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The Skarù·rę? (Tuscarora) Food Forest Project—Reconciliation in Sustainable Agriculture Research and Education through Cross-Cultural Agroforestry Demonstration

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Abstract Temperate nut trees have long been utilized in eastern North America, providing high quality food, durable materials, and contributing to multispecies relationships across geographic and cultural landscapes. While not widely consumed today, renewed interest in temperate nuts such as hybrid chestnuts and hazelnuts, are part of efforts to realize nature-based solutions to climate change, which include multifunctional agroforestry systems. Indigenous peoples' contributions to agroforestry and climate resilience are substantial, however sustainable agricultural research often overlooks critical social justice implications underlying the history of colonization in settler nations, including dispossessed land and appropriated Indigenous crops. As one of the most nutritionally dense plant-based foods, nuts were important components of Haudenosaunee foodways. Archaeological, ethnographic, and historical-ecological evidence indicate that the Haudenosaunee subsistence and settlement dynamics transformed cultural landscapes favoring such nut trees. The *Skarù·rę*? (Tuscarora) Food Forest was a community-based project demonstrating contemporary contributions of nut trees to Indigenous food systems in ancestral Haudenosaunee territories, today known as New York State. While domesticated crop polycultures (i.e., the Three Sisters) are iconic of Haudenosaunee horticultural ingenuities, temperate nuts are lesser-known woodland foods that can additionally contribute to food and language revitalization efforts within contemporary Haudenosaunee territories. Here we discuss theories and praxes informing community engaged approaches at the *Skarù·rę*? Nation. By addressing social justice concerns within agricultural science, we demonstrate how the *Skarù·rę*? Food Forest Project can provide a methodological testing ground for reconciliation-based and decolonial participatory action research that expands ongoing food sovereignty, community health, and education initiatives.

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Introduction

Agroforestry is the intentional inclusion of woody perennials within crop and/or livestock systems to meet livelihood and ecological needs. It has long existed globally in landscapes stewarded by Indigenous traditional ecological knowledges (Fajardo Cavalcanti de Albuquerque 2020). The subject of this manuscript occurred at the *Skarù·rę*? (Tuscarora) Nation, a federally recognized Indian reservation in so-called Lewiston, New York (NY), United States (US), and is in the ancestral homelands of the Haudenosaunee Confederacy. Archaeobotanical and historical ecological evidence demonstrate the presence and cultural use of nut trees since at least 2500 BCE in this biocultural landscape (Gerard-Little 2017, Ritchie 1980; Schaefer 2011, Tulowiecki et al 2020; Yarnell 1984). Through photosynthetic carbon capture and storage in plant biomass and soils, agroforestry has a global carbon (C) sequestration potential of up to 5.7 gigatons C yr^{-1} (Mbow et al. 2019). As such, it ranks

highly amongst nature-based solutions (NbS) to climate change, which together are estimated to deliver 30–40% of global greenhouse gas mitigation by 2030 (Arneth et al. 2019; Griscom et al. 2017). Agroforestry also enhances ecosystem services, biodiversity, and sustainable food production (Munsell and Chamberlain 2019).

Despite accounting for 4% of the global population, Indigenous peoples currently manage, own, and/or steward 40% of critical protected areas worldwide and 22% of tropical and subtropical carbon resources (Garnett et al. 2018; Frechette et al. 2018). Recognition of Indigenous contributions to NbS and climate resilience were outlined in the Paris Climate Agreement (United Nations 2015), the IPCC special report on Climate Change and Land (Arneth et al. 2019), and elsewhere (Townsend, Moola, and Craig 2020). However, claims that agroforestry (and NbS) can contribute to transformational change often fail to consider aspects of social justice, colonization, and sovereignty. For example, it has been argued that scaling-up the extent of agroforestry to help global agroecosystems align with sustainable development goals needs to critically support resurgent Indigenous governance (Artelle et al. 2019), transdisciplinary action-research for multifunctional forestry (Ojha et al. 2019), inclusive knowledge co-production discursive to settler colonial human-nature divides (Woroniecki et al. 2020), and account for limitations in the NbS approach.

Reconciliatory & Community Engaged Research in the Haudenosaunee Context

The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), detailing the freedoms and human rights standards entitled to Indigenous peoples worldwide, recognizes treaties as the basis for strengthening relationships between Indigenous and State entities and asserts the State's responsibility for providing public education therein for its non-Indigenous citizens (UN General Assembly 2007). In 2015, the Truth and Reconciliation Commission (TRC) of Canada not only bolstered UNDRIP's assertions regarding the central role of education (Truth and Reconciliation Commission of Canada 2015:298–290), but also highlighted the role of cross-cultural research partnerships as "vital to reconciliation" (ibid. 293). While social science and humanities disciplines were particularly called in by TRC, natural and physical sciences have often been central in colonial conquests of land and the subjugation of Indigenous peoples (Smith 2012). On the other hand, Indigenous peoples not only have made numerous contributions to scientific disciplines but can also help advance shared goals and objectives regarding environmental sustainability (Turner, Cuerrier, and Joseph 2022). Given the fraught history and political implications of land, biodiversity, and ecosystem research, natural scientists need a heightened awareness of how their work does, or does not, contribute to reconciliation (Dawson et al. 2021; Wong et al. 2020).

