Supplementary Materials

We have compiled the parameters used to evaluate five ecosystem services: crop production, carbon storage, water conservation, habitat quality, and soil retention. The following text is added to the Supplementary Materials:

(1) Carbon storage (CS)

We calculated the carbon density data for the study area by collating existing research data within our study area. The respective carbon density data for each land type were derived from the aforementioned research studies[1,2], as illustrated in Table S1.

Table S1 The carbon density of each land use/land cover (mg/ha).

Land use/land cover	C_above	C_below	C_soil	C_dead
farmland	9.0	4.0	25.0	0.3
forestland	39.6	30.3	42.4	7.2
the Yellow River	1.5	0.5	30.0	0.0
open water	1.0	0.5	16.0	0.0
grassland	18.1	13.7	31.0	0.4
residential area	0.0	0.0	12.0	0.0
mudflat	1.7	1.0	15.0	0.0
aquaculture ponds	0.5	0.0	12.0	0.0
ports	0.0	0.0	8.0	0.0
saline-alkali land	0.0	0.0	8.6	0.0
industrial land	0.0	0.0	7.1	0.0
salt ponds	0.0	0.0	21.0	0.0

Note: C_above is carbon density in aboveground biomass; C_below is carbon density in belowground biomass; C_soil is carbon density in the soil; C_dead is carbon density in dead matter.

(2)Water yield

The table of biophysical parameters (Table S2) essential for assessing water yield in this study primarily encompasses plant root depth (Root Depth) and crop evapotranspiration coefficient (Kc). These parameters were sourced from pertinent literature references[3,4] , as well as the InVEST modeling manual.

Table S2 Biophysical table of water yield.

Land use/land cover	Root_depth(mm)	Kc	LULC_veg
farmland	2100	0.65	1
forestland	5200	0.93	1
the Yellow River	1	1	0
open water	1	0.9	0
grassland	2300	0.75	1
residential area	500	0.23	0
mudflat	1000	0.7	1
aquaculture ponds	1	0.87	0
ports	1	0.4	0
saline-alkali land	300	0.2	0
industrial land	1	0.4	0
salt ponds	1	0.9	0

Note: Root_depth is Maximum root depth (mm); Kc is the evapotranspiration coefficient of plants corresponding to the land type; LULC_veg means whether the the LULC class is vegetated

(3) Soil retention

We conducted a quantitative assessment of the spatial and temporal variations in soil retention. This assessment was performed using the Sediment Delivery Ratio module within the InVEST model. The specific parameters are adjusted based on the actual conditions in the study area[3].

Table S3. Biophysical table of soil retention.

Land use/land cover	usle_c	usle_p
farmland	0.23	0.30
forestland	0.08	1.00
the Yellow River	0.00	0.02
open water	0.00	0.00
grassland	0.24	1.00
residential area	0.00	0.00
mudflat	1.00	0.5
aquaculture ponds	0.00	0.00
ports	0.00	0.00
saline-alkali land	1.00	0.27
industrial land	0.00	0.00
salt ponds	0.00	0.00

(4) Habitat quality

The InVEST model necessitates the inclusion of a Threat Factor Table (Table S4) and

Sensitivity Table (Table S5), and these are determined through a combination of referencing existing studies and tailoring them to the specific conditions within our study area [3,5].

Table S4 Threat source impact distance level weights.

Threat factors	Maximum distance of influence	Weights	Spatial decay types
farmland	3.3	0.85	linear
residential area	2.8	0.9	linear
aquaculture ponds	1.6	0.65	linear
salt ponds	1.32	0.49	linear
ports	5.52	0.82	linear
industrial land	3.1	0.8	linear

Table S5 Sensitivity of threat factors for different land uses.

Land use/land cover	Habitat	Sensitivity to threats					
		farmland	residential area	aquaculture ponds	salt ponds	ports	industrial land
farmland	0	0	0	0	0	0	0
forestland	1	0.65	0.9	0.65	0.65	0.99	0.65
the Yellow River	1	0.65	0.9	0.3	0.45	0.99	0.55
open water	1	0.45	0.9	0.25	0.55	0.99	0.55
grassland	1	0.5	0.9	0.45	0.45	0.99	0.7
residential area	0	0	0	0	0	0	0

mudflat	1	0.65	0.9	0.45	0.55	0.99	0.85
aquaculture ponds	0	0	0	0	0	0	0
ports	0	0	0	0	0	0	0
saline-alkali land	1	0.7	0.9	0.5	0.7	0.99	0.85
industrial land	0	0	0	0	0	0	0
salt ponds	0	0	0	0	0	0	0

(5) Emergy transformity rate

Table S6. Emergy transformity rate

	parameters	value	reference
crop production	T_{cp}	1.58×1015sej/t	[6]
water conservation	T_{wc}	4.09×104sej/J	[7]
carbon storage	T_{cs}	3.78×1013 sej/t	[7]
habitat quality	T_{hq}	2.92×1019 sej/y	[8]
soil retention	T_{sr}	7.4×104 sej/J	[9]

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