Title: **Decline of traditional rice farming constrains the recovery of endangered crested ibis**

Key Mechanism of the Expert System

Let A be an item of evidence known at a given location, and let us set up a hypothesis (B_j) that the land use class j occurs at this location. The Bayes' rule can then be given as:

$$P(B_j \mid A) = \frac{P(A \mid B_j) P(B_j)}{\sum_{i=1}^{n} P(A \mid B_i) P(B_i)}; i = 1, 2, \ldots, n \tag{1}$$

where $P(A|B_j)$ is the conditional probability that a certain grid cell location has an item of evidence (A) given B_j (see Table S1); $P(B_j)$ is the *prior* probability of occurrence of a land use class at a certain location that can be obtained from the rule images of the initial classification. The denominator of Eq. 1 is the sum of all possible cases, where n is the total number of the land use classes in this study (i.e. $n = 7$).

The expert system algorithm worked forward from the item of evidence to the hypothesis and the search terminated only after all the evidence had been evaluated. All pixels were finally relabeled by the hypothesis that possessed the highest *posterior* probability (i.e. $P(B_j|A)$).

Table S1 Probability rules used by the Bayesian expert system for land cover/land use mapping

Item of evidence		Winter-dry rice field	Winter-flooded rice field	Shrub/Grass	Open water	Rain-fed field	Forest	Others
Elevation (m)	< 500	0.4	0.05	0.1	0.3	0.2	0.05	0.3
	500-600	0.3	0.2	0.15	0.2	0.5	0.1	0.15
	600-800	0.25	0.3	0.3	0.1	0.25	0.2	0.1
	800-1000	0	0.05	0.05	0.1	0.02	0.15	0.05
	1000-1300	0.08	0.08	0.02	0	0	0.3	0.05
	>1300	0	0	0.03	0	0	0.95	0
Terrain position	Gully	0.4	0.4	0	0.1	0	0.01	0.05
	Lower mid-slope	0.3	0.2	0.1	0.1	0.1	0.25	0.1
	Mid-slope	0.05	0.05	0.3	0.1	0.3	0.3	0.1
	Upper mid-slope	0.02	0	0.3	0	0.3	0.25	0.1
	Ridge	0	0	0.3	0	0.3	0.2	0.1

Note: Values of zero in the table were replaced by a very small value close to zero in our calculations
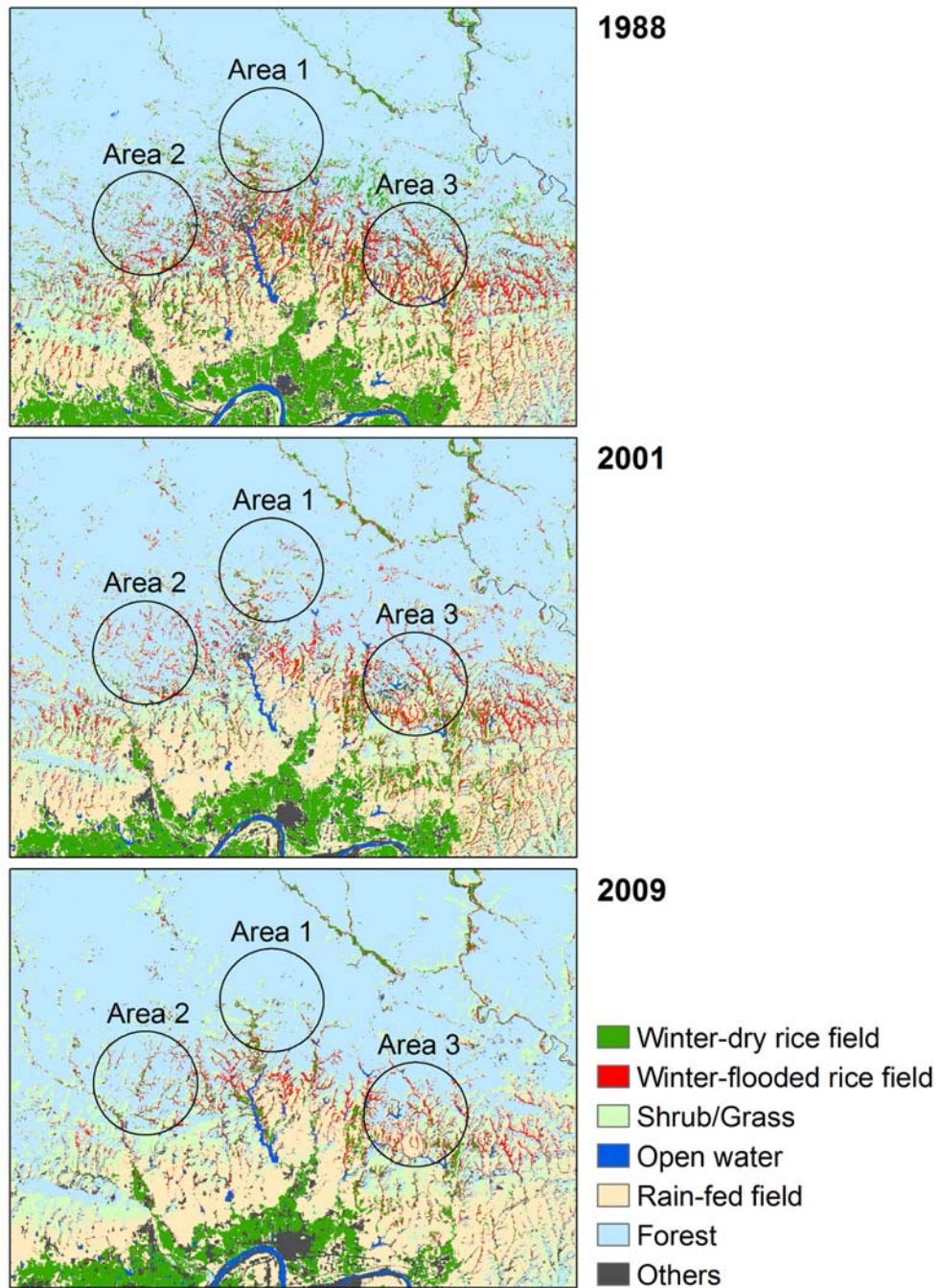
Fig. S1 Maps of the land cover/use classifications in the whole study area for 1988, 2001 and 2009