

1. Kinds of traditional knowledge

While IK research originally emphasized indigenous technical knowledge of the environment, it is now accepted that the concept of IK goes beyond this narrow interpretation. IK is now considered to be cultural knowledge in its broadest sense, including all of the social, political, economic and spiritual aspects of a local way of life. Sustainable development researchers, however, have found the following categories of IK to be of particular interest:

- Resource management knowledge and the tools,
- Techniques, practices and rules related to pastoralism,
- Agriculture, agro-forestry, water management and the gathering of wild food;
- Classification systems for plants, animals, soils, water and weather;
- Empirical knowledge about flora, fauna and inanimate resources and their practical uses;
- And the worldview or way the local group perceives its relationship to the natural world.

2. The physical and social contexts in which traditional knowledge development

The evolution of TKS is very much local in nature and associated with a particular environmental and/or socio-cultural context. It is designed and developed by the local community through their constant observation, trial and modification/customization to match with its appropriateness. Therefore, TKS has the characteristics of local, empirical, time tested dynamisms. Moreover, TKS is always handed over or transferred from one generation to another and also between communities mostly orally and/or visually.

From its domain of application and associated management approaches, TKS can be categorized as

- (i) Traditional Ecological Knowledge (TEK)
- (ii) Traditional Technical Knowledge (TTK) and
- (iii) Traditional Value and Ethics (TVE).

TEK represents knowledge associated with natural resources and environmental management, TTK refers to knowledge associated with tools and appliances used and TVE refers to value, norm, institution and policy framework evolved with traditional knowledge based practices.

I. Traditional Ecological Knowledge (TEK)

TEK refers to the evolving knowledge acquired by indigenous and local people over hundreds or thousands of years through direct contact with the environment. This knowledge is specific to a location and includes the relationships between plants, animals, natural phenomena, and the landscape that are used for livelihood and sustenance of life, such as resource gathering through hunting, fishing, agriculture, livestock farming, forestry, agro-forestry, etc. All these can be categorized as natural resource management, as these practices are linked with management of land, water, flora and fauna. Such practices are linked to prioritization of uses along the line of sustainable harnessing, wise use, equitable sharing of benefits, management of future stocks through conservation, defining threshold limits, etc.

There are practices for weather forecasting too. Such TEK considers natural landscape characteristics (topography, slope, soil and rock characteristics), weather and climate as well as types of flora and fauna. The community takes necessary decision based on abundance/ scarcity and seasonality of biotic and abiotic resources, natural disasters, and associated problems. It is a process of indigenous communities for observation, classification, analysis, interpretation and decision making for daily walk of life along with development of world views.



II. Traditional Technical Knowledge (TTK)

TTK represents the knowledge related to design and development of tools, implements and gears for different application in the context of natural resource management by the indigenous communities. Such practices are related to agriculture, fisheries, animal husbandry, forestry, handloom and handicraft etc. Moreover, TTK also represents the knowledge and skill about design and construction like housing, water harvesting structure, roads and bridges, etc.