The *Skarù·rę*ʔ Food Forest Project (SFFP) is a collaboration between a non-Indigenous Cornell University (CU) PhD graduate (Samantha Bosco, PhD '22, Horticulture) and Skarù·rę? (Tuscarora Nation) members. The project was a component of Bosco's dissertation research about the past, present, and future contributions of temperature nut trees to Haudenosaunee food sovereignty and climate smart agriculture in New York state (Bosco 2022 forthcoming; Bosco and Thomas 2019). Emerging in the contemporary US context, where states and institutions have shown much greater inertia to UNDRIP, this project sought to enact anti-oppressive praxes called for in the Declaration and elsewhere in critical Indigenous literature. "Land education" (Tuck, McKenzie, and McCoy 2014)— placed-based Indigenous futurities as an intervention to settler colonial assumptions in education—and "Decolonial Participatory Action Research (DPAR) (Tuck and Guishard 2013)—centering Indigenous relationality and protocols when conducting community-based research with Indigenous peoples—broadly informed SFFP. As a cross-cultural collaboration, the *Kaswentha* (Two Row Wampum, or Covenant Chain Treaty) was centered to ensure that Haudenosaunee treaty rights, cultural identity, values, and traditional knowledge were respected (Ransom and Ettenger 2001). The Two Row Wampum has also been used as a guiding framework for cross-cultural authorship (Hill and Coleman 2019) and following this philosophy, this paper was primarily authored by Samantha Bosco with contributions from Bradley Thomas (*Skarù·rę*ʔ; Snipe Clan).

*Skarù·rę*ʔ are one of six sovereign Indigenous Nations comprising the Haudenosaunee Confederacy in the United States (Figure 1), whose territories, customary laws, and governance structures, precedes the establishment of CU, New York, and the United States by millennia. Cornell University was established

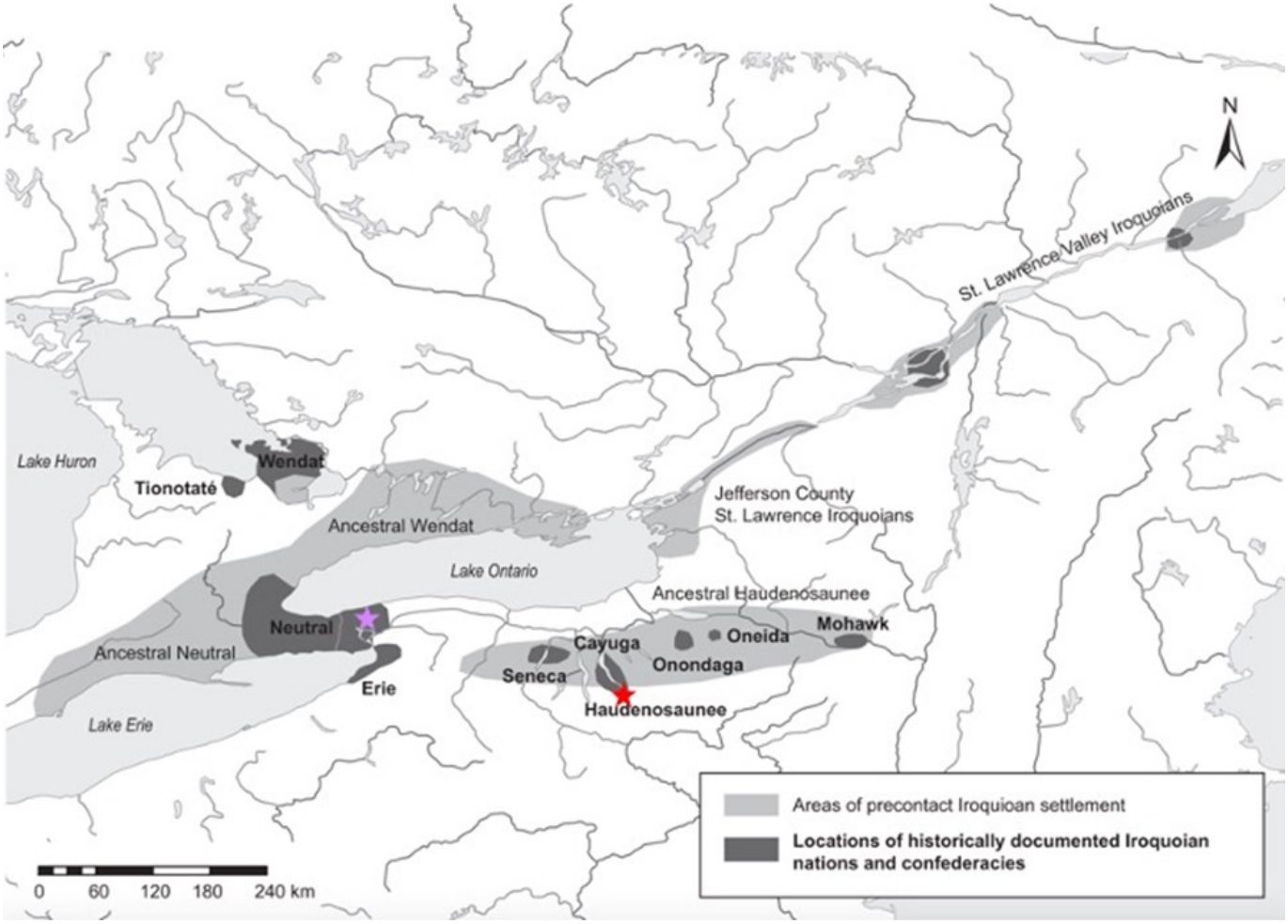


Figure 1 Archaeologically and historically documented locations of the Haudenosaunee Confederacy and other Northern Iroquoian Nations (reproduced from Birch and Hart 2018). The approximate location of Cornell University is indicated by a red star (★) and the approximate location of the Tuscarora Federal Indian Reservation is indicated by a purple star (★).

