Progress and Cooperation Needs of the Yellow River Health Assessment

Yellow River Institute of Hydraulic Research

YRIHR

Contents

- Relevant research projects has been carried out
- Cooperation ideas and needs

Already Carried out Research Projects of River Health Assessment

Program of the "Eleventh Five-year Plan" for Sci & Tech Research of China, "Yellow River Health Restoration Objectives and Countermeasures"

1. Put forward the river health connotation and outstanding features

Signs of river health: a smooth and stable river channel, moderate amount of surface runoff, good water quality, and sustainable river ecosystem.

2. Set up the index system of the health of the Yellow River

Objective	Feature	Index	Standard		2030 target
			Suitable	Lowest	
Basic balanced play of the natural function and social function of the Yellow River	A smooth and stable river channel, moderate amount of surface runoff, good water quality, and sustainable river ecosystem	Bankfull discharge	Downstream 4000~/s Ningxia to Inner Mongolia 2000~/s	Downstream /s Ningxia to Inner Mongolia /s	Downstream /s (more) Ningxia to Inner Mongolia /s (more)
		Flood carrying capacity of the channel	Downstream/s(Huayuankou) Ningxia to Inner Mongolia 5600～5900 m^3/s	Same to the left	Same to the left
		Beach channel elevation difference	＞1m	＞0m	＞0m
		Water quality classification	Upper Lanzhou: Ⅱ Following Lanzhou: Ⅲ	Allowing Ⅳ class for local reach in short period	Normal year: Ⅲ, no worse Ⅴ class in dry years
		Birds or fish condition			
		Discharge and water volume			
		Downstream sediment	For the operational mode “trapping coarse sand and discharging fine sand” of reservoirs in the middle reaches, the Xiaolangdi sediment should not be more than 600 million ton.		Same to the left

3.Conduct a comprehensive evaluation of the health status of the Yellow River in different periods

Index	1950～1959	1974～1986	1997～2002	2006～2007
Bankfull discharge	Healthy	Sub-healthy	Poor health	Downstream: Sub-healthy, 50% of the stream segment in Inner Mongolia: Poor health.
Beach channel elevation difference	Healthy	Hua～Jia Healthy、Jia ～ Sun Poor health	Hua～Jia: Sub-healthy Jia～Sun: Poor health	Hua～Jia: Healthy Jia～Sun: Poor health
Water quality	Healthy	Lanzhou ～ Hua: Sub-healthy	20%: Poor health 50%: Healthy	Lanzhou ～ Huayuankou: 50 % Sub-healthy, the remaining is healthy.
Discharge and water volume	Healthy	Overall healthy, but the drying up of the estuary	Poor health	Sub-healthy
Birds and fish condition	Healthy	Healthy	Poor health	Sub-healthy
Comprehensive evaluation of health level	Healthy	Upper Longyangxia: Healthy Following Longyangxia: Sub-healthy or poor health	Upper Lanzhou: Sub-healthy Following Lanzhou: Poor health	Shizuishan ～ Tongguan and Jiahetan ～ Sunkou: Poor health Remaining: Sub-healthy

Public Benefit Research Foundation of Ministry of Water Research, "Impact on the river ecosystem and ecological operation of the Reservoirs in the mainstream of the Yellow River "

- **Six biological parameters are selected as the indexes of the river aquatic ecosystem health assessment. Phytoplankton parameter includes the number of species, density and biomass; benthic animals includes the number of species and biological indices; the standard of evaluation of fish is the number of species.**
- **The ecological status of the Yellow River is evaluated with reference to the 1980s, some indicators is with reference to the 1950s.**

Table 1 Evaluation levels and scores of the indexes

Level	Evaluation Levels	Score
Ⅰ	No change	0
Ⅱ	Slight change	1-5
Ⅲ	Moderate change	6-10
Ⅳ	Bigger change	11-15
Ⅴ	Significant change	16-20
Ⅶ	Severe change	21-25

Table2 Classification standards of river aquatic ecosystem health

Level	Description	Score
Ⅰ	No change, natural state	100
Ⅱ	A slight change, the natural habitats of the ecosystem and community composition changes, but the ecological functions have no change	80-99
Ⅲ	Moderate change, the natural habitat of the river ecosystem and community composition have great changes, but did not change the basic function of the ecosystem	60-79
Ⅳ	Bigger changes, the structure and function of the ecosystem have bigger changes	40-59
Ⅴ	Significant change, ecosystem changes significantly, and the basic ecological functions lost	20-39
Ⅶ	Severe change, the basic ecological functions lost and it is also irreversible	0-19

