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Dataset Development on Nitrogen and Phosphorus Flows in Agricultural System Affected by Tourists in Wentang Town, Jiangxi Province of China (2018, 2020)

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Abstract: Phosphorus and nitrogen are critical indicators of water eutrophication, with socio-economic activities being major contributing factors. This study area located in Wentang Town, Jiangxi Province, China, by applying material balance theory and nitrogen and phosphorus life cycle analysis to assess their flows within the agricultural system (i.e. the System). The System was subdivided into 5 subprocesses: cultivation, animal feeding, food processing, consumption, and waste disposal. Data on phosphorus and nitrogen flows associated with tourist consumption behaviors and the agricultural system were collected through questionnaire surveys (conducted in December 2018 and March 2020) and literature research. Activity levels and calculation coefficients were identified and compiled to quantitatively assess the impact of tourist consumption on phosphorus and nitrogen dynamics within the System. The dataset includes: (1) geolocation of Wentang Town; (2) underlying data of tourist consumption behaviors and typical agricultural economic system and calculated coefficient of N and P; (3) the influence of tourist consumption behaviors on P and N flow in 5 subprocesses: cultivation, animal feeding, food processing, consumption and disposal; (4) the influence of tourist consumption behaviors on P and N import and export in typical agricultural economic system. The dataset is archived in .shp and .xlsx data formats, and consists of 8 data files with data size of 143 KB (compressed into one file with 135 KB).

Keywords: phosphorus; nitrogen; agricultural activity; resident consumption; tourist consumption; tourism

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[2] Chen, Q. Q., Pang, A. P., Long, Z. D., *et al*. Dataset of nitrogen and phosphorus flow in agricultural system affected by tourists in Wentang Town of Jiangxi Province of China (2018, 2020) [J/DB/OL]. *Digital Journal of Global Change Data Repository*, 2025. https://doi.org/10.3974/geodb.2025.01.03.V1.

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1 Introduction

Phosphorus and nitrogen are essential nutrients for biological processes, and which are fundamental to human societal development. However, their extensive use has caused significant environmental pollution and resource depletion[1,2]. Between 2016 and 2022, more than 81%–99% of phosphorus and 85%–97% of nitrogen discharges originated from domestic, agricultural, and centralized waste treatment sources[1]. Material balance theory underpins substance flow analysis, which tracks and quantifies resource utilization[3] and environmental impacts[4,5] by analyzing phosphorus and nitrogen inputs, outputs, and storage across socio-economic and environmental systems. Previous research has explored nutrient flows at global[6–8], national[5,9], and regional scales[10], primarily focusing on socio-economic systems where urban and rural populations are the primary consumers. These studies indicate that human activities—driven by economic development, population growth, dietary shifts, and population density[5,10,11]—substantially influence nitrogen and phosphorus fluxes.

Tourism has emerged as a significant driver of environmental change, intensifying pollution and resource depletion in destination areas. However, studies on the influence of tourist consumption on nitrogen and phosphorus flows remain scarce. Most prior research has focused on phosphorus and nitrogen flows associated with urban and rural residents while neglecting the heightened metabolic intensity introduced by tourists. This study addresses this gap by selecting Wentang Town, an agriculturally driven economy in Jiangxi Province, as a study area. Using material balance theory and substance flow analysis, phosphorus and nitrogen activity levels associated with both tourist consumption and agricultural activities (hereafter referred to as the “System”) were systematically compiled. A refined phosphorus and nitrogen flow model was developed to quantitatively assess the impact of tourism-related consumption on nutrient dynamics within the System and its subprocesses.

2 Metadata of the Dataset

Dataset of nitrogen and phosphorus flow in agricultural system affected by tourists in Wentang Town of Jiangxi Province of China (2018, 2020)[12] has been summarized in Table 1. It includes the dataset full name, short name, authors, year of the dataset, data format, data size, data files, data publisher, and data sharing policy, etc.

