

University Extension Programs to Promote the Traditional Knowledge of Marginalised Rural Communities in the ASEAN Region

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Abstract: Many indigenous and marginalised communities, particularly those in tropical regions, traditionally use herbs and medicinal plants to treat various illnesses and disorders. This “traditional knowledge” requires protection. Unfortunately, the World Intellectual Property Organization members have been unable to agree on a definition. However, member states have acted in concert with other members or independently. Initially, the paper analyses the legal instruments utilised by each of the ten countries of ASEAN to protect and promote traditional knowledge. For instance, in 1999, Thailand legislated its Protection and Promotion of Traditional Thai Medicinal Intelligence Act and Plant Varieties Protection Act. The World Health Organization recognises the role of herbal medicines. Universities can play a pivotal role in working with the local communities for the common good and including the community in the rewards from any commercial production. Roles for universities require personnel with the ability to work with local communities and gain their confidence and trust. This knowledge obtained from the community will be held in high regard. Nevertheless, its pharmacology and efficacy must be tested. Universities can also play a role in every step of product development. Finally, examples of successful roles provided by universities and other research institutions are presented. Such projects require a comprehensive team of specialists with a variety of skills, such as scientists, agriculturalists, pharmacists, medical practitioners, intellectual property lawyers, and business development and marketing specialists. Finally, any research and development activities must acknowledge traditional knowledge holders.

Key Words: Traditional knowledge, innovation, university outreach, marginalised communities, ASEAN.

1. Introduction

Many indigenous and marginalised communities, particularly those in tropical regions, traditionally use herbs and medicinal plants to treat various illnesses and disorders (World Intellectual Property Organization (WIPO, 2015). “Many modern drugs and vaccines are based on natural resources and associated traditional knowledge” (p 1). The World Intellectual Property Organization (WIPO) agrees that this “traditional knowledge” requires protection. Unfortunately, as the WIPO members have been unable to agree on a treaty for decades, the General Assembly of WIPO at its July 2022 meeting resolved that a draft international instrument be drafted, and talks be concluded not later than 2024 (Heilprin, 2022). In this vacuum, some member states have acted in concert with other members or independently, as is the case with the ten members states of ASEAN, namely, Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

The World Health Organization South-East Asian Region has investigated the feasibility study into integrating traditional and complementary medicine (T&CM) into the pharmacovigilance systems in Bangladesh, Bhutan, India, Indonesia, the Maldives, Nepal, Sri Lanka and Thailand (Suwankesawong, 2019). It found that it is “feasible for T&CM to be integrated with, or separated from, the existing national pharmacovigilance system depending on the context of each country. . . .To enhance the system functions, it should operate alongside an effective national drug regulatory system so that the signal could be aligned with proper regulatory measures” (Suwankesawong, 2019, p 16). The study also found that the significant challenges in accomplishing the safety surveillance of T&CM products in the Region is the limited resources and “also the lack of knowledge and expertise regarding the analysis of the association between products and adverse drug reactions (ADRs). Insufficient information and difficulties in accessing reliable information support are other critical challenges” (Suwankesawong, 2019, p 15).

Protection and promotion of traditional knowledge are key activities that can assist marginalised communities to improve their living standards and become more sustainability. In addition, this knowledge can benefit the wider population with efficacious Traditional and Complementary Medicines (TCMs). The paper provides a definition of traditional knowledge and its role in agriculture. It then follows with a call to action where is outlines a role for universities in assisting local communities in the protection and promotion of their traditional

knowledge which will involve both innovation and entrepreneurship. The article focuses on Southeast Asia but is relevant to communities worldwide.

2. Literature review

2.1 Definition

For this article, we are considering traditional knowledge in the strict sense and only as it applies to agriculture:

“Traditional knowledge refers to the knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of . . . agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry.” (Secretariat of the Convention on Biological Diversity, n.d.).

An argument could be made for adopting the Thai phrase “local wisdom”, which is probably self-explanatory without the need for an explanation of nearly 100 words. Charoeniyomphrai et al (2006) used the term “knowledge and local wisdom” in their study of the “customary use of biological resources by highland communities in Northern Thailand” (p 5).

