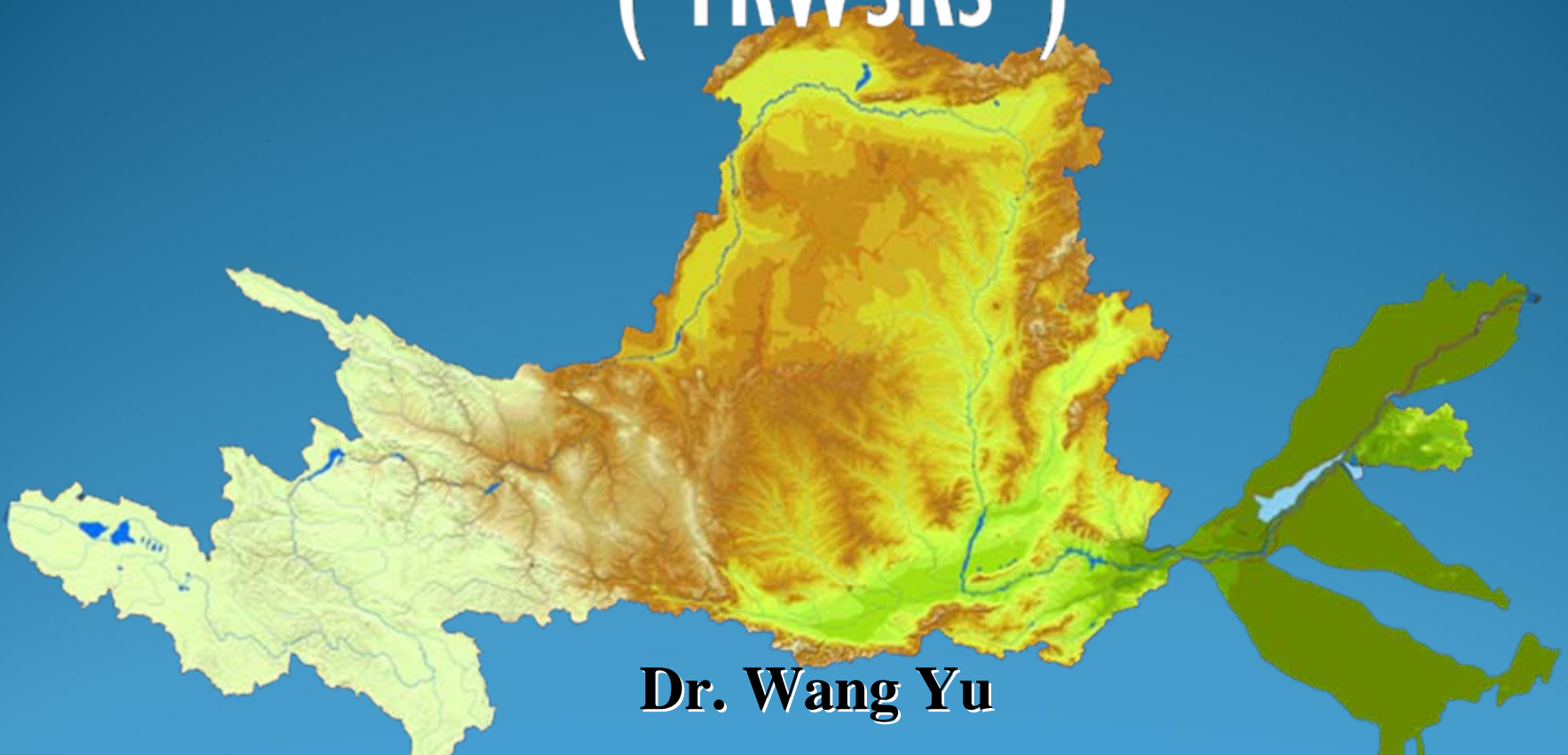


The Construction of Yellow River Water-Sediment Regulation System (YRWSRS)