through the 1862 Land Grant under the Morrill Act of 1862, enabling the sale of nearly one million acres of stolen Indigenous land (Lee and Ahtone 2020). The Smith Lever Act of 1914 mobilized a national Cooperative Extension Service (referred to as simply "extension") that extended outreach programming of Land Grant Institutions through county-based association offices— expanding and entrenching settler agriculture agendas throughout the state. The Ithaca, NY-based campus presently resides on the ancestral territory of the *Gayogo̱hó꞉nǫ'* (Cayuga Nation); the University owns and operates several thousands of acres across the Haudenosaunee homelands and beyond (Jordan 2022). Cornell's academic Horticulture program, within the College of Agriculture and Life Sciences (CALS), has been central to the Land Grant Charter since its establishment and has achieved global eminence in agriculture research and education today. An official response, list of demands, and further analysis related to the "Land-Grab Universities" report is maintained by the American Indian and Indigenous Studies Program (AIISP) at CU (ibid.).

AIISP is administratively based in CALS and officially began in 1983 (then the American Indian Program; American Indian and Indigenous Studies Program 2022). It was sparked by Indigenous student activism a decade earlier finding that CU's negligence in actively recruiting Indigenous students was in violation of the 1964 Civil Rights Act. Today, over 400 Indigenous undergraduate and graduate students are affiliated with AIISP, with one of the highest

Indigenous student retention rates in the US. Dr. Professor Emeritus Jane Mt. Pleasant (Tuscarora), who was Bosco's PhD committee chair until her retirement in 2018, served as the AIISP director from 1995–1999 and 2002–2008, and advised Bosco during the initiation of SFFP. Professor Jolene Rickard (*Skarù·rę*ʔ, Turtle Clan), served as AIISP director from 2011–2019 and in 2017 invited Bosco to the Tuscarora Reservation to discuss SFFP with Tuscarora title holders. Professor Kurt Jordan serves as the current AIISP director and was also on Bosco's PhD committee advising her graduate minor in American Indian and Indigenous Studies.

Acknowledging the deeply rooted colonial histories of the university and New York State, and as a student benefiting from this, SFFP sought to collaboratively center Haudenosaunee people and perspectives to: (1) interrupt ongoing silence and apathy of this settler colonial legacy within CU, and (2) offer an example of agriculture research and education that integrates social justice aspects of sustainability (Klinsky et al. 2016).

Many New Yorkers (and US citizens) assume Haudenosaunee peoples are remnants of the past and no longer present in the region. In fact, Haudenosaunee are vigorously rebuilding and expanding their communities across New York and Canada (Simpson 2014). Along with language revitalization, direct actions, self-governance, and economic development, many communities are highlighting the importance of food (Adams 2020; Delormier et al. 2017; Mt. Pleasant 2016) and forests (Francis 2019). Indigenous food sovereignty (IFS) is the expansion of political rights discourse and action around food production and consumption to include Indigenous cultural, social, and governance resurgence (Grey and Patel 2014). Further, IFS accounts for the interdependent relationships between Indigenous peoples, the places of their territories, and the sacred responsibilities that give rise to the enactments of particular practices (Martens et al. 2016).

Haudenosaunee Food Sovereignty in a Nutshell

Intercropped annual plants including maize (*Zea mays*), beans (*Phaseolus vulgaris*), squash (*Curcubita pepo*)—collectively referred to as the "Three Sisters"—as well as sunflower (*Helianthus annuus*) are foundational to Haudenosaunee food sovereignty as well as to the food sovereignty of their Iroquoian speaking neighbors in territories north of Haudenosaunee homelands (see Schillaci et al. 2017 for a spatiotemporal review of Iroquoian languages) and their Anishinaabe neighbors in the Upper Great Lakes region. This cropping system was decisively important to the regional size and political strength of the Haudenosaunee leading up to colonial invasion (Mt. Pleasant and Burt 2010). These plants' role in Haudenosaunee cosmology further underscore deep cultural and ontological ties (Adams 2020). By 1300 CE, archaeological evidence suggests that Haudenosaunee and other northern Iroquoian peoples established agriculturally based villages that were relocated in cycles lasting up to 40 years (Birch et al. 2021) forming landscape relationships beyond the cleared fields and into forests edges.

Trees are important parts of Haudenosaunee biocultural life- and foodways. For example, black ash (*Fraxinus nigra*) was and is commonly used for constructing baskets (Francis 2019), shagbark hickory (*Caya ovata*) is prized for *Dehoñtjihgwa'és* (lacrosse) sticks and hunting bows, while red oak (*Quercus rubra*), white cedar (*Thuja occidentalis*), and American elm (*Ulmus americana*) were used for longhouse construction (Gerard-Little 2017). Trees also offer important teachings in Haudenosaunee ontology, axiology, and relationality. Depending on the orator, the *Thanksgiving Address/Words that Come Before All Else* may include references to white pine (*Pinus strobus*) as the Tree of Peace—symbolizing the 1,000-year-old teachings of the Peacemaker that formed the Haudenosaunee confederacy—and how sugar maple (*Acer saccharum*) sap flow marks the beginning of the yearly cycle of ceremonies (Dolan 2016; Francis 2019). Ethnohistoric accounts of nuts in Haudenosaunee food and medicine are well documented (Parker 1910; Waugh 1916).

