

Sub-Theme-V

TRADITIONAL KNOWLEDGE SYSTEM

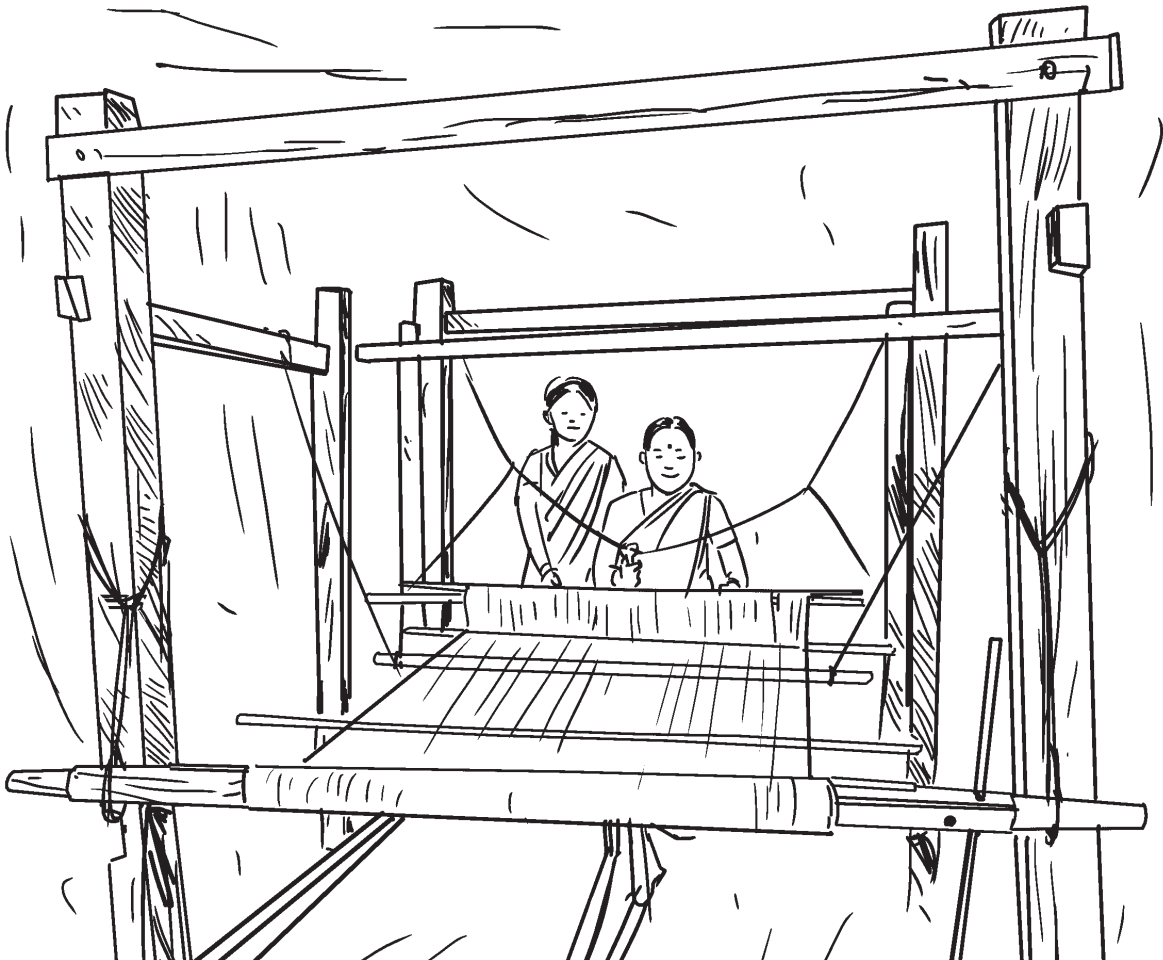


Traditional Knowledge System

5.1. Background

Traditional Knowledge System (TKS) is the know-how of the people, gathered through day to-day walk of life, to overcome the hurdles and tap the potentialities from their immediate neighbourhood. In fact, TKS evolved in a specific location within certain physical and socio-cultural environment, where it reflects people's specific knowledge, understanding as well as observational and experimental information about their dwelling environments, along with skill and technology to design a lifestyle in that specific environmental context.

TKS represents information, knowledge, skill and technology along with standard management practices, which are defined through the cultural systems. In the contemporary world when human civilization is facing the challenges of climate change, natural disaster, biodiversity loss, destabilized ecological services, food and nutritional inequality, problems of sanitation and health and many others, there is a need to give emphasis on TKS for searching alternative solutions or ways to face the challenges and design a sustainable lifestyle.



The international focus on TKS began in Rio-declaration of the Convention on Biological Diversity, which was the outcome of the World Summit on Sustainable Development, where it was described

“Traditional knowledge (TK) 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 stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Sometimes it is referred to as an oral tradition for it is practiced, sung, danced, painted, carved, chanted and performed down through millennia. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, forestry and environmental management in general.”¹

Concurrently, different international forums started to focus on the relevance of TKS. Organizations like World Intellectual Property Organization (WIPO)², the International Labour Organization (ILO), especially its convention 169³, the Food and Agricultural Organization (FAO)⁴, World Health Organization (WHO)⁵, United Nations Educational, Scientific and Cultural Organization (UNESCO)⁶, United Nations Environment Programme (UNEP)⁷, United Nations Development Programme (UNDP)⁸, United Nations Commission on Human Rights (UNCHR)⁹ took initiatives to document the TKS and research for its validation along with developing different protocols for preservation, protection of rights, appropriate application as well as facilitating fair and equitable sharing of the benefits from their applications.

It is noteworthy that *the World Conference on Science*, organized by UNESCO and the International Council for Science (ICSU), in its *Declaration on Science and the Use of Scientific Knowledge*, explicitly recognized the importance of TK and the need to respect and encourage its use for various forms of human endeavour (ICSU 2002)¹⁰. Moreover, World Conference on Science (Budapest, June 1999), focussed on TKS, and recommended through ‘Science Agenda: Framework for Action’ (UNESCO, 2000), that, *“modern scientific knowledge and traditional knowledge should be brought closer together in interdisciplinary projects dealing with the links between culture, environment and development in such areas as the conservation of biological diversity, management of natural resources, understanding of natural hazards and mitigation of their impact. Local communities and other relevant players should be involved in these projects. Individual scientists and the scientific community have a responsibility to communicate in clear language the scientific explanations of these issues and the ways in which science can play a key role in addressing them.”*¹¹

In India, similar focus is also given on TKS by National Knowledge Commission for proper documentation and protection of Intellectual Property Rights¹². Different organizations and institutions have taken up activities for research and documentation and development of TKS application¹³. It is to be noted that the Indian Journal of Traditional Knowledge was

evolved to share such endeavour of research and documentation¹⁴. Moreover, legal instruments have also been developed like National Biodiversity Act (NBA), 2002¹⁵.

There are many examples of TKS-based practices in the country on natural resource management¹⁶, agricultural practices¹⁷, medicine and health¹⁸, housing and allied design and construction¹⁹, which have the potential to act as leverage to sustainable development. In the fifteen different agro-climatic zones of India²⁰ there is diversity in terms of environmental and cultural practices, which nurture different traditional knowledge based practices to adjust way of life of the people to their respective environmental set-up. All these practices have some age-old history, progression and empirically tested observation, which essentially need not only documentation but also validation and applicability in contemporary context to meet the requirement for sustainable development.

