

WATER SUPPLY, FOOD RISK MANAGEMENT, AND DISASTER PREVENTION



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BRIEF INTRODUCTION



ADB Urban and Social Sector in the PRC: Sector Objectives and Operational Priorities

- ADB support in the urban and social sectors aligned with the PRC's social and economic priorities of Thirteenth Five-Year Plan
- A strong infrastructure and development focus on “western and northeastern regions” for inclusive growth especially of small- and medium-sized cities
- A “green urban portfolio” for environmentally sound and low-carbon development
- Vocational education, elderly care and elderly accessibility, and urban-rural integration for inclusive urbanization
- Support TVET reforms-demonstration & innovation
- TA support – develop health sector, social assistance systems, human resource needs
- Strong regional linkages with CAREC and GMS – RCI, and knowledge sharing

ADB Urban and Social Sector in the PRC:

Urban Development: Approach

- Effective policy dialogue at national level through strategic policy and advisory TAs with strong demonstration effects
- Innovative projects that promote integrated green, competitive and inclusive urban-rural development-Flagship Projects
- Projects that contribute to regional cooperation, urban-rural development, reduce carbon footprint, pollution control, and enhance climate change resilience, and are replicable

Strategic Policy TAs

- TA 2773: Water Supply Tariff Study
 - National Guidelines on Water Tariffs
- TA 3749: Preparing the National Guidelines for Urban Wastewater Tariffs and Management Study
 - National Guidelines on Wastewater Tariffs
- TA 4702: Study on Sustainable Urbanization in Metropolitan Regions
 - Identification of key issues and policy recommendations
- TA 7002: Urban Wastewater and Solid Waste Management for Small Cities and Towns
 - Regulation for wastewater and solid waste management
- TA 7533: Policy Study on Strategic Options for Urbanization in the PRC
 - Inputs to the new type urbanization plan
- TA 8165: Management of Uncontrolled Landfills
 - Technical Guidelines (aiming at providing practical guidance on various management options and solutions available)
- TA 8447: Strategies for involving Social Workers in Social Assistance
 - Implementation manual output which has helped MOCA and MOF to issue guidance on the creation of pilots for innovative approaches to social worker integration in selected counties across the country
- TA 8672: Strategic Elderly Care Services Development in Yichang
 - Multisectoral strategic plan to develop elderly care services (financing, services, human resources, investments) as part of the urban development plan

WATER SUPPLY, FOOD RISK MANAGEMENT, AND DISASTER PREVENTION



Dalian Water Supply Project: Map



Dalian Water Supply Project: Objective and Scope

- The Project- address severe water shortage in Dalian by providing new infrastructure for water production and distribution.
- Project scope - (i) a northern conveyor system from the Biliuhe Reservoir to the Wazidian Reservoir; and (ii) a southern conveyor system including transmission pipelines, water treatment plants (WTPs), and distribution pipelines from the Wazidian Reservoir to Dalian City.
- During implementation- two additional small subprojects added using loan savings- expansion and rehabilitation of the Pulandian water supply system and the Jinshitan water supply system- using raw water supply from the northern conveyor.

Dalian Water Supply Project: Total Cost and Financing Plan

Project Cost At Appraisal/Reappraisal and Actual Project Cost
(\$ million)

Item	Appraisal			Actual		
	FX	LC	Total	FX	LC	Total
Base Cost						
Land	0.00	12.60	12.60	0.00	5.29	5.29
Resettlement	0.00	3.07	3.07	0.00	8.06	8.06
Civil Works	17.91	132.50	150.41	13.57	132.07	145.64
Construction Materials	92.91	8.67	101.58	80.11	6.24	86.35
Equipment	29.38	1.33	30.71	15.06	5.76	20.82
Consulting Services and Training	3.06	8.26	11.32	1.52	8.85	10.37
Administration	0.44	3.26	3.70	0.15	4.41	4.56
Subtotal	143.69	169.70	313.39	110.41	170.68	281.09
Contingencies						
Physical	7.75	15.47	23.22	0.00	0.00	0.00
Price	10.15	26.60	36.75	0.00	0.00	0.00
Subtotal	17.90	42.07	59.97	0.00	0.00	0.00
IDC and other Charges	17.51	17.53	35.04	16.62	10.54	27.16
Total Project Cost	179.10	229.30	408.40	127.03	181.22	308.25

FX = foreign exchange cost; LC = local currency cost

Dalian Water Supply Project: FIRR, EIRR and Number of Beneficiaries

Financial Internal Rates of Return

Key Variables	Appraisal		Project Completion	
	FIRR	WACC	FIRR	WACC
Part A: Northern subproject	8.6	4.3	7.8	4.6
Part B-1: Southern subproject	9.9	4.3	10.2	4.5
Part A and B-1	9.6	4.3	9.5	4.5
Part B-2: Jinshitan subproject	5.1	3.7	2.9	4.3
Part C: Pulandian subproject	5.3	3.7	5.1	4.6

- Economic internal rates of return (EIRRs) were also computed for the additional subprojects in Jinshitan and Pulandian at reappraisal.
- The resulting EIRR for Pulandian was computed to be 20.1 percent and that for Jinshitan at 6.9 percent.
- The project beneficiaries include 2.2 million people living in the Dalian service area, about 139,000 residents of Pulandian and 2,000 in Jinshitan, with additional benefits to industries and business establishments.

Zhejiang Shanxi Water Supply Project: Map



Zhejiang Shanxi Water Supply Project: Objective and Scope

- The long-term objective of the Project was to alleviate the water supply crisis in Wenzhou Prefecture.
- The short-term objectives were to (i) provide upto 1.8 million cubic meters per day (m³/day) of good quality raw water supply to the three main urban areas in Wenzhou Prefecture, (ii) improve flood protection for 250,000 persons in the lower Feiyun River valley, (iii) provide irrigation water for 60,000 hectares, and (iv) provide installed capacity of 220 megawatts (MW) of hydroelectric power on a peaking basis.
- In addition to the physical objectives, the Project aimed to support improved efficiency and governance of the Shanxi EconomicDevelopment Company (SEDC).