3 Methods

3.1 Data Collection and Processing

The study aimed to quantify the impact of tourist consumption on phosphorus and nitrogen

[1] Ministry of Ecology and Environment of P. R. China. 2016–2019 Annual Report on the State of the Ecology and Environment in China, 2020; 2020 Annual Report on the State of the Ecology and Environment in China, 2022; 2021 Annual Report on the State of the Ecology and Environment in China, 2023; 2022 Annual Report on the State of the Ecology and Environment in China, 2023. https://www.mee.gov.cn/hjzl/sthjzk/sthjtjnb/.

Table 1 Metadata summary of Dataset of nitrogen and phosphorus flow in agricultural system affected by tourists in Wentang Town of Jiangxi Province of China (2018, 2020)

Items	Description
Dataset full name	Dataset of nitrogen and phosphorus flow in agricultural system affected by tourists in Wentang Town of Jiangxi Province of China (2018, 2020)
Dataset short name	N&P_Flow_WentangJX
Authors	Chen, Q. Q., College of Life Science and Resources and Environment, Yichun University, chenqq@nju.edu.cn Pang, A. P., Department of Public Management, Nanjing Academy of Administration, qinglan231@163.com Long, Z. D., Hunan Soil Fertilizer Research Institute, longzd313@hunaas.cn Liu, Z. H., Law enforcement brigade for ecological environment protection comprehensive of Yuan Zhou, Yichun, 346381060@qq.com Xu, Y. Y., Law enforcement brigade for ecological environment protection comprehensive of Jinzhong City, 19581905174@163.com
Geographical region	Wentang Town of Jiangxi Province
Year	2018, 2020
Data format	.shp and .xlsx
Data size	143 KB, compressed to135 KB
Data files	Geolocation of Wentang Town; Underlying data on tourist consumption behaviors and typical agricultural economic system and calculated coefficient of N and P; The influence of tourist consumption behaviors on P and N flow in 5 subprocesses, and the influence of tourist consumption behaviors on P and N import and export in typical agricultural economic systems
Foundations	Education Department of Jiangxi Province (GJJ190845, GL21223)
Data publisher	Global Change Research Data Publishing & Repository, http://www.geodoi.ac.cn
Address	No. 11A, Datun Road, Chaoyang District, Beijing 100101, China
Data sharing policy	(1) *Data* are openly available and can be free downloaded via the Internet; (2) End users are encouraged to use *Data* subject to citation; (3) Users, who are by definition also value-added service providers, are welcome to redistribute *Data* subject to written permission from the GCdataPR Editorial Office and the issuance of a *Data* redistribution license; and (4) If *Data* are used to compile new datasets, the "ten percent principal" should be followed such that *Data* records utilized should not surpass 10% of the new dataset contents, while sources should be clearly noted in suitable places in the new dataset[13]
Communication and searchable system	DOI, CSTR, Crossref, DCI, CSCD, CNKI, SciEngine, WDS, GEOSS, PubScholar, CKRSC

flows within a typical agricultural system. The methodology involved 3 key steps (Figure 1). First, we reviewed existing literature to identify phosphorus and nitrogen inputs, outputs, and stocks, determine activity levels, and establish model parameters. This initial model considered only urban and rural residents as consumers. Second, data sources—including statistical records, literature reviews, and questionnaire surveys—were used to characterize phosphorus and nitrogen flows associated with tourist consumption. This step enabled the identification of inputs, outputs, and stocks specific to tourists, along with the necessary activity level data and computational parameters. As a result, a revised "three-bodies" (urban residents, rural residents, and tourists) phosphorus and nitrogen flow model was developed, incorporating urban residents, rural residents, and tourists. Finally, we calculated and analyzed phosphorus and nitrogen fluxes under scenarios with and without tourist consumption, allowing for a quantitative evaluation of tourism's impact on nutrient dynamics within the System.

This study employed substance flow analysis (SFA) to develop a phosphorus and nitrogen flow model for the agricultural system, we established a phosphorus and nitrogen metabolism model, which integrates tourists as the third consumer group within the agricultural economic system. The model's spatial boundary corresponded to Wentang Town's administrative limits, with 2018 as the reference year. The System was categorized into 5 subprocesses: cultivation, animal feeding, food processing, consumption, and waste disposal.