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主要内容: **Talk Outline**



Essential aspects and approaches of YRB



Current situation and problem of YRWSRS



Overall layout and goal of YRWSRS



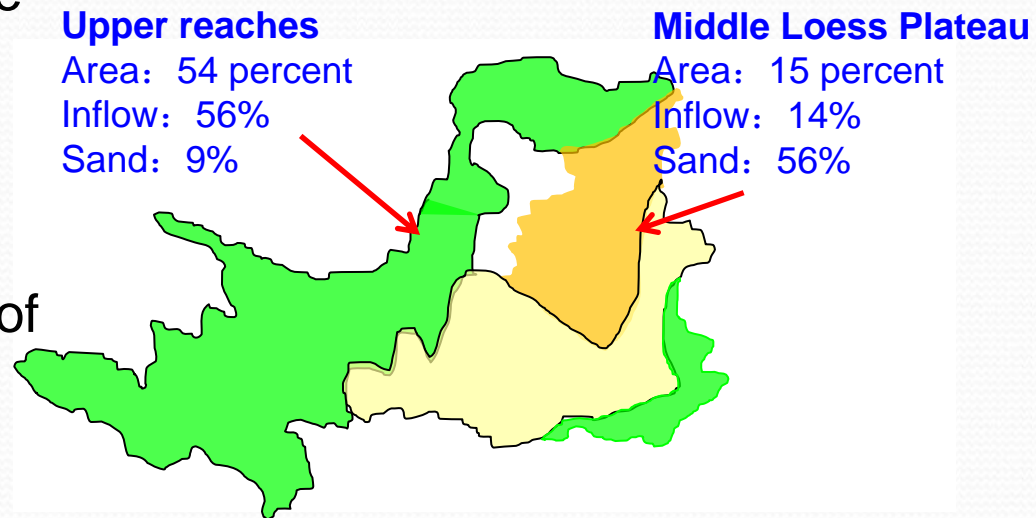
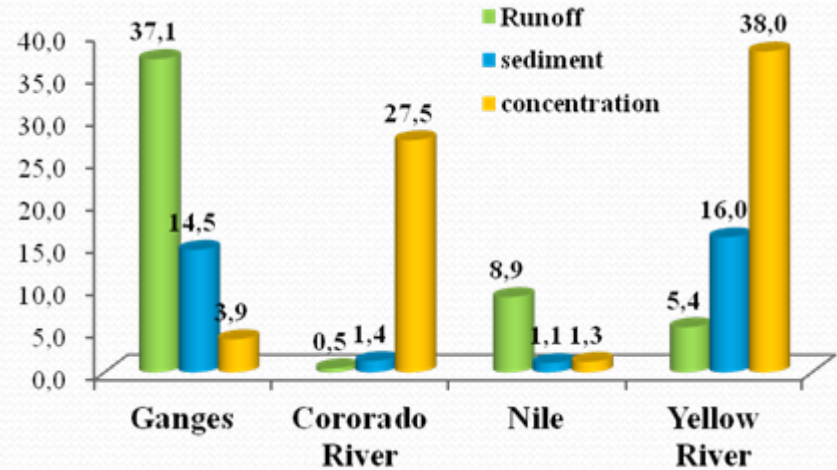
Effects of YRWSRS

黄河显著特征及治理对策

Essential Aspects and Approaches of YRB

Essential Aspects

- ◆ Insufficient water and excessive sediment
- ◆ Water and sediment come from different regions
- ◆ Incompatible relationship of water and sediment



Approaches to solve

Problems

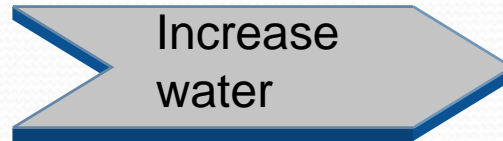


Approaches



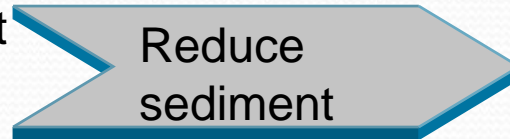
Measures

◆ Insufficient water



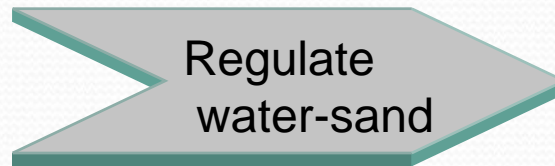
- Inter-basin water transfer
- Water-saving

◆ Excessive sediment



- Soil and water conservation
- Reservoir storage

◆ Incompatible water and sand



Construction of Yellow River Water-Sediment Regulation System (YRWSRS)

2.

