Strategies to Explore, Document, Validate and Check Traditional Knowledge Erosion on Wild edibles: Learning and Lessons from Adi Tribe of Arunachal Pradesh, India.

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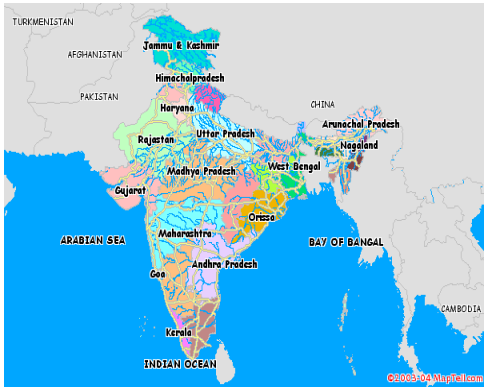
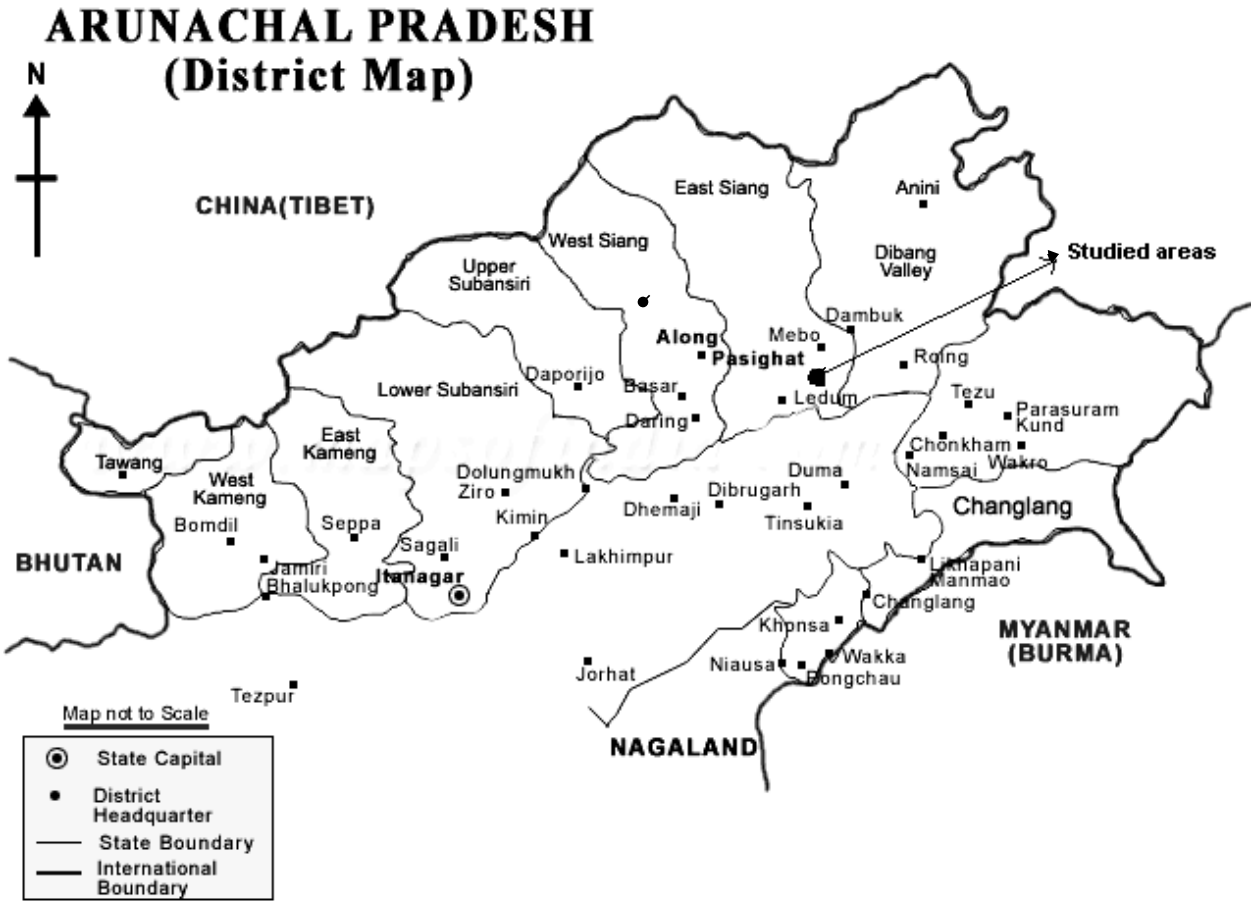
North East India - mega biodiversity centre
Ecological & Bio-cultural diversity
Terrain is landlocked
Dependence on surroundings
Collective decision making
Community rights
Traditional institutions
Biodiversity conservation

Study Area


TURKMENISTAN
AFGHANISTAN
PAKISTAN
CHINA
Jammu & Kashmir
Himachalpradesh
Haryana
Rajasthan
Uttar Pradesh
Arunachal Pradesh
Nagaland
Madhya Pradesh
West Bengal
Gujarat
Orissa
Maharashtra
Goa
Andhra Pradesh
Kerala
CAMBODIA
ARABIAN SEA
BAY OF BANGAL
INDIAN OCEAN

