

Dear Authors,

The well-structured and written article introduces an innovative methodology for the detection of floating plastic in the Saigon river. It investigates the dynamic of water hyacinth and plastic at five sample sites along a 42 km section of the Saigon river in Vietnam using UAVs and bridge mounted fixed cameras. The applicability of the YOLOv8 deep learning model on tiled and resized imagery was evaluated. The plastic concentration was found to be higher in water hyacinth patches than in the open water. The water hyacinth surface cover decreased from the upstream to the downstream sample sites. However, the plastic concentration trapped within water hyacinth was the highest at the most downstream sampling site, which may suggest that the removal of plastic would be most efficient in the downstream region. Moreover, the article proves evidence for the importance of Water Hyacinth for the retention and transport of plastic at five different locations along the river.

Subsequently, you can find a list of comments that should be addressed prior to the publication.

#### **Minor comments:**

Line 67: "using water hyacinths as a proxy"

As you state in line 226 & 227 considering the spatial and temporal variation of the water hyacinth trapped plastic concentration is important. In my opinion it is going to be challenging to use water hyacinth as a proxy for the quantification of riverine plastic due to the variability of different river systems and their drainage area leading to inconsistency in the amount or concentration of plastic trapped by water hyacinths.

Line 90: Did you consider the flow speed of the Saigon and the resulting transport of water hyacinth and plastic to plan the field?

Were the field measurements planned and timed according to the flow speed to aim measuring the same patches of water hyacinth and plastic at all 5 sample sites?

If not the records may not be directly comparable due to the spatiotemporal variation of the water hyacinth and plastic concentration

Line 95: How did you merge the records of the different measurement periods together?  
Was imagery of the same measurement period used or did the measurement period vary for the different sample sites?

Figure 1. "five measurement locations"

Why are you measuring at these locations?

Reasoning?

Hypothesis?

Why are you using bridge cameras at three location and UAV imagery at the other two?

Example:

"A bridge camera was installed at Binh Loi, since UAV flights are not permitted due to the no flight zone in the landing/departure zone of the nearby Tan Son Nhat airport."

Figure 1 A. In the mini map presenting Vietnam and the neighboring countries, displaying the Saigon river and potentially Ho Chi Minh City would help readers that are not familiar with

the area to locate the study area.

On the map illustrating the Saigon River, displaying a rough outline of Ho Chi Minh city can create the link to the mini map in the upper right corner.

At the end of the article I was surprised to read that the studied river section traverses Ho Chi Minh City. Considering the map I was completely unaware of it. Knowing that Vietnam's largest city is right at the river banks may help readers to understand one potential source of the plastic pollution. For instance, the North arrow could be moved up north to the upper left corner, the scale down south to the lower left corner and the Legend over to the right below the mini map to make space to illustrate Ho Chi Minh city at the western bank of the Saigon.

Figure 1. Caption and map's legend are not matching  
no **crosses** (for UAV locations) in map's legend  
**triangles** for UAV locations according to map, but for camera locations according to caption.

Figure 1. In the text there is no cross reference to **Figure 1**. It would be nice to refer to the illustrations and map displayed in **Figure 1** in the relevant text passages. Examples:

**Fig. 1A in 2.2 Field data collection**

for instance in line 91: "**Fig. 1A** illustrates the most upstream (Phu Long) and downstream (Quy Kien) locations, which were 41.9 km and 5.5 km upstream of [...]"

**Fig. 1B & Fig. 1D in 2.2.1 Bridge mounted cameras**

**Fig. 1C & Fig. 1E in 2.2.2 Uncrewed Aerial Vehicle**

for instance in line 119: "UAV crossed the entire river width back and forth following a U-shape flight path (Geraeds et al., 2019) as illustrated in **Fig. 1C**."

Line 196: Assumption of elliptical water hyacinth shape may not be applicable

Line 209: Can the FOV corrected camera data from the bridges be directly compared to the UAV data? Is there a potential limitation due to distortion/correction errors?

Figure 2.B. "surface plastic concentration [# / km<sup>2</sup>] in water hyacinths increased towards the river mouth." However, Quy Kien also has the biggest standard deviation or percentiles

Line 262: "[...] traverses Ho Chi Minh City."

I expected much more plastic in the river after traversing Ho Chi Minh City. May this also partly explain the higher concentration of water hyacinth trapped plastic at Quy Kien?

May some of the plastic that was measured at previous sampling locations had been suspended/submerged or settled on the riverbed over the 42 km flow distance?

