8th International Forum on Waterfront and Watershed Restoration

11th-12th November 2011

Feng River Restoration: from land to water

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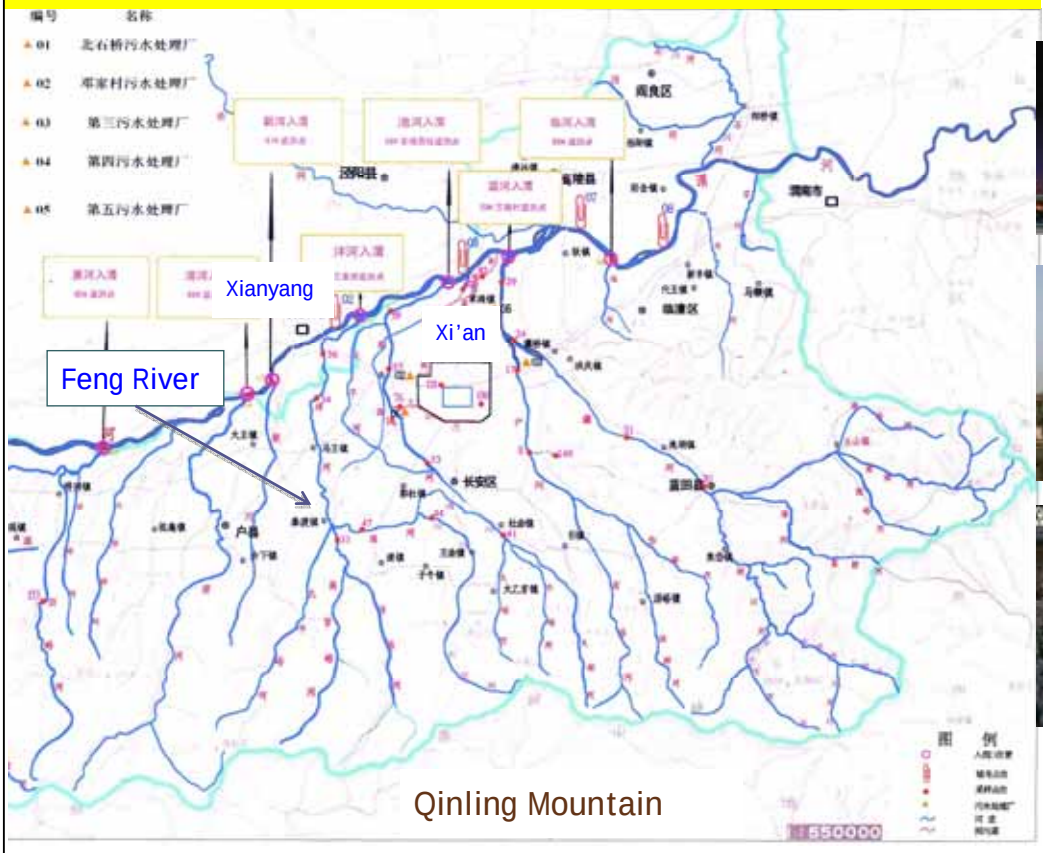
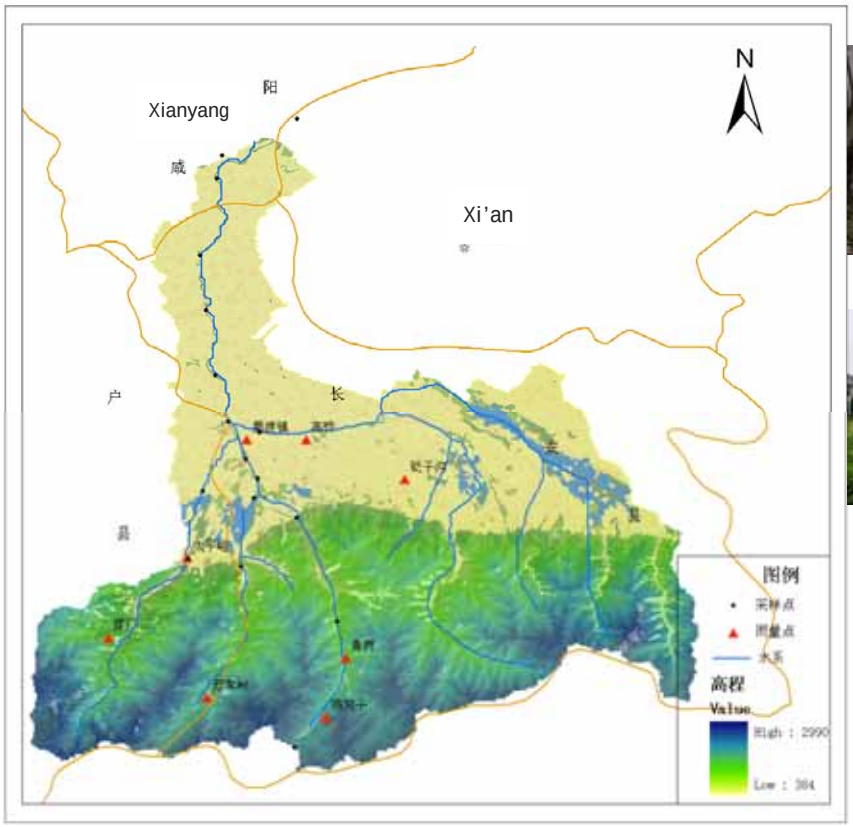
STUDY AREA



