Santander Art and Culture Law Review 1/2026 (12): 101-124
https://doi.org/10.4467/2450050XSNR.26.002.23492

GENERAL ARTICLES

Agnieszka Pawłowska-Mainville*

agnes.pawlowska-mainville@unbc.ca
https://orcid.org/0000-0002-2151-8162
University of Northern British Columbia
3333 University Way, Prince George, BC V2N 4Z9
Canada

Jarosław Pająkowski**

j.pajakowski@dolwislapark.pl
https://orcid.org/0009-0007-8214-855X
Complex of Landscape Parks of the Lower Vistula River
ul. Sądowa 5, 86-100 Świecie
Poland

Franciszek Chmarzyński***

agnieszka.pm1314@gmail.com
https://orcid.org/0009-0000-8430-1043
Buśnia 14, 86-160 Warlubie
Poland

Living Archives: Pine Resin Harvesting and Culturally Modified Trees as Intangible Cultural Heritage in Poland

Abstract: Pine resin harvesting, a traditional practice in Poland, involves carefully stripping a small section of bark to collect raw resin from pine trees. This skill, passed down through generations, has been integral to producing valuable goods such as turpentine, traditional medicine, glue, and other forest-based products. Resin harvesting played an important economic and cultural role in many rural communities, particularly in forested regions where livelihoods were closely connected to the sustainable use of non-timber forest resources. Today, pine resin harvesting is an at-risk element of Poland's intangible cultural heritage, with only a few remaining practitioners left preserving and transmitting this knowledge. Preserving and revitalizing this practice is essential for its continuity across gen-

erations, while conserving the old-growth trees marked by this tradition supports ecological diversity and strengthens the relationship between cultural heritage and the natural environment. This article explores the role of pine resin harvesting in the Lower Vistula River Valley and Tuchola Forest regions of Poland, emphasizing ongoing efforts to document and safeguard its associated knowledge and skills. Drawing on field research, interviews with knowledge holders, and collaboration with forestry institutions, it highlights the importance of intergenerational transmission and community engagement in sustaining this heritage. By situating pine resin harvesting within the context of culturally modified trees, the article demonstrates how resin-harvested pines function as living archives of human interaction with forest ecosystems. These trees provide tangible evidence of historical land-use practices while supporting biodiversity and ecological resilience. The article argues that documenting and recognizing this heritage not only contributes to the revitalization of an at-risk tradition, but also promotes a shift in forestry and conservation practices that acknowledges the interconnections between cultural heritage, ecological stewardship, and biocultural diversity.

Keywords: pine (*Pinus silvestris*) resin harvesting, intangible cultural heritage, culturally modified trees, traditional ecological knowledge, biocultural diversity

* **Agnieszka Pawłowska-Mainville** is Associate Professor at the University of Northern British Columbia and UNESCO Chair in Living Heritage and Sustainable Livelihoods, Canada. She specializes in intangible cultural heritage, with a focus on cultural landscapes, language valuation, and heritage practices that influence livelihoods. Pawłowska-Mainville has contributed to international initiatives, including two IPBES Assessments and various UNESCO projects and reports. Her research has been published in *Ecology and Society*, *Nature*, *COSUST*, and the *International Journal of Intangible Heritage*, and she is the author of books on Indigenous living heritages, cultural landscapes, and heritage-language valuation.

** **Jarosław Pająkowski** is the Director of the Complex of Landscape Parks of the Lower Vistula River.

*** **Franciszek Chmarzyński** is a retired pine-resin harvester and knowledge custodian with over 30 years of experience in the practice. His expertise spans both the practical and cultural dimensions of this centuries-old craft, including the seasonal rhythms, tools, and land-use knowledge that sustain it. As a custodian of intangible cultural heritage, Chmarzyński has contributed to research, educational workshops, and heritage preservation initiatives, ensuring that this unique practice continues to be valued and shared with future generations.

This publication and research were funded in part by the National Science Centre Poland and the European Union's Horizon 2020 Research and Innovation Programme under the Marie Skłodowska-Curie grant titled "Exchanging Knowledges on Best Practices in Folklore and Intangible Cultural Heritage Safeguarding" (agreement no. 945339, project no. Polonez Bis1 2021/43/P/HS2/01350). The project was led by Agnieszka Pawłowska-Mainville, as Principal Investigator. It would not have been possible without the considered observations of the Regional Directorate of State Forests in Toruń and other foresters. Special thanks go to Mr Włodzimierz Pamfil, Director of the Regional Directorate of State Forests in Toruń, Mr Marek Sobczak, Deputy Director for Economic Affairs of the Regional Directorate of State Forests in Toruń, Mr Karol Pawlicki from the Dąbrowa Forest District, as well as Mr Stanisław Miłkowski and Mr Łukasz Woźniak.

Introduction

This article examines how pine resin harvesting in Poland represents both an endangered cultural practice and a critical element of biocultural conservation. We argue that recognizing these trees as culturally modified trees (CMTs) within forest management policies is essential for their protection and for ensuring the continuity of ecocultural knowledge. The 2003 UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (ICH Convention) defines intangible cultural heritage (ICH) as practices, knowledge, and skills passed down through generations, shaping community identity and continuity.[1] Rooted in the natural environment, ICH both influences and is shaped by ecosystems, biodiversity, and sustainable resource use. Despite its significance, gaps remain in safeguarding this ICH element, particularly its cultural and ecological connections.

The afternoon sun filters through the towering pine trees in the forest near Jeżewo, Poland, casting dappled light on the western sides of the trees, their trunks marked with the unique rib-like shapes used for pine resin harvesting. This traditional[2] practice, vital to Poland's economy and culture since time immemorial, through the Middle Ages and up to the 1970s, today exists only through these markings, evidence of past harvests and livelihoods.[3] As we walk, the air is filled with the scent of pine needles and earth, and our guide – Franciszek Chmarzyński, one of the last living experts in the tradition – leads us to a nearby tree. We wander among the forgotten markings on the trees, many of them overrun with green lichen and moss. Some grooves are smaller, hinting at the tree's effort to veil its exposed cambium. With reverence, Chmarzyński touches the bark, his eyes reflecting both the weight of history and his deep connection to the practice. He extends his wrinkled hand, gently touching the tree, his fingers and open palm gliding along the ribs. His eyes take on a specific look – a blend of admiration, memory, and respect. Framed by a web of fine lines that speak of hard labour, resilience, and good spirits, his face radiates warmth and experience, embodying a living connection with the area.

---

1 17 October 2003, 2368 UNTS 3, Art. 2(1).

2 The term "traditional" can be problematic as it often suggests a static, unchanging perspective on cultural practices, failing to acknowledge the dynamic and evolving nature of local and Indigenous cultures. Its use may also reinforce stereotypes, marginalizing contemporary experiences and innovative adaptations. Without proper context, the term risks overlooking the sociolinguistic nuances of local societies and influencing worldviews, academic discourse, and linguistic hegemony. In this paper, we prefer to use "ecocultural knowledge" instead of "traditional ecological knowledge", as it is living knowledge tied to a specific locale and sociolinguistic space. For a detailed examination of this term in the context of tree-beekeeping by Indigenous peoples in Canada, see A. Pawłowska-Mainville, *"Stored in the Bones": Safeguarding Indigenous Living Heritages*, University of Manitoba Press, Winnipeg 2023 and eadem, *Living Heritage Landscapes: An Anthropological Approach to Intangible Cultural Heritage and Language Valuation in Canada and Poland*, National Folk Museum of Korea, Seoul 2024, respectively.

3 S.T. Jackson, R.J. Hobbs, *Ecological Restoration in the Light of Ecological History*, "Science" 2009, Vol. 325(5940), pp. 567–569.

