

Supplementary Material

Estimation of the Source Apportionment of Phosphorus and Its Responses to Future Climate Changes using Multi-model Applications

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1. Introduction

The Long Ashton Research Station Weather Generator (LARS-WG) model used in this study can be downloaded at <http://resources.rothamsted.ac.uk/mas-models/larswg>.

The Regional Nutrient Management (ReNuMa) model used in this study can be downloaded at <http://www.eeb.cornell.edu/biogeonanc/usda/renuma.htm>.

The land use map of the study area is provided in Figure S1.

This Supplementary Material summarizes the model parameters and outputs of ReNuMa and LARS-WG in this study for readers to test and replicate this work.

2. LARS-WG Model

The parameters of the LARS-WG model are summarized in the folder named “parameters of LARS-WG”. The model outputs of LARS-WG that represent the future climate statuses can be found in the folder named “results of LARS-WG”.

3. ReNuMa model

The results of scenario analyses based on the ReNuMa model to estimate the future watershed dissolved phosphorus are summarized in the folder named “results of ReNuMa”. The model parameters for the ReNuMa model are provided in Table S1 and Table S2 below.

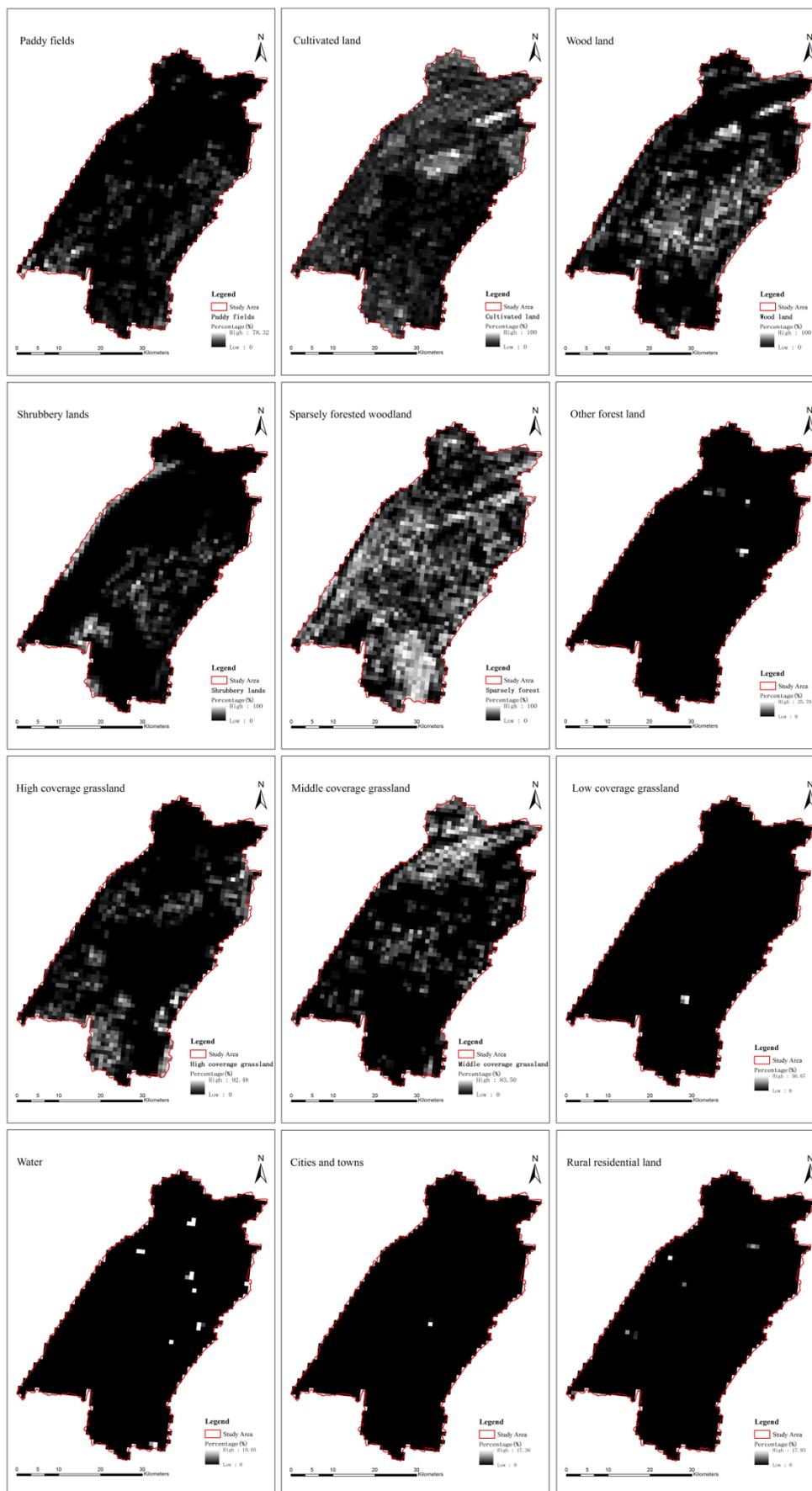


Figure S1. The land use map of the study area. A series of 1 km raster maps are provided with the values of percentages for each land use type in one raster.

Table S1. Hydrological Parameters of Regional Nutrient Management (ReNuMa) model.

| Parameter Items | Subcategories | Parameter Values |
|------------------------|---------------------------------------|-------------------------|
| runoff curve number | Paddy fields | 76.77 |
| | Cultivated land | 84.03 |
| | Wood land | 47.26 |
| | Shrubbery lands | 56.59 |