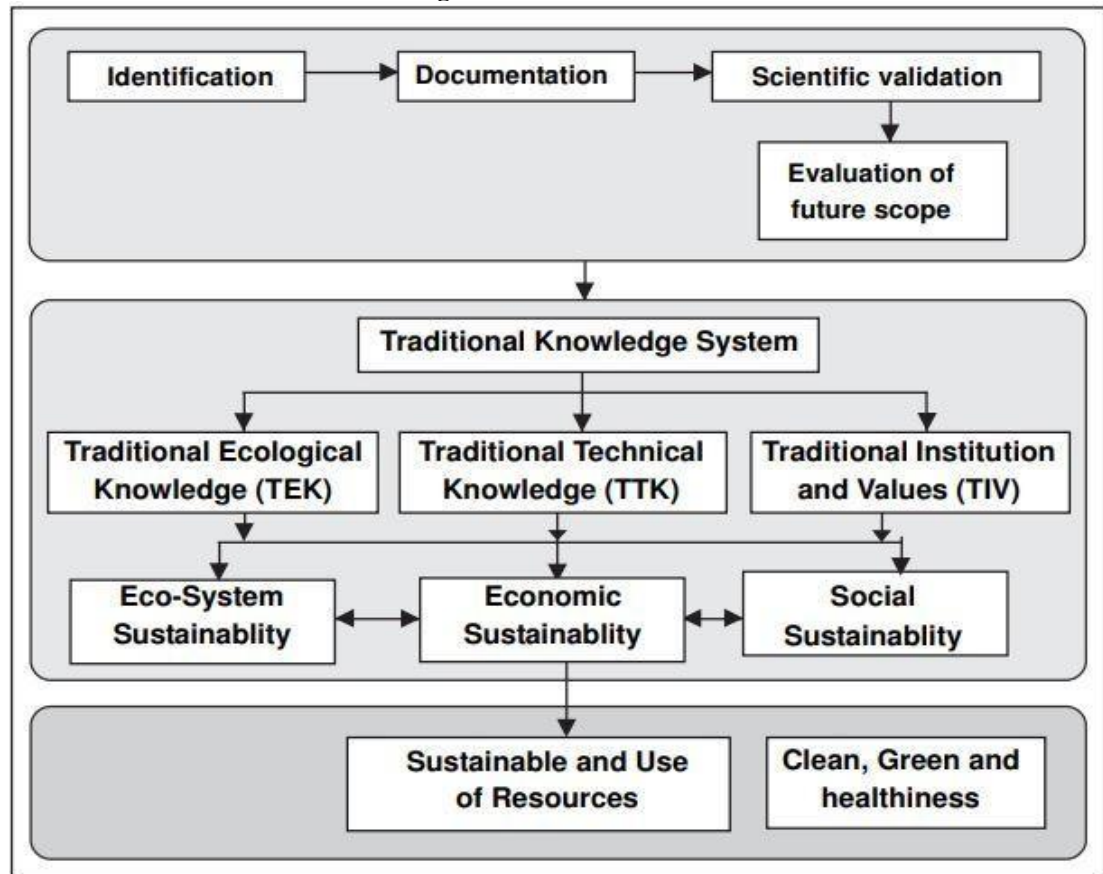


III. Traditional Value and Ethics (TVE)

TVE is linked to traditional cultural practices which prioritize dos and don'ts in the aspects in relation to natural resource harvesting, conservation, and equitable sharing etc. During the process, it evolves the concept of sacred species, space, forests, water bodies, etc. This

involves seasonality based practices like restriction of fishing during breeding season, harvesting forest resources during flowering period, etc. Sometimes institutions are developed to manage human habitation, controlling human practices related to health and sanitation, like restriction of food in different seasons, restriction of waste disposal, norms for location of animal sheds, toilets etc. Exploration and documentation of such practices in local context will help in understanding these practices, creating a knowledge base and analysis and validation of its scientific base. This will help to identify the prospects for the future adopting lifestyles, habitat management, environment, natural resource management, wildlife protection, etc.

Fig: Framework of the sub-theme



3. The historical impact of social change on traditional knowledge systems

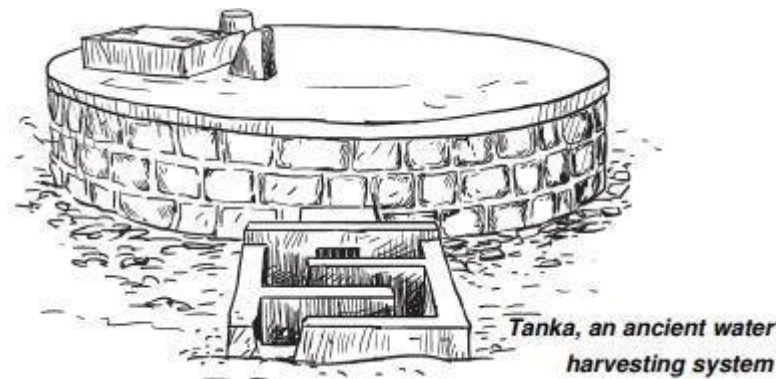
I. Traditional Water harvesting practices

There are many age-old-practices of harvesting water in the country, basically to collect rainwater, restore surface flow of water, ground water recharging, etc. These are based on simple technology and defined management principles.