Zhejiang Shanxi Water Supply Project: Objective and Scope

- Project components
- 130-meter (m) multipurpose high storage dam at Shanxi town with a 200 MW hydroelectric generating plant, related diversion tunnels, electrical transformer station, and transmission facilities;
- 62.8 kilometer (km) gravity flow water conveyance system including tunnels, structural aqueducts, pipes
- Capacity building for Shanxi Development Corporation and the responsible Wenzhou municipal government (WMG) bureaus.

Zhejiang Shanxi Water Supply Project: Total Cost and Financing Plan

Project Cost at Appraisal and Actual Project Cost
(\$ million)

Description	Appraisal			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
A. Base Costs						
Civil Works	0.00	141.92	141.92	0.00	162.92	162.92
Metal Structures	6.16	6.24	12.40	3.21	9.08	12.29
Electrical and Mechanical	21.91	14.72	36.63	18.58	28.20	46.78
Transmission Works	2.05	13.82	15.87	0.00	9.26	9.26
Project Management	0.00	8.78	8.78	0.00	1.13	1.13
Survey and Design	0.00	11.62	11.62	0.00	5.40	5.40
Consulting and Training	1.20	2.06	3.26	0.73	1.87	2.60
Resettlement	16.59	100.93	117.52	0.00	137.58	137.58
Environment	0.00	1.54	1.54	0.00	9.00	9.00
Construction Equipment/Materials	37.23	0.00	37.23	7.59	0.00	7.59
Taxes and Duties	0.00	25.78	25.78	0.00	0.00	0.00
Subtotal	85.14	327.41	412.55	30.11	364.44	394.55
B. Contingencies						
Physical	5.25	30.40	35.65	0.00	0.00	0.00
Price	4.16	44.13	48.29	0.00	0.00	0.00
Subtotal	9.41	74.53	83.94	0.00	0.00	0.00
C. IDC and Other Charges	16.90	4.57	21.47	6.86	35.85	42.71
Total	111.45	406.51	517.96	36.97	400.29	437.26

IDC = interest during construction.

Source: Shanxi Economic Development Company.

Zhejiang Shanxi Water Supply Project: FIRR and EIRR

- FIRR exceeds the weighted average cost of capital.
 - The estimated FIRR for the Project as a whole was 5.2%.
 - This is more than the weighted average cost of capital of 2.9%.
 - At appraisal, the FIRR was estimated to be 8.5%.
-
- The EIRR was estimated for the overall Project.
 - The estimated EIRR for the Project is 9.4%.
 - This is below the ADB threshold value of 12%.
 - At appraisal, the EIRR was estimated at 5.5%.

Harbin Water Supply Project: Objective and Scope

- Project- improve the health and living conditions of the HMG administrative area population by providing clean, safe drinking water.
- Short-term objectives:
- Supply 450,000 cubic meters (m³) per day of clean water in Harbin City
- Improve public health by supplying clean, safe water
- Promote long-term urban development in Harbin City by avoiding water shortages
- Strengthen the institutional system of HMWSCC and the Harbin Municipal Tap Water Company
- Reform the water tariff to achieve full cost recovery.

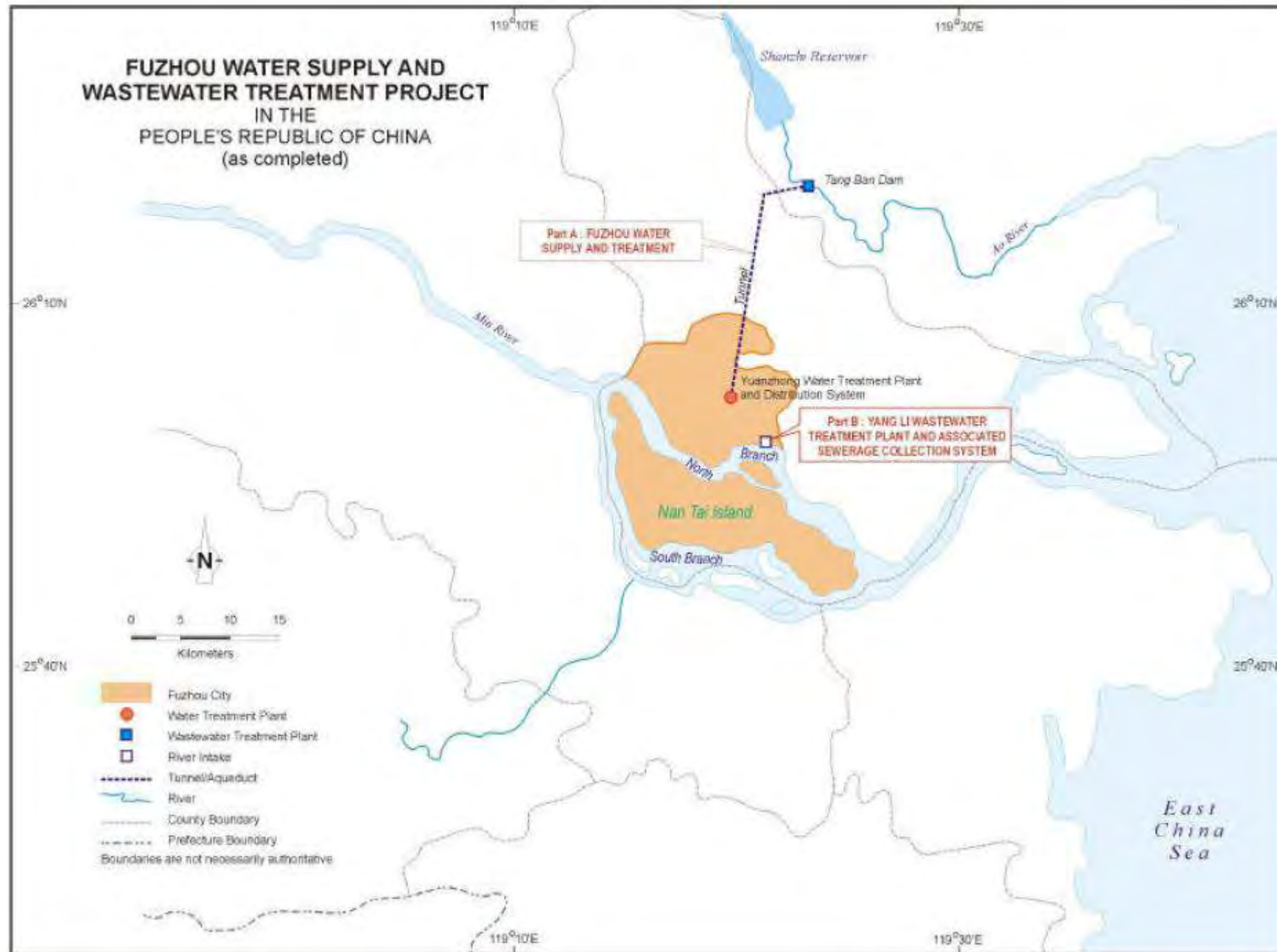
Harbin Water Supply Project: Objective and Scope

