

Effect of pollution load reduction on water quality in typical lakes in the shallow hill water Network area

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Content

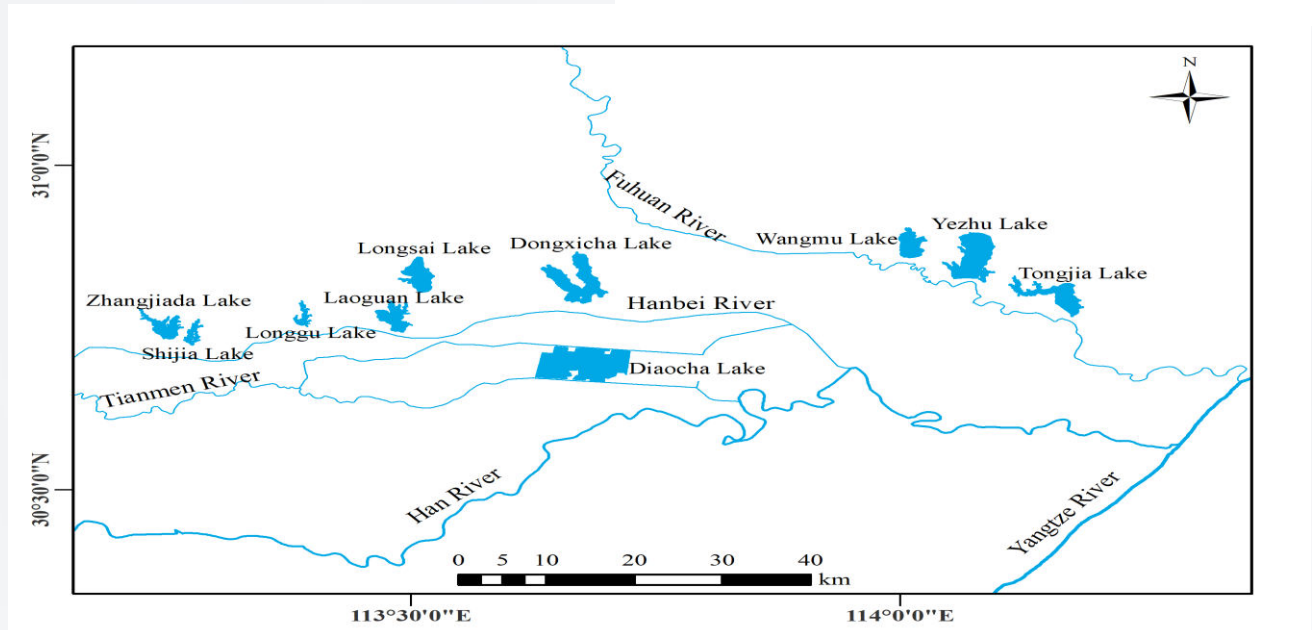
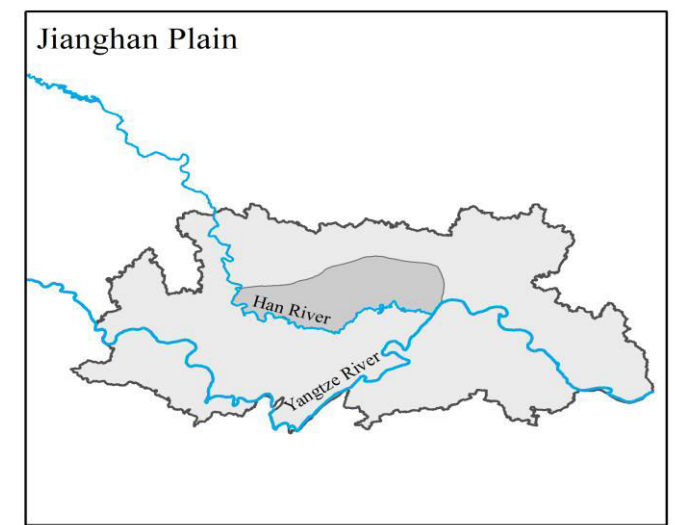
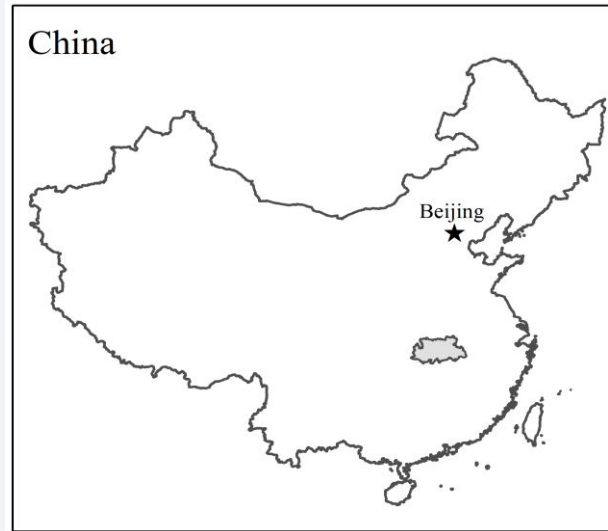
- **Water Quality Improvement in Rural Lakes**
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Water quality improvement in rural lakes

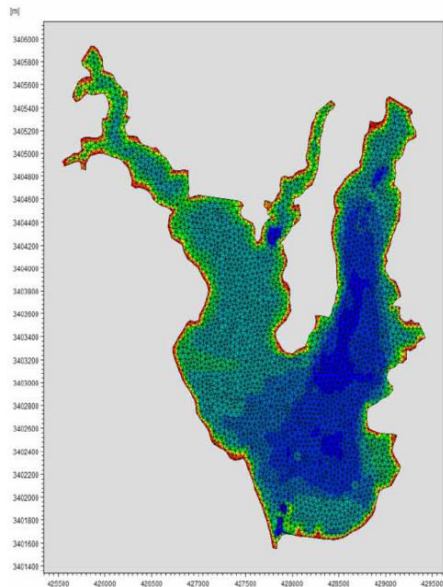
- There is poor water environment quality in rural and urban lakes in the shallow hill water network area north of the Han River on the Chinese Jiangnan Plain due to their poor hydrodynamic conditions.

- Selected ten typical rural lakes to simulate water environment improvement.

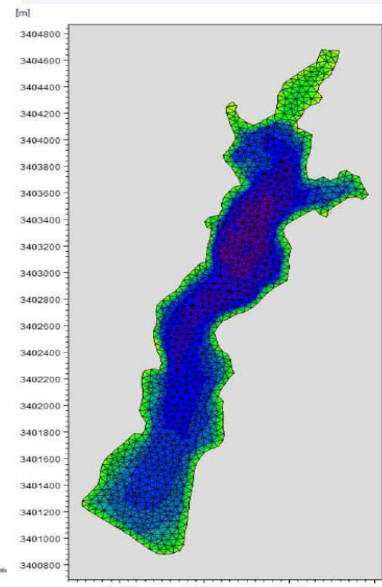
- Based on MIKE21, the hydrodynamic and water quality models are established and verified.