Forest clearing for domestic centers and agricultural fields, wood harvesting for infrastructure and firewood, and forest management for the maintenance of vital plant and animal communities resulted in long lasting changes to individual species and forest communities at distances of 5–15 km from village centers, detectable even centuries later (Fulton and Yansa 2020; Gerard-Little 2017). For example, the presence of black walnut (*Juglans nigra*) in association with Haudenosaunee settlement and village sites well outside its so-called natural range offers compelling evidence that the species was at least managed and to some extent cultivated and/or transplanted (Coladonato 1991; Wykoff, 1991). Recent spatial models of late pre-Colonial Seneca,

Cayuga, and Onondaga homelands (western and central NY) demonstrates that hyper-dominance of fire-adapted mast taxa (including oak, hickory, walnut, and chestnut species) in 18th century land surveys, again indicating an association between species distribution and recursive practices of Haudenosaunee subsistence and settlement (Fulton and Yansa 2020). Haudenosaunee settlement establishment and subsequent village relocations were importantly cradled and deeply nourished by dynamic relationships with ethnoforests rich in nuts and other wild foods.

By the 18th century, Haudenosaunee communities had selectively adopted European fruit trees into the food systems, including the tending and orcharding of native plums (*Prunus americana*) and non-native domesticated apples (*Malus domestica* [Suckow] Borkh) and peaches (*Prunus persica* var. persica), which were brought to the Western hemisphere by Europeans but also acquired through inter-Indigenous trade (Kerrigan 2008). During the Revolutionary War, American forces targeted British-allied Haudenosaunee Nations, burning thousands of acres of maize and fruit orchards during the scorched earth Sullivan Campaign of 1779.

Haudenosaunee–US relations continued to decline into the 19th Century. Treaties with the now United States promised less and less land for the nations of the Haudenosaunee Confederacy. Residents of the newly formed New York State, aided by transportation projects such as the building of the Erie Canal, moved aggressively to settle newly dispossessed land that had been vacated through violence and bribery (Hauptman 1999; Palmer 2020). The contemporary Tuscarora Reservation is located in the historic Holland Land Company, Morris Reserve, and Phelps and Gorham purchases (Tulowiecki, Robertson, and Larsen 2020), which wrested 3 million acres from Haudenosaunee sovereignty, leaving only 56,550 acres in federally recognized reservation lands. Throughout the mid-19th and early 20th century, life confined to the reservations was further under attack with attempts to culturally assimilate Haudenosaunee youth and disrupt Indigenous family systems through residential schools operated by state and religious organizations, in some cases operating well into the 20th century (Nichols 2006; Palmer 2020; Tiro 2006). By the first half of the 20th Century, the effects of US Indian Termination policies, political meddling by NY , and the ongoing effects of reservation life forced Haudenosaunee communities into destitute conditions, with some Nations extirpated to other US states or across the US-Canada international border. Continued expansion of US federal and NY state development projects, such as the Kinzua Dam, the Niagara Falls "Tuscarora Reservoir", and the St. Lawrence Seaway further eroded the land bases of Haudenosaunee territories, even affecting federally recognized reservations (Hauptman 1986).

Despite centuries of occupation by colonists and settlers, almost complete loss of languages and cultural traditions, denial of sovereignty, and the systematic dispossession of over 99% of their traditional land, the Haudenosaunee have maintained important components of their traditional food ways. Today, Haudenosaunee-led initiatives are actively seeking to restore traditional foods to their diets and multiple food-focused initiatives are active across Haudenosaunee territories including: Iroquois White Corn Project (Friends of Ganondagan 2015); Oneida Community Integrated Food Systems (Oneida Tribe of Indians of Wisconsin 2017); *Kanien'kehá:ka* (Mohawk Nation) Akwesasne Community Food Assessment (saint Regis Mohawk Tribe 2016) and efforts in *Kahnawà:ke* (Delormier et al. 2017); Six Nations Healthy Roots (de Souza et al. 2021); Seneca Nation of Indians Gakwi:yo:h Farm (Pietrorazio 2021); *Gayogo̱hó:nǫ'* ("Cayuga SHARE Farm" 2022; Forstadt 2021); and seed saving and rematriation at the Onondaga Nation Farm (Lisjak 2018).

While traditional corn is often the focus, relationships with forests and particular tree taxa—Indigenous agroforestry— are a less prominent dimension of Haudenosaunee IFS. Attention to temperate nut trees, either currently in forests or intentionally planted, can further expand ongoing food sovereignty initiatives, add to language revitalization efforts, and greatly contribute to Indigenous well-being in the face colonial interruptions to Indigenous food ways (Dennis and Robin 2020). Many Haudenosaunee currently gather nuts or remember their parents and grandparents collecting nuts for home consumption. Community members have identified nuts as a significant source of healthy fats, important for people with diabetes, which are limited due to the contamination of local freshwater fish by industrial pollution in their territories (personal communication, Jolene Rickard; *Skarù·rę*ʔ, Turtle Clan).