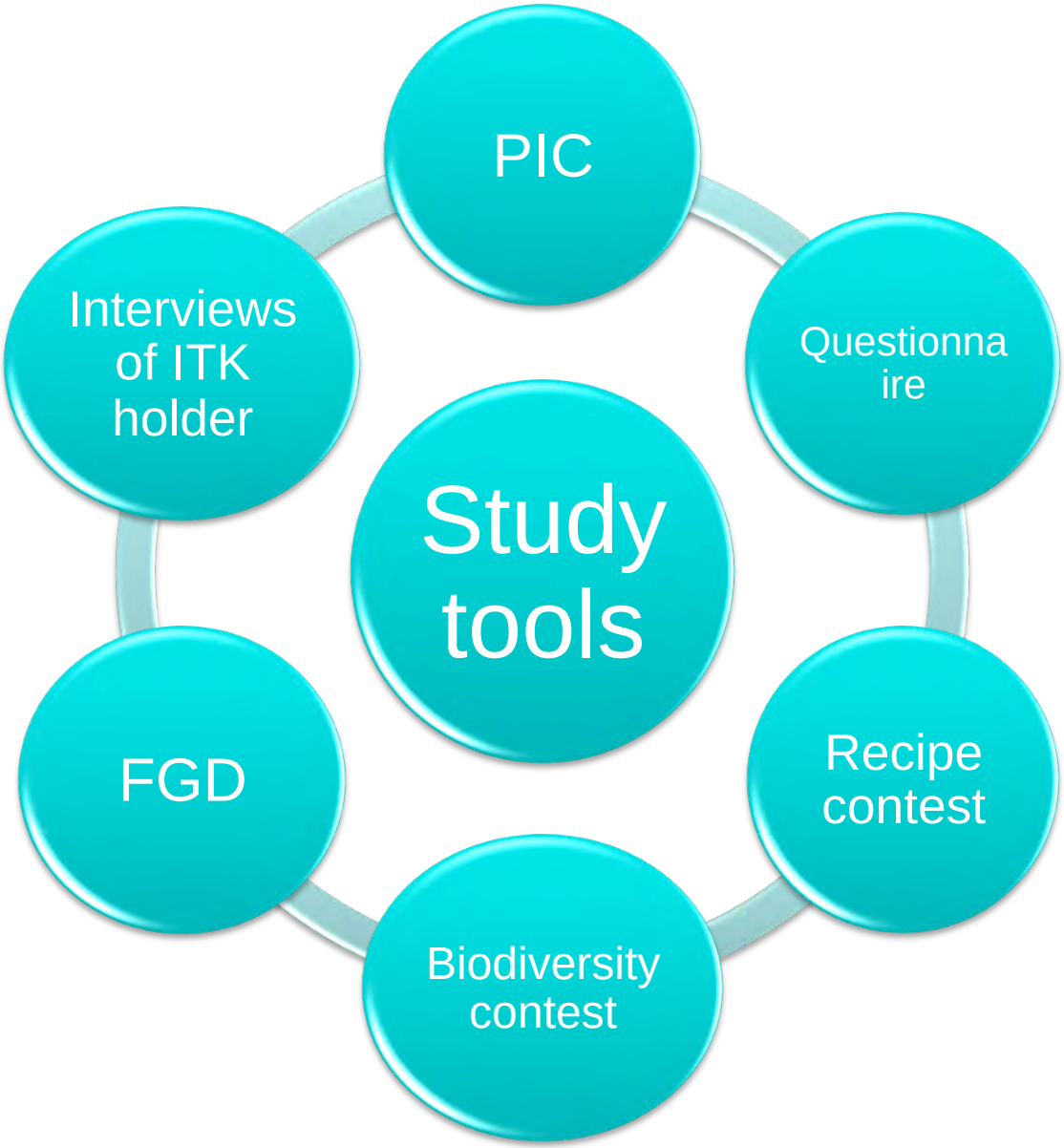

ARUNACHAL PRADESH
(District Map)
N
CHINA(TIBET)
East Siang
Anini
West Siang
Upper Subansiri
Dibang Valley
Studied areas
Dambuk
Along
Pasighat
Mebo
Roing
Daporijo
Basar
Lower Subansiri
Ledum
Tezu
Parasuram Kund
Daring
East Kameng
Chonkham
Namsai
Wakro
Tawang
West Kameng
Dolungmukh
Ziro
Duma
Dibrugarh
Changlang
Dhemaji
Kimin
Tinsukia
Bomdil
Seppa
Sagali
BHUTAN
Lakhimpur
Jamiri
Bhalukpong
Itanagar
Lakhapani
Manmao
Changlang
Khonsa
MYANMAR
(BURMA)
Jorhat
Niausa
Wakka
Pongchau
Tezpur
NAGALAND
Map not to Scale
State Capital
District Headquarter
State Boundary
International Boundary


Remote locations
Dependence on surrounding
Ethnicity of population
Forest cover
Existing informal institution
Elderly women
Sampling criteria


View of remote Sibuk Village


24 7 2005

Meat drying: Kitchen fire place has three shelves called *rapmeng* (lower shelf), *perap* (middle shelf) and *borang* (top shelf). In the first layer fish, meat and fresh plants are kept and dried for 3-4 days after that, they are transferred to *perap* for about 2-3 days. Almost dried foods are kept at *borang*


PIC
Questionnaire
Recipe contest
Biodiversity contest
FGD
Interviews of ITK holder
Study tools

Prior Informed Consent (PIC) on Indigenous Traditional Knowledge

- A. Can NIF share your address with those interested in your traditional knowledge?
  N.I.F. nok aku kennam legape nok dungko dakho add kenlayen ?
- B. Can NIF display/publish your traditional knowledge on the Internet/*in Honey Bee* magazine or any other media?

