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SUPPLEMENTARY MATERIAL

Trait-based evaluation of plant assemblages in traditional farm ponds in Korea: Ecological and management implications

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Tab. S1. Characteristics and classification of ponds in previous research and this study. Specific description of Ramsar classfiication (Human-made-1: Aquaculture ponds -2: ponds includes farm ponds, stock ponds, small tanks generally below 8 ha; -6: Salt exploitation sites include salt pans, salines, etc.; -7: Excavation pits include borrow pits, mining pools). is provided in appendix.

Term*	Ramsar classification	Regional location	Area (unit: m^2)	Depth (unit: cm)	Construction purposes	Reference
Artificial pond	Human-made-2, 6	Intensively farmed region (Spain)	Mean: 12656 S.D.: 22787 Min: 98 Max.: 176555	Mean: 463 S.D.: 500 Min.:44.6 Max.: 3241	Greenhouse drip irrigation	(Fuentes-Rodríguez et al. 2013)
Farm pond	Human-made-2, 7	Manor Farm (England)	Mean: 150	Largely under 100	Excavation of calcareous clay	(Sayer et al. 2012)
Pinkhill monitoring pond	Inland-Tp, Ts Human-made-2	Floodplain grassland (England)	Min.: 200 Max.: 7500	Min.: 20 Max.: 150	Biodiversity study	(Williams et al. 2008)
Farm pond	Human-made-1, 2, 6	Broadleaved forest, paddy fields and urban area (Japan)	Mean: 11000 S.D.: 14800 Min.: 800 Max: 114300	Mean: 70 S.D.: 60 Min.: 10 Max.: 360	Irrigate rice paddy fields	(Usio et al. 2013)
Farmland pond	Inland-Tp, Ts Human-made-2	2 intensively farmed regions (Italy)	Mean: 63 S.D.: 50 Min.: 25 Max.: 301	Mean: 63 S.D.: 50 Min.: 25 Max.: 200	Unknown	(Gioria et al. 2010)
Farmland pond	Inland- Tp Human-made-2	Extensively farmed regions (Ireland)	Mean: 97 S.D.: 53 Min.: 50 Max.: 189	Mean: 130 S.D.: 40 Min.: 40 Max.: 180	Cattle watering	(Santi et al. 2010)
Man-made pond	Human-made-1, 2 7	Intensively managed wetlands† (Belgium)	< 20000	< 200	Excavation of iron ore and peat, fish farming	(Lemmens et al. 2013)
Stormwater management pond	Human-made-2	Urban area (Canada)	Mean: 13720 S.D.: 15380 Min.: 1020 Max.: 50310	Mean: 130 S.D.: 200 Min.: 30 Max.: 1000	Stormwater control	(Hassall and Anderson 2015)

Dumbeong, irrigation pond	Human-made-2	Rice paddy fields and forest area (Korea)	Mean: 204 S.D.: 338 Min.: 10 Max.: 1127	Mean: 45 S.D.: 29 Min: 12 Max.: 120	Irrigate rice paddy fields	(Choe et al. 2013)
Small palustrine wetland	Inland-Tp Human-made-1, 2	Rural area (Korea)	Mean: 1584 S.D.: 1352 Min.: 347 Max.: 4971	Mean: 150 S.D.: 122 Min.: 40 Max.: 400	Irrigate agricultural lands	(Son et al. 2010)
Dumbeong, small irrigate pond	Inland-Tp, Ts Human-made-2	Rice paddy fields (Korea)	Min.: 4.6 Max: 14.1	Min.: 19 Max.: 186	Irrigate rice paddy fields	(Kim 2011)
Dumbeong	Inland-Tp Human-made-1, 2	Agricultural land and forest area (Korea)	Mean: 191 S.D.: 134 Min.: 24 Max.: 436	Mean: 66 S.D.: 37 Min.: 2 Max.: 129	Irrigate agricultural lands	This study

* The term used to describe study sites in the corresponding reference; † The region, a part of "De Wijers", comprises more than 1000 shallow ponds.

Tab. S2 Trait composition of each functional group. The total number of species in each functional group: FG1 (n=10); FG2 (n=5); FG3 (n=5); FG4 (n=4); FG5 (n=10) and FG6 (n=3). Numbers in bold indicate dominant trait categories which were assigned more than half of the species within an each functional group