Skarù·ręʔ **Nation History — By Bradley Thomas**

"*We were burned down three times and are still here today*!" – Wendy Bissell

Before colonization, Tuscarora people or *Skarù·rę*ʔ lived in what is now called North Carolina, in the areas ranging from the Roanoke, Neuse, Taw and Pamlico Rivers. Much of our historical diet came from living within these systems which had rich agriculture soils, prime fishing water, and forests to hunt and a variety of areas to collect medicine. Archaeological evidence found tree crops such as oak acorns and hickory nuts in middens that prove agroforestry has been a Tuscarora custom for centuries. In our entire history we relied on the forest as a source of food and tended to settle in places with a high number of nut producing trees. In 1713, We were burned down for the first time in the events that followed the Tuscarora War and the battle of *Neyuherú·kę*. The survivors were welcomed by the Haudenosaunee and stayed in Oneida territory along the Susquehanna River near modern day Brisbane NY. The area was flush with everything that was familiar to us, and we were able to provide for ourselves but unfortunately only a couple of generations enjoyed this area until the Sullivan Campaign in 1789.

We were gifted land from the Seneca for the current territory in Niagara County, NY within the Niagara River watershed, with good soil to plant and "great quantities of butternuts and walnuts and a nice stream (Johnson 2006:34)". Despite continual encroachment from New York State, there are many of the 1100 Tuscaroras who still carry on the agricultural traditions on the remaining 24 km^2 territory. Tuscarora, at one point, was home to successful fruit orchards and Tuscarora White Corn is still planted and harvested every year. In recent history, there has been a resurgence of Tuscaroras returning to our original way of life and a need to regain food sovereignty through our traditional diet. *Skarù·rę*ʔ Food Forest is one initiative that has helped Tuscarora people of all ages begin to realize the importance and relevance of forest food crops.

Skarù·rę*ʔ* Food Forest Project — By Samantha Bosco

Project Overview

*Skarù·rę*ʔ Food Forest Project was developed and conducted in three phases from 2016–2021. These phases were modeled after the Akwesasne Good Research Model (Akwesasne Task Force on the Environment Research Advisory Committee 1996, figs. 1, 2), discussed further below. Phase 1 consisted of project development based on literature review, presentation to *Skarù·rę*ʔ for approval, and then following approval, articulated in grant proposals for project funding. Once initial funding was secured, Institutional Review Board (IRB) approval was applied for and granted, and Phase 2 consisted of a two-year period of relationship building between Bosco and *Skarù·rę*ʔ in advance of project implementation. Phase 3 included planning and conducting a three-part workshop series in collaboration with hired and volunteer *Skarù·rę*ʔ community partners, as well as the co-compilation of a SFFP booklet and the co-authorship of this publication. As an outsider-researcher and guest at *Skarù·rę*ʔ, I often felt a tension between the imperative to collect data and the desire to build genuine relationships. This tension was informed by personal observations during Phase 2 that Skarù·rę*ʔ* peoples seemed less interested in filling out forms, being recorded, or being formally (or semi-formally) interviewed. In recognizing their right to refusal (Simpson 2014; Tuck and Yang 2014), I made a conscious effort to prioritize relationship building at the expense of formal data collection. One result of this is that I now refer to this as a community-based "project", rather than "research".

Methods for Allied and Reconciliatory Approaches in Sustainable Agriculture Projects

When I began developing my dissertation research in August 2016, I was interested in focusing on temperate nut trees to advance both agroforestry research in NY and, in recognition of NY and CU's ongoing role in Haudenosaunee dispossession (Lee and Ahtone 2020), contribute to reconciliatory and reciprocal practices as an allied researcher and educator in sustainable agriculture (more recently articulated by Wong et al 2020). There were no similar past or present projects at CU to draw on, however, I was fortunate that my faculty advisor, Dr. Jane Mt Pleasant (*Skarù·rę*ʔ)— was a (the only) Haudeno-saunee (Tuscarora) agronomist at CU. She connected me with the American Indian and Indigenous Studies Program (AIISP) graduate minor where I began engaging with decolonial discourse (Smith 2012, Wilson 2006), traditional ecological knowledges (Escobar 2008; Kimmerer 2013), critical Indigenous and place-based studies (Betasamosake Simpson 2014; Calderon 2014; Furman and Gruenewald 2004; Tuck and Gaztambide-Fernández 2013; Tuck, McKenzie, and McCoy 2014), and decolonial participatory action

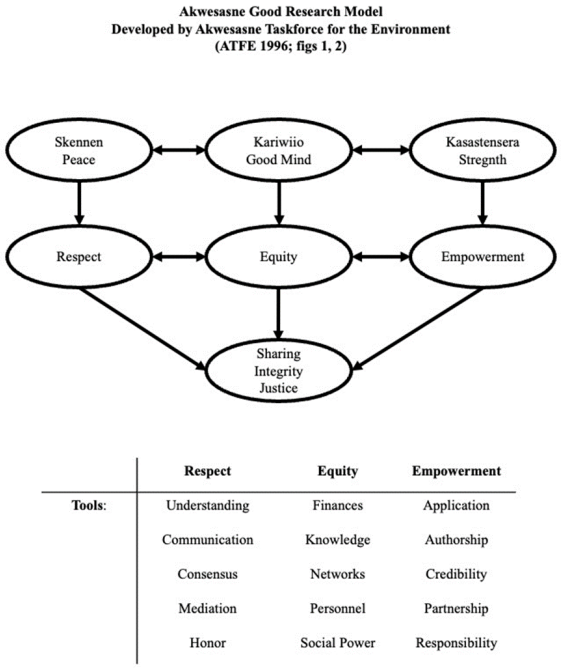
research (Tuck 2009; Tuck and Guishard 2013). The SFFP sought to exemplify a collaborative, community-based, and action-science project that demonstrated the Indigenous roots and future of agroforestry—something that had never been done in the history of CU.