Characteristics of Feng river basin

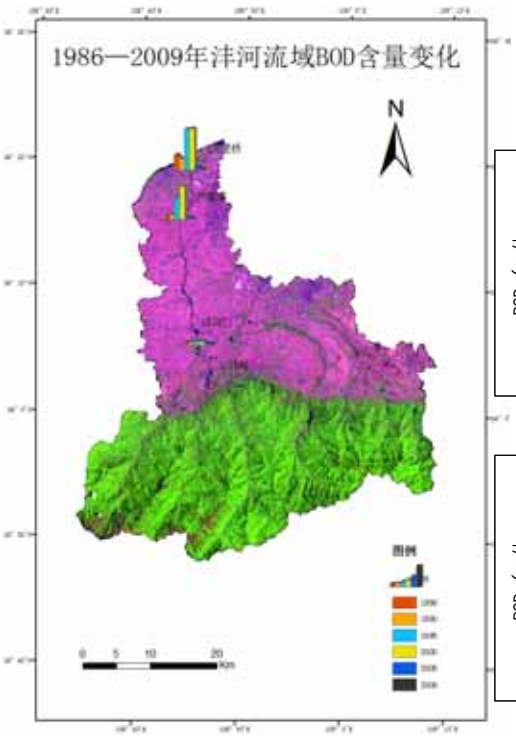


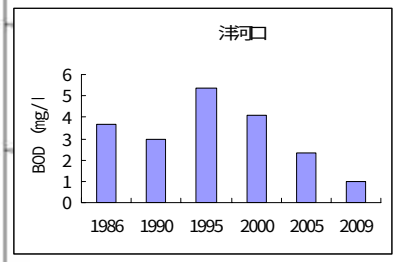
Feng River Restoration Project

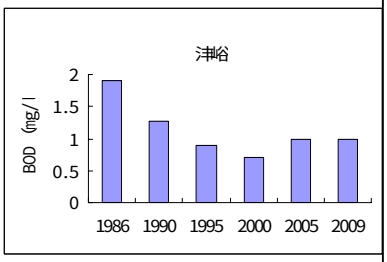
- River Problem Identification
  - River health evaluation
  - Ammonia source tracing
  - Sediment investigation
  - Impact of human activities on river
- Pollution Control Technology Development
  - Rural wastewater treatment
  - Community wastewater treatment
  - Solid waste reuse
- River Restoration Engineering
  - Ecological engineering
  - Planning and design

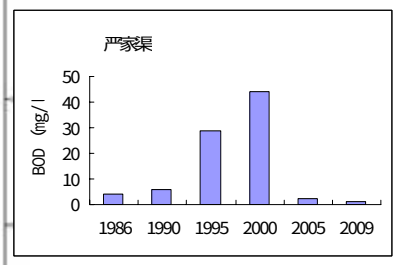
River Problem Identification

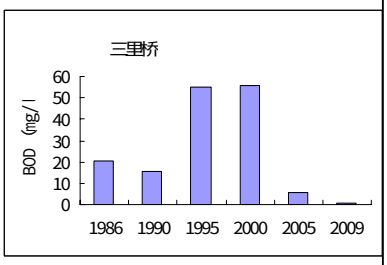
BOD_5 variations at the monitoring stations from 1986-2009





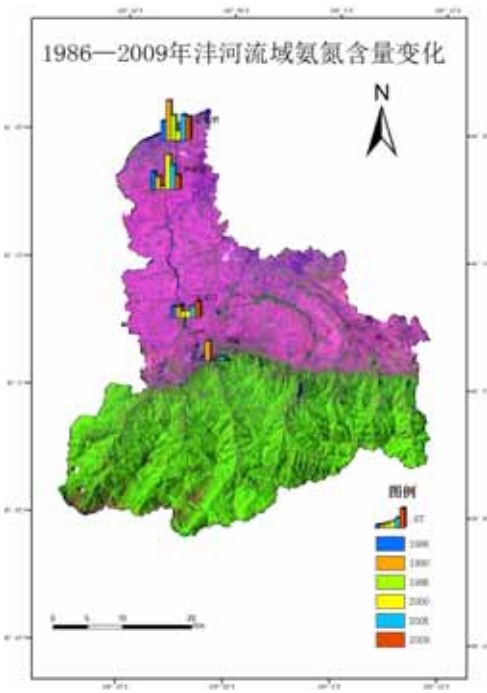


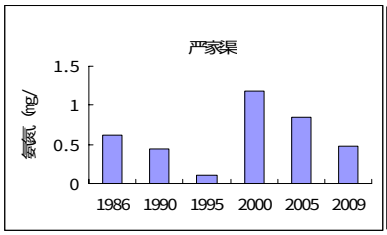


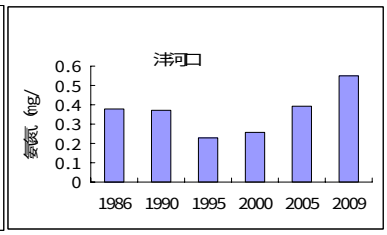


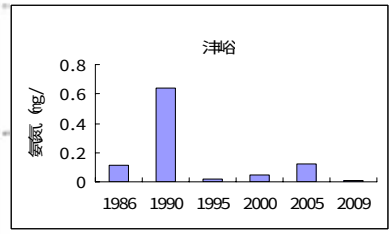
River Problem Identification

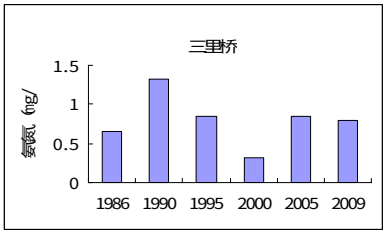
NH_3-N variations at the monitoring stations from 1986-2009





