WEAVING NATURE

THE FLOW OF AINU ELM BARK FIBRES THROUGH HOKKAIDO'S ECOSYSTEMS

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Data Availability Statement: All relevant data are within the paper and its Supporting Information files.
Competing Interests: The Author(s) declare(s) no conflict of interest
10.36253/fh-2929

Abstract

Japan's Indigenous Peoples, the Ainu, inhabitants of Hokkaidō island, are renowned for their robes made from 'exchanges' with botanical species, such as elm bark fibres. Their God-spirits (kamui) manifesting in flora, fauna, and natural forces, guided their respectful use of materials, ensuring that nothing was wasted. Their spiritual practices, in reverence for nature, contrast with today's destructive driven fashions.

Textiles are often overlooked in the ecological humanities. This paper, through a framework rooted in decolonial and Indigenous studies, environmental history, cultural anthropology and regenerative design, explores the ecological entanglements of human-nature coexistence, materiality and agency of elm bark fibre garments, weaving together their narratives, practices and environments.

The study highlights the ingenuity and sophisticated technologies that allow the transformation of plant fibres into durable garments essential in northern climates. It explores the Indigenous perceptions of nature and resource extraction, particularly during the pre-colonial and early colonial periods in Hokkaidō.

By exploring Ainu textile traditions, this paper highlights the potential of Indigenous knowledge to inform sustainable fashion practices. However, applying this learning must avoid perpetuating the colonial legacy of exploitation. Instead, efforts should prioritise equitable partnerships that respect and protect Indigenous contributions, while guiding a move away from petroleum-based systems.

Keywords: *Ainu Indigenous Peoples; Traditional Ecological Knowledge; Elm Bark Cloth: Attush; Arctic Fashion; Sustainable Fashion Practices.*

METHODOLOGY

The research methodology used in this paper can be outlined in five main strands.

INDIGENIST APPROACHES TO RESEARCH

As a non-Indigenous Research Associate at the Smithsonian Arctic Studies Center specialising in Arctic Fashion, I employ an Indigenist research methodology rooted in the wisdom, cultures, and experiences of Indigenous communities. This decolonising approach prioritises the voices of Indigenous Elders as primary sources, honouring their cultural protocols and knowledge systems (Wilson, 2007). Open to researchers of all backgrounds, this paradigm emphasizes mutual respect, community benefit, and the integrity of Indigenous traditions (Rix et al., 2019). Indigenist research is rooted in Indigenous Knowledge (IK), or Traditional Ecological Knowledge which has been recognised through the United Nations Declaration on the Rights of Indigenous Peoples, reflecting the philosophies and identity of Indigenous communities (Wilson, 2007). IK is tied to the cultural practices, landscapes, and environments that sustain and transmit it, offering an alternative to Western knowledge systems (Dierksmeier, 2021). This work integrates land and culture recognition practices (Shaginoff, 2021). My research involves collaboration with Indigenous communities such as the Hezhe, Alutiiq, Ainu, and Nanai (Palomino, 2022). These partnerships have enriched my understanding of Indigenous cultures and built meaningful relationships.

Fig. 01

A key focus of my work is facilitating Native artists' reconnection with their artefacts in museum collections, recovering and sharing oral histories and ethnographic accounts (Gordon et al., 2013). I acknowledge the Elders who have guided me on this research, including Yukiko Kaizawa and Reiko Kayano (Ainu) Shigehiro Takano (non-Native Japanese), June Pardue (Alaska Native, Alutiiq and Inupiaq) and Anatoly Donkan (Siberian Native Nanai). Additionally, this work was informed by artists like Masahiro Nomoto (Ainu), and Maki Sekine (Ainu).

DECOLONISING RESEARCH PRACTICES

Since 2017, I have collaborated with the curators of the Nibutani Ainu Culture Museum, Kenji and Maki Sekine co-creating workshops on Ainu culture and promoting the connection between Ainu artists and other Indigenous Arctic Peoples (Palomino et al., 2023). During my annual field trips to Japan, I have documented the many Ainu traditions such as fish skin processing through the work of these exceptional artists (Palomino et al., 2024).

In March 2022, fieldwork was conducted across the National Museums of Hokkaido, bringing Arctic Native experts into direct contact with historical Ainu artefacts. Supported by the Japan Foundation, the fieldwork and accompanying conference advanced knowledge of Arctic Fashion production such as fish skin, elm bark and bast fibres production.

