Analysis of Water Quality Based on Physical and Chemical Data in Hanjiang River Basin (China)

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Abstract. According to the investigation of 25 stations in Hanjiang River Basin in August 2015 and January 2016, the aquatic health index of the region was evaluated by using the evaluation method. The diversity evaluation grade was light or non-polluting in August 2015 while diversity rating for the heavy pollution in January 2016. Water quality in the summer is better than that in winter season. The greater impact of plankton water quality factor for the total nitrogen and total phosphorus. water ecology evaluation results can better reflect Eutrophication and the degree of risk of algal blooms such as aquatic in water of Hanjiang River Basin.

Introduction

Meijiang River Basin and Tingjiang River Basin is the main part of Hanjiang River source, which is in Guangdong province, China. This study provides the basis for ecological protection and management in Hanjiang River Basin.

Materials and methods

Introduction of Sampling Basin

The sampling site is located in the Hanjiang River Basin including dry river basin, a reservoir basin, the Yongding River Basin, Zhang Xi River Basin, Mianhuatan Basin, the survey conducted two phases, Respectively August 2015 wet season and dry season in January 2016, Simultaneous detection of water quality data and aquatic data.

Physical and Chemical Data Analysis of Sampling Basin

Analysis on monitoring data of water quality results in dry and wet season:

The target water quality of single factor water quality evaluation is three kinds of standard of surface water, the single factor water quality evaluation of water quality of Hanjiang River Basin show

that the water quality of Hanjiang River Basin is inferior to five, part of the basin into four categories, the main pollutant of total phosphorus, total nitrogen, the Hanjiang River Basin were chlorophylla, total phosphorus, total nitrogen, permanganate index evaluation comprehensive nutrition state for water quality comprehensive nutrition state of mild eutrophication[1].

Single factor evaluation

Calculation method of single factor pollution index of water quality: pH and DO use a separate evaluation method, the remaining indicators using a general method[2].

Evaluation results

Using the formula of single factor pollution index, according to the 2015-2016 River Basin in Changtan reservoir, Duobao reservoir, Mianhuatan reservoir water quality monitoring of the 25 monitoring sections of value calculated each section of water quality index Pi value, according to the Pi value and water quality requirements, the evaluation results of the water quality section are obtained, determine the main pollution indicators at the same time, should be marked multiples of this index concentration than Class III water quality standards in the index, which exceed the standard ratio for water temperature, pH value and dissolved oxygen and other projects do not exceed the standard calculation of multiples[3].

Comprehensive evaluation method of water quality

The nutritional status of water quality was evaluated by the method of comprehensive nutrition state index[4] , The correlation between Chla of Chinese lakes (reservoirs) and other parameters r_{ij} and r_{ij}^2 are shown in Table:

Table 1 Correlation between some parameters of Chinese lakes (reservoirs) and Chla $r_{ij}$and r_{ij}^2

.

parameter	**chla**	**TP**	**TN**	**SD**	**COD_{Mn}**
r_{ij}	1	0.84	0.82	-0.83	0.83
r_{ij}^2	1	0.7056	0.6724	0.6889	0.6889

Under the same nutritional status, the higher the index value is, the higher the nutritional level is.In this evaluation, Chlorophyll a (Chla), total phosphorus (TP), total nitrogen (TN), permanganate index (CODMn) four index were chosen to evaluate.

