Adaptive indicator recommendation and weight allocation for river and lake health assessment

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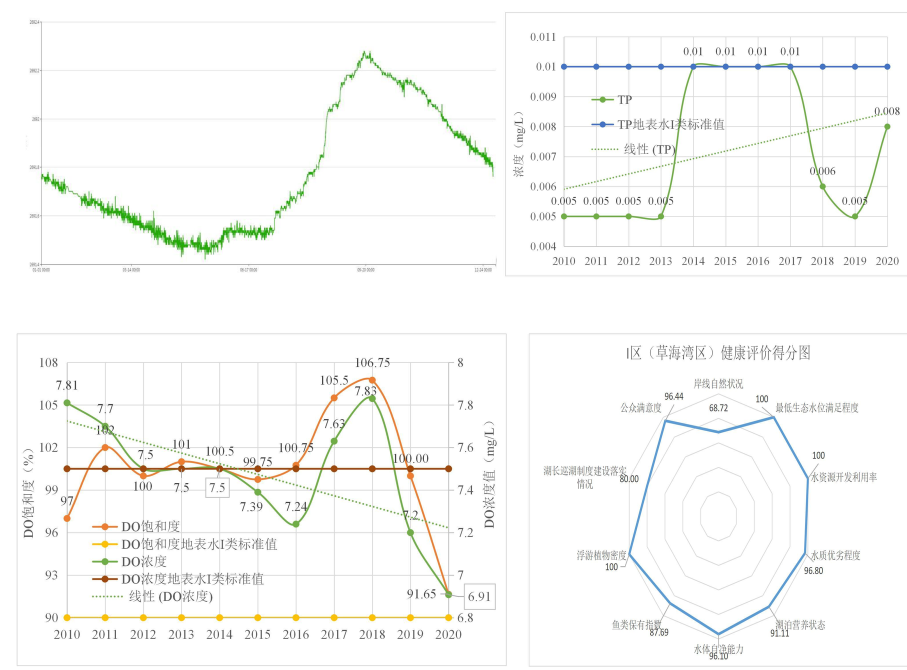
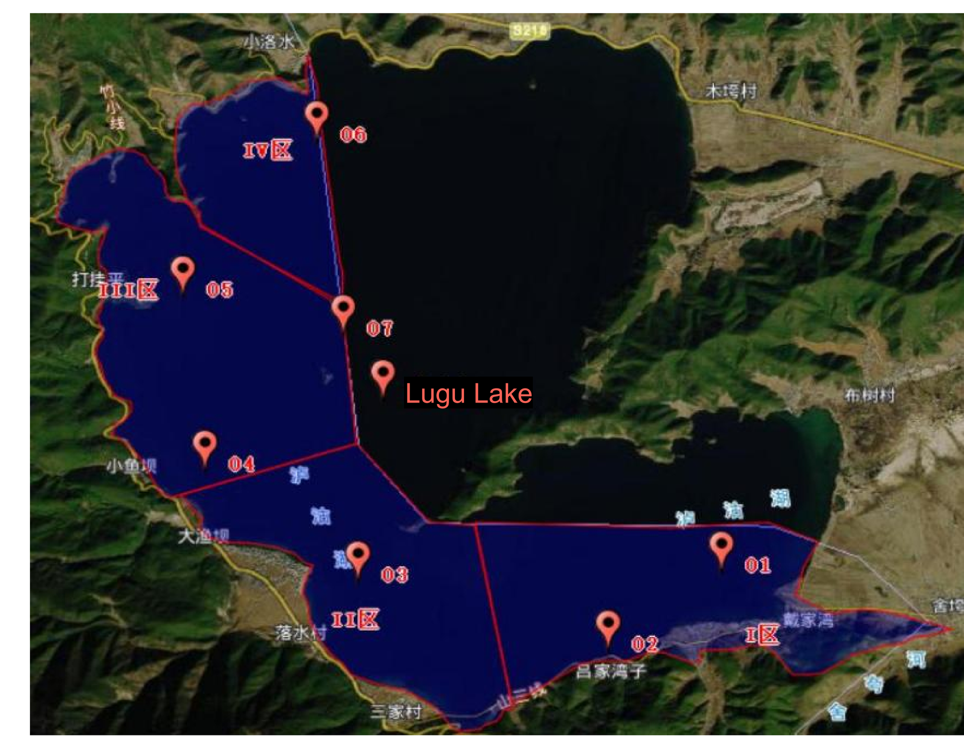
Background

The general indicators and weight can not effectively reflect the real situation of rivers and lakes in different regions, and will deviate from the current situation. Although the technical guide also allows appropriate adjustment according to the specific situation, it is greatly affected by the subjective decision of the staff, and there are many other operational issues.