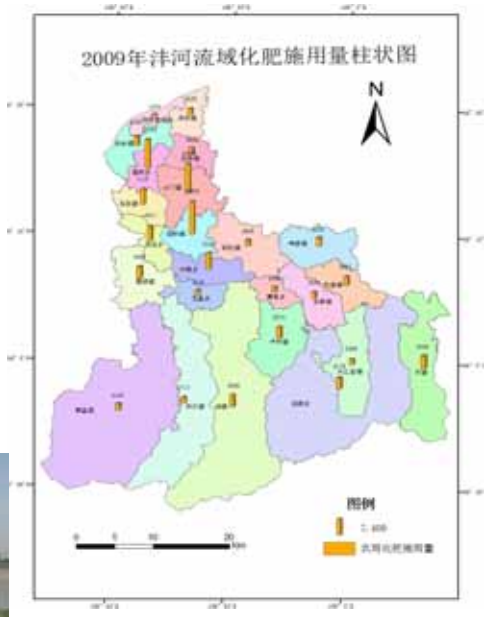


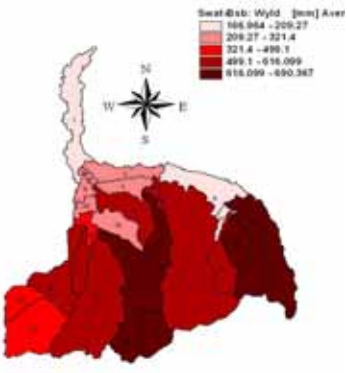




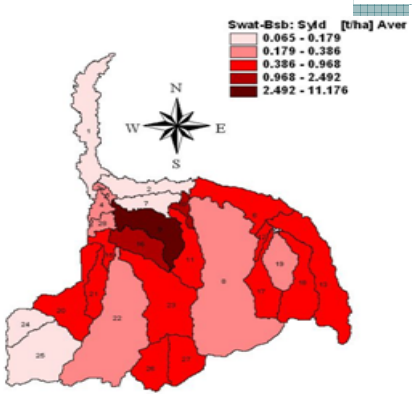
NH3-N source tracing

- Untreated municipal wastewater NH3-N $\delta^{15}N$~14.5‰
- Treated industrial wastewater NH3-N $\delta^{15}N$~3.0‰
- NO3-N $\delta^{15}N$ from municipal and agricultural > industrial source
- NH3-N: 20% from agricultural source

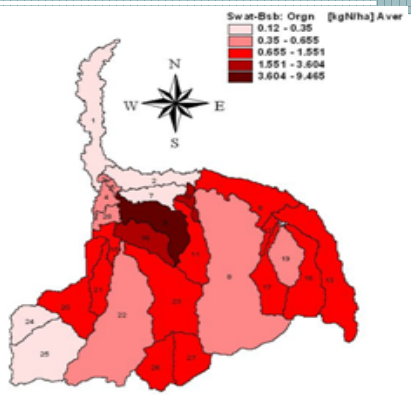




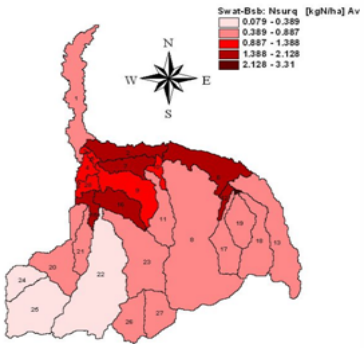
Runoff depth (mm)



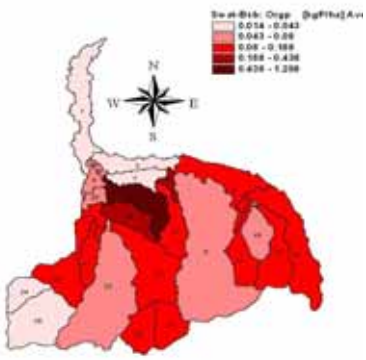
Sediment load (t/ha)



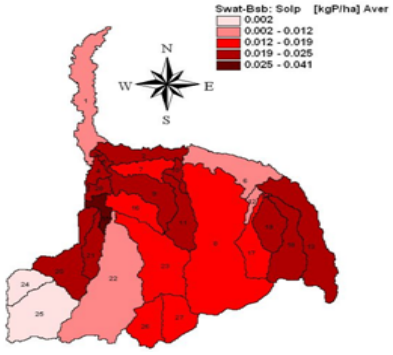
Ammonia load (kg/ha)



Nitrate load (kg/ha)