2.2 Protection of traditional knowledge in the ASEAN region

In 2000 ASEAN issued the ASEAN Declaration on Cultural Heritage, which declared that “ASEAN Member Countries shall ensure that traditional communities have access, protection and rights of ownership to their own heritage (*ASEAN Declaration on Cultural Heritage*, art 9). ASEAN Members must “cooperate for the enactment of international laws on intellectual property to recognise indigenous populations and traditional groups as the legitimate owners of their own cultural heritage” (art 9). Also,

“Every person has the right to enjoy the benefits of modern scientific and economic progress and their applications. However, certain advances, notably in the biomedical and life sciences as well as in information technology, may potentially have adverse consequences on the cultural heritage of ASEAN. Therefore, ASEAN Member Countries shall strengthen regional cooperation to ensure that commercial utilisation does not impinge upon the integrity, dignity and rights of particular ASEAN societies” (*ASEAN Declaration on Cultural Heritage*, art 11).

In 2014 ASEAN issued its *Guidelines on Claims and Claims Substantiation for Traditional Medicines (TM)* (ASEAN Traditional Medicines and Health Supplements Scientific Committee Meeting, 2014). The guidelines took into consideration similar guidelines prepared by the WHO, EU, USA, Canada and Australia and the regulatory situation and stakeholders’ interests in the ASEAN region” (ASEAN, 2014, s 1). “The TM claims refer to any message that states, suggests, or implies that a TM ingredient/product has a positive contribution and benefit to human health. A balanced approach between consumer protection and encouraging science and innovation is important in implementing the harmonised ASEAN Guidelines on Claims and Claims Substantiation for Traditional Medicines.” (s 1). It covers three types of claims: traditional health use claims, traditional treatment claims, and scientifically established treatment claims (ASEAN, 2014, s 4.1). Evidence required to support different types of claims is shown in Table 1.

Amongst the significant initiatives of ASEAN are two compendiums of ASEAN herbal and medicinal plants. The first volume was published in 2010 (Ali et al, 2010), with Volume II published in 2017 (Sukmajaya et al, 2017). The plants are reported succinctly by country. Each entry includes a photograph, scientific name, vernacular names, brief plant description, propagation method, geographical distribution/ecology, chemical constituents, reports on medical usage (i.e. uses supported by experimental/clinical data; uses in traditional medicine), contraindications, and bibliography. A series of studies have been undertaken on plant variety protection (PVP) systems in Southeast Asia (Janke et al, 2020; Kanniah & Antons, 2012).

Table 1: Degree of evidence required to support different Traditional Medicine Claims

Type of Tradition Medicine Claim	Level of Evidence	Evidence to Substantiate Claim
Traditional Health Use	Evidence from documented traditional use and knowledge	Evidence of documented traditional use or history of use that may be found in the following: <ul style="list-style-type: none"> • Classical TM Texts • Pharmacopoeias and Monographs • Reference Textbooks/Journals
Traditional Treatment	Evidence from documented traditional use and knowledge	Evidence of documented history of traditional treatment that may be found in the following: <ul style="list-style-type: none"> • Classical TM Texts • Pharmacopoeias and Monographs • Reference Textbooks/Journals
Scientifically Established Treatment	Scientific data and traditional medicine principles	<p>Compulsory evidence: Substantiation of TM claims based on scientific data as required by the regulatory authority to be conducted on finished products or ingredient(s). Justification must be provided to the regulatory authority if evidence provided is based on the ingredients.</p> <p>At least one piece of additional evidence: Evidence of documented history of traditional treatment that may be found in the following:</p> <ul style="list-style-type: none"> • Classical TM Texts • Pharmacopoeias and Monographs • Reference Textbooks/Journals

Source: ASEAN (2014) Table 2.

