

Assessing the Changes of Ecosystem Services in the Nansi Lake wetland, China

Supplementary Material



Figure S1. Current ecological environment in the Nansi Lake Wetland.



Figure S2. Field surveys with different respondents in the Nansi Lake Wetland ((a) enterprise employee; (b) village cadres; (c) teachers; (d) retailers; (e) surrounding residents (f) fishermen)

Questionnaire on the current ecological environment in the Nansi Lake Wetland

I. Introduction

Dear residents,

Good day! The Questionnaire on the current ecological environment in Nansi Lake Wetland is dedicated to improving wetland management. Through this brief survey, your answers will be helpful in improving wetland ecological services. Your response will only be used for survey purposes. In case you have any questions regarding the survey, please call Ms. Fan Wang at 0516-83591301. Thank you very much for your time and suggestions.

II. Questions:

Directions: Please indicate your level of agreement or disagreement with each of these statements regarding Questionnaire. Place an "X" mark in the box of answers.

Q1: Do you know the basic situation of the Nansi Lake Wetland?

- The approximate area of the lake? _____
- Which government departments manage the Nansi Lake wetland ? _____
- The function of the ecosystem of the wetland? _____

Q2: How do you think the ecological environment of the Nansi Lake Wetland has changed in the past 30 years?

• Environment	☐ good	☐ poor
• Fish species	☐ more	☐ less
• Fish resource production	☐ increase	☐ decrease
• Bird species	☐ more	☐ less
• Vegetation species	☐ more	☐ less
• Water quality	☐ good	☐ poor
• Water resources	☐ more	☐ less

Q3: Do you know the approximate average price of various ecosystem products and service functions in the Nansi Lake wetland

- The cost of irrigation farmland and the price of waterworks? _____
- The unit price of the *Trapa bispinosa*? _____
- The unit price of the *Euryale ferox* _____

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- The unit price of the *Phragmites australis* _____
- The unit price of the *Nelumbo nucifera* _____
- The unit price of the fish _____
- The unit price of the rice _____
- The cost of constructing a cubic meter of reservoir _____
- The price of fertilizer _____

Q4: Do you think the surrounding industry will affect Nansi Lake Wetland ecological environment?

☐yes ☐no

If you choose "Yes", please select an industry that you think has an impact on the ecological environment of Nansi Lake

☐ Paper Industry	☐ Food Industry
☐ Coal Industry	☐ Shipping Industry
☐ Fishery	☐ Agricultural

Q5: Do you have any other suggestions on strengthening the ecological environmental protection of the Nansi Lake Wetland?

III. Demographic Data

Name (optional): _____ Gender: _____

Age (optional): _____ Profession: _____

E-mail (optional): _____ Place: _____

IV. Thank you for sharing your thoughts with us.

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Figure S3. Questionnaire on the current ecological environment in the Nansi Lake Wetland

Table 1. The average price of various ecosystem products and service functions in the Nansi Lake Wetland¹.

Accounting indicators	Assessing Price
The cost of farmland irrigation and the price of waterworks (USD/m ³)	0.05
The unit price of the <i>Trapa bispinosa</i> (USD/kg)	14.73
The unit price of the <i>Euryale ferox</i> (USD/kg)	15.34
The unit price of the <i>Phragmites australis</i> (USD/kg)	0.09
The unit price of the <i>Nelumbo nucifera</i> (USD/kg)	0.91
The unit price of the fish (USD/kg)	4.45
The unit price of the rice (USD/kg)	0.52
The cost of afforestation of CO ₂ (USD/kg)	0.09
The cost of O ₂ released (USD/kg)	0.06
The cost of constructing a cubic meter of reservoir (USD/m ³)	0.31
The price of fertilizer (USD/kg)	0.68
The purification value of the unit <i>Phragmites australis</i> (USD/km ²)	87.69×10 ⁴
The unit value of entertainment (USD/km ²)	39.70
The unit value of cultural education (USD/km ²)	59.54

Note: ¹ The assessing price used the 2017 constant price in this study.