- Project scope and components
- 45-meter high storage dam at Mopanshan Mountain with an effective volume of 356 million m³, diversion tunnel and river outlet works, and gated spillway
- 175.5-kilometer (km) raw water pipeline diverting water from the Mopanshan Dam by gravity to Harbin City
- 450,000 m³ per day capacity water treatment plant
- expansion and rehabilitation of the water distribution network- 73.8 km of large pipes and 18 km of smaller pipes and separation valves
- Capacity building of HMWSCC and HMTWC
- Result of the inundation of areas behind the dam, about 6,022 persons (1,740 households) relocated, mostly to host villages within the same county.

Harbin Water Supply Project: FIRR, EIRR and Number of Beneficiaries

- As of the end of 2007, over 2.6 million people in 907,000 households have been connected to water supply, a connection rate of 87%.
- Of these, the 42,000 poorest households have been provided with water meters and free connection charges.
- HMG has also committed to waive future tariff increases for these households.

Fuzhou Water Supply and Wastewater Project: Map



Fuzhou Water Supply and Wastewater Project: Objective and Scope

- Project objectives were to improve the quality and quantity of water supply in Fuzhou City
- Improve the urban environment by reducing contamination of the Min River and the city's watercourses.
- Strengthening capacity of the water and wastewater operations to be more efficient and to be managed on commercial principles
- Improving revenue generation through an improved tariff structure and gradual tariff increases.

Fuzhou Water Supply and Wastewater Project: Objective and Scope

- The project scope:
- Water supply component - new source of water supply from the Ao River, water treatment facilities, and feeder mains
- Wastewater treatment- sewer collection network, interceptors, pumping stations, and a wastewater treatment plant at Yang Li
- Training - project implementation and to convert the implementing agencies into operational companies upon completion of construction.

Fuzhou Water Supply and Wastewater Project: Total Cost and Financing Plan

Financing Plan (\$million)

Cost	Appraisal Estimate			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
Implementation Costs						
Borrower-Financed	0.00	89.10	89.10	0.00	84.86	84.86
ADB-Financed	89.30	0.00	89.30	66.61	0.00	66.61
Other External Financing	0.00	0.00	0.00	0.00	0.00	0.00
Total	89.30	89.10	178.40	66.61	84.86	151.47
IDC Costs						
Borrower-Financed	0.00	1.10	1.10	0.00	1.35	1.35
ADB-Financed	12.70	0.00	12.70	4.87	0.00	4.87
Other External Financing	0.00	0.00	0.00	0.00	0.00	0.00
Total	12.70	1.10	13.80	4.87	1.35	6.22

ADB = Asian Development Bank, IDC = interest during construction.

Fuzhou Water Supply and Wastewater Project: EIRRs

- EIRRs of the water supply - wastewater components- recalculated - compared with estimates at appraisal.
- Actual EIRRs for both components- higher than appraisal- reduced project costs.
- Project EIRR 18.8% vs 18.4% at appraisal
- EIRR- water supply component-19.5% vs 18.2% at appraisal
- EIRR for Wastewater component- 18.5% vs 18.4% at appraisal
- Sensitivity analyses- EIRRs relatively more susceptible to reduction in project benefits than reduction in costs

Fuzhou Water Supply and Wastewater Project: FIRR

- FIRR- recalculated, based on actual project cost and financing and revenue data.
- Real weighted average cost of capital for the water supply component was 0.8% and for the wastewater treatment component, 0.5%.
- Project FIRR 8.7% vs 7.2% at appraisal
- FIRR-Water supply component- 10.2% vs 8.5% at appraisal
- FIRR- wastewater component- 8.9% vs 6.1% at appraisal
- Sensitivity analyses indicated that the FIRR of both components were more vulnerable to decreases in revenues than increases in O&M costs, as projected at appraisal.

Fuzhou Water Supply and Wastewater Project: Number of Beneficiaries

- Water supply component- benefits 1.85 million residents in Fuzhou City
- The completed wastewater treatment facilities provide service to about 650,000 people living in eastern Fuzhou City vs 400,000 people at appraisal.