黄河水沙调控体系建设现状与问题

The current situations and challenges of YRWSRS

Current project status

- Four controlling reservoirs have been built, a primary framework is setup
- Played great roles in flood control, water allocation and sediment-reduction of YRB



Challenges encountered (存在问题)

Middle and lower reaches

Due to insufficient water impetus, it is hard to regulate water and sediment jointly and maintain the medium-flow channel which is important for flood control.



Upper reaches

Unable to resolve the conflicts among water supply, power generation and the sediment-flushing. The sedimentation and shrinking of Inner-Mongolia river channel are increasingly severe, which increase the flood and ice-flood risks.



Ice disaster



Flood threat



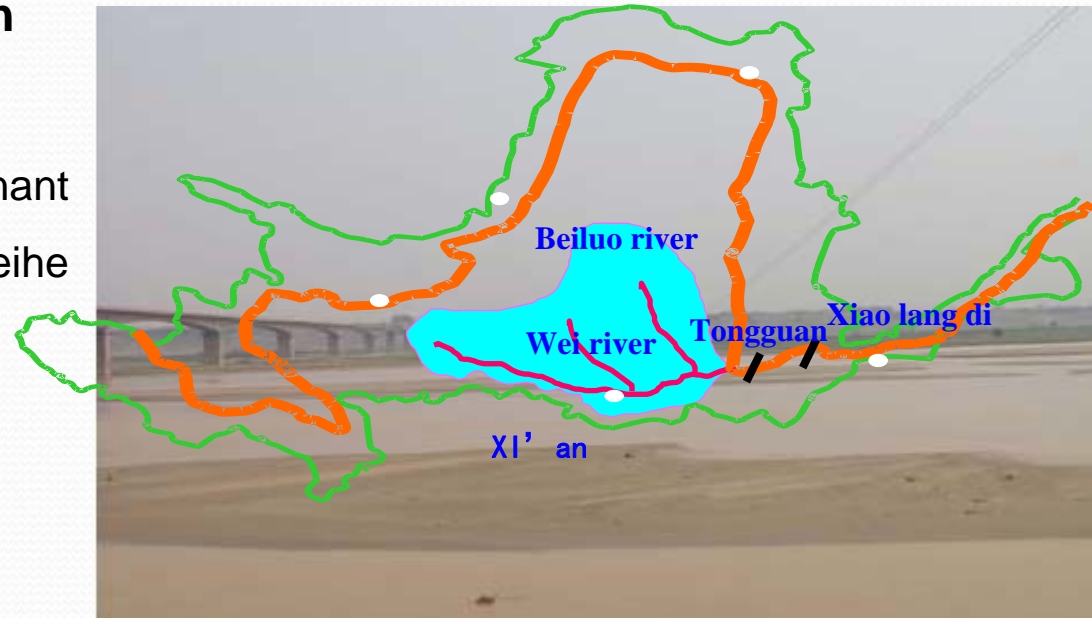
Hydro-electricity limited



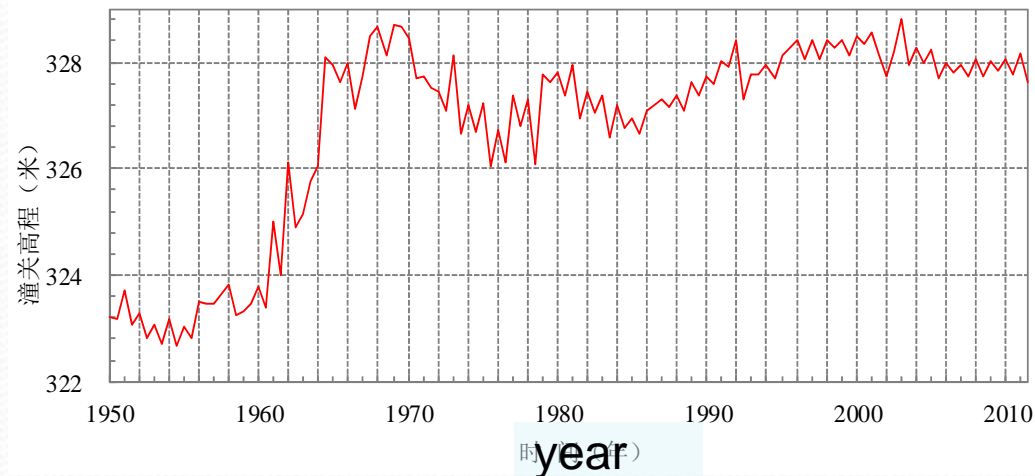
Water shortage

Tongguan elevation keeps high

Tongguan Elevation is a determinant factor for the siltation of lower Weihe River.