Cultivation subprocess: this subprocess involved the sowing and harvesting of crops from both cultivated farmland and landscaped areas. Most agricultural products were directed to the food processing subprocess, while a smaller portion was allocated as animal feed. No significant phosphorus or nitrogen losses occurred within this subprocess. The phosphorus and nitrogen balance followed the equation: input (other subprocesses (intra-system circulation), import, environmental input) = output (other subprocesses, export, environmental emissions) + stock.

Animal feeding subprocess: this subprocess encompassed livestock rearing from juvenile stages to maturity before slaughter. No additional nutrient losses occurred. The phosphorus and nitrogen balance were expressed as: input (other subprocesses (intra-system circulation), import) = output (other subprocesses, export, environmental emissions) + stock.

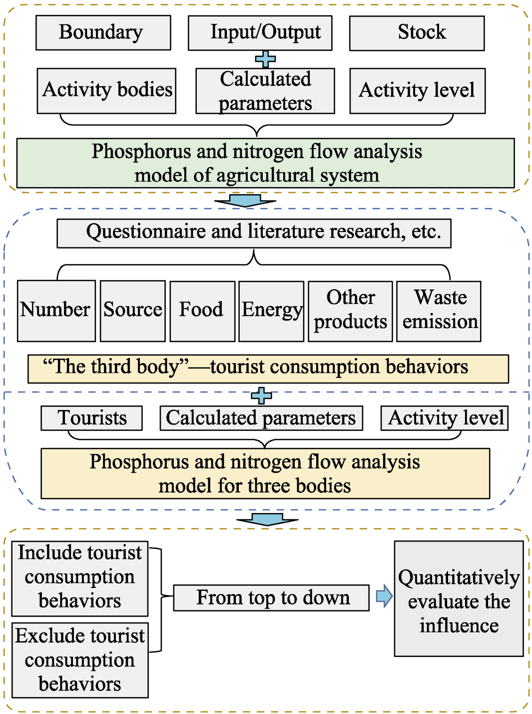

Figure 1 Flowchart of the dataset development

Food processing subprocess: this referred to the initial processing of agricultural and livestock products based on industrial practices. Unlike other subprocesses, this stage experienced processing-related losses. Phosphorus and nitrogen dynamics were described as: input (other subprocesses (intra-system))=output (other subprocesses, export, environmental emissions) + loss.

Consumption subprocess: this encompassed the intake and metabolism of agricultural products by urban residents, rural residents, and tourists, with partial stockpiling to meet metabolic demands. Excluding local inhabitants who traveled as tourists, visiting tourists were categorized into three groups based on their origin and length of stay, they are domestic one-day tourists (610.36×10^4 person-times), domestic overnight tourists (395.36×10^4 person- times), and international overnight visitors (7.72×10^4 person-times). The phosphorus and nitrogen flows associated with tourists were aggregated across these three categories. The phosphorus and nitrogen balance for this subprocess was: input (other subprocesses (intra-system circulation), import) = output (other subprocesses, export, environmental emissions) + stock + loss.

Waste disposal subprocess: this encompassed waste management for discarded materials from the cultivation, animal feeding, food processing, and consumption subprocesses. No additional losses occurred in this stage. The phosphorus and nitrogen balance for this subprocess was: input (other subprocesses (intra-system circulation)) = output (other subprocesses, export, environmental emissions) + stock.

3.2 Data Sources

Data for this study were collected through survey questionnaires, interviews, statistics, and published literature. Information on cultivated land, crop yield, pesticide and fertilizer usage, livestock stocking, slaughter rates, and animal product yields was sourced from the "2018 Rural Economic Statistical Yearbook of Wentang Town, Yichun City"[14].