  N.I.F. nok aku kennam-panam legang dem "Honey Bee" kakot magazine lo delokke (internet) T.V. dekelo moteng among lo kemolayedi ?
- C. Can NIF share your traditional knowledge under the following condition/situation (s)?

  Nok lerilok kenbom nam dem N.I.F. me kape kisape kenmolidun ?

  (a) Partial disclosure/summary **Anyope**
  (b) Full disclosure **Takam em (doiying kisape)** Only on commercial terms (if the interested party is willing to pay for it) **Pettom murko paisa lega imilo**

  (c) At no cost for individual use, but on commercial basis for larger use
  Agi atel ipisinam lega murkong lagimang. Idola business pe imilo lagidung.

  (d) After further research on it

  Maa hem ati him airupe kenyin rongam iyeku
- D. Can NIF mediate on your behalf to pursue the following?

  N.I.F. nok kennam dem ami em lubilayadi ?

  (i) Developing business plan by third party/students

  Students (porina kokiding) demangkom, amiabit nok kennam delok business pe ilenlidung imilo.

  (ii) Product development **Eku serang monam legang imilo.**

  (iii) Intellectual Property Right protection

  Agi kennam dem duyardope delo ami em pyomomadope inam lega ?

Food Frequency and food knowledge questionnaire

Frequency Codes – Daily (1), Twice/Thrice (2), Weekly (3), Fortnightly (4), Monthly (5), Occasionally (6)
Consumption Quantity Codes – Staple (st), Supplement (sup), Snacks (sn), Salad (sd)
Processing codes – Boil (B), Fry (F), Roast (R), Smoking (S), Fermenting (Fm), Grilling (G), Wine (W)

::

Food items	Freq. Code	Cons. Qty Code	Proce. Code	Season of availability	Remarks

1. Foods used during special occasions….
2. Management of common child hood illness ……
3. Traditional foods avoided/preferred during specific illness or conditions?
4. Foods that give energy?
5. Foods that help in better growth?
6. Foods which are good for the eyes?
7. Foods that enrich or strengthen the blood?
8. Foods which were available earlier in 1970s…
9. Food preservation methods

Recipe contest at Aiying & Pangin village

Interview of ITK holders

Yazing darang,
Sole village

GB, Sole vilage

Yakyam dupak,
Dengki, village

Yapang Gamnoh,
Rayang village

Focused Group Discussion –

- On availability of different wild edibles, location and distance
- On medicinal value of different plants
- On processing & preservation methods

Kebang meeting in progress –

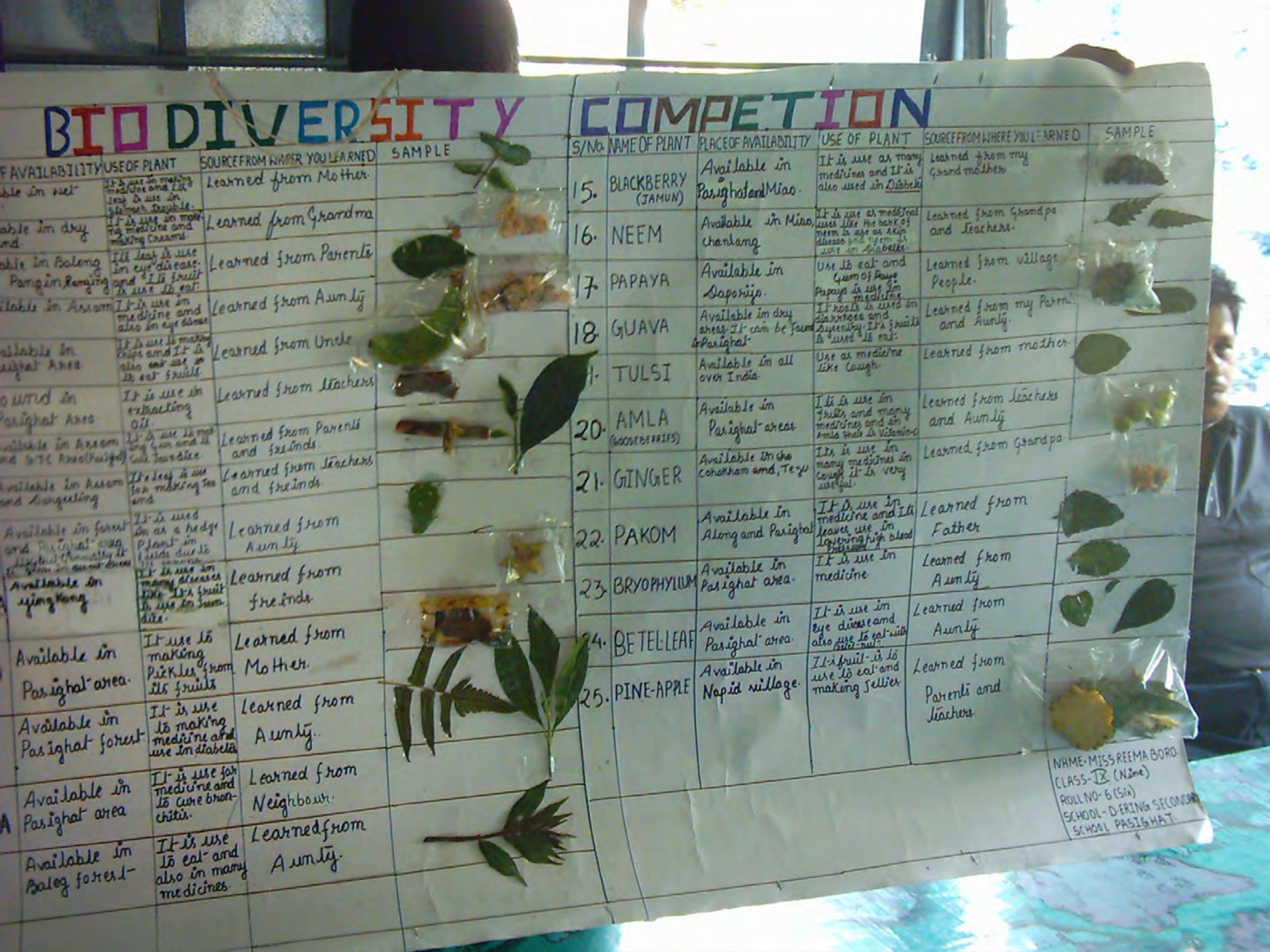
- Forest land clearing for jhum cultivation
- Extent of use of different forest resources and rotation plan
- Disputes related to ownership and infringement