5.2. TKS – Nature and Type

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 categorised 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.



5.2.1. 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.²² All these can be categorised as natural resource management²³, 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 too²⁴. 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.²⁵

5.2.2. 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 communities²⁷. Such practices are related to agriculture²⁶, fisheries²⁸, animal husbandry²⁹, forestry, handloom and handicraft etc. Moreover, TTK also represents the knowledge and skill about design and construction like housing³⁰, water harvesting structure³¹, roads and bridges, etc.



5.2.3. 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 etc³². 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.



5.3. Framework

The approach starts with identification of traditional knowledge based practices along with its link to manage natural resources with the aim to maintain ecological services, management of food and fodder, augmenting nutritional inputs, health and sanitation, disaster risk reduction, climate change adaptation, etc. Such practices need to be documented with appropriate answer to the questions like: *“What it is? Where it is? Who practice it? Why it is in practice? From when this is being practiced? How does it function?”* In the process of documentation there is need to adopt the approaches of process documentation . If required one can adopt the tools like - flow chart with narratives, maps, photographs, etc. However, there is a need to mention what type of TKS is focused in the study,(viz. TEK, TTK or TVE).

It is equally important to validate these with appropriate interpretation in terms of its specific context, as well as in the universal contexts. For example, in water harvesting system from surface flows, it is required to verify, “Whether watershed perspectives are there? How

slope is considered? What are the catchment area treatment mechanisms followed in the practices?” These are very much contextual perspectives. On the other hand, verification of applicability of gravity flow of water is a universal aspect. Sometime, if such surface flow system is used only for irrigation, one can verify possibilities of harnessing energy from the flowing water, without disturbing the output of irrigation or one can think about applicability of pedal pumps or hydraulic rams with the system to increase its efficiency without disassociating TKS based practices. Such efforts can be part of an alternative, critical and creative thinking to strengthen the system under study.

From context to context, approach of validation may vary. However, it is essential to reflect the validation approaches, methods and tools in methodological approach of the study. Moreover, entire analysis and interpretation need to portray “how this particular TKS based practices help in sustainable/ wise use of resources and how it will contribute to clean, green and healthy nation along with its future prospects” (Fig.1).

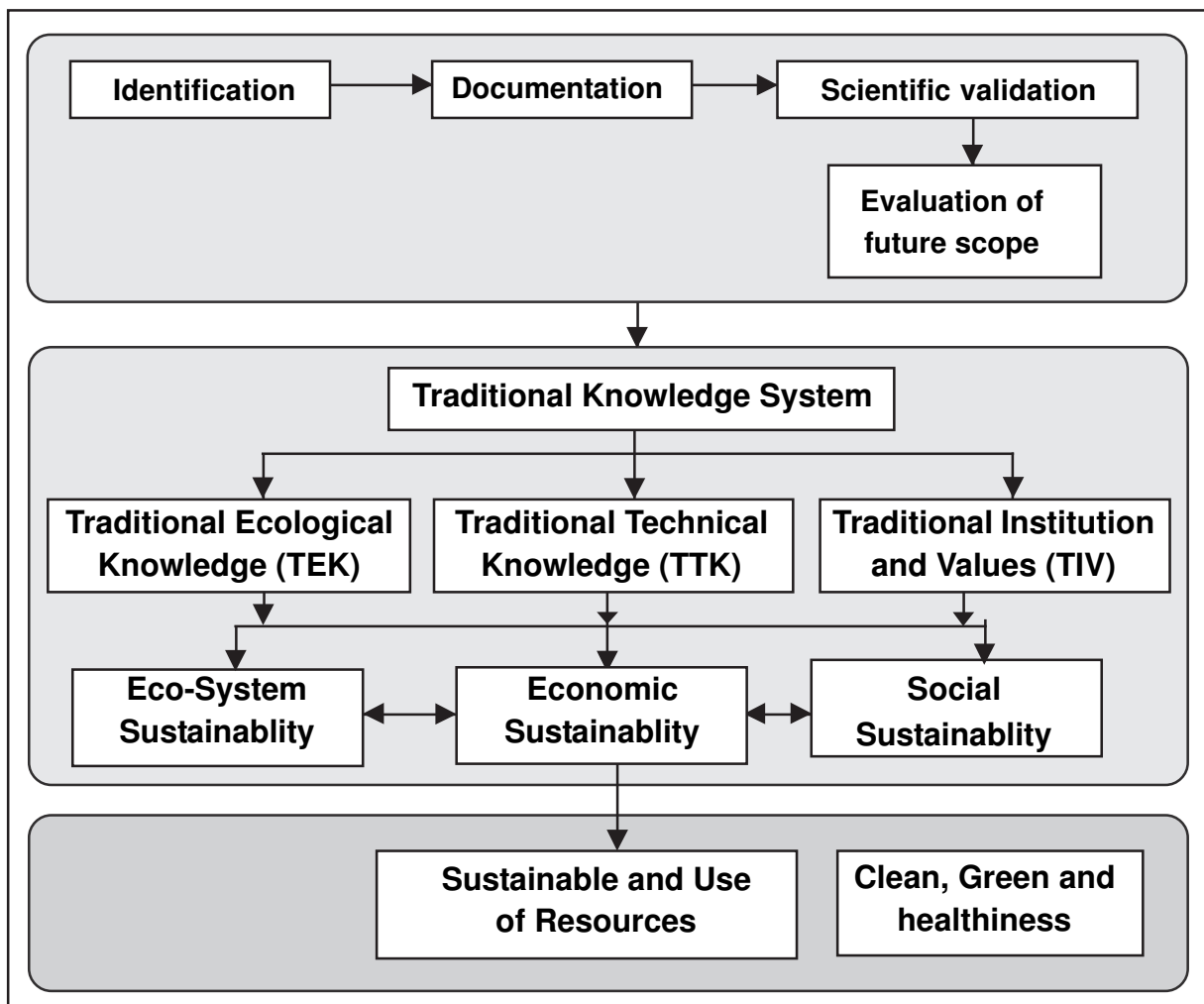


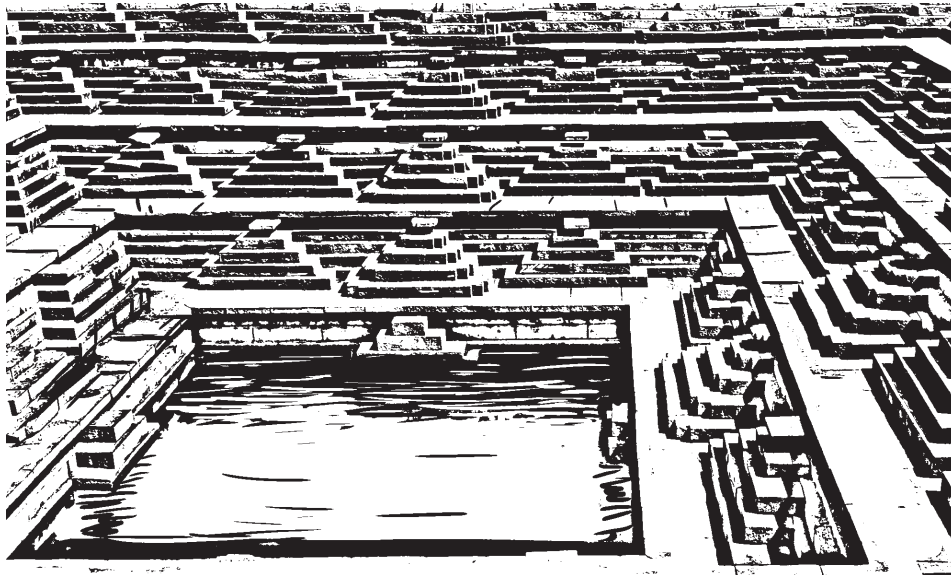
Fig.5.1. Framework of the sub-theme

5.4. Some examples of practices

All over the country many traditional knowledge based practices are followed by different communities; examples of some of the practices are presented below.