Work in southwest





Hydrological characteristics of rivers under human activities

human activity	flow, water level	sediment concentration
damage vegetation	runoff increase, water level change sharply	increased
hardening pavement	runoff increase, water level change sharply	
building reservoirs	increase the regulation of flow	reduce the reservoir downstream river
concentration of lake reclamation	weaken the regulation of lake on runoff reduction	
Lay permeable bricks	water level change gently	
afforestation, grass	water level change gently	reduction

Index framework

$$\mu_l=\begin{cases}1+0i_1+0i_2+0i_3+0j & x_l\geq S_1\\ \frac{x_l-S_2}{S_1-S_2}+\frac{S_1-x_l}{S_1-S_2}i_1+0i_2+0i_3+0j & S_2\leq x_l<S_1\\ 0+\frac{x_l-S_3}{S_2-S_3}i_1+\frac{S_2-x_l}{S_2-S_3}i_2+0i_3+0j & S_3\leq x_l<S_2\\ 0+0i_1+\frac{x_l-S_4}{S_3-S_4}i_2+\frac{S_3-x_l}{S_3-S_4}i_3+0j & S_4\leq x_l<S_3\\ 0+0i_1+0i_2+\frac{x_l-S_5}{S_4-S_5}i_3+\frac{S_4-x_l}{S_4-S_5}j & S_5\leq x_l<S_4\\ 0+0i_1+0i_2+0i_3+0i_4+1j & x_l<S_5\end{cases}$$

Benefit index

$$\mu_l=\begin{cases}1+0i_1+0i_2+0i_3+0j & x_l\leq S_1\\ \frac{S_2-x_l}{S_2-S_1}+\frac{x_l-S_1}{S_2-S_1}i_1+0i_2+0i_3+0j & S_1<x_l\leq S_2\\ 0+\frac{S_3-x_l}{S_3-S_2}i_1+\frac{x_l-S_2}{S_3-S_2}i_2+0i_3+0j & S_2<x_l\leq S_3\\ 0+0i_1+\frac{S_4-x_l}{S_4-S_3}i_2+\frac{x_l-S_3}{S_4-S_3}i_3+0j & S_3<x_l\leq S_4\\ 0+0i_1+0i_2+\frac{S_5-x_l}{S_5-S_4}i_3+\frac{x_l-S_4}{S_5-S_4}j & S_4<x_l\leq S_5\\ 0+0i_1+0i_2+0i_3+1j & x_l>S_5\end{cases}$$