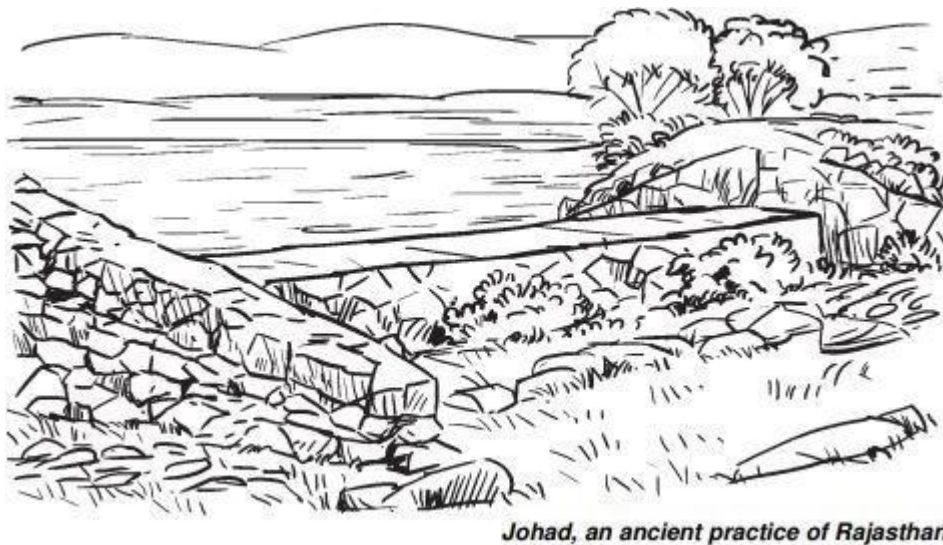


Step well, an ancient water harvesting structure

A step well is exactly what it sounds like- steps down to a well. The earliest step wells date back to about 550 AD was developed in India as a necessity for areas suffering from torrential seasonal rains.



Though originally found in the desert towns, the system has since gained immense popularity in rural areas. The rural Taankas found in Phalodi, Barmer and Balotra region, were of 6.1 m deep, 4.27 m long and 2.44 m wide. This technique of rainwater harvesting was perfected to a fine art in the arid regions of western Rajasthan.



Tanka, an ancient water harvesting system 127 Step well, an ancient water harvesting structure Johd is a dam that collects rainwater to replenish the supply of underground water table.



Zabo, which means ‘impounding water’, is an ingenious method of catching rainwater runoff from the mountains. It is located at an altitude of 1270 m in Kikrumba, a quaint village nestled in a rain-shadow area of Phek district of Nagaland. Centuries ago, the village evolved a self-organizing system to take care of its water, forest and farm management Johad, an ancient practice of Rajasthan Zabo a traditional practices among the Naga communities

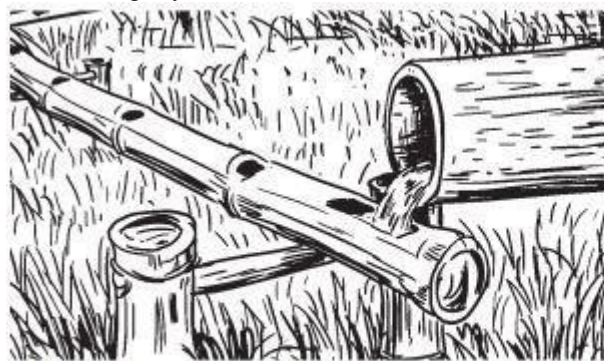
Surangas continue to be one of the relatively less known and gradually disappearing traditional water harvesting systems of Kasargod district of Kerala. Surangas can be compared to a horizontal well or cave excavated in hard lateritic soil formations from which water seeps out, and flows out of the tunnel to be collected in open ponds. Despite their decline, they continue to be a lifeline for a large number of farmers in Kasargod, who depend on surangas to meet their drinking water needs.