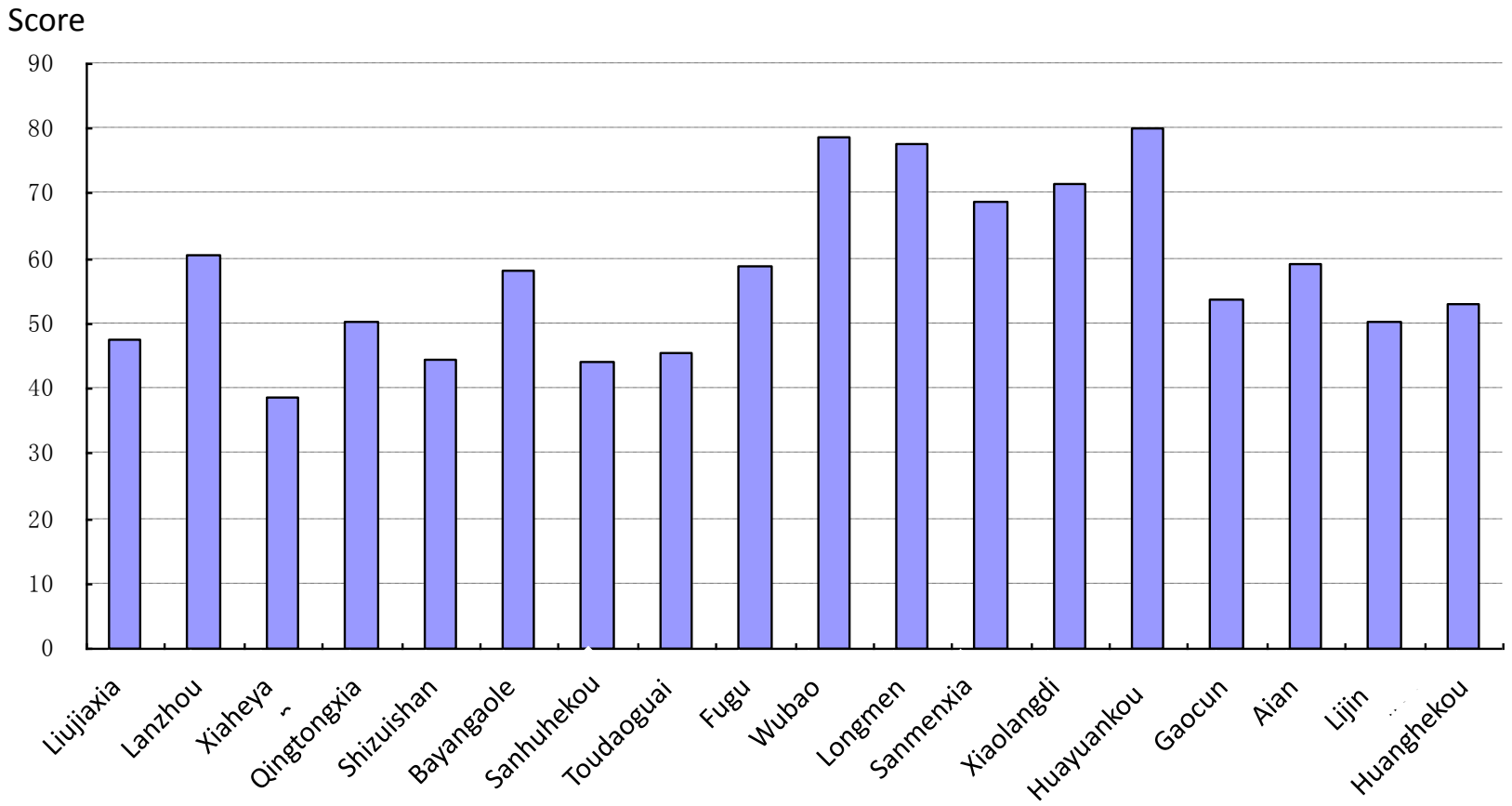