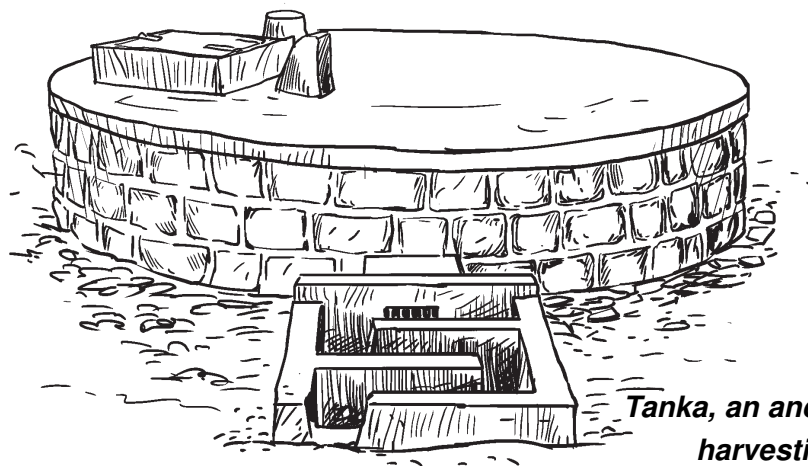
5.4.1. Traditional Water harvesting practices

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.³³



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 were developed in India as a necessity for areas suffering from torrential seasonal rains.³⁴



Tanka, an ancient water harvesting system

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.³⁵



Johad, an ancient practice of Rajasthan

Johad is a dam that collects rainwater to replenish the supply of underground water table.³⁶



Zabo a traditional practices among the Naga communities

Zabo, which means ‘impounding water’, is an ingenious method of catching rainwater runoff from the mountains.³⁷ 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

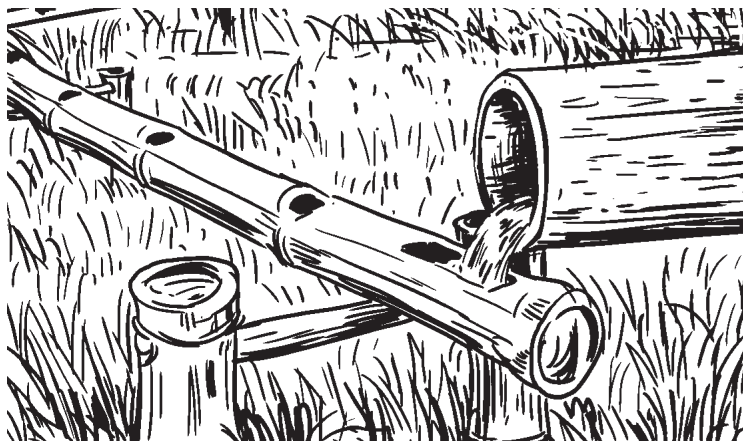
Surangas continue to be one of the relatively less known and gradually disappearing traditional water harvesting systems of Kasargod district of Kerala. *Surangas* can be compared to a horizontal well or cave excavated in hard lateritic soil formations from which water seeps out, and flows out of the 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.³⁸

5.4.2. 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.³⁹



(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. A different Traditional Bamboo drip irrigation (B) is practiced in high rainfall area of Meghalaya

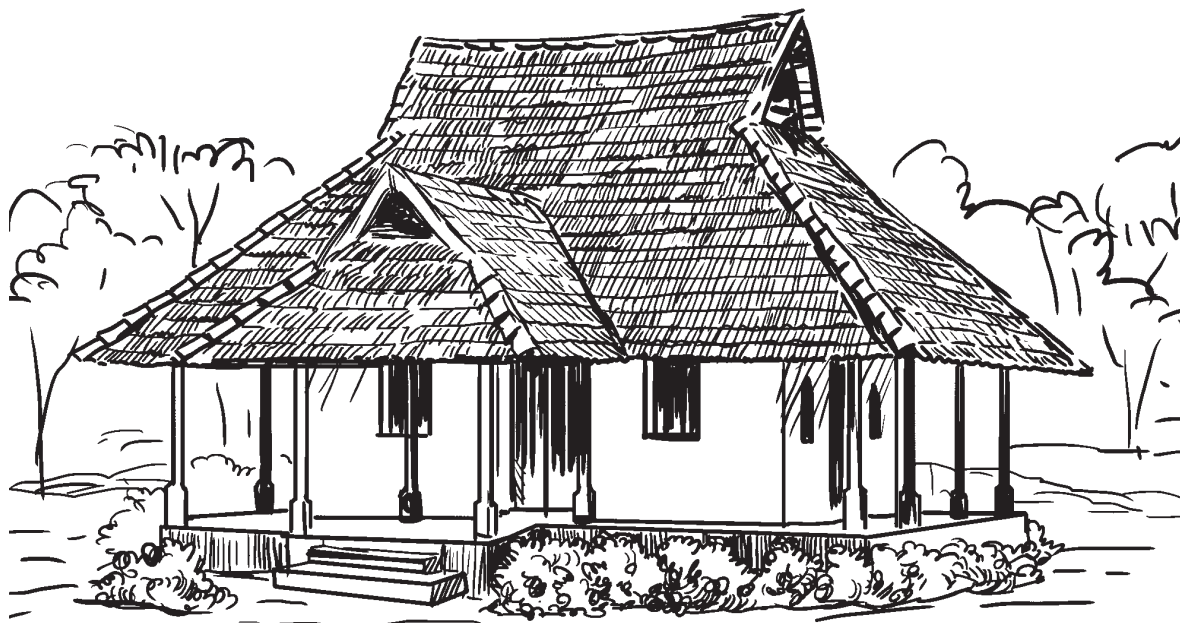


Traditional Bamboo drip irrigation in intermediate rainfall area of on the northern plains and foothills of Assam-Aruanachal and Bhutan border area