The team included Native Alutiiq and Inupiaq fish skin artist and grass weaver June Pardue, fish skin artist Anatoly Donkan (Nanai, Eastern Siberia), a Japanese translator, a Russian translator and me, an Arctic fashion scholar (fig.1). We examined several Ainu elm fibre robes and woven grass accessories, with June noting similarities to Alutiiq grass woven traditions. A highlight was meeting 91-year-old Ainu weaver Reiko Kayano (fig. 2). Reiko shared her elm bark weaving skills, while visits to the Nibutani Ainu Museum with curators Kenji and Maki Sekine brought insights into Ainu embroidery. Maki, an embroidery artist, discussed the motifs of her Kaparamip robes, which June and her fellow Alaska Native artists recognised from home as similar to Tlingit designs.

For the Alaska and Siberian Native artists, connecting with each other and Ainu knowledge keepers was a long-held dream. Similarly, for Ainu communities, meeting Indigenous Peoples worldwide provided an opportunity to explore their place within the global Indigenous landscape. This exchange enriched Elders, museum curators, and participants alike (Palomino et al., 2023).

ETHNOGRAPHIC RESEARCH

Ethnographic research explores groups or aspects of their lives (Myers, 2008; Hammersley & Atkinson, 1995), involving immersion and participant observation. However, such practices often marginalise Indigenous groups and perpetuate dominant societal interests. Historically, geographical methods have supported colonisation. Decolonising approaches emphasize collaborative knowledge production, fostering egalitarian relationships and co-designed objectives, methods, and outcomes. Extractive practices are replaced with mutual communication, enabling non-academic collaborators to shape research priorities, design, and analysis. Methods like auto-ethnography and storytelling capture overlooked experiences (Radcliffe, 2021). This auto-ethnographic research applied Participatory Action Research (PAR), creating a partnership with Native artists as co-researchers actively shaping all research stages, highlighting their central role in knowledge co-production.

LITERATURE REVIEW

This paper examines the historical use of Ainu elm bark fibre through historical literature from the late 19th and early 20th centuries supplemented by contemporary literature on material sustainability. A critical review informed a framework for understanding traditional elm bark practices, which was refined through further participatory action research fieldwork. The method aimed to gather insights into traditional elm bark cultural theory and practice to document its historical, cultural, and environmental significance.

Fig. 02

ARCHIVAL RESEARCH: ARTEFACT ANALYSIS

Fieldwork conducted at Hokkaido Museums involved archival research, observations and documenting collections. Employing a qualitative methodology, particularly an arts-based inquiry (Denzin & Lincoln, 2008), facilitated the creation of new knowledge through active participation. Primary data collection included semi-structured interviews with museum curators and Native Elders. Visioning elm bark artefacts emphasised a practice-led approach, involving material analysis and hands-on interaction with the artefacts. In-depth analysis deciphered the design elements and styles, weaving, construction and dyeing techniques and spiritual meanings. Triangulation of data was achieved combining the above with a further analysis of literature on elm bark fibre traditions.

ELM BARK FIBRE ARTEFACTS IN INTERNATIONAL MUSEUMS

Historical records at international museums provide valuable information on elm bark fibre artefacts, but the traditional knowledge of the Ainu themselves matters even more. Over two centuries, explorers and scientists collected artefacts documenting Ainu's identities, often storing them far from their origins. This led to the alienation of these communities from their heritage. Museums worldwide have amassed ethnographic collections, often under the wrong assumption that these cultures were disappearing. However, these collections, which include ritual objects, clothing, and tools, contain crucial information about traditional knowledge and material culture. Today, many Indigenous Peoples seek to reconnect with their heritage through these artefacts (Palomino, 2022).

The history of these collections is closely tied to colonialism, with many items acquired through violent means. Museums are now beginning to acknowledge this history and are working with Indigenous communities to ensure that artefacts are displayed and interpreted respectfully. In Hokkaidō, Ainu artefacts have been returned to their communities, building local museums where Ainu artists run workshops sharing their skills, allowing them regain control over their cultural heritage.