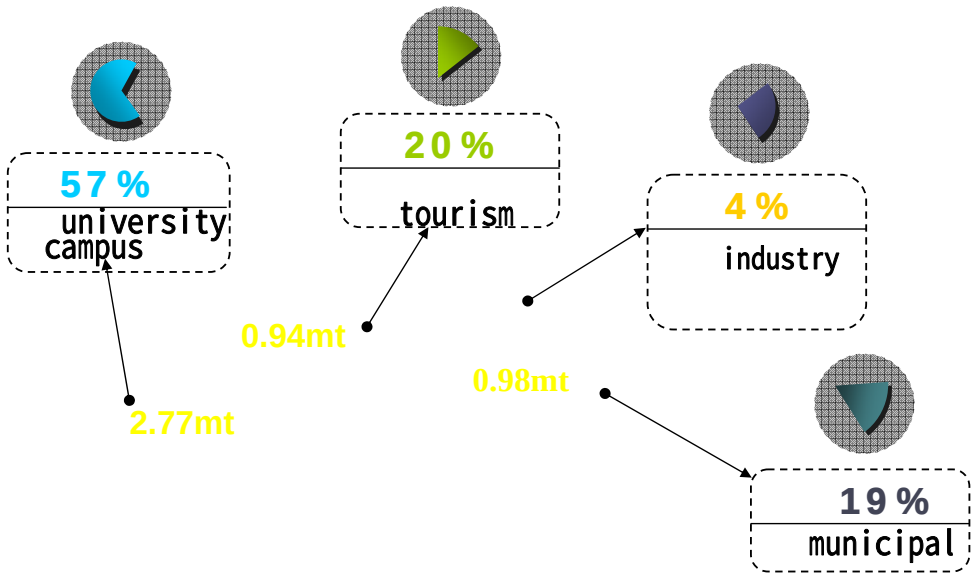
P load (kg/ha)



dissolved P load (kg/ha)

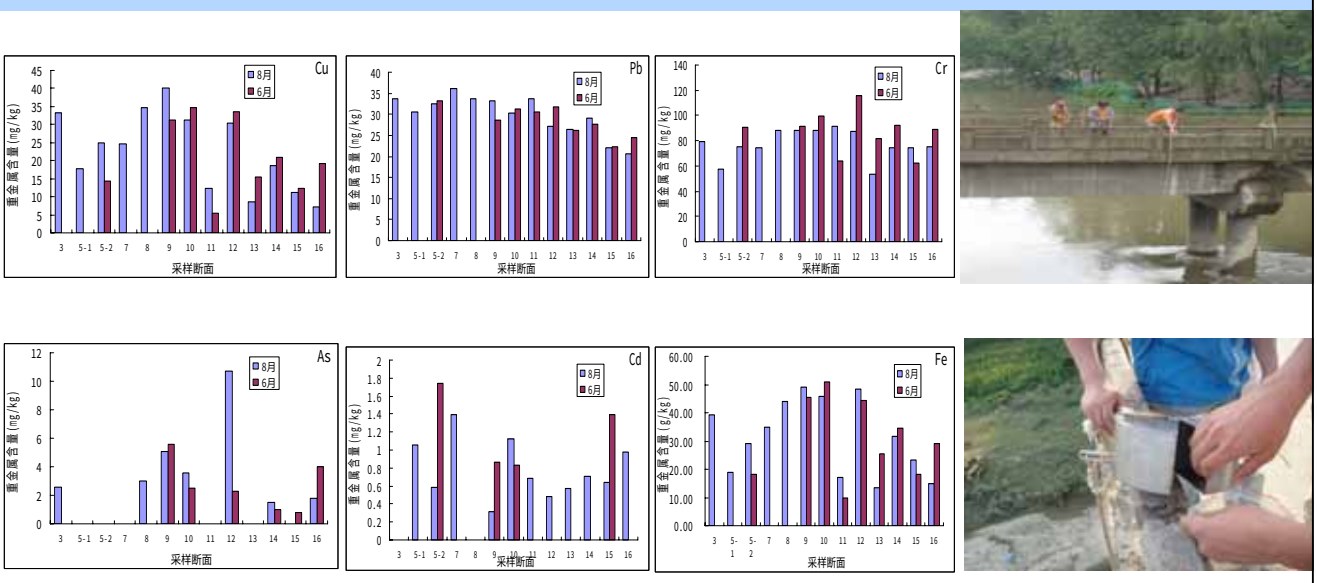
River Problem Identification

NH3-N in wastewater (point source)