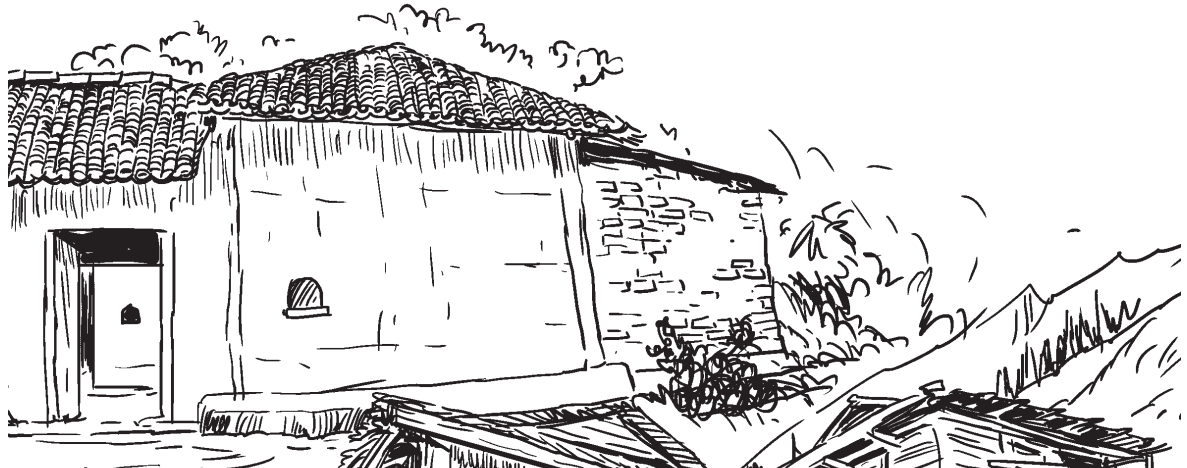
5.4.3. Traditional Housing - a reflection of STI

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 labours. 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.⁴¹ Based on the building materials used in wall construction it can be categorised 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.



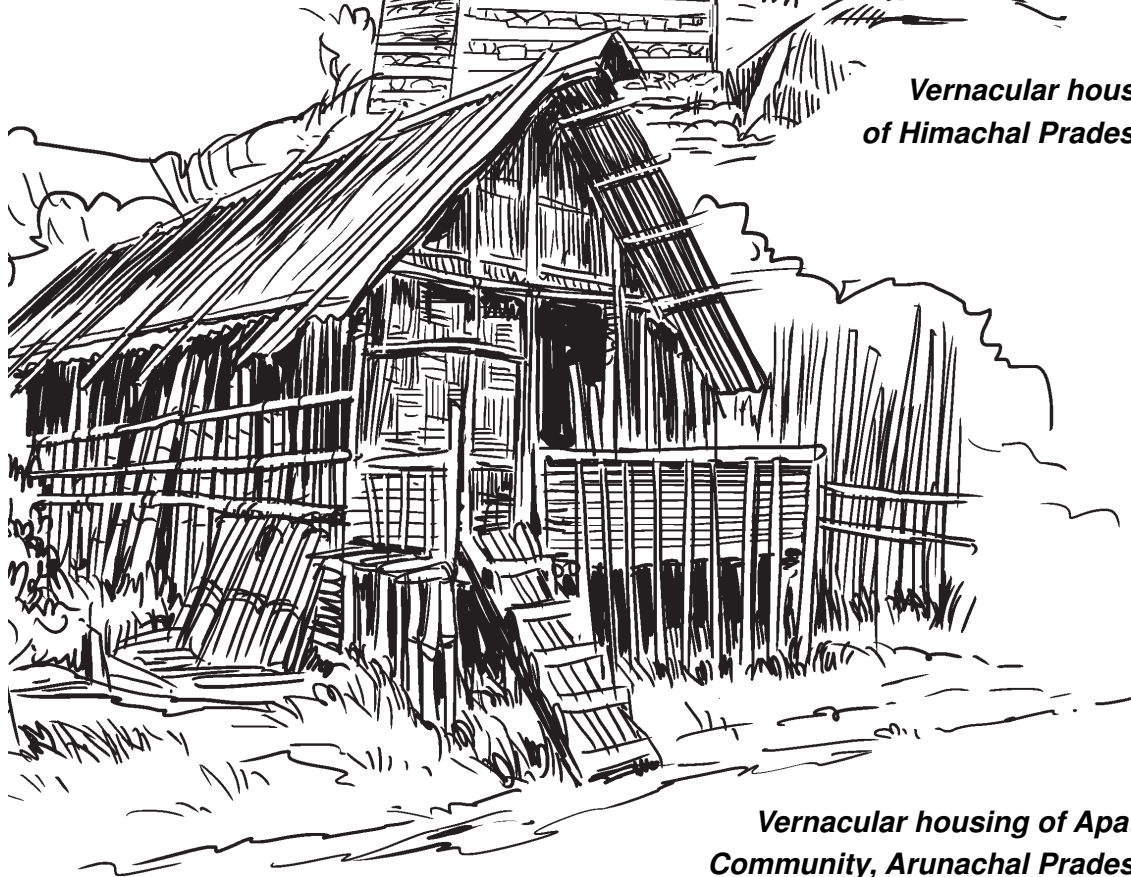
Vernacular housing of Kerala⁴²



**Vernacular housing
of Chatishgarh⁴³**



**Vernacular housing
of Himachal Pradesh⁴⁴**



**Vernacular housing of Apatani
Community, Arunachal Pradesh⁴⁵**

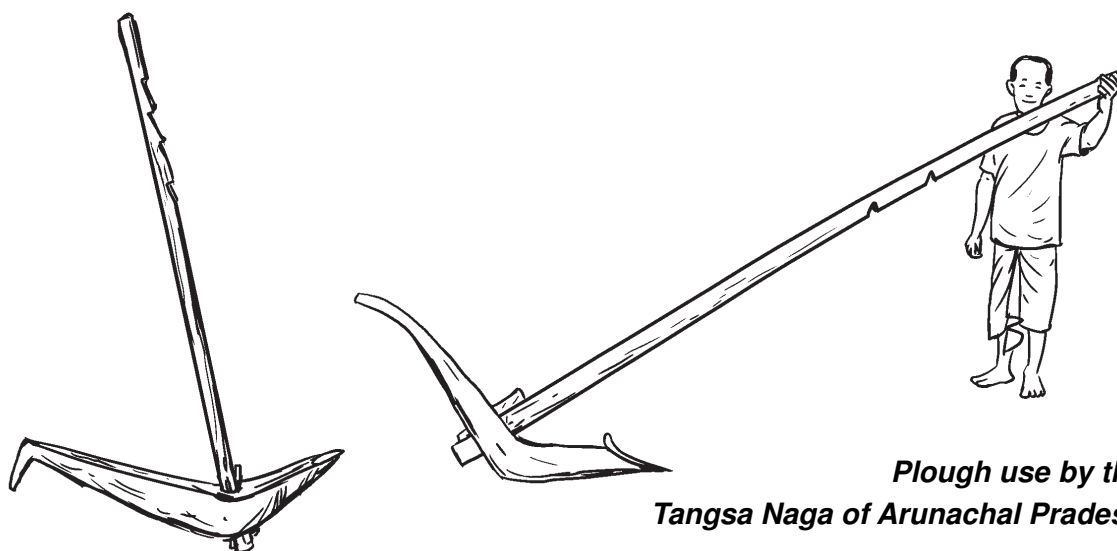
It is important to explore such practices with the objectives to identify merits and demerits of such practices and its usefulness in the context of climate change adaptation, earthquake resistance, environmental sustainability etc.