Haudenosaunee historical (Hauptman 1999; 1986) and emic perspectives (Akwesasne Task Force on the Environment Research Advisory Committee 1996; Benedict 2004; Committee Research Advisory 2000; Holmes, Lickers, and Barkley 2002; Lickers, n.d.; Ransom and Ettenger 2001; Story and Lickers 1997; Tarball and Arquette 2000) were most critical in informing this project. The Akwesasne Mohawk "Good Research Agreement" (Figure 2), while not specific to *Skarù·rę*ʔ, was the best approximation for cross-cultural collaborations in Haudenosaunee territories. I used this model to guide how the SFFP was developed, implemented, and assessed. Phase 1: *Skennen* (Peace) included the literature review described above, as well as a pitch to *Skarù·rę*ʔ title holders from several clans in late 2016, describing the ways in which nut trees could help expand food sovereignty efforts delivered. The idea for the project was accepted, and during 2017 and 2018, the project entered Phase 2: *Kariwiio* (Good Mind). I focused on relationship building and familiarity at the reservation by providing interactive and educational table displays focusing on nut trees and foods at the annual Tuscarora History Day and the Tuscarora Community Fair. During this time, Dr. Mt Pleasant and I wrote a federal grant proposal specifically detailing funding for this project, including funding for a Tuscarora Community Partner (TCP), which we budgeted at $20/hour for 20 hours/week over three years.

The grant was awarded in late 2017, and in early 2018 the project welcomed Mia McKie (Turtle Clan) as TCP and Phase 3: *Kasastensera* (Strength) began. Together we co-designed a three-part workshop series that took place between August 2018–June 2019 (Figure 3). While Mia began her doctoral studies in fall 2018 and stepped away from the project, Vince Schiffert (Turtle Clan), teacher at both the Nation's elementary school and the settler Niagara-Wheatfield middle school, became a significant volunteer and collaborator through the duration of the project. Bradley Thomas (Snipe Clan) was hired as the TCP in early 2019 through the duration of the project.

Project Outcomes

Part I—Tree Walk and Talk.



	Respect	Equity	Empowerment
Tools:	Understanding	Finances	Application
	Communication	Knowledge	Authorship
	Consensus	Networks	Credibility
	Mediation	Personnel	Partnership
	Honor	Social Power	Responsibility

Figure 2 The Akwesasne "Good Research Model" schematic, principles, and tools (reproduced from Akwesasne Task Force on the Environment Research Advisory Committee 1996; figs. 1, 2).

On 3 August 2018, Bosco and McKie facilitated a six-hour introductory workshop for which McKie designed the flier (Figure 3A), advertised through word of mouth and posting at the Nation building. The first half of the workshop included a walking tour of a nearby and commonly used grove of trees where participants engaged in dialogue about tree identification, botanical uses, and personal stories—focusing primarily on nut tree species (Figure 3B). The second half of the event included a provided lunch while I presented the scope of the SFFP, highlighting the intersections of food sovereignty, community health, and youth education. We provided some participatory hickory nut tea making opportunities (Figure 3C) and textual information about nut tree ecology and production. Over 20 *Skarù·rę*ʔ Nation members whose ages ranged from 5–95 participated (Figure 3D). Here, voluntary media release consent forms were presented and signed by consenting participants. At the end, attendees of this event were given the opportunity to sign up to receive native fruit and nut tree seedlings in the following spring at Part III of the series.

Part II—Nut processing workshop.

