Perception and Prioritization of Ecosystem Service from Bamboo Forest in Lao PDR: Case Study of Sangthong District

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Table S1. Population of 5 villages, Sanghtong district in 2020 (unit: person, %)

Classification	Study village					
	Nongboua	**Nachalern**	**Tao Hai**	**Kuay**	**Xor**	**Total**
Population	423(100)	1,307(100)	772(100)	653(100)	2,007(100)	5,162(100)
Women	204(48.2)	662(50.7)	312(40.4)	306(46.9)	961(47.9)	2,445(47.4)
Men	219(51.8)	645(49.3)	460(59.6)	347(52.1)	1,046(52.6)	2,717(52.6)
Household	86	275	159	179	407	1,106

Source: DOF, 2020, investigated by the local expert in 2020

Table S2. Land use of 5 villages in 2020 (unit: ha)

Classification	Land use types	Nong-boua	Nacha-lern	Tao Hai	Kuay	Xor	Total
I	**Forest cover**	**504.4**	**592.3**	**1,751.5**	**977**	**3,196**	**7021.2**
1.1	Village conservation forest	80.0	192.7	1,074.9	342	320	2009.6
1.2	Village protection forest	345	20	0	268	326	959
1.3	Village utility forest	43	102.1	623.5	162	2,550	3,480.6
1.4	Sacred forest	18	17.	53	-	-	88
1.5	Plantation	18.4	260.5	1,112	205	-	1,595.9
II	**Agriculture land**	**599.5**	**747.2**	**1,434.6**	**1,398**	**3,930**	**8,109.3**
2.1	Paddy field	378	296	388	575	400	2,037
2.2	Shifting cultivation	24.3	40.6	30	592	3,420	4,106.9
2.3	Garden and other uses	16.5	21.9	620	-	70	728.4
2.4	Rangeland	180.7	388.8	396.6	231	40	1,237.1
III	**Settlement area**	**32.**	**15.7**	**15.4**	**14.3**	**27**	**104.4**
IV	**Other land use**	**-**	**-**	**-**	**38.8**	**1,373**	**1,411.8**
Total		**1,135.9**	**1,355.1**	**3,201.5**	**2,428.1**	**8,526**	**16,646.6**

Source: DOF, 2020, investigated by the local expert in 2020

Table S3. Interviewer information

Gender	Affiliation	Education	Career associated with ES
Women	Provincial Agriculture and Forestry Office, Laos	Undergraduate	< 3 years
Men	Department of Forestry, Laos		3 – 5 years
	Department of Forestry, Laos		3 – 5 years

Public Priority Survey of Ecosystem Service for Different Land-Use Types

[Community group or smallholder farmer]

1. Priority of ecosystem service (ES) with respect to land-use types

1-1. Ecosystem service (ES) provided from bamboo forest

- ✓ **In your opinion, which ecosystem service type from bamboo forest is more important for you?**
  - ➢ Please score priorities of ecosystem services from bamboo forest on 100-points scale.
  - ➢ Close to '100' indicates more important for your life; close to '10' indicates less important; and '0' indicates not important at all.
  - ➢ The summation of all points for ecosystem service types should be 100 points.

Ecosystem Service type	100 preference points										
	0	10	20	30	40	50	60	70	80	90	100
Food											
Raw materials supply											
Bioenergy											
Timber											
Freshwater											
Natural hazard regulation											
Soil erosion											
Water purification											
Air quality and local climate regulation											
Landscape beauty											
Cultural/religious values											
Habitat for species											
Biodiversity											

Figure S1. The questionnaire form of 100 preference points for priority survey

Table S4. List of ES from bamboo forest identified in Sanghtong district. Ecosystem services based on TEEB categories.

Ecosystem service category	Important ES lists identified by literature reviews	Description of bamboo forests*	Beneficiary/Use*
Provisioning service	Food	Provides foods especially edible and palatable shoots	Public/ Private
	Raw materials	Provides various type of raw materials (e.g. housing, flooring, craft and fiber, and bamboo splits for chopstick)	Public/ Private
	Bioenergy	Substitutes for wood charcoal and mineral coal, thus replacing fossil fuels and decreasing the carbon footprint	Private
	Timber	Provides construction timber (e.g., building raw materials)	Private
	Medicine	Provides traditionally medicine	Public/ Private
	Freshwater	Helps protect water source and freshwater supply	Public/ Private
Regulating service	Carbon sequestration	Grows fast and can sequestrate carbon from atmosphere over tree. Over 90% of bamboo carbon can be sequestrated in durable products such as boards, panels, and activated charcoal	Public
	Natural hazard control	The complex root network controls flooding and landslides by holding soil particles together	Public
	Soil erosion	Stabilizes slopes and prevents soil erosion and decrease the deposition load downstream	Public/ Private
	Water purification	Filters out and decompose organic waste from land and water. And it can assimilate and detoxify compounds of soil and subsoil	Public/ Private
	Air quality and local climate regulation	Filters the air and remove odors and dust particles out of the air through the action of leaves and bark. Improved air quality makes the local climate better through the action of leaves and bark of bamboo	Public

Cultural service	Cultural/ religious value	Provides materials for religious and cultural purposes. Traditionally, the Laos people use intricately woven bamboo mats and incense stick in temple (wat). Most live in rural villages around a temple, temple or house often constructed entirely from woven bamboo thatching.	Public
	Landscape beauty	Prevents land degradation and enhances landscape restoration and greenery.	Public
Habitat service	Habitat provision	Provides suitable habitats for different species (flora and fauna).	Public
	Biodiversity (focusing species)	Maintains major bamboo species by promoting different varieties and providing a habitat for wild animals.	Public

Note: * Based on [28]