Evaluation results of water nutritional status quality

Table 2 Comprehensive evaluation of water quality in Meizhou during 2015-2016

Sample number in January	Index (opacity)	Afterinspection	Sample number in August	Index	Afterinspection
1	39.97	Mesotropher	1	58.15	light eutropher
2	53.51	light eutropher	2	53.12	light eutropher
3	46.10	Mesotropher	3	55.77	light eutropher
4	47.37	Mesotropher	4	52.19	light eutropher
5	46.80	Mesotropher	5	47.57	Mesotropher
6	40.36	Mesotropher	6	48.92	Mesotropher
7	40.20	Mesotropher	7	42.82	Mesotropher
8	40.17	Mesotropher	8	49.45	Mesotropher
9	65.20	Middle eutropher	9	60.86	Middle eutropher
			10	59.11	light eutropher
11	73.04	Hyper eutropher	11	60.81	Middle eutropher
12	64.15	Middle eutropher	12	63.29	Middle eutropher
13	62.89	Middle eutropher	13	63.90	Middle eutropher
14	54.56	light eutropher	14	55.74	light eutropher
15	41.55	Mesotropher	15	48.78	Mesotropher
16	39.62	Mesotropher	16	37.82	Mesotropher
17	40.11	Mesotropher	17	40.94	Mesotropher
18	39.50	Mesotropher	18	38.43	Mesotropher
19	40.50	Mesotropher			
20	37.24	Mesotropher	20	36.99	Mesotropher
21	37.82	Mesotropher	21	40.84	Mesotropher
22	44.35	Mesotropher	22	41.42	Mesotropher
23	51.80	light eutropher	23	55.72	light eutropher
24	52.84	light eutropher	24	52.15	light eutropher
25	58.20	light eutropher	25	59.68	light eutropher

Evaluation results of water nutritional status quality

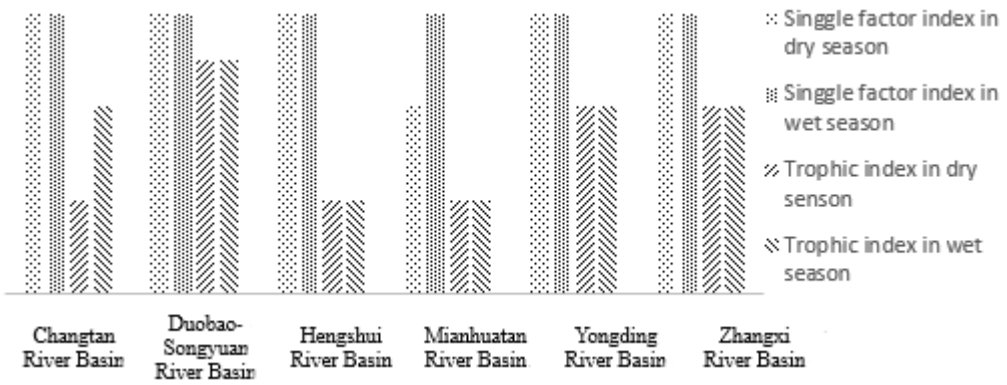

Fig.1 The comparison in Dry and wet period in different water quality and nutritional status of single factor in Hanjiang River Basin

Conclusion

On the mutagenicity and the plentiful water quality monitoring data analysis results are as follows: The evaluation of single factor water quality in Hanjiang River Basin shows that the water quality in Hanjiang River Basin was integrated to five classes [5], part of the basin to four categories, main pollutants for total phosphorus, total nitrogen, chlorophyll a and total phosphorus, total nitrogen.

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References

[1] PRADHAN U K,SHIRODKAR P V,SAHU B K. Physico-chemical characteristicsof the coastal water off Dev i estuary, Orissa and evaluation of its seasonal changes using chemometric techniques[J]. Current Science,200 9, 96(9):1203-1209.

[2] EL-OTIFY A M,ISKAROS I A. Water quality and potamoplankton evaluation of the Nile River in Upper Egy pt[J]. Acta Limnologica Brasiliensia, 2015, 27(2):171-190.

[3] KOKLU R,SENGORUR B,TOPAL B. Water Quality Assessment Using Multivariate Statistical Methods-A Case Study: Melen River System (Turkey)[J]. Water Resources Management, 2010, 24(5):959-978.

[4] OLGUIN H F,PUIG A,LOEZ C R,et al. An integration of water physicochemistry, algal bioassays, phytoplank ton, and zooplankton for ecotoxicological assessment in a highly polluted lowland river [J]. Water Air and Soil Pollution, 2004, 155(1-4):355-381.

[5] SAPPA G,ERGUL S,FERRANTI F,et al. Effects of seasonal change and seawater intrusion on water quality f or drinking and irrigation purposes, in coastal aquifers of Dar es Salaam, Tanzania [J]. Journal of African Earth Sciences, 2015,105:64-84.