Phosphorus and nitrogen consumption data for urban residents were derived from a combination of questionnaire surveys conducted in December 2018 and statistical data. These included household consumption of food, meat, vegetables, phosphorus-containing chemical products, and waste generation, alongside basic demographic information such as population size and lifespan. Rural residents' phosphorus and nitrogen consumption and waste discharge were primarily obtained from statistical records. Tourist consumption data were gathered through survey questionnaires and statistical reports. In December 2018, food consumption and waste emissions from tourists were assessed via a survey of the catering industry and interviews conducted in Wentang Town. A follow-up study in March 2020 provided supplementary data on tourist consumption and waste discharge. Phosphorus and nitrogen coefficients were primarily extracted from published literature and technical standards and were adjusted based on the specific conditions of the study area. To ensure accuracy, preference was given to sources from Yichun City or Jiangxi Province, aligning with the local context of Wentang Town.

Respondents for the questionnaire survey were selected primarily from central streets and densely populated areas. Given the relatively high educational level among urban residents, the survey was conducted anonymously and self-administered, with researchers providing guidance as needed to ensure data quality.

All data and parameters used in this study are detailed in the dataset Dataset of nitrogen and phosphorus flow in agricultural system affected by tourists in Wentang Town of Jiangxi Province of China (2018, 2020)[12]

4 Data Results and Validation

4.1 Dataset Composition

The dataset consists of the following components: (1) geolocation of Wentang Town; (2) underlying data of tourist consumption behaviors and typical agricultural economic system and calculated coefficient of N and P; (3) the influence of tourist consumption behaviors on P and N flow in 5 subprocesses: cultivation, animal feeding, food processing, consumption and disposal; (4) the influence of tourist consumption behaviors on P and N import and export in typical agricultural economic system. The dataset is archived in .shp and .xlsx formats, with detailed information of (2)–(4) presented in Table 2.

4.2 Data Results

The cultivation subprocess served as the starting point for phosphorus and nitrogen flows within the agricultural system. Tourist consumption introduced additional input pathways for phosphorus and nitrogen, leading to variations in input, output, and stock within the cultivation subprocess (Figure 2). Specifically, tourist consumption resulted in increased excrement and kitchen waste being returned to cultivated land, raising intra-system circulation rates of phosphorus and nitrogen by 1,311.82 kg and 7,047.67 kg, respectively. However, phosphorus output remained unaffected by tourist consumption behaviors.

While the overall output pathways of phosphorus were unchanged, the volatilization and leaching of organic fertilizers (derived from tourist excrement and kitchen waste) led to an increase in nitrogen output, with an increment of 2,580.61 kg. The imbalance between

Table 2 Main sub-datasets composition

No.	Sub-dataset	Data composition
1	Underlying data of tourist consumption behaviors and typical agricultural economic system and calculated coefficient of N and P	Underlying data of tourist consumption behaviors and typical agricultural economic system Calculation coefficient of N and P
2	The influence of tourist consumption behaviors on P and N flow in cultivation subprocess	The influence of tourist consumption behaviors on P flow structure in cultivation subprocess The P flow structure in cultivation subprocess without tourist consumption behaviors The influence of tourist consumption behaviors on N flow structure in cultivation subprocess The influence of tourist consumption behaviors on N environmental emission in cultivation subprocess The N flow structure in cultivation subprocess without tourist consumption behaviors The N environmental emission in cultivation subprocess without tourist consumption behaviors
3	The influence of tourist consumption behaviors on P and N flow in animal feeding subprocess	The influence of tourist consumption behaviors on P flow structure in animal feeding subprocess The P flow structure in animal feeding subprocess without tourist consumption behaviors The influence of tourist consumption behaviors on N flow structure in animal feeding subprocess The N flow structure in animal feeding subprocess without tourist consumption behaviors
4	The influence of tourist consumption behaviors on P and N flow in food processing subprocess	The influence of tourist consumption behaviors on P flow structure in food processing subprocess The P flow structure in food processing subprocess without tourist consumption behaviors The influence of tourist consumption behaviors on N flow structure in food processing subprocess The N flow structure in food processing subprocess without tourist consumption behaviors
5	The influence of tourist consumption behaviors on P and N flow in consumption subprocess	The P consumption structure of urban residents The P consumption structure of rural residents The P consumption structure of tourists The influence of tourist consumption behaviors on P flow structure in consumption subprocess The P flow structure in consumption subprocess without tourist consumption behaviors The N consumption structure of urban residents The N consumption structure of rural residents The N consumption structure of tourists The influence of tourist consumption behaviors on N flow structure in consumption subprocess The N flow structure in consumption subprocess without tourist consumption behaviors
6	The influence of tourist consumption behaviors on P and N flow in disposal subprocess	The influence of tourist consumption behaviors on P flow structure in disposal subprocess The P flow structure in disposal subprocess without tourist consumption behaviors The influence of tourist consumption behaviors on N flow structure in disposal subprocess The influence of tourist consumption behaviors on N environmental emission in disposal subprocess The N flow structure in disposal subprocess without tourist consumption behaviors The N environmental emission in disposal subprocess without tourist consumption behaviors
7	The influence of tourist consumption behaviors on P and N import and export in typical agricultural economic system	The influence of tourist consumption behaviors on P and N import and export in typical agricultural economic system