Table S2. Average biomass of biological resources in the Nansi Lake Wetland

		1985	1992	2005	2011	2017
Floating leaf	<i>Trapa bispinosa</i> (10 ³ kg)	64.80	51.64	55.24	51.75	58.50
plants	<i>Euryale ferox</i> (10 ³ kg)	469.88	381.75	367.13	423.75	450.10
Emergent plants	<i>Phragmites australis</i> (10 ⁷ kg)	80.97	86.23	31.70	45.10	60.10
	<i>Nelumbo nucifera</i> (10 ⁷ kg)	40.11	49.02	21.13	29.10	35.00
Fish resources (10 ⁷ kg)		1.10	0.95	3.27	5.00	7.00
Paddy field (10 ⁷ kg)		6.10	7.27	12.34	23.17	12.73

Table S3. Other related indicators of regulation service in the Nansi Lake Wetland

	1985	1992	2005	2011	2017
The amount of fixed CO ₂ (10 ⁷ kg)	515.61	479.77	325.30	418.02	438.52
The amount of O ₂ released (10 ⁷ kg)	376.74	350.55	237.70	305.43	320.42
The maximum lake area (km ²)	738.06	767.63	728.10	909.44	902.97
The average surface runoff (10 ⁻⁴ km)	7.50	7.50	7.50	7.50	7.50
The medium depth of erosion without vegetation (10 ⁻² m/a)	2.50	2.50	2.50	2.50	2.50
The soil bulk density (g/cm ³)	1.30	1.30	1.30	1.30	1.30
The average content of soil nutrient (%)	1.96	1.96	1.96	1.96	1.96
The maximum amount of flood season(km ³)	4.61	4.61	4.61	4.61	4.61
The area of <i>Phragmites australis</i> distribution (km ²)	279.16	297.32	109.30	319.77	426.36
The area of entertainment (km ³)	1045.56	1062.77	1038.58	952.51	1077.38
The area of cultural education (km ³)	1116.04	1147.28	1182.08	1222.92	1225.40

Table S4. Variation of gross ecosystem product in the Nansi Lake Wetland (10⁸ USD)

		1985	1992	2005	2011	2017
Ecosystem Product Value (EPV _s)	Water resources	1.16	1.53	1.83	2.00	2.14
	Biological resources	5.27	6.11	4.38	6.55	7.59
Ecosystem	Climate adjusting	3.55	3.31	2.24	2.88	3.02
Regulation	Water conservation	1.73	1.80	1.71	2.14	2.12
Service Value (ERV _s)	Soil and water conservation	4.82	4.96	5.11	5.28	5.29
	Regulate flood	14.42	14.42	14.42	14.42	14.42
	Water purification	2.45	2.61	0.96	2.80	3.74
Ecosystem Cultural Service Value (ECV _s)	Entertainment	4.15	4.22	4.12	3.78	4.28
	Cultural education	3.35	3.45	3.55	3.67	3.68
Gross ecosystem product (GEPs)		40.91	42.41	38.32	43.52	46.28

Table S5. Landscape type classification area in the Nansi Lake Wetland (km²)

	1985	1992	2005	2011	2017
Lake	527.94	498.37	537.90	356.56	363.03
River	23.16	21.37	28.86	45.17	24.20
Swamp	476.67	417.87	60.26	116.16	141.13
Pond	17.79	125.16	411.56	434.62	549.02
Paddy field	70.48	84.51	143.50	269.41	148.02
Building land	71.68	114.73	43.40	41.96	393.78
Other land	101.35	27.04	63.58	25.17	177.09
Natural wetland	1027.77	938.01	627.02	517.89	528.36
Altered wetland	88.27	209.27	555.06	704.03	697.04
Total water resource	1116.04	1147.28	1182.08	1221.92	1225.40

Table S6. Variation of gross ecosystem product of natural wetlands in the Nansi Lake Wetland (10⁸USD)

	1985	1992	2005	2011	2017
Water resources	1.11	1.39	1.37	1.30	1.46
Biological resources	4.91	5.64	3.02	4.02	5.11
Climate adjusting	3.31	2.91	1.39	1.56	1.72
Water conservation	1.73	1.80	1.71	2.14	2.12
Soil and water conservation	4.44	4.05	2.71	2.24	2.28
Water purification	2.45	2.61	0.96	2.80	3.74
Entertainment	4.08	3.72	2.49	2.05	2.10
Cultural education	3.09	2.82	1.89	1.56	1.59
Gross ecosystem product	25.12	24.94	15.54	17.67	20.12

Table S7. Variation of gross ecosystem product of altered wetlands in the Nansi Lake Wetland (10⁸ USD)

	1985	1992	2005	2011	2017
Water resources	0.05	0.15	0.46	0.70	0.67
Biological resources	0.36	0.47	1.36	2.53	2.48
Climate adjusting	0.24	0.39	0.85	1.32	1.30
Soil and water conservation	0.38	0.91	2.40	3.04	3.01
Entertainment	0.07	0.50	1.63	1.73	2.18
Cultural education	0.27	0.63	1.67	2.12	2.10
Gross ecosystem product	1.37	3.04	8.37	11.43	11.74