Museums with ethnological collections provide key insights into the relationship between humans and nature. Elm bark fibre artefacts illustrate the technological innovation and cultural adaptation of Ainu communities over time. These objects are a testament to the Ainu's resilience and sustainability, reflecting their connection to the environment and their ability to thrive in Hokkaidō.

FIBER AND LAND: THE POWER DYNAMICS OF JAPANESE AINU ASSIMILATION

The Ainu are the direct descendants of the Jomon, one of Japan's earliest cultures dating back over twelve thousand years. Before being integrated into modern nation-states, the Ainu called their homeland Ainu moshir, or "the Land of Men" which originally spanned Japan's Hokkaidō and formerly North-Eastern Honshū, Russia's Sakhalin, the Kuril Islands, Khabarovsk Krai, southern Kamchatka Peninsula and the Amour River estuary region (Godefroy, 2018).

During Japan's military aggression from the fourteenth to seventeenth centuries, Hokkaidō's natural resources were overexploited. Ainu traditional clothing and materials were discouraged, favouring dependence on Japanese textiles, especially cotton. Despite these pressures, the Ainu's use of animal skins and local bast fibres persisted into the late nineteenth century in remote areas where Japanese influence was limited (Dubreuil, 2002).

Women's activities included fishing, gathering edible, medicinal or processable plants for clothing, and crafting intricately designed garments (Fitzhugh and Dubrueil, 1999) using locally available natural resources (Williams, 2017). This respect for nature was jeopardised by the increased invasion of Japanese commercial interests and territory and was threatened by their growing dependency on Japanese goods during the Edo period (Godefroy, 2018). The Hokkaidō Ancient Aborigines Protection Act of 1899 further displaced the Ainu, stripping them of their culture (Dubreuil, 2002). Despite this, Ainu ethnicity persisted, with the Ainu formally recognised by the Japanese government in 2008 for the first time as "Indigenous Peoples with a distinct language, religion and culture" and formally in legislation in 2019. This legislation accompanied the international focus in Japan as host of the Olympic games in 2021 (Godefroy, 2011).

ELM BARK FIBRE TRADE: TRAVELLING ACROSS NATIONAL BORDERS

As the Ainu navigated the pressures and influences of external cultures, particularly from the Japanese, their migration patterns shifted, pushing them northwards. This movement saw some Ainu communities settling on Sakhalin Island, the Kuril Islands, and even the southern tip of Kamchatka by the first millennium AD (Cevoli & Glebova, 2015). The relocation of these communities was not just a physical migration but also a cultural one, as they encountered new environments and neighbouring Peoples. This context of movement and adaptation is crucial to understanding the evolution of Ainu material culture, which was shaped by both the need to thrive in new landscapes and the desire to maintain cultural continuity.

The Ainu were not isolated in their cultural evolution. Various Ainu groups, such as the Tohoku Ainu in Honshu, the Sakhalin Ainu, the Kurile Ainu and the Kamchatka Ainu, interacted with other North Pacific Peoples, creating a shared heritage among these groups. Oral narratives suggest that the Ainu and the Northwest Coast Peoples of southern Alaska, are part of an extended family. The Aleutian Islands were likely a critical trans-Pacific route for contact between the Ainu, Aleut, and Tlingit peoples. Historical records confirm that the Aleut and Ainu were forced by Russians to trap sea otters together in the Kuriles during the 1700s, but earlier contact was likely (Dubreil, 2007).

Trade played a pivotal role in this cultural exchange, especially between China and Japan. By the 17th century, a well-established trade route stretched from northern China across the lower Amour River—home to Indigenous groups such as the Hezhe, Nanai, Ulchi, and Nivkh—to the Ainu of Sakhalin and Hokkaidō. This route facilitated the exchange of various goods, including silk fabric, metal objects, adornments, and lacquer bowls (SRM, 2021). Interestingly, many of the motifs used by Sakhalin Ainu textile artists bear resemblance to those used by the Nivkh people of the lower Amour region of Siberia, highlighting the interconnectedness of Indigenous cultures across this region (Murray et al., 2018).

This phenomenon of cultural and resource borrowing in response to changing climates and ecosystems is a common theme among Indigenous Peoples, as noted by Lewallen (2016). For the Ainu, this borrowing was not passive but rather an active and creative process. Ainu women played a crucial role in this cultural synthesis. They incorporated new materials—sometimes borrowed from neighbouring cultures, such as sealskins and cotton fabrics—into their traditional robes, all the while adhering to Ainu aesthetics and cultural principles.