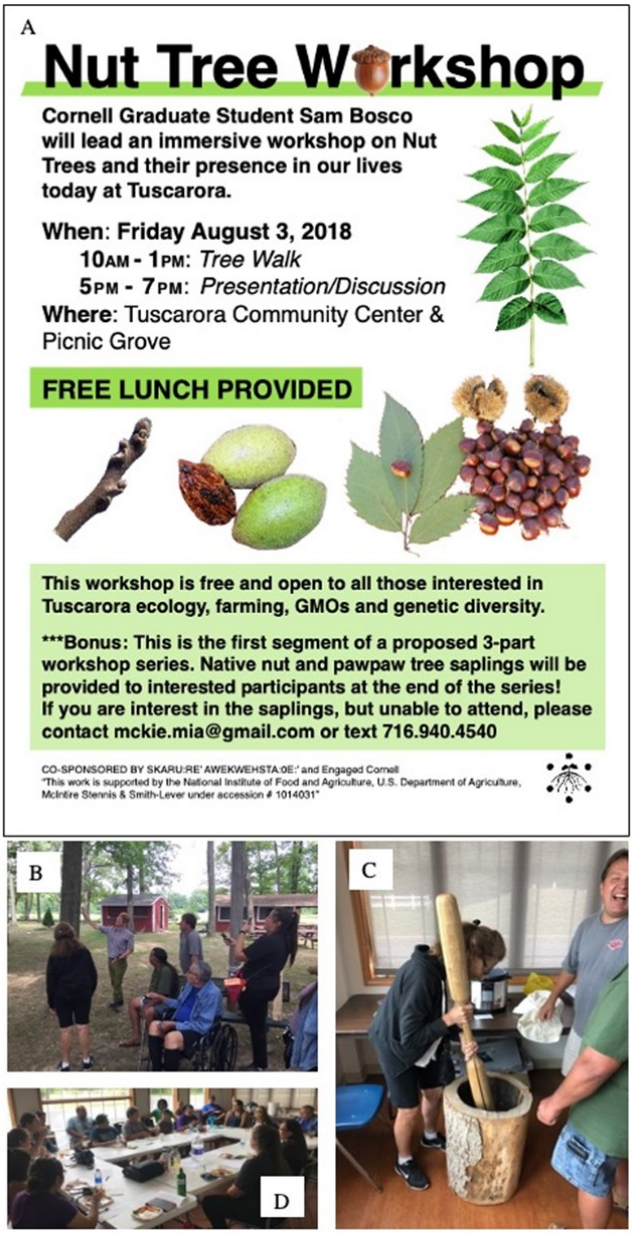


Figure 3 Skarù·rę? Food Forest Project. Part I: Initial nut tree walk and talk flier (A) and pictures (B – D). Photo credits: Samantha Bosco and Waylon Wilson (Skarù·rę?).

Vince Schiffert and I collaborated on advertisement design, with Vince bringing the *Skarù·rę?* word for nuts (Figure 4A). Vince helped advertise the event through word of mouth. On 16 December 2018, 12 participants gathered in the Skarù·rę? Nation House's Community Room for a six-hour interactive and communal nut processing and cooking workshop, with lunch was provided. Schiffert, other Nation members, and I, brought nuts collected from that season including black walnuts (*Juglans nigra*), various hickories (*Carya spp.*), and Chinese chestnuts (*Castanea mollissima*). We split into groups and worked together cracking and sorting nuts. One elder Nation member even brought his own custom-welded drill-powered nutcracker (Figure 4B), which proficiently assisted black walnut processing. Through social network

Figure 4 Skarù·rę? Food Forest Project workshop series Part 2: Nut Processing flier (A) and pictures. (B–D). Photo credits: Samantha Bosco and Bradley Thomas.

promotion, traditional Mohawk seedkeeper, Terrylynn Brant, who operates the Mohawk Seedkeeper Network at the Six Nation Territory in Ontario Canada, made a surprised and welcomed visit (Figure 4C). We made a variety of traditional and modern *Skarù·rę*ʔ recipes, including *nu:yah* cookies (Figure 4D), hickory nut "milk", and chestnut-corn mush. Vince and I both compiled printed resources of nut processing recipes, journal articles, fact sheets, and Haudenosaunee stories about nuts, which were bound in three ring binders and gifted to participants.

Part III—Seedling giveaway and planting.
By this phase of the project in 2019, Bradley Thomas had been hired as community partner. During the winter, we generated further interest in the project through a SFFP Facebook group that Brad created and made short posts about significant native food trees. We collaborated on the event flier (Figure 5A) to share in our Facebook group and contacted the Nation members that signed up for trees during Part I. Over 300 fruit, nut, and medicine plants were brought from the greater Ithaca area to the *Skarù·rę*ʔ Nation on 25 May 2019 (Figure 5B). I grew roughly one-third of the plants using CU greenhouses, with the remainder provided by donation from local permaculture nurseries and farms. Nation members who had signed up for trees during Part I and other Nation members who saw the social media post collected their order. What was not taken was then planted on Nation school grounds and included chestnuts, pecans, elderberries, raspberries, and a variety of medicinal and culinary herbs (Figure 5C).

Additional Events
Based on the success of the previous three workshops, a second nut processing workshop was held 15 December 2019, which expanded the repertoire of nut processed to also include acorns as well as supplies for nut-themed arts and crafts. Owners of the Tuscarora Woodworks business (www.tuscarorawoodworks.com) made custom shirts for the event with the *Skarù·rę*ʔ language word, *Nwęhraruhčręh*, meaning "we gather nuts", and black walnut husks were used to tie-dye the shirts. A second plant giveaway and school planting on 1 April 2021 transferred nearly 200 plants to Nation members and bolstered existing plantings at the Nation school.

Challenges
Two major challenges I encountered were project relevance to life at *Skarù·rę*ʔ and the longevity or continuance of interest in nut trees beyond the project timeline. While Haudenosaunee food sovereignty efforts are primarily focused on Three Sisters cultivation, the SFFP sought to expand this work to

Figure 5 Skarù·rę? Food Forest Project workshop series Part III: Seedling give away and food forest planting flier (A) and photos (B, C). Photo credits: Samantha Bosco.

also include nut trees. In Haudenosaunee cosmology, nut trees do not share the same revered status that the Three Sisters and other plants do (e.g., white pine [Tree of Peace], maple tree [Leader of the Trees]). Engaging *Skarù·rę?* people's interest required drawing on less well-known Haudenosaunee–forest relationships and appealing to the nutritional benefits of consuming nuts (Barbour et al. 2014; Chen, Wan, and Qin 2016; Zhou et al. 2014). Globally, nut consumption falls below dietary recommendations due to misinformation about healthy fat content in nuts and high price of purchasing nuts, among other reasons (Neale, Tran, and Brown 2020). Educational and economic inequities are likely more pronounced on Federal Indian Reserves, such as *Skarù·rę?*, following centuries of attempted genocide and forced assimilation, obscuring even older histories of Indigenous-forest relationships. Being of settler descendance, I had to ensure that the SFFP was inclusive, expansive, and in service to existing *Skarù·rę?* foodways—not proselytizing or replacing them with a myopic interest in nut trees.