Biodiversity contest at D. Ering School , Pasighat


National Innovation Fund
In Support of Grassroots Innovations


National Innovation
In Support of Grassroots


SOURCE FROM WHERE LEARNED OR INQUIRED THE INFORMATION ABOUT PLANT
SAMPLE
USE OF THE PLANT
NAME OF THE PLANT
PLACE OF AVAILABILITY
USE OF THE PLANT
SOURCE FROM WHERE LEARNED OR INQUIRED THE INFORMATION ABOUT PLANT



BIODIVERSITY COMPETITION
USE OF PLANT
SOURCE FROM WHERE YOU LEARNED
SAMPLE
Learned from Mother
Learned from Grandma
Learned from Parents
Learned from Aunty
Learned from Uncle
Learned from teachers
Learned from Parents and freinds
Learned from teachers and freinds
Learned from Aunty
Learned from freinds
Available in Pasighat area.
It use to making Pickles from its fruits
Learned from Mother.
Available in Pasighat forest
It is use to making medicine and use in diabetes
Learned from Aunty.
Available in Pasighat area
It is use for medicine and to cure bronchitis.
Learned from Neighbour.
Available in Baleg forest
It is use to eat and also in many medicines
Learned from Aunty.
S/No.
NAME OF PLANT
PLACE OF AVAILABILITY
USE OF PLANT
SOURCE FROM WHERE YOU LEARNED
SAMPLE
15. BLACKBERRY (JAMUN)
Available in Pasighat and Miao.
It is use as many medicines and It is also used in Diabetes
Learned from my Grand mother
16. NEEM
Available in Miao, Changlang
Learned from Grandpa and teachers.
17. PAPAYA
Available in Saporiip.
Learned from village People.
18. GUAVA
Learned from my Parents and Aunty
19. TULSI
Available in all over India.
Use as medicine like Cough.
Learned from mother.
20. AMLA (GOOSEBERRIES)
Available in Pasighat areas
Learned from teachers and Aunty
21. GINGER
Learned from Grandpa
22. PAKOM
Available in Along and Pasighat
Learned from Father
23. BRYOPHYLLUM
Available in Pasighat area.
It is use in medicine
Learned from Aunty
24. BETEL LEAF
Available in Pasighat area.
Learned from Aunty
25. PINE-APPLE
Available in Napid village.
It is fruit is to use to eat and making Jellies
Learned from Parents and teachers
NAME- MISS REEMA BORO
CLASS- IX (Nine)
ROLL NO- 6 (Six)
SCHOOL- D-ERING SECONDARY SCHOOL PASIGHAT

Highly important, for family nutritional security

- **Cereals and millets - Rice- boil, Rice - wine, Mirung (finger millet) – wine**
- **Legumes- French bean- boil**
- **Vegetables – Ongin (*Clerodendrum colebrookianum*), Pettu(Brassica sp.), kopi(*Solanum torvum*), kopir(*Solanum khasianum*), Ange (Collocasia), fermented bamboo shoot**
- **Fruits – Banana, Pineapple**
- **Meat – Fish**
- **Spices – Ginger and chilly**