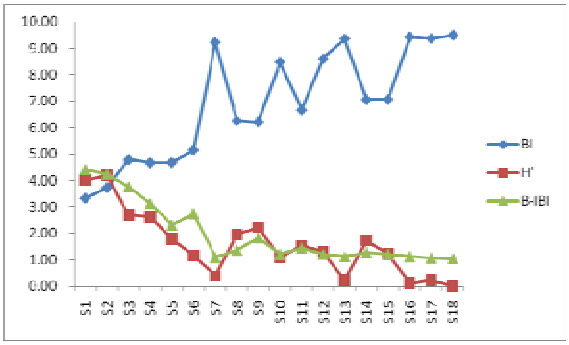


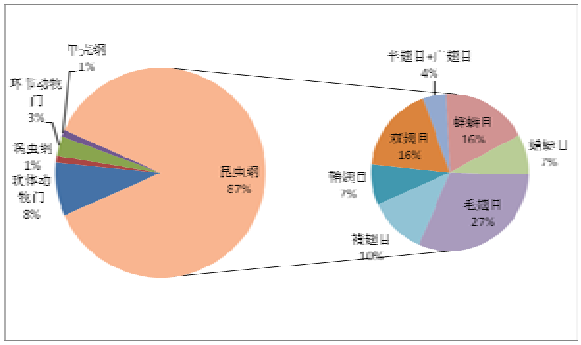
River Problem Identification

Heavy metals in sediment



Biological investigation results





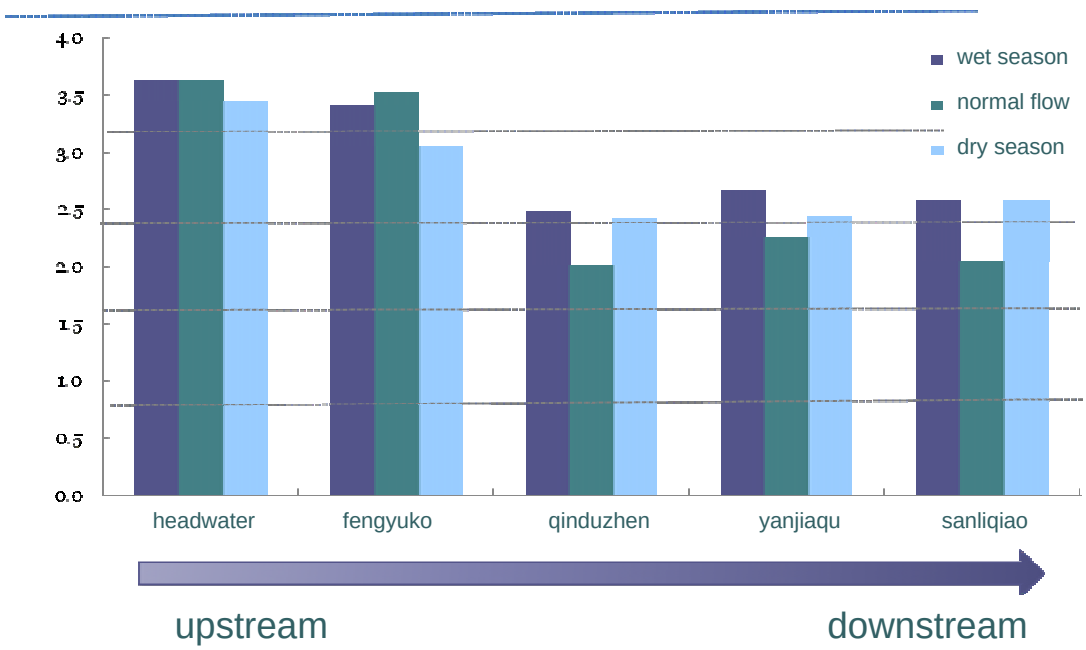
River health evaluation

1st index	2nd index	
HYDROLOGY	velocity	
	flow	
HABITAT	River bank	stability
		vegetation
	River bed	sediment
		channelization
	morphology	sinuosity
		connectivity

1st index	2nd index
WATER QUALITY	NH_3-N
	BOD_5
	TP
	COD
BIOLOGY	community
	integrity
	sensitivity
	diatom