Though SFFP was grounded in historically documented foodways that are the heritage of *Skarù·rę?* and Haudenosaunee peoples, it did not seem to be 'top of mind' regarding important land use projects. This engages the meta-question: what is the relationship of Indigenous food projects to the larger political project of IFS if they are stimulated and carried by outsider entities? In reflection of this, SFFP occupied somewhat of an in-between place: it resonated with the interests of particular individuals (younger and elder) at *Skarù·rę?* but was predicated on, and needed, my (outsider) input to take shape. In sum, SFFP was aspirationally decolonial: it substantively demonstrated anti-oppressive education and research praxes, rather than materially contributing to resurgent enactments of sovereignty. Transforming such allied research into more subversive "action" and "activist" moieties requires much longer, deeper, and professionally riskier social contracts (Armstrong and McAlvay 2019). Examples of how the related ethnobiology and archaeology fields can and have interrupted settler colonial encroachments can be found in the *Journal of Ethnobiology* Special Issue on Action Ethnobiology (ibid.).

The question of project impact longevity is a tough nut to crack (pun intended), especially when based on the ephemeral nature of grant cycles and student tenure. When Mia parted ways to begin her doctoral studies, she offered pointed feedback that I still reflect on,

> *"Even though Sam was able to come to Tuscarora and participate in the community fair and history conferences over the course of two years, was this enough to establish ethical and reciprocal relationships? The short answer is no. In order to break this (still in use) model, Sam committed to longer engagement with the community over the course of this project, that doesn't always work in [her] own best interest. Which brings us back to the question of reciprocity and the undeniable necessity to bring something to the table when conducting research. Both parties are engaging in an exchange, however for many researchers once their "interests" shift or a site becomes unproductive, these relationships are ultimately dismissed or forgotten."*

While the plants we planted and gave away may live on for decades, Mia's critique will serve as a touchstone for evaluating this and other projects into the future.

Collecting and measuring specific project outcomes was deemphasized to reduce transaction-based relations in favor organic and relational approaches. Thus, it is difficult to objectively assess the success of the SFFP. However, by the end of the project, nearly 500 plants (valued at approximately $5000) found new homes at *Skarù·rę?*, a living compendium of culturally relevant nut resources was compiled and distributed, program activities expanded food sovereignty conversations amongst a wide audience, accommodated various levels of participation, and enriched the territory with edible and medicine plants. Furthermore, Nation members experienced culturally relevant forest foods and new relationships were built on shared interests in how nuts contribute to food sovereignty, community health, and youth education. Brad Thomas offered this in reflection of our work together: "You have at least started a conversation of contemporary agroforestry amongst groups of people on the rez so I would call that a success".

Conclusion

The *Skarù·rę?* Food Forest Project is an example of cross-cultural, interdisciplinary, and community-based

research intentionally designed to center Indigenous ingenuities and futures. Based on upholding treaty relationships (*Kaswentha*) and principles of reconciliation, the project prioritized reciprocal relationships over data extraction. We focused on temperate nut trees as ecologically prevalent plants that provide nutritive crops and have been an integral part of Haudenosaunee land management spanning several millennia.

This type of project is atypical of Cornell University research and required specific attention to notions of justice inherent to sustainable agriculture. The SFFP found its success in stepping away from traditional research protocols and instead focused on community-based education, hands-on projects, and knowledge co-creation. Projects and relationships such as those demonstrated by the SFFP may be better suited for the Cornell Cooperative Extension (CCE) system, which are county-based associations that focus on community work. One benefit of CCE is that staff often maintain long term employment, which better serves lasting relationship building. However, CCE, as part of the Cornell University Land Grant system, needs to overcome the institutional values, rules, and knowledge inherited from CU's "Land Grab" legacy.

Calls for reimagining extension have been raised elsewhere (Peters, 2014) and highlight extension's community-oriented, democratic, and nature-based origins (Ostrom, 2020) as facultative to larger social transformations through agroforestry and NbS. Attending to the equity outcomes of transformative change requires reckoning and repairing the origins of CU and CCE as beneficiaries of Indigenous dispossession and actively cultivate social justice as integral to NbS approaches (Nightingale, 2017; Seddon et al., 2021; Townsend et al., 2020).

Liberation Extension (Copeland, 2022) is an emerging framework that re-envisions Extension away from neutrality and toward facilitating collective responsibility for just and sustainable responses to emerging and urgent problems. Within agriculture, Liberation Extension not only supports agroforestry and NbS land management, but also climate resilience and food sovereignty efforts. Given Cornell's history as an institution built on anti-Indigenous settler colonialism and the Indigenous roots of nut tree integrated AfS, we recommend that Liberation Extension, in what is today NY, specifically attend to Indigenous food sovereignty. Indigenous led and allied conservation efforts demonstrate enormous potential in aligning conservation and sovereignty goals, thus making progress on NbS that enhance justice. The SFFP was an example of the kinds of methods, relationship building, and outcomes that engendered cross-cultural collaborations specifically in the Skarù·rę?/Haudenosaunee context.

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Declarations

Permissions: The *Skarù·rę?* Food Forest Project was granted Exemption from Cornell University IRB Review (Protocol ID#: 1705007154) and was approved according to Cornell IRB Policy #2 and under paragraph(s) 2 of the Department of Health and Human Services Code of Federal Regulations 45CFR 46.101(b).

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