Important, for family nutritional security

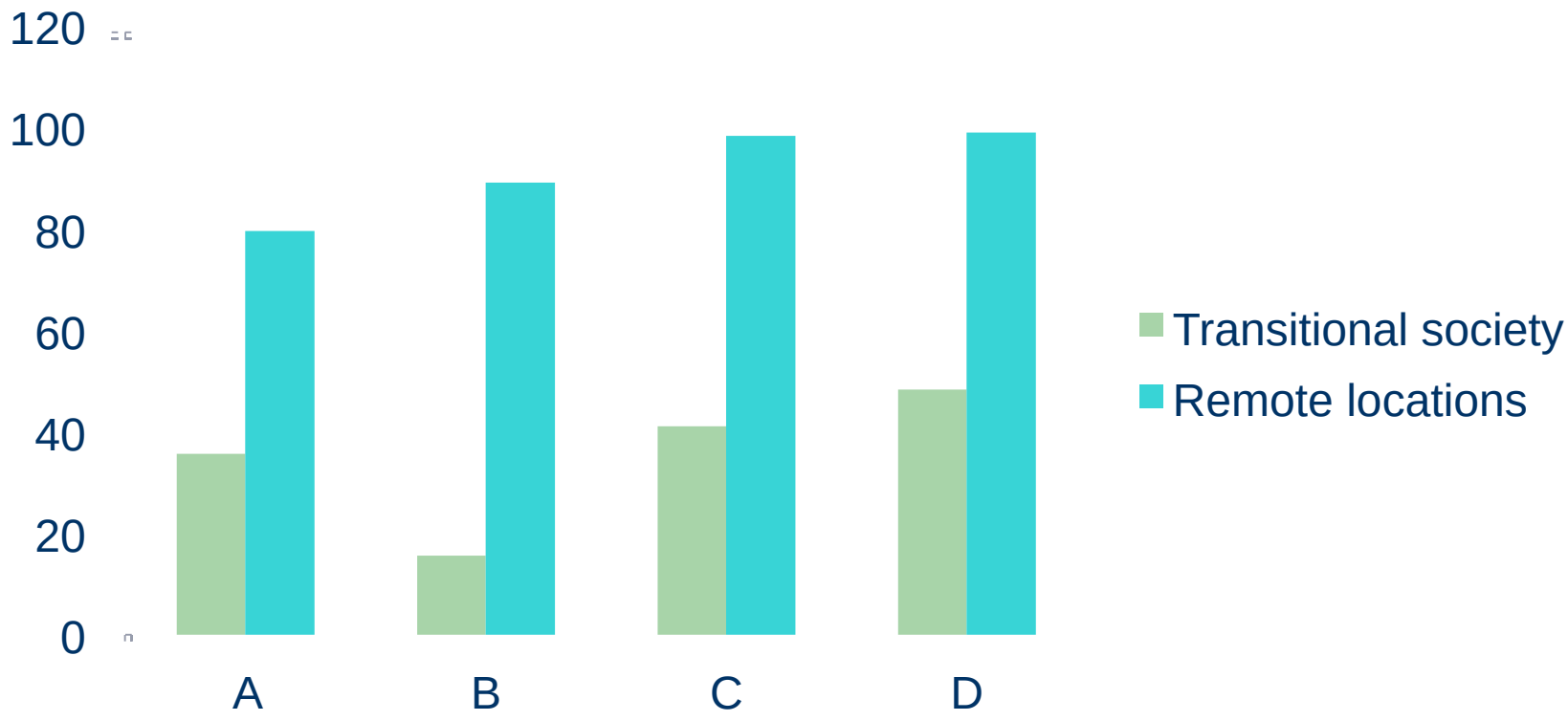
- **Cereals and millets – Merung, Angyat and Ayak – Boil, Matpe – boil & wine**
- **Legumes- Arhar, Rajma, black gram - boil**
- **Vegetables – Oyik, Gaam oying, Ogen, Colocassia, Akshap, Dhekia**
- **Fruits – Papaya, Tapil, Hilica, Silum**
- **Meat – Chicken, beef, mithun (*Bos frontalis*), forest based meat, dried fish, dried meat**
- **Spices – Onion and garlic**

Moderately important, for family nutritional security

- **Cereals and millets – Angyat (foxtail millet) and Ayak – wine, Maize - boil**
- **Legumes- Soybean- fermented, Mungbean – boil**
- **Vegetables – Onger (*Zanthoxylum rhetsa*), Marsang (*Diplazium esculentum*), Lorri (*Piper pedicellatum*), Potato, Poi (*Basella rubra*), Cucumber, Bottlegourd, Pumpkin, unripe Papaya**
- **Fruits – Pear, longan, Rambutan**
- **Meat – pork**
- **Spices – wild onion (*Allium hookerii*)**

Erosion of Indigenous Traditional Knowledge

Per cent of *Adi* tribe household following different aspects of cultural ethics associated with traditional foods



A - Sharing food with community members, B- Bartering of traditional food resources, C - Using traditional foods during marriages, local festivals and other cultural gatherings, D- Preferences for consuming traditional foods in daily diet

Name of foods	Ailments/diseases	Use level in percentage	
		Transitional Communities	Remote villages
Kekir (Red ginger)	After childbirth to mother for proper expulsion, maintaining menstrual cycle.	40.32	75.98
Bangko (Solanum spirale)	Controls high blood pressure and malaria	41.32	65.67
Onger (Xanthoxylem rhetsa)	To cure constipation and gal bladder's stone	60.54	95.67
Ongin (Clerodendrum colebrookianum)	Control gastritis and used in reducing the diabetes	56.67	92.34
Kopi (Solanum viarum)	To control high blood pressure	68.93	90.57
Kopir (Solanum torvum)	Used in cough probelm	29.43	68.87

Papaya (unripe)	Curing dysentery	30.43	34.56
Marshang (Spilanthus acmella)	Diarrhea	32.36	47.67
Eyuup	To cure smallpox	65.53	70.45
Oyik (Pouzolzia benettiana)	For eyes, improves lactation, leaves with egg massaged for faster recovery of bone fracture	50.56	78.89
Hillika (Terminalia citrina)	diabetes and gas trouble	26.67	79.34
Silum/komker	Use in cough	29.35	85.34
Tapil (Phoebe cooperians)	constipation and indigestion	10.34	68.96
Ogen (Gynura cusumbua)	pain and infection of eyes	30.67	86.67