A legal analysis by Rohaini (2015) of the legal situation in Indonesia concluded that adequate protection is not provided by reliance on intellectual property laws alone. Therefore a sui generis law is required, but this “may impede the equity-oriented goals of some traditional knowledge communities” but “is needed to protect intangible property right that will prohibit anyone other than the rights holders from making any utilisation of this intergenerational knowledge without consent” (Rohaini, 2015, p 718). For instance, Thailand enacted the *Protection and Promotion of Traditional Thai Medicinal Intelligence Act* in 1999, and Myanmar enacted the *Myanmar Traditional Medicine Council Law* in 2019.

Thailand provides the most comprehensive rights for domestic users of the ASEAN Member States under the *Plant Varieties Protection Act*. In particular, it allows for the registration of a plant variety that only grows in a particular locality and has not been registered as a new plant variety (s 42). It can be registered by a community that can share in the profits so generated (s 49). In addition, the Act established a Plant Varieties Protection Fund to provide funds to assist and subsidise activities related to plant varieties conservation, research and development (s 54).

2.3 Traditional Knowledge in Agriculture

A glimpse of the diversity of studies in the field of traditional knowledge can be obtained from the edited book by Wijesuriya and Court (2020). Water management is critical to sustainability in agriculture. Two chapters show how traditional knowledge continues to have an active role in managing water resources:

- *Implementation of Tri Hita Karana philosophy for the sustainability of the subak irrigation system in Bali, Indonesia;* and
- *Khmer water management in Cambodia: traditional practices and religious associations.*

Whilst another chapter presents the case for harnessing traditional knowledge to build resilience to flooding, whilst the fourth paper seeks to learn from historical water management systems to ensure resilience and sustainable agricultural development into the future:

- *Traditional Knowledge Systems for reducing disaster risk and building resilience in India;* and
- *Harnessing traditional knowledge at Ayutthaya, Thailand: resilience and sustainable development.*

In **Malaysia**, a case study provided an example where the indigenous classification of trees by the Iban and Dusun tribes, based on their traditional knowledge, that a tree classified as a single under the Linnean system was, in fact, two species (Teow et al, 2022). The classifications of the trees by the indigenous peoples was confirmed by subsequent DNA testing. In the Linnean system, the tree was classified as *Artocarpus odoratissimus*. The Iban of Malaysian Borneo called the two varieties *Iban Lumok* and *Pingan*, whilst the Dusun people of Sabah called them *Timadang* and *Tonggom-Onggom*, respectively. “[T]his case example highlights the significance of indigenous knowledge developed through generations of societies on the land, and the failure to appreciate and engage with indigenous knowledge may result in the loss of opportunities to achieve better biodiversity conservation outcomes” (Teow et al, 2022, p 2).

A case study from **Indonesia** shows the importance of listening and investigating before criticising long-held myths and legends. In Indonesia, rice is the dominant staple food and “the dominant traditional ecological knowledge (TEK) on food in Indonesia is rice” (Sumarwati, 2022). However, the TEK of the Tawangmangu District of Central Java is about non-rice food security.

“This is based on the two folktales allowing farmers to plant vegetables and pulses instead of rice, disregarding climatic and geographical conditions. Tawangmangu District is, located on the Mount Lawu slopes and is a cold area with high rainfall, unsuitable for planting rice. Therefore, the folktales described several taboo statements, especially prohibiting planting rice. Breaking this rule will expose the residents to a deadly disease outbreak” (Sumarwati, 2022).

Sumarwati (2022) identified community sustainability practices and strategies, including crop selection for non-rice food, the use of irrigation of terraced agricultural land, intercropping of vegetables, water resources management, and harvest management (sorting crop commodities, cleaning, classifying, and storage). The community also protects the forest areas of Mount Lawu slopes “as their source of life by prohibiting logging and reforestation”.

Whilst minority communities in **Vietnam's** North Mountainous Region (NMR) have developed climate-resilient agroecological farming practices, wider adoption has been limited (Son et al, 2021). It was argued that for Indigenous Knowledge to be more valuable, there must be “a change in awareness and attitudes of policymakers, community development advocates, government authorities, university educators, and local communities” (Son et al, 2021, p 519). This lack of awareness occurred despite national legislation promoting linkages between the various stakeholders, as there was a lack of an enabling environment.