Although many measures have been adopted in recent years, it is still unable to effectively decrease the Tongguan Elevation.



黄河水沙调控体系总体布局和目标

The overall layout and goal of YRWSRS

Components of YRWSRS

- 7 controlling reservoirs on the main stem (Long,Liu,Hei,Qi,Gu,San,Xiao)
- 2 reservoirs as supplement. (Hai,Wan)
- 4 reservoirs on tributaries. (Gu,Lu,He,Dong)



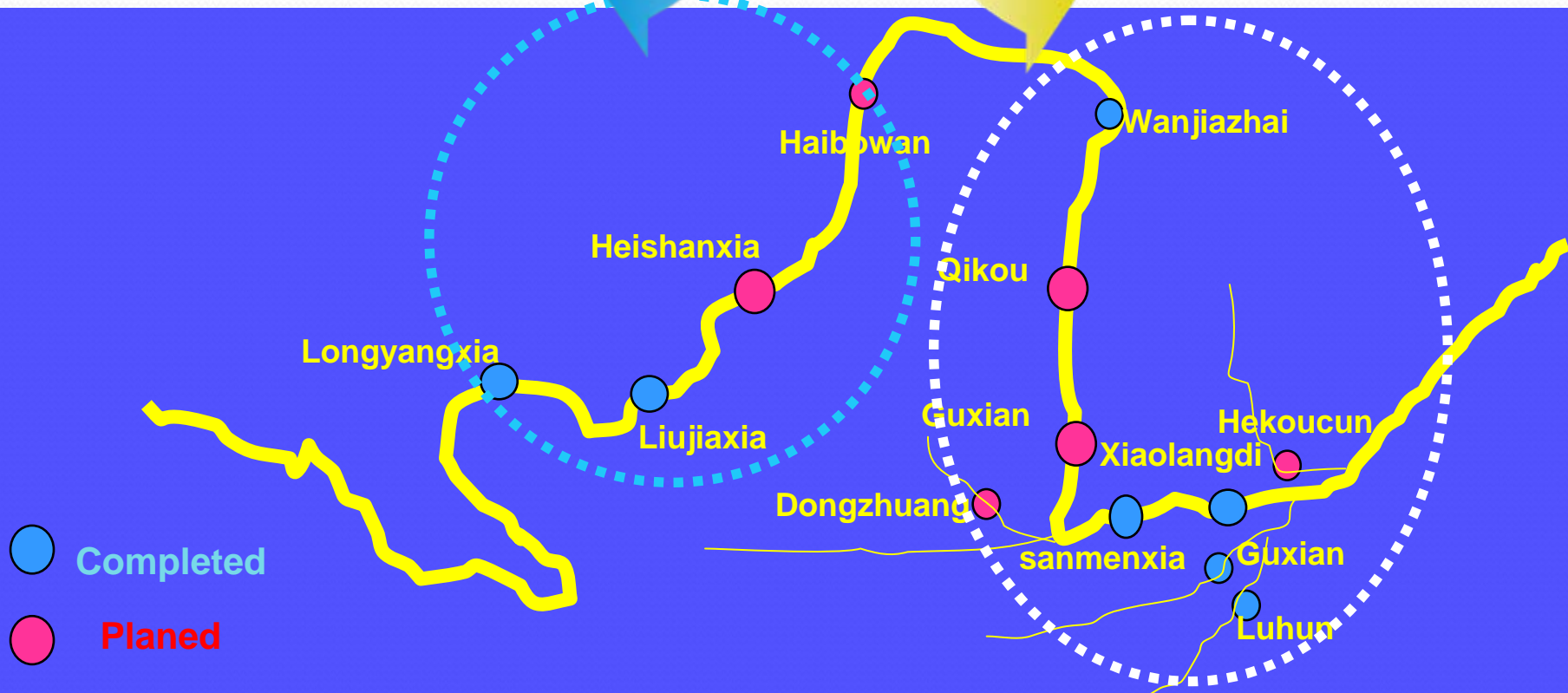


Structure of YRWSRS

YRWSRS

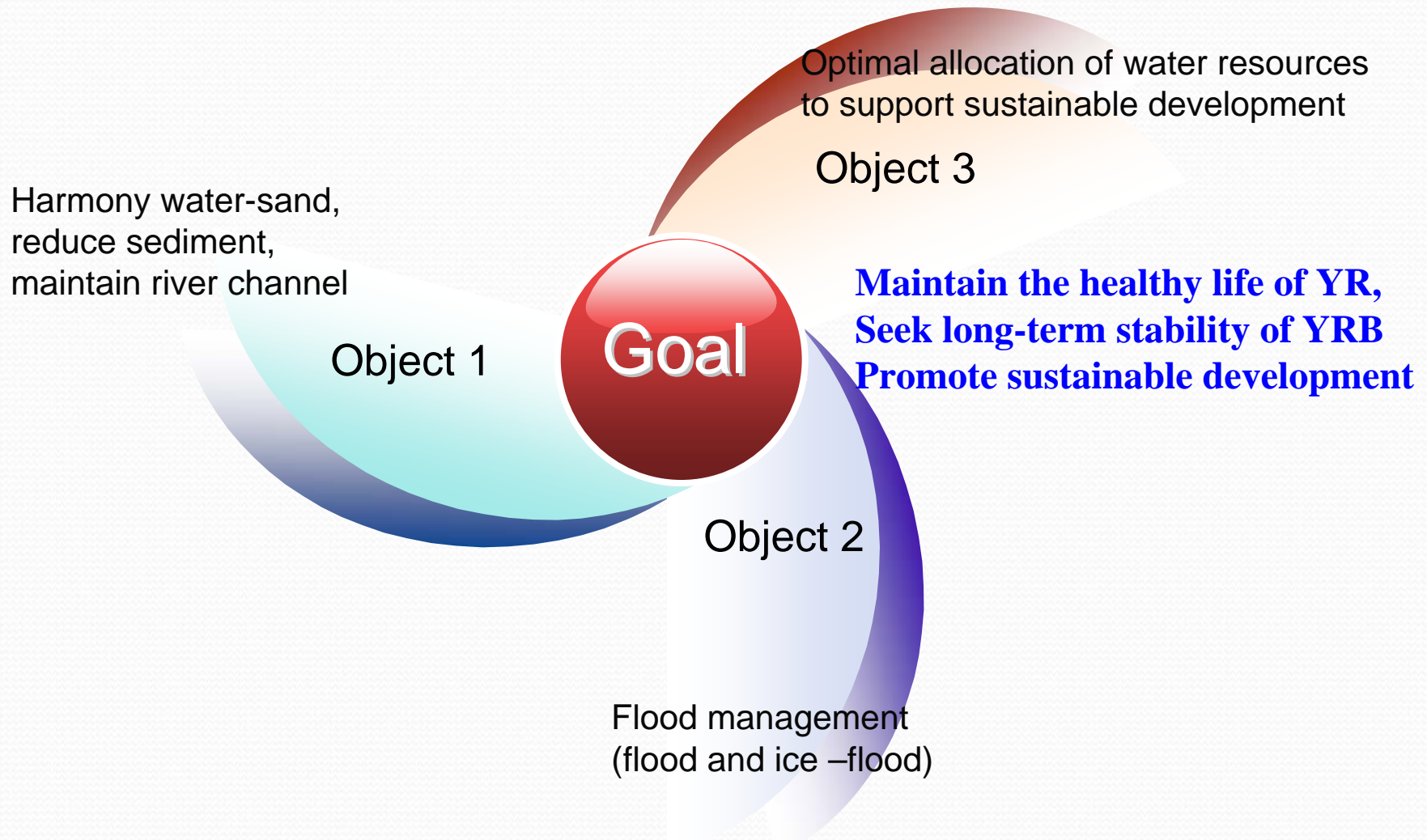
*Subsystem of upper reaches
for water allocation*

*Subsystem of middle and
lower reaches for flood and
sediment control*



黄河水沙调控体系的运用目标

The Goal of YRWSRS



4.

