

Water Quality Assessment of Han River Using Diatoms as Bioindicators

Hyunjin Park
Department of Integrative Biology, School of Biological Sciences



Backgrounds

Diatoms are unicellular algae characterized by distinctive cell walls composed of silica. Each diatoms species carries TP and TN indices. These values can be used to assess the level of eutrophication, and thereby monitoring the organic pollution, in a natural water body.

Keywords

TP: total phosphorus index

TN: total nitrogen index

Eutrophication: excessive concentration of nutrients in a body of water; often induced by runoff from the land

Methods and Materials

- Study site: Han River is 494 km long. It is the water source of Seoul and its suburbs. A series of dams was constructed in 2011 along the upstream of the river, which could generate unusual amount of runoff.
- Sample collection: The total of 12 samples were collected (Fig. 1, 2).
- Treatment: Samples were preserved with Lugol's solution.
- Preparation: Samples were washed with KCr_2O_7 and H_2O_2 . Permanent slides were prepared with Naphrax mounting medium.
- Taxonomical analysis was done using differential interference contrast microscopy (1000 X) and SEM (3.46-152.61 K X).

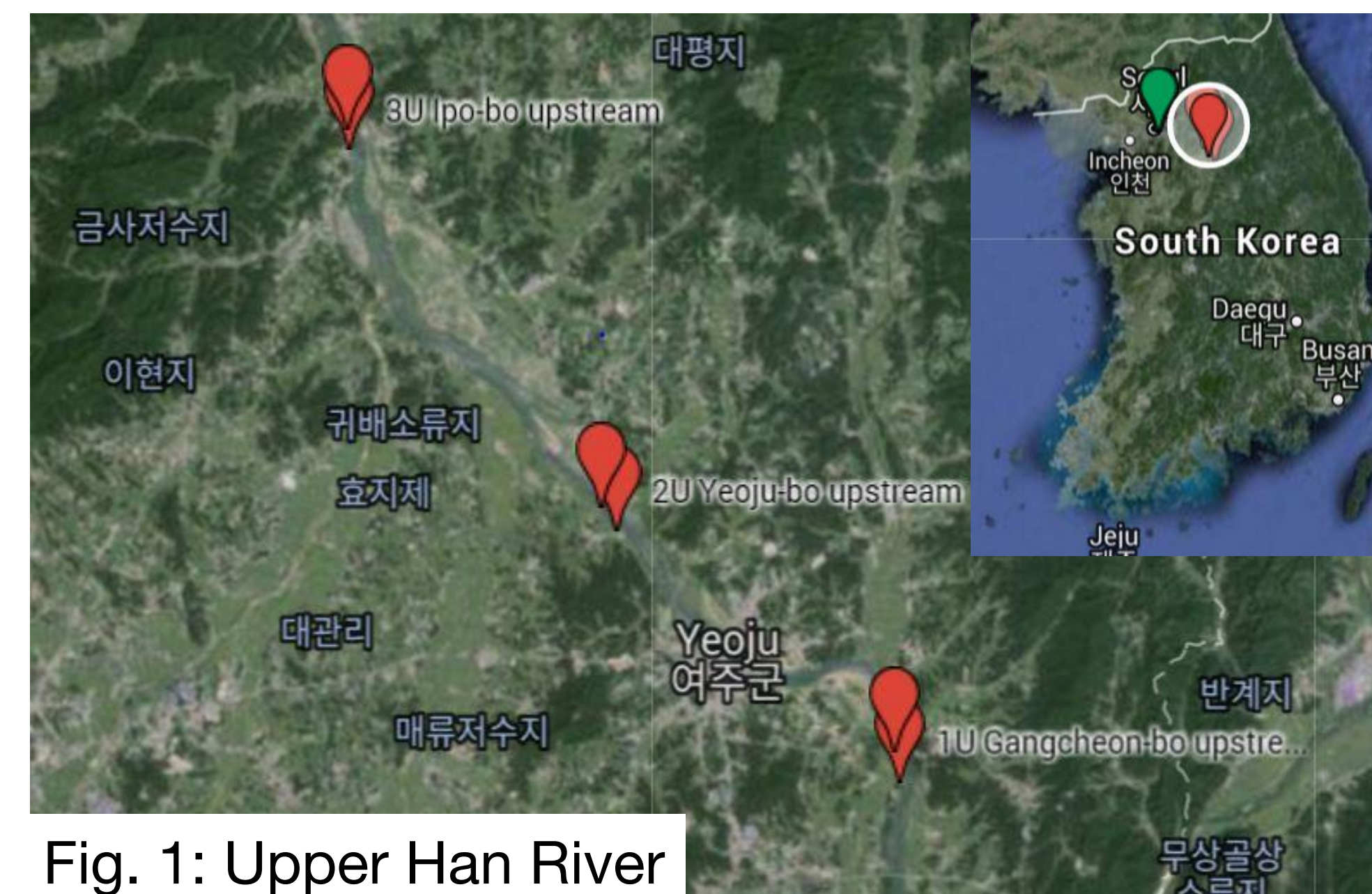


Fig. 1: Upper Han River

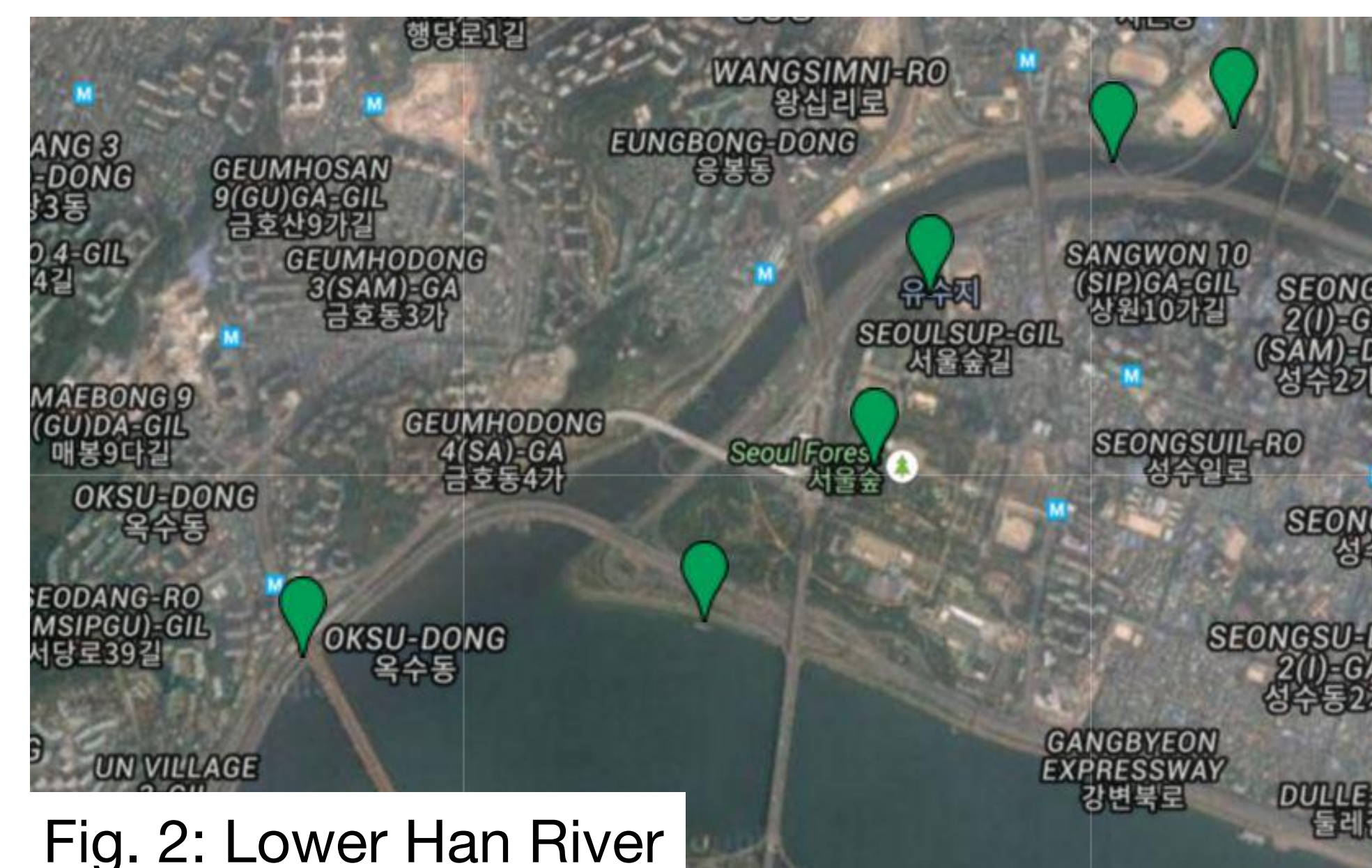


Fig. 2: Lower Han River

Genus	No. of taxa (Upper HR)	No. of taxa (Lower HR)
<i>Aulacoseira</i>	3	2
<i>Cyclostephanos</i>	2	3
<i>Cyclotella</i>	3	2
<i>Diatoma</i>	2	0
<i>Discostella</i>	2	1
<i>Encyonema</i>	1	0
<i>Fragilaria</i>	0	1
<i>Lindavia</i>	2	1
<i>Melosira</i>	0	1
<i>Nitzschia</i>	1	0
<i>Stephanodiscus</i>	2	3
<i>Synedra</i>	0	1
<i>Thalassiosira</i>	1	2
Total	19	17

Table 1: Diatom genera and number of taxa identified during the study period (12/20/15-12/24/15).