Foods attributes	Name of foods
Energy	Green leafy vegetables, *perok*, rice, *pettu*, meat, fish, egg, *oyik, osik, kopak,* pear
Better growth	Rice, mithun meat, local fish
Good for eyes	*Nyokung*, snail boiled with *pettu*, *oyik, ngobi* fish, beans, *tamir* tree's bark, *gali tatak* fish
enrich or strengthen the blood	Bitter gourd, chicken, fish, *kuchiya* bam (local breed of fish), *akshap* (*Mussenda glabra*) *takuk*, beans, *bayom, ange*, papaya
Improves digestive system	*Bangko, ongin, pudina*, gourd, papaya, pumpkin, *onger, sungkom*
act as laxatives	*Asitapa* mushroom, green leafy vegetables, cucumber, watermelon, jackfruit, *oyik*
blood pressure	*Ongin, kopi, bangko, baak*
Curing malaria	Fish liver along with gall bladder

Ailments/ disease	foods	
	Avoided	**Preferred**
Pregnancy	Monkey meat, papaya flower, *perik,* chili	*Pettu* soup, *perok,* rice, egg, *dal*,
Lactation	Papaya flower, chilly, raw fish, pork, ginger, *kala-apong*	Unripe papaya fruit, *pettu*, chicken, fish, milk, egg, soup, *oyik*
Diarrhoea	*Ongin*, pork, raw fish, meat, chilly, jackfruit, pumpkin, chilli, *namsing peron*, maize, *kompi*	Bitter gourd, *ongin*, *bangko, kedi*, boiled rice, *kuna, tasing, chinkom*
Jaundice	Lemon, pumpkin, ginger, *dilap*, oil, pork, turmeric, fried food, chilly, egg	*Kordoi, tabat*, leafy vegetables, sugarcane, banana, tender shoots of guava
Malaria	*Ikung, eep,* (any sour foods), *ongin, onger, marsang*, kopi	Porcupine intestine, bear's gall bladder, papaya flower, boiled fish *mithun* meat, *sidol* fish
Diabetes	Brinjal, fried food, local rice	Boiled green leafy vegetables
High blood pressure	Pork, *onger, apong*, meat	*Ongin, bangko, kopi, oko*

Medicinal value believes and scientific reports

Wild plant and medicinal uses	Reported in scientific literature (from CAB abstract)
Kalanchoe pinnata (Tuktak) Leaves juice for treatment of stomachache, Malaria, small cuts	**anti-inflammatory**, Anti-tumor, anti-ulcer, **Anti-malaria**l anti-leishmanial, **Analgesic, antipyretic**, Hepatoprotective, antibacterial, antifungal.
Paederia foetida (Epiriyong) Leave juice, Diarrhea	**diarrhoea**, rheumatism, fever, headache, asthma, eye disease and wounds anti-Helicobacter pylori rheumatic diseases, antiinflammatory hepatoprotective, helpful in menstrual problems
Moringa oleifera (drumstick) Leave paste, treatment of muscle pain, pull, ligament injury	wound healing anti-microbial effective in limiting the development of skin **lesions anti-rheumatic anti-inflammatory** antibiotic Antimicrobial
Cuscuta reflexa (Kordoi) Whole plant, treatment of Jaundice.	**body aches and colic, liver disorders**, fevers, coughs, itches, carminative, anti-helmintic, **anti-jaundice**, anti-HIV agents
Ageratum conyzoides. (Botpamon, Mahakua) Leaves paste in Cuts and wounds	**Biofungicidal, fungistatic, biocidal, Anti-inflammatory Anti-bacteria**l anti-nociceptive Anti-microbial, anti-spasmodic, anti-asthmatic, haemostatic and insecticidal properties

- fruit is used in making chutney
- Green leaves as boiled vegetable
- Matured fruits after drying are powdered and mixed with local coriander

Banko (*Solanum spirale*)

Medicinal value:

Green leaves in lukewarm form are used in waist pain

It is used in high blood pressure and malaria

It is used in improving digestive system

It is used in curing the diarrhea

Ongin
(Clerodendrum colebrookianum)

It helps in controlling gastritis
Used in reducing the diabetes
Used in reducing the high blood pressure
Used in curing the malaria

Green leaves are used as vegetables

Onger (*Zanthoxylum rhetsa*)
Fruits & barks are used for eco-friendly fishing and as bio-pesticides in paddy crop.
Green leaves are used as boiled vegetable

Medicinal Value
Used in stomach disorders like constipation
The green leaves of *onger* are rich in antioxidants and are used in controlling dysentery & diarrhea.
Added with pork to reduce helminthes problem

Namdung (Perilla ocymoides)

Green leaves as boiled vegetable

Seeds dried/fermented as chutneys

Leaves contain 3.1% protein, 0.8% fat, 4.1% carbohydrate, 1.1 % ash.

Seeds 21.5% protein, 43.4% fat, 11.3% carbohydrate, 4.4% ash with very high n-3 PUFA

Used in treatment of Asthma, colds, nausea, abdominal pain, bronchitis and constipation.