5.4.4. 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:

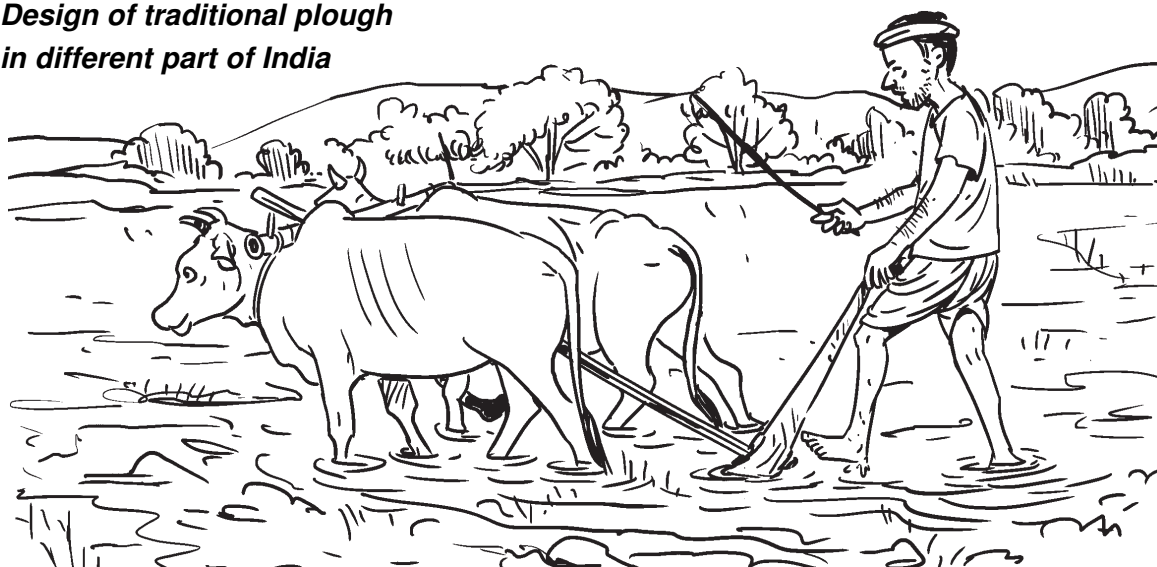
There are different shapes and sizes of ploughs and hoes used for tilling of soil in the country, which varies from region to region based on soil quality, terrain condition and the crop used for cultivation. Not only that, with variations in the crop varieties, the tools used for harvesting also changes. 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.



***Plough use by the
Tangsa Naga of Arunachal Pradesh***

***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:

5.4.5. 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.⁴⁶



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

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- ritlang*", 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.;*Leguminosaceae*)



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 agro-climatic zones of the country.

5.4.6. 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.

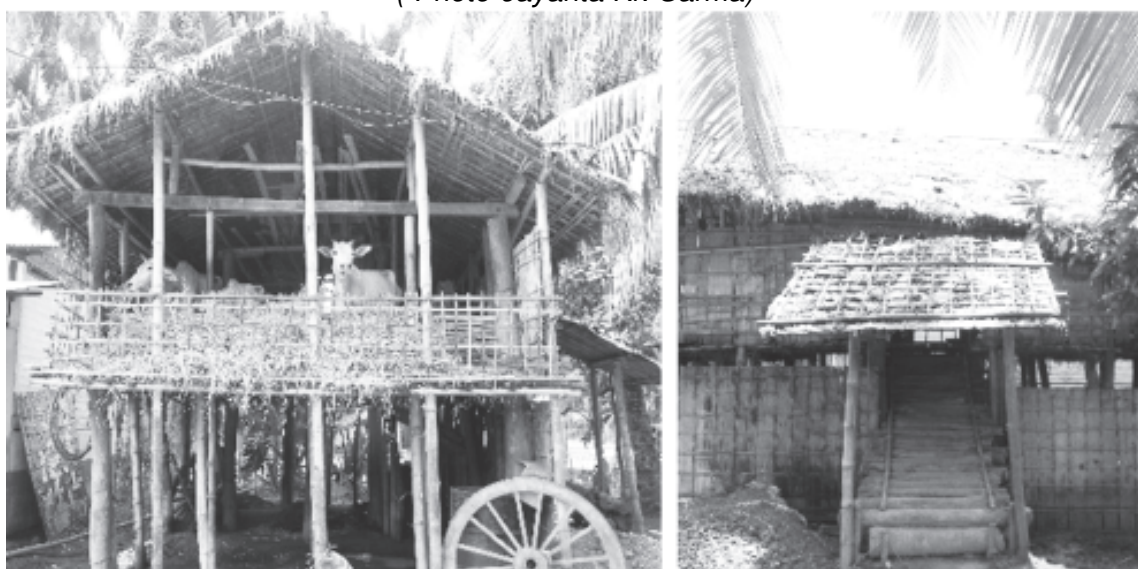
Sl.no.	Ailments	Practice Followed
1	Wounds	Devadar Tree Oil
2	External Parasites	Cow Urine and Black Ash
3	Loss of Appetite	Dhania +Onion+Kalajeera+Curd
4	Fever	Kala Jeera Powder
5	De worming	Forest Leaves, Stem Peeling
6	Bloat	Kala Jeera + Dhania mix with the feed
7	Rumination	Kala Jeera
8	Treatment of minor injuries	“Bans” leaf pastel local name of some grass
9	Controls of Ticks in Animals	“Karoj” 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-storeyed cattle sheds, The first floor of the bamboo-steel multi-storeyed 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.⁴⁷



Managing fodder plot in abundant jhum plot by Garo community in Meghalaya
(Photo-Jayanta Kr. Sarma)



Multi-storied cattle shed
(Photo –Jayanta Kr. Sarama)

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

5.5. Coverage under the Sub-theme

The sub-theme will cover any subject related with traditional ecological and technological knowledge along with values and ethics. Such studies can be related with settlement system, housing, agricultural and allied practices, natural resource management, food systems, disaster management, mitigation of human and wildlife conflict, handloom and handicraft, traditional medicinal practices, etc.

It is expected that the study will cover the aspects of scientific documentation of the practices, its present status, management approach involved, along with scientific validation of the basic principles, techniques, material uses (if any) in the context of objectives of the said practices. In doing so, one may also be able to use secondary information and data with due references of sources only to establish the significance of the practices or to narrate the trends. However, some original primary data derived through survey, field experimentation or laboratory experimentation is mandatory to support core analysis and interpretation of the study.

5.6. Important aspects need to be focussed

Identification of traditional unique practices, its documentation, and verification of status of uses/application, measures of effectiveness and validation of its appropriateness along with scientific base are the important aspects involved in any project for study under these sub-themes. From these perspectives, it is better to follow the steps of work as mentioned below.

(i) Observation and identification of practices

Instead of randomly picking up a problem for the study, it will be ideal initially to conduct observation in the locality and observe local communities' daily life and approaches of work. Out of these, it is better to find out some traditional practices which is unique to the area and/or specific to the community. It is always better to note down the observational information in a systematic manner which will help in identification of specific study, as shown in table-1 .

