

## General Comments:

This manuscript investigates the origins and pathways of water and associated nutrient dynamics (N, P, Si) in three small backwater systems (“Wando”) within the urban Tama River, Tokyo. The authors employ a multi-tracer approach, including  $^{222}\text{Rn}$ , stable water isotopes ( $\delta^2\text{H}$ ,  $\delta^{18}\text{O}$ ), stable nitrate isotopes ( $\delta^{15}\text{N}$ ,  $\delta^{18}\text{O}-\text{NO}_3$ ), ion balance, and CDOM, to distinguish between river water underflow and shallow groundwater contributions. The study finds that water sources and nutrient conditions vary both spatially among the three backwaters and seasonally, with implications for nutrient stoichiometry (N:P:Si ratios) and, by extension, potential phytoplankton community composition. In my opinion the paper may be published with minor revisions after addressing comments provided below:

## Specific Comments:

### Abstract

The abstract is generally well-structured and informative, providing clear ranges of nutrient concentrations. It is somewhat long and could be tightened.

**L17:** The claim that CDOM serves as “an effective indicator” might overstated given the single-campaign measurement as you stated the measurement “only in November 2022” (L122).

**L25:** Subject–verb disagreement, “...the **backwaters**, which **was**...”

**L27–28:** The final sentence is vague and reads more like a future research direction than a conclusion.

### Introduction

The introduction provides adequate context on floodplain ecology, the flood pulse concept, and the specific Japanese context of embankment-confined floodplains, which is really good. The transition from large floodplain studies to small backwater systems is clearly motivated.

**L60–62:** The hypothesis statement is somewhat generic. The specific testable predictions could be sharpened, for example, what nutrient dynamics differences were expected, and why? The introduction would also benefit from briefly mentioning previous multi-tracer studies in floodplain contexts to better position the novelty of this work.

## Methods

The study site description is detailed and supported by clear figures. Analytical methods are generally well-described with appropriate references to standard protocols. However, it would be nice to provide analytical precision values for measurements, especially the isotope measurement.

**L94:** “Pond A” appears to refer to Backwater A?

**L109:** Are the number of replicate samples (n=3) at each site likely refers to field replicates?

**L122–124:** CDOM measurement is described only briefly, and calibration is not detailed sufficiently for reproducibility.

**L138:** “Standard materials USGS32, USGS34, and IAEA were used”. Which IAEA standard? IAEA-NO-3? Please specify the full standard details.

## Results

Results are presented systematically. The data are rich and generally well-organized.

**L236:** DS<sub>i</sub> concentrations for Backwater C are reported as “14 to 40 μmol”, the unit L<sup>-1</sup> appears to be missing. Additionally, these values are dramatically lower than those for Backwater A and B (175–276 μmol L<sup>-1</sup>), yet this large discrepancy is not discussed. Is this an artifact of diatom uptake, dilution by low-DS<sub>i</sub> rainwater, or a data entry error?

**L250:** “corresponding” should be “corresponding”?

**L268:** “Ellins’ et al., 1990”, the apostrophe placement is unusual.

## Discussion

The discussion is structured around water origin estimation and nutrient dynamics, which is logical. However, the discussion remains largely qualitative and descriptive, it would be nice to have quantitative mixing estimates, but it seems out of the scope of this research.

**L322:** The δ<sup>15</sup>N range for river water is cited as “15–20‰, Kumazawa, 1999” but the authors’ own data show a range of 12.7‰–18.1‰ (L240). Using the authors’ measured values rather than a literature value would be more appropriate here.

**L364:** “groudwater” should read “groundwater” and “compostion” should read “composition.”

## **Conclusion?**

The manuscript ends abruptly after Section 4.4 without a Conclusions section. For Biogeosciences, a concise synthesis of the main findings, their broader significance, and key limitations is expected. The current Discussion does not adequately summarize the study's contribution. A dedicated Conclusions section (approximately 150–250 words) should be added.

## **Data availability**

**L395:** The statement “Available from the corresponding author upon reasonable request” does not meet Biogeosciences’ data policy. The data should be deposited in a public repository prior to acceptance.