II. Bamboo drip irrigation



Surangas a traditional practice in Kerala

In different states of North-Eastern part of India Bamboo drip irrigation is a common practice. The design of the Bamboo pipe for irrigation varies with variation of rainfall, which reflects the uniqueness of traditional knowledge system of the local communities.



(A) Bamboo drip irrigation of Karbi-Anglong, Assam



(B) Bamboo drip irrigation of Meghalaya

Picture (A) shows the Traditional Bamboo drip irrigation practiced by the Karbi communities (known as Longsor in Karbi) in the rain-shadow area of Karbi-Anglong, Assam.



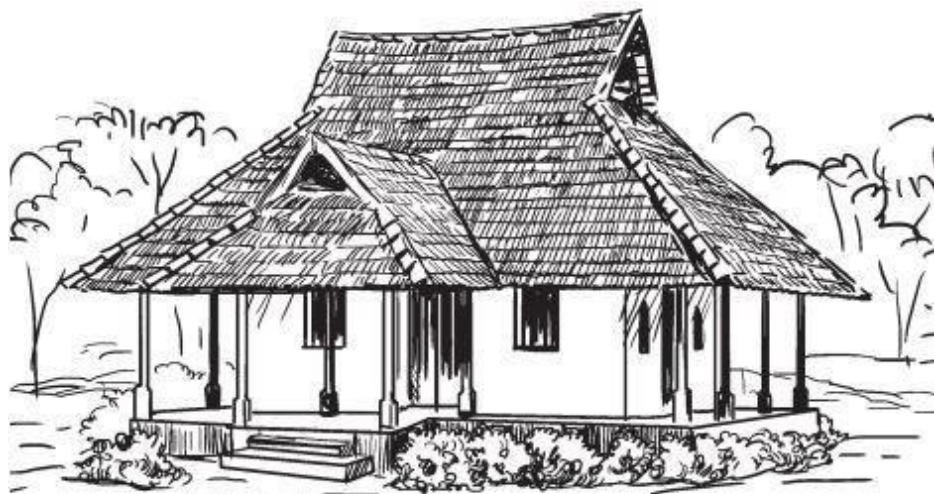
Traditional Bamboo drip irrigation in intermediate rainfall area of on the northern plains and foothills of Assam-Aruanachal and Bhutan border area

A different Traditional Bamboo drip irrigation (B) is practiced in high rainfall area of Meghalaya Surangas a traditional practice in Kerala (B) Bamboo drip irrigation of Meghalaya (A) Bamboo drip irrigation of Karbi-Anglong, Assam

