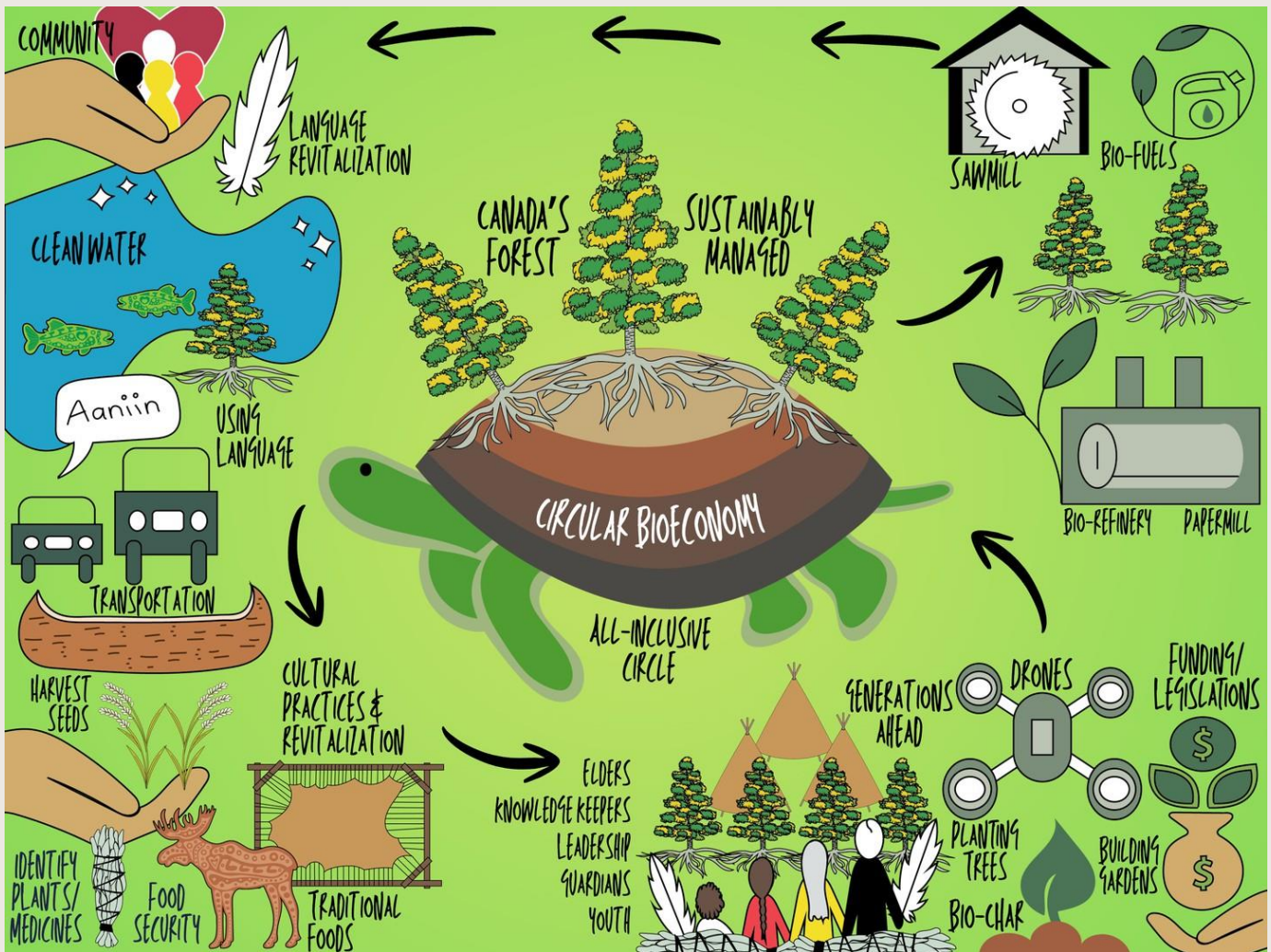


Circular Bioeconomy

Prepared by Dean Assinewe, Isabell Souliere & Heather MacDonald



This artwork illustrates an Indigenous vision of a circular bioeconomy rooted in balance, sustainability, and community. Centred on the turtle of Turtle Island, it connects land, water, culture, and future generations, showing how economic systems can exist in respectful relationship with the earth. By weaving together forests, clean water, traditional foods, language, and intergenerational knowledge, the piece emphasizes that true sustainability is inseparable from cultural continuity and collective wellbeing - Artwork by Rainbow Agawa

Acknowledgements



It is with deep gratitude that we acknowledge the wisdom and generosity of spirit shown by the Elders, Knowledge Keepers, leaders, and businesspeople who contributed to guide these workshops about Indigenous-led circular bioeconomies.

In particular, we thank Elder (former Ogama) Dean Sayers from Obadjiwan (Batchewana First Nation) who opened and closed the workshops in a good way, blessing our efforts with kindness, optimism, and grace.

In addition, we would like to thank the following individuals for their participation in the Canadian workshops about Indigenous-led circular bioeconomies:

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- Nolan Rainville, Missanabie Cree First Nation
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- Aisha Chohan, Great Lakes Forestry Centre
- Mary Knockwood, Indigenous Seed Collection Program
- Ray Wilson, Indigenous Forestry Initiative
- Stephanie Seymour, Great Lakes Forestry Centre
- Claudette Trudeau, Director, Great Lakes Forestry Centre

This report documents perspectives from First Nations People in diverse parts of Canada on local circular bioeconomies and their social, environmental, economic, and cultural impacts on communities. The report presents opportunities for First Nations participants to describe the challenges, risks, and benefits associated with circular bioeconomies in relation to their Inherent Rights and Responsibilities. All participants permitted by their organization to accept honoraria were compensated for their valuable input and time.