Some Interesting Processing Methods

Rice Cooked Wrapped in Ekkam Leaf in Green Bamboo (Madung System) over Direct Fire

Apong preparation, local bear from, rice or millets

Dehusking of seeds

roasting of husk to make it black

Half boiling

Half boiled seeds and charcoal are mixed together

Add one tablet of yeast (approx 20 gms) per 5.0 Kg seed and mix it

Keep it air tight

Fiter if 4-5 days during summer and 7-10 days during winter

Filtration is done through bamboo cylinder, having hole at bottom. Fermented slurry is filled, over it hot boiling water is poured, and filtrate is collected at bottom

Fermented foods

Engo ngosing

Small fish ngopi are boiled after wrapping with ekkam leaves. packed in fresh bamboo chunga (cylinder) and is made airtight. Kept on borang for 10-12 days for fermentation

Given to the weak person, lactating mother and women after child birth

Peron namsing

soybean seeds are cleaned, washed and boiled. Tightly wrapped into *ekkam* leaves kept for fermentation on Borang for 10-12 days.

***Tange* and *pettu tuyang* *pettu*,**

Its soup is considered equivalent to cow milk. The green leaves of *brassica sp.* are boiled, wrapped in *ekkam* leaves and placed on *perap* for 5-6 days to ferment.

Eup and Ekung - Fermented Bamboo shoot

- Bamboo shoots are peeled and sliced
- Ekkam (*phyrunum pubenerve*) leaves layered at bottom of bamboo made basket
- slices are layered covvered with ekkam leaves and pressed to make the basket airtight.
- The basket is left for 5-6 days in summer and 8-10 days in winters on higher branches of tree for complete fermentation.
- Degradation and leaching of taxiphylin and cyanohydrins

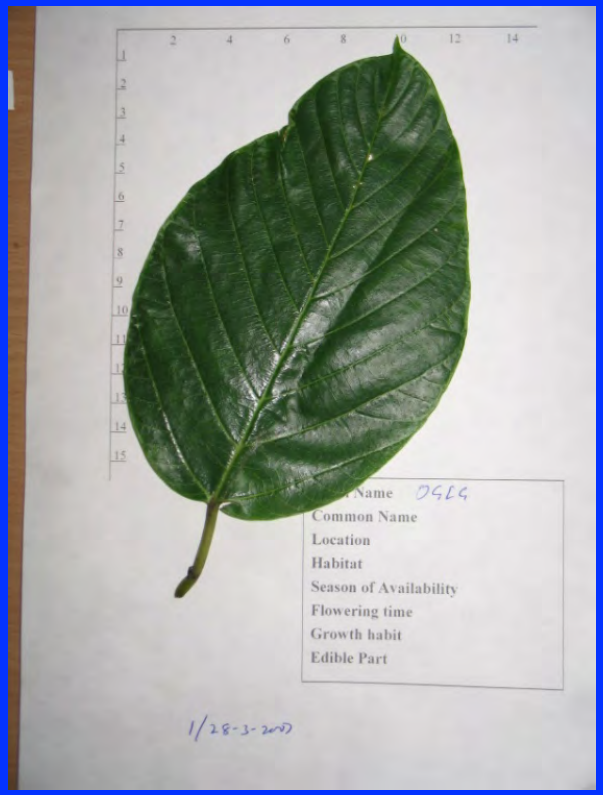
Some comments and proverbs

Common Adi proverb -

“ Oyik doboname reyik, reyik,

Ogen doboname regen, regen”

Person eating *oyik* are handsome and beautiful and those eating *ogen* have good health and physique.



“Leaves of OGIG, a tree creeper are complete food”. Local people don’t carry food while going to forest and instead consume ogig leaves as raw.

“Whatever is eaten by Mithun (*Bos frontalis*) is edible for us, important is to process it to make it palatable and easily digestible”

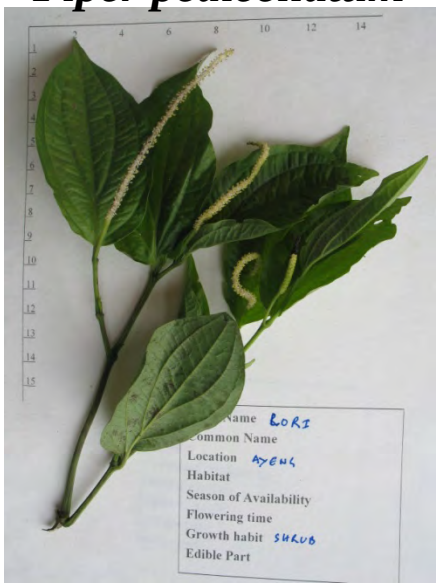
Proximate analysis of some ethnic foods

Local Name	Scientific name	% moisture	% ash	%Crude Protein	% crude fat	% Dietary fiber	Vitamin c mg/100g
Kopi	*Solanum torvum*	76.34	0.56	4.82	0.95	0.637	17.6
Kopir	*Solanum khasianum*	73.13	1.77	6.33	2.45	0.721	20.0
Onger	*Zanthoxylum rhetsa*	82.18	1.49	5.31	1.68	0.283	14.7
Pumpkin Leaves	*Cucurbita moschata*	84.01	2.35	3.99	0.98	0.352	11.7
Rori	*Piper pedicellatum*	82.18	2.74	4.14	1.13	0.557	52.0
Poi	*Basella rubra*	85.26	2.80	5.15	0.86	0.528	83.7
Dhekia	*Diplazium esculentum*	85.19	2.45	7.36	0.76	0.673	18.6
Marsang	*Spilanthus acmella*	88.13	1.86	3.26	1.19	0.496	12.1
Oyik (K, Co, Mg, Ca)	*Pouzolzia benettiana*	81.19	2.91	7.39	0.89	0.524	18.2
Ogen (K, Co)	*Gynura cusumbua*	76.87	2.93	5.57	2.93	0.532	34.6
Gaam oying (Fe, Mn, Zn, Mg)	*Glochidion multiloculari*	69.36	3.30	9.23	3.56	0.732	61.3
Ogig (Co, Mg, Ca)		83.41	3.81	5.90	1.01	0.571	12.3