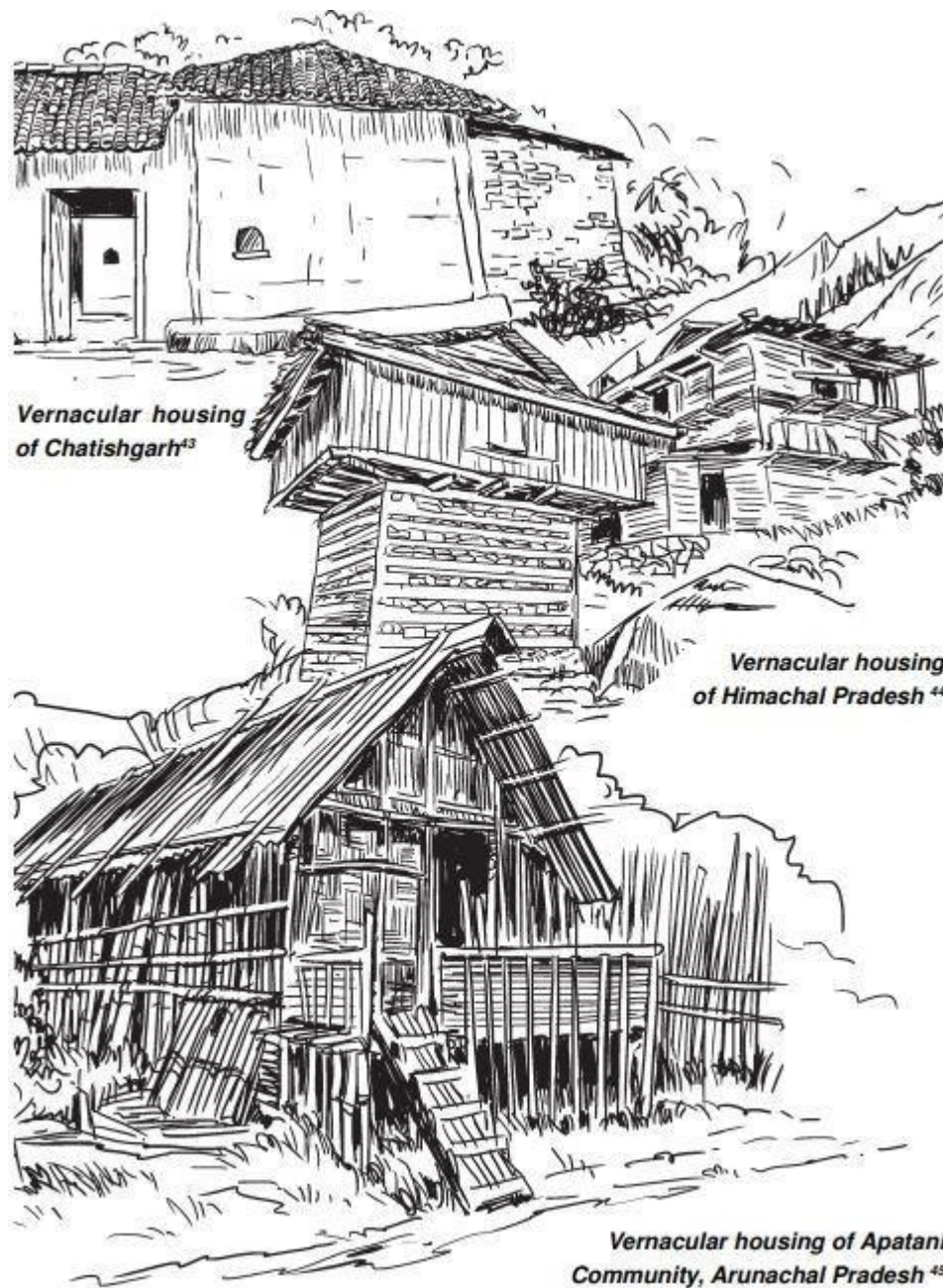
III. Traditional Housing - a reflection of STI

Usually these are called Vernacular Architecture, which is an architectural style and design based on local needs, availability of construction materials and reflecting local traditions. Originally, vernacular architecture relied on the design skills and tradition of local builders/ skilled labors. It tends to evolve over time to reflect the environmental, cultural, technological, economic, and historical context in which it exists. 40 In case of environmental factors major aspects are – geology, land and soil; weather and climate; availability of the building materials in the locality. On the other hand, family size, family structure (joint or nuclear), food habits, materials, cultural practices, belief system etc. Based on the building materials used in wall construction it can be categorized as Adobe (mud blocks or whole walls), Masonry (stone, clay, or concrete blocks), Timber, Bamboo etc. Commonly a combination of materials is generally used. The layout of the building also varies, like Circular plan, Rectangular plan and linear plan. Similarly, there may be Single story or Multi-storied buildings.

In Indian condition such vernacular housing are very common in rural context and its design, plan and building material vary with geographical regions.



Vernacular housing of Kerala



Traditional Bamboo drip irrigation in intermediate rainfall area of on the northern plains and foothills of Assam-Aruanachal and Bhutan border area Vernacular housing of Kerala

It is important to explore such practices with the objectives to identify merits and demerits of such practices and its usefulness in the context of climate change adaptation, earthquake resistance, environmental sustainability etc.