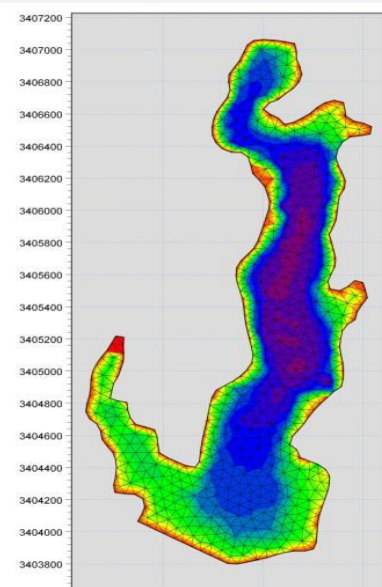
Water quality improvement in rural lakes



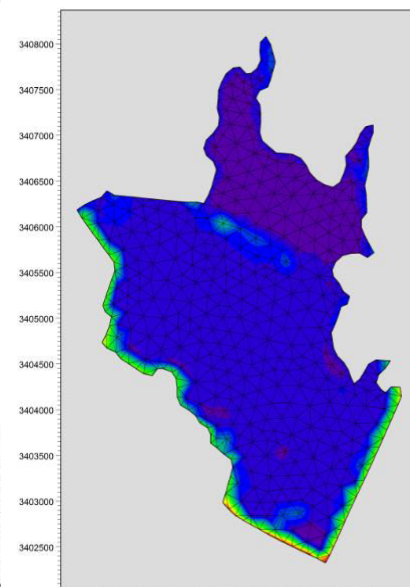
Zhangjiada Lake



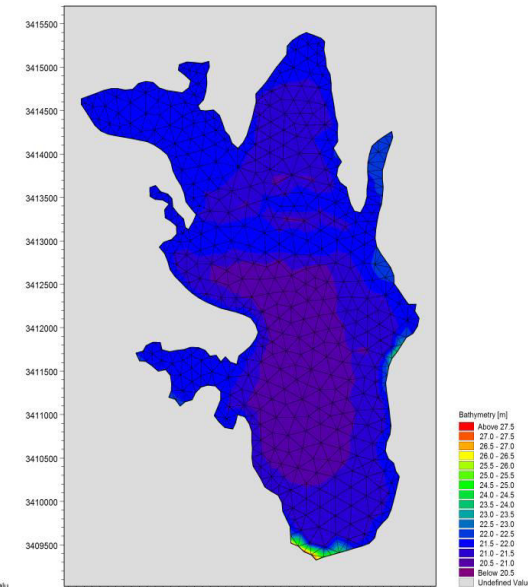
Shijia Lake



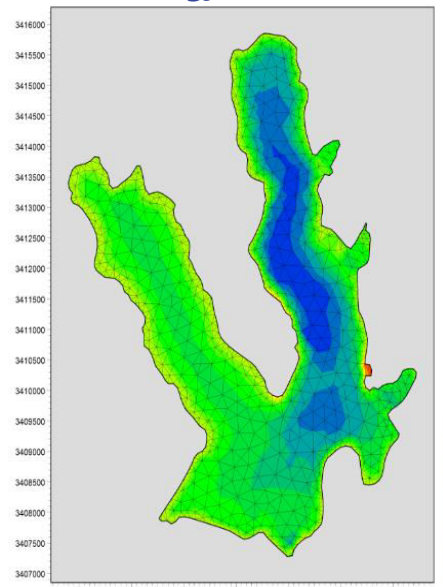
Longgu Lake



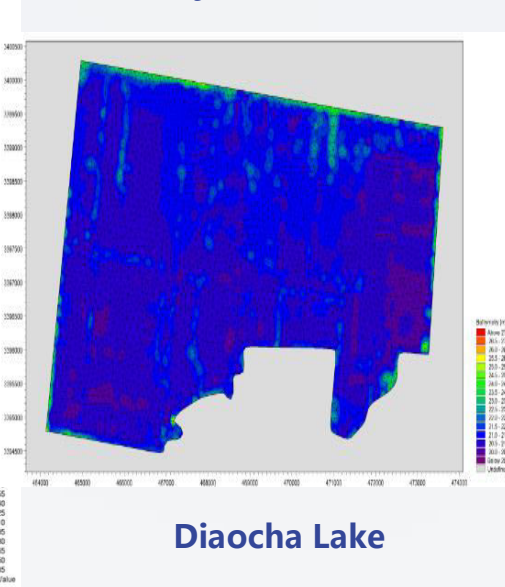
Laoguan Lake



Longsai Lake

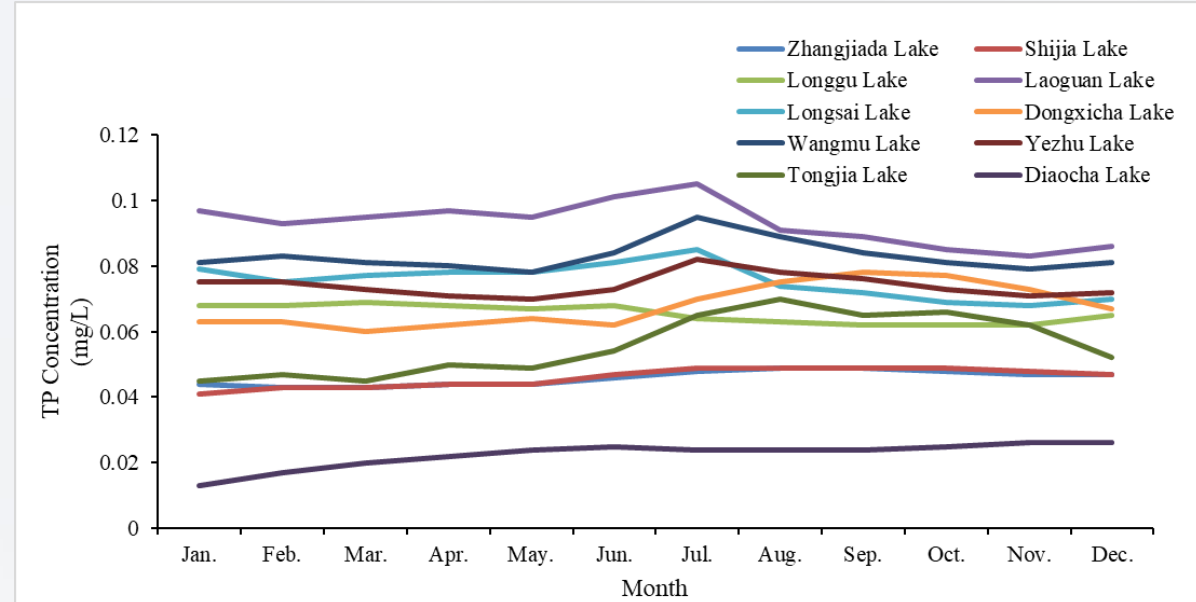
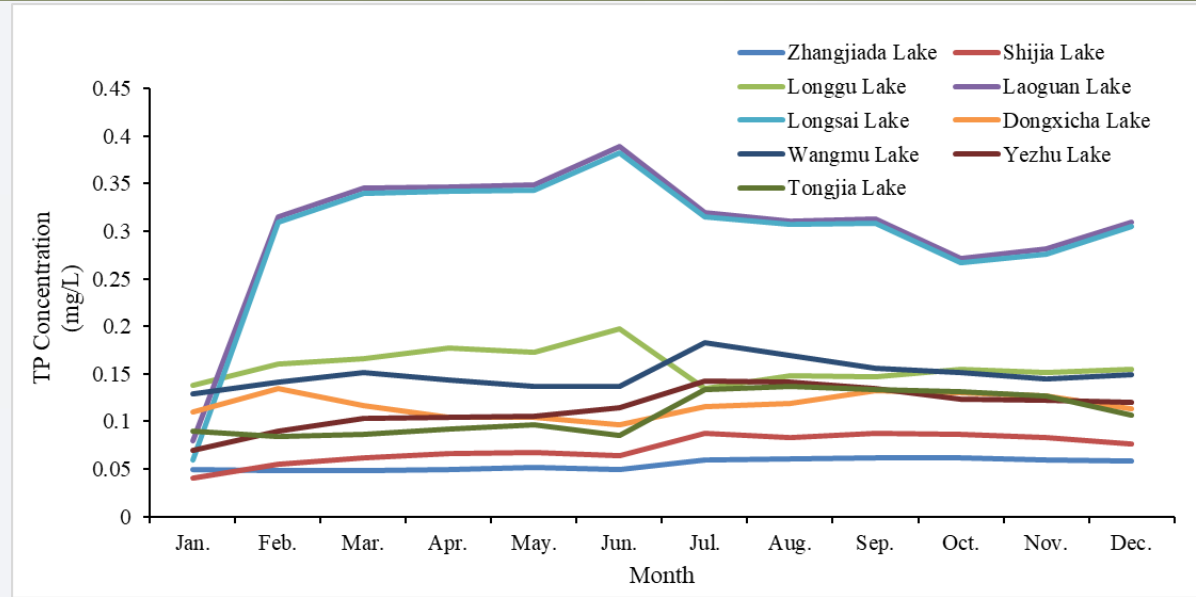


Dongxicha Lake