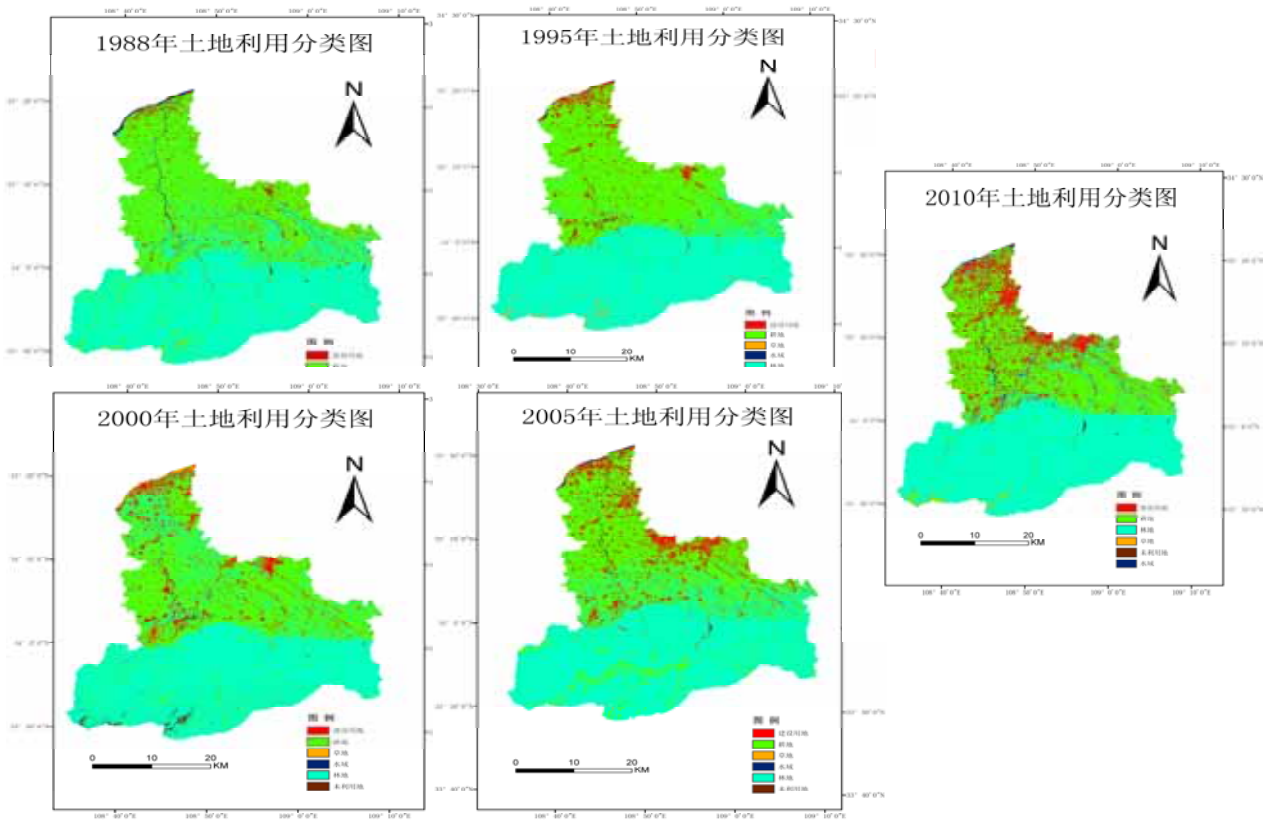
Category	5	4	3	2	1
Score	0≤S<0.8	0.8≤S<1.6	1.6≤S<2.4	2.4≤S<3.2	3.2≤S≤4

River Problem Identification



River Problem Identification

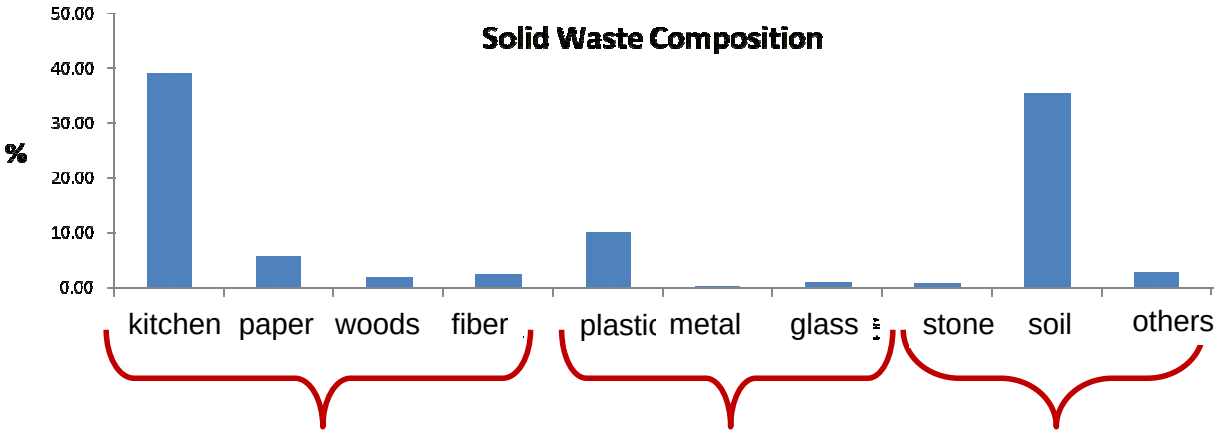
Land use change (1988-2010)




Pollution Control Technology Development
Rural Wastewater Treatment:
Enhanced pretreatment + constructed wetland