| | Sparsely forested woodland | 50.17 |
| | Other forest land including garden | 68.98 |
| | High coverage grassland | 72.65 |
| | Middle coverage grassland | 81.04 |
| | Low coverage grassland | 87.84 |
| | Water surface | 100.00 |
| | Cities and towns | 93.83 |
| | Rural residential land | 92.92 |
| runoff curve number | JAN | 0.32 |
| | FEB | 0.32 |
| | MAR | 0.66 |
| | APR | 0.66 |
| | MAY | 0.66 |
| | JUNE | 0.66 |
| | JULY | 0.66 |
| | AUG | 0.66 |
| | SEPT | 0.66 |
| | OCT | 0.66 |
| | NOV | 0.32 |
| | DEC | 0.32 |
| Groundwater flow | Quick recession coefficient | 0.0670 |
| | Quick seepage coefficient | 0.0153 |
| | Slow recession coefficient | 0.0594 |
| | Slow seepage coefficient | 0 |
| | Ground water limit for recession (cm) | 0.2 |
| | Ground water limit for seepage (cm) | 0.2 |
| | Unsaturated zone available water(cm) | 8.3779 |
| | Unsaturated zone leakage coefficient | 0.4193 |

Table S2. Nutrient Parameters of Regional Nutrient Management (ReNuMa) model.

| Parameter Items | Subcategories | Parameter Values |
|--|--|------------------|
| Manure | First manure month | 5 |
| | Last manure month | 8 |
| Rural runoff P concentration (mg/L) | Paddy fields | 0.3456 |
| | Cultivated land | 0.3456 |
| | Wood land | 0.0772 |
| | Shrubbery lands | 0.0772 |
| | Sparsely forested woodland | 0.0772 |
| | Other forest land including garden | 0.0772 |
| | High coverage grassland | 0.1543 |
| | Middle coverage grassland | 0.1543 |
| Rural runoff P concentration during manure months (mg/L) | Low coverage grassland | 0.1543 |
| | Paddy fields | 0.4503 |
| Septic systems | Cultivated land | 0.4503 |
| | Per capita tank P effluent (g/day) | 3 |
| Ground water | Per capita grow season P uptake (g/day) | 1.6 |
| | Ground water phosphorus concentration (mg/L) | 0.0514 |



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