FOOD RISK MANAGEMENT



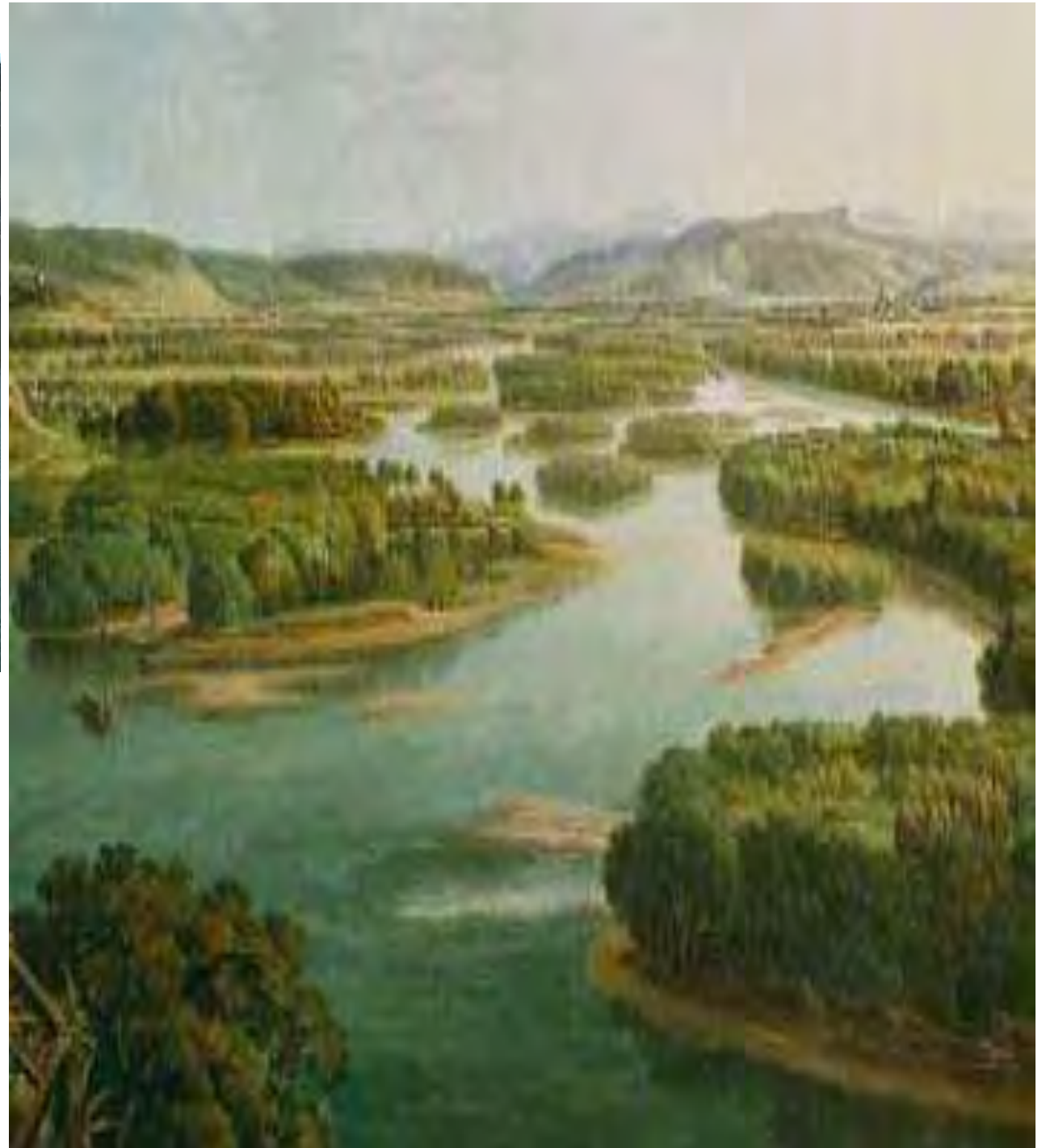
Jiangxi Pingxiang Integrated Rural-Urban Infrastructure Development Project

APPROACHES TO FLOOD RISK MANAGEMENT:

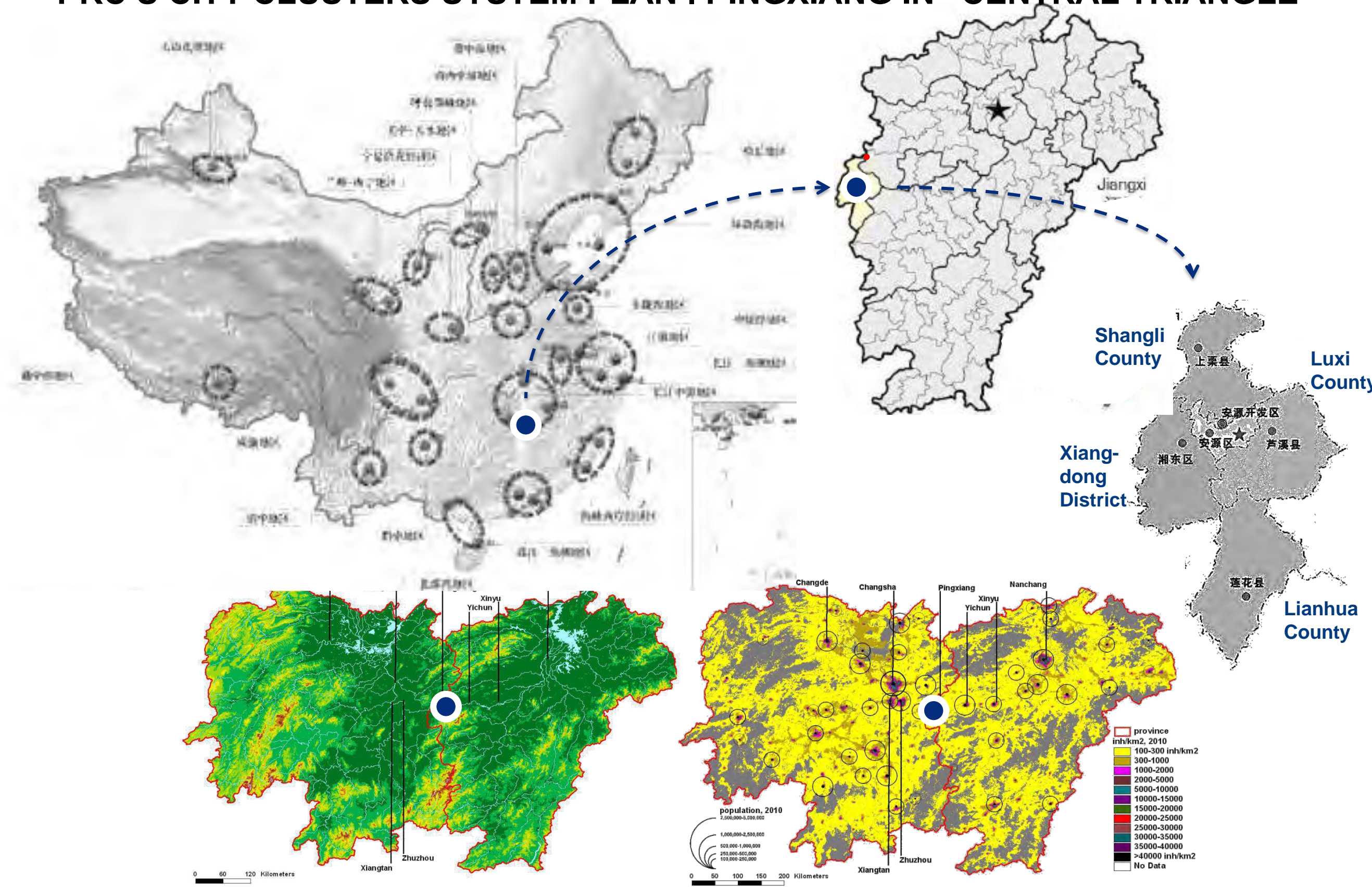
TRADITIONAL ENGINEERING AND ECOSYSTEMS-BASED ADAPTATION

GRAY INFRASTRUCTURE

GREEN INFRASTRUCTURE



PROJECT LOCATION:
PRC'S CITY CLUSTERS SYSTEM PLAN . PINGXIANG IN “CENTRAL TRIANGLE”



PROJECT ADDRESSES KEY DEVELOPMENT CHALLENGES

1. Promote **balanced rural-urban development and integration**, reduce **rural-urban income** and services **gap**, and **out-migration push factors**;
2. Improve **safety from flooding** for 308,000 residents and **enhance river environment**, restore riparian ecology and wetlands, preserve floodplains;
3. Reduce water, soil, and groundwater pollution by increasing **wastewater collection and treatment benefitting** 175,000 residents, improve water safety;
4. Improve **road connectivity for** 247,000 farmers and residents of **rural townships and villages** to access urban markets, jobs and services; and
5. Structural interventions are complemented by **non-structural initiatives to increase project sustainability** and enhance local development capacity.

PROJECT IMPACT, OUTCOME, OUTPUTS, INPUTS, COST

Impact:

(i) Integrated and green urban-rural development in Pingxiang municipality and Jiangxi Province improved (PRC National New-Type Urbanization Plan, 2014-2020); and (ii) Socioeconomic wellbeing of residents in cities, townships, and villages in Pingxiang municipality and Jiangxi Province improved (project derived)

Outcome:

Living conditions of rural and urban residents using integrated infrastructure in Pingxiang municipality

Outputs:

1. Improved and integrated flood risk management and river rehabilitation (\$180M)
2. Improved wastewater collection and treatment (\$38M)
3. Improved rural-urban linkages (\$70M)
4. Project management support and capacity development (\$2.8M)

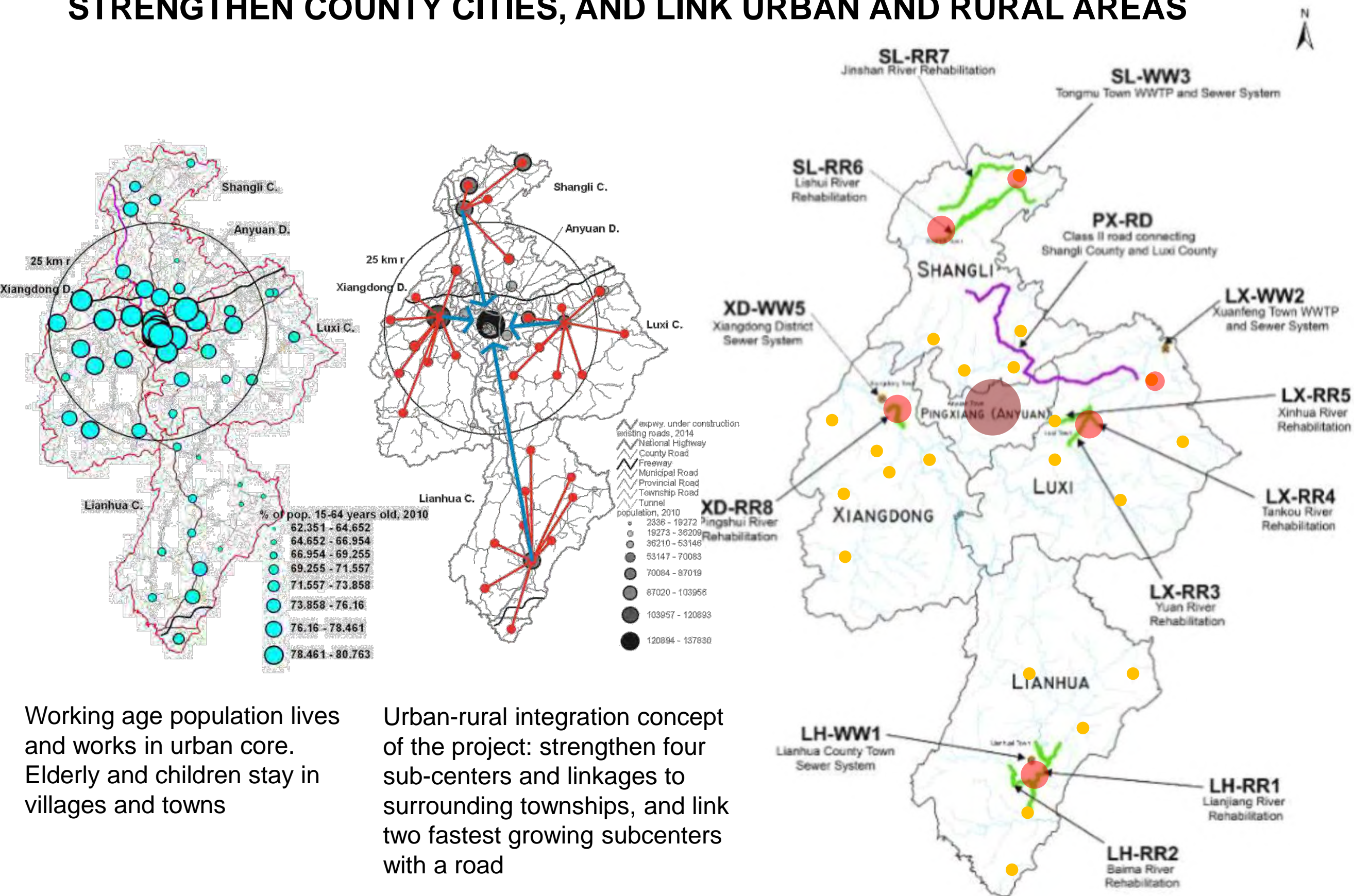
Inputs / Cost:

ADB OCR Loan:	\$150 million
Government:	\$188 million
Total project cost:	\$338 million

Safeguards categories:

Environment: A -- Involuntary Resettlement: A -- Indigenous Peoples: C

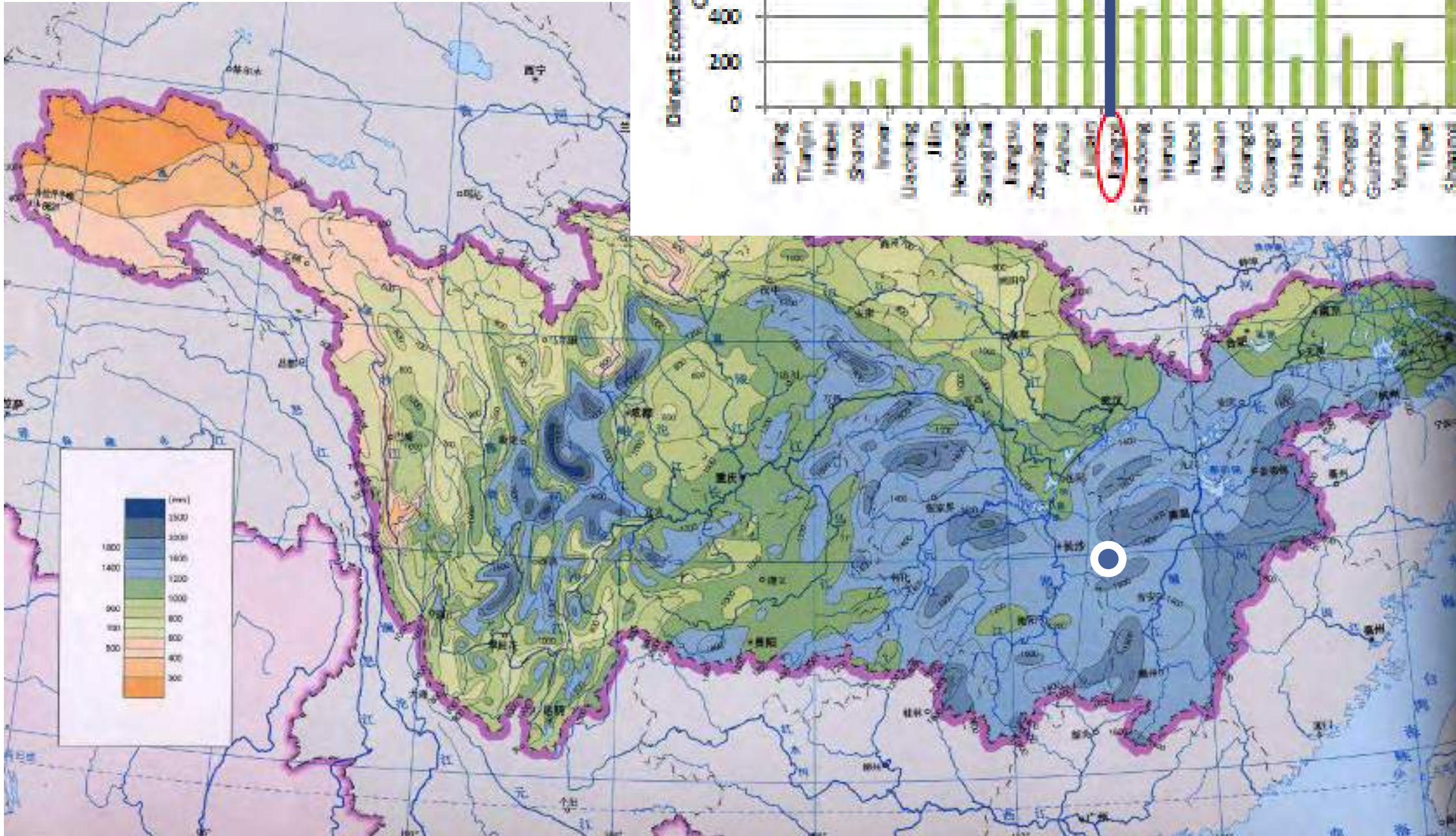
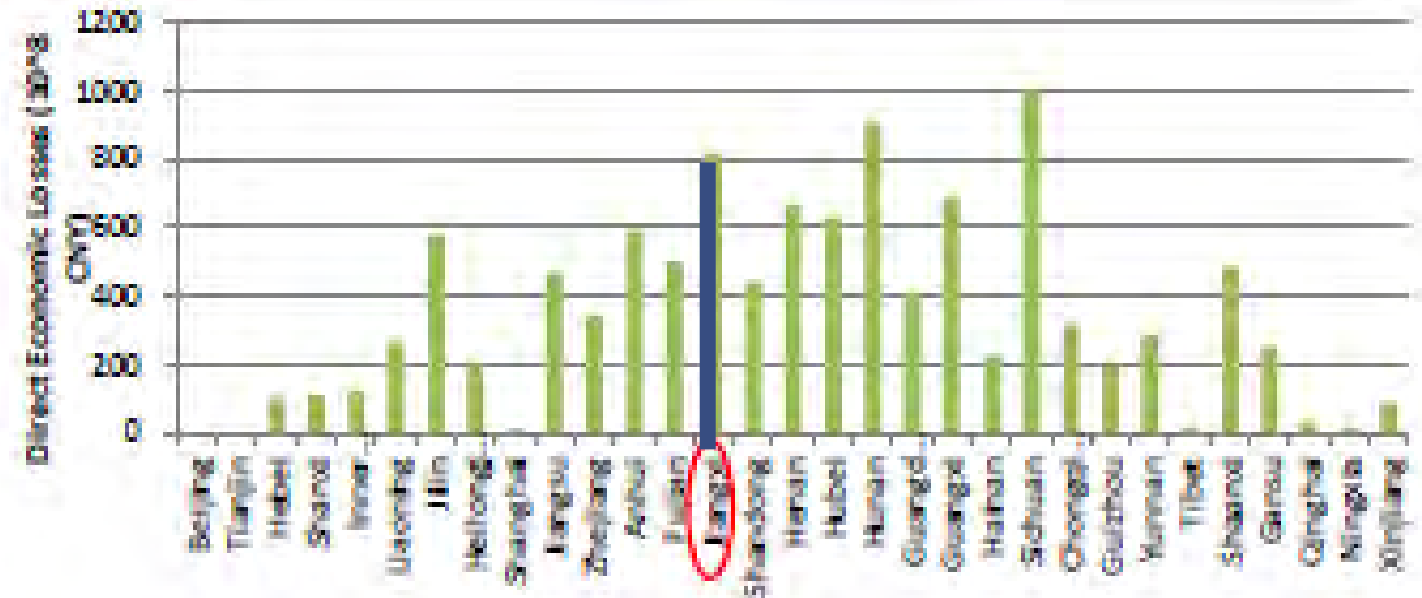
KEY STRATEGY: RURAL-URBAN INTEGRATION - REDUCING THE GAP STRENGTHEN COUNTY CITIES, AND LINK URBAN AND RURAL AREAS