He shares that he has spent most of his life in this forest near Buśnia, Poland, and recalls how on some mornings, as he entered the area to collect the sap, the whole forest would be filled with the scent of pine resin.[4] Sunlight filters through the dense canopy and Franciszek leans down to pick up an old felled draw shave knife for debarking tree stubs. He puts aside his cane and presses the tool against the bark, peeling away the bark confidently with brisk up and down movements. As he explains each tool in the toolbox, we – Pawłowska-Mainville and Pająkowski – take photos and record his words, ensuring that his knowledge is transmitted. Ironically, by preserving this fading element of intangible cultural heritage on film, we also document the presence of this practice on the tree itself, visibly altering its appearance. Pine resin harvesting exemplifies this link, as it transforms trees into culturally modified trees (CMTs), that is, a living record of human interaction with forests. In Poland, CMTs remain unrecognized in legal and environmental frameworks; Pawłowska-Mainville sees it from her work in Canada and international contexts and is excited to deepen the concept in Poland.[5] This article documents the collaborative efforts to introduce the concept of CMTs through pine-resin extraction, showing how these trees preserve ecocultural knowledge and biocultural diversity to Poland. Found in old-growth forests, their physical marks testify to centuries-old practices that integrate cultural heritage with non-timber forest product management.

CMTs at the Intersections of Ecology, Culture, and Legal Recognition across the Globe

Forests and culturally modified trees (CMTs) are key intersections of ecology, culture, and human well-being, serving as living documents of human–nature interactions. CMTs are altered by human activities to fulfil cultural, spiritual, or practical needs, providing tangible connections to the heritage of local communities.[6] They

[4] Franciszek Chmarzyński, personal communication, Buśnia, 9 September 2024.

[5] A. Pawłowska-Mainville, *"Stored in the Bones"*...; A. Pawłowska-Mainville, J. Pająkowski, *Cultural Heritage-in-Nature as a Public Good: Living Heritage, Climate Resilience, and Sustainable Development in Forest Landscapes*, technical paper submitted to the UNESCO World Conference on Cultural Policies and Sustainable Development – MONDIACULT 2025, https://mondiacult2025.com/wp-content/uploads/2025/10/M25-Technical-Paper-UNESCO-Chairs-and-UNITWIN-Networks-individual-UNESCO-Chair-in-Living-Heritage-Sustainable-Livelihoods-Canada.pdf [accessed 8 February 2026].

[6] For examples and detailed discussions about CMTs please see M. Gadgil, V.D. Vartak, *The Sacred Groves of Western Ghats in India*, "Economic Botany" 1976, Vol. 30(2), pp. 152–160; State Government of Victoria, *Fact Sheet: Aboriginal Scarred Trees*, https://www.firstpeoplesrelations.vic.gov.au/fact-sheet-aboriginal-scar-trees [accessed 24 January 2025]; L. Östlund et al., *Traces of Past Sami Forest Use: An Ecological Study of Culturally Modified Trees and Earlier Land Use within a Boreal Forest Reserve*, "Scandinavian Journal of Forest Research" 2003, Vol. 18(1), pp. 78–89; A. Pawłowska-Mainville, *Living Heritage Landscapes*...; Archaeology Branch of the B.C. Ministry of Small Business, Tourism and Culture, *Culturally Modified Trees of British Columbia: A Handbook for the Identification and Recording of Culturally Modified Trees*, Version 2.0, March 2001; N.J. Turner, *The Cedar Tree: A Cultural and Ecological History*, University of Washington Press, Seattle 2004.

embody stories, traditions, and practices, functioning as living archives of human–nature relationships. Examples from around the world highlight the diversity and significance of CMTs and their legal recognition (or lack thereof). For example, in western Canada and the United States, red cedar trees (*Thuja plicata*) have been used by Coastal First Nations to make regalia, clothing, baskets, and canoes; the trees continue to be used for ceremonial purposes, as they have been since time immemorial.[7] Today, these trees exhibit bark removal patterns. In Australia, Aboriginal communities have used tree bark for crafting boats, containers, shields, and temporary shelters. They also carved "toe holds" into tree trunks to facilitate climbing, allowing hunters to use trees as lookouts and access bee hives or harvest bark from higher sections. Similarly, in northern Europe, the Saami use trees for various purposes, including marking reindeer grazing territories and extracting bark for food supplements. These modifications reflect the cultural and subsistence needs of both communities.

The legal and institutional recognition of CMTs as part of cultural and natural heritage is gaining traction globally, though progress remains slow. Laws and initiatives across various sectors provide differing levels of protection, leading to varied approaches to the preservation and management of these trees worldwide. Many regions recognize CMTs within existing frameworks for national historic sites, grave sites, archaeological resources, or even environmental impact assessments.[8] British Columbia, Canada, formally recognizes CMTs under law.[9] These trees, altered by Indigenous peoples after 1846, are protected under Canada's Heritage Conservation Act, which acknowledges their cultural significance to First Nations and may indicate their historical use of the land.[10] The Act mandates the assessment and documentation of CMTs before logging or development in areas where they are found, ensuring their preservation.[11] Collaborations with Indigenous groups, such as the Haida in Haida Gwaii, the Nuu-chah-Nulth in Tla-o-qui-aht, and the Anishinaabeg at Asatiwisipe Aki, demonstrate the integration of cultural heritage into forest and land-use management practices.[12] In Australia, scarred trees are protected under state and federal heritage laws, ensuring their preservation as part of cultural landscapes. In Patagonia, Indigenous groups such as the Mapuche and Tehuelche Lenga demonstrate the modification and use of Ñire trees (*Nothofagus*

[7] N.J. Turner, op. cit.

[8] N.J. Turner et al., *Cultural Management of Living Trees: An International Perspective*, "Journal of Ethnobiology" 2009, Vol. 29(2), pp. 237–270; National Park Service, *Culturally Modified Trees in the Dena'ina Cultural Landscape*, 6 July 2020, https://www.nps.gov/articles/000/denainacmt.htm [accessed 24 June 2025].

[9] Heritage Conservation Act, R.S.B.C. 1996, c. 187; Forest and Range Practices Act, S.B.C. 2002, c. 69.

[10] Archaeology Branch of the B.C. Ministry of Small Business, Tourism and Culture, op. cit.

[11] A. Pawłowska-Mainville, *"Stored in the Bones"*...

[12] A. Pawłowska-Mainville, *Asserting Declarations: Supporting Indigenous Customary Governance in Canada through Intangible Cultural Heritage*, "Patrimonio: Economía Cultural y Educación para la Paz (MEC-EDUPAZ)" 2021, Vol. 1(19), pp. 346–381.

species), though legal protections for these trees remain limited. A similar situation exists in India, where the Sacred Groves of the Western Ghats in the northeastern part of the country and parts of Madhya Pradesh are not only considered spiritually significant, but also play a crucial role in protecting biodiversity by sustaining rare and endangered species in the surrounding ecosystems.[13] These sacred groves are often viewed as natural "buffer zones" for ecosystems, and the trees within them are revered, modified, or marked to preserve spiritual or cultural integrity. While India has recognized certain aspects of CMTs under various conservation and heritage protection laws, such as the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act (2006),[14] which acknowledges local peoples' rights to manage, protect, and sustainably use forest resources, CMTs as a distinct category remain unprotected by law.[15]

In the United States, efforts to preserve CMTs include creating buffer zones and raising awareness about their historical significance through organizations like the Trail Tree Project. While the USA (like Canada) lacks specific federal laws protecting CMTs, several legal frameworks such as the National Historic Preservation Act (NHPA)[16] and the Archaeological Resources Protection Act (ARPA)[17] offer indirect protection. It is also important to note that many Indigenous communities and local peoples have their own regulations and customary governance systems for protecting CMTs within their territories. Some of these measures involve collaboration between these communities or Indigenous nations and state authorities to ensure the survival of CMTs in landscapes facing development pressures.[18]

In Poland, cultural heritage practices such as tree-beekeeping, pine resin extraction, and basketry have shaped ecocultural landscapes, leaving a legacy of CMTs. The Lower Vistula River Valley and Tuchola regions, where these traditions persist or are being revived, represent important areas of study within the broader Polish context. Scots pine (*Pinus sylvestris*) in these forests continue to bear marks of these practices, serving as living records of non-timber forest product (NTFP)[19] use. Discussion of CMTs remains largely absent. While "formed" trees, such as

[13] M. Gadgil, V.D. Vartak, op. cit.