黄河水沙调控体系效果

Estimated Effects of YRWSRS

古贤水库的作用



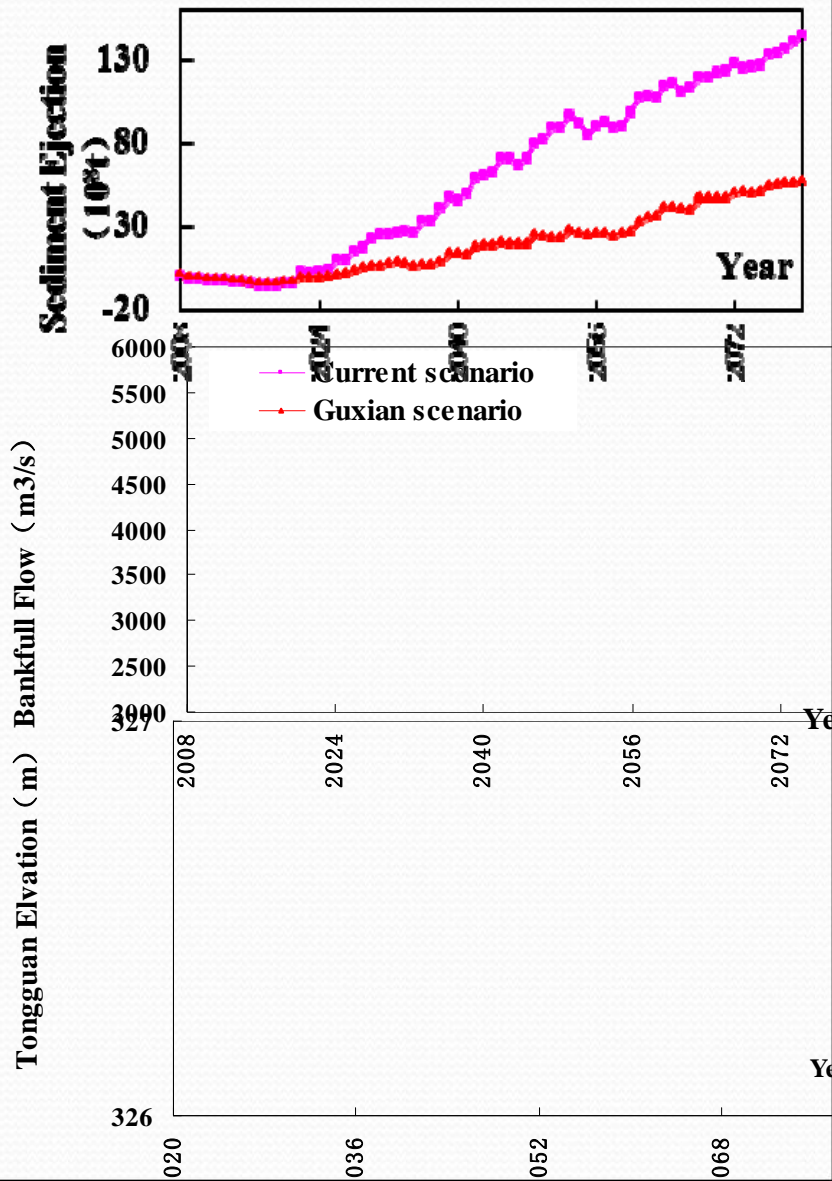
Effects of Guxian Reservoir (planned to be in effort in 2020)

+ Trapping sediment 14 billion m³ in reservoir and reducing 11.2 billion tons sediment in Lower Reaches (= siltation for 50 years at current condition)

+ Maintaining a rational medium-flow channel with capacity of 4000m³/s in Lower Reaches for 50 years.