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Funding for this project was provided by the International Energy Agency (IEA) Bioenergy Task 43 which focuses on sustainably sourced biomass supply chains. A set of three workshops in Canada, as well as a series of workshops in Australia, represents the first project of the new IEA Bioenergy Task 43 work package commenced in 2025:

“Assessing Social and Socio-Economic Implications of Biomass Supply in Nature-Positive Circular Economies.”

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Acronyms, Definitions & Key Terms



ACC	Allowable Annual Cut, the amount of timber that is permitted to be cut annually from a particular area by a regulator, which differs from location to location
Biochar	Biochar is a charcoal-like substance made by heating organic material from agricultural and forestry wastes in a controlled process called pyrolysis. During pyrolysis, organic materials, such as wood chips, leaf litter or dead plants, are burned in a container with very little oxygen. The heat and biofuels created can be captured and used as clean energy (Regeneration International, 2026).
CFS	Canadian Forest Service, part of Natural Resources Canada
Guardians	Guardians care for lands and waters, bringing together youth and Elders, strengthening language and cultural revitalization (First Nations National Guardians Network, 2026)
Intrinsic Rights	Collective, pre-existing rights that Indigenous Peoples have possessed since time immemorial (Centre for Indigenous Governance, 2026)
Jordan's Principle	Jordan River Anderson (October 22, 1999 - February 2, 2005) is a First Nations child with complex medical needs from Norway House Cree Nation in Manitoba who lived in hospital far from his community while the federal Canadian and Manitoban governments argued about who would pay for home care. Named in honour of Jordan, the principle is a legal child-first principle to ensure that First Nations children can access all public services without delay or denial regardless of whether the children live on or off-reserve (Assembly of First Nations, 2018).
Mass Timber	Mass timber refers to a category of framing styles using large, engineered wood construction material (e.g., panels, columns and beams). Panels are most frequently used in horizontal applications for floors and roofs but can also be used vertically for walls (Woodworks, 2026).
Natural Law	Described by Elders in the Indigenous Circles of Experts Regional Gatherings as the first rule of spirituality, Natural Law reflects the understanding that “the natural world is not separate from humans, but is rather a world where all living beings and spirits are connected; this understanding requires us to care for, live in harmony with, and respect the natural world” (Indigenous Circle of Experts, 2018, p. 104)
NRCAN	Natural Resources Canada
SIKU	A free mobile app and web platform by and for Indigenous Communities and Harvesters, designed to protect Indigenous data sovereignty (SIKU.org)
Title	A legal term that recognizes Indigenous interest in land. It is based on the longstanding use and occupancy of the land by today's Indigenous Peoples as the descendants of the original inhabitants of Canada. In Canada, where no treaty has been signed, Aboriginal Title exists (Assembly of First Nations, 2026)
TRC	From 2008 to 2015, the TRC documented the history, impacts, and legacy of the Residential School system in Canada, which operated for over 150 years, starting in the late 1800s and continuing until the last school Kivalliq Hall closed in 1997 (Truth and Reconciliation Commission, 2015a-c)

Introduction



Indigenous Peoples have been practicing circular economies as a way of life for millennia. Circular bioeconomies rely on biodiversity at the heart of a functioning ecosystem that can perform, adapt and evolve. Community impacts from circular bioeconomies include First Nations cultural revitalization, food sovereignty, and fulfilling Intrinsic Responsibilities. Circular bioeconomies are defined not just by products, but by people, practices, and culture. Healthy cultures encompass Medicines, Traditional Foods, Food Security, Cultural Revitalization, Being on the Land and Water, Language, Community, and Well-being. Indigenous circular bioeconomy practices include cultural burns, stewardship, harvesting, and seed collection. People are essential, including Elders, Knowledge Keepers, Leadership, Guardians, and Youth.

This report describes a series of three virtual workshops between October 2025 and January 2026 with Elders, Knowledge Keepers, and representatives from the national Indigenous forestry association (NAFA), businesses, a Tribal industrial investment organization, a Tribal Council, a social enterprise, as well as representatives from the Canadian Forest Service (CFS).

This Circular Bioeconomies Report documents perspectives from First Nation representatives from diverse parts of Canada on local circular bioeconomies and their social, environmental, economic, and cultural impacts on communities. The report presents opportunities for First Nations participants to describe the challenges, risks, and benefits associated with circular bioeconomies in relation to the Inherent Rights and Responsibilities of First Nations on Turtle Island. One important lesson from the workshop is that Indigenous Peoples will rise and fulfil our Intrinsic Responsibilities, shaped both by the distant past and colonial times as we continue to hold onto our values and adapt so that we can move towards balance, healthy communities, sustainable resource development and the circular bioeconomy.



Background



The International Energy Agency (IEA) Bioenergy Task 43 convened workshops on novel approaches for biomass supply in Hungary in fall 2019 and in Canada in winter 2020 (IEA Bioenergy, 2020). In 2024, Dean Assinewe was invited to review the report with a view to Indigenous relationship building, opportunities for creating innovations, economic development, and prosperity. This analysis of IEA Bioenergy Task 43 summary of biohub strengths, weaknesses, opportunities and threats resulted in the following recommendations:

- Invite Indigenous community, organizations and companies and their representatives who can provide meaningful input into the design of a bio-hub economy. Create a forum that is respectful and welcoming to Indigenous representatives.
- Develop a network of Indigenous community and economic representatives from various regions that can participate on a regular (or as needed basis). Create a forum for dialogue and business interactions that can strengthen the bio-hub business model and productivity.
- There are many economic development initiatives from each region, and each may have the building blocks for a bio-hub: Provide more opportunity for inclusion and participation.

