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Web Archiving of Indigenous Knowledge Systems in Asia and Africa: A Comparative Study

[1*]Ranjan Samanta & [2]Dipanjali Chakraborty

[1]Librarian, Naba Ballygunge Mahavidyalaya, Kolkata-700042

[2]MLIS Student, DLIS, Jadavpur University, Kolkata-700032

*For Correspondence: ranjansamanta5@gmail.com

ABSTRACT:

Introduction: Indigenous Knowledge (IK) is considered the fundamental element of a country's knowledge. This paper presents a general outlook by defining the indigenous knowledge as well as its characteristic features and various types.

Purpose: Aim of this study is to survey the selected indigenous knowledge systems (IKS) repositories of two continents: Asia & Africa, by evaluating their collection, notable features, different policies, dealing subjects etc.

Design: Eight major libraries and repositories, four from each Asia and Africa were chosen who are completely and partially devoted to maintain an indigenous knowledge collection, across the continent of Africa and Asia. This study aims to perform a comparative analysis among the repositories of Asia and Africa based on thirteen (13) criteria like dealing subjects, document types, file format, search option, access policy, copyright policy, classification, cataloguing, indexing technique, Archival technique etc.

Findings: In Asian and African (except African Online Digital Library) context, most importance has been given to preserve the traditional medicine. Same importance needs to be given to preserve the traditional food and the communities. Most of the databases were developed while keeping in mind of a particular geographic area (e.g., India, Ghana). Since, maintaining a database that covers the entire continent might be impossible and far-fetched, measures should be taken to create databases that focus into a specific region (e.g. North, South).

Originality: All the previous researches undertaken in this field have dealt with repositories located in a specific geographical area (e.g. Africa). This is, by far, the first research that has not only dealt with repositories from two continents at the same time, but also performed a comparative analysis between them.

Keywords: Indigenous knowledge (IK), Indigenous Knowledge System (IKS), Digital Library, Web Archiving, Digitisation, Institutional Repositor.

1. Introduction:

Indigenous knowledge, often neglected and forgotten, has proved to be a very diversified collection of information constricted in a specific geographical region of a country. IK also called traditional knowledge, comprises of expertise, wisdom, experience, and perception used by the local people in their daily lives for the betterment of their livelihood. Indigenous peoples have evolved and maintained incredibly useful information and cognitive systems across millennia. As it is one of the most basic components of a country's knowledge, measures have been taken to preserve and archive them, so that, the future generation has ties and can remember the century old traditional practices. Asia and Africa, both continents consist of various indigenous communities. These communities have their very own cultural heritages, traditional rituals. Repositories were developed and maintained to protect this knowledge in these continents.

2. Objective:

The main purpose of this study was to overview and analyse the different collection showcased by the repositories and digital libraries across the continents of Asia and Africa to preserve and archive the indigenous knowledge materials. Thus, this study will attempt to:

i. Analyse the content and collection related to indigenous knowledge of the repositories.
ii. Examine the archival policies followed by the repositories.
iii. Scrutinise the techniques followed by the libraries to classify and catalogue the indigenous knowledge collection.
iv. Perform a comparative study among the repositories of Asia and Africa.

3. Scope:

In order to conduct the research, eight major libraries and repositories were chosen who are completely and partially devoted to maintain an indigenous knowledge collection, across the continent of Africa and Asia. The selected libraries are as follows:

- Asia:

1) Traditional knowledge digital library-India
2) Korean Traditional Knowledge Portal – South Korea
3) Chinese traditional Medicine database – China
4) Philippine Traditional Knowledge Digital Library on Health-Philippines

- Africa:

1) African Online Digital Library
2) Indigenous Knowledge on Forest foods & Medicinal plants in Ghana- Ghana
3) PlantZAfrica- South Africa