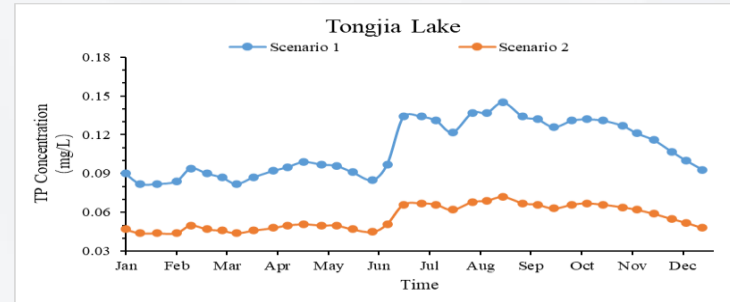
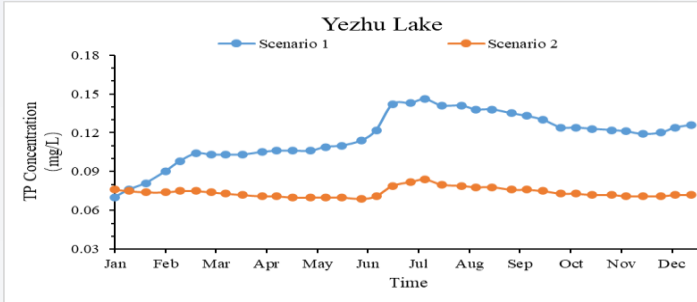
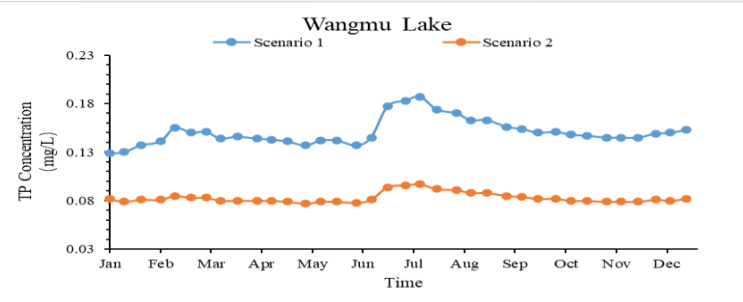
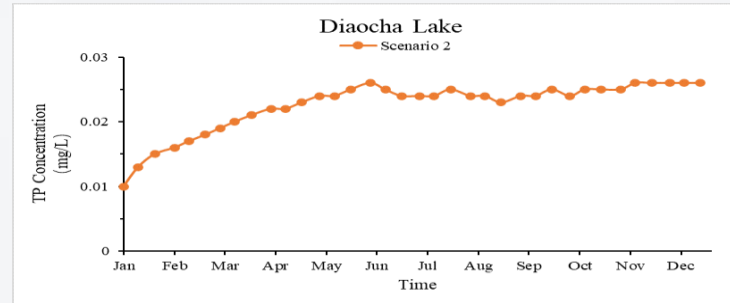
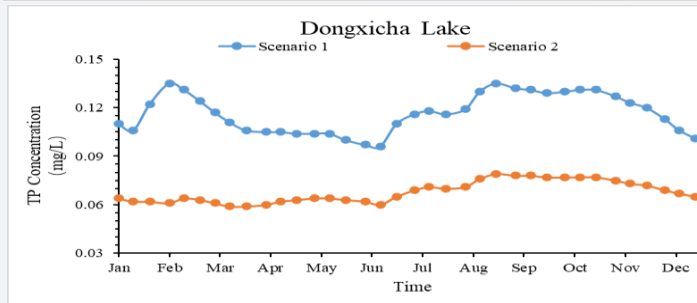
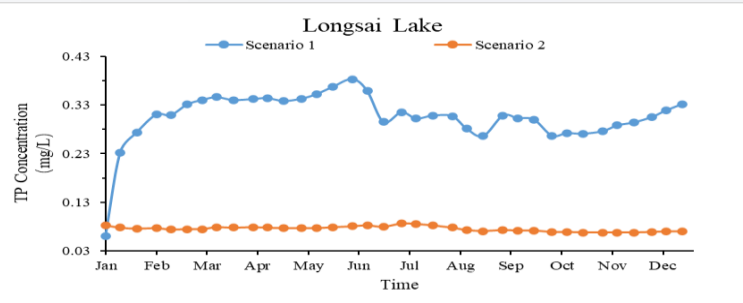
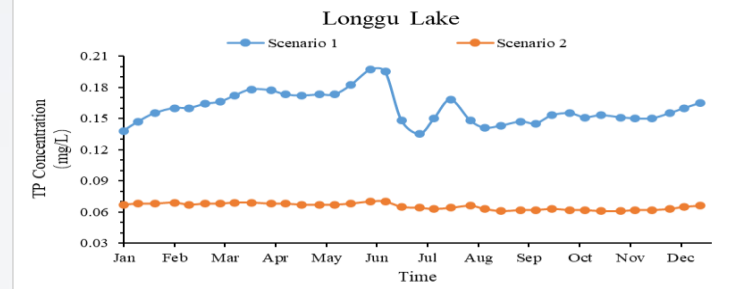
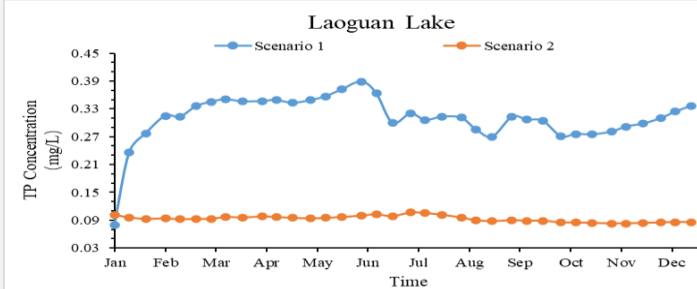
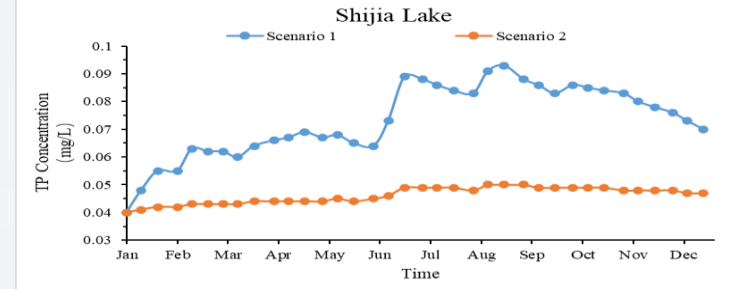
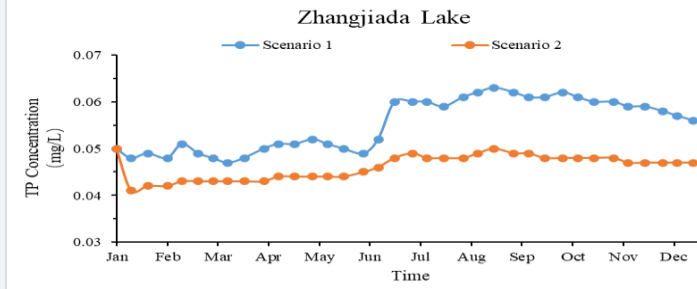
Water quality improvement in rural lakes