+ Decreasing the Tongguan Elevation by 2m at most

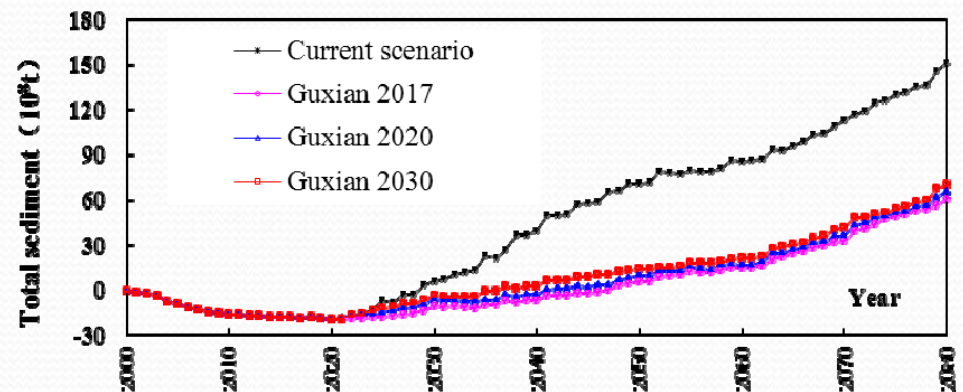
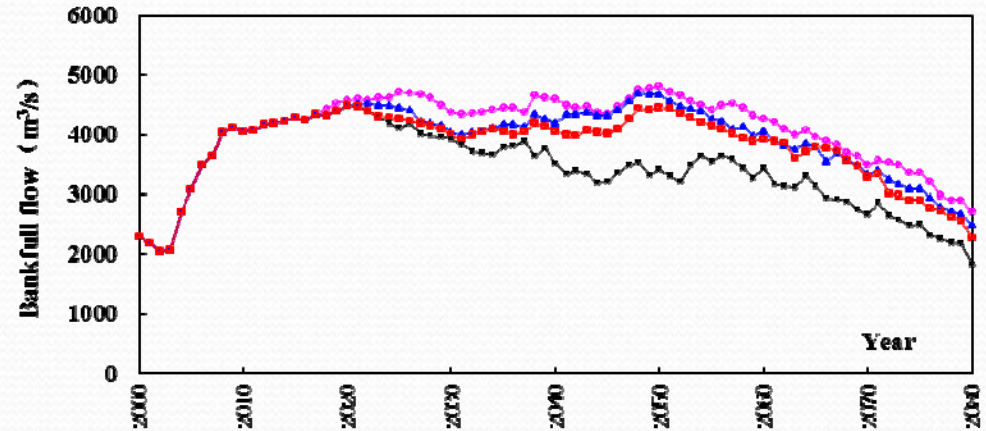
+ Improving water supply, mitigating the conflicts of peak load regulation and promoting regional development





Effects of Guxian

Analysis shows: the joint regulation of Guxian Reservoir and Xiaolangdi Reservoir will perform better than single reservoir, and have more powerful control on water and sediment. This is so called “1+1>2”.



The earlier the Guxian Reservoir is put into operation, the more benefits it will have on sediment reduction in Lower Reaches.