EXCHANGES AMONGST HUMANS, NON-HUMANS AND MORE-THAN-HUMANS TO CREATE FIBRE AS MATTER

For the Ainu (fig. 1) every element of the physical world—mountains, trees, lakes, and animals—is inhabited by spirits deserving of respect. Their lifestyle and economy were shaped by these natural resources, with a deep reverence for kamui, God-spirits who would visit the Earth in the forms of plants, animals, or natural forces such as wind, rain, and snow (Geoffroy, 2018). This spiritual connection is reflected in the creation of highly spiritual clothing made with the materials resulting from their "exchanges" with various animal and plant species (Krutak, 2012).

The Ainu religion revered these God-spirits, with shamans playing a crucial role as intermediaries (Geoffroy, 2018). These Gods lived in a parallel world, kamuy-mosir, and all natural phenomena were, in fact, Gods in disguise—gifts to be respected. If the Gods had been honoured, they came to them in the shape of trees as temporary gifts (Batchelor, 1971). For the Ainu, elm trees harboured spirits, and the act of harvesting the bark was accompanied by rituals of gratitude. When they peeled bark (the protective clothing of the elm tree God) for producing attush cloth, they thanked the tree for giving up its 'clothes'. Only bark from one side of the tree was taken to ensure the tree's survival, and after the bark was stripped, trees were marked to allow them to recover, and a strip of bark would be wrapped around the tree so that it would not lose any more of its 'clothes' in the wind. Then, offerings of grain and tobacco were made to appease the spirit of the tree (Batchelor, 1971; Dubreuil, 2002). The connection between physical peeling bark for fibre and spiritual practices of gratitude brings together spiritually charged items intertwining tangible and intangible values for their makers and users.

Ainu robes (fig. 3) were originally used in ceremonial acts (fig.1), embodying a respect for kamui. The decorative elements (fig.4) of the attush cloth embroidered by Ainu women were imbued with a protective meaning for their loved ones. Each part of the garment was symbolically linked to different realms: the upper edges represented the Upper World, the hem the underworld or underwater world, and the middle parts the human world. The embroidery, often concentrated on the collar, upper back, hemline, and cuffs, would guard the wearer against harmful spirits, particularly at the openings of the garment where spirits might enter (Murray et al., 2018). These designs, made with chain stitching using blends of the various earthy colours of elm bark, were typically symmetrical (Krutak, 2012) and abstract. The symbols reflected the spirituality of both the maker and the wearer through the emotional connection concentrated in the garment with each stitch of the needle. The communication between the Ainu and these deities was expressed through a sensitive approach to working with natural materials, and the creation of clothing under spiritual aesthetics. Despite the devastating impact of colonialism on Ainu traditions, Hokkaidō textile artists today continue to imbue cloth with spiritual force by introducing a blessing during the process (Lewallen, 2018).

In Ainu cosmogony, when a person died, they were dressed in their best attush attire and placed by the hearth, positioned lengthwise with the feet facing the doorway, ready for the journey to the afterlife. If the deceased was a woman, she was buried with items essential for her journey: needles and thread, Native and Japanese textiles in different colours and styles, a set of weaving tools, and her personal trinkets. These items were deliberately cut, torn, or broken; a symbolic act intended to release their spirits. Once damaged, these belongings were buried with their owner, ensuring the deceased was well-provided for on the passage to the next life (Batchelor, 1971).

In times of distress, such as the current climate crisis, it is crucial to reconnect with nature and humanity's role as a responsible steward. The spiritual significance of elm bark could be integrated into contemporary sustainable fashion practices, reminding us of the Ainu's connection to nature by integrating Indigenous knowledge, into nature-based solutions (NbS) while adopting a regenerative design perspective (Lyle, 1996; CSM, 2024; Korhonen & Niinimäki, 2024; Weichenrieder, 2024).

ELM BARK FIBRE TECHNOLOGY: AGENCY AND MATERIALITY HISTORICAL ELM BARK FIBRE PRACTICES FROM THE FORESTS OF HOKKAIDŌ

In the mountains of Hokkaidō, the Ainu People developed sophisticated textile techniques using natural fibres harvested from the plant life in their surroundings. Although they did not cultivate plants, they extensively used bast fibres, particularly from the inner bark of the Manchurian elm and

1 At is the Ainu word for elm and tush is the Ainu word for bark.

2 NbS is a newly emerging term for actions to harness the power of ecosystems to protect people, optimise ecosystem infrastructure and ensure a stable and biodiverse future.