In response to this analysis, a series of workshops were proposed in two countries with representatives from Indigenous Tribal Councils, Social Enterprises, Tribal Council Investment organizations, businesses, and other Indigenous-led organizations and communities to gather information about social and economic impacts of existing Indigenous-led circular bioeconomies.

The First Nations of Australia Circular Bioeconomies Report (Davis-Angeles & McBride, 2026) reported on a face-to-face consultation process completed from May to July 2025 that involved First Nations voices from several different cultural groups.

These groups included:

- Cobble Cobble
- Wakka Wakka
- Yuggera
- Great Sandy Straits Butchulla
- Hervey Bay Butchulla
- Eastern Kuku Yalanji
- Yalanji Wujal Wujal
- Dulabed
- Malanbarra
- Yidinji



The Canadian and Australian workshops were created to be complementary in nature, each adopting approaches that align with their unique national contexts. For example, in Canada, certain First Nations communities are engaged in bioenergy initiatives while their communities and individuals are focused on revitalizing cultural and traditional practices. The economic and social effects of these activities will be assessed, with attention given to issues such as biomass supply during project implementation. By contrast, the Australian case study focused on defining circular bioeconomy practices, including the harvesting of non-timber products, ecotourism, cultural burning, silviculture, and forest carbon management.

Purpose



This project seeks to document and analyse existing First Nations-led circular bioeconomies, with particular attention to their social and economic impacts.

The primary objective is to host workshops in Canada and Australia to gather insights about Indigenous-led circular bioeconomies, specifically to provide descriptions of:

- Local circular bioeconomies, including descriptions of multiple uses of vegetation or forest biomass (e.g., for building, food/medicine, heat/energy, intergenerational cultural exchange, etc.)
- Community impacts of circular bioeconomies (e.g., social, environmental, economic development, jobs, community benefits).

Description of Workshops

This report describes a series of three virtual workshops with Elders, Knowledge Keepers, and representatives from the national Indigenous forestry association (NAFA), businesses, a Tribal industrial investment organization, a Tribal Council, and a social enterprise. Canadian Forest Service (CFS) employees including from the Indigenous Seed Collection Program (ISCP) and the Indigenous Forestry Initiative (IFI) also participated in the workshops.

On November 10, 2025, following an offering of Tobacco by Dean Assinewe, Elder Dean Sayers, Former Ogama (Chief) of Batchewana First Nation opened the Circle with a prayer and a blessing.

After the Opening, Heather MacDonald from the Great Lakes Forestry Centre in Sault Ste. Marie / Bawating expressed gratitude to the Obadjiwan (Batchewana First Nation), Ketegaunseebee (Garden River First Nation Ontario) and other Indigenous Nations who have made this place their home, as the original caretakers of the land on which the Great Lakes Forestry Centre is situated. Next, time was taken to recognize that there were representatives from First Nations from diverse places on Turtle Island participating in the workshops.

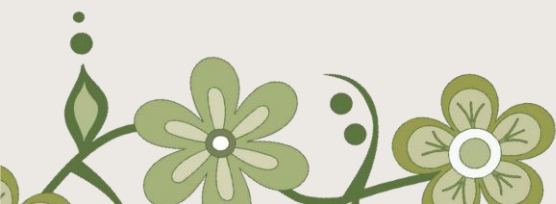
Truth & Reconciliation



Heather MacDonald acknowledged the Truth and Reconciliation Commission (TRC) reports and Calls to Action as providing personal inspiration to her as a non-Indigenous person (Truth and Reconciliation Commission, 2015a-c). The TRC Calls to Action helped guide this project collectively with Dean Assinewe, the project lead, and Isabell Souliere, a Cultural Researcher at the Great Lakes Forestry Centre, Canadian Forest Service. Commitments to reconciliation by the Canadian Forest Service as part of Natural Resources Canada (NRCAN) are meant to transform more than just words to how natural resource projects are done through respecting rights and building partnerships.

Concepts of Circular Bioeconomies

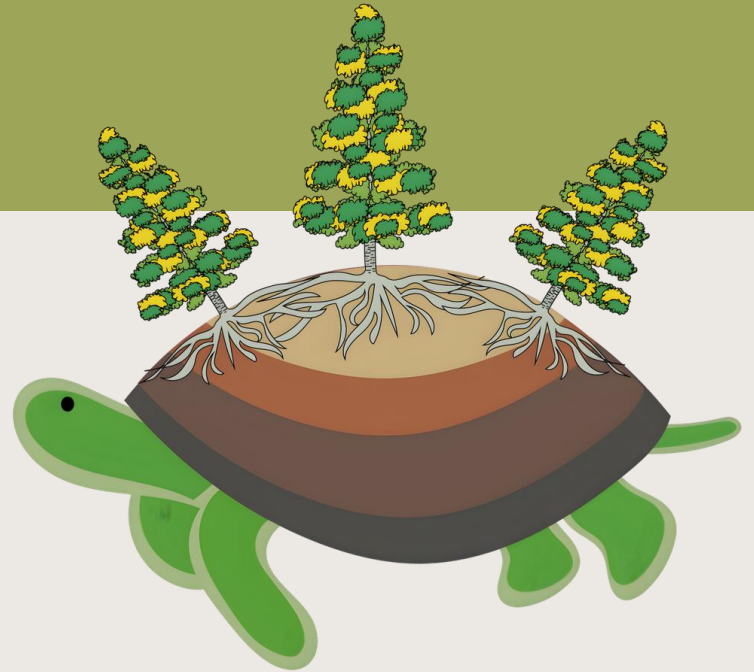
Broadly, bioeconomies encompass land and marine ecosystems. From an economic viewpoint, circular economies include production sectors like agriculture and forestry, and the industrial sector working together in an intentionally crafted, circular manner.



