA technicians who had themselves participated in the project as CFFL students, performed extension work and conducted tree monitoring. Sewanee graduates continued to participate in the project by analyzing data, making maps and training the AZA technicians remotely to use GIS. Collaborative work with other institutions included developing a calculator to estimate potential carbon storage in Haitian agroforestry systems, as well as a remote sensing model to verify carbon sequestration from satellite imagery.

Faculty-led, and student-conducted, carbon verification in this program meant that the overall cost of producing valid carbon credits was reduced. This reduced cost meant that the Haitian farmers could receive a larger portion of the carbon payments. Working together in the ecosystem, students developed relationships with farmers, strengthening the collaborative partnership as well as an understanding of sense of place (McGrath et al., 2022).

Sewanee students were obvious beneficiaries of this program, and many earned graduate degrees and pursued careers in fields such as forestry, global health, ecosystem services and medicine. As professionals, many alumni continue to offer technical support to the ZK partnership while others

make financial contributions to the project. While it is difficult to quantify the impact of this educational experience on students, the fact that so many continue to support the program as alumni suggests that the place-based educational experience was both transformative and inspirational.

Importance of CES

Several CES were strengthened through the ZK partnership, and the program in turn has been more successful because of CES enhancement (Figure 30.2). The CES elements of education, sense of place, and inspiration for climate justice have reinforced the other program elements that are aimed at improving the regulating, provisioning, and supporting ES. It may be that education about the intersection of historical, social and economic factors that influence environmental health, justice and human well being created as much or more value than the technical training involving the measurement of carbon and other ecological indicators.

Although challenging to assess, we believe the project strengthened the sense of place for farmers and students, as well as inspiration to work toward mitigating historical and climate injustices between the Global North and the Global South.

Education. The significance of place-based education is well recognized as a CES, although measurements for this service are complicated (Mocior and Kruse, 2016) and may only provide a low-end estimate of value (e.g. Hutcheson et al., 2018). More recent efforts (Webb et al., 2023) have emphasized that hands-on learning approaches are needed to enact far-reaching structural changes that focus on planetary health. Other research has emphasized the importance of harnessing transformative learning in the movement toward sustainable development (O’Grady, 2022, UNESCO, 2020). Indeed, transformative education and experiential learning often provide skills and purpose that inspire informed and sustained action (Gibson, 2021), such that the CES of education and inspiration are often intertwined.

A strong sense of place was developed in students as well. Both Haitian and Sewanee students better understood the cultural and historical significance of the Haitian revolution through planting the trees. They were exposed to the lasting impacts of environmental degradation and economic exploitation by the Global North, and its contributions to food insecurity and climate change

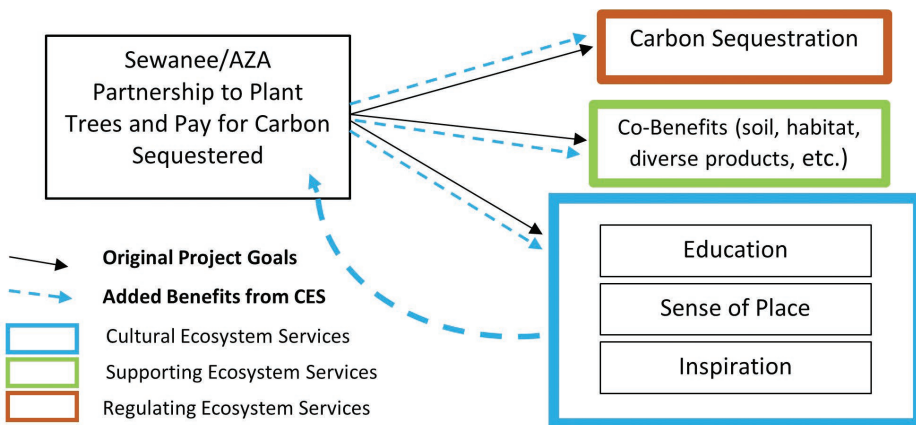


Figure 30.2 Sewanee/AZA Partnership and reinforcing role of cultural ecosystem services.