Efficient use of land, water and sunlight

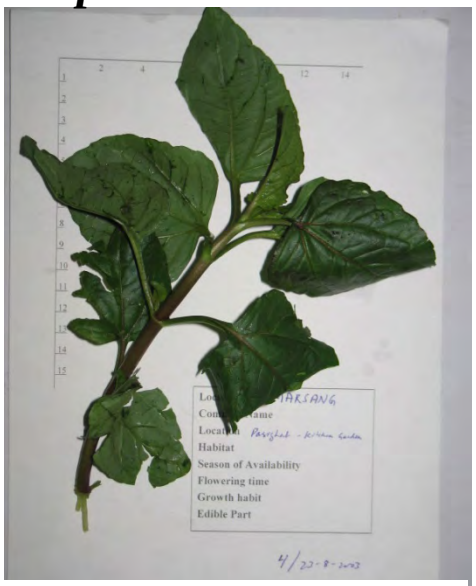
Herbariums

Piper pedicellatum

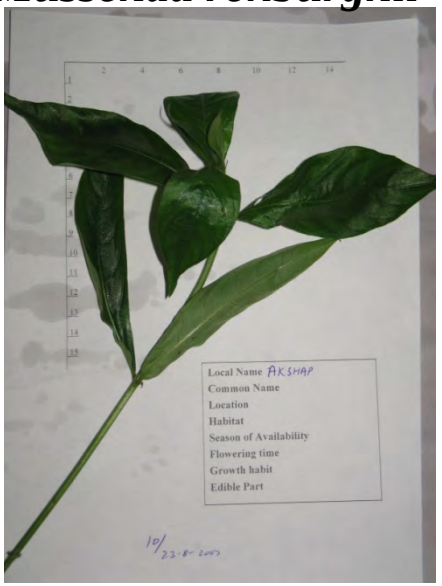


Pouzolzia benettiana

Spilanthus acmella



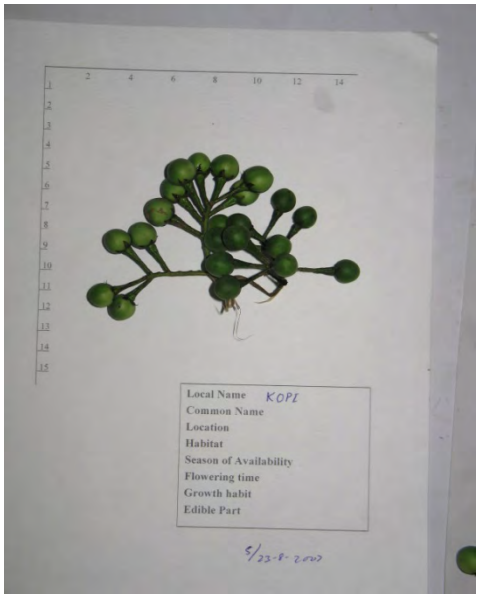
Mussenda roxburghii



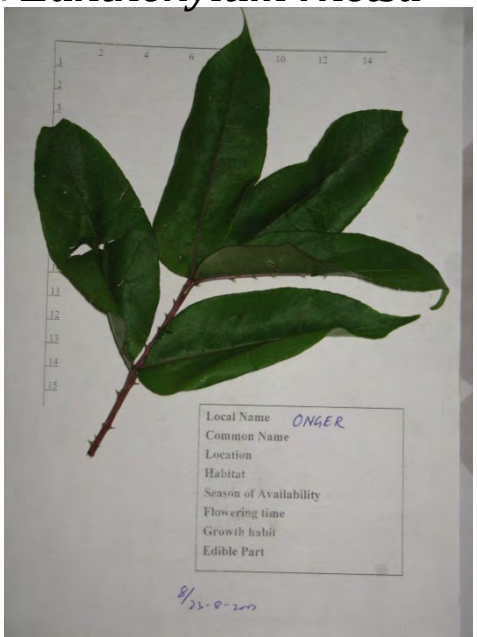
Phoebe cooperians

Gynura cusumbua

Solanum torvum



Zanthoxylum rhetsa



Conclusions

- Traditional communities living in remote locations in north east India, have conserved traditional knowledge but erosion is observed in transitional societies.
- There is need of documentation, conservation and promotion of traditional knowledge system for biodiversity conservation
- Multi facet approach is needed for surveying which includes questionnaire, interviews, focused group discussions, recipe contests, biodiversity contests, traditional food fares etc.
- Some of the wild edibles are more nutritious then commonly consumed vegetables.
- Distinct processing methods their impact on nutrient retention and inactivation of anti-nutritional factors is needed to be studied.
- Traditional people have fare knowledge on medicinal value of wild plants in subtle sense as proven by available scientific literature.


Welcome to Arunachal