May the vertical transport of plastic have an effect within the observed 42 km of the river (van Emmerink & Schwarz 2020 Plastic debris in rivers) so that newly added plastic from Saigon is measured at Quy Kien and some of the plastic from upriver can't be observed since it is transported below the water surface?

In my opinion a short clarification about plastic transported by subsurface flows or deposited on the riverbed would be good to indicate that the application of your method may be limited to plastic floating close to the water surface but not the entire plastic within the river system. This clarification would also address the subsequent two points.

### 3.4 Uncertainties and limitations

Uncertainties about the amount of submerged/suspended plastic that can't be observed at the water surface?

**Schreyers et al. 2024** River plastic transport and storage budget

"suspended plastics account for over 96% of item transport within the river channel, while their relative contribution to mass transport is only 30%–37% (depending on the river section considered)."

Uncertainties about the time it takes for riverine or marine plastic to sink and not be detectable with the presented approach?

**van Emmerink & Schwarz 2020** Plastic debris in rivers

"foils and thin plastics, with a high surface area to mass ratio, tend to be affected more strongly by surface pollution, such as mud or biofouling, making the material heavier and more likely to sink or at least remain in the lower part of the water column"

"With low vertical transport, plastics remain more affected by horizontal transport. Lower in the water column, horizontal transport mechanisms are weaker and hence less pronounced"

Maybe the OEAN CLEANUP also published some research on the sinking rate of plastic  
May a part of the plastic temporarily or permanently settle on the riverbed?

Figure C1. “((a) and (b))

Influence of bridge's shadow on plastic and water hyacinth detection?

Based on RGB data do you think the shadow influence could interfere the detection compared to the sunny parts of the FOV?

#### Technical comments to be addressed:

Line 25: Sub-Saharan

Line 29: “free-floating aquatic plants with freely hanging roots”

**Venter et al. 2017:**

**"[...] it occurs as free-floating plant or to a lesser extent as an emergent macrophyte (Penfound and Earle, 1948, Barret and Forno, 1982)."**

"Water hyacinth (*Eichhornia crassipes* Mart. Solms Pontederiaceae) **mainly occurs as a free-floating aquatic plant, but can survive decreasing water levels when rooted in soil.** This adaptation to seasonal fluctuations in hydrology may contribute to its invasive potential in natural and man-made water bodies, where **stranded plants can take root.**"

Line 39: van Emmerik et al., (2019)

Line 99: (Table 2)

Line 99: pointing

Line 162: delete one being from being being

- Line 185: “The results show [...]”  
The Model performance evaluation results are already presented in the Methods section.  
Maybe it would be better to present the results in the results section.
- Line 217: delete ‘at’
- Figure 2. add ‘D. ‘ [...] towards the river mouth. D. The ratio between [...]
- Line: 222 write at instead of and
- Line 255: add ‘be’ may ‘be’ caused
- Line 259: either delete parentheses or delete '(variations)'
- Line 307: add ‘n’ pattern
- Line 351: add a comma ‘,’ “river systems’,’ lakes, and [...]”
- Line 390: delete ‘n’ “a final value of [...]”
- Line 414: replace ‘The’ with ‘We’ “We used the following equation:”
- Line 424: add closing parantheses ')’ (A<sub>r</sub> - A<sub>wh</sub>)’

#### **Access review (quick report), peer review, and interactive public discussion**

1. Does the paper address relevant scientific questions within the scope of BG?  
Yes.
2. Does the paper present novel concepts, ideas, tools, or data?  
Yes, data on free floating and trapped plastic at 5 sampling sites along the Saigon river.
3. Are substantial conclusions reached?  
Yes.
4. Are the scientific methods and assumptions valid and clearly outlined?  
Yes.
5. Are the results sufficient to support the interpretations and conclusions?  
Yes.
6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?  
Yes.
7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution?  
Yes, previous work by for instance Schreyer et al. & van Emmerink was mentioned and clarified.
8. Does the title clearly reflect the contents of the paper?  
Yes.

9. Does the abstract provide a concise and complete summary?  
Yes.
10. Is the overall presentation well structured and clear?  
Yes.
11. Is the language fluent and precise?  
Yes.
12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?  
Yes.
13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?  
Yes, consider the comments.
14. Are the number and quality of references appropriate?  
Yes.
15. Is the amount and quality of supplementary material appropriate?  
Yes.

This review was written by an early career scientist.