- After a series of **pollution control treatment measures** have been taken, such as sewage outlet renovation, sewage collection and treatment, rural domestic sewage treatment project, garbage pollution prevention and control, farmland non-point source pollution prevention and control, livestock and poultry breeding pollution treatment project, water and soil loss control, urban surface runoff pollution prevention and control, lake endogenous control, the improvement rate of water pollution load after pollution treatment is more than **70%**.



Water quality improvement in rural lakes

- After pollution control treatment measures, lakes still failed to meet the water quality target.

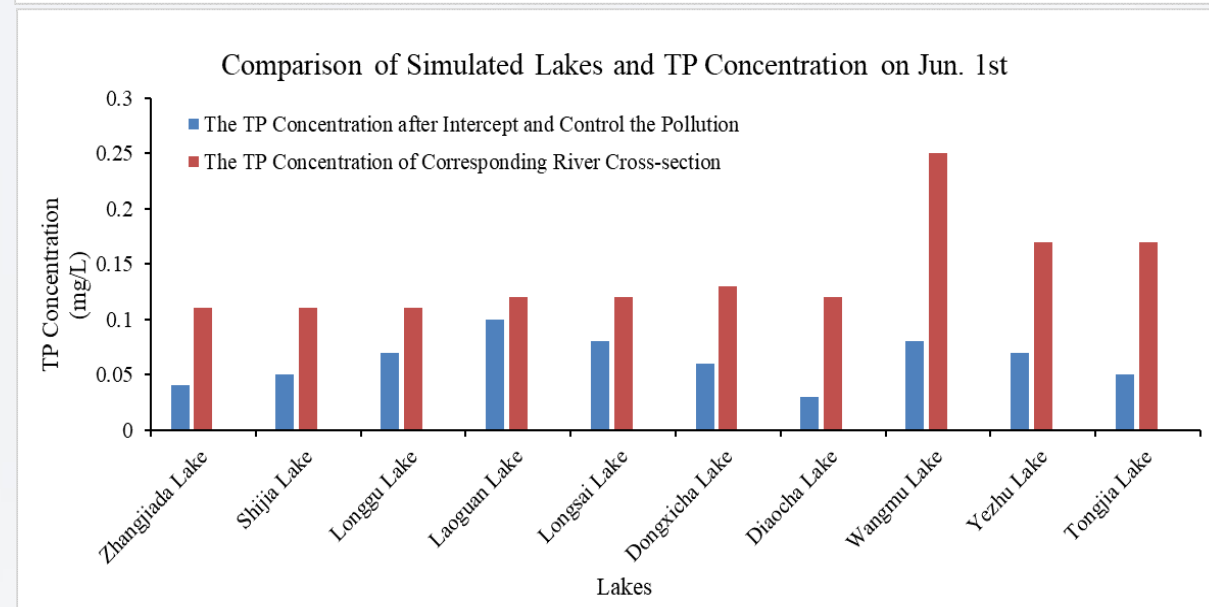
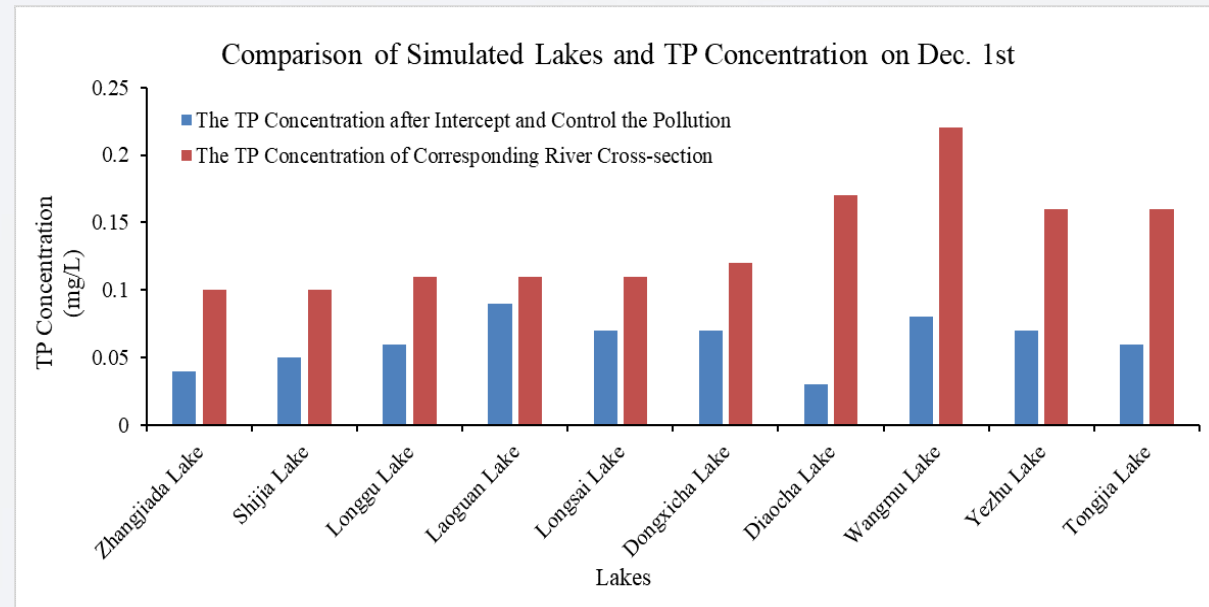