In **Malaysia**, the Indigenous Peoples Assistance Facility (IPAF) provided funding to improve the livelihoods of the Jukan people of the Malaysian forests, who are “looking after the forests and only using what they need to live” (IPAF, n.d.). Unfortunately, their traditional livelihoods are at risk. The project focussed on strengthening “their social enterprise, improving access to fair markets, strengthening cultural values, and enriching the diversity of their agriculture” (IPAF, n. d.).

3. Methodology

This research is based on the documentary research concept as it describes Traditional Knowledge and provides examples from Southeast Asia. Much of the traditional knowledge remains unrecorded, especially in the area of Traditional and Complementary Medicines. The authors consider that there is a potential role for universities in the protection and promotion of this knowledge and provide examples of several successful projects. Finally it provides an analysis of the legal remedies available to protect traditional knowledge and the products that may be derived from the exploitation of this knowledge.

4. Discussion

4.1 Potential Extension Roles for Universities

Universities are by far the best placed to undertake outreach in the Agricultural sector of marginalised rural communities as they can provide an integrated “one-stop-shop” for the required services (Smith and Perry, 2023). A comprehensive team to support the protection and commercialisation of traditional knowledge in the agriculture sector might include: agronomists, biologists, botanists, business development specialists, chemists, climate resilience specialists, dieticians, epidemiologists, ethicists, food technologists, foresters, intellectual property lawyers, marketing development specialist, pharmacists, process engineers, soil scientists, traditional medicine researchers and water engineers. Some marginalised communities may also require guidance and skills

development in areas such as financial management; language skills; the care, cultivation and breeding of crops and animals (i.e. farm husbandry). Most importantly, the community is the owner of the knowledge, and the role of the university or the research institute must be that of a trusted advisor.

Not only is community outreach encouraged in some Southeast Asia countries it is mandated as a social contract between the university and the community. For instance, in Thailand the *Higher Education Act B.E. 2562 (2019)* requires that higher education institutions provide academic services that are beneficial to the development of communities, society and the country. Students and academics must participate in “the development of communities, rural societies and socially disadvantaged groups in order to create responsibility towards the community and society” (s 12 translated).

4.2 Extension Programs in Action

Researchers from the University of Northern Philippines investigated the indigenous knowledge of medicinal plants used by traditional healers in the **Province of Ilocos Sur in the Philippines** (Molina et al, 2015). They found that the traditional healers “possess rich ethnic pharmacological knowledge”. They found that the local healers lacked awareness of appropriate hygiene, lacked certification for their medicines and “did not work in cooperation with therapeutical professionals in the preparation of their medicine”. The study concluded that there were high-value medicinal plant species for potential economic development. They recommended that traditional healers be provided with training in primary health care delivery and that the medicinal plants be harvested sustainably, especially as many of the plant species were reported to be rare.

A study in Prey Lang province of **Cambodia** sought to generate a plant list to create a database to support community-based biodiversity monitoring (Turreira Garcia et al, 2017). The study was undertaken on a participatory basis, with local people gaining ownership of the outcome. The study design ensured that the results would be provided to the communities as an ethnobotanical book. Unsurprisingly, “this motivated study participants to extensively collect useful plants and explain their uses in detail” (p 86). The plant collectors hoped the “book might motivate younger generations to take interest in the subject, and subsequently pass on their knowledge to future generations” (p 86). The study's authors pointed out that additional plants may have been used in the past or elsewhere in the province. Nevertheless, it was considered an indicator of the biocultural diversity of the province. They also considered that the ecosystem should be conserved to ensure the sustainability of the local communities.