Goals

Goals of Circular Bioeconomies:

- Replacing fossil-based raw materials used in objects ranging from packaging to clothing with innovative wood-derived items
- Creating fair solutions that involve developing countries and vulnerable communities, identifying their needs from the very start
- Creating new value chains to result in nature-based products and services that generate more local profit.

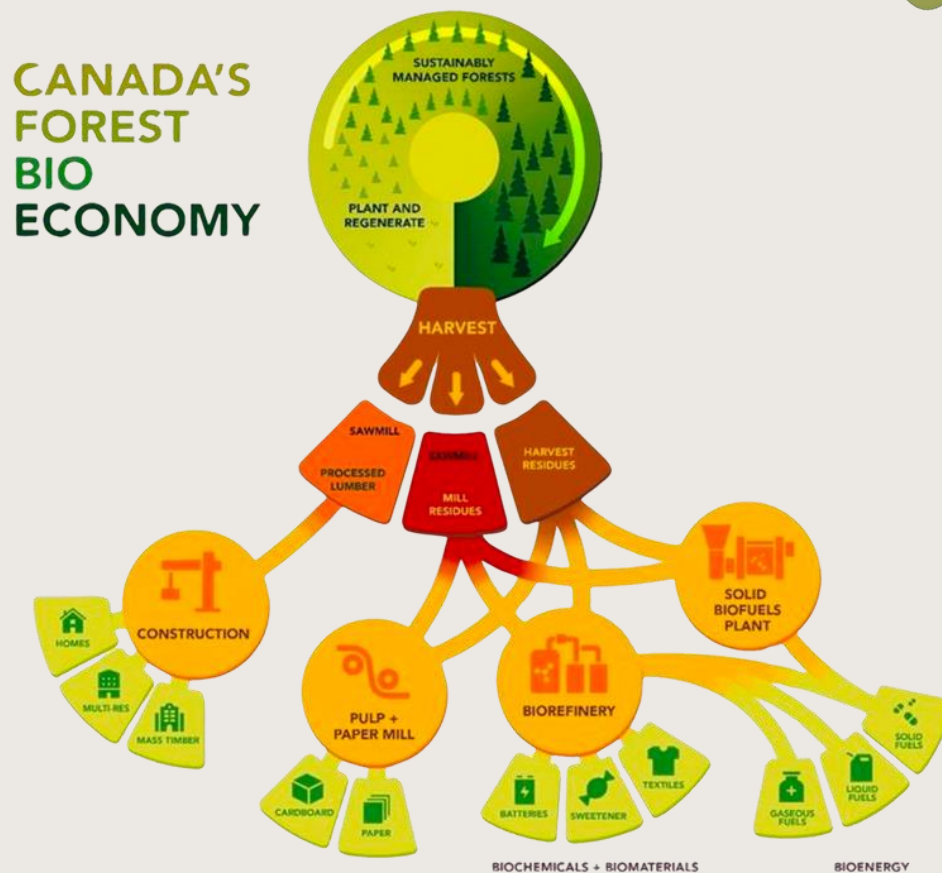


Considering forest-based bioeconomies as a subsector of circular bioeconomy concepts focuses on the transformation of our current system through the conscious use, and re-use, of forest materials. Wood is the most versatile renewable material on earth. Mass timber buildings can be built up to eighteen stories and bridges can be built from timber which shifts the heavy carbon footprint away from concrete and steel. Wood-based textiles and fibers can be used to design beautiful structures led by Indigenous People.

Wood based products replace carbon intense, non-renewable materials. For example, the construction sector, dominated by concrete and steel, could become more sustainable using wood. In the textile industry, wood-based fibers could replace synthetic ones, lowering the carbon footprint. An example of a forest-oriented bioeconomy schematic is a relatively narrow view of a bioeconomy published by NRCAN (Figure 1). There are important facets in Figure 1, but this “slice of pie” is focused on materials: forest management, infrastructure and output, using natural materials to fuel industries and reduce carbon emissions.



Figure 1: NRCAN Schematic of a Circular Bioeconomy



Dean Assinewe encouraged the workshop participants to consider “The Bigger Picture” as being what we are looking for, made up of practices, culture, people and spirituality.

Practices such as cultural burning, harvesting, not exhausting the resource.

Culture: language, foods, art, community well-being.

People: at the heart of the Circular Bioeconomy. Elders understand, leadership is important and can come from multiple places.

Spirituality: Circular bioeconomies mean looking at the whole picture = strong connection to the land and spirituality.

Figure 2: Figure 2: Slide from the December 9, 2025, Workshop about Indigenous-led Circular Bioeconomies



At the conclusion of the first workshop on November 10, 2025, participants in the workshops were invited to reflect on two topics:

1. Descriptions of different local circular bioeconomies, including multiple uses of vegetation or forest biomass (e.g., for building, food/medicine, heat/energy, intergenerational cultural exchange, etc.)
2. Community impacts of circular bioeconomies (e.g., social, environmental, economic development, jobs, community benefits)

During the second workshop about Indigenous-led circular bioeconomies on December 9, 2025, Knowledge Keepers were asked for input on what goes into a circular bioeconomy (Figure 2). During the workshop discussions, notes were taken but the workshops were not recorded out of respect and to build trust among the participants and Knowledge Keepers. A summary of the key themes discussed mostly on December 9, 2025 (but also including discussions from the workshops on November 10, 2025, and January 27, 2026) was compiled collectively led by Dean Assinewe (workshop moderator) and Isabell Souliere from the Canadian Forest Service, with support from Heather MacDonald from the Canadian Forest Service.