Water quality improvement in rural lakes

- The replenishment of water could enhance the fluidity of the rural lakes but can't eliminate the **TP** risk.

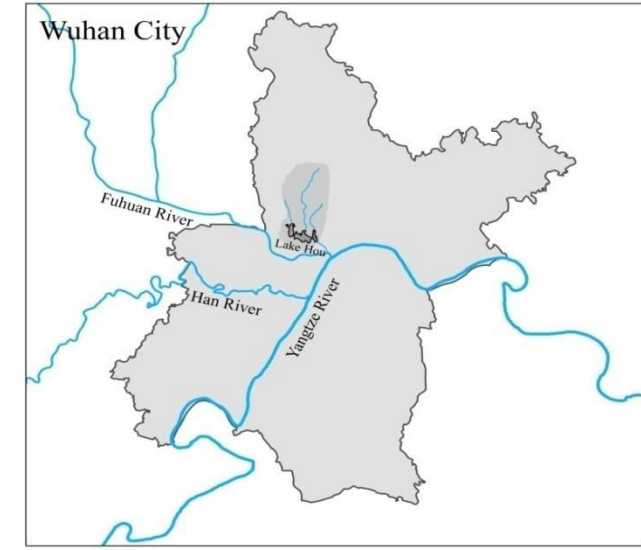
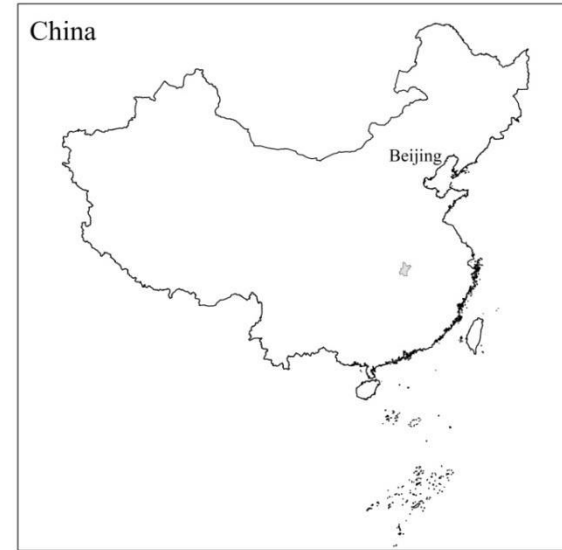
- In the relatively closed water bodies of rural lakes in the shallow hilly water network area, pollution intercept and control is key to controlling **TP**.

- Taking measures such as **increasing lake hydrodynamic conditions** in summer will be a more efficient approach to improve rural lake water quality.