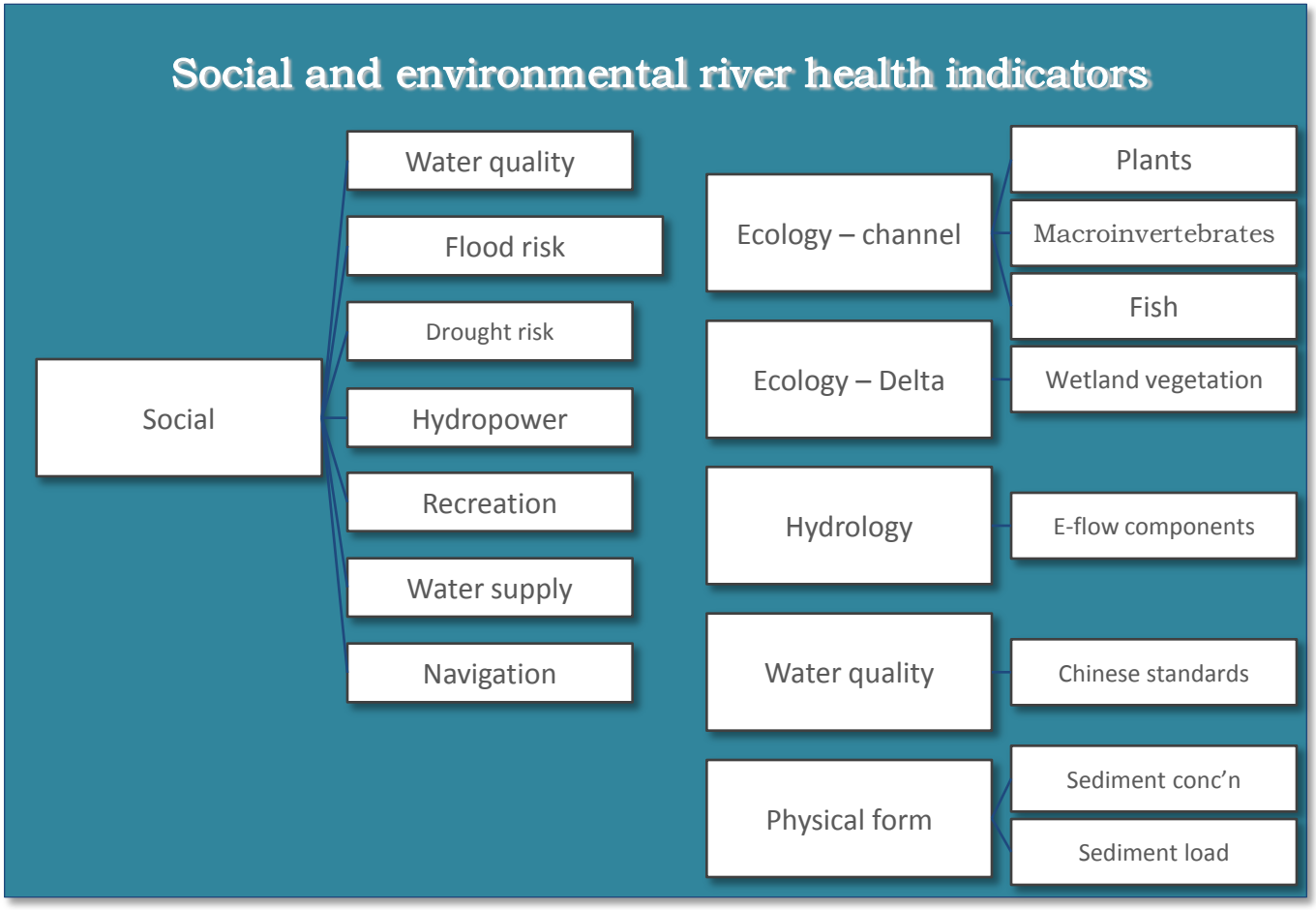


