

# Community Forest and Ecosystem Services



## Community Forestry and Ecosystem Services

- ❖ **Community Forestry:** CF is defined managing natural or plantation forest at the local level in a way that is compatible with local objectives and values(Uprety, 2006).
- ❖ An area of 66,934 ha of the total forest cover of 2,779,725ha in Bhutan is covered by community forests since its inception, 1995 (Department of Forest and Park Services, 2015).
- ❖ CF as an approach to sustainable utilization of forest resource arose during 1970's when the development strategies of the 1950's – 1960's were criticized for overlooking the rural development and not meeting the needs of the poor (Samdrup, 2011).
- ❖ CF is considered as key component to *'empower rural communities to manage forests sustainably for socio-economic benefits, poverty reduction and to contribute to overall sustainable forest management at national level'*.
- ❖ Community forestry in Bhutan remains as major influence to the development of forest policies.



Community forests under the project cover showing different vegetation cover

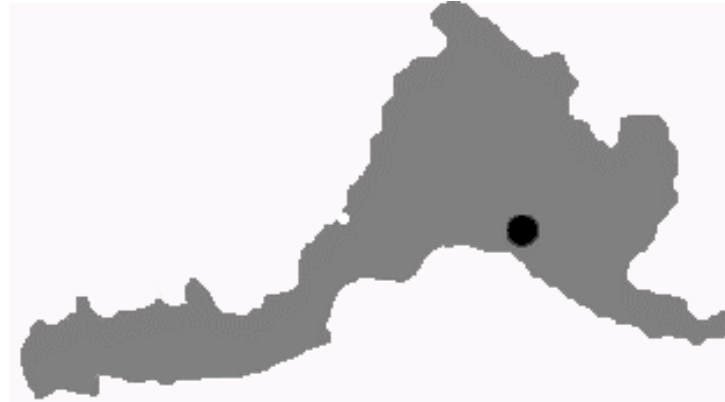
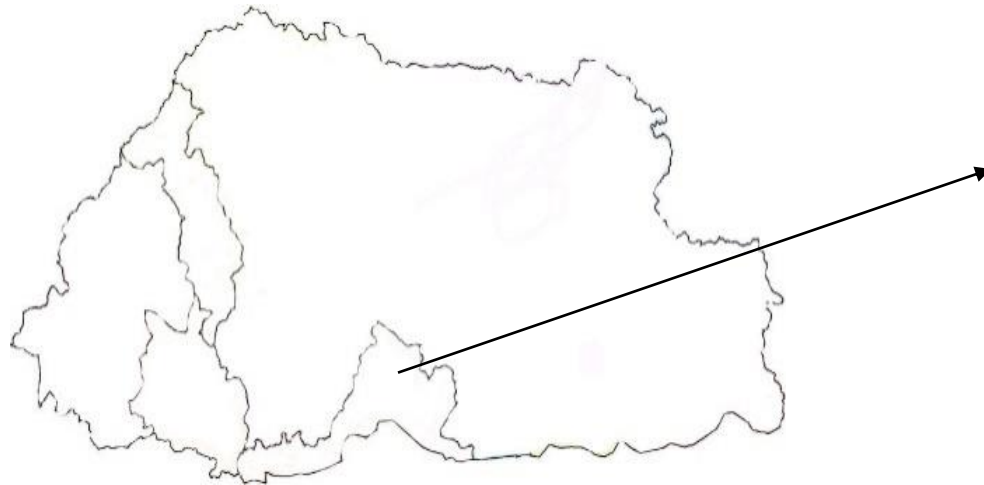
- ❖ **Ecosystem Services:** Ecosystem Services are the benefits people obtain from ecosystems (Millennium Ecosystem Assessment, 2005)
- ❖ The term “services” to encompass both the tangible and the intangible benefits human obtain from ecosystem, which are sometimes separated into “goods” and “services”, respectively (Regamey *et al.*, 2011).
- ❖ The Convention on Biological Diversity (CBD) recognizes that all levels of biodiversity contribute to maintenance of processes that provide a range of fundamental goods and services to mankind (Christie *et al.*, 2011).
- ❖ **Categories of ecosystem services:** The ecosystem services are categorized along functional lines as per the Millennium Ecosystem Assessment, 2005 into;
  - i. provisioning
  - ii. Regulating,
  - iii. supporting services and
  - iv. cultural practices (Pereira *et al.*, 2005).