Working with participants to share their knowledge and experience into what they would describe as a circular bioeconomy and the values that are important to them. The unranked themes are described in the following sections:

- Governance and Forest Management
- Bioeconomy and Fiber Utilization
- Non-Timber Forest Products (NTFPs) and Wholistic Values
- Cultural practices and teaching
- Food Sovereignty
- Environmental Concerns
- Historical Perspective
- Innovation
- Investment and Infrastructure

During the workshop on January 27, 2026, the draft themes were described, and consensus from the Circle was sought on the themes, as well as forward-looking recommendations.



Circular Bioeconomies Summarized

Circular bioeconomies have been practiced by Indigenous Peoples for millennia. Land and marine ecosystems work in an intentionally crafted, circular manner, resulting in local material flows and economies. Implementing circular bioeconomies is full of both challenges and benefits. Challenges are encountered by communities developing and operating within circular economies that affect their land and communities positively. Challenges facing circular bioeconomies industries and economy include economists that see the forest as an infinite resource, climate change, invasive species, urban expansion, and our shrinking forests. Positives include greater inclusion and fairness, revitalizing our culture, greater utilization of natural resources, and being less wasteful.

Circular bioeconomies are defined not just by products, but by people, practices, and culture. Healthy cultures encompass Medicines, Traditional Foods, Food Security, Cultural Revitalization, Being on the Land and Water, Language, Community, and Well-being. Indigenous circular bioeconomy practices include cultural burns, stewardship, harvesting, and seed collection. People are essential, including Elders, Knowledge Keepers, Leadership, Guardians, and Youth.

Working with Knowledge Keepers to share their knowledge and experience into what they would describe as a circular bioeconomy and the values that are important to them, a broad range of circular bioeconomy examples were raised, from food forests to advanced bioenergy technologies. The (unranked) themes are summarized below.

Governance and Forest Management - Instances where land was restored to Indigenous governance were described by Elders in the Circles. Despite examples of resurging Indigenous governance, Inherent Rights are still contested by Canadian governments at multiple levels. Respect for Indigenous laws by proponents was described as crucial to relationship building and stewardship.

Bioeconomy and Fiber Utilization - Wood fiber is used for construction and heating of buildings and greenhouses, bio-coal, packaging, strand board, cement additives, fertilizer/soil amendment, building materials, renewable natural gas, water treatment, spill mitigation, and sequester carbon.

Non-timber Forest Products (NTFPs) and Wholistic Values - Elders recommended First Nations developing processes to inventory availability of medicines and foods, including, but not limited to reclaimed timber for art or furniture, baskets, canoes, skin care products, ointments, planted and harvested foods, and medicines. Wholistic values cherish inter-generational knowledge exchange.

Cultural Practices and Teaching - Circular bioeconomies were perceived as creating fair solutions for communities and others, enabling healthy communities connected to culture. Elders bring knowledge and history which is highly sought after by First Nations Lands and Resources departments. Our relationships with trees and all other elements, were emphasized as an approach to cultural revitalization.

Food Sovereignty - Food forests are integral to circular bioeconomies. Forests were considered and managed as places to cultivate and gather food in a circular bioeconomy. Food security threats caused by wildfire were issues of concern. At the same time, In ancestral territories, food gardens can be introduced as part of forest fire mitigation frameworks. Soil quality was discussed as an essential consideration when talking about garden and food projects.

Environmental Concerns - Circular bioeconomy planning encompassed many goals and strategies including harvesting/storing seeds, considering the time required for landscapes to recover from forest fire, and making contingency plans in case forests are inaccessible. Glyphosate was raised as an environmental concern as well, leading to alternatives being actively explored.

Historical Perspective - Bravery and perseverance exemplified by leaders in the face of obscurity and oppression of First Nations exercising Inherent Rights is essential to remember and honour. Now forest circular bioeconomies offer the opportunity to attract families back home. Knowledge Keepers expressed a strong value for looking at past ways and incorporating traditional practices. Past practices and ancient patterns are models, guiding First Nations with current-day challenges such as decline of forest plant and animal species.

Innovation - Drones are increasingly used to manage Indigenous-led circular bioeconomies, enhanced by applications which protect Indigenous data sovereignty about sacred and other important locations. Geographical Information Systems (GIS) can serve as a tool for asserting sovereignty, preserving culture, and enhancing land management and stewardship.

Investment and Infrastructure - Workshop participants made the argument to support both economic and social infrastructure. Examples of how Indigenous economic drivers benefit local, regional and national economies were provided.



Key Findings



Governance and Forest Management Planning

Indigenous governance reflects the core values at our roots. Pride in people was described from participating, being proactive rather than reactive, and incorporating what people are noticing on the land using a mix of technology and traditional ways. Many examples of expanding Indigenous governance were discussed in the workshops. In northern Saskatchewan, the Meadow Lake Tribal Council bought the industry (through its ownership of NorSASK Forest Products and its partnership with Mistik Management):

"With ownership, we can decide we're not going into that area, because it is moose territory or because of medicines."



Photo courtesy of Tina Rasmussen, Meadow Lake Tribal Council Industrial Investments



Also, Squamish First Nation, which purchased the rights to all the harvest, buying out Interfor in the early 2000s for control over a part of the Squamish territory. Since taking over from Interfor, Squamish Nation now has control over who harvests what, where and the volume. Squamish Nation Rights and Title mean the Nation approves all referrals to the territory, not just forestry but our rivers and oceans as well. Squamish First Nation is managing "128,000 hectares in their territory," reflecting a people centric mission: it is "all about the people." These kinds of "friendly take overs" whereby resource governance is switched to First Nations was alternatively described as a sacred and very detailed process requiring much planning.