[14] 29 December 2006, The Gazette of India, No. 2 of 2007.

[15] A.A. Ormsby, S.A. Bhagwat, *Sacred Forests of India: A Strong Tradition of Community-Based Natural Resource Management*, "Environmental Conservation" 2010, Vol. 37(3), pp. 320–326.

[16] 16 U.S.C. § 470 – Transferred or Omitted.

[17] 16 U.S.C. Chapter 1B – Archaeological Resources Protection. The NHPA can safeguard CMTs if they are part of recognized historic sites, and the ARPA protects trees that are considered archaeological resources on federal and tribal lands.

[18] A. Pawłowska-Mainville, *Asserting Declarations…*

[19] Non-timber forest products are materials and/or resources obtained from forests which do not require the harvesting (logging) of trees: fur-bearers, nuts, seeds, berries, mushrooms, oils, foliage, pollarding, tools, medicines, consumables, clothing, medicinal plants, peat, mast, fuelwood, fish, spices and forage, etc. See https://www.ipbes.net/glossary-tag/non-timber-forest-product.

those in the Crooked Forest, are noted for their distinctive shapes, broader recognition of culturally modified trees (CMTs) remains limited, creating an opportunity for Pawłowska-Mainville to introduce and further develop CMT discourse within the Polish context through engagement with local and regional forestry and park initiatives.

The legal framework for resin harvesting (*żywicowanie*) in Poland is minimal, as there are few explicit regulations. The 1991 Forest Act[20] recognizes resin collection as part of forest management, but no specific national legislation governs it as a distinct activity. The main restriction comes from the 1971 Code of Misdemeanours,[21] which penalizes unauthorized resin harvesting on land not owned by the harvester without the owner's consent. It is considered a minor offence, punishable by a fine of up to PLN 250 (USD 62) or a reprimand. If the harvested resin's value exceeds PLN 800 (USD 200), the act may be classified as theft, carrying criminal penalties.[22]

Despite its historical significance, resin harvesting is not formally recognized as part of Poland's cultural heritage. While elements of this practice are recognized within the history of the Regional Directorate of State Forests in Toruń ("State Forests"), CMTs remain absent from forest management discourse. No regulations safeguard these trees or recognize resin harvesting as an intangible cultural practice. While State Forests have internal tree management guidelines, they are not legally binding beyond their jurisdiction. This regulatory gap has contributed to the marginalization of resin collection, which peaked in the 1960s but has since declined due to shifting forest policies and a lack of economic incentives. However, CMTs serve as profound reminders of the intertwined relationship between people and nature. Legal protections, along with ongoing initiatives, reflect a growing recognition of their cultural, ecological, and historical significance. By acknowledging and safeguarding CMTs, we not only enrich our understanding of heritage, but also promote sustainable and respectful interactions with natural landscapes.

Trees, CMTs, and Pine Resin Harvesting in Poland

In Polish folklore and cultural history, old trees – such as oaks, yews, and lindens – hold deep symbolic meaning, inspiring legends, superstitions, and artistic expression. Their longevity and presence often elevated them to sacred or mythological status. In 1926, Polish artist Leon Wyczółkowski found inspiration in ancient yew forests, depicting them in paintings, lithographs, and drawings. These towering

[20] Ustawa z dnia 28 września 1991 r. o lasach [Act of 28 September 1991 on Forests], Journal of Laws 1991 No. 101 item 444, as amended, Art. 6(1)(1).

[21] Ustawa z dnia 20 maja 1971 r. Kodeks wykroczeń [Act of 20 May 1971 – Code of Misdemeanours], Journal of Laws 1971 No. 12 item 114, Art. 153(1)(1).

[22] Ibidem, Art. 153(1)(1). Thank you to Prof. Dr hab. Wojciech Radecki, Professor Emeritus from the Institute of Law of the Polish Academy of Sciences, for his legal opinion.

trees became his sacred grove, embodying the enduring cultural bond between people and nature.[23]

Throughout history, trees have been viewed not only as ecological entities, but also as living symbols, embodying spiritual and cultural meanings that resonate deeply in various societies.[24] Particularly in rural landscapes, centuries-old trees have played central roles in daily life, each species carrying unique significance. In Poland, lindens were linked to courts and celebrations, while oaks often marked sombre events, such as executions. Large trees also figured in religious and cultural rituals, from planting apple trees to commemorate life events to the tradition of "Papal Oaks" honouring anniversaries.[25] Beyond their symbolic roles, trees also held practical significance, providing shelter during storms or floods, serving as markers for hidden treasures, or guiding travellers along trails.[26] Over the centuries, these trees in Poland have shaped cultural practices, rituals, and the landscape itself, embodying both the natural and cultural (even spiritual) worlds.

Pinus sylvestris (Scots pine), one of the most common trees in Poland, plays a vital economic and cultural role. It is used in timber production, resin extraction, and traditional crafts like basket making and timber rafting, and it has a strong presence in folklore, rituals, and ecological conservation. Pine resin has been integral to Poland's economy and cultural heritage for centuries.[27] In the Middle Ages, for example, resin was used in a variety of fields, from medicine to shipping, where it was employed to seal ships (naval gum). In the pre-industrial era, resin harvesting relied on traditional tools and methods, passed down orally through generations. During the 18th and 19th centuries, the rise of industry and the increasing demand for turpentine and pine rosin led to the growth of resin extraction as a significant economic activity.[28] With its vast pine forests, Poland became one of Europe's leading resin producers. By the 20th century, however, technological advancements and industrial changes led to the decline of industrial resin extraction, although it remained a key element of the cultural landscape in certain regions.

As a practice deeply rooted in ecocultural knowledge, resin harvesting shaped the cultural landscape as well as the economy of many Polish regions, particular-

[23] W. Kawecki, *Nasze drzewa i lasy w artystycznej twórczości Leona Wyczółkowskiego (Wspomnienie pośmiertne)* [Our Trees and Forests in the Art of Leon Wyczółkowski (Obituary)], "Sylwan. Organ Polskiego Towarzystwa Leśnego" 1937, Vol. 55(5), pp. 101–105.

[24] B. Ogrodowska, *Medycyna tradycyjna w Polsce* [Traditional Medicine in Poland], Muza, Warszawa 2012; eadem, *Polskie obrzędy i zwyczaje ludowe* [Polish Folk Traditions], Muza, Warszawa 2001.

[25] Nowadays it is fashionable to plant trees (usually oaks) to celebrate anniversaries, such as the 1000th anniversary of the state or in honour of someone like Pope John Paul II – the "Papal Oaks".

[26] S. Kłosiewicz, O. Kłosiewicz, *Przyroda w polskiej tradycji* [Nature in Polish Tradition], Wydawnictwo Sport i Turystyka, Warszawa 2011.

[27] S.T. Jackson, R.J. Hobbs, op. cit.