Figure 9The aquatic ecosystem health score value for each reach in the mainstream of the Yellow River

The score of Lanzhou, Wubao, Longmen, Sanmenxia and Xiaolangdi etc. reaches is between 60 and 80, the aquatic ecological health level is Ⅲ, and compared with the reference value, the natural habitat of the river ecosystem and community composition have great changes, but the basic function of the ecosystem did not change.

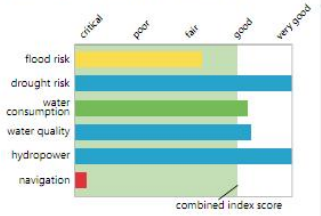
The score of remaining reaches is between 40 and 59, the aquatic ecological health level is Ⅳ, and compared with the reference value, the structure of the ecosystem have bigger changes.

China-Australian Cooperation Project (ACEDP)
River Health and Environment Flow



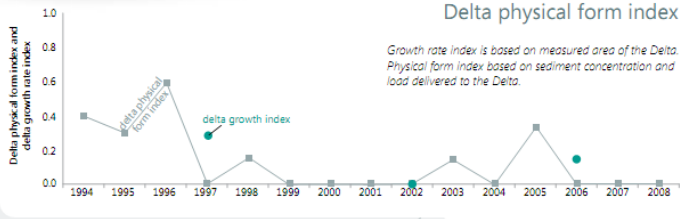
Report Card Results

Socio-economic indicators



Scores for socio-economic indicators for the lower Yellow River in 2008

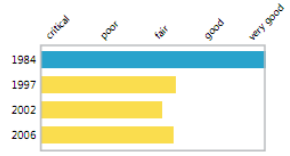
Delta physical form index



Growth rate index is based on measured area of the Delta. Physical form index based on sediment concentration and load delivered to the Delta.

Ecological survey site (2008)
Water quality station
Hydrology station

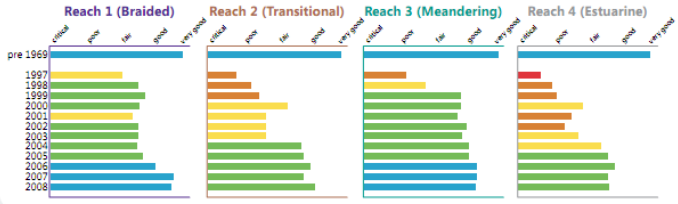
Delta vegetation composition index



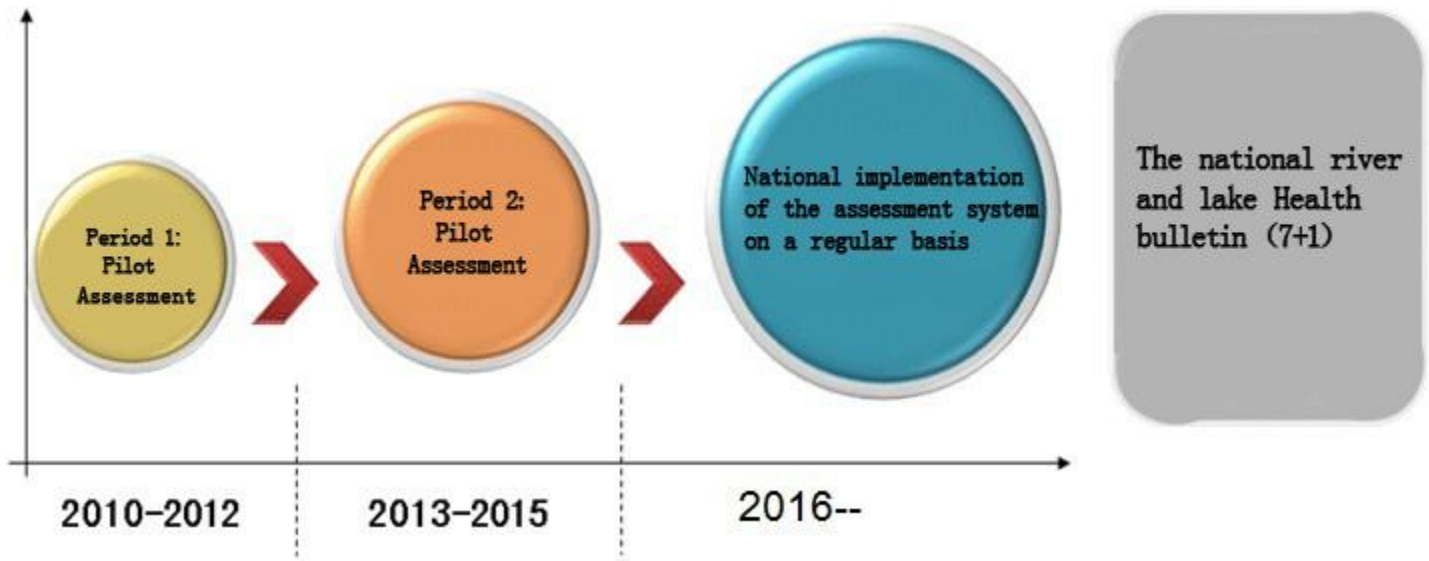
Scores for the delta based on vegetation composition calculated using remote sensing technology, using 1984 as the reference condition.

