

Traditional and Local Knowledge in the Use of Non-Timber Forest Products: Comparative Perspectives from Japan and Korea

Ryo Kohsaka *

Department of Forest Science, Graduate School of Agricultural and Life Sciences, The University of Tokyo, Tokyo 113-8657, Japan

Abstract: The role of traditional and local knowledge is reviewed in their use and management of non-timber forest products (NTFPs) through comparative perspectives from Japan and Korea. NTFPs in forests are a broad concept entailing honey, mushrooms, nuts, and bamboo with history in sustained rural livelihoods, cultural practices, and forest ecosystems in East Asia and beyond. Drawing on the concept of traditional ecological knowledge (TEK), this paper situates the collection, processing, and trade of NTFPs within adaptive socio-ecological systems shaped by historical, cultural, and environmental contexts. In Japan, TEK is embedded in *satoyama* landscapes, where knowledge of seasonal cycles governs shiitake cultivation and apiculture, while in Korea, village forest systems and kinship-based governance have historically managed resources such as pine nuts and matsutake. These localized knowledge systems not only ensured sustainable use but also reinforced communal values through rituals and customary rules.

Case studies of honey, mushrooms, and other NTFPs demonstrate how TEK integrates ecological observation, cultural identity, and market adaptation. Traditional beekeeping and mushroom harvesting practices illustrate both the persistence and transformation of knowledge under modernization and globalization. Comparative analysis reveals shared regional characteristics—such as family-based transmission and cooperative management—alongside institutional divergences: Japan's *Satoyama Initiative* somewhat emphasizes human–nature coexistence, while Korea's forest cooperatives highlight collective governance. Both countries increasingly align TEK with global frameworks such as the Convention on Biological Diversity (CBD) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

Contemporary challenges, such as climate change, rural depopulation, and market globalization threaten NTFP sustainability and the TEK continuity. Policy innovations including certification systems, participatory management, and eco-tourism seek to revitalize these traditions. The paper concludes that integrating TEK with scientific research and adaptive governance is essential for sustaining biocultural diversity and ensuring the resilience of NTFP-based socio-ecological systems in Japan, Korea, and beyond.

Key words: *Traditional knowledge, Non-timber forest products (NTFPs), Satoyama, Biocultural diversity, Adaptive governance*

Introduction

Non-timber forest products (NTFPs) comprise a diverse array of forest-derived goods, excluding timber, such as honey, mushrooms, nuts, medicinal plants, resins, and bamboo. These products are essential for rural livelihoods, biodiversity conservation, and cultural heritage, as global reviews have examined both the commercialization and

socio-ecological significance of NTFPs, highlighting their complex roles in development and conservation (Belcher et al., 2005; Neumann and Hirsch, 2000; Shackleton et al., 2011). Further studies emphasized the links between NTFPs, household diversification, and conservation trade-offs, pointing to both opportunities and challenges for sustainable management (Arnold and Ruiz Pérez, 2001; Marshall et al., 2003; Pandey et al., 2016). Belcher et al. (2005) provide a comparative global analysis of NTFP use and management, highlighting implications for the livelihoods of rural households as well as for the conservation of forest ecosystems. In Asia, particularly

* Corresponding author

E-mail: rkohsaka@g.ecc.u-tokyo.ac.jp

ORCID

Ryo Kohsaka  <https://orcid.org/0000-0001-6822-4340>

Japan and Korea, NTFPs have historically played central roles in socio-ecological systems, serving as subsistence resources, trade commodities, and cultural symbols. The traditional ecological knowledge (TEK) embedded in their collection, cultivation, and processing reflects centuries of adaptation to ecological variability and socio-political change (Berkes et al., 2000; Berkes, 2018).

In the 21st century, NTFPs are increasingly recognized not only for their economic and cultural values but also for their contributions to ecosystem services, the Sustainable Development Goals (SDGs), and biodiversity conservation frameworks such as the Convention on Biological Diversity (CBD) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (CBD, 2022; FAO, 2019; IPBES, 2019; Millennium Ecosystem Assessment, 2005). Beyond these global frameworks, scholars have also emphasized the need to integrate TEK and biocultural diversity into policy and practice (Nakashima et al., 2012; Cocks and Wiersum, 2014) and to link such knowledge systems with adaptive governance approaches (Turner and Berkes, 2006). At the same time, challenges such as climate change, rural depopulation, and globalization of markets are reshaping the ways in which TEK is transmitted and applied (Gurung et al., 2021; Hosen et al., 2019; Sunderland et al., 2011; Tieminie et al., 2021; Uchiyama et al., 2017). These global frameworks and conceptual debates provide the basis for examining how NTFPs are understood and managed in specific regional contexts. This paper provides a comprehensive review of NTFPs in Japan and Korea, with a particular focus on the role of traditional and local knowledge within these contexts. By highlighting both country-specific practices and comparative perspectives, we aim to provide insights into the evolving relationships between culture, ecology, and policy in East Asia.