Fig. 03

Fig. 04

Japanese linden growing on slopes near the humid riversides or valleys. To protect themselves from bears, Ainu men and women would gather in groups and venture into the Hokkaidō mountains in search of a suitable tree. Once they found one with high-quality bark, they begun the process. Their fibre was obtained by stripping the rough outer bark of the tree from living elm trees before the spring growth began, a period when the bark was easier to peel away. Using a slender blade, they cut around the base of the tree, pulling the bark until it slipped off the trunk, peeling all the way up to the very top (Batchelor, 1971).

They peeled the trees' papery bark in long rolls like scrolls. Once sufficient bark was gathered, they would carry it home and soaked it in warm water (fig.5). After a week, the bark would soften, allowing the women to separate the inner layers from the outer ones. These long layers were then hung to air dry and split up by fingers into threads and bundled. The bark was added to boiling water, and just before it boiled again, wood ash was mixed in to soften the threads for easier separation. The pot was then covered and simmered for several hours, ensuring the alkaline mixture evenly penetrated the bark. The boiled, softened bark, now reddish-brown, was thoroughly washed in running water to remove any sliminess that could weaken the fibres. Once the fibre layers separated, they were carefully kneaded and peeled to avoid uneven thickness. The fibres were hung outdoors on a pole or frame to dry for about two weeks in sunlight, which fades the colour, and rain, which evens it out. After drying, the fibres were softened in water

again, peeled into thin layers, shredded into 2 mm wide strips, and dried. The shredded fibres were lightly twisted and spun into long threads, a process that took a month to produce a single ball of thread. Then they were ready for weaving or to be made into sewing thread (Dubreuil, 1999; Kodama, 1999; Kogei Japan, 2024).

Thread-making was a process, achieved by chewing the fibres with their teeth, creating aqueous emulsions with the salivary fluid making the fibres supple. Many evenings, members of the community would gather in dim light, conversing while Ainu women chewed the fibres into thread. The thread or yarn was used in its natural golden colour but could also be coloured using vegetable dyes from Native plants like marigold and madder (fig. 6). Some garments were dyed to achieve a darker colour, accomplished by steeping the fabric in a warm decoction of oak or alder bark, or by soaking it in marshy areas. This process resulted in a dirty reddish hue, leading to these garments being called kunnep, meaning "black things" (Batchelor, 1971). Finally, the warp threads, which must be longer than the fabric, were set outdoors on windless days to prevent tangling. A stake was hammered into the ground to secure the loom's warp threads, with another stake holding the threads on the opposite side. Two people worked together— one feeding the threads while the other setting them on the loom. Afterwards, the threads were bundled at 70 to 90 cm intervals, and the stakes were removed. The Attushi karape (fig.7), an ancient backstrap loom, fixed one end of the warp threads to a pillar and the other to the loom and the weaver's waist. The weaver sat down, pulled the threads while weaving and rolled the woven cloth on the ground as they moved forward (Kogei Japan, 2024). These threads were woven into a dense, warm golden-coloured fabric known as attush. The elm fibres need moisture in the air to weave it, with weaving often taking place during the heavy snowfall season of February and March, making the fibres easier to work with. Weaving was typically done at night, with the weaver sitting in the main room, surrounded by community members who would chat and encourage her.