Other Indigenous-led operations brought up were New Leaf Forestry out of Nipigon, Bingwi Neyaashi Anishinaabek at Sand Bay, and Apitipi Anicinapek Nation out of Matheson/Kirkland Lake.

Despite successful resurgence of Indigenous management, challenges still exist. For instance, in some locations, forestry companies were described as having more access to forest land and traditional territory than First Nations. One Tribal Council representative reported that:

“Other than our small reserve, we don’t have control over the traditional lands and can’t direct how forestry and agriculture are using the land.”

Participants stressed the value of First Nations being involved with their traditional territories. In situations where companies operate in First Nation territories, a desire to see respect for traditional governance and community values:

“First Nations economic policies need to include the spirit of Indigenous Natural Laws, Stewardship, and Culture. Observance by proponents is crucial to relationship building based on mutual respect.”

Despite the challenges, strength and perseverance were expressed:

“In line with our inheritance, we are rising once again.”



Bio Economy and Fiber Utilization

The workshops included discussion about fiber utilization and making use of waste products, contributing to heating buildings and greenhouses, bio-coal for steel smelting, cement additives, biochar for garden soil, building materials, renewable natural gas (RNG) derived from organic waste, and many other uses. One example of biochar fish waste being used on gardens sourced from a farm where composting was used to heat the greenhouse.

The feasibility of heat and power from biomass was discussed. A presentation made during the first workshop on November 10, 2025, included discussion about a biofuel feasibility study underway. The estimated cost for the biofuel facility was \$50 million because this approach uses two kilns which is very expensive. Production of wood pellets was also considered as a less expensive alternative by the community. This participant also suggested that it might be possible to work with mining and logging companies operating in traditional territories to collect waste wood on a First Nation’s behalf. Another idea raised was a possible partnership with a First Nation and their Guardian Program to identify and locate usable wood waste.



Strategizing about partnerships and incentives was encouraged during the workshops. The discussion included consideration of the potential for underground greenhouse operations for northern communities, working in partnership with mining companies responsible for site clean-up. Carbon offsets were mentioned several times during the workshops, in the form of considering participation in a biochar program with offsets being used as well.

Relationships with forestry companies were nurtured by Knowledge Keepers so that harvesting birch bark can be done in cut-block areas. Some First Nation businesses export forest products overseas, whereas previously more wood was being shipped to the United States. Opportunities for trade across provincial boundaries were thought to be possibly increasing considering recent Canadian efforts to lower inter-provincial trade barriers (Canada, 2025). The circular bioeconomy was characterized as a way to mitigate the impacts of tariffs imposed by the United States.

A key challenge is that communities “need to find a solution to the woodpiles that are left everywhere.” Negative environmental and social impacts of forestry operations were recorded, concern over forestry cut blocks, birch bark roots and trees down, and lots of stumps left behind. Workshop participants asked how wood waste can be utilized rather than just leave it behind in the forest, described as a “mess of trees left behind.” Slash pile burning of residual forest fiber by Indigenous-led forestry operations even though First Nations are seeking other opportunities.

“There is so much we don’t do with our wood waste. Even after accommodating the members’ interests, we still leave a bunch of waste in the woods. It halts my heart, proving there are other uses. We don’t have to be a traditional mill; we can co-exist with the land.”



Non-Timber Forest Products (NTFP) and Wholistic Values

Wholistic values were a focus of the circular bioeconomy workshops, inclusive of non-timber forest values such as:

- Reclaimed timber for art, furniture, etc.
- Birch bark baskets and canoes
- Eco-tourism
- Ointments and skincare
- Firewood, wood pellets
- Planted and harvested food
- Syrups
- Medicines
- Intergenerational knowledge exchange



Picture courtesy of Blythe Commando

NTFPs can provide great incentives for getting out in the forest to learn the values in your area. Damaged material or deadfall can be repurposed for other uses. Willow, Birch, blueberries are raised. First Nations-led inventorying the forest was described as critical in such cases, especially given various land use activities:

“It’s important to understand what the forest has to offer. Perhaps developing a process to inventory availability of medicines, and foods.”

Soil was discussed as an essential consideration when talking about garden and food projects. For instance, a 16 clay belt in the Northeast part of Ontario represents prime agricultural land in the north.

Eco-tourism was described as an opportunity for education of the wider community. Guardian programs can contribute to education, with Elder or Guardian-led walks.

Cultural Practices and Teaching

Indigenous-led governance of forests entailed making space for cultural uses of the land within a circular economy. For instance, Indigenous leaders discussed the opportunity for creating areas for blueberries when clearing wood during forest fire mitigation efforts. 'In addition to using wild blueberries for their fruit, these plants can also serve as an effective firebreak to slow or stop the spread of forest fires thanks to their low fuel load, fire-resistance properties and ability to be managed through controlled burns and pruning.



Circular bioeconomies were perceived as creating fair solutions for communities and others, enabling healthy communities connected to culture. Relationships between trees, and all other elements, were emphasized as an approach to cultural revitalization:

“So many challenges, suicide being one of them I’m not saying that jobs are the answer. But healthy communities are connected to culture.”

Education and tourism contribute to circular bioeconomies, specifically teaching youth and providing tourism opportunities. The Circle considered the implications of loss of access to medicines and cultural practices. For instance, one person described the inability to harvest black ash and moose in eastern Canada:

“In Nova Scotia, we can no longer harvest black ash and moose.”