As synthetic dyes are being utilised in preference to plant dyes, traditional knowledge of plants used for dyeing is disappearing. To counter this trend, Ling and nine colleagues from universities and research institutes from China, Israel, Myanmar, Thailand, and the USA researched the traditional knowledge of textile dyeing plants in the Chin ethnic group in **Western Myanmar** (Ling et al, 2022). They interviewed 2070 informants from 14 Chin communities who “used a total of 32 plant species for textile dyeing from 29 genera in 24 families” (p 1). They considered that “understanding traditional textile dyeing and colour extraction from local plants is crucial to the Chin people because their cultural identity is expressed through traditional clothing” (p 12). Among their recommendations was conducting a further study to improve the dye extraction method and its stability. The study should include an evaluation of the pigments' phytochemical properties, bioactivity, and safety. They also recommended pilot plant development to “produce the pigments on a larger scale to sustainably supply users nationally and internationally” (p 12).

A study from **Malaysia** found that the home gardens of Kampung Masjid Ijok were “important reservoirs for medicinal plant species and traditional knowledge” (Ramli et al, 2021). They considered that home gardens are “one of the important places to study ethnopharmacology” as the knowledge is practised and preserved among family members. The study identified more than sixty plants that could be investigated for possible selection as medicinal plants for cultivation in home gardens. The medicinal plants in the home gardens are primarily used to treat the most common ailments in rural areas, namely gastrointestinal and respiratory disorders. Details reported were species name, family name, local names, habit, part of plant utilised in the preparation of traditional medicine, frequencies of occurrence in home gardens, ailment for which product is utilised, and method of preparation and then its administration to the patient.

The Agro-Biodiversity Initiative (TABI) in the uplands of **Laos PDR** was an initiative of the National Agriculture and Forestry Research Institute of the Ministry of Agriculture and Forestry and the Swiss Agency for Development and Cooperation (Rodericks, 2020). TABI was established to leverage agro-biodiversity, which was “the legacy of the upland farmers' agricultural knowledge and practices passed down over generations” (Rodericks, 2020, p vi). The design of TABI sought to mobilise the ownership, commitment and participation of

diverse stakeholders, including organisations, individuals, proponents of other development projects, and government departments. Participation was planned to be across sectors and at different levels within the organisations and grew into a 10-year commitment.

“The intent of the initiative was to leverage the country’s rich biodiversity to help realise development goals in the near term without jeopardising future capacity to do so. The initiative sought to conserve, enhance, manage, and sustainably utilise the biological diversity found in upland farming landscapes in order to improve the livelihoods of farming families in the region” (Rodericks, 2020, p vi).

The successful outcome of the initiative and the challenges it faced are described in the book authored by Rodericks (2020).

Duakaju and Imang (2021) undertook a qualitative study in Kalimantan, **Indonesia**, to study the traditional agriculture of different ethnic and sub-ethnic groups. They found that swidden (“slash and burn”) agricultural practices were widely practised by several ethnic groups utilising inland land and forest areas sufficiently large for farming.

“The results showed that the farming system was still widely practised in the tropics by several ethnic groups who generally live in inland areas and utilise land and forests that are large enough for farming. In this cultivation system, various local wisdoms and knowledge are identified in practising swidden agriculture, starting from the stages of looking for land, determining soil fertility, cutting, burning, controlling pests, harvesting and storing rice, especially rice for preparation of seeds for planting in the following year” (Duakaju and Imang, 2021, p 25).

They found that integrating various local knowledge and wisdom practised by various ethnic groups at each activity stage “can increase the production and productivity of upland rice and as a form of sustainable and environmentally friendly agriculture”.

4.3 Protection of Traditional Knowledge

Once the traditional knowledge has been identified, several ways could be explored to provide protection. It may be by way of a patent, trademark or geographical indication. Regardless of the method chosen, ethically, the ownership must remain with the community.

A patent may be used to protect devices, substances, methods or processes (IP Australia, 2023d). To be granted a patent, it must pass the following tests: it must be new, useful, and inventive in that it is different from what already exists and must be suitable subject matter. Patents are not granted for “human beings or the biological process for their generation, artistic creations, mathematical models, or mathematical models, plans, schemes or other purely mental processes” (IP Australia, 2023d). In the case of traditional knowledge, the most likely way a patent could be granted would be for a “novel” product manufactured from medicinal plants, herbs and the like but not for the plant themselves.