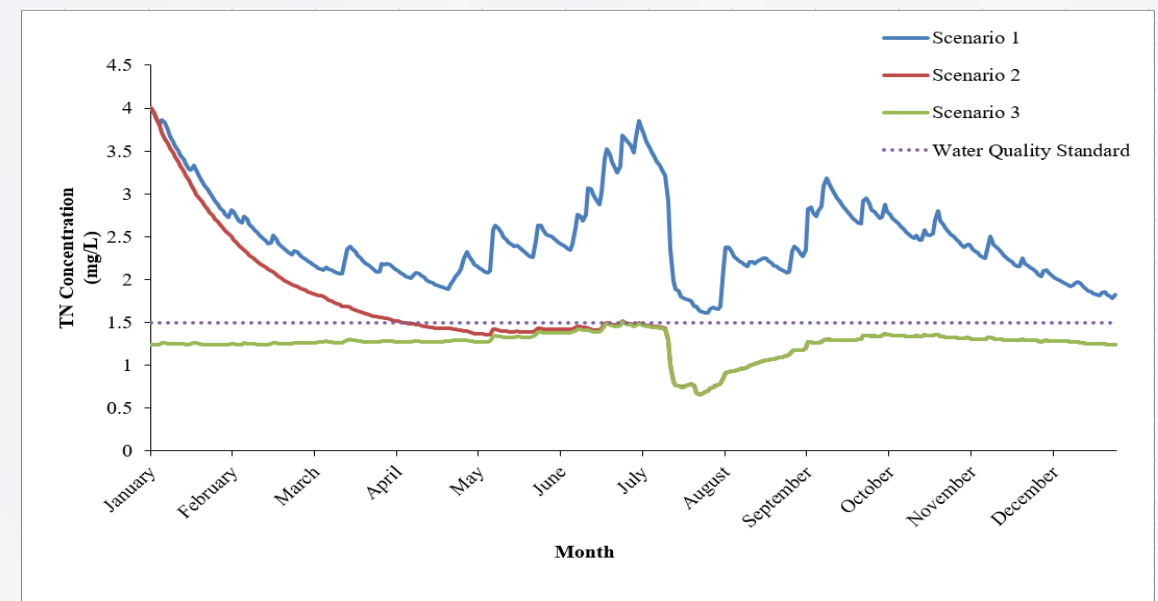
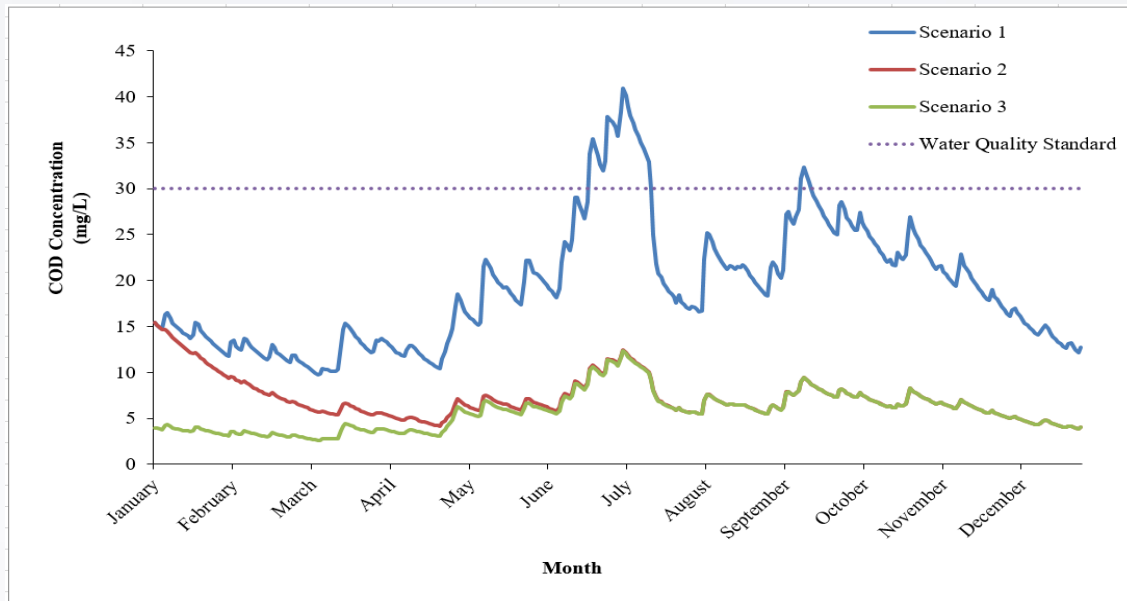
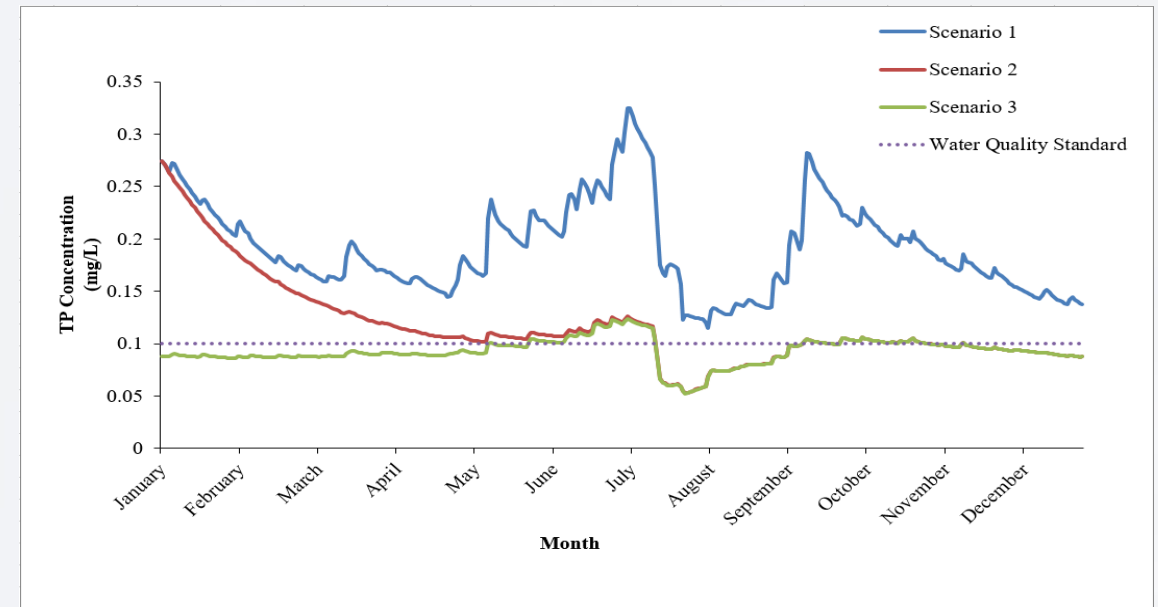
Water quality improvement in urban lake

- Lake Hou, situated in the middle and lower reaches of the Yangtze River, is a prototypical urban lake in Wuhan, Hubei Province.
- Located between longitudes $30^{\circ}45'$ and $30^{\circ}44'$ E and latitudes $114^{\circ}14'$ and $114^{\circ}19'$ N with an area of about 16.3 km^2 and a watershed area of 157 km^2 .
- The lake's shape is rectangular and elongated, with 9.06 km in length, average 2.11 km in width, and 2.2 m in average depth, with a reservoir capacity of $42.437 \text{ million m}^3$.