Cost index

Data Center

- Watershed
- GIS Data
- Lake & Rivers
- Third part

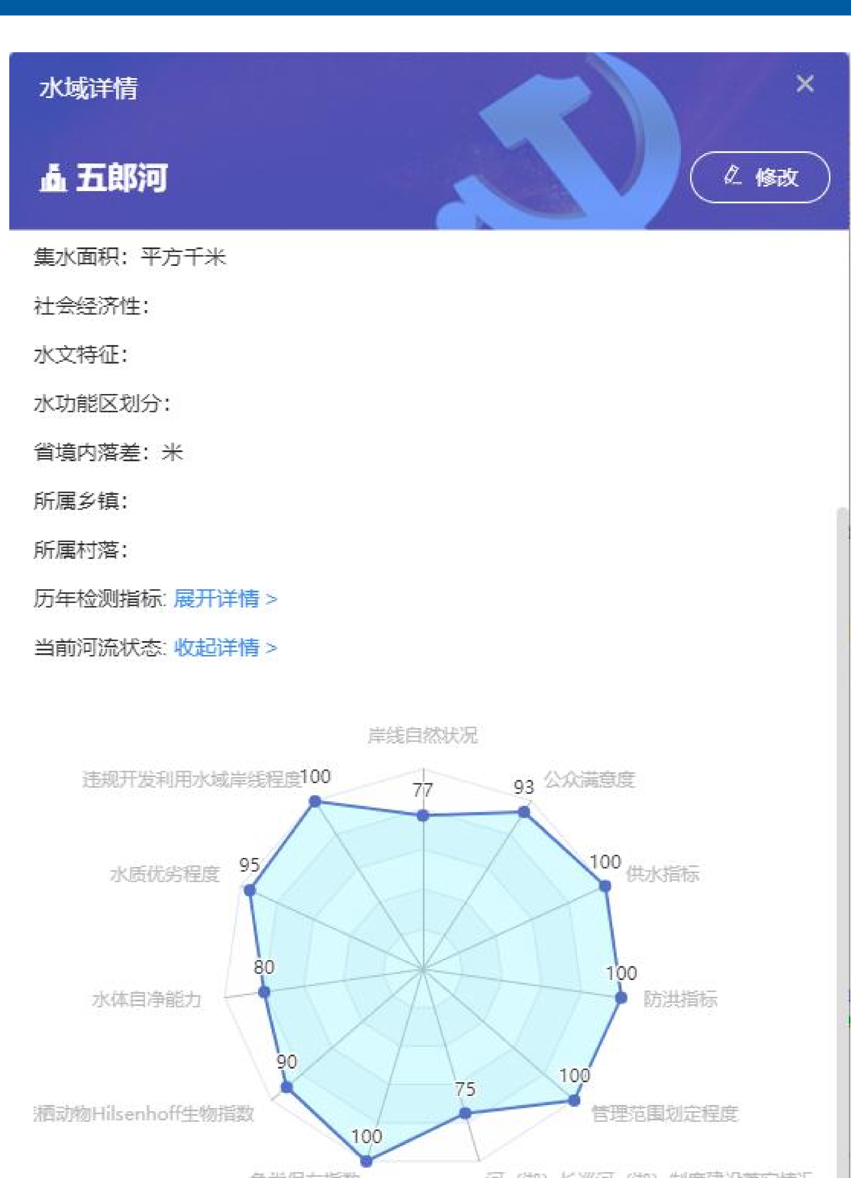
AI Center

- Health assessment
- Public opinion management

Applicant

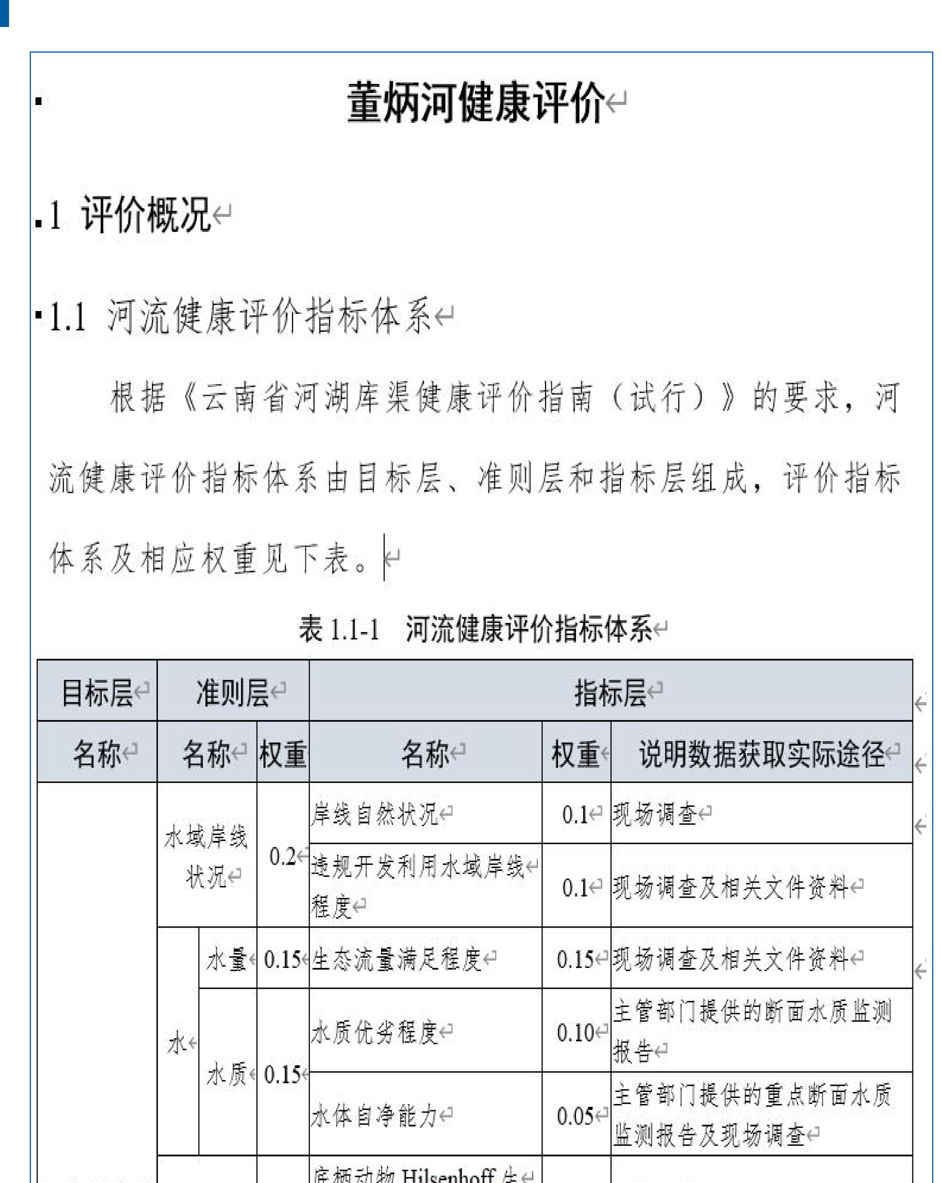
- Mini programs
- Full process dynamics

Intelligent management system



Indicator-based health assessment

AI-based public opinion analysis



NLP-based report production

AI-based water photo analysis