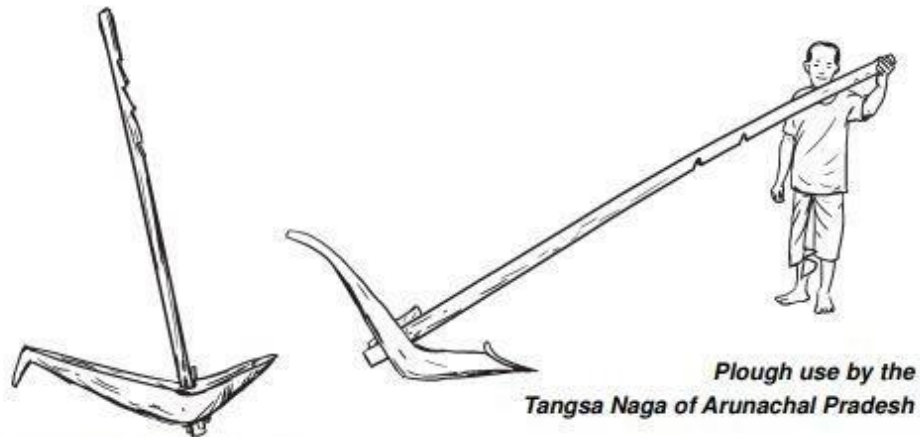
IV. Traditional agricultural practices

In many areas of the country, traditional agricultural practices are still considered important. These practices are followed in selection of crop varieties, land selection, land preparation, soil fertility management, pest and disease management, irrigation, harvesting, post-harvest management, seed preservation, etc. Moreover there are different tools and implements used for the purposes, some of which are mentioned below:

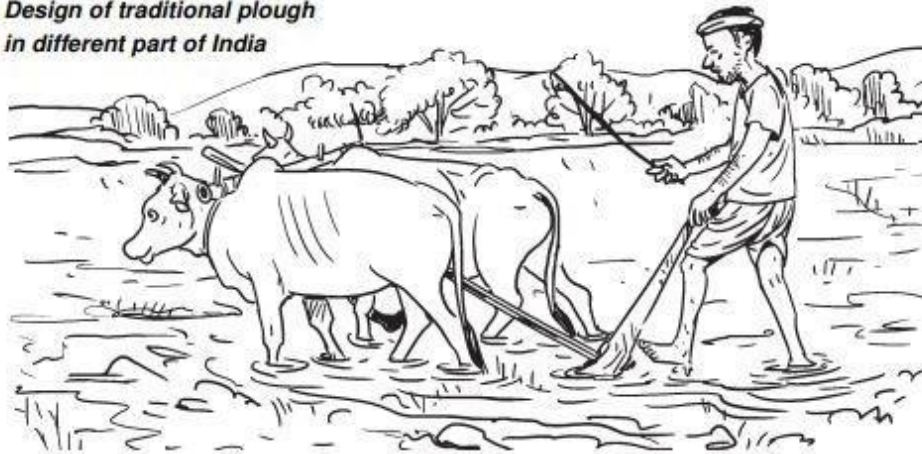
There are different shapes and sizes of ploughs and hoes used for tilling of soil in the country, which

varies from region to region based on soil quality, terrain condition and the crop used for cultivation. Not only that, with variations in the crop varieties, the tools used for harvesting also changes. Best example is variations in the different shape and size of sickle used in different areas from time immemorial.

Similarly there are different types of land cultivar in different regions, which are potential source for climate change adaptation; because many of such crop varieties are either draught and/ or flood tolerant.



**Design of traditional plough
in different part of India**



Varied design of Sickle used in different regions of India



Traditional rice land races



Variety most common in central part of North Eastern Region of India



Variety most common in Assam and northern India



Variety prominent in The Cauvery Delta near Thanjavur of Tamilnadu

Seed Preservation Technique

In different regions people adopt different methods of seeds preservation and storage, some of which are shown below:



Seed preserved by the Nyishi Women in Lower Subansiri, Arunachal Pradesh

V. Weather Forecasting/ Prediction

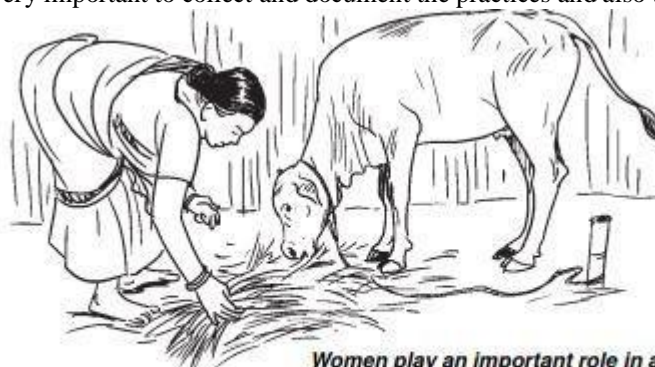
There are many methods of weather prediction practiced by the farmers in different parts of the country. For example, farmers in Himachal Pradesh believe that if the honeybee flies toward northern hill there will be no rainfall, if they fly towards south there will be good rainfall. On the other hand, in Rajasthan many local communities believe that appearance of many butterflies together indicate a good rain and get better crops.

Similarly, Karbi Hill Tribes of Assam have a traditional calendar system which is used for agricultural planning. The months or periods are identified by a few conserved features of plants and animals and also physical factors. These indicators are so marked that there is a specific 'phrase' ascribed to each month or period. For example, the first month of the year is called ThangThang(February), which is noted with phrase — ThangThang- ritlangl , where ThangThang represents the month and rit means Jhum (shifting cultivation), lang means – cultivation of land; simply it is the time for preparing land for shifting cultivation. This month is characterised by flowering of Pharche (*Erythrina stricta* Roxb.; Leguminosae) and Pharkong (*Bombax malabaricum* DC.; Bombacaceae). These are the most important indicators of this period, which reminds the people of the appropriate time to look for new jhum land. Similarly, for all the months they have some biological indicators, which acts as the link to agricultural activities. In most of the cases, such phenomenon are related with seasonality and in maintaining season-wise agricultural activities. Similarly, there are many such examples available in different agroclimatic zones of the country. Seed preserved by the Nyishi Women in Lower Subansiri, Arunachal Pradesh



VI. Traditional practices in animal husbandry

Traditional knowledge regarding animal husbandry can be considered as old as domestication of various livestock species. But these practices are in vogue throughout rural India and those are documented little and hence, there are possibilities of eroding out of these knowledge systems. For example, traditional practice of the feeding includes crop residues like straw, stalks, stovers, tops and crop thrush like wheat, paddy straw, etc as well as crop by-products that includes Bran, Husk, straw of Wheat, Rice, Bajra and Maize. Women have a very important role in the traditional method of integrating agriculture with animal husbandry. Traditional knowledge about treatment of the animal disease includes both preventive and curative practices based on local medicine using herbs. Women understand the importance of each herb and plant combination. They understand which leaves are best for which fodder; and their suitability for milching of the cattle and preparing highly concentrated feeds for the animals for improving milk yield. Thus, it becomes very important to collect and document the practices and also to evaluate their validity.



Women play an important role in animal husbandry

Table-5.1. Treatments practised to cure disease of the animals.

Sl.no.	Ailments	Practice Followed
1	Wounds	Devadar Tree Oil
2	External Parasites	Cow Urine and Black Ash
3	Loss of Appetite	Dhania +Onion+Kalajeera+Curd
4	Fever	Kala Jeera Powder
5	De worming	Forest Leaves, Stem Peeling
6	Bloat	Kala Jeera + Dhania mix with the feed
7	Rumination	Kala Jeera
8	Treatment of minor injuries	"Bans" leaf pastel local name of some grass
9	Controls of Ticks in Animals	"Karoi" grass rubbed on the skin
10	Food and mouth disease	Animals with rotten foot are kept in mud, phenyl is applied to the foot and condition of sour mouth

Source: *Animal Husbandry Practices of Organic Farmers: An Appraisal. Subrahmanyeshwari B and Mahesh Chander, Veterinary World, 2008*

Fodder management for domesticated cattle is a challenge for many rural areas. Traditionally people adopted different techniques. For example, in Garo hills area of Meghalaya, successive vegetative growth of grassland abundant in Jhum plots is protected by Garo community as the source of fodder for their cattle. Usually, they shift their cattle shed near to this plot for easy grazing. With variations in such grass plot in abundant jhum they shift their cattle rearing sites. It is noteworthy that, shifting of cattle shed near to such plot also contributes addition of cow dung and urine to jhum plot. In many regions the provisions of cattle shed also varies with their environmental situation. For example, in Barpeta and Baksa districts of Assam, villagers keep their domesticated cattle in multi-storied cattle sheds; the first floor of the bamboo-steel multi-storied cattle shed is used for keeping the cattle. According to many villagers, these practices ultimately help them to maintain clean cattle sheds and make it easy to collect the dung. The clean cattle shed helps in maintaining cattle health, particularly from diseases that occur in the summer and monsoon season.