4) National Indigenous Knowledge Management System- South Africa

4. Literature review:

Balogun&Kalusopa(2021) highlighted the digitization of Indigenous Knowledge Systems (IKS) in institutional repositories in South Africa with a view to develop a framework for Web archiving IKS-related websites in South Africa. The research proposed a Web archiving framework incorporated with digital preservation policy of few countries of South Africa. **Frederiksson (2021)** analysed India's Traditional Knowledge Digital Library (TKDL) as a potential intervention in the administration of patent law. He concluded that the TKDL bridged the gap between the main branches of Indian traditional medicine and the formal knowledge system of International Patent Classifications. **Hangshing (2019)** traced the emergent field of indigenous librarianship, draining from experience in developed countries. He highlighted the progress growth of librarianship in India and emphasised the need for Indigenous librarians and importance of IK. **Mangare& Li (2018)** aimed at surveying the constructed Indigenous knowledge systems databases for African Traditional medicine, diversity features, common challenges and developed the missing information of indigenous knowledge system for Tanzanian Traditional Medicine. They realised the need of using the collaborative approach for defining a common standard in medicinal plant database for knowledge sharing. **Sraku-Lartey&othrts (2017)** discussed the digitization of indigenous knowledge on forest foods and medicine for the effective management of Ghana's forest resources. They revealed that local communities have an in-depth knowledge of indigenous forest foods and medicines and they also recommended the promulgation of laws and legal instruments to protect communities from bio-piracy. **Biyela, Oyelude & Haumba (2016)** strived to explore the state of digitisation of Indigenous Knowledge (IK) across the three countries: Nigeria, South Africa and Uganda. They realised the need for intensifying digitisation projects of IK found in rural communities. **Sarkhel, J K.(2016)** studied the best management of the indigenous knowledge in the libraries. He also explained that library professionals need to be proactive in devising strategies for the management and preservation of IK. **Ansari, M S.(2016)** described the importance of traditional knowledge in the field of medicine. He discussed the theoretical and conceptual understandings of traditional knowledge and its preservation & protection from bio-piracy. **Anyaoku, Nwafor-Orizu & Eneh (2015)** thought that the people's collective indigenous knowledge heritage, medical libraries in Nigeria should be developed with inclusive policies that support collection development of TMK information resources as a matter of community's priority. **Poorna, Mymoon & Hariharan (2014)** provided highlights on some major documentation initiatives across the globe at the community and country levels that aim at preserving and safeguarding TK.**Akinwale (2013)** examined digitisation of indigenous knowledge as a critical resource for the promotion of effective management of natural resources in Africa. The findings reveal

several opportunities and challenges in attempts to promote African approaches to natural resources management. **Chakraborty, R.(2010)** discussed the need for preserving traditional knowledge and described the role of the Traditional Knowledge Digital Library and its activities in preserving traditional medicinal knowledge in India. **Eyong, C. T. (2007)** argued that IKS in Central Africa have a high sustainability potential and addressed some challenges. **Rao (2006)** discussed sustaining of IK, identifies reasons for current Intellectual Property Systems (IPSs) and inability to protect IK. He also highlighted international and Indian initiatives for protection of IK.

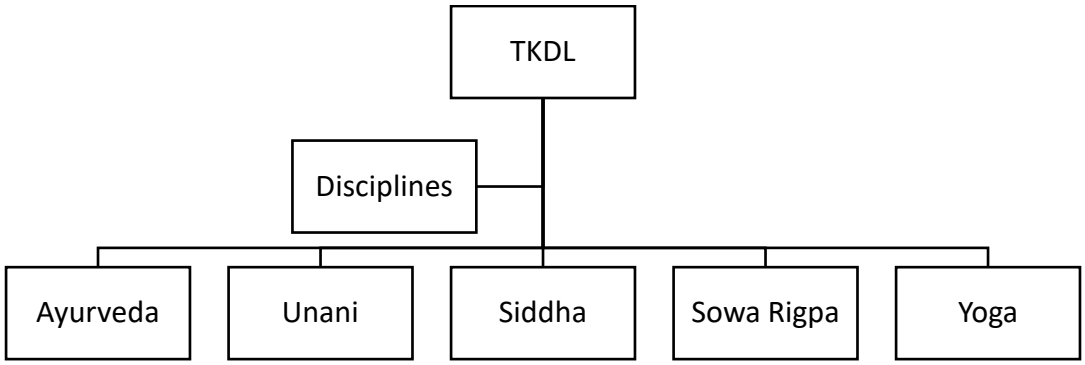
5. Indigenous knowledge libraries/systems:

5.1 Asia:

5.1.1 Traditional Knowledge Digital Library (India)(TKDL)

- Established in 2011, Traditional Knowledge Digital Library (TKDL) is a venture undertaken by the government of India to protect and preserve India's rich and age-old tradition of herbs, medicines, and spices.
- Collaborative effort of CSIR, NISCAIR, Ministry of Science and Technology, the Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha, and Homeopathy (AYUSH), Ministry of Health and Family Welfare, of India etc.
- It acts as a bridge to deal with the language barrier by methodically converting the ancient scriptures into five globally used languages namely English, Japanese, French, German, and Spanish.
- The very first repository across the world, vocal about the issue of biopiracy, successfully nullified various patents filed in USA that claimed unique uses of herbs and spices explained in ancient texts of India.
- Uses own classification system, Traditional Knowledge Resource Classification (TKRC) to classify Indian medicinal systems with basic and advanced search.