Trait	Category	FG1	FG2	FG3	FG4	FG5	FG6
Life history	Annual	**7**	**5**	**5**	0	0	0
	Perennial	3	0	0	**4**	**10**	**3**
Photosynthetic pathways	C3	**10**	**5**	1	**3**	**10**	**3**
	C4	0	0	**4**	1	0	0
Growth form	Woody	0	0	0	0	0	**3**
	Graminoid	0	0	**5**	**3**	5	0
Wetland indicator status	OBL	**9**	0	0	0	**10**	0
	FACW	0	**4**	**4**	2	0	**3**
	FAC	1	0	0	1	0	0
	FACU	0	1	0	1	0	0
	UPL	0	0	1	0	0	0
Aquatic plants morphology	Emergent	3	0	0	0	**8**	0
	Submerged	1	0	0	0	0	0
	Floating-leaved	2	0	0	0	2	0
	Floating	1	0	0	0	0	0
Vegetative propagation	Below	0	0	0	**3**	**10**	**3**
	Above	**7**	0	**3**	0	2	**3**
Seed morphology	Balloon	0	1	**5**	1	**8**	0
	Elongated	2	2	2	0	3	**3**
	No appendage	**7**	1	0	**3**	1	0

Tab. S3. Planted species and the purposes of planting by the owners of *dumbeongs*.

Purpose of planting	Species name
Ornamental plants	*Nelumbo nuficera*, *Nymphaea tetragona, Iris pseudacorus*
Food source	*Trapa japonica*, *Nelumbo nuficera*
Prevention of destruction of *dumbeong* walls	*Salix chaenomeloides, Salix gracilistyla*

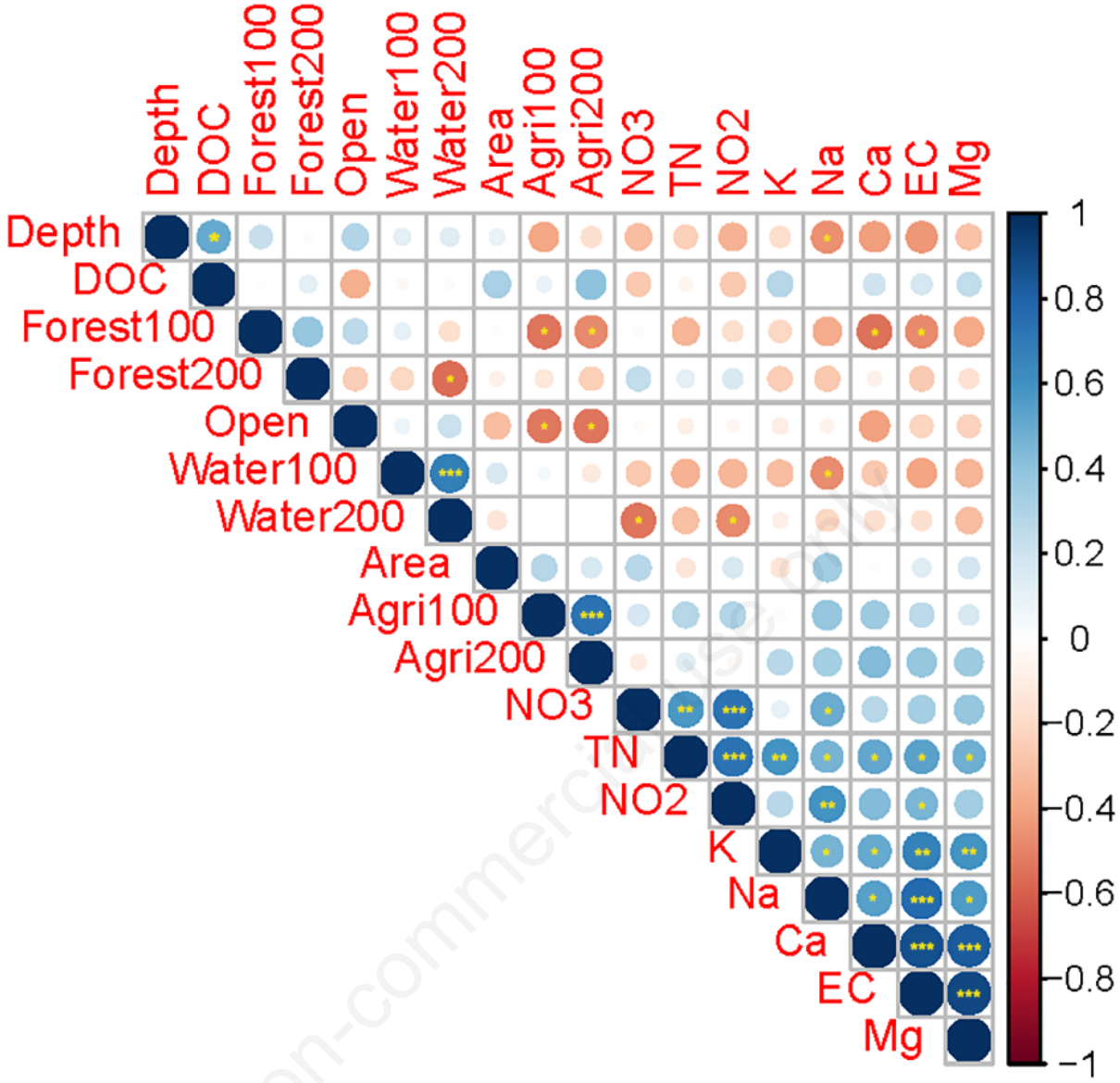

Fig. S1. Spearman's correlation coefficients among all environmental and land use variables of this study. The statistical significance was recorded as follows: *P<0.05, **P<0.01, and ***P<0.001.