Provisioning collected by  
the villagers from CF

## Project Site

- ❖ Project site is located in Sarpang district southern central belt of Bhutan in the latitude of 27.45198 and longitude of 90.4880° E. The altitude ranges from 200 m – 3600 masl.
- ❖ It consists of moist deciduous sub-tropical forest receiving annual precipitation of 883 mm of rainfall.



Sarpang district

# Research Methodology



- ❖ **Reconnaissance Survey:** A ground reconnaissance survey using LANDSAT photos to locate streams, forest types, and geographical alignment was carried out.
- ❖ **Development of reference site:** The identified potential site was developed to reference site for identification/replication of similar habitat in other CFs.
  - Phytosociological assessment; Analytical characters was computed following standard methods given by Curtis & McIntosh (1950). Following Shannon-Weiner and Simpson species diversity was studied. The distribution of plant species will be assessed by Ruankiaer's law of frequency.
- ❖ Quantitative Forest Resource Assessment will be done along with Phytosociological studies to see growing stock by measuring the DBH and marking the tress „T“ that can be used as timber by considering bole size, straightness and damage

- ❖ Assessment of Non Wood Forest Product was done base on priority ranking by discussing with rural people that which NWFP"s are important commercially and its availability. Based on those factors the NWFP will be ranked.
- ❖ Economic valuation of market value / NWFP (annually) was done using environmental framework developed by De Groot et al., 2002. A quantitative value will be assigned to different NWFPs using direct market valuation technique.
- ❖ Economic valuation of non-consumptive use values (annually) was done using the methodology of Sheil et al., 2002. It uses contingent valuation method to state their willingness to pay (WTP) to deduce monetary bearing of the non-consumptive use values in the CF.
- ❖ Quantity of water discharge was measured using „Velocity Area Method“ using floater.





Field work



# Result

Reference site: Dungmin CF



	No. of species	H'	Ds	Raunkiaer's frequency distribution (RFD)	Water discharge	Wild life presence
Tree	56	3.56	27			
Shrub	35	2.4	11.54	36>9>5≠3 >0 (T)	61.7 ft <sup>3</sup> /sec.	<i>Elephas maxima</i> , <i>Coun alpinus</i> , <i>Muntiacus muntjac</i> , <i>Pavo cristatus</i> , <i>Bos gaurus</i> etc.
Herbs	13					

Name of CF	No. of species	H' (T)	Ds (T)	RFD (T)	Water discharge	
Dangling	Tree- T, Shrub-S and Herb-H	54 (T), 25(S), 12 (H)	3.4	23.73	42>7>4 ≠ 2 > 0 (T)	61.7 ft <sup>3</sup> /sec.
Tashithang	Tree- T, Shrub-S and Herb-H	30 (T), 11(S), 7 (H)	3.18	4.47	51 > 45 ≠ 0=0	5.4 ft <sup>3</sup> /sec.
Lingar	Tree- T, Shrub-S and Herb-H	30 (T), 7 (S), 13 (H)	2.58	6.59	23>7>0≠1>0	6.32 ft <sup>3</sup> /sec.
Gaden	Tree- T, Shrub-S and Herb-H	12(T), 7(S), 12 (H)	1.95	4.48	8>3>0≠1>0	-