phosphorus and nitrogen inputs and outputs, driven by tourist consumption behaviors, resulted in net increases in stock within the cultivation subprocess, amounting to 1,311.82 kg for phosphorus and 4,467.06 kg for nitrogen.

Tourist consumption behaviors also influenced the input pathways of the animal feeding subprocess, indirectly altering the balance between imports and intra-system phosphorus and nitrogen circulation (Figure 3). The recycling of kitchen waste from tourists as animal feed reduced the need for imported refined feed, decreasing phosphorus and nitrogen imports by 43.64 kg and 2,269.47 kg, respectively. However, statistical analysis indicated that tourist consumption had a minimal impact on phosphorus and nitrogen outputs and stocks in the animal feeding subprocess, rendering these changes statistically indistinguishable.

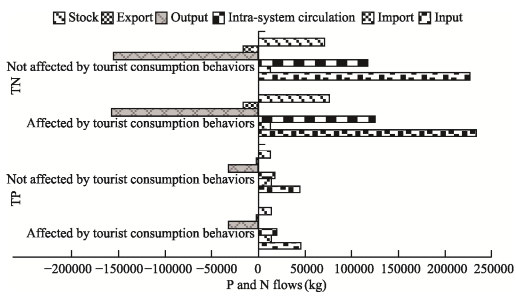

Figure 2 Influence of tourist consumption behaviors on phosphorus and nitrogen flow in the cultivation subprocess

(Positive values indicate inputs and stock accumulation, while negative values represent outputs)

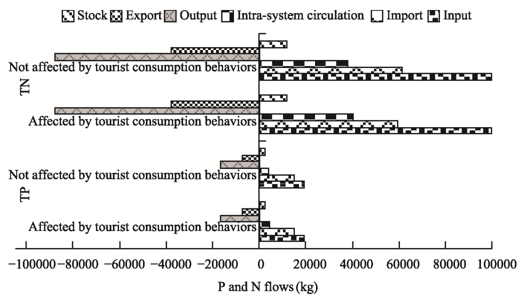

Figure 3 Influence of tourist consumption behaviors on phosphorus and nitrogen flow in the animal feeding subprocess

(Positive values indicate inputs and stock accumulation, while negative values represent outputs)

Field investigations revealed that the food processing subprocess primarily performs preliminary processing of products originating from the cultivation and animal feeding subprocesses. Consequently, tourist consumption indirectly influenced phosphorus and nitrogen levels within the food processing subprocess (Figure 4). In the absence of tourist consumption, the food processing subprocess not only met local residents' food demands but also produced a surplus for export. This surplus led to substantial increases in phosphorus and nitrogen levels, with increments of 6,753.45 kg and 13,197.09 kg, corresponding to growth rates of 1,429.77% and 351.47%, respectively. However, when considering consumption by all "three bodies", the entire food output of the food processing subprocess was redirected to the consumption subprocess to fulfill local food demand.