Traditional Knowledge Systems and NTFPs

Traditional ecological knowledge (TEK) refers to the cumulative body of knowledge, practices, and beliefs that evolve through adaptive processes and are handed down across generations (Berkes et al., 2000; Berkes, 2018). In the context of NTFPs, TEK encompasses knowledge of

species identification, harvesting methods, ecological cycles, and cultural significance of these resources, and it has been recognized globally as a critical element of biocultural diversity and adaptive management (Posey, 1999; Gómez-Baggethun et al., 2013; Zent, 2009).

In Japan and Korea, these knowledge systems are embedded within traditional landscapes and community practices, shaping how NTFPs are used, managed, and valued. In Japan, TEK is closely tied to the mosaic ecosystems of *satoyama* landscapes, shaped by human-nature interactions that include woodlands, grasslands, rice paddies, and irrigation ponds. Knowledge of seasonal cycles determines the timing of shiitake harvesting and honey production. Similarly, in Korea, traditional village forest systems and kinship-based management structures regulate access to pine nuts, medicinal herbs, and mushrooms (Park and Lee, 2020). More broadly, across Northeast Asia, TEK and customary practices have historically shaped forest management and contributed to sustainable use (Kim et al., 2017).

The transmission of TEK has historically been familial, with skills in apiculture, mushroom cultivation, or nut harvesting passed down orally or through apprenticeship (Uchiyama et al., 2017). In both Japan and Korea, rituals, festivals, and taboos reinforced sustainable use practices by embedding ecological knowledge with cultural values. For instance, restrictions on collecting matsutake before certain festivals reflected not only ecological awareness but also the importance of social cohesion (Yun, 2015). In Japan, the *satoyama* framework has highlighted how TEK transmission and local practices are intertwined with community-based management of mosaic landscapes, which also sustain food provisioning and communal sharing practices documented in recent studies (Saito et al., 2016; Takeuchi, 2010). These practices encompass the collection and sharing of NTFPs such as wild vegetables, mushrooms, and fruits, which continue to sustain rural livelihoods and reinforce cultural traditions.

However, modernization, industrial forestry, and the decline of rural populations have disrupted these pathways of knowledge transfer. Scholars now emphasize the need to revitalize and adapt TEK by linking it with scientific knowledge, certification systems, and market innovations (Kohsaka et al., 2013), while also strengthening the

interface between traditional knowledge and contemporary governance frameworks (Nakashima et al., 2012; Turner and Berkes, 2006).

Case Studies from Japan

1. Honey and Beekeeping

Beekeeping in Japan is deeply rooted in traditional practices, with native species such as the Japanese honeybee (*Apis cerana japonica*) managed through locally adapted methods. Historically, hives were constructed from hollowed logs, and harvesting followed seasonal cues that aligned with flowering cycles (Uchiyama et al., 2017). Traditional apiculture emphasized coexistence with nature, avoiding excessive exploitation. Honey served not only as a sweetener but also as a medicinal product, embedded in cultural practices.

In contrast, Korea also has long-standing traditions of apiculture, particularly in mountainous villages where bees were kept in straw or wooden hives (Kohsaka et al., 2017). Native beekeeping, based on traditional forest knowledge (TFK), has historically linked forest communities to surrounding ecosystems, transmitting ecological, economic, and cultural practices across generations and contributing to sustainable forest management (Park & Youn, 2012). However, both countries experienced significant changes with the introduction of Western honeybees (*Apis mellifera*), which increased yields but also posed ecological and cultural challenges. For instance, the reliance on imported species threatened native bee populations and disrupted traditional knowledge tied to indigenous species management (Kohsaka et al., 2017; Park and Youn, 2012).

Knowledge transmission in apiculture is a central issue in both contexts. Family-owned knowledge systems have historically restricted access, but recent calls for opening and sharing knowledge through cooperatives and research institutions have emerged (Uchiyama et al., 2017). In Japan, cooperatives now play roles in branding honey as local specialties, while in Korea, beekeepers are increasingly experimenting with organic certification and GI labeling.

2. Mushrooms: Shiitake, Matsutake, and Beyond

Mushrooms are perhaps the most iconic NTFPs in both Japan and Korea, with shiitake (*Lentinula edodes*) and

matsutake (*Tricholoma matsutake*) representing both subsistence and luxury goods. In Japan, shiitake cultivation on oak logs dates back centuries, with sophisticated methods developed to manage moisture, shade, and fungal inoculation (Chang and Miles, 2004). This practice exemplifies TEK that integrates ecological observation with practical management.

Matsutake, on the other hand, resists artificial cultivation, and its harvesting is closely tied to forest management practices. Japanese communities historically maintained pine forests conducive to matsutake growth through selective thinning and understory management. Despite long-standing challenges, recent research has made incremental advances in experimental cultivation techniques, highlighting both the biological complexity and continuing scientific interest in this prized mushroom (Yamanaka et al., 2020). In Korea, matsutake also holds cultural and economic significance, often exported to Japan as a delicacy. Korean systems of harvesting emphasize communal rules, with local associations regulating access and timing (FAO, 2018).