[28] L. Antkowiak, *Żywicowanie* [Resin Extraction], Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, Poznań 1996.

ly in areas rich in pine forests.[29] The sites where resin harvesters worked became landmarks within local communities, contributing to a unique forest landscape often described as one that, according to Franciszek Chmarzyński, "filled the whole forest with the scent of sap".[30] Resin harvesting is intricately tied to intangible heritage, incorporating traditions, beliefs, and specialized knowledge of extraction techniques.[31]

The traditions surrounding resin harvesting were also an integral part of the lives of many rural communities, particularly in regions abundant with pine forests. Pine resin provided families with materials, medicine, and income, and the techniques for harvesting it were passed down through generations. In folk medicine, pine resin was primarily used for treating wounds[32] and infections due to its antibacterial and anti-inflammatory properties. It was also used in inhalations for respiratory issues[33] and in ointments for joint pain.[34] In the household, resin was utilized for wood impregnation, the production of natural glue, tool repair, candle making, and even as natural chewing gum.[35] This ecocultural knowledge, including practical skills and oral traditions related to forestry, is a key element of Poland's (and human) cultural legacy. Protecting and promoting this heritage is vital for preserving rural traditions and livelihoods, as well as ensuring their transmission across generations. These skills were integral to local knowledge, connecting families and communities to the forest.

However, the profession of resin workers, once widespread in certain regions of Poland, is now on the brink of extinction.[36] Traditional resin harvesting techniques, which involve manually scoring pine trunks at specific times of the year, are increasingly rare, as are knowledge of the surrounding nature, the use of specialized tools, and the construction of "bunkers" for resin collection. As a result, the rich knowledge associated with these practices is gradually fading, leaving a gap in

[29] M. Kardoš et al., *Traditional Uses of Resin and Resin Products in Central Europe*, "Journal of Ethnopharmacology" 2013, Vol. 148(1), pp. 32–39.

[30] Franciszek Chmarzyński, personal communication, Buśnia, 24 August 2024.

[31] UNESCO proposes five broad domains through which ICH is manifested: (1) oral traditions and expressions, including language as a vehicle of the intangible cultural heritage; (2) the performing arts; (3) social practices, rituals, and festive events; (4) knowledge and practices concerning nature and the universe; and (5) traditional artisanship and craftsmanship. While many elements of ICH overlap or can be included across multiple domains, these domains are useful for categorizing cultural elements with the aim of safeguarding them. The domain list is flexible, allowing countries and communities to adapt it by adding new domains or creating alternative categories to suit their specific ICH practices.

[32] E.S. Curtis, *The North American Indian*, Cambridge University Press, Cambridge 1907–1930.

[33] B. Ogrodowska, *Medycyna tradycyjna…*

[34] Z. Parada, *Zioła w tradycji polskiej medycyny ludowej* [Herbs in the Tradition of Polish Folk Medicine], Państwowy Instytut Wydawniczy, Warszawa 1985.

[35] K. Trzciński, *Żywica sosnowa – zastosowania w dawnych i współczesnych czasach* [Pine Resin – Uses in Ancient and Modern Times], "Las Polski" 2015, Vol. 10.

[36] Franciszek Chmarzyński, personal communication, Buśnia, 9 September 2024; Stanisław Miłkowski, personal communication, Góry Łosiowe, 10 January 2025.

the cultural and ecological understanding that has sustained these rural communities for centuries. As resin harvesting and the knowledge of the practice faces the risk of extinction, the urgency to safeguard it grows, reflecting broader efforts to protect cultural landscapes and their intangible heritage. This article designates Poland's resin-extracted pine trees as CMTs, recognizing them as visible marks of human interaction that reflect a long tradition of resin harvesting. By acknowledging these trees as CMTs, we reinforce the connection between cultural practices and the natural environment, emphasizing the need for integrated conservation efforts that protect both biodiversity and intangible cultural heritage.

The protection and revitalization of these practices and CMTs are essential for ensuring that this heritage endures for future generations. The research methodology applied an ICH approach to document and protect resin harvesting knowledge, focusing on preserving both the practice and the CMTs that are integral to this ecocultural landscape. The article contributes to the growing recognition of CMTs and their role in fostering sustainable interactions with natural environments. Through this approach, it establishes a model for safeguarding not only a specific practice, but the entire living heritage that has shaped these forests and the communities that depend on them.

Methodology and Data Collection

The research[37] applied an ICH perspective to Poland's regional State Forests to document and protect the at-risk practice of pine resin harvesting and to promote its role in fostering ecocultural diversity. The fieldwork focussed on community-based engagement with some of the last custodians of resin harvesting in the Lower Vistula River Valley, ensuring that the knowledge exchange observed a deep respect for local traditions and expertise. The aim of this approach was to safeguard the practice while emphasizing its cultural and environmental significance within the region – and to honour the custodians.[38] The living heritage of resin harvesting was documented over two years by Pawłowska-Mainville, through formal and informal interviews, site visits, and ground truthing with custodians across 8–11 locations in the Kuyavian-Pomeranian region; she later included Jarosław Pająkowski on elements of the research. These visits were immersive, bridging ecological and cultur-

[37] The project, "Exchanging Knowledges on Best Practices in Folklore and Intangible Cultural Heritage Safeguarding" (Polonez Bis1 2021/43/P/HS2/01350), was funded by the National Science Centre in Poland and the European Union's Horizon 2020 research and innovation programme under a Marie Skłodowska-Curie Grant (agreement no. 945339). It was led by Pawłowska-Mainville, who consulted Jarosław Pająkowski on limited aspects of the research as needed.

[38] For methodological and methodical information regarding this style of research, please see A. Pawłowska-Mainville, *Engaging Dibaajimowinan: "Stories" in Community-Based Research at Asatiwisipe Aki, Manitoba*, in: S. MacKinnon (ed.), *Practising Community-Based Participatory Research: Stories of Engagement, Empowerment, and Mobilization*, Purich Press; Canadian Centre for Policy Alternatives, Vancouver 2018, pp. 127–143; L.T. Smith, *Decolonizing Methodologies: Research and Indigenous Peoples*, 2nd ed., Zed Books, London 2012.

al knowledge while introducing perspectives from Pawłowska-Mainville's work in Canada to the Polish context. Walking through dense forests, Pawłowska-Mainville examined trees marked by resin extraction, tested traditional tools, and observed the seasonal rhythms of the practice. The study highlighted how this knowledge, primarily transmitted through oral tradition and hands-on demonstration, has been largely overlooked in the existing literature. By integrating storytelling with ecological observation, the research enriched the knowledge of the terrain, the spatial distribution of CMTs, and the environmental conditions that shape the practice. This approach revealed layers of meaning embedded in the forest, deepening both cultural and ecological perspectives on these historically significant trees.

A brief description of our team is essential, as the collaboration and diversity of expertise played a pivotal role in the success of this research. Our transdisciplinary and multisectoral approach merged distinct knowledge systems and perspectives. Pawłowska-Mainville, as lead researcher, brought a crucial dimension to the project through her extensive experience with Indigenous communities in Canada, particularly in traditional land-use studies and intangible cultural heritage documentation. Her leadership in safeguarding heritage practices and integrating ecocultural knowledge shaped the study's interdisciplinary framework, effectively bridging theory and practice across the Polish and Canadian contexts. Discussions with the Regional Directorate of State Forests in Toruń provided valuable support in identifying and accessing relevant forest areas. Their input, grounded in long-term forest management records, provided contextual information for the study; however, no catalogues specifically identifying pine-resin-harvest trees existed, thus the detailed documentation and spatial identification of these trees were taken independently by Pawłowska-Mainville through extensive fieldwork and consultation with Chmarzyński and other pine-resin harvesters across multiple forest sites.

Key contributors included Franciszek Chmarzyński, a retired forest worker and one of the last living knowledge-holders of pine resin extraction in the region as well as Jarosław Pająkowski.[39] While Pająkowski's familiarity with the Kuyavian-Pomeranian region helped situate the research within its local geography, Chmarzyński's deep practical expertise and decades of embodied experience were central to the research. With over 30 years of experience, Chmarzyński managed over 2,000 trees at the height of his career, offering rare firsthand insight into techniques, forest conditions, and the lived realities of resin extraction workers.[40]

[39] Stanisław Miłkowski, a retired forester, also played a crucial role in the research, bringing his extensive knowledge of the local forests. He assisted in identifying and mapping via GPS, and contributed to archival work by gathering historical documents and photographs. Although he did not engage in resin harvesting professionally, his expertise was invaluable in enriching the research.