The integration of tourist consumption into the consumption subprocess has shifted the system from a "two bodies" (urban residents, rural residents) to a "three bodies" (urban residents, rural residents, and tourists) consumption model, leading to considerable increases in phosphorus and nitrogen consumption and output (Figure 5). The input, output, and export of phosphorus increased by 24,059.28 kg, 20,060.32 kg, and 3,726.98 kg, respectively, corresponding to growth rates of 121.01%, 115.84%, and 138.52%. However, phosphorus stock remained unchanged, unaffected by tourist consumption behaviors. Similarly, nitrogen flows experienced substantial changes due to tourist consumption, with input increasing by 261,140.33 kg and output rising by 156,467.56 kg, including a 67,938.78 kg increase in exports. The corresponding growth rates were 141.80%, 137.68%, and 510.73%, respectively. However, nitrogen stock showed no difference between the "two bodies" and "three bodies" consumption patterns.

Tourist consumption also heightened the demand for phosphorus- and nitrogen-rich products such as crops, fruits, vegetables, meat, and eggs. Despite full utilization of food produced by animal feeding and food processing subprocesses, total output remains insufficient to meet the combined needs of residents and tourists. This shortfall necessitates substantial external imports, resulting in phosphorus and nitrogen import increases of 795.60% and 213.82%, respectively.

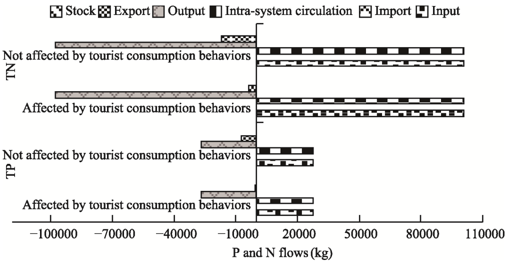

Figure 4 Influence of tourist consumption behaviors on phosphorus and nitrogen flow in the food processing subprocess
(Positive values indicate inputs and stock accumulation, while negative values represent outputs)

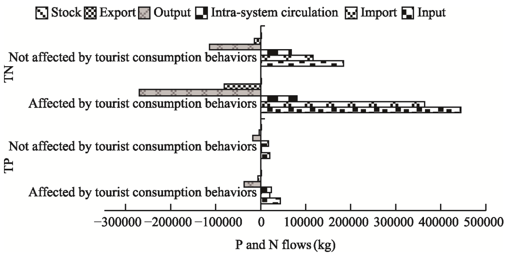

Figure 5 Influence of tourist consumption behaviors on phosphorus and nitrogen flow in the consumption subprocess
(Positive values indicate inputs and stock accumulation, while negative values represent outputs)

The phosphorus and nitrogen consumption patterns of the "three bodies" are illustrated in Figure 6. Phosphorus consumption per capita for urban residents, rural residents, and tourists ranged from 0.86 kg/cap/a to 1.42 kg/cap/a, with tourists exhibiting the highest consumption and rural residents the lowest. Food phosphorus intake constituted the dominant form of phosphorus consumption, accounting for at least 94% of the total, with per capita intake ranging from 0.85 kg/cap/a to 1.33 kg/cap/a. Vegetable-based foods contributed over 85% of all food phosphorus intake.

Similarly, nitrogen consumption per capita ranged from 8.10 kg/cap/a to 15.37 kg/cap/a, with tourists consuming nearly twice as much nitrogen as urban and rural residents. Rural residents had the lowest nitrogen intake, though their consumption levels were comparable to those of urban residents. Food nitrogen intake accounted for at least 51% of total nitrogen consumption, with per capita intake ranging from 4.12 kg/cap/a to 7.71 kg/cap/a. Tourists had the highest food nitrogen intake, nearly double that of urban and rural residents. Vegetable-based foods were the primary nitrogen source, accounting for 62% of food nitrogen among urban and rural residents and 82% among tourists.

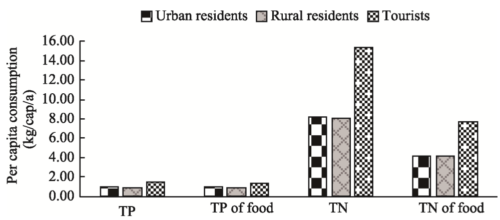

Figure 6 The phosphorus and nitrogen consumption per capita for urban residents, rural residents and tourists

The disposal subprocess receives agricultural waste, domestic wastewater, and solid waste generated by the cultivation, animal feeding, food processing, and consumption subprocesses. The discharge of domestic sewage and solid waste from tourist activities has significantly increased the burden on the waste disposal subprocess (Figure 7). Consequently, phosphorus input and stock increased by 281.07% and 21.65%, respectively. Meanwhile, phosphorus emissions surged by 444.36%, with exports rising by 482.32%. Similarly, nitrogen requiring disposal increased by 205.98%, while nitrogen emissions grew by 297.83%, including a 440.22% rise in exports. Additionally, nitrogen stock increased by 111.99%.