Table-5.2. Compilation of observational information

House building	Preparatory activities	Design setting
	Midway activities	Building material selection and uses
	Final activities	Construction operation
	Application of tools and techniques	Type of tools and gears used for cutting/ fitting of building material and in other phases of construction
	Management principle	How it is focuses on minimizing material waste, minimizing cost of time, labour and money, how it helps the marginalized one
	Associated manpower	How efficiently manpower used for the purpose
	Uniqueness if any	Environment friendliness, seismic resistant, reflection of energy efficiency any other
	Remarks	At the time of observation, visit to all possible site of the locality, discuss with local practitioners involved with the work

Water management	Preparatory activities	Source identification
	Midway activities	Utilization approaches and purposes
	Final activities	End uses
	Application of tools and techniques	Tools and gears in use
	Management principle	Core management principle adopted for minimization of waste, safety, maintaining cleanliness, etc
	Associated manpower	Manpower involved in the process and their role & responsibilities
	Uniqueness if any	If able overcome certain constrains, achieved reliability in terms of quantity and quality
	Remarks	At the time of observation visit to all possible site of the locality, discuss with local practitioners involved with the work
Agriculture	Preparatory activities	Type of crop produced, land selection and preparation for the purpose
	Midway activities	Selection of seed/ planting material selection, seed bed development (if required), soil nutrient management, water supply system, weed and pest management
	Final activities	Harvesting and post harvesting approach and process
	Application of tools and techniques	Tools and gears in use
	Management principle	Core management principle adopted for minimization of waste, safety of crops, maintaining cleanliness, etc
	Associated manpower	Manpower involved in the process, their role & responsibilities
	Uniqueness if any	If any constrains faced and overcome, if it is a unique product to culturally defined food system, if it has certain weather climate connection, if it has certain value addition potentiality
	Remarks	At the time of observation visit to all possible sites of the locality, discuss with local practitioners involved with the work
Food and medicine	Preparatory activities	What is for what and for whom?
	Midway activities	Identification and utilization of sources
	Final activities	Harvesting practices, final product preparation
	Application of tools and techniques	Tools and gears in use
	Management principle	Core management principle adopted for minimization of waste, safety of the product, maintaining cleanliness, etc
	Associated manpower	Manpower involved in the process, their role & responsibilities
	Uniqueness if any	If any constrains faced and overcome, if it is a unique product to culturally defined food and health system, if it has certain weather climate connection, if it has certain value addition potentiality, if it promotes sustainable consumption practices
	Remarks	At the time of observation visit to all possible sites of the locality, discuss with local practitioners involved with the work

Handloom and handicraft	Preparatory activities	What is for what and for whom?
	Midway activities	Design setting, sources of raw material
	Final activities	Harvesting practices of raw material, material processing, end products
	Application of tools and techniques	Tools and gears in use
	Management principle	Core management principle adopted for minimization of waste, safety of the product, maintaining cleanliness, etc
	Associated manpower	Manpower involved in the process, their role & responsibilities
	Uniqueness if any	If any local opportunities materialized, if it is a unique product to culturally defined way of life, if it has certain weather climate connection, if it has certain value addition potentiality, if it promotes sustainable consumption practices
	Remarks	At the time of observation visit to all possible sites of the locality, discuss with local practitioners involved with the work

(ii) Detail documentation

After initial observation and compilation of observational information, it is very much essential to document the practices in detail, covering all the aspects as it is mentioned in the above table. Such documentation need a process interpretation note explaining through the diagram, shown through figure- 5.2.

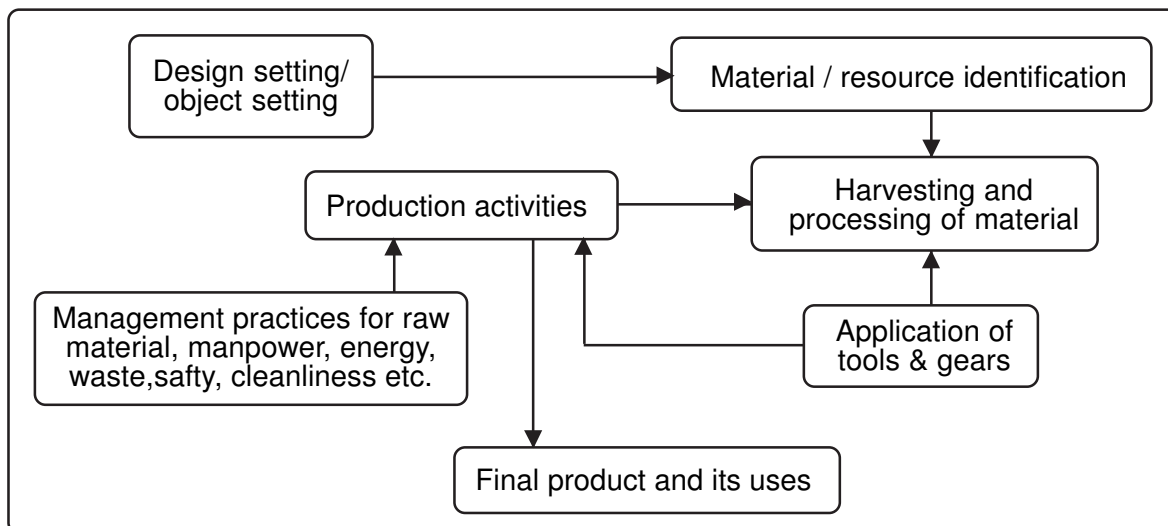


Fig.-5.2. An example of product base activities, that may vary with type of activities

(iii) Validation of core principle:

The important aspects of the chosen specific approach practiced by the community need to be validated with the application of method of science. If it is an approach that nurtures soil health, it requires testing of soil under such practices and validate the impacts. On the other hand, if it is related to weather it requires to validate with weather condition and seasonality. Similarly, if it is related herbal medicine, it is required to test to identify chemical content in the herbs and its impact on health or if it is water management it is necessary to find out how

such practices help in water conservation, assuring reliable supply system, maintaining perennial supply system, cleanliness of water etc. It is mentionable that with issues/subject of study the approach of validation will vary. However, without validation it is difficult to establish its appropriate utility; and in absence of that it may not help us to explore its applicability in future context or to undertake any initiatives for its improvement.

5.7. Project Ideas

Project – 1:

Biochemical Analysis of Nutritious Insects Eaten in Tribal Areas of India

Introduction:

The world faces huge challenges in terms of animal based proteins. This has become a major problem because of the increasing human population and environment degradation. Traditional societies have time immortals used insects as a source of protein. It's time to recognize the role of entomophagy(eating of insects as food) in traditional societies and also reduce ecological foot print in regard to the food production

Objectives:

1. To analyze the nutritious value of insects
2. To compare the nutritious value of the insects with other standard nutritious food

Methodology:

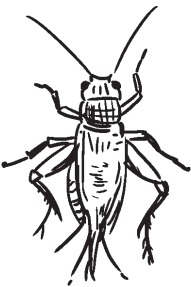



1. Collection of records of known edible insects in the locality
2. Identification regarding breeding seasons and other details about the insect
3. Note down important biochemical test (Starch, sugar and protein content)
4. Comparison of nutrient content with other nutritious valuable food

Parameters	Insect	Beef / Animal meat
Moisture (% of fresh weight)		
Protein		
Fat		
Metabolizable energy (Kcal/kg)		

5. To note down if there is a significant difference or comparable results with other nutritious food

Expected Result: To find out if there is significant nutritious value being provided by the insects.