Managing fodder plot in abundant jhum plot by Garo community in Meghalaya



Multi-storied cattle shed

Similarly there are many such traditional practices, their documentation along with assessment of scientific basis are important areas of study.

4. Indigenous Knowledge (IK), characteristics

The term "Indigenous" defined according to UN as "Groups of people whose social, cultural and economic conditions distinguish them from other sections of the national communities, and whose status is regulated wholly or partially by their own customs or traditions or by special laws or regulations. People in independent countries who are regarded as indigenous are considered as descent people who inhabited geographical region to which belongs, at the time of colonization or the establishment of present state boundaries".

Considering the diversity of indigenous people, an official definition of "indigenous" has not been adopted by any UN-system body. Instead the system has developed a modern understanding of this term based on the following criteria:

- Historical continuity with pre-colonial and/or pre-settler societies.
- Strong link to territories and surrounding natural resources.
- Distinct social, economic or political systems.
- Distinct language, culture and beliefs.
- Form non-dominant group of society.
- Resolve to maintain and reproduce their ancestral environments and systems as distinctive people and communities.

The term "indigenous" has prevailed as a generic term for many years, in some countries, there may be preference for other terms including: tribes, first people/nations, aboriginals, ethnic groups, Adivasi, janajati, geographical terms like hunter, nomads, peasants, hill people ... etc. In many cases, the term "indigenous" has negative connotations and some nations may choose not to reveal or define their origin as "indigenous".

LOCAL AND TRADITIONAL KNOWLEDGE and other definitions that should be considered:

Local knowledge (LK) is a collection of facts and relates to the entire system of concepts, beliefs and perceptions that people hold about the world around them. This includes the way people observe and measure their surroundings, how they solve problems and validate new information. It includes the processes whereby knowledge is generated, stored, applied and transmitted to others.

Traditional knowledge (TK) implies that people living in rural areas are isolated from the rest of the world and that their knowledge systems are static and do not interact with other knowledge systems.

Traditional Ecological Knowledge (TEK) is indigenous or local knowledge and is the body of knowledge or natural history built up by a group of people through generations of living in close contact with nature, which through trial and error they have developed an understanding of the ecosystem in which they lived. TEK includes a system of classification, a set of empirical observations about the local ecology, and a system of self-management that governs resource uses such as hunting, trapping and fishing. .

Ethno-ecology is the study of local or native people's interaction with the environment in which they live and work, including their perceptions, use and management, and knowledge. Sub-disciplines of ethno ecology include ethno biology, ethno botany, ethno zoology, and ethno pharmacology.

INDIGENOUS/ TRADITIONAL KNOWLEDGE CHARACTERISTICS

- It is dynamic, systematic and universal in principle. It is unwritten and known through the oral traditions.
- It is practical common sense, based on teachings and experience passed on from generation to generation.
- It is holistic - it cannot be compartmentalized and It is rooted in the spiritual health, culture and language of the people.
- It sets out the rules governing the use of resources - respect; an obligation to share. It is dynamic, cumulative and stable.
- It is a way of life - wisdom is using knowledge in good ways. It is using the heart and the head together. It comes from the spirit in order to survive.
- It gives credibility to people.
- It is based on experience, acquired from observations over time - it is argued that it may be most useful for local scale decision-making;
- It can show an understanding of the complex relationships between these individual components and the dynamic ecosystems within which they act;
- It is frequently linked with the sustainable use of local resources.
- It describes the health of the local environment, wildlife, etc., promotes consideration of the relationships between human and biological systems;
- It often describes these symbiotic relationships and provides the basis for life sustaining decisions about how to relate to the environment.