Tourist consumption of food and industrial products, as well as increased waste discharge and disposal, has led to a substantial rise in phosphorus and nitrogen imports and exports within the agricultural system (Figure 8). Phosphorus imports and exports increased by 17,262.19 kg and 9,232.55 kg, with growth rates of 55.53% and 42.16%, respectively. Similarly, nitrogen imports and exports rose by 129.45% and 79.18%, respectively, driven by the combined effects of urban, rural, and tourist consumption.

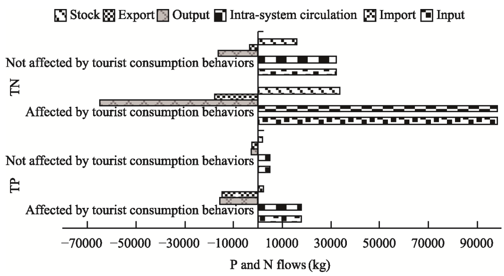

Figure 7 Influence of tourist consumption behaviors on phosphorus and nitrogen flows in the disposal subprocess
(Positive values indicate inputs and stock accumulation, while negative values represent outputs)

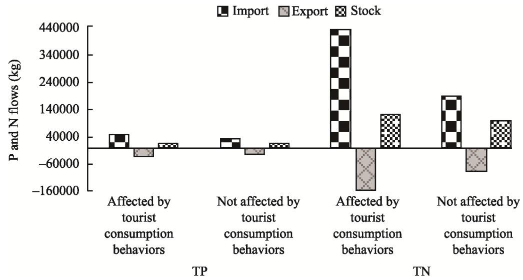

Figure 8 Influence of tourist consumption behaviors on phosphorus and nitrogen across typical agricultural systems
(Positive values indicate inputs and stock accumulation, while negative values represent outputs)

4.3 Data Validation

The data and coefficients for nitrogen and phosphorus used in this study were sourced from previous research[1–11], primarily conducted around 2018 in local or nearby regions such as Yichun City, Xinyu City, and Jiangxi Province. These studies were carefully selected to minimize the influence of spatiotemporal variability on the calculated nitrogen and phosphorus fluxes. However, limited research has examined the effects of tourist consumption behaviors on phosphorus and nitrogen flows, necessitating further analysis of the associated uncertainties and characterization parameters. Tourist consumption behaviors essentially mirrors resident consumption in tourism areas, exhibiting both similarities and differences compared to consumption patterns in their place of residence. Based on regional distinctions and duration of stay, tourists were classified into three categories: overnight international tourists, overnight domestic tourists, and domestic one-day tourists (excluding local residents). This classification was used to estimate nitrogen and phosphorus consumption and output.

Niu[15] and Li *et al*.[16] categorized tourism consumption into 6 major components: transportation and postal services, catering, accommodation, shopping, sightseeing, and entertainment. Although they used different models to assess environmental impacts, the nitrogen and phosphorus carriers in tourist consumption—food consumption, industrial product use, energy consumption, and waste generation—were consistent with our study. Niu (2007) found that tourists consume substantially more food and energy than local inhabitants[15]. Similarly, Li *et al*. (2019)[17] reported that food consumption during travel and dining out was approximately 1.7 times higher than daily household consumption. Zhang *et al*. (2018)[18], in a study of 159 catering enterprises across Chengdu, Shanghai, Beijing, and Lhasa, noted that per capita food waste among tourists exceeded that of local residents. However, an investigation into the Beijing catering industry found that local inhabitants consumed twice as much food as tourists[19]. In contrast, research in Lhasa showed that tourists had higher food consumption than residents[20], while a 2011 study reported the opposite trend[21]. These discrepancies underscore significant variability in food consumption across regions and studies, aligning with findings from our questionnaire survey. Accordingly, the selected value for tourist food consumption in this study is both scientifically justified and reasonable.