Table S5. Community (n = 500) public perception result of ES from bamboo forest

	ES categories	No current use (A)		Little current use (B)		Moderate current use (C)		High current use (D)		Total NO (A+B)[1]		Total YES (C+D)[2]		Final selection
		N	%	N	%	N	%	N	%	N	%	N	%	
P[3]	Food	26	5.2	9	1.8	89	17.8	376	75.2	35	7	465	93.0	**O**
	Raw materials	27	5.4	30	6	157	31.4	286	57.2	57	11.4	443	88.6	**O**
	Bioenergy	61	12.2	163	32.6	147	29.4	129	25.8	224	44.8	276	55.2	**O**
	Timber	98	19.6	67	13.4	142	28.4	193	38.6	165	33	335	67.0	**O**
	Medicine	379	75.8	32	6.4	56	11.2	33	6.6	411	82.2	89	17.8	**X**
	Freshwater	70	14	61	12.2	160	32	209	41.8	131	26.2	369	73.8	**O**
R	Carbon sequestration	264	52.8	66	13.2	73	14.6	97	19.4	330	66	170	34.0	**X**
	Natural hazard regulation	38	7.6	62	12.4	183	36.6	217	43.4	100	20	400	80.0	**O**
	Soil erosion	25	5	84	16.8	168	33.6	223	44.6	109	21.8	391	78.2	**O**
	Water purification	69	13.8	55	11	148	29.6	228	45.6	124	24.8	376	75.2	**O**
	Air quality and local climate regulation	18	3.6	30	6	114	22.8	338	67.6	48	9.6	452	90.4	**O**
C	Landscape beauty	11	2.2	21	4.2	95	19	373	74.6	32	6.4	468	93.6	**O**
	Cultural/religious values	60	12	133	26.6	172	34.4	135	27	193	38.6	307	61.4	**O**
H	Habitat for species	40	8	92	18.4	221	44.2	147	29.4	132	26.4	368	73.6	**O**
	Biodiversity	32	6.4	81	16.2	198	39.6	189	37.8	113	22.6	387	77.4	**O**

[1] A+B indicates the sum of negative responses (1 = no use, 2 = little use)

[2] C+D indicates the sum of positive responses (3 = moderate use, 4 = high use)

[3] P: Provisioing service, R: Regulating service, C: Cultural service, H: Habitat service

Table S6. Expert (n = 30) public perception result of ES from bamboo forest

	ES categories	No current use (A)		Little current use (B)		Moderate current use (C)		High current use (D)		Total NO (A+B)		Total YES (C+D)		Final selection
		N	%	N	%	N	%	N	%	N	%	N	%	
P	Food	0	0.0	0	0.0	0	0.0	30	100	0	0.0	30	100	**O**
	Raw materials	0	0.0	0	0.0	10	33.3	20	66.7	0	0.0	30	100	**O**
	Bioenergy	0	0.0	10	33.3	15	50.0	5	16.7	10	33.3	20	66.7	**O**
	Timber	0	0.0	14	46.7	14	46.7	2	6.7	14	46.7	16	53.3	**O**
	Medicine	10	33.3	12	40.0	8	26.7	0	0.0	22	73.3	8	26.7	**X**
	Freshwater	0	0.0	10	33.3	17	56.7	3	10.0	10	33.3	20	66.7	**O**
R	Carbon sequestration	0	0.0	8	26.7	22	73.3	0	0.0	8	26.7	22	73.3	**O**
	Natural hazard regulation	0	0.0	16	53.3	13	43.3	1	3.3	16	53.3	14	46.7	**X**
	Soil erosion	0	0.0	3	10.0	16	53.3	11	36.7	3	10.0	27	90.0	**O**
	Water purification	0	0.0	7	23.3	16	53.3	7	23.3	7	23.3	23	76.7	**O**
	Air quality and local climate regulation	0	0.0	0	0.0	16	53.3	14	46.7	0	0.0	30	100	**O**
C	Landscape beauty	0	0.0	0	0.0	6	20.0	24	80.0	0	0.0	30	100	**O**
	Cultural/religious values	0	0.0	9	30.0	13	43.3	8	26.7	9	30.0	21	70.0	**O**
H	Habitat for species	0	0.0	12	40.0	18	60.0	0	0.0	12	40.0	18	60.0	**O**
	Biodiversity	0	0.0	7	23.3	15	50.0	8	26.7	7	23.3	23	76.7	**O**

Table S7. Mann-Whitney test result of prioritizing bamboo ES for stakeholder groups

ES category		Stakeholder group	Mean Rank	p-value
Provisioning service	Food	Community	790.83	0.060
		Expert	873.28	
	Raw_material	Community	809.96	0.000*
		Expert	554.51	
	Bioenergy	Community	784.50	0.063
		Expert	680.47	
	Timber	Community	794.55	0.865
		Expert	802.51	
	Freshwater	Community	792.32	0.045*
		Expert	848.56	
	Medicine	Community	791.44	0.085
		Expert	863.14	
Regulating service	Natural_hazard_regulation	Community	800.72	0.042*
		Expert	708.54	
	Soil_erosion	Community	790.52	0.058
		Expert	860.67	
	Water_purification	Community	804.24	0.000*
		Expert	649.88	
	Fresh_air_regualtion	Community	802.95	0.000*
		Expert	653.89	
	Carbon_sequstration	Community	765.50	0.000*
		Expert	1295.50	
Cultural service	Landscape_beauty	Community	798.35	0.254
		Expert	748.08	
	Cultural_religious_values	Community	795.68	0.943
		Expert	792.49	
Habitat service	Habitat for species	Community	793.78	0.364
		Expert	824.17	
	Biodiversity	Community	792.76	0.360
		Expert	823.39	

*$p < 0.05$.