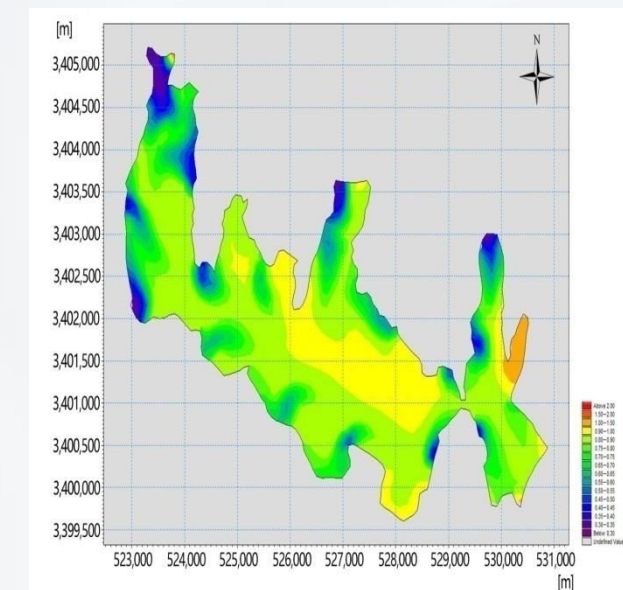
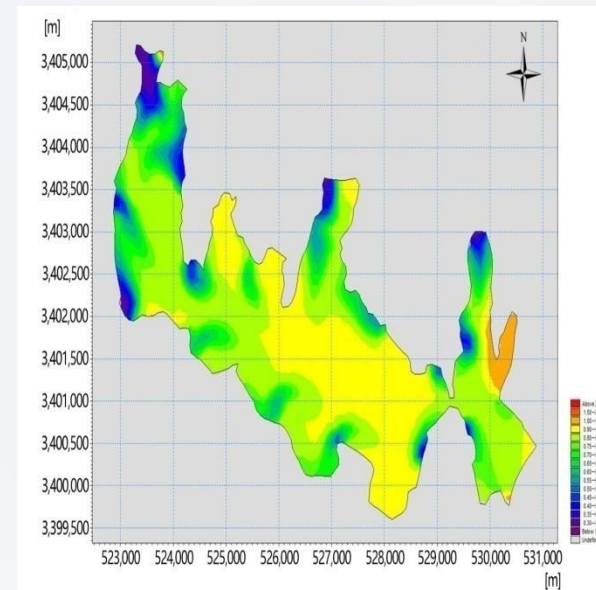
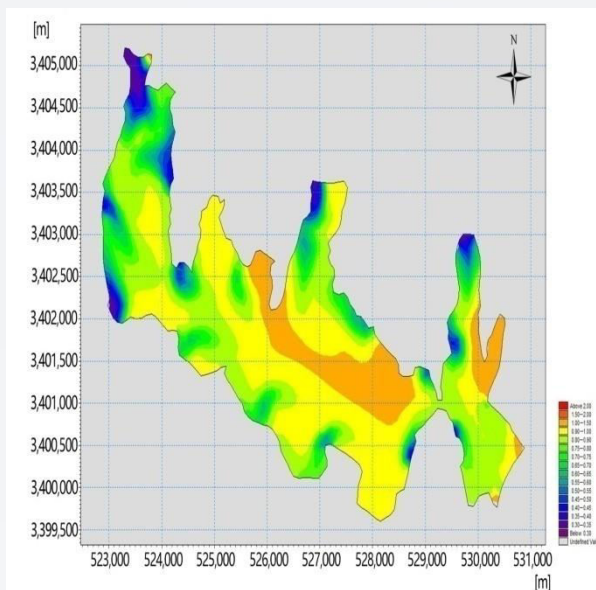
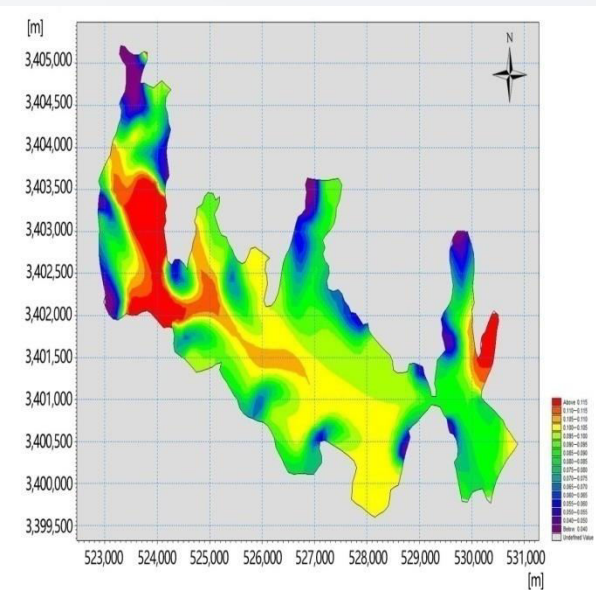
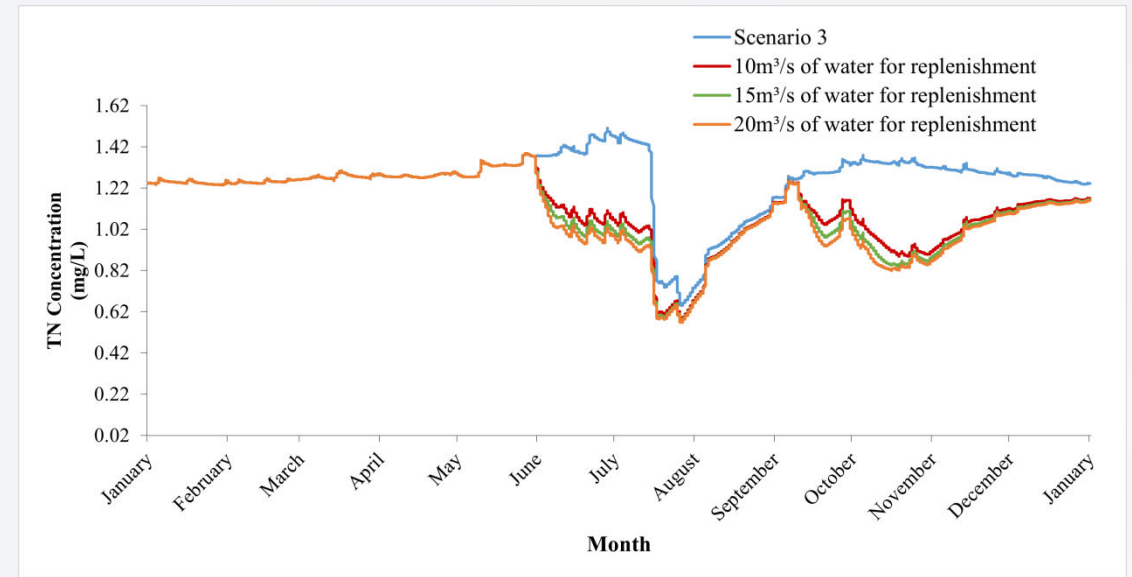
Water quality improvement in urban lake

- Typical urban lake results show that the parameters of various water quality of the lake were improved with increases recharge flow.
- When recharge flow increases from $10\text{m}^3/\text{s}$ to $20\text{m}^3/\text{s}$, water quality gradually increases.