Regarding solid waste, previous studies reported varying levels of waste generation among tourists. For example, the solid waste output in the Nanyue Scenic Area was higher than the values observed in our study[22]. Davenport, J. and Davenport, J. L. found that per capita solid waste generation among tourists (3.5 kg/d) exceeded our survey results[23]. Additionally, the annual solid waste output per capita from one-day tourists was 500 g/cap/a[24], which is also higher than our study's findings. However, Mateu-Sbert reported an average per-tourist solid waste yield of 1.31 kg/cap/d, lower than that of local inhabitants (1.48 kg/cap/d)[25]. These variations indicate that the per capita waste generation values in previous studies were both higher and lower than our findings. Therefore, the final selected value in this study (0.4504 kg/cap/d) remains reasonable. Meanwhile, the average consumption of industrial products[26,27] and energy[28] among Chinese residents was useful as a reference for estimating tourist consumption in our study.

5 Discussion and Conclusion

Using a material balance approach, this study employed a substance flow analysis model to examine phosphorus and nitrogen flows within an agricultural system, explicitly incorporating tourist consumption behaviors—an often overlooked factor in previous research. By integrating these behaviors into the agricultural system, we quantitatively assessed their impact on phosphorus and nitrogen fluxes along the supply chain, from food and industrial product consumption to waste disposal. The study provides new insights and data to inform mitigation strategies for phosphorus and nitrogen pollution. An uncertainty analysis comparing our activity-level data and phosphorus/nitrogen coefficients with previous studies confirmed the high reliability of our dataset.

Key findings through the dataset include the following: (1) Tourist consumption behaviors significantly influence phosphorus and nitrogen flows within the agricultural system and its subprocesses. Specifically, phosphorus import and export increased by 55.53% and 42.16%, respectively, due to tourism. Similarly, nitrogen import and export rose by 129.45% and 79.18%. (2) Tourist consumption directly introduced new phosphorus and nitrogen input pathways into cultivation and animal breeding, increasing phosphorus and nitrogen fluxes in the cultivation subprocess by 2.98% and 3.12%, respectively. (3) The food processing subprocess was indirectly affected by tourist consumption, with phosphorus and nitrogen-related exports rising by 1,429.77% and 351.47%, respectively. (4) The increased demand for food and industrial products among tourists led to a greater reliance on imports from external sources. Consequently, the consumption subprocess experienced a sharp rise in phosphorus and nitrogen imports, increasing by 795.60% and 213.82%, respectively. Waste disposal also escalated proportionally to meet higher waste discharge demands. (5) According to the Chinese Nutrition Society, the average adult phosphorus requirement, recommended intake, and tolerable intake are 0.219 kg/cap/a, 0.263 kg/cap/a, and 1.278 kg/cap/a, respectively[29]. The food phosphorus intake among inhabitants exceeded the recommended level but remained below the tolerable limit, ensuring adequate nutrition. In contrast, tourists' food nitrogen intake slightly exceeded the tolerable threshold, though their shorter stay duration mitigated health risks. The per capita food nitrogen intake among both inhabitants and tourists exceeded the minimum intake for healthy adults (3 kg/cap/a) and was higher than China's per capita food consumption (3.6 kg/cap/a). However, it remained below the 6 kg/cap/a obesity risk threshold, ensuring adequate protein intake without contributing to obesity[26]. (6) The waste disposal subprocess saw an increase of 281.07% and 205.98% in phosphorus and nitrogen inputs, respectively, leading to heightened waste emissions. The growth rates for phosphorus and nitrogen discharge were 444.36% and

297.83%, respectively.

Author Contributions

Chen, Q. Q. designed the algorithms of dataset. Liu, Z. H., Xu, Y. Y., Pang, A. P. and Long, Z. D. contributed to the data processing and analysis. All authors wrote the data paper.

Conflicts of Interest

The authors declare no conflicts of interest.

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