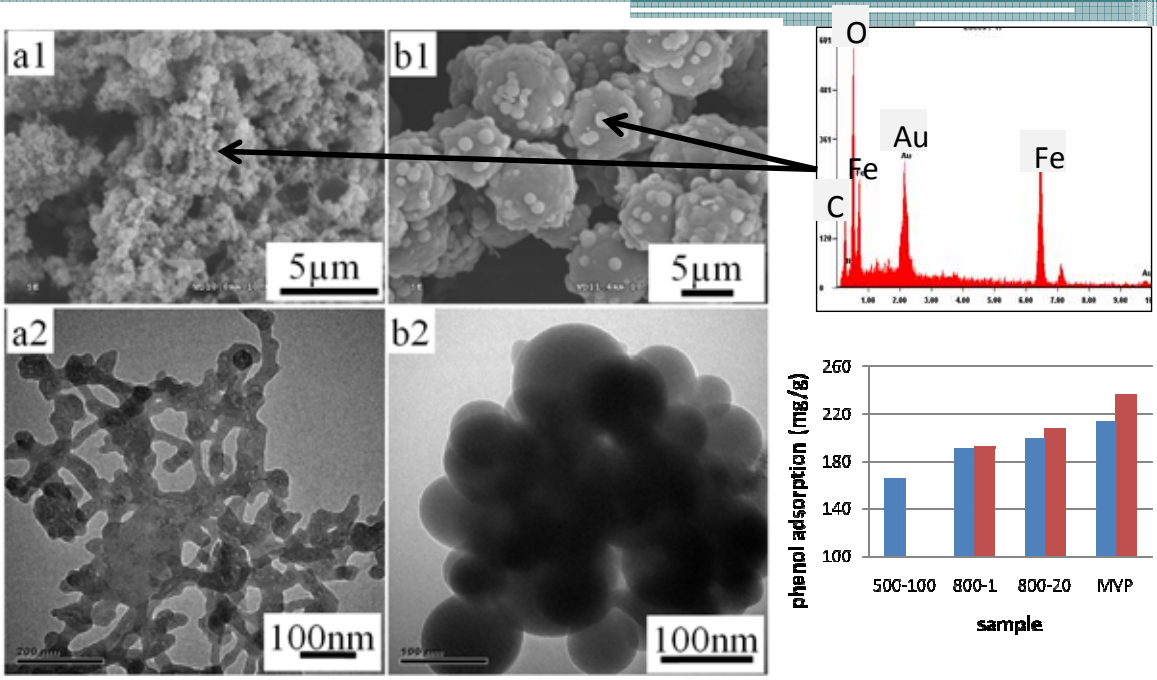

Pollution Control Technology Development
再生水动力柜（AP2）
University Campus Wastewater Treatment:
CASS + Reuse
2011 2 22

Pollution Control Technology Development



Organics	Recyclable	Inorganics
• Reuse（49.33%）	• Recycle（11.48%）	• Landfill/reuse（39.19%）

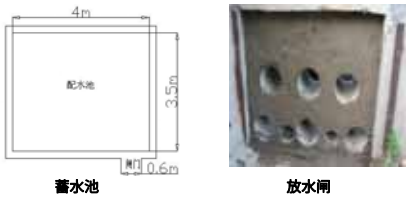
Pollution Control Technology Development



Kitchen wastes can be reused as adsorbing material for wastewater treatment

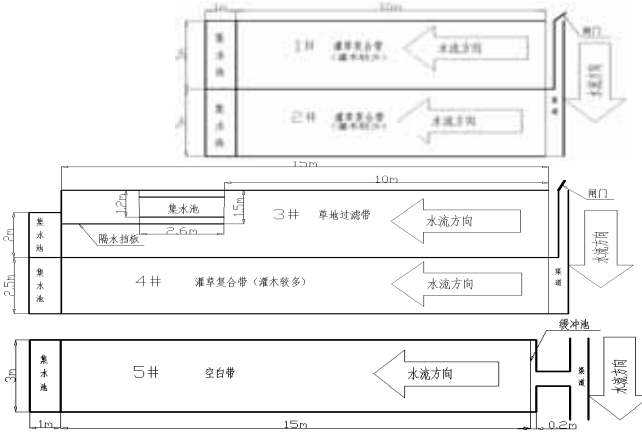
Pollution Control Technology Development