Fig. 05

Fig. 06

During the summer months, the women prepared bark for cloth-making, twisted thread, and crafted mats (Batchelor, 1971).
The woven cloths were then assembled to create the robe (fig.4). Unlike the uniformly wide sleeves or the varying sleeve lengths of a woman's Japanese kimono that indicates marital status, the sleeves of an Ainu garment are tapered. The robe is secured with a simple, narrow woven belt, rather than the wide Japanese obi, making the Ainu-style gown more practical for work. For ceremonial garments, the designer must carefully choose the size, colour, shape, placement, and types of materials to be appliquéd. When left undecorated, simple attush robes were used as workwear and often traded to the Japanese for similar purposes. When adorned with decorative elements, the garments became ceremonial attire, revered as wearable art (Dubreuil, 2002). The attush cloth was both durable and well-suited for the sub-arctic climate of Hokkaidō. The hollow nature of the fibres provided natural insulation, making the garments effective in retaining heat. For summer wear, the fibres were twisted to close the hollow core, allowing body heat to escape, while in winter garments, the fibres were left untwisted to better insulate the body (Dubreuil, 2002). The attush cloth was coarse and brittle when dry but became very strong when wet. Properties such as water resistance and the ability to repel moths contributed to the longevity of the garments, making them popular as workwear for the herring fishing industry and for sailors on Kitamae ships travelling between Honshu and Ezo-chi (Northerncross, 2015). Over time, the fabric became softer with wear, enhancing its comfort and texture (Dubreuil, 2002; Murray et al., 2018). A finer variety was crafted from nettle bast fibres or hemp. During the summer Ainu wore leggings made from elm bark fibre to protect themselves from insects and wore sandals made from elm bark and vines (Batchelor, 1971).
The Ainu used bone needles and fibres from the elm tree, sometimes dyed black, for sewing and embroidery. Indigo dyed cotton cloth, once a luxurious and highly prized material, was traded from the Japanese and used by the Ainu

Fig. 07

for appliqué decorations around the neck, front opening, sleeves, and hem (fig. 4). This style of attire only emerged during the Meiji era (1868-1912), when cotton fabrics became affordable for many Ainu people. This adaptation marked a significant shift in Ainu textile practices, blending traditional materials with new influences (Dubreuil, 2002).The process of creating an attush robe could take over a year, with the garments being passed down through generations as treasured items. Ainu women were responsible for every phase of the creative process, from harvesting the bark to weaving the fabric and decorating the finished garment. The embroidery motifs (fig.4) were created from memory (Batchelor, 1971) with mothers and grandmothers teaching young girls by drawing patterns in the sand or ashes of the fire pit. Each design was unique, reflecting the wearer's personality and social status (Dubreuil, 2002).

CONTEMPORARY PROCESSING OF ELM BARK FIBRE

Along the Saru River basin in southern Hokkaidō, elm and linden trees have always abounded in the remote village of Nibutani (Kogei Japan, 2024). This craft has been sustained by the people of Biratori, specifically by two remaining elm bark weavers, Yukiko Kaizawa and Reiko Kayano, now in their 80s and 90s. Yukiko Kaizawa (fig.8), began weaving at a young age, selling her work to high-end Japanese department stores.Despite her over 50 years of dedication, the tradition faces a challenge: younger generations are interested but find it difficult to sustain due to the craft's time-consuming nature and lack of economic viability. Maki Sekine, an Ainu embroidery artist and Yukiko Kaizawa's daughter, continues to uphold her family's legacy. Reiko Kayano, the other elm bark weaver in Nibutani, is a 90-year-old Ainu woman and the widow of Shigeru Kayano, a prominent figure in the Ainu cultural movement and the first Ainu member of Japan's parliament. His efforts were instrumental in the enactment of the "New Ainu Law" in 1997.Moreover, Nibutani-attush was the first Hokkaidō item to be designated as "traditional craft" by the Japanese Ministry of Economy, Trade and Industry in 2013 (Northerncross, 2015).

In addition, it is important to note that the creation of elm bark garments has not stopped since its beginnings, even with the arrival of cheaper and easier to use cotton (Dubreuil, 2002).

FUTURE OF ELM BARK FIBRE MATERIAL CULTURE

Elm bark fibre offers an example of how clothing can connect people to the land, past, and present. Its production encapsulates values of collaboration, ecological resilience, and local pride, while addressing the pressing need to replace fossil-fuel-derived materials with sustainable alternatives (Gilbertson, 2024). By reviving elm bark fibre weaving, local skills are developed, creating valuable cultural and economic connections. Historically, Ainu weavers have transformed elm bark into textiles, using processes that harmonise with seasonal rhythms and regional biodiversity. These traditional practices serve as a model for contemporary regenerative systems, which prioritise small-scale, flexible production, blending old technologies, and fostering community-based initiatives. Such systems align with a more equitable and sustainable economy by reducing reliance on extractive industries while promoting community well-being. Elm bark's potential reinforces its value within an ecological fibre system. Revitalizing this craft can help build local fibre economies that respect history, land, and culture while fostering innovation and entrepreneurship. Regenerative practices that support bast fibres, including elm bark fibre, can improve biodiversity, and reduce carbon footprints. Such practices promote harmony with nature and demonstrate a shift toward a fashion industry rooted in climate and social justice (Minney, 2024).