Rijug	Tree- T, Shrub-S and Herb-H	18(T), 7(S), 13 (H)	2.7	14.7	14>3>0≠0>0	0.22 ft. <sup>3</sup> /min
Tareythang B	Tree- T, Shrub-S and Herb-H	42 (T), 24 (S), 8 (H)	3.39	25.8	39>9>3≠0>0	5.18 ft. <sup>3</sup> /min.
Juenphen	Tree- T, Shrub-S and Herb-H	39 (T), 17 (S), 7 (H)	2.7	7.44	26>9>3≠0<1	0.61 ft <sup>3</sup> /min.
Chakgari	Tree- T, Shrub-S and Herb-H	56 (T), 27 (S), 8 (H)	3.7	35.7	16<33>7≠0>0	-
Tirkhola	Tree- T, Shrub-S and Herb-H	46 (T), 15 (S), 27 (H)	3.4	36.3	40>6>3≠0>0.	9.2 ft <sup>3</sup> /sec.
Samdrupcholing	Tree- T, Shrub-S and Herb-H	32 (T), 9 (S), 7 (H)	2.3	7.34	51 > 45 > 4 = 0 < 0	382.6 ft <sup>3</sup> /minute

## Economic valuation of CF

	Dungmin	Dangling	Tashithang	Lingar	Gaden	Tareythang B	Juenphen	Chakgari	Tirkhola	Samdrupcholing	Rijug
Economic valuation of market value (Nu. In millions)	-	-	0.021	-	-	-	0.061	0.0028	-	0.07	-
Economic valuation of non-consumptive use value (Nu. In millions).	1.75	0.23	2.04	1.34	1.89	1.22	1.03	1.65	1.55	0.21	1.34

# Recommendation

## Replication of Forest community

- ❖ Community Forests; Samdrupcholing, Tashithang, Juenphen, Chakgari, Tareythang B and Dangling CF can be replicated similar to Dungmin CF (reference CF) ecologically for increasing the habitat size, availability of food and lessen the competition for wildlife.
- ❖ Lingar, Gaden and Rijug showed the heterogeneous distribution plants which showed disturbance in ecology. Many CFs are in seral stages, therefore ecological restoration is recommended.
- ❖ Tree species providing food and nesting to wildlife have to be protected (eg. *Terminalia bellerica*)

## Livelihood

- ❖ Except for Dangling, Dungmin and Chakgari and CFs, other CFs has to be managed for timber production as it lack the good timber species naturally growing in it, thus requiring the plantation of timber seedlings.

- ❖ The management for NTFP production should be CF specific based on availability and regeneration potential of NTFP in the CF. Samdrupcholing and Tashithang CF should focus on growing NTFPs; *Bambusa nutans* and *Thysanolaena maxima* to gain monetary benefit. Dangling, Dungmin, Chakgari CFs should manage CF for NTFPs such as firewood, *Thysanolaena maxima* and *Piper longum*.
- ❖ CFs such as Samdrupcholing and Tashithang can be managed with silviculture practices to boost the timber production in future.
- ❖ Most timber species have not reached to harvestable sizes and should be managed from pathogen (fungal infection; heart rot) for quality timber in future.

### **Water discharges**

- ❖ Samdrupcholing, Dangling, Dungmin, Lingar, Juenphen, Rijug, Tirkhola CF should maintain good green cover in the catchment area to recharge aquifer for drinking and irrigation of fields.
- ❖ Rijug and Samdrupcholing CFs have to take care of water source as the flow rate is minimal and consumption is higher.
- ❖ Tirkhola, Dangling and Dungmin CFs serve as catchment area, therefore catchment area should be maintained with good green cover.

## Economic valuation

- ❖ Although market economic value of all CFs is very less, the suitability to grow the NTFPs is very high. Eg. Samdrupcholing and Tashithang can grow *Thysanolaena maxima* and CFs such as Dungmin, Dangling, Chakgari , Tirkhola and Tareythang B CFs can manage for Piper longum collection.
- ❖ The contingent economic value of all the community forest is Nu. 16.11 millions for the period of 2016-2017. The value of forest will increase when people starts to benefit more. Therefore the current economic value can be a baseline information to see the trait of benefit of forest (increase or decrease of benefit) in following years.

Thank you