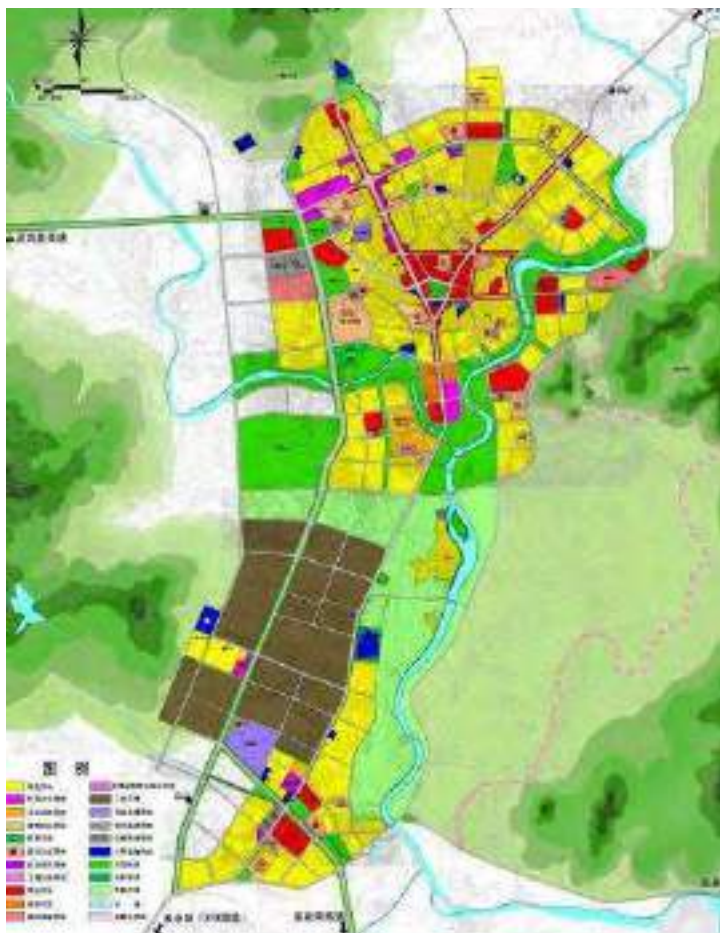
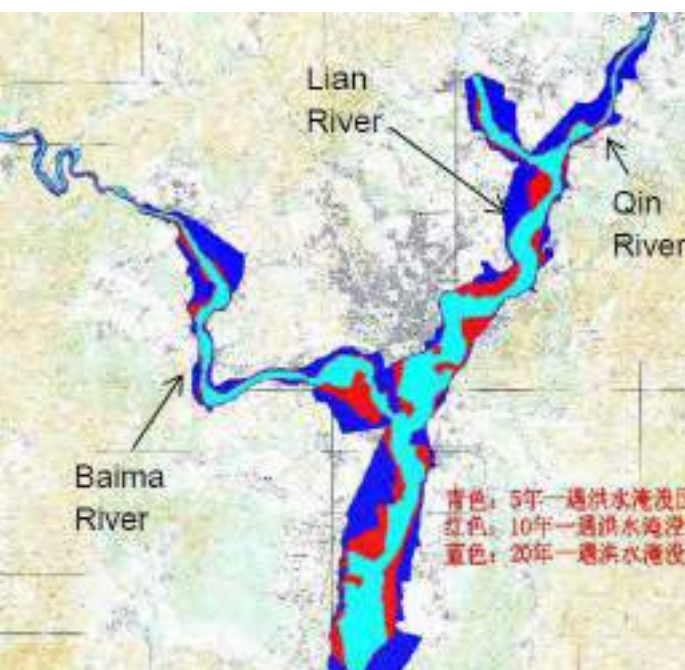
Working age population lives and works in urban core. Elderly and children stay in villages and towns

Urban-rural integration concept of the project: strengthen four sub-centers and linkages to surrounding townships, and link two fastest growing subcenters with a road

FLOODING IS KEY DEVELOPMENT CHALLENGE: JIANGXI IS THIRD MOST ECONOMICALLY AFFECTED PROVINCE IN PRC BETWEEN 2000 TO 2010



SYNOPSIS: FROM GRAY INFRASTRUCTURE TO SPONGE CITY INFRASTRUCTURE WITH MULTIPLE ECOSYSTEMS SERVICE BENEFITS



PINGXIANG FLOOD-CHALLENGED – FLOOD RISK REDUCTION TOP PRIORITY

Flood frequency and severity have increased significantly. Floods in 1998, 2001, 2002, 2008, 2010, and 2014 affected more than 496,000 people, caused collapse of more than 2,600 houses, and significant economic losses in agriculture.