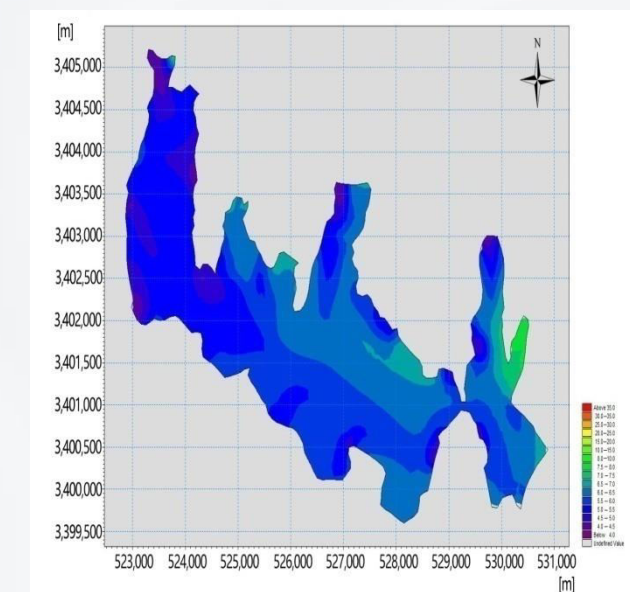
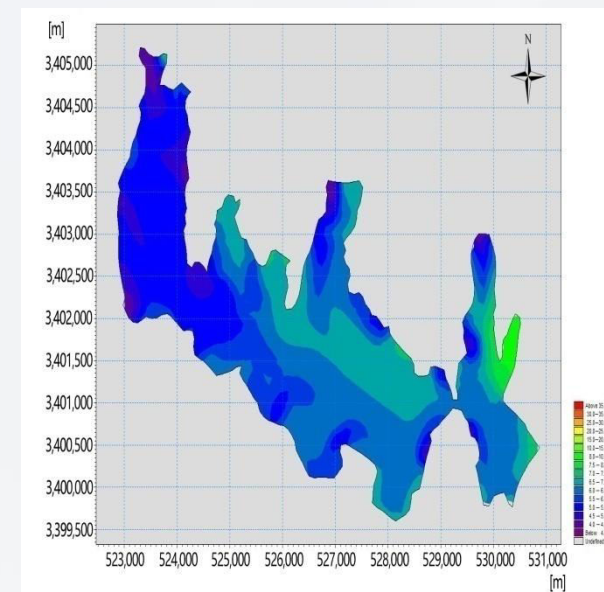
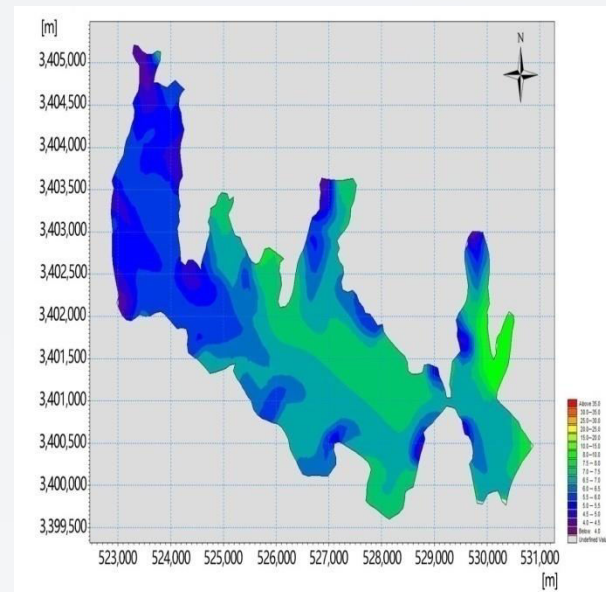
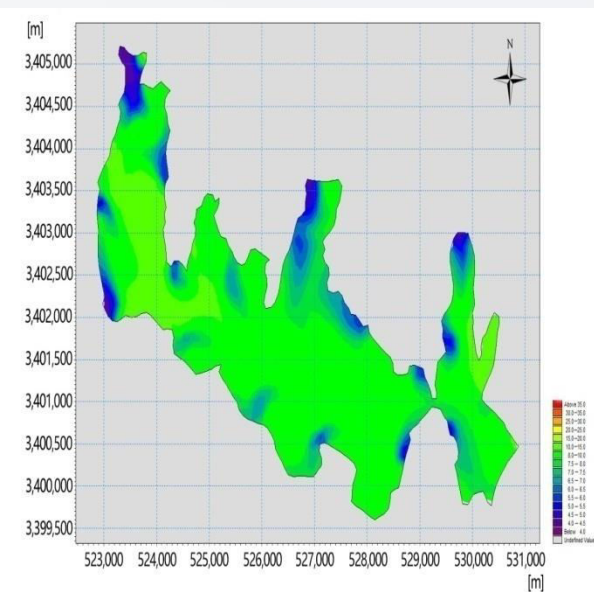
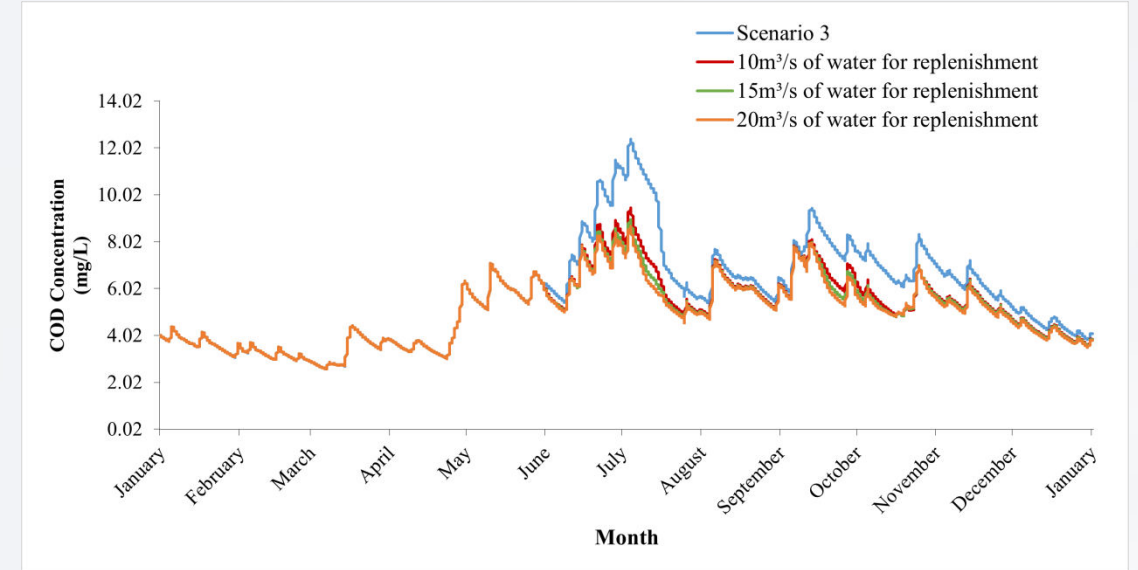
Water quality improvement in urban lake

- A downward trend can be observed with increasing rates of TP, TN, and COD improvements (%), from 10 m³/s to 15 m³/s, at 4.2%, 3.56%, and 1.27%, respectively.



Water quality improvement in urban lake

- The increasing rates of TP, TN, and COD improvements (%) from 15 m³/s to 20 m³/s were 2.6%, 2.4%, and 0.27%, respectively.



Water quality improvement in urban lake

- When a water diversion to a lake is considered for the ecological replenishment, the economics should be carefully evaluated such as the cost, implementation difficulty and improvement of the water quality.