[40] While terms such as "pine sap collector" and "resin tapper" refer to individuals who gather resin from pine trees, our use of the term "[pine] resin harvester" or "extractor" suggests a more organized or professional approach to gathering pine resin, often implying a long-term or specialized practice or a harvester within an established industry.



Fig. 1. Franciszek Chmarzyński, one of the last pine-resin harvesters in the Lower Vistula River Valley region, stands in front of the trees he has harvested resin from for over 30 years. The living archives serve as a testament to his enduring connection with forests and tradition

© 2025 Agnieszka Pawłowska-Mainville

His detailed accounts and in situ illustrations of resin harvesting techniques were invaluable, especially during ground truthing, when we visited trees he had worked on. As illustrated in Fig. 1, the visible "ribs" on pine trunks serve as both cultural markers and evidence of sustainable resource use, highlighting CMTs as living archives of ecological knowledge. Chmarzyński's (and later others') firsthand expertise bridged historical practices with contemporary documentation, emphasizing the ongoing cultural significance of resin harvesting in the Lower Vistula River Valley and Tuchola regions.

The first stage of the methodology involved systematically mapping trees marked by resin extraction, integrating spatial data analysis with on-the-ground verification. The research combined interdisciplinary methods and logistical planning to ensure accuracy and inclusivity in documentation. Maps provided by State Forest (SF), Poland's forestry service, were cross-referenced through field visits to address inconsistencies, while GPS-based ground truthing enabled precise recording of CMT sites and resin-related markings. Distinctions among Polish, Franco-Prussian, and German extraction styles were identified within the study area, offering historical depth to the findings. This process not only refined spatial data, but also highlighted the trees' role as living monuments to past livelihoods. Once sufficient data were collected, Pawłowska-Mainville facilitated workshops that brought together Elders and young participants, including foresters, to exchange knowledge and strengthen the intergenerational transmission of heritage practices.

Cultural Landscapes: Key Findings

Through Pawłowska-Mainville's research drawing attention to their potential cultural and ecological significance, awareness of CMTs and their role in biocultural diversity has grown in Poland. The Regional Directorate of SF in Toruń now plays a key role in documenting these trees and inventorying pine resin harvesting practices, highlighting their cultural and ecological significance today. Building on this awareness, ongoing documentation and safeguarding are essential to preserve both the trees and the traditional knowledge associated with them for future generations. SF need to acknowledge their own crucial role in safeguarding these trees and ensuring that their ecological and cultural value is recognized, documented, and preserved within existing land-use plans. Currently, forest managers schedule logging across pine forests, marking selected trees for harvest within 2–3 years. Older, larger trees – 80 to 150 years old and 30–60 cm in diameter – are slated for felling within 5 years but can also be identified by the foresters themselves as suitable for resin harvesting, and living heritage education, beforehand. This places a clear responsibility on forest managers and SF to ensure that both the forests and the traditional knowledge linked to resin harvesting endure for future generations.[41]

Figure 3 illustrates the spatial distribution and density of pine trees used for resin extraction across selected forestry districts and within Góry Łosiowe Landscape Park in Poland. Various extraction sites are indicated by yellow circles of different sizes, representing the number of trees used for resin harvesting: small circles for fewer than 10 trees, medium circles for 10 to 20 trees, and large circles for 20 to 80 trees, using SF's land-use categorization system. The clusters highlighted in the map reveal a pattern of resin harvesting concentrated in areas of high cultural and ecological significance, suggesting that these sites serve as focal points for both heritage and biodiversity conservation. The map's data also shows a notable concentration of resin-harvested pine trees in specific areas, suggesting that these sites were historically significant for resin extraction. This pattern indicates that factors such as tree age, species suitability, and accessibility made these locations economically viable. Given that many harvesters preferred stands closer to their homesteads, allowing them to balance resin harvesting with other responsibilities, the clusters of harvested trees likely reflect both the practicality of access and the ecocultural knowledge of the harvesters in selecting and managing these sites efficiently.

[41] Trees harvested for resin in Poland, aged between 80 and 150 years, can vary in diameter depending on factors such as soil type, climatic conditions, and forest management practices. In the case of Scots pines (*Pinus sylvestris*), which are often resin-harvested, the trunk diameter can range from 25 cm to 40 cm for an 80-year-old tree, and from 40 cm to 60 cm for a 150-year-old tree (sometimes more, in favourable growing conditions). These values may vary depending on the specific location and forestry practices. It is also important to note that resin harvesting can impact the tree's health, which may, in turn, influence its growth rate.

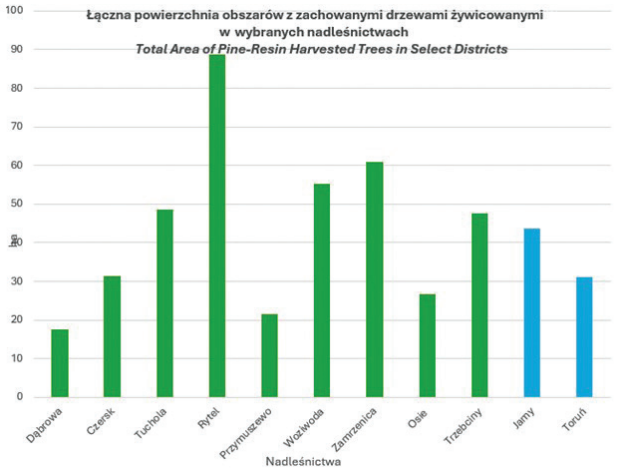


Fig. 2. Total area of forest sites with resin-extracted trees across selected districts, highlighting Tuchola as the largest contributor with 398.17 hectares in total

© 2025 ZPKnDW

The total area across specific forest districts covers 398.17 hectares and comprises 141 locations with CMTs (Fig. 2). Among the districts, Tuchola exhibits the highest concentration of resin-harvested areas, followed by Zamrzenica, Trzebciny, and Czersk. This pattern indicates that certain districts contain significantly larger clusters of historically or actively used resin-harvested sites, reflecting both ecological suitability and historical factors connected to the practice and local livelihoods. Figure 3, on the other hand, shows the concentration of resin-harvested CMTs in Góry Łosiowe Landscape Park. Together, the two images complement the quantitative data by providing a detailed spatial representation of the resin-harvested areas. This spatial distribution provides valuable context for understanding not only resin yield data, but also the cultural and ecological significance of the practice. In Góry Łosiowe Landscape Park, for example, resin yield per tree ranged from 1.5 to 2 kg/year in lower-quality habitats (IV and V classifications) and 2.5–3.0 kg/year in higher-quality habitats (I and II classifications).[42] Higher-density zones in the central and northern parts of the park likely correspond to these better habitats, supporting greater resin yields per tree. Pine resin harvesting required considerable physical strength and effort, and the abundance of resin-bearing trees allowed for efficient extraction. This combination of resource availability (large, old-growth trees) and labour demands, made pine resin extraction a sustainable and practical livelihood in these ecological zones, supporting both local economies and community survival strategies. In contrast, the sparse distribution in southern areas corresponds with poorer habitats and lower resin yields.

[42] Franciszek Chmarzyński, personal communication, Buśnia, 9 September 2024; Stanisław Miłkowski, personal communication, Góry Łosiowe, 10 January 2025; data analysis made by Pawłowska-Mainville.