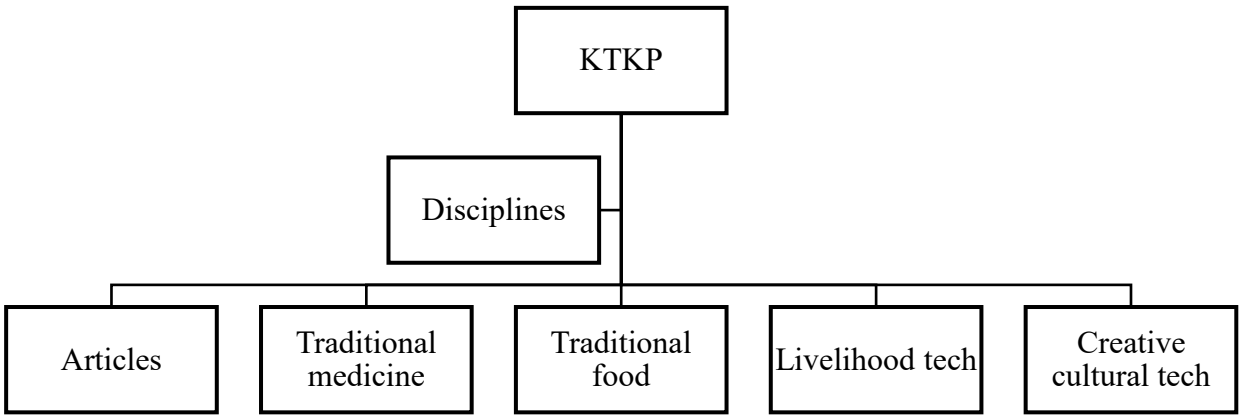
Classification: Disciplines are divided into 5 categories:



5.1.2 Korean Traditional Knowledge Portal (Korea)

- Korean Traditional Knowledge Portal (KTKP) established in 2004 under the supervision of Korean Intellectual Property Office (KIPO)
- An extensive collection of Korean literature, oriental medicine, livelihood, traditional food etc.
- Language Cover: English & Korean with basic and advanced search.
- A separate disease database which helps a user to find related herbs and prescriptions to get cured from the disease and a separate journal database with traditional knowledge of Korea.

Classification: The disciplines are classified in the following manner:



5.2.1.3. Traditional Chinese medicine database (China):

- The world's largest non-commercial database, TCM@Taiwan database, established in 2003 under the guidance and supervision of computational and system biology laboratory to protect and preserve of Chinese traditional knowledge.
- Devoted to herbs, animal products, minerals.
- Language: Chinese and English with basic, advanced and formula search
- Classification; The traditional Yin-yang, the human Meridan/Channel system, the Five Elements theory, and the Zang Fu organ theory.
- Available in CD format and downloadable, compounds available in Mol2 format used screening

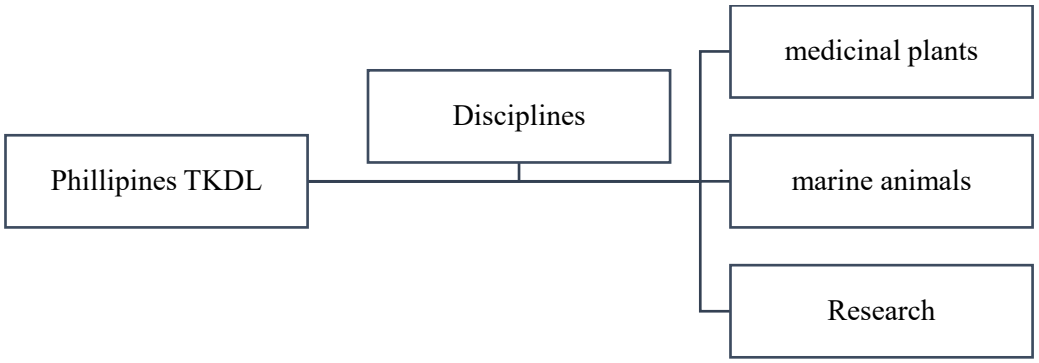
Classification: All traditional Chinese medicines are divided into 22 main classes and many sub-classes.