Buffer zone for diffuse pollution control



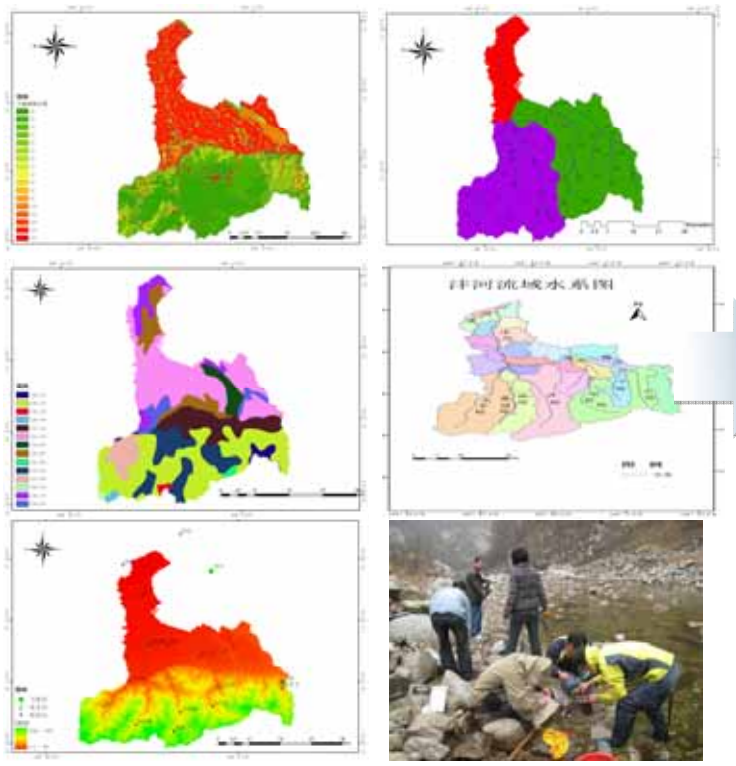
蓄水池

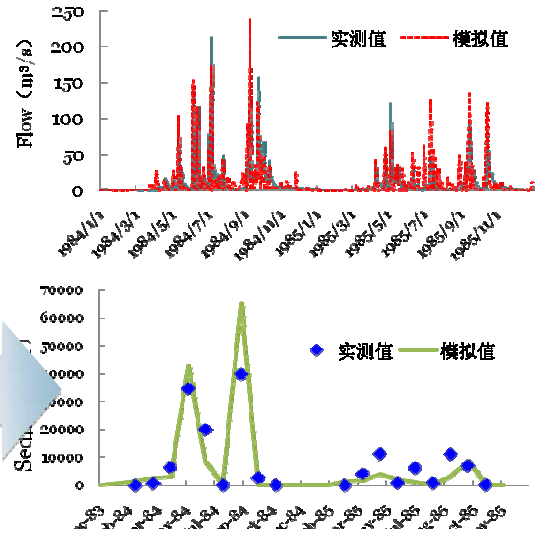
放水闸

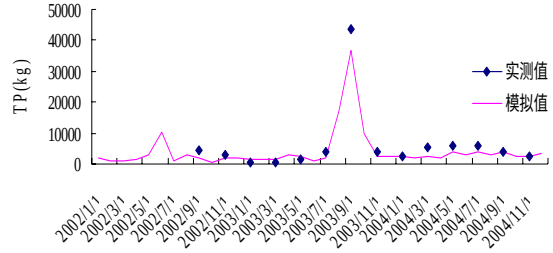


River Restoration Engineering

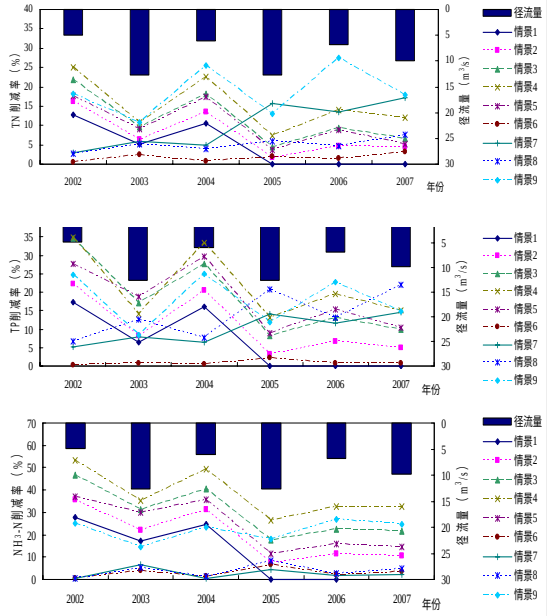
Catchment model application

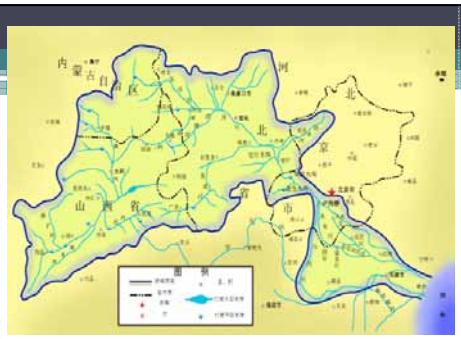






scenario	settings	description
1	point source reduction 40% in 2001-2004, 2005-2006 constant	Current situation on pollution control
2	industrial pollutant reduction by 20%	
3	industrial pollutant reduction by 40%	Industrial pollution control policy
4	industrial pollutant reduction by 60%	
5	municipal pollutant reduction by 50%	University campus pollution control measures
6	USLE_P	BMPs
7	chemical fertilizer reduction by 50%	BMPs
8	Effectiveness of buffer zone	Ecological engineering
9	Constructed wetland	Ecological engineering

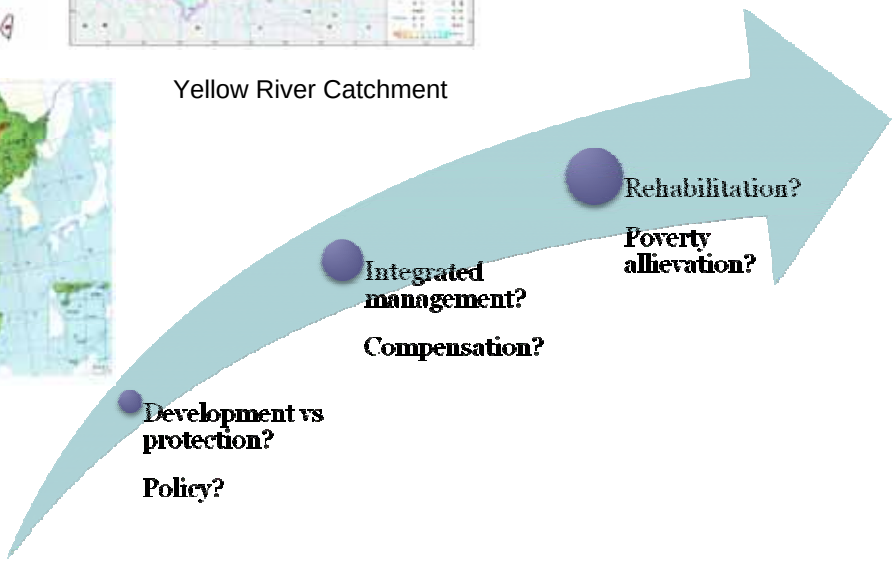




Yongding River Catchment

Yellow River Catchment

National scale



Thank you for your attention!