Hydrological indicators

Degree of compliance with environmental flow recommendation made in this project



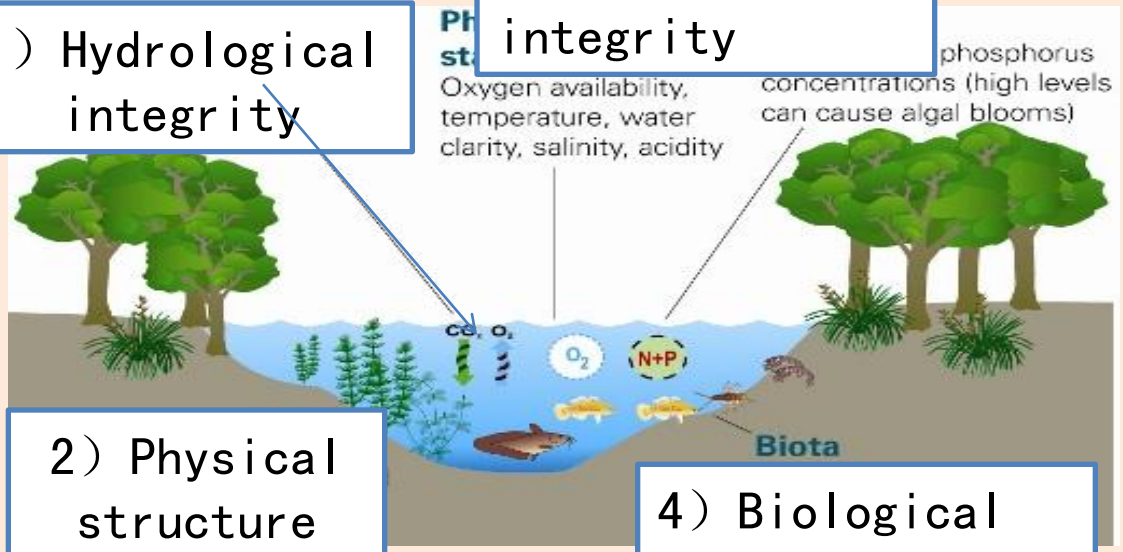
National River and Lake Health Program （ NRHLP ）



1. Assessment focus

1）Hydrological integrity

3）Chemical integrity



2）Physical structure integrity

4）Biological integrity

5 Integrities:

- Hydrological integrity;
- Physical structure integrity
- Chemical integrity;
- Biological integrity;
- Functional integrity

Ecological integrity

5）Social service function integrity

Health of rivers and lakes

2. Evaluation index system

- One target layer, five criteria layer, multiple indicators and sub-indicators
- To follow unified architecture, reflecting the open system based on the universality

Target layer	Criteria layer	River	Lake	Reservoir
River and lake health	Hydrology and water resources	Degree of flow variation	Satisfaction of the condition of minimum ecological water level	Satisfaction of discharged ecological water
		Guarantee of the ecological flow	Degree of lake inflow variation	Guarantee of inflow
	Physical structure	Rivers and lakes connectivity status	Rivers and lakes connectivity status	
		Retention rate of natural wetlands	Rivers and lakes shrinking status	Reservoir sedimentation condition
		Riparian status	Lakeside status	Fluctuating zone status
	Water quality	Variation of water temperature		
		DO status	DO status	DO status
		Organic pollution	Organic pollution	Organic pollution
		Heavy metal pollution		Sediment pollution
			Eutrophic condition	Eutrophic condition
	Biology		Phytoplankton density	Phytoplankton density
			Zooplankton biomass loss index	
			Macrophytes coverage	
		Macroinvertebrate biological integrity index	Macroinvertebrate biological integrity index	Macroinvertebrate biological integrity index
		Fish loss index	Fish loss index	
	Social service function	Indicators of water function zones standard	Indicators of water function zones standard	Indicators of water function zones standard
		Water resources development and utilization index	Water resources development and utilization index	Water resources development and utilization index
		Flood control Index	Flood control Index	Flood control Index
		Public satisfaction index	Public satisfaction index	Public satisfaction index

3. Evaluation score system

Table 2-3 The lake health Assessment Classification table

Level	Class	Color		Score range	Description
1	Ideal condition	Blue		80-100	Close to the reference conditions or anticipated goal
2	Healthy	Green		60-80	Smaller difference from the reference conditions or anticipated goal
3	Sub-healthy	Yellow		40-60	Moderate difference from the reference conditions or anticipated goal
4	Poor healthy	Orange		20-40	Larger difference from the reference conditions or anticipated goal
5	Sick	Red		0-20	Significant difference from the reference conditions or anticipated goal

Cooperation ideas and needs

Based on the above understanding, in the China-EU scientific and technological cooperation, we hope to carry out the following research.
(1) To carry out the study of ecological zoning in the basin, and research the evolution rule and driving factors of the river ecosystem, for providing a basis for the river health management.
(2) To establish the monitoring system of the Yellow River aquatic ecosystem, regularly monitor the river aquatic ecosystem.


Thanks !
黄河防洪的坚固屏障
Solid defence of flood prevention of the Huanghe River