After **major flood on 25 May 2014** caused estimated \$115 million in economic losses, all local governments prioritized river component

Rainy season from April–June flood events occur for several days. Water levels rise by up to 4 meters above normal levels for a 1-in 20-year flood



MOST RIVERBANKS HAVE INADEQUATE FLOOD PROTECTION, OBSTACLES IN RIVERS, SEDIMENTATION RAISED RIVERBEDS, AND CONSTRAINING WALLS



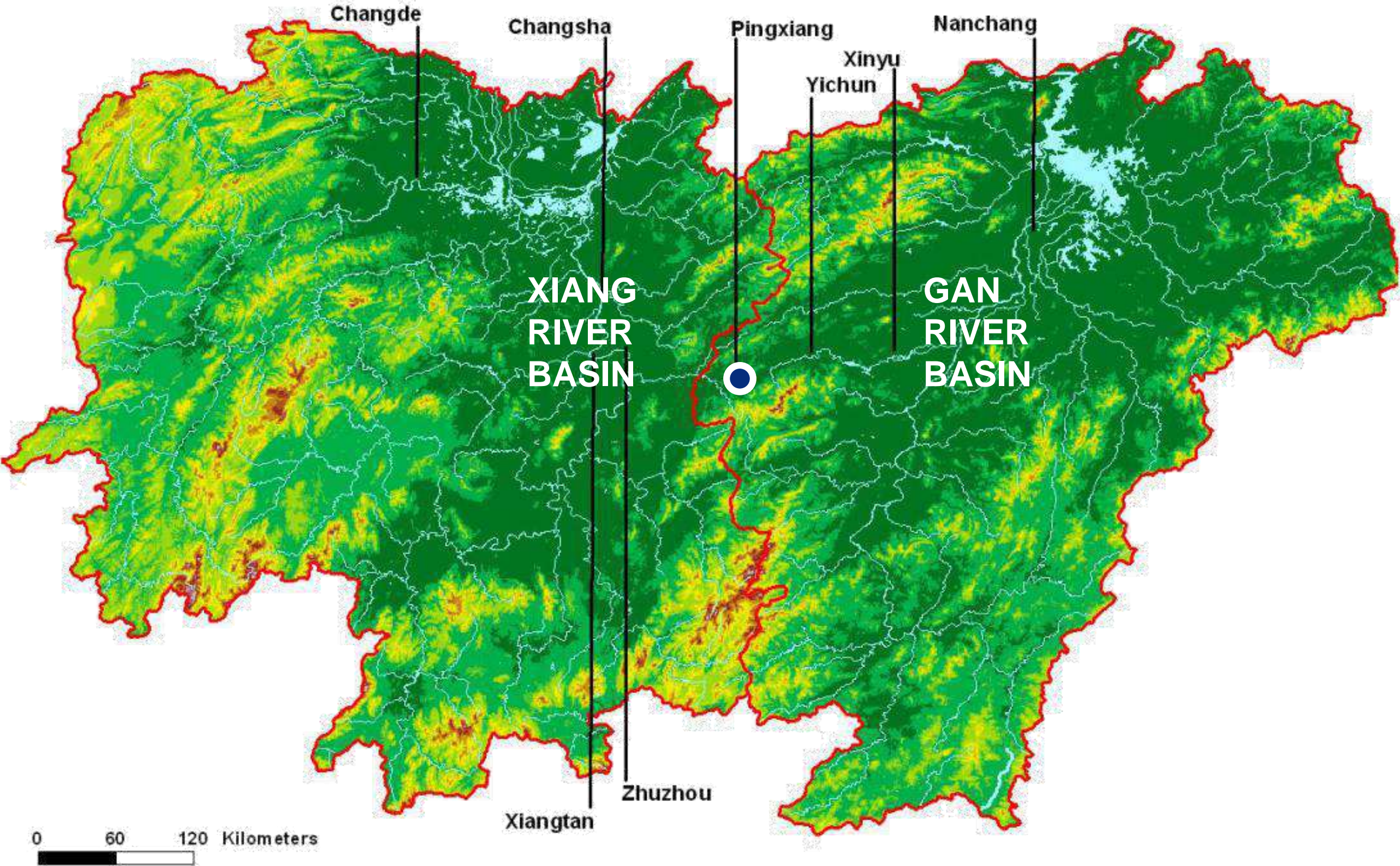
ADB ADDED VALUE: FLOOD RISK MODELING AND CLIMATE CHANGE RISK AND VULNERABILITY ASSESSMENT, VERIFICATION OF DESIGN STANDARDS

- 1. Government/local engineers** used technical guidebooks to assess and quantify flood risk, flood levels, flood inundation mapping etc. based on **climate variability of today**. They designed flood defense as **gray infrastructure (dredging, concrete flood walls and concrete dykes)** for 1 in 20 year flood for urban areas and 1 in 10 year flood in rural areas. Guidelines require a **freeboard**, an increased wall/embankment height for safety above the calculated highest flood level under today's variability.
- 2. ADB supported hydraulic modeling** by a PPTA national hydrologist and **climate proofing through CRVA** that modeled climate risk and variability localizing UNFCCC global climate change **models for 2050 and 2100**. ADB also used a **stormwater drainage simulation model** and **confirmed** that results by national engineers were conservative and **locally designed flood defense systems in gray infrastructure were fit to protect** accordingly also from floods in 2050 and well beyond, mostly for 2100. ADB contributed and will continue with improvement of flood monitoring and early warning systems.
- 3. ADB** introduced principle of **EBA and urban-rural flood risk partnerships with reduced flood design standards in rural farmland areas to increase flood protection for urban areas**. Training in flood resilient farming, agriculture shelterbelts, additional farmer income strategies will be provided during loan implementation, along with policy dialogue on urban-rural compensation – beyond insurance.