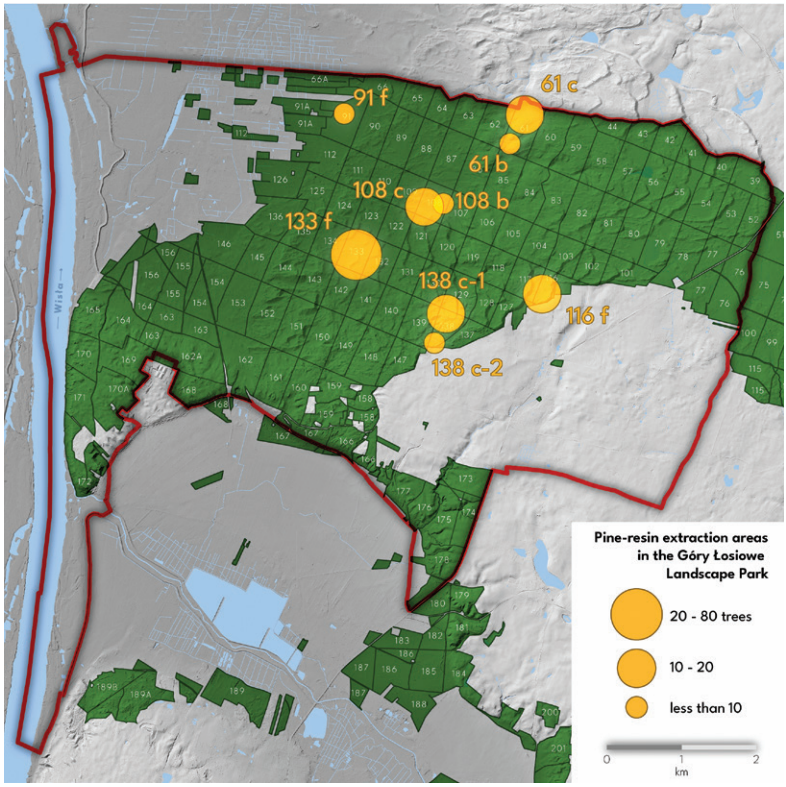


Fig. 3. Spatial distribution of resin-extraction areas within Góry Łosiowe Landscape Park, showing density clusters ranging from fewer than 10 to up to 80 trees per zone

© 2025 ZPKnDW & Agnieszka Pawłowska-Mainville

This spatial understanding underscores resin harvesting as a key element of intangible cultural heritage, where knowledge of tree selection, extraction techniques, and community access reflects sustainable forest management and the use of non-timber forest products for local livelihoods.[43]

These visuals illustrate the distribution and intensity of resin-extraction activity, emphasizing both its ecological and cultural heritage dimensions. Key districts emerge as central to understanding traditional forest-use practices, offering opportunities for conservation and heritage safeguarding. Resin harvesting, rooted in ICH, shaped local livelihoods, with families relying on CMTs for resin extraction. By modifying trees, families preserved intergenerational ecological knowledge while maintaining essential resources. This practice supported

[43] Typically, trees located nearer to homesteads were harvested to allow men to manage both sap collection and their farm duties efficiently.

cultural transmission and promoted ecological balance, linking land use, NTFPs, and local economies. The observed patterns highlight the need for further ecological and anthropological research on the history, sustainability, and ongoing relevance of resin extraction practices in Poland.

Discussion: Integrating CMTs and ICH in Forest Management

The findings show that these modified trees, particularly within old-growth forests, contribute to biodiversity far beyond their cultural or timber value. Sustainable pine-resin extraction creates microhabitats that support insects, fungi, and birds, enriching the forest's trophic web. Controlled resin flow sustains tree vitality and longevity, reinforcing surrounding ecosystems. Recognizing CMTs as part of old-growth forests highlights their role as vital reservoirs of biodiversity and ecosystem services. Preserving resin-harvested trees is equally important for safeguarding the cultural knowledge they represent. Though the trees themselves do not sustain skills, they serve as "living archives", tangible records through which future generations can learn resin-extraction techniques. Meaningful inclusion of local stewards and resource users in decision-making processes strengthens this approach, recognizing their experiential knowledge as essential to long-term ecological governance and culturally grounded forest management.[44] Integrating CMTs into conservation areas advances ecological and community resilience while supporting education and the renewal of forest-based livelihoods.

The inclusion of CMTs within conservation frameworks bridges nature and culture, highlighting the interconnectedness of ecosystems and human heritage. Recognizing forests as living archives – sites of both biodiversity and cultural narratives – places a responsibility on the leadership of the SF Regional Directorates to ensure that traditional knowledge, including pine resin harvesting, continues to inform management. Following more than 18 months of engagement – including discussions with regional directors, presentations across all 27 forest districts, and three hands-on pine resin extraction workshops with practitioners (Fig. 4) – the groundwork has been laid for integrating these practices into forestry management, with ongoing stewardship resting on institutional commitment.[45]

[44] For a discussion on decision-making, please see P. Arias-Arévalo et al., *The Role of Power in Leveraging the Diverse Values of Nature for Transformative Change*, "Current Opinion in Environmental Sustainability" 2013, Vol. 64, https://doi.org/10.1016/j.cosust.2023.101352; R. Chaplin-Kramer et al., *Transformation for Inclusive Conservation: Evidence on Values, Decisions, and Impacts in Protected Areas*, "Current Opinion in Environmental Sustainability" 2013, Vol. 64, https://doi.org/10.1016/j.cosust.2023.101347; A. Pawłowska-Mainville, *"Experts and Professionals": Intangible Cultural Heritage Custodians and Natural Resource Management in Poland and Canada*, in: F. Calabrò, L. Della Spina, M.J. Piñeira Mantiñán (eds.), *New Metropolitan Perspectives: Post COVID Dynamics: Green and Digital Transition, between Metropolitan and Return to Villages Perspectives*, Springer, Cham 2022, pp. 2383–2392.

[45] Pawłowska-Mainville and Pająkowski have presented their research and findings at SF's regional meeting on 13 February 2025, titled "'The Whole Forest Smelled of Resin': Documentation of Resin Traditions



Fig. 4. Learning from Chmarzyński (standing to the right behind the tree), two young workshop participants practice pine resin extraction in Poland, reviving an age-old forest livelihood and this cultural heritage element

© 2025 Agnieszka Pawłowska-Mainville

The willingness of forestry officials to collaborate on Pawłowska-Mainville's research reflects a growing recognition of the value of holistic conservation approaches. Securing formal recognition of resin harvesting as a valuable cultural and ecological practice will be essential. Although Poland currently lacks legal recognition for CMTs, promising policy opportunities for reform exist. SF's interest in these ribbed trees positions them to play a key role in guiding forest planning and regional bylaws over the next decade. Forest managers have demonstrated a commitment to supporting the development of educational materials, guided demonstrations, and apprenticeship programmes in resin harvesting, reinforcing their responsibility in sustaining this heritage practice within contemporary forest management. How this commitment will translate into sustained, long-term action remains to be seen; however, it will need to extend beyond Pawłowska-Mainville's

as Part of Intangible Cultural Heritage and Biocultural Diversity ['Cały las pachniał żywicą': Dokumentacja tradycji żywiczarskich jako element niematerialnego dziedzictwa kulturowego i różnorodności biokulturowej]".

initial efforts. Continued follow-through and institutional support will determine whether this promising direction becomes an enduring part of Poland's forestry policy and practice.

This emerging support indicates that this ICH element's transmission chain, though weakened, has not been entirely severed and could be revitalized through engagement. Integrating CMTs into forest management and conservation policies is both a responsibility and an opportunity – one that requires consistent follow-through from the SF Directorates. Comparative experiences abroad strengthen this case: in Castilla y León, Spain, resin harvesting has been successfully woven into forest management plans, while Norway's Cultural Heritage Act[46] safeguards Culturally Significant Traditional Practices within its conservation framework. Aligning CMT protection with the European Union's Biodiversity Strategy for 2030 and with Mondiacult's 2022 Declaration, which emphasizes culture as a global public good and advocates for protecting living heritage and diverse knowledge systems, could further mobilize resources for both ecological and cultural initiatives, reinforcing the dual recognition of nature and culture in forest policy. Whether Poland's institutions will continue along this promising path is to be seen.