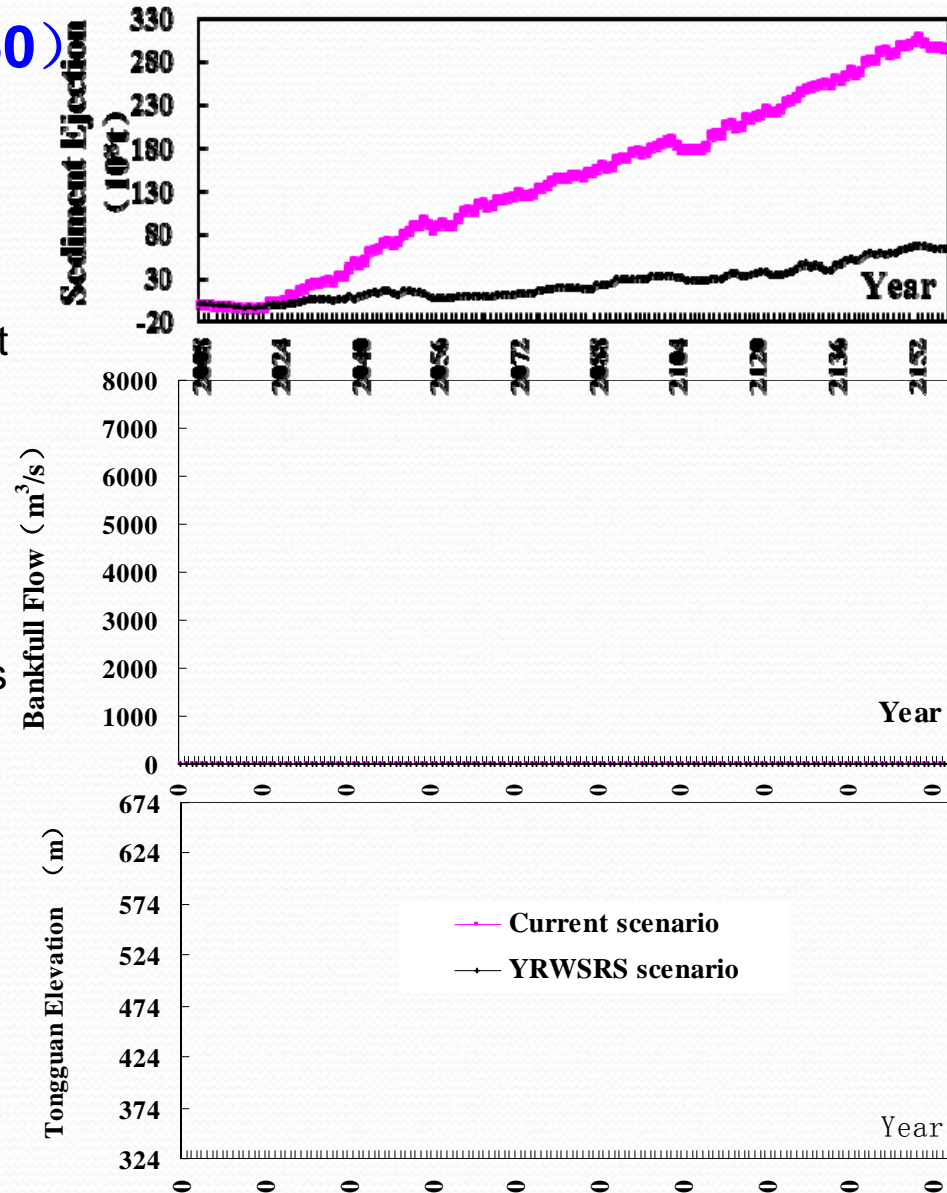
Effects of integrating YRWSRS (planned to be completed in 2050)

◆ Sediment reduction

= Within next 150 years, sediment reduction in the Lower Reaches will account for 19.71 billion tons (it means no siltation occurs in the Lower Reaches for 100 years under current project condition).

= rational medium-flow channel with the flow capacity of $4000\text{m}^3/\text{s}$ in Lower Reaches and $2000\text{m}^3/\text{s}$ in Inner Mongolia Reach can be stable for a long term.

= Tongguan Elevation can be decreased by 3.6m at most





Effects of integrating YRWSRS

◆ Flood and ice-flood mitigation

+ flood control standards will be increased as the rare floods are slashed in the planned reservoirs, especially mitigating floods in Inner Mongolia Reach effectively.



Inner Mongolia ice flood

+ the protection of ice-flood will be enhanced, as the flows in winter will be better controlled by the planned reservoirs.



Floods in the Lower Reaches



Effects of integrating YRWSRS

◆ Water allocation and power generation

- + Average annual water supply will increase by 335~542 million m³,
- + Water shortage will decrease by 2.52~3.90 billion m³ in special dry year,
- + Average annual power generation will increase 1.6~3.9 billion kW•h.

Comparison of water shortage among different conditions

Scenario	Year level	Average	Moderate dry year	Special dry year	Consecutive dry years
Current Engineering	2020	74.86	101.88	180.96	136.62
	2030	97.21	127.58	185.38	150.67
	2030 West route water transfer	31.02	41.82	72.47	42.72
Integrating YRWSRS	2020	70.99	96.60	155.42	127.11
	2030	93.86	122.95	146.41	130.89
	2030 West route water transfer	25.61	32.36	47.26	32.92

5.

结论 Conclusions

The **Yellow River Water-Sediment Regulation System (YRWSRS)** is a strategic approach to achieve the long-term stability of YRB. It is of significant importance in water-sediment regulation, effective flood management and optimal water allocation.

Thank You
for your attention!



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