Output: If the popular non vegetarian food could be substituted with insects, then there could be a balance in the ecosystem

Nutritional Value of selected Insect serving size			
	Crickets Serving size: 100g		Nutrition Facts Giant water bugs Serving size: 100g
	Amount Per Serving Calories- 122 total Fat- 5.5g Phosphorus- 185mg Iron- 10mg Calcium-76mg Carbohydrate- 5.1g Protein- 12.9g		Amount Per Serving Calories- 62 total Fat- 8.3g Phosphorus- 185mg Iron- 14mg Calcium-44mg Carbohydrate- 2.1g Protein- 12.9g
	Red ant eggs Serving size: 100g		Small grasshoppers Serving size: 100g
	Amount Per Serving Calories- 83 total Fat- 3.2g Phosphorus- 113mg Iron- 4mg Calcium-8mg Carbohydrate- 5.1g Protein- 12.9g		Amount Per Serving Calories-153 total Fat- 6.1g Phosphorus- 238mg Iron- 5mg Calcium-35mg Carbohydrate- 3.7g Protein- 20.6g

Few examples of nutritious value of Insects, Source: Internet

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Project – 2:

Study of the Use of Herbal Medicine

for the Treatment of Dengue Fever

Introduction:

Recent spurt in the incidence of dengue fever and an increasing number of deaths occurred due to the disease incidence triggered a re-look into the traditional Siddha medicine and its effectiveness for treatment of fevers, body ache, temperature control etc.. Documented work on the use of leaf extracts of Papaya, and/or Nilavembu (*Andrographis paniculata*) was revisited and validation of the same led to large scale adoption of this traditional practice. Now this has become a standard treatment protocol for treatment of dengue fever accepted by many state health departments leading to centralized preparation and administration of the herbal preparation to the affected population. Its effectiveness in control of the epidemic has been accepted by the modern system of allopathic medicine also.

Objectives

1. To do a review of literature of all available herbal medicine for treatment of body ache, fevers and associated difficulties.

2. To Study the disease incidence pattern of dengue fever in a location with refer to vector occurrence, breeding point mapping, study of socio-economic background of affected population.
3. To study the out of pocket (OOP) expenditure incurred by dengue patients before the introduction of the herbal medicine and compare with the expenditure incurred after the introduction of the herbal medicine.
4. To document, study, validate the traditional knowledge, attitude and perceptions (KAP) of affected population, related to dengue fever.
5. To study the disease profile with help from community health centre (with adequate precautions of not getting disease to oneself).
6. To study the loss of livelihood due to disease incidence to a sample population.

Methodology

1. Secondary reference to available documentation related to use of specific medicinal plants/plant parts.
2. OOPs study format (ref. National Health Systems Resource Centre, NRHM, New Delhi)
3. KAP study related to Objective No. 4.
4. Experimentation with sample population and disease monitoring using simple body thermometers, diagnostics procedures adopted by doctors (with help from PHC doctors)
5. Development of a protocol for disease reporting, procedures for treatment, dos, don'ts etc.
6. Looking at the source of vector multiplication as the problem and identifying solutions of avoiding water stagnation points, standard protocols, drainage mapping.
7. Community based action for awareness building, Solid waste management, health, hygiene etc. including schools, panchayats, civil society organizations, govt. infrastructure, media etc.
8. Use of modern communication technologies for effective health communication outreach.
9. To also look at control groups who have not taken other forms of medicine or no medicines at all and to see how far the herbal medicine is effective or not.
10. To look at the various preparations, protocols for preparation of the herbal extracts, their shelf life etc.

Expected Outcome

1. Understanding the intricacies of traditional knowledge and its modern application potential to newer challenges.
2. To mainstream, adopt, adapt and integrate the traditional knowledge systems to modern and changing socio-ecological and economic conditions
3. Understanding the economic impacts leading to loss of livelihoods, attendance in schools, negative impact to local production systems, and possible impact on developmental process, sustainability etc.
4. To understand the pattern of Out of Pocket (OOP) expenditure of various sections of the community / classes and the varied impact of the same disease on different socio-economic sections.

5. Effective and meaningful S&T/health communication strategies designed, implemented and adopted by the communities themselves can lead to sustainable livelihoods ,
6. To see if there are fake herbal products sold in the name of Traditional practices, commercialization of traditional knowledge if any etc.

Project – 3:

Ethno-Botanical Study of Various Important Medicinal Plants and their Important Phytochemical Properties



Introduction

Ethnobotany is the scientific study of the traditional knowledge and customs of people concerning with different uses of plants as medicine food etc. Human beings have collected rich experience with natural resources since time immemorial Plants have been used for ages as food, beverages, natural dye, natural additive and food preservative. The curative and prophylactic uses of medicinal herbs have been known since time immemorial. Indigenous knowledge is the main resource of ethno botanical investigations and it is mainly known as the traditional ethno botanical knowledge (TEK). The documentation of TEK is important for proper conservation and utilization of the biological resources. Proper experimentation should be carried out before these rich heritages are lost due to various reasons like anthropogenic.

Objectives

1. To identify important medicinal plants that have been used to treat diseases traditionally
2. Phytochemical analysis of important medicinal value of the plants.

Methodology

Study Area

Identification of geographical location(s) for analysis of traditional plants to be used for treatment.

Data Collection

Semi structured interviews can be carried out to gather information about the medicinal plants used in the study area. The information can include various data such as local names, ailments and disease treated, therapeutic effects, parts of the plant used and method of preparation can be obtained from the local people through individual and face to face interviews. At the end of the semi-structured interview the information's about the medicinal plants and usage can be carefully recorded.

Data Analysis and Quantitative study

A. Sample Collection

B. Preparation of Plant Extract

C. Phytochemical Analysis

Pholobotannins(a chemical constituent of the plant)

- Plant sample is mixed with distilled water
- 1% HCL (aqueous) is added.
- Plant sample is boiled with the help of hot plate stirrer
- Formation of red color precipitate denotes the positive result

Reducing Sugar

- 0.50 g of plant sample is taken
- 5 ml of distilled water is added
- 1 ml of ethanol is added
- Around 1ml of Fehlings solutions A + Fehlings solutions B is taken
- Solutions are boiled
- Addition of ethanol and development of positive result depicts positive results for terpenoids, alkaloids and other important plant properties

Expected Outcome

1. To create an inventory data base for the medicinal plants available and used in local community/traditions
2. To identify plants with important medicinal and nutraceutical properties that can be further researched and documented.