The internationalization of matsutake trade has placed pressures on both countries. While Japanese matsutake are prized for quality, imports from Korea, China, and even Canada have altered market dynamics (Hosford et al., 1997). Both Japan and Korea face the challenge of balancing market demand with ecological sustainability, as overharvesting and pine forest decline threaten matsutake habitats.

Medicinal mushrooms such as reishi (*Ganoderma lucidum*) also illustrate the blending of TEK and modern science. In both countries, these fungi have been integrated into health products, sometimes supported by clinical research (Wasser, 2014). However, debates remain on standardization, intellectual property, and benefit sharing.

3. Other NTFPs: Chestnuts, Bamboo, and Lacquer

Chestnuts (*Castanea crenata*) have long been staples in Japanese and Korean diets. Traditional management involved grafting techniques and intercropping, contributing to agrobiodiversity (Sasaki, 2018). Bamboo, another important NTFP, served multiple roles in tool-making, construction, and crafts. TEK determined sustainable harvesting times to maintain vigor in bamboo groves, with

festivals often marking collection seasons (Isagi et al., 2016).

In Korea, chestnuts were historically taxed as tribute, reflecting their economic value. Bamboo crafts such as basketry remain cultural symbols, though both industries face decline with synthetic substitutes. Lacquer (*Toxicodendron vernicifluum*) tapping represents another traditional practice shared by both countries, where artisans passed down techniques for resin extraction and processing (Yoshida, 2019).

These examples demonstrate that NTFPs are not merely economic commodities but embedded in cultural landscapes. TEK ensures sustainable use while reinforcing identities and values across generations.

Comparative Perspectives and International Frameworks

Comparing Japan and Korea reveals both convergences and divergences in the role of TEK in NTFP management. Both countries share historical reliance on family-based transmission systems, cooperative management, and integration of cultural rituals with resource use. This reflects broader regional patterns, where TEK has played a critical role in forest management across Northeast Asia (Kim et al., 2017). Within this broader context, Japan's *satoyama* landscapes emphasize mosaic land-use systems, while Korea's village forests highlight communal governance.

Policy approaches also diverge. Japan has promoted *satoyama* revitalization through programs like the *Satoyama Initiative* (Takeuchi, 2010), linking biodiversity conservation with human well-being. Korea, by contrast, emphasizes village forestry cooperatives and national forest ownership structures. Both countries, however, are increasingly aligning with international frameworks. The IPBES conceptual framework emphasizes the integration of diverse knowledge systems, while the CBD's Kunming-Montreal Global Biodiversity Framework calls for equitable benefit sharing from biodiversity use (IPBES, 2019; CBD, 2022).

NTFPs thus serve as entry points for bridging TEK with global agendas. For example, honey and mushrooms can be positioned within GI certification systems, enhancing rural economies while protecting cultural heritage.

International organizations such as FAO and CIFOR have emphasized the importance of NTFPs for both poverty alleviation and biodiversity conservation (FAO, 2019; Sunderland et al., 2011).

Contemporary Challenges, Policy, and Research Directions

Despite their resilience, NTFPs face mounting challenges. Climate change is altering flowering times, pest outbreaks, and fungal distributions, directly threatening beekeeping and mushroom cultivation (Asamoah et al., 2024; Bi et al., 2025; Kohyama et al., 2019; Miyake and Kohsaka, 2023). Rural depopulation further erodes TEK transmission, as younger generations migrate to urban centers. Globalization of markets further intensifies these pressures, as international demand for matsutake and medicinal plants exposes local producers to volatile prices and external competition (He, 2010; Hosford et al., 1997; van Gevelt, 2013, 2014). In Japan, abandoned *satoyama* landscapes no longer provide the ecological niches required for shiitake and matsutake, while in Korea, forest privatization and market pressures undermine cooperative governance. More recently, regulatory reforms around food safety and quality have further centralized oversight in the Korean NTFP sector, particularly in wild-simulated ginseng, creating tensions with traditional harvesting communities (Kim et al., 2023).

Policy responses have sought to revitalize NTFPs through certification (e.g., organic honey, GI labels for matsutake), education programs, and eco-tourism. At the global scale, NTFPs are also recognized for their contributions to poverty alleviation and livelihood security (Asamoah et al., 2025; FAO, 2018). However, tensions remain between commodification and cultural values. Intellectual property rights for medicinal mushrooms, for instance, risk excluding traditional knowledge holders.

Future research should focus on integrating TEK with scientific innovation, ensuring participatory governance, and developing valuation methods that capture the cultural ecosystem services of NTFPs.

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Manuscript Received : October 27, 2025

First Revision : December 4, 2025

Accepted : December 10, 2025