If cultural traditions have to be paused, for instance halting the moose hunt in the Highlands of Nova Scotia, will First Nations have to import moose to teach the youth the words and processes? Is there a need to document cultural practices if communities can no longer access forest species in their territory?





Food Sovereignty



Food security was a recurring theme in the circular bioeconomy workshops. From discussions about high food costs in remote communities, to challenges with a short growing season, forests were considered places to cultivate and gather food in a circular bioeconomy. In ancestral territories, food gardens can be introduced as part of forest fire mitigation. After fuel treatments, creating spaces for foods like blueberries can facilitate reconnecting communities with food forests (Photo at left by Isabell Souliere).

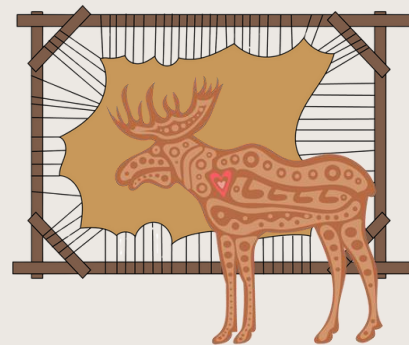
To this day, 200-year-old food stands with intentionally planted guilds are still being discovered (SFU, 2022).

Food forests support sacred livelihood aspects and First Nation sensibilities to do things in a good way. Food forests are replicable, even considering different ecozones.

Food forests support sacred livelihood aspects and First Nation sensibilities to do things in a good way. Food forests are replicable, even considering different ecozones.

Apitipi Anicinapek Nation is creating food forests with "Leading Cloud Gardens" including greenhouse garden beds, outdoor growing areas for seasonal planting, and composting, welcoming traditional foods like Algonquin pumpkin and speckled beans through seeds gifted by seed keepers (Ecological Farmers Association of Ontario, 2026). Communities are implementing creative food security solutions in a variety of conditions, including short growing seasons.

Soil was discussed as an essential consideration when talking about garden and food projects. For instance, a clay belt in the Northeast part of Ontario represents prime agricultural land in the north. Using biochar for soil amendment was highly valued by Knowledge Keepers.





Environmental Concerns

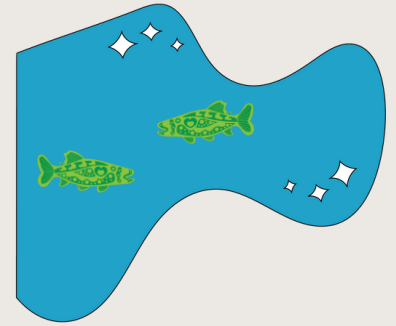
Healthy ecosystems tied to human health and well-being is the goal. A healthy tree can create healthy birchbark that can create the crafts and items we need. In terms of restoration, one participant asked whether it would even be possible to bring back the area to what it was, in cases where wildfire burned the forest down to the bedrock and the soil isn't there any longer.

As noted during the January 27, 2026 workshop, First Nations in the Northeast Superior Region of Ontario are applying alternatives to glyphosate, a commonly used forestry herbicide, because of the environmental and health risks associated with chemical herbicides that harm the land, waters, plants, and people (Kayahara & Armstrong, 2015).

Possible benefits of bioenergy were described; reduced methane, such as reduced greenhouse gas emissions and reduced waste. However, negative environmental and social impacts of forestry operations were recorded, in particular concern over forestry cut blocks, birch bark roots and trees down, lots of stumps left, waste left behind. Workshop participants asked how wood waste can be utilized rather than just leave it behind in the forest, described as a "mess of trees left behind."

In terms of environmental restoration, workshops considered the question of how to bring the land back to what it was, because it may not come back like it was in places where forest fires have burned down to the bedrock and the soil isn't there. Planning included working with partners to harvest and store seeds and considering the time required for landscapes to recover from forest fire.

Managing resources includes documenting what is there and planning for seed collection/storage. Discussions considered what could be done in cases where access to the forest is impossible.



Historical Perspectives

Dean Sayers, Former Ogama (Chief) of Batchewana First Nation, read from a news article how he was charged by the Ontario government for harvesting timber without a permit from the Ontario government as well as for opening a road to the traditional lands of Batchewana First Nation on Gargantua Harbour (SooToday, 2008).

Kim Rainville, Former Ogama (Chief) of Missanabie Cree First Nation, described how in 1906, Missanabie Cree First Nation was snubbed in terms of land despite signing Treaty 9 in 1906, which promised 128 acres per person (Missanabie Cree First Nation, 2026):

"After 118 years, we have a home. Now, there are opportunities to bring families home. We are attracting people back with forest opportunities. ."

In 1981, First Nations of Northwest Saskatchewan united to form the Meadow Lake District Chiefs Joint Venture to buy the industry controlling 1.8M ha of northern Saskatchewan. Efforts to organize were motivated in part by lack of respect for Treaty and Inherent Rights.

Knowledge Keepers expressed strong value for incorporating traditional practices. Past practices and ancient patterns are models, guiding First Nations with current-day challenges, for instance, decline of forest species. Two-hundred-year-old food stands engineered by Indigenous people are still being discovered, sometimes using drones.

Against the backdrop of this historical perspective, today, forests and circular bioeconomies were viewed as possibly providing opportunities so that young people do not have to leave the community.



Innovation

Drones and other technologies are being implemented by First Nations to map traditional territories (Photo above by Isabell Souliere). One Guardian described a flight survey of moose, taking notes about tracks in winter when the moose were yarding. In comparison to a flight survey, this person noted how it was possible to collect data and find the moose yard with a drone. Efforts to scout for a mine used the yarding coordinates to protect that area. Aerial (helicopter or fixed wing) surveys might cost \$400 to \$800/hour, compared to which drones are much cheaper:

“It's inexpensive to run a drone, work my own data, take notes, monitor the land.”