Phytochemical Analysis Data can be represented in the following manner

Test	A.n	B.b	D.r	P.e	T.a	Z.z
Alkaloids	-	+	-	+	+	-
Glycosides	+	+	+	+	+	+
Saponins	+	-	-	+	+	+
Terponins	+	+	+	+	+	+
Sterols	+	-	+	+	+	-
Resins	-	+	-	-	-	+
Carbohydrates	+	+	+	+	+	+
Balsam	-	+	-	-	-	+
Flavonoids	+	-	+	+	+	+
Anthraquinones	+	-	+	-	-	-
Key + = present, – = absent, A.n = A.nilotica, B.b = B.buonopozense, D.r = D.rotundifolia, P.e = P.srinacus, T.a = T.avicsnnioides, Z.z = Z.zanthoxyloides						

Project – 4:**To Study Traditional Indigenous Knowledge Techniques in Coping with the Climatic Vulnerability****Introduction**

Indigenous knowledge has been used in designing and implementing sustainable development projects but very less work has been done in incorporating it into formal climate change strategies. It is well known fact that climate change cannot be separated from sustainable development as it is the most important and crucial for climate mitigation. Although, incorporation of the climate change should be done integrated with the modern/ western knowledge. It should be aimed that indigenous knowledge should complement the global knowledge system. Villagers/farmers have since time immemorial used various cultivation, mulching, soil management techniques in conserving the resources and coping with the climatic vulnerability.

Traditional methods of reducing climate variability and extremes includes the following

- Development of early warning system for the prediction or forecast of event, wealth of knowledge has been based on predicting weather and climate changes
 - Utilizing organic agriculture which is a holistic way of managing agro-ecosystem health.
 - Organic agriculture prevents nutrient and water loss through high organic content and soil covers, thus soil is made more resilient to floods, drought and land degradation process.
 - Increasing diversifying plant crops that are drought tolerant and/or resistant to temperature stresses which takes advantages of the available water and making efficient use of it
- Different architectural structures of houses to combat with different climate changes and variability

Objectives

1. To explore some of the ways in which society copes with the vulnerability of the climate
2. To integrate indigenous knowledge with the climatic change adaptation strategies

Methodology

1. Identification of particular local community
2. Identification of different parameters that help in coping up with climatic vulnerability which are (better to select one / two aspects only)
 - Housing patterns
 - Water conservation techniques
 - Clothing pattern
 - Agricultural farming
3. Preparation of questionnaires with structured and open ended questions
4. Sampling methods: stratified random sampling and purposive sampling techniques
5. Adopt focus interview based on questionnaire
6. Carry out field observation along with documentation
7. Carry out focused group discussion with community groups
8. Systematic compilation and tabulation of data
9. Scientific validation: Any particular parameter can be identified and scientifically validated, for e.g if study is on housing pattern and about how it is able to combat heat , rainfall, wind .

Expected Outcome

Identification of important traditional method of combating climatic variations and integrating with modern techniques

5.8. Additional Project Ideas

1. Evaluation of nutritional values of traditional food
2. Documentation of food fermentation techniques and its relation to food quality preservation
3. Study on biodiversity of a particular local community and developing people's biodiversity register
4. Different architectural structures and its importance in maintaining the ecosystem (e.g housing, bridges, water distribution canals)
5. Resource conservation methods and its sustainability
6. Various agricultural farming systems and its importance with the future scope
7. Traditional knowledge of various agricultural tools and its applicability in organic farming
8. Sustainable knowledge of various agricultural practices
9. Traditional knowledge of fisherman and its links to sustainable livelihoods
10. Study on community seed bank and its relation to food security
11. Traditional knowledge on Food Preservation Techniques and its importance as source of livelihood
12. Traditional knowledge on natural fiber and its uses in modern context
13. Study on traditional knowledge on ecological restoration mechanism its impact on ecosystem management
14. Design and development of appropriate technology based on traditional technological knowledge
15. Experiment on water harvesting based on traditional knowledge to verify its contemporary applicability

5.9. End Notes

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Annexure - II

Proforma for Data Collection Protocol related to Model Project-3 under Traditional Knowledge System

(A) Biodiversity listings

Sl. No	Habit/Type	Species	Habitat
1	Non - flowering plants	1. <i>Spirogyra</i> sp. (Alga) 2. <i>Volvox</i> sp. (Alga) 3. <i>Polyporus</i> sp. (fungus) 4. <i>Marselliaminuta</i> (fern) 5. 6.	Stream Stream Fallen logs Water pools
2	Herbs	1. <i>Cynodondactylon</i> (dubgrass) 2. <i>Ocimumcanum</i> (jungelytulsi) 3. 4.	Moist area Open area
3	Shrubs	1. <i>Woodfordiafruiticosa</i> (dhawdi) 2. 3.	Rock faces
4	Climbers	1..... 2.....	
5	Trees	1..... 2.....	
6	Non-chordates	1..... 2.....	
7	Fishes	1..... 2.....	
8	Amphibia	1..... 2.....	
9	Reptiles	1..... 2.....	
10	Birds	1..... 2.....	
11	Mammals	1..... 2.....	

Synopsis

1) Species wise, 2) habitat wise

Sl. No	Benefits	Method to know status	Present status	Trends		
1	Shade during fair and festivals*(if used)	Interviews	Available			✓
2	Morning and evening walk facility**	-do-	-do-			✓
3	Suitable fair site	-do-	-do-			✓
4	Honey bee hives (pollination service)	Interview and direct observation	Present	✓		
5	Vulture roosting and nesting site (Scavenging service)	-do-	-do		✓	
6	Bathing facilities	-do-	Available			✓
7	Cattle drinking facilities	-do-	-do-			✓
8	Water level in wells present at periphery of the grove	-do-	Record present level			✓

(B). Direct Benefit Evaluation

Opportunistic Cost calculation

*Cost of 1 fair, 20 shops (size 10 x10 ft)

Tent size needed 20 x 10 x10 = 2000 sqft

Cost of tenting 2000 @ Rs 10 P.Sq Ft = Rs. 20000/-

Cost of shade service Rs. 20000/-

**Morning and evening walk costing

50 persons using area twice a day (morning and evening)

Total entry 100

Entry ticket of nearest public garden Rs. 5 per entry

Total cost 100 x 5 x 365 = 182500/-

Similarly quantify and calculate the costs of other services

(C). Direct Benefits (in the cases it is allowed)

Sl. No	Benefit	Quantum extracted	Market rate	Total Value, (Rs)	Trend*	Suggestions/solutions
1	Dry fallen woods used as fuel*	10 qtls	500/qtl	5000	Decreasing	Plant fuel yielding is species in gaps
2	Dry fallen leaves collected for manuring	500 kg	10/kg	5000	Decreasing	Plant species having more foliage
3	Honey collection	50 kg	200/kg	10000	Decreasing	Plant flowering tree and bush species
4	Wax collection	5 kg	500/kg	2500	Decreasing	-do-
5	Wild mango fruit collection	100 kg	50/kg	50000	Stable	Maintain number of mango trees
6	Wild Jamun collection	200 kg	200/kg	40000	Stable	-do-
7	Broom grass collection	50 kg		1000	Increasing	Protect from fire hazard
8						
9						
	Total direct benefits					

*Wherever in practice

Anexure - III

Recommended Dietary Allowance of Nutrients for adolescents in 24 hours						
	Male			Female		
	10-12 Yr	13-15 Yr	16-18Yr	10-12 Yr	13-15 Yr	16-18Yr
Energy(Kcal)	2200	2500	2700	2000	2100	2100
Protein (gms)	54	70	78	57	65	63
Calcium (mg)	600	600	500	600	600	500
Iron (mg)	34	41	50	19	28	30

Source: <https://vikaspedia.in/health/women-health/adolescent-health-1/management-of-adolescent-health/nutritional-needs-of-adolescents-and-anaemia>