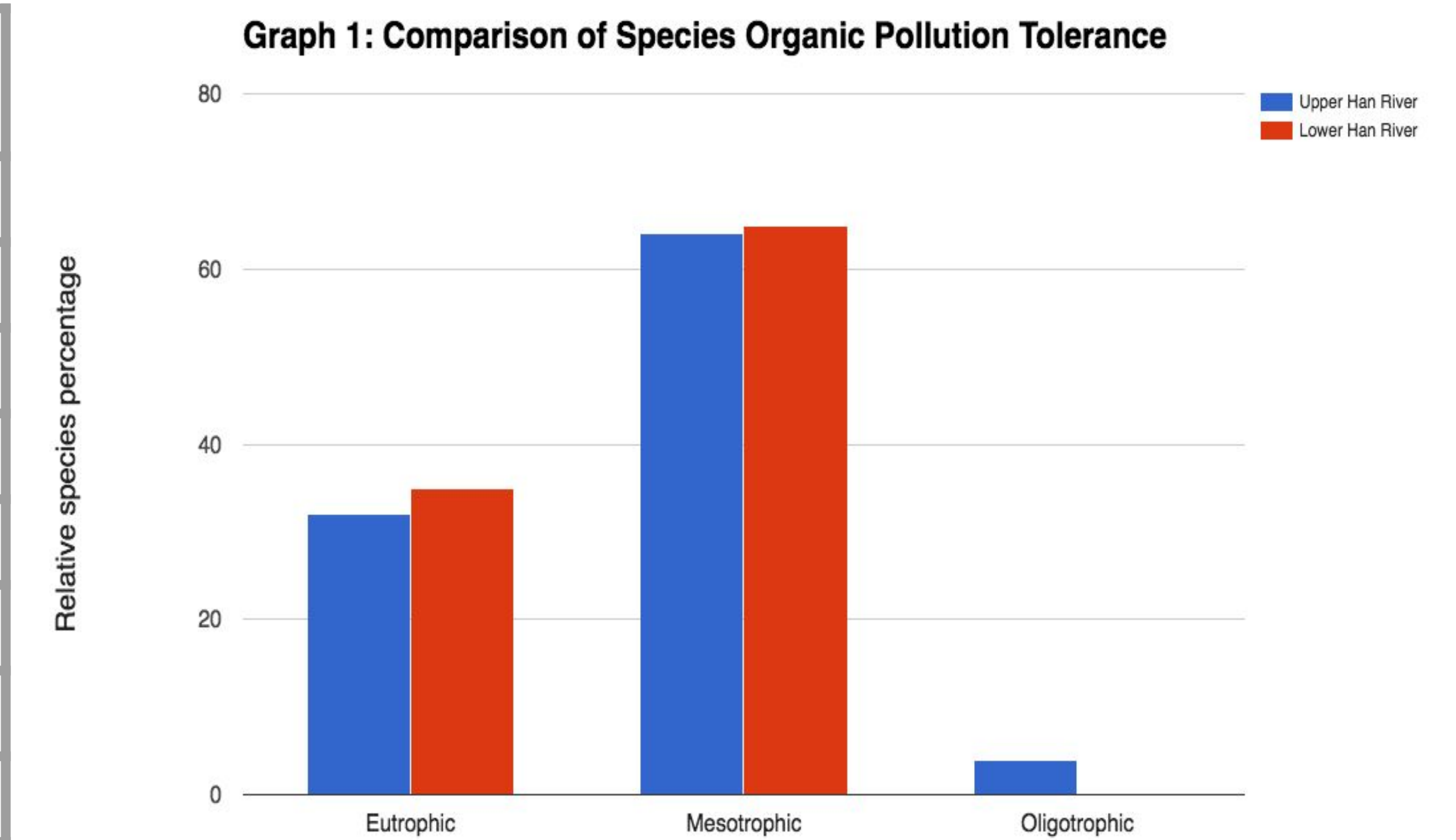


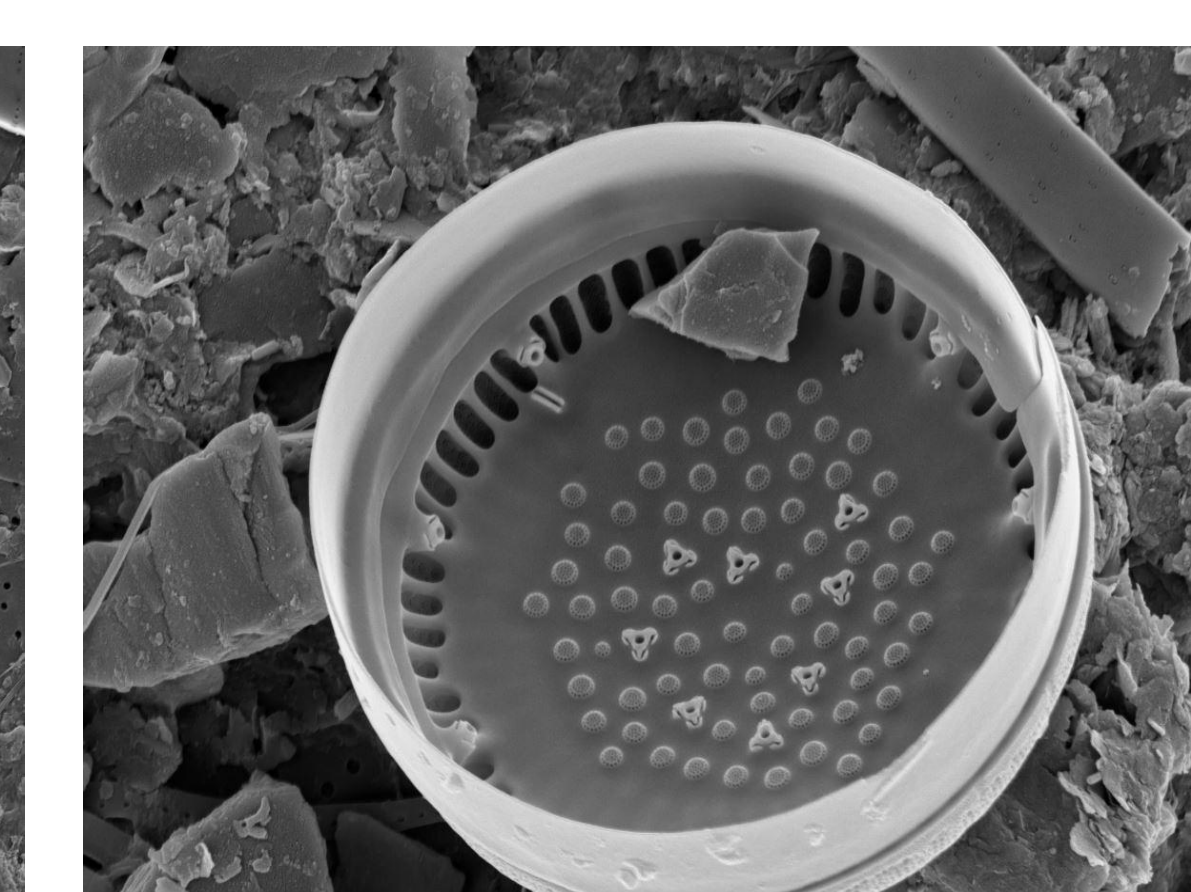
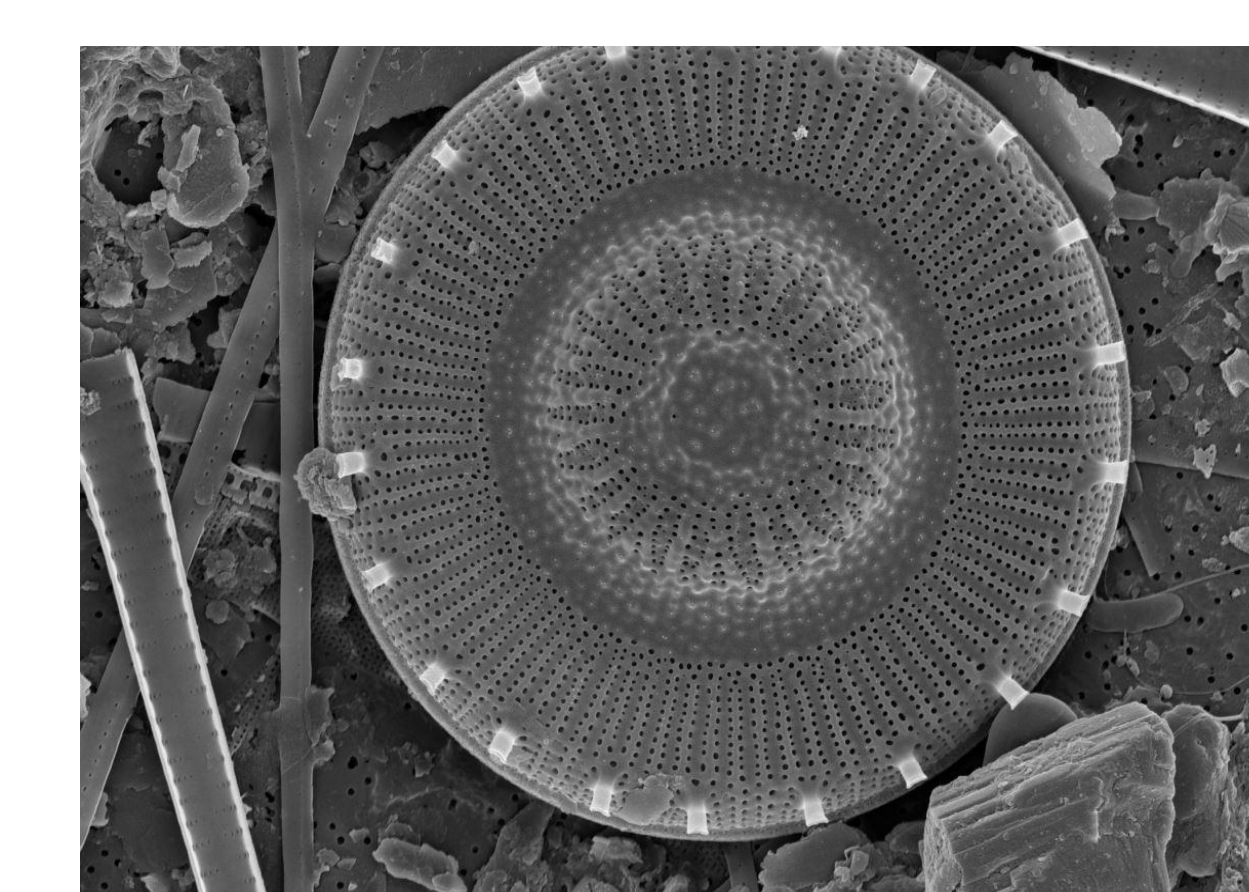
Fig. 3: *C. meneghiniana*

Fig. 4: *S. hantzschii*



Fig. 5: *D. asterocostata*

Fig. 6: *L. shanxiensis*



Results and Analysis

Diatoms taxa, belonging to 13 genera, were identified. Species count was made (Table 1). Each species was classified as eutrophic, mesotrophic, and oligotrophic based on TP-TN tolerance matrix established by Potapova and Charles (Graph 1).

Discussion and Conclusion

- The species composition indicates mesotrophic conditions in the river.
- The difference of water quality between the upper and lower regions of the river does not appear to be biologically significant.
- Further assessments using physicochemical indices, such as pH, electrical conductivity (EC), $[Al^{3+}]$, $[Zn^{2+}]$, and $[Pb^{2+}]$, is strongly suggested.

Acknowledgment

Special thanks to my faculty advisor,
Dr. Edward C. Theriot | Department of Integrative Biology, Texas Natural Science Center

References

1. Y.J. Park, J.S. Choi, H.S. Kim
Water quality assessment of the Sinchun stream based on epilithic diatom communities
J. Environ. Biol. 35 (2014), pp. 1053-1059
2. M. Potapova, D.F. Charles
Diatom metrics for monitoring eutrophication in rivers of the United States
Ecological Indicators. 7 (2007), pp. 48-70