Drawing insights from Ainu traditions offers an opportunity to envision regenerative practices in fibre sourcing and craft production that respect planetary boundaries. However, it is crucial to ensure that such inspiration avoids perpetuating colonial legacies of extraction and recontextualization. By prioritising non-exploitative, collaborative approaches, we can foster resilient systems that support a sustainable and equitable future in fashion and beyond.

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3 The term Nibutani originates from niputai which is an Ainu language word that means "a land where the trees grow thickly"

Fig. 08

CONCLUSIONS

Natural elm bark fibre processing in Hokkaidō, provides valuable lessons for creating a sustainable society. Humanity's material footprint has exceeded the planet's limits, making it essential to look to Indigenous practices for guidance. The Ainu's painstaking process of harvesting, spinning, and weaving elm bark into attush cloth exemplifies a sustainable approach to fashion, rooted in respect for nature and minimal waste.

In the village of Nibutani, the continuation of the elm bark textile tradition by a few committed artists demonstrates the resilience of Ainu craftsmanship. The use of attush has evolved beyond traditional robes, finding new life in modern fashion and interior design. Ainu women play a crucial role in bridging ancestral heritage with contemporary practices, contributing to cultural revitalisation. This research highlights the importance of attush craft in preserving cultural identity. The tradition of elm bark textiles offers insights into sustainable practices that contrast sharply with the environmental destructiveness of modern fashion. By studying historical elm bark artefacts, we gain a deeper understanding of the techniques, tools, and spiritual significance that have sustained Ainu communities for generations.

Integrating Ainu Indigenous knowledge systems which include cultural, spiritual, and ecological practices, into contemporary nature-based solutions (NbS) can enhance climate resilience and promote sustainable practices in the fashion industry. Indigenous Peoples, despite their small global population, manage lands rich in biodiversity, offering critical insights into sustainable land management. The expertise of Ainu seamstresses, who were once artists, designers, biochemists, and climatologists, demonstrates the potential of biobased textiles to inspire more sustainable practices in today's fashion.

This paper calls for a shift from resource-intensive, petroleum-based materials to sustainable, nature-based solutions, inspired by Indigenous practices. While building on Ainu traditions and other indigenous knowledge systems offers possibilities for promoting waste reduction, biodiversity restoration and community empowerment, it is essential to prioritise collaboration and mutual respect, avoiding the risks of continuing colonial legacies of exploitation and reinterpretation. Adopting a regenerative design perspective can guide more sustainable and ethical material practices, while challenging the destructive patterns established by Western colonialism.

CAPTIONS

[Fig. 01] Elisa Palomino, June Pardue, Ainu performer artist, and Masahiro Nomoto, Director of Culture Promotion Department at the Upopoy National Ainu Museum. Shiraoi, Hokkaido

[Fig. 02] Elisa Palomino, June Pardue, Reiko Kayano, Lyna Torayashiki, Anatoly Donkan, Oleg Mitrofanov and Elisa Palomino in Nibutani, Hokkaido.

[Fig. 03] Ainu hunter wearing a ceremonial attush. Ezotō kikan. Hata, Awagimaru, 1764-1808. Japanese Rare Book Collection, Library of Congress. Washington, DC, USA.

[Fig. 04] Ainu ceremonial garment with cotton appliqué and embroidery on elm-bark fibre cloth. Minneapolis Institute of Art, Minneapolis, USA.

[Fig. 05] Elm bark soaked in warm water by Yukiko Kaizawa.

[Fig. 06] Elm bark yarn in its natural golden colour and dyed with vegetable dyes from indigenous plants such as marigold and madder, by Yukiko Kaizawa.

[Fig. 07] Two Ainu women weaving in the Attushi karape loom. Ezo kikō. Tani, Bunkei, 1778-1840.

Japanese Rare Book Collection, Library of Congress. Washington, DC, USA.

[Fig. 08] Ainu weaver Yukiko Kaizawa. Nibutani, Hokkaido, Japan

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