5.2.1.4. Philippine Traditional Knowledge Digital Library on Health

- Established by the University of Philippines in 2011, with the support of Philippine Council for Health Research and Development of the Department of Science and Technology, the Philippine Institute of Traditional and Alternative Health Care.

- Vast collection of information on various topics such as medicinal plants, traditional healing practices, rituals, plant compendium, traditional healing terminologies and traditional healers
- Separate collection 'Digital Herbarium', details of local plants with collection of pictures and scholarly articles devoted to researches on the indigenous cultures and practices
- Basic, keyword and advanced search

Classification: The disciplines are separated into 3 main divisions



5.2 Africa:

5.2.1 Africa Online Digital Library

- Established in 2000, the primary focus of Africa Online Digital Library (AODL) free access of digital cultural heritage materials.
- An expansive collection of tens and thousands of digitised photographs, videos, documents, maps, interviews, and oral history from all over the Africa.
- Collection by format, country, language, date etc.
- Separated curated collection with oral narratives of indigenous community across different parts of Africa.

5.2.2 Indigenous Knowledge on Forest foods & Medicinal plants in Ghana

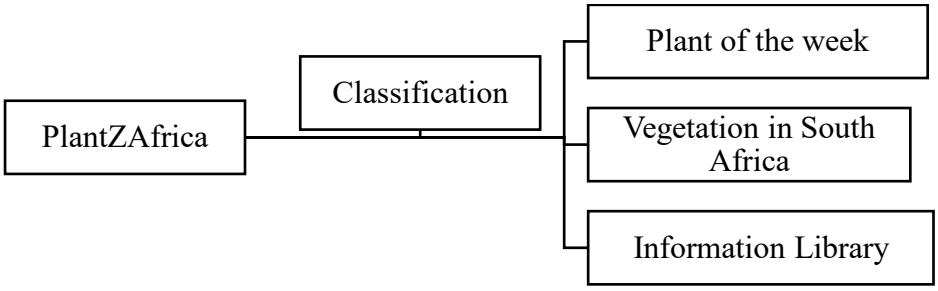
- CSIR, funded by Elsevier foundation undertook the Ghana project to preserve and digitise the rich culture of Ghana
- An extensive collection of medicinal plants and forest foods native to Ghana
- Separate collection of articles and database of medicinal plants with basic search

5.2.3PlantZAfrica- South Africa

- Established in 2000, by the South African National Biodiversity Institute.
- An extensive collection of plants native to South Africa.
- It updates two new plants in its database every week.
- Information available in downloadable PDF format
- Separate database of diversified vegetation of South Africa.

- Common names of plants in different languages spoken in South Africa.

Classification: Information is broadly classified into 3 categories:



5.2.4 National Indigenous Knowledge Management System (NIKMAS), South Africa

- Developed by National Indigenous Knowledge Registration System (NIKRS) with the purpose of recording, storing, management and dissemination of Indigenous Knowledge of Africa.
- Separate databases for all the native communities and 'Pharmacopoeia', traditional African medicinal plants of South Africa
- Open & confidential freely accessible indigenous knowledge through registration, verification with basic and advanced search

6. Methodology:

Qualitative content analysis was chosen for this research. Later, comparative analysis was also adopted to compare the different archival techniques pursued by the libraries and systems. All the websites of the different libraries and systems were thoroughly searched. Their collection, archival policies were overviewed, analysed, and compared.