Source: Figure by authors.

vulnerability. These experiences opened space for conversations about Haiti's identity as the first free Black republic, as well as past and present injustices that create an imperative for the Global North to support efforts at development and adaptation by the Global South. When students visited Central Plateau farms, they experienced the generosity of rural families and witnessed the ingenuity, skill and tenacity with which Haitian farmers have already faced so many environmental challenges. Working alongside Haitians, students not only gained skills in field methods, but they also recognized the complexity and nuance of narratives about poverty and environmental degradation.

Sense of Place. Soon after the ZK carbon offset program began, an important sister project was developed by documentary photographer Pradip Malde. "Zanmi Foto" (partners in photography) put cameras in the hands of families with the objective of fostering household conversations about community needs and strengthening families' sense of place. It also provided photographic evidence of environmental and community change through the eyes of those who experienced it. Most of the Zanmi Foto families also participated in the ZK project. Trained by Professor Malde, AZA technicians and former CFFL students led the project, providing families with some instruction on photography. They returned to Bois Joly at frequent intervals to collect memory cards from the cameras so they could print out the photographs at AZA. The photos were returned to the families who arranged them in photo albums that they shared widely with visitors and neighbors. Over time, Zanmi Foto provided some of the most important photographic evidence of the environmental improvements that accompanied tree planting. Judging from the excitement with which the families shared their photo albums, the project communicated a sense of identity and place already deeply felt by these families.

Inspiration. According to Dai et al., (2022) inspirational services provided by CES include "intellectual motivation and humanity". We contend that inspiration to act in ways that address injustice is a critical place-based CES that enhanced, and was enhanced by, project goals of carbon sequestration. Some authors (Coscieme, 2015; Costanza et al., 2014) have written that the interaction and/or balance of natural, social and human capital are necessary to sustain and improve human well-being. In this project, inspiration was derived through the cross-cultural and shared experiences of building the agroecosystem, learning new skills, and acquiring a better understanding of the context in Haiti. These outcomes in turn strengthened the natural capital that developed from the establishment of income-generating and ecosystem-enhancing agroforestry systems. In this way, inspiration propelled the project forward, year after year despite increasingly difficult circumstances in Haiti. The inspired work of students on campus supported the continued purchase of offsets from Haitian farmers after 2019, even though students were no longer involved in on-the-ground measurements. Similarly, other projects have shown that active participation by local communities strengthen both the social and environmental outcomes and build longevity that produces transformative change (Bremer et al., 2023).

Summary and lessons learned

Despite the potential of CES to engage people more deeply, CES often remain a secondary or complementary focus of most ES research and decision making (Horcea-Milcu et al., 2013). But CES may strengthen climate mitigation efforts and other ES due to the inherent linkages between sense of place, education, and inspiration to work for justice and economic and ecological improvement.

Throughout the ZK partnership, the attention to outcomes embodied by CES was crucial to the ongoing success of this program. Without these elements it is unclear whether the project would have survived. This model capitalizes on the mutual gains from

- Carbon offsets for an academic institution, which values carbon sequestration
- Increased income for smallholder farmers

- Improved growing conditions for coffee production and better protected soils
- Place-based training and skill building for students and a non-profit partner
- Improved sense of place CES for farmers that may help reduce outward migration
- A more contextual understanding of environmental degradation and poverty
- Education and inspiration to address climate injustice

Carbon markets can offer a means of transferring income from the Global North to the Global South to help balance the burdens of climate mitigation efforts. Focusing on the CES available through carbon exchanges can increase the value to all; the carbon offsets produced are measurable and additional, smallholder farm incomes and resiliency are improved, and co-benefits are strengthened throughout. Especially in vulnerable places like Haiti, where deforestation undermines agricultural resiliency, these landscapes can be good investments for carbon offsets. Additional research should focus on evaluating the long run lift for all types of ES benefits from the investment in CES. With intersectional goals of education, sustainability and environmental justice, colleges and universities are natural partners for ES programs that integrate CES. This project offers a model for leveraging academic institutions as collaborators in future carbon partnerships and improved CES that may be adapted to other locations.

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