If, however, a plant (or its components or materials) has been developed “through a technical intervention such as breeding, mutation or genetic engineering”, it may be patentable (IP Australia, 2023a). Examples of patentable plant materials are:

- a. “Genes or chromosomes that [the claimant] has developed through mutagenesis or genetic engineering;
- b. Reproductive material such as seeds, whole plants, cuttings, cells or protoplasts;
- c. Products from plants, including fruit, flowers, oils, starches, chemicals or pharmaceuticals;
- d. Plant material such as cell lines that are used in industrial processes; and
- e. Methods or processes for using, testing or producing plants or plant products, including:
 - i. Genetic engineering techniques;
 - ii. Plant tissue culture;
 - iii. Cell and protoplast culture; and
 - iv. Mutagenesis” (IP Australia, 2023a).

Alternatively, it may be protected by registration under national legislation on plant breeders’ rights. Countries that accede to the *International Convention for the Protection of New Varieties of Plants (amended as of 19 March 1991)* must enact such legislation (*UPOV Convention*, Ch II). Examples could be rice varieties developed to thrive under challenging conditions.

If it is a product, it could be protected by a trademark. Depending on the jurisdiction, the trade mark can be a word or phrase, a fancy font, characters in Roman or non-Roman script, a logo or figurative trade mark, a colour trade mark, a shape trademark, a sound trademark, a scent trade mark, or a movement trademark (IP Australia, 2023c). Possibly the best protection and commercially valuable trademark is a geographical indication (GI). The method of registering a geographical indication could vary by jurisdiction and has several features. Most importantly, it indicates to consumers that the product comes from a specific geographical region and has “a distinctive set of qualities or reputation attributable to that region” (IP Australia, 2023b).

The GI rules may include: “how a product is made, what ingredients are used, the environmental or agricultural features of the region which give the product distinctive qualities”, and most importantly, “a strong reputation in the region for producing a particular product of a certain quality” (IP Australia, 2023b). Probably one of the best-known examples of a Geographical Indication is that of Parmigiano Reggiano, a hard cheese originating from certain specified provinces in Italy, which is produced in a particular manner. In a recent case in Singapore, the General Division of the Singapore High Court ruled that under the *Geographical Indications Act 2014* of Singapore not only is the name *Parmigiano Reggiano* protected but also is the term *Parmesan* (Allen and Gledhill, 2023). The court ruled that the term *Parmesan* is a translation of the geographical indication *Parmigiano Reggiano*. Therefore the generic term “Parmesan cheese” cannot be used to describe a cheese other than registered by the Consorzio del Formaggio Parmigiano Reggiano which is responsible for certifying that the cheese meets the requirements to be called *Parmigiano Reggiano*. It might be noted in passing that the Consorzio is very active in protecting its cheese under Geographical Indications legislation in key markets around the world.

5. Conclusion

There is a considerable role that Universities can play in protecting and promoting the traditional knowledge of marginalised rural communities and so improve their living standards and sustainability. This article has provided examples from the ASEAN region, but the need is worldwide. Tradition knowledge in the agricultural sector is not restricted to indigenous people but can be found amongst can probably found among primary producers everywhere.

Finally, any research and development activities must acknowledge traditional knowledge holders.

