**Citation:** Rong, Q., M. Su, W. Yue, and Y. Cai. 2022. Management of nutrient export from diffuse sources in watersheds for environmental protection under uncertainty. Journal of Soil and Water Conservation 77(3). <https://doi.org/10.2489/jswc.2022.00192>.

**Supplemental Material**

**Table S1 Economic and attribute data of different crops**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameters** | **Rice** | **Tubers** | **Vegetable** | **Soybean** | **Peanut** |
| Yield per unit area (*YAj*, kg/ha) | 5588 | 4613 | 20076 | 2337 | 2394 |
| Unit net benefit (*BCj*, $/ha) | [1400,1500] | [1550,1700] | [3900,4150] | [600,700] | [1450,1650] |
| Biological nitrogen fixation (*BF*ant *j* kg/ha·a) | 25.00 | 5.00 | 5.00 | 138.60 | 159.30 |
| Crop N content (*NCj* , g/kg) | 13 | 3 | 2 | 35 | 40 |
| Crop P content (*PCj*, g/kg) | 2.67 | 0.5 | 0.33 | 5.83 | 6.67 |
| straw-grain ratio (sgj) | 0.9 | 0.5 | n.a. | 1.6 | 0.8 |
| Straw N content (*NSj*, %) | 0.91 | 2.51 | n.a. | 1.81 | 1.82 |
| Straw P content (*PSj*, %) | 0.13 | 0.2775 | n.a. | 0.2 | 0.163 |
| Returning rate of crop straw to the field (*Retj*) | 0.42 | 0.50 | n.a. | 0.17 | 0.26 |
| N demand per unit area (*NDj*, kg/ha) | [110,120] | [22,24] | [880,920] | [150,165] | [140,160] |
| P demand per unit area (*PDj*, kg/ha) | [45,60] | [11,13] | [290,310] | [36,39] | [27,31] |

**Table S2 Economic and excretion data of different livestock and poultry**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameters** | **Hogs** | **Cattle** | **Sheep** | **Poultry** |
| Unit benefit (*BLl*, $/unit) | [50,55] | [550,600] | [54,60] | [2,3] |
| N excretive coefficients (*ENl*, kg/unit·a) | 15.30 | 55.51 | 11.27 | 0.52 |
| P excretive coefficients (*EPl*, kg/unit·a) | 4.10 | 9.69 | 1.66 | 0.30 |
| Loss coefficient during the manure collection process (LC) | 0.30 | 0.15 | 0.15 | 0.15 |
| Application rate of each type of manure (RE) | 0.495 | 0.645 | 0.23 | 0.22 |

**Table S3 Other related data in the simulation and management model**

|  |  |
| --- | --- |
| **Parameters** | **Value** |
| N volatilization coefficient of fertilizer (VCfe) | 0.35 |
| N volatilization coefficient of manure (*VC*ma) | 0.30 |
| Atmospheric N deposition coefficient of agricultural area (*AD*ant, g/m2 a) | 3.85 |
| Atmospheric N deposition coefficient of natural area (*AD*nat, g/m2 a) | 1.5 |
| Unit cost for N fertilizer application (purified) (*CFN*, $/kg) | [0.7,0.9] |
| Unit cost for P fertilizer application (*CFP*, $/kg) | [0.98,1.18] |
| Annual water runoff from land to streams (, m) | (0.795,0.1652) |

**Table S4** **The upper limits of crop yields and agricultural areas in the East River basin**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Watersheds** | **Agricultural land area (ha)** | **Crop yield (t)** | | | | |
| **Rice** | **Tubers** | **Soybean** | **Peanut** | **Vegetable** |
| Xunwu (XW) | 40927 | 166667 | 6700 | 4458 | 6939 | 146878 |
| Beiling (BL) | 22892 | 942340 | 3086 | 1886 | 2569 | 75659 |
| Lijiang (LJ) | 29882 | 106080 | 5417 | 3744 | 5022 | 107527 |
| Xinfeng (XF) | 70411 | 209709 | 12731 | 10511 | 29032 | 279079 |
| Main stream (MS) | 120836 | 325297 | 18194 | 9216 | 39241 | 889638 |
| Gongzhuang (GZ) | 19253 | 34011 | 1673 | 454 | 5222 | 211166 |
| Qiuxiang (QX) | 34325 | 102469 | 9178 | 3156 | 11544 | 219561 |
| Xizhi (XZ) | 65152 | 117030 | 30022 | 1516 | 17577 | 633294 |
| Shima (SM) | 23836 | 32521 | 2599 | 411 | 7394 | 328808 |

**Table S****5 The upper limits of production numbers for different livestock and poultry types in the East River basin**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Watersheds** | **Livestock** | | | |
| **Hogs** | **Cattle** | **Sheep** | **Poultry** |
| Xunwu | 144981 | 35995 | 9866 | 776936 |
| Beiling | 192845 | 22175 | 1509 | 384020 |
| Lijiang | 123286 | 20805 | 1706 | 626255 |
| Xinfeng | 153459 | 44925 | 2971 | 1189289 |
| Main stream | 485468 | 74938 | 2196 | 3070279 |
| Gongzhuang | 101407 | 10307 | 316 | 590999 |
| Qiuxiang | 98177 | 27105 | 120 | 784675 |
| Xizhi | 173799 | 41396 | 1507 | 860391 |
| Shima | 140137 | 13994 | 157 | 745244 |

**Table S6** **Crop yield occupied per unit livestock and poultry in base year (unit: kg )**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Crops** | **Hogs** | **Cattle** | **Sheep** | **Poultry** |
| Rice | 736.28 | 4073.60 | 58388.17 | 131.59 |
| Tubers | 55.53 | 307.23 | 4403.56 | 9.92 |
| Soybean | 21.91 | 121.21 | 1737.41 | 3.92 |
| Peanut | 77.18 | 427.03 | 6120.74 | 13.79 |
| Vegetable | 1792.07 | 9915.00 | 142114.81 | 320.29 |