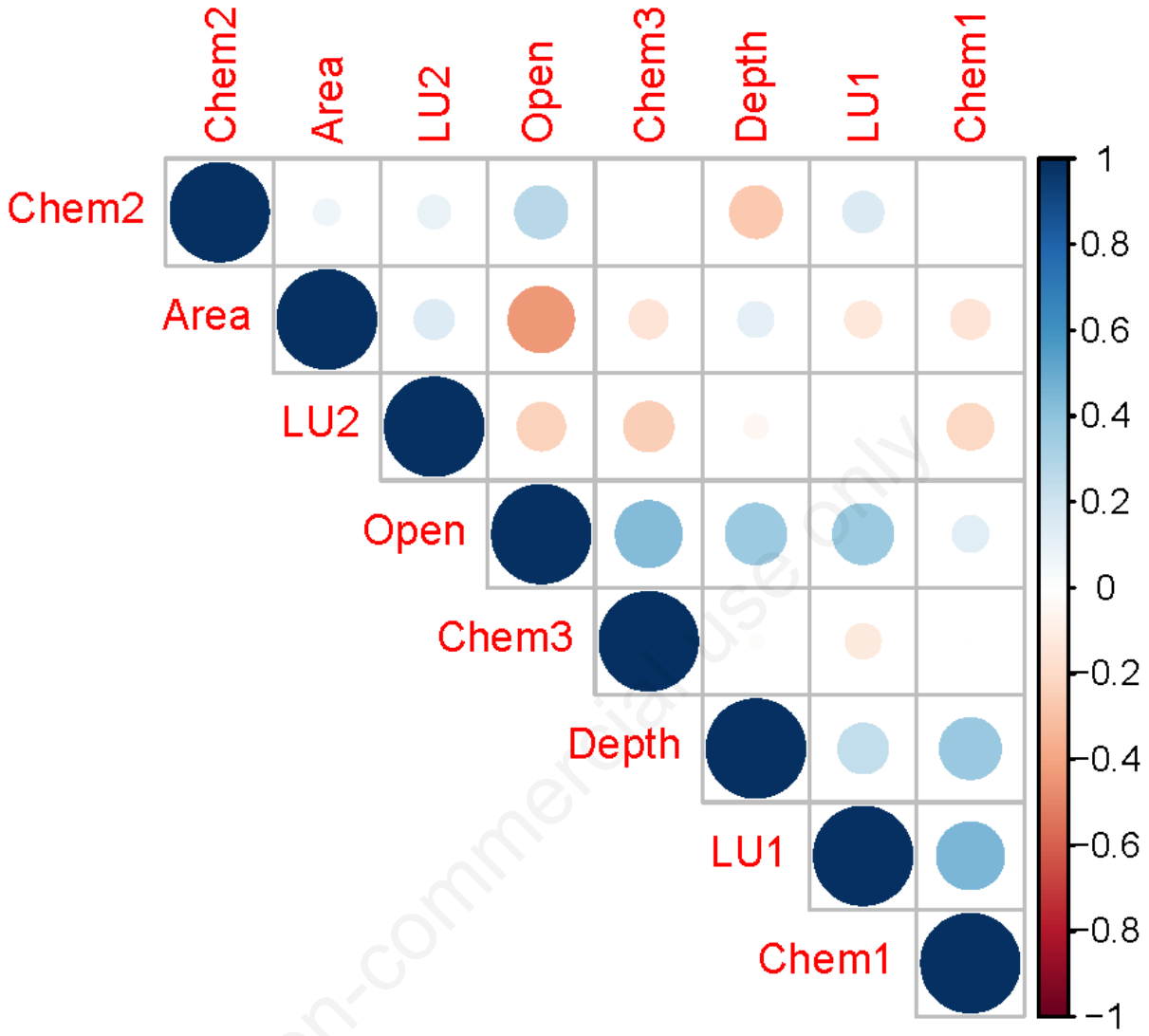

Fig. S2. Spearman's correlation coefficients among final explanatory variables used in redundancy analysis of this study. The statistical significance was recorded as follows: *P<0.05, **P<0.01, and ***P<0.001.

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