Although boots on the ground are still needed for ground truthing, drones can be used to find ancient patterns of forest management. Drones can be trained and used to locate Species at Risk or other important plants for seed harvesting (National Research Council, 2024). In the SIKU app, people can collect their own information. Drone technology can also be used with Traditional Knowledge by sitting down with Elders and asking them what plants are there. Technology can be used to set the sensitivity level so that sacred or sensitive areas can only be seen by the community.

The potential of drones to provide business opportunities was considered, whether drone operations could constitute a viable business, and how communities could otherwise use drones or other technologies. For instance, one participant described flying a drone before logging operations (before and after) providing a detailed current map (compared to Google Earth, which could be five to six years old). (Photo below by Isabell Souliere.)

Many Indigenous-led businesses are utilizing drone works:

In the Prairies, we switched to drones, and then I would be able to go right there, from the drone map.”

Another area of technical innovation involving biomass was the possibility of establishing 3D printing and related businesses to build cottages using wood biomass as feedstock. 3D-printed furniture for new community facilities could also be included in a broader proposal. This initiative was described as innovative, eco-friendly, and good for on-reserve employment and economic development.





Investment & Infrastructure

Challenges with the amount of funding to support investment in circular bioeconomy infrastructure are critical issues. \$45 million over 3 years available from the Canadian Forest Service Indigenous Forestry Initiative (IFI) creates a situation with too much competition between First Nations. \$150 million allocated to Indigenous economic development by Indigenous Services Canada is problematically low. Jordan's Principle, which is intended to ensure equitable access to government programs, caused economic funds to be used to support social programs.

Despite the challenges reported, the workshop discussions included optimism:

"Now is the time in the Indigenous forestry sector"

Discussions about NRCAN's Indigenous Forestry Initiative (IFI) included recognition that there are good ideas out there, and that venues such as the IFI are important.

During the workshops, several discussions concentrated on feasibility ahead of First Nation investment decisions. One example of an investment feasibility study completed by a First Nation was a project including two kilns to produce biochar and biofuel for home heating and cooking. Compared with coal, bioenergy was associated with a massive reduction in greenhouse gas emissions. Alternatively, a cheaper option was to produce wood pellets. To produce biofuel would cost \$50 million because it uses two kilns, which is very expensive.

Human infrastructure was also valued by participants. Traditional Knowledge possessed by Elders was valued by younger generations as bringing knowledge and history. Human infrastructure was also raised when someone asked who would operate the technology. Workshop participants made the argument to support both economic and social infrastructure.



Conclusion & Looking Forward



A circular bioeconomy offers the opportunity to transform our land, food, health and industrial systems where people sustainably manage natural ecosystems like forests for their livelihoods. Circular bioeconomies were considered by Knowledge Keepers as revitalizing opportunities for a more balanced approach and new income opportunities from those landscapes. Circular economies can offer economic security in remote areas where there are few industrial opportunities, for instance in the case of small towns with a sawmill. Transition will bring with it opportunities for decarbonization and contribute to managing and rebuilding ecosystems and landscapes that desperately need it.

Circular bioeconomies use vegetative biomass for construction and heating of buildings and greenhouses, bio-coal, packaging, strand board, cement additives, biochar for garden soil, renewable natural gas from organic waste, and many other applications. Beyond the uses of biomass, people are at the heart of the circular bioeconomy. Approaches need to be tailored to localities. Efforts need to be integrated and participatory, so no one is left behind.

Who's going to operate the circular bioeconomy in the future? What are our values? One important lesson from the workshop is that we will rise and fulfil our Intrinsic Responsibilities, shaped both by the distant past and colonial times as we continue to hold onto our values and adapt so that we can move towards balance, healthy communities, sustainable resource development and the circular bioeconomy.

Based on the workshops completed about Indigenous-led circular bioeconomies in Canada, the following recommendations are offered.



Recommendations



Respecting the efforts of the Knowledge Keepers is a high priority and this could be honoured by developing a path forward so their time and energy lead to outcomes beyond a report. Identifying several recommendations is important to recognizing Knowledge Keepers and keeping them engaged with all parties involved in the project. The following are key recommendations for advancing the project forward and creating stronger relationships with Indigenous communities and organizations across Canada.

Recommendation # 1

Seek out economic opportunities and activities that advance the goals of the circular bioeconomy. Industry development such as biomass renewable energy (e.g. biochar facility) addresses common concerns such as utilization of harvesting and sawmill residuals that are left to decay. These facilities consume residuals to produce heat that can be used to operate greenhouses, provide soil fertilizers, and other industrial applications such as steel smelting.

Recommendation # 2

Create investment and resources to plan and develop businesses and revitalize cultural awareness is among the highest priorities that generate wealth and healthy communities. Indigenous proponents would like to engage with the IEA Bioenergy group to explore opportunities to creating funding mechanisms to begin working on bioenergy projects in Canada as well as investing in the cultural awareness the builds the foundation of an Indigenous led initiative.

Recommendation # 3

Recognize the working group that has been assembled for this project and others. Individual members of this group represent their communities, businesses and organizations to a high standard and are champions to their cause. If there are future IEA Biomass initiatives this working group should be pulled together to take on the project.

Recommendation # 4

Knowledge transfer and networking are powerful activities when promoting ideas such as circular bioeconomies. Discussion should begin on planning knowledge and exchange between Australian and Canadian knowledge keepers. The exchange could involve visiting and presenting information towards cultural and business development at one another's country and community gatherings.



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