7. Data Collection and analysis:

	Point of Difference	Repositories and digital libraries			
		ASIA			
		Traditional Knowledge Digital Library (India)	**Korean Traditional Knowledge Portal**	**Chinese traditional medicine database**	**Philippine Traditional Knowledge Digital Library on Health**

A S I A	Dealing of subject	Books and other resources on traditional medicine systems such as Unani, Siddha, Ayurveda, Sowa rigpa and yoga.	Traditional medicine, traditional food, livelihood tech etc.	Traditional Chinese medicine	Medicinal plants, traditional ritual, and practices in healing.
	Available details	Name of the books, author(s), compiler, publisher, edition details.	Includes the following: a. Herbs: scientific name, Latin name, used part, chief virtue etc. b.Prescription for various diseases. c. Diseases & their signs, symptoms. d. cooking method of local, traditional food. e. Methods of agriculture and arts of living. f. Books and various methods of cultural heritage.	Molecular details of compound, their 2D and 3D structures, list of references.	<u>Medicinal plants:</u> plant description includes habit, leaves, root, stem, fruit and inflorescence's structure, pictures, medicinal uses, and geographic area of collection. Note: Traditional practices and ritual requires

					user login to access them.
	Distinguished feature(s)	Taken notable steps against bio-piracy and put an end to multiple errored patents based on Indian traditional practices.	Provides an alphabetical list on intangible cultural heritage with their designated number.	TCM docking: provides docking simulations of more than 20000 TCM compounds with user's choice of protein. isplice: web-based tool that calculates the possibility of various splicing events in designed mutagenesis experiments. iscreening: drug screening and De Novo system based on TCM database.	Includes a digital herbarium of medicinal plants gathered during documentation.
	Documents available in language(s)	English, Spanish, Dutch, French, Japanese etc.	Korean, English	Chinese, English	English
	Types of documents	Books	Journal, blogs	Two- and three-dimensional medical structures of TCM constituents along with related references.	Journal, blogs

	File format(s)	Text	Text, images, videos	Text, 2D & 3D images	Text, Images
	Available search option(s)	Simple, advanced, TKRC, IPC search	Basic, keyword, advanced search	Basic, advanced search.	Keyword search. Note: advanced search only available for users.
	Availability of scholarly/research articles	None	4 types of journals available: oriental medicine, food, pharmacy, biology	None	Scholarly articles available on medicinal plants.
	Accessing policy	accessed by anyone.	Basic information accessed by anyone	Basic information accessed by anyone	Basic information accessed by anyone
	User log-in	Unavailable	Available	Available	Available
	Downloadability	Unavailable	Unavailable	Available	Unavailable
	Classification techniques	Traditional Knowledge Resource Classification (TKRC)	Classifies in the following way: Articles Herbs Main: prescription, disease, chemical compound, terminology	Traditional Yin-yang, the human Meridan/Channel system, the Five Elements theory, and the Zang Fu organ theory.	No information found

			Auxiliary: disease mapping		
	Cataloguing techniques	Not mentioned	Not mentioned	Not mentioned	Not mentioned
	Copyright policy	Not mentioned	mentioned	mentioned	mentioned
	Archival techniques	digitisation	digitisation	digitisation	digitisation
AFRICA					
		Africa Online Digital Library	**Indigenous Knowledge on Forest foods & Medicinal plants in Ghana**	**PlantZAfrica**	**National Indigenous Knowledge Management System (NIKMAS)**
	Dealing of subject	Past and present of Africa, different communities and their lifestyles, different religions followed by the communities.	Different plants native to Ghana and their traditional uses.	Different plants native to South Africa and their traditional uses.	Communities native to South Africa and their geographic location.
AFRI	Available details	Blogs, essays, videos, images, articles on a topic.	Details available are: name, common name, scientific name, uses and pictures.	Details are available: Name, common name, scientific name, description, conservation status, distribution, and	Geographic location of the communities.

CA				habitat with ample pictures etc.	Note: registered member to access IK details on traditional food and medicine.
	Distinguishable feature(s)	Special curated collection of oral narratives assembled from the indigenous communities	List of indigenous communities native to Ghana.	Extensive section completely devoted to biome description and preservation of South Africa	Includes pharmacopoeia of restricted view without registration
	Documents available in language(s)	English	English	English	English
	Types of documents	Map, interviews, poems, photographs, drawings	blogs	Journals, blogs	Journal, blogs
	File format(s)	audio, video, text, images	Text, images.	Images and text.	Text, Images
	Accessing policy	accessed by anyone	accessed by anyone	accessed by anyone	Basic information accessed by anyone
	User log-in	Not available	Not available	Available	Available
	Downloadability	Permitted	Not permitted	Not permitted	Not permitted

	Classification process	Indigenous knowledge and related contents.	Medicinal plants and forest foods	Plant of the week, information library, South African vegetation.	Pharmacopeia, indigenous knowledge, medicinal plants.
	Cataloguing process	Not mentioned	Not mentioned	Not mentioned	NRS catalogue process
	Copyright policy	Not mentioned	mentioned	mentioned	mentioned
	Archival techniques	Digitisation	Digitisation	Digitisation	Digitisation