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References

- Ali, R.M., Samah, Z.A.S., Mustapha, N. M. and Hussein, N. (2010) *ASEAN Herbal and Medicinal Plants*, ASEAN Secretariat, Jakarta.
- Allen and Gledhill (2023) “Singapore High Court rules that *Parmesan* is a translation of geographical indication *Parmigiano Reggiano*”, <https://www.allenandgledhill.com/sg/publication/articles/23553/high-court-rules-that-parmesan-is-a-translation-of-geographical-indication-parmigiano-reggiano>.
- ARISE+ (2019) *Geographical Indications in the ASEAN Region*. ASEAN Intellectual Property Rights, Bangkok, https://euipeuf.eu/sites/default/files/arise-docs/2019/ASEAN_GI-Booklet.pdf.
- ASEAN Declaration on Cultural Heritage, 25 July 2000, <https://asean.org/wp-content/uploads/2021/01/ASEAN-Declaration-on-Cultural-Heritage.pdf>.
- ASEAN Traditional Medicines and Health Supplements Scientific Committee Meeting (2014). “Annex VII - ASEAN Guidelines on Claims and Claims Substantiation for Traditional Medicines”, ASEAN, Jakarta, <http://asean.org/wp-content/uploads/2017/09/ASEAN-Guidelines-on-Claims-Claims-Substantiation-TM-V2.0-with-discla....pdf>.
- Charoeniyomphrai, U., Pichetkulsamphan, C. and Tharawodome, W. (Eds.) (2006) *Indigenous Knowledge, Customary Use of Natural Resources and Sustainable Biodiversity Management: Case Study of Hmong and Karen Communities in Thailand*. Inter Mountain Peoples Education and Cultures in Thailand Association (IMPECT), Chiang Mai, <http://www.forestpeoples.org/sites/fpp/files/publication/2010/08/10cthailandimpectjun06eng.pdf>.
- Duakaju, N. N. and Imang, N. (2021) “The practices of traditional knowledge and wisdom by multi-ethnics on swidden agriculture of Kalimantan, Indonesia”, *The International Journal of Humanities & Social Studies*, Vol. 9, No. 3, pp 25-30.
- Fonterra Brands (Singapore) Pte Ltd v Consorzio del Formaggio Parmigiano Reggiano [2023] SGHC 77, https://www.elitigation.sg/gd/s/2023_SGHC_77.

- Geographical Indications Act 2014 (Singapore, 2014 rev ed, as amended by the Intellectual Property (Dispute Resolution) Act 2019)*, <https://wipo.int/en/text/550139>.
- Heilprin, J. (2022) "Breakthrough on genetic resources treaty", *Health Policy Watch*, <https://healthpolicy-watch.news/breakthrough-on-genetic-resources-treaty/>.
- Higher Education Act B.E. 2562 (2019) (Thailand)*, <https://www.mhesi.go.th/images/2563/pusit/legal-all/1p2562.pdf>.
- International Convention for the Protection of New Varieties of Plants (amended as at 19 March 1991)*, https://www.upov.int/edocs/pubdocs/en/upov_pub_221.pdf.
- IP Australia (2023a) *Can I patent my new plant?* Australian Government, <https://www.ipaustralia.gov.au/patents/what-are-patents/can-i-patent-my-new-plant>.
- IP Australia (2023b) *Geographical indications and trade marks*, Australian Government, <https://www.ipaustralia.gov.au/trade-marks/what-are-trade-marks/types-of-trade-marks/geographical-indications>.
- IP Australia (2023c) *Types of trade marks*, Australian Government, <https://www.ipaustralia.gov.au/trade-marks/what-are-trade-marks/types-of-trade-marks>.
- IP Australia (2023d) *What are patents?* Australian Government, <https://www.ipaustralia.gov.au/patents/what-are-patents>.
- IPAF (n.d.) *Indigenous communities in Malaysia building capacity for resilience through IPAF*. Indigenous Peoples Assistance Facility (IPAF), Rome, <https://www.ifad.org/nl/web/latest/-/photo/indigenous-communities-in-malaysia-building-capacity-for-resilience-through-ipaf>.
- Janke, T., Curtis, L., Goulding, P., McNeill, S., Mundine, J., and Auld, R. (2020) *Comparative Study on Genetic Resources, Traditional Knowledge and Traditional Cultural Expressions (GRTKTCE)*. Terri Janke and Company Pty Ltd, Roseberry, https://aanzfta.asean.org/uploads/2021/10/Comparative-Study-GRTKTCE_Final-For-Public.pdf
- Kanniah, R. and Antons, C. (2012) "Plant Variety Protection and Traditional Agricultural Knowledge in Southeast Asia", *Australian Journal of Asian Law*, Vol. 13, No. 1, pp 1-23.
- Molina, G. G. V., Eder, M. N. R., and Gascon, V. (2015) "Indigenous knowledge of medicinal plants used by traditional healers in Ilocos Sur", *International Journal of Scientific & Engineering Research*, Vol. 6, No. 12, pp 159-170.
- Myanmar Traditional Medicine Council Law (Law No. 1/2019 of January 25, 2019)*, <https://wipo.int/en/legislation/details/20426>.
- Plant Varieties Protection Act BE 2542 (1999) (Thailand)*, <https://wipo.int/en/text/129781>.
- Protection and Promotion of Traditional Thai Medicinal Intelligence Act, BE 2542 (1999) (Thailand)*, <https://wipo.int/en/text/179713>.
- Ramli, M. R., Milow, P. and Malek, S. (2021) "Diversity and traditional knowledge of medicinal plants in home gardens of Kampung Masjid Ijok, Perak, Malaysia", *Biodiversitas*, Vol. 22, No. 5, pp 2458-2465.
- Rodericks, A. (2020) *Living landscapes: Embracing agro-biodiversity in Northern Laos*. National Agriculture and Forestry Research Institute (NAFRI), Ministry of Agriculture and Forestry, Vientiane.
- Rohaini (2015) "Establishing the sui generis laws for protecting traditional knowledge in Indonesia", *US-China Law Review*, Vol. 12, pp 708-718.
- Secretariat of the Convention on Biological Diversity. (n.d.). *Traditional Knowledge and the Convention on Biological Diversity*, <https://www.cbd.int/doc/publications/8j-brochure-en.pdf>.
- Smith, R. B. and Perry, M. (2023). University Extension Programs to Develop Intellectual Property in the Agriculture Sector of Marginalized Rural Communities in the ASEAN Region. In T. Walker, K. Tarabieh, S. Goubran, and G. Machnik-Kekesi (Eds.), *Sustainable Practices in Higher Education: Finance, Strategy, and Engagement*, Palgrave-Macmillan, London (in press).
- Son, H. N., Kingsbury, A. and Hoa, H. T. (2021) "Indigenous knowledge and the enhancement of community resilience to climate change in the Northern Mountainous Region of Vietnam", *Agroecology and Sustainable Food Systems*, Vol. 45, No. 4, pp 499-522.
- Sukmajaya, D., Permatasari, A., Mohtar, M., Kiong, L. S., Badron, U. H. and Ali, R. M. (2017) *ASEAN Herbal and Medicinal Plants, Volume II*, ASEAN Secretariat, Jakarta.
- Sumarwati, S. (2022) "Traditional ecological knowledge on the slope of Mount Lawu, Indonesia: all about non-rice food security", *Journal of Ethnic Foods*, Vol. 9, No. 9, pp 1-13, <https://doi.org/10.1186/s42779-022-00120-z>.
- Suwankesawong, W. (2019) *Pharmacovigilance and Traditional and Complementary Medicine in South-East Asia: A Situation Review*. World Health Organization, Regional Office for South-East Asia.
- Teow, H. H., Tang, S., Ahmed, P K., Nair, M., & Vaithilingam, S. (2022) "Roles of Malaysian indigenous communities in biodiversity conservation: A case study approach", *International Conference on Sustainable Development ISD 2022*, https://ic-sd.org/wp-content/uploads/2022/11/submission_262.pdf
- Turreira Garcia, N., Argyriou, D., Chhang, P., Srisanga, P. and Theilade, I. (2017) "Ethnobotanical knowledge of the Kuy and Khmer people in Prey Lang, Cambodia", *Cambodian Journal of Natural History*, Vol 2017, No. 1, pp 76-101.
- Wijesuriya, G., & Court, S. (Eds.) (2020) "Traditional Knowledge Systems and the conservation and management of Asia's heritage", International Centre for the Study of the Preservation and Restoration of Cultural Property, Rome. <https://www.iccrom.org/news/traditional-knowledge-systems-conservation-and-management-asia%E2%80%99s-heritage>.
- World Intellectual Property Organization (2015) "Intellectual Property and Traditional Medical Knowledge", *Background Brief*, No. 1, https://www.wipo.int/edocs/pubdocs/en/wipo_pub_tk_6.pdf.