Human impact on Chinese mega-estuaries: challenge and perspectives

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Mega-river in China

- Yellow R
- Yangtze R. (Changjiang)
- Pearl R.
Yangtze River and Estuary: under multi-stressor

- Third longest river in the world (>6000 km)
- Drainage basin area >1.80 million km²,
- Population >400 million
- GDP of Yangtze delta: ~15%
- Dam >40,000
- Increasing fertilizer application
- Rapid urbanization

Increasing P-fertilizer in recent 50 years

Increasing nutrients to the river mouth area, Nitrates >3-4 times since 1960s
Coastal erosion and decreasing progradation

Decreasing sedimentation rate from 4.8 cm/yr to 4.5 cm/yr

Decreasing progradation rate
Estuarine Eutrophication

Changing nutrient ratio

Lowering SPM

Environmental Transition

Hypoxia zone (Oxygen < 2 mg/L)

Aquacultural degradation

Increasing occurrences in red tides and increasing toxic algae
Yellow River: dramatic reduction in sediment load entering the sea

Wang et al., 2013
Will human-regulated hydrological cycle match the life cycles of coastal inhabitants?

\[ S = 37.508 \cdot e^{-0.001Q} \]  
(Sun and Yang 2010)

Spawning stage
Post-larvae growing stage
Salinity limitation
Nutrient limitation
Pearl River estuary: Sand mining and saltwater intrusion

- Sand mining

- 1988
- 2002

Wu et al., 2006

Gong et al., 2013
What we can help?

• Science-based observation
• Multidisciplinary sciences
• Increase in social awareness and responsibility
• Science-influenced policy and policy implementation
• Education and bottom-up voices
• BRICS communities
Thank you very much