8. Findings and interpretations:

i. Dealing of subject: it was noticed that, where repositories from Asia have mainly focused on archiving their traditional medicinal plants, African repositories have put ample focus on showcasing their indigenous communities, their lifestyles, and their stories. They have also showcased the different vegetations found in South Africa.

ii. Available details: both continents' repositories have performed an exceptional work on curating every necessary detail related to the plant's native to their areas. KTKP from Asia also includes treatments of various diseases possible their medicinal plants.

iii. Distinguishable feature(s): when it comes to notable features, repositories from Asia have beaten African repositories with a good margin. From fighting against bio-piracy, maintaining a list of intangible cultural heritage to docking and screening system for medicines etc. Asian repositories have made sure to protect their indigenous knowledge as well as utilising the knowledge. However, African repositories too have tried their best to protect their traditional knowledge by showcasing the oral narratives from the different tribes etc.

iv. Documents available in language(s): Asian repositories are not only available in their regional languages (e.g. Hindi, Korean), they are also available in internationally popular languages such as French, Spanish and English whereas African repositories are only available in English.

v. Types of documents: both African and Asian repositories include the journals and blogs as their preferred type of documents. However, African Online Digital Library includes a wide range of documents starting from maps, drawings, photographs to poems, interviews etc.

vi. File format(s): both African and Asian repositories support image and textual format. However, African Online Digital Library includes audio-visual format as well.

vii. Available search option(s): Most of the Asian and African repositories provide basic and advanced search, some African and Asian repositories provide the facility of keyword search. But, TKDL from India provides TKRC and IPC search as well.

viii. Availability of scholarly/research articles: KTKP from Asia includes articles on oriental medicine, food, and pharmacology whereas TKDL Philippines includes articles on medicinal plants only. In African repositories, however, along with scholarly articles (PlantZAfrica, NIKMAS), transcriptions of interviews are also available (AODL).

ix. Accessing policy and user-login: in both African and Asian repositories, basic information can be accessed by everyone but most of them require user-login in order to get complete set of information.

x. Downloadability: most of the repositories do not provide download facilities except of two: TCM database of China and African Online Digital Library (AOD)

xi. Classification & cataloguing: Most of the repositories have their distinct classification system but their cataloguing systems were not mentioned in most of the repositories.

xii. Copyright policy: most of the African and Asian repositories mention their copyright policies.

xiii. Archival techniques: all the African and Asian repositories have opted for digitisation as their archival technique.

In Asian and African context, most importance has been given to preserve the traditional medicine. Same importance needs to be given to preserve the traditional food and the communities. Most of the databases were developed while keeping in mind of a particular geographic area (e.g. India, Ghana).

9. Suggestions:

After carefully evaluating the repositories, the following suggestions were made:

a) More repositories should provide their copyright policy to aware their users about their terms and conditions.

b) More repositories should allow users to access all the information available in the database without the user registration.

c) Repositories should make their database downloadable.

d) Repositories should develop their own classification system (e.g. TKRC system by TKDL India) which will be exclusively used to classify indigenous knowledge as well as support interoperability across various repositories.
e) As India is the home for multiple indigenous communities, there is a diverse collection of indigenous knowledge at every part of the country. Therefore, measures must be taken by the concerned authorities to collect all these knowledges and come up with a repository where this knowledge can be stored in a consolidated format.
f) These repositories should include the anthropological aspect in their repositories.

10. Conclusion:

The process of globalisation threatens to turn portions of this IK into proprietary knowledge for the financial gain of a select few. Through national policies and international law, these delicate knowledge systems need to be strengthened and protected while also being developed and used properly for the benefit of its owners. In the new millennium, there is also a need for strong connections between IK holders and scientists in order to examine the connections between various knowledge systems. Since, maintaining a database that covers the entire continent might be impossible and far-fetched, measures should be taken to create databases that focus into a specific region (e.g. North, South). The indigenous communities and their knowledge across Asia and Africa are so diverse that they deserve the recognition and acknowledgement after decades of ill-treatment. This knowledge will not only enrich the continent's knowledge database but will also help the next generation to have a better insight of their tradition. This knowledge has tremendous potentials to be extremely helpful in future scientific inventions as well.

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