Proposing pine resin harvesting for inclusion in Poland's national ICH registry under the ICH Convention would represent a strategic step toward recognition and policy integration. Interest at higher levels of forestry already signals an institutional readiness to pursue this direction. While CMTs are not yet explicitly listed as ICH elements, several UNESCO-recognized practices – such as tree-beekeeping in Poland and Belarus, olive cultivation in Türkiye and France, and date palm cultivation across 15 Arab states – demonstrate how tree modification embodies enduring relationships between people, ecosystems, and livelihoods.[47] As an NTFP, pine resin retains strong potential for artisanal, medicinal, and biological applications, aligning with sustainable and circular forest economies. Recognizing pine resin harvesting within this framework would not only strengthen Poland's heritage policy, but also align national conservation and forestry strategies with UNESCO's broader emphasis on biodiversity, resilience, and living heritage.

[46] Lov 1978-06-09 nr 50 Lov om kulturminner [Act No. 50 of 9 June 1978 Concerning the Cultural Heritage], https://lovdata.no/dokument/NLE/lov/1978-06-09-50 [accessed 25 June 2025].

[47] UNESCO, *Tree Beekeeping Culture*, https://ich.unesco.org/en/RL/tree-beekeeping-culture-01573 [accessed 25 June 2025]; UNESCO, *Traditional Knowledge, Methods and Practices concerning Olive Cultivation*, https://ich.unesco.org/en/RL/traditional-knowledge-methods-and-practices-concerning-olive-cultivation-01983 [accessed 25 June 2025]; UNESCO, *Date Palm, Knowledge, Skills, Traditions and Practices*, https://ich.unesco.org/en/RL/date-palm-knowledge-skills-traditions-and-practices-01902 [accessed 25 June 2025].



Fig. 5. This felled pine tree from the Kuyavian-Pomeranian region, marked with six resin-harvesting incisions, illustrates the long-standing tradition and ongoing practice of resin extraction in the area

© 2025 Agnieszka Pawłowska-Mainville

Securing UNESCO ICH listing would strengthen the case for integrating CMTs and pine resin harvesting into national forest management and conservation strategies, particularly under the 1991 Forest Act. Many of these trees, aged between one and two centuries, qualify for protection as old-growth forests. Incorporating them into existing conservation categories – such as biogroups of untouched trees or old-growth zones – would align with current forestry practices while enhancing their cultural and ecological value.[48] Figure 5 depicts a felled pine tree bearing multiple resin-harvesting incisions, visual evidence of a long-standing tradition and its continuity in the region.

The findings show that resin-harvested trees, particularly within old-growth forests, make unique ecological contributions that extend far beyond timber or cultural value. Sustainable pine-resin extraction enhances biodiversity by creating microhabitats for insects, fungi, and birds, enriching the forest's trophic web.[49] Controlled incisions allow resin to flow without damaging the tree's vascular

[48] Biogroups refer to groups of trees distinguished in a forest as a compact, ecological (functional/spatial) unit. See https://www.lasy.gov.pl/pl/edukacja/slownik/b/biogrupa.

[49] Franciszek Chmarzyński, personal communication, Buśnia, 9 September 2024; Stanisław Miłkowski, personal communication, Góry Łosiowe, 10 January 2025.

system, strengthening resilience against pests, fungi, and climatic stressors.[50] Over time, many trees recover fully, as seen in Fig. 6, where bark regrowth has nearly concealed the incision. Knowledge holders affirm that these trees develop structural and biochemical adaptations that improve longevity and vitality. Including CMTs within the category of old-growth forests underscores their value as biodiversity reservoirs and living archives of human–forest interaction. Far from scarring or harming trees, responsible resin harvesting demonstrates how traditional stewardship can complement forest dynamics, fostering healthy ecosystems while sustaining practices.[51] Integrating resin-harvested trees into forestry models supports both biodiversity and the transmission of ecological knowledge essential for future conservation.



Fig. 6. An old pine tree (*Pinus sylvestris*) bearing an incision (centre line) from resin extraction, with the bark covering nearly 100% of the cambium, demonstrating the tree's natural resilience and capacity for regeneration

© 2025 Agnieszka Pawłowska-Mainville

[50] Franciszek Chmarzyński, personal communication, Buśnia, 9 September 2024; Stanisław Miłkowski, personal communication, Góry Łosiowe, 10 January 2025. Similar opinions were held by some foresters and other ICH custodians in both Poland and Canada. For some examples, see A. Pawłowska-Mainville, *"Stored in the Bones"*...; Archaeology Branch of the B.C. Ministry of Small Business, Tourism and Culture, op. cit.

[51] A. Pawłowska-Mainville, *"Stored in the Bones"*...; eadem, *Creating a Quiet Buzz: Opportunities and Challenges for Meaningful Participation of Boreal Forest Apiarists in the Science-Policy Interface for Biodiversity and Ecosystem Services*, "Ecology & Society" 2025, Vol. 30(1), https://doi.org/10.5751/ES-15559-300119; eadem, *Les institutions culturelles en tant que territoires: trois études de cas sur le patrimoine culturel immatériel et la gouvernance autochtone dans les relations territoriales*, "Géographies canadiennes / Canadian Geographies", forthcoming.

Conclusion

Culturally modified trees represent a critical intersection of cultural heritage and forest conservation, serving as both ecological and cultural assets. Recognizing resin-harvested trees within conservation frameworks promotes biodiversity while preserving traditional ecological knowledge. Expanding documentation, assessing long-term impacts, and integrating CMTs into forest management strategies are essential for continued livelihoods, ecosystem services, and climate-resilient forestry. Formal recognition – through Poland's national ICH registry and potential UNESCO nomination – could provide legal and financial support for safeguarding these practices.

Collaboration with forest managers, park authorities, and local knowledge holders is central to ensuring continuity, passing skills down to future generations, and maintaining cultural and ecological integrity. Education, workshops, and community engagement reinforce these living archives, allowing intergenerational knowledge, forest stewardship, and cultural practices to endure. Economic initiatives must prioritize ecological balance and cultural stewardship to support forest-based livelihoods. As living archives, CMTs preserve intergenerational knowledge, land-based practices, and relational worldviews, linking intangible heritage with practical forest management.[52] Recognizing CMTs as carriers of both cultural and ecological value enables policymakers and heritage practitioners to integrate conservation, sustainable development, and cultural preservation, ensuring that these forests and the practices they sustain remain resilient and vibrant for generations to come.

Use of AI: AI (ChatGPT, GPT-5-mini, October 2025 version) was used as a writing tool to assist with selecting synonyms, refining the writing style, and ensuring an accurate translation of Polish institutional names and positions. AI was not used to generate content or analysis.

Open Data Statement: The datasets generated and analysed during this research are available in the Zenodo.org repository: 10.5281/zenodo.15250748. These include inventory data on pine resin-harvested trees and associated field measurements. All data have been anonymized to protect sensitive locations and the privacy of local knowledge holders. Researchers are encouraged to use these datasets for scholarly, conservation, and policy-related purposes, with appropriate citation of this study. Additional metadata, including methodology for ground truthing and GIS mapping, is provided alongside the datasets to facilitate reproducibility and further research.

[52] A. Pawłowska-Mainville, J. Pająkowski, op. cit.

References

16 U.S.C. § 470 – Transferred or Omitted.

16 U.S.C. Chapter 1B – Archaeological Resources Protection.

Antkowiak L., *Żywicowanie* [Resin Extraction], Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, Poznań 1996.

Archaeology Branch of the B.C. Ministry of Small Business, Tourism and Culture, *Culturally Modified Trees of British Columbia: A Handbook for the Identification and Recording of Culturally Modified Trees*, Version 2.0, March 2001.

Arias-Arévalo P. et al., *The Role of Power in Leveraging the Diverse Values of Nature for Transformative Change*, "Current Opinion in Environmental Sustainability" 2013, Vol. 64, https://doi.org/10.1016/j.cosust.2023.101352.

Chaplin-Kramer R. et al., *Transformation for Inclusive Conservation: Evidence on Values, Decisions, and Impacts in Protected Areas*, "Current Opinion in Environmental Sustainability" 2013, Vol. 64, https://doi.org/10.1016/j.cosust.2023.101347.

Convention for the Safeguarding of the Intangible Cultural Heritage, 17 October 2003, 2368 UNTS 3.

Curtis E.S., *The North American Indian*, Cambridge University Press, Cambridge 1907–1930.

Forest and Range Practices Act, S.B.C. 2002, c. 69.

Gadgil M., Vartak V.D., *The Sacred Groves of Western Ghats in India*, "Economic Botany" 1976, Vol. 30(2), pp. 152–160.

Heritage Conservation Act, R.S.B.C. 1996, c. 187.

Jackson S.T., Hobbs R.J., *Ecological Restoration in the Light of Ecological History*, "Science" 2009, Vol. 325(5940), pp. 567–569.

Kardoš M. et al., *Traditional Uses of Resin and Resin Products in Central Europe*, "Journal of Ethnopharmacology" 2013, Vol. 148(1), pp. 32–39.

Kawecki W., *Nasze drzewa i lasy w artystycznej twórczości Leona Wyczółkowskiego (Wspomnienie pośmiertne)* [Our Trees and Forests in the Art of Leon Wyczółkowski (Obituary)], "Sylwan. Organ Polskiego Towarzystwa Leśnego" 1937, Vol. 55(5), pp. 101–105.

Kłosiewicz S., Kłosiewicz O., *Przyroda w polskiej tradycji* [Nature in Polish Tradition], Wydawnictwo Sport i Turystyka, Warszawa 2011.

Lixinski L., *Intangible Cultural Heritage in International Law*, Oxford University Press, Oxford 2013.

Lov 1978-06-09 nr 50 Lov om kulturminner [Act No. 50 of 9 June 1978 Concerning the Cultural Heritage], https://lovdata.no/dokument/NLE/lov/1978-06-09-50 [accessed 25 June 2025].

National Park Service, *Culturally Modified Trees in the Dena'ina Cultural Landscape*, 6 July 2020, https://www.nps.gov/articles/000/denainacmt.htm [accessed 24 June 2025].

Ogrodowska B., *Medycyna tradycyjna w Polsce* [Traditional Medicine in Poland], Muza, Warszawa 2012.

Ogrodowska B., *Polskie obrzędy i zwyczaje ludowe* [Polish Folk Traditions], Muza, Warszawa 2001.

Ormsby A.A., Bhagwat S.A., *Sacred Forests of India: A Strong Tradition of Community-Based Natural Resource Management*, "Environmental Conservation" 2010, Vol. 37(3), pp. 320–326.

Östlund L. et al., *Traces of Past Sami Forest Use: An Ecological Study of Culturally Modified Trees and Earlier Land Use within a Boreal Forest Reserve*, "Scandinavian Journal of Forest Research" 2003, Vol. 18(1), pp. 78–89.

Parada Z., *Zioła w tradycji polskiej medycyny ludowej* [Herbs in the Tradition of Polish Folk Medicine], Państwowy Instytut Wydawniczy, Warszawa 1985.

Pawłowska-Mainville A., *Asserting Declarations: Supporting Indigenous Customary Governance in Canada through Intangible Cultural Heritage*, "Patrimonio: Economía Cultural y Educación para la Paz (MEC-EDUPAZ)" 2021, Vol. 1(19), pp. 346–381.

Pawłowska-Mainville A., *Creating a Quiet Buzz: Opportunities and Challenges for Meaningful Participation of Boreal Forest Apiarists in the Science-Policy Interface for Biodiversity and Ecosystem Services*, "Ecology & Society" 2025, Vol. 30(1), https://doi.org/10.5751/ES-15559-300119.

Pawłowska-Mainville A., *Engaging Dibaajimowinan: "Stories" in Community-Based Research at Asatiwisipe Aki, Manitoba*, in: S. MacKinnon (ed.), *Practising Community-Based Participatory Research: Stories of Engagement, Empowerment, and Mobilization*, Purich Press; Canadian Centre for Policy Alternatives, Vancouver 2018, pp. 127–143.

Pawłowska-Mainville A., *"Experts and Professionals": Intangible Cultural Heritage Custodians and Natural Resource Management in Poland and Canada*, in: F. Calabrò, L. Della Spina, M.J. Piñeira Mantiñán (eds.), *New Metropolitan Perspectives: Post COVID Dynamics: Green and Digital Transition, between Metropolitan and Return to Villages Perspectives*, Springer, Cham 2022, pp. 2383–2392.

Pawłowska-Mainville A., *Les institutions culturelles en tant que territoires: trois études de cas sur le patrimoine culturel immatériel et la gouvernance autochtone dans les relations territoriales*, "Géographies canadiennes / Canadian Geographies", forthcoming.

Pawłowska-Mainville A., *Living Heritage Landscapes: An Anthropological Approach to Intangible Cultural Heritage and Language Valuation in Canada and Poland*, National Folk Museum of Korea, Seoul 2024.

Pawłowska-Mainville A., *"Stored in the Bones": Safeguarding Indigenous Living Heritages*, University of Manitoba Press, Winnipeg 2023.

Pawłowska-Mainville A., Pająkowski J., *Cultural Heritage-in-Nature as a Public Good: Living Heritage, Climate Resilience, and Sustainable Development in Forest Landscapes*, technical paper submitted to the UNESCO World Conference on Cultural Policies and Sustainable Development – MONDIACULT 2025, https://mondiacult2025.com/wp-content/uploads/2025/10/M25-Technical-Paper-UNESCO-Chairs-and-UNITWIN-Networks-individual-UNESCO-Chair-in-Living-Heritage-Sustainable-Livelihoods-Canada.pdf [accessed 8 February 2026].

Smith L.T., *Decolonizing Methodologies: Research and Indigenous Peoples*, 2nd ed., Zed Books, London 2012.

State Government of Victoria, *Fact Sheet: Aboriginal Scarred Trees*, https://www.firstpeoplesrelations.vic.gov.au/fact-sheet-aboriginal-scar-trees [accessed 24 January 2025].

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 29 December 2006, The Gazette of India, No. 2 of 2007.

Trzciński K., *Żywica sosnowa – zastosowania w dawnych i współczesnych czasach* [Pine Resin – Uses in Ancient and Modern Times], "Las Polski" 2015, Vol. 10.

Turner N.J., *The Cedar Tree: A Cultural and Ecological History*, University of Washington Press, Seattle 2004.

Turner N.J. et al., *Cultural Management of Living Trees: An International Perspective*, "Journal of Ethnobiology" 2009, Vol. 29(2), pp. 237–270.

UNESCO, *Date Palm*, *Knowledge*, *Skills*, *Traditions and Practices*, https://ich.unesco.org/en/RL/date-palm-knowledge-skills-traditions-and-practices-01902 [accessed 25 June 2025].

UNESCO, *Traditional Knowledge*, *Methods and Practices concerning Olive Cultivation*, https://ich.unesco.org/en/RL/traditional-knowledge-methods-and-practices-concerning-olive-cultivation-01983 [accessed 25 June 2025].

UNESCO, *Tree Beekeeping Culture*, https://ich.unesco.org/en/RL/tree-beekeeping-culture-01573 [accessed 25 June 2025].

Ustawa z dnia 20 maja 1971 r. Kodeks wykroczeń [Act of 20 May 1971 – Code of Misdemeanours], Journal of Laws 1971 No. 12 item 114.

Ustawa z dnia 28 września 1991 r. o lasach [Act of 28 September 1991 on Forests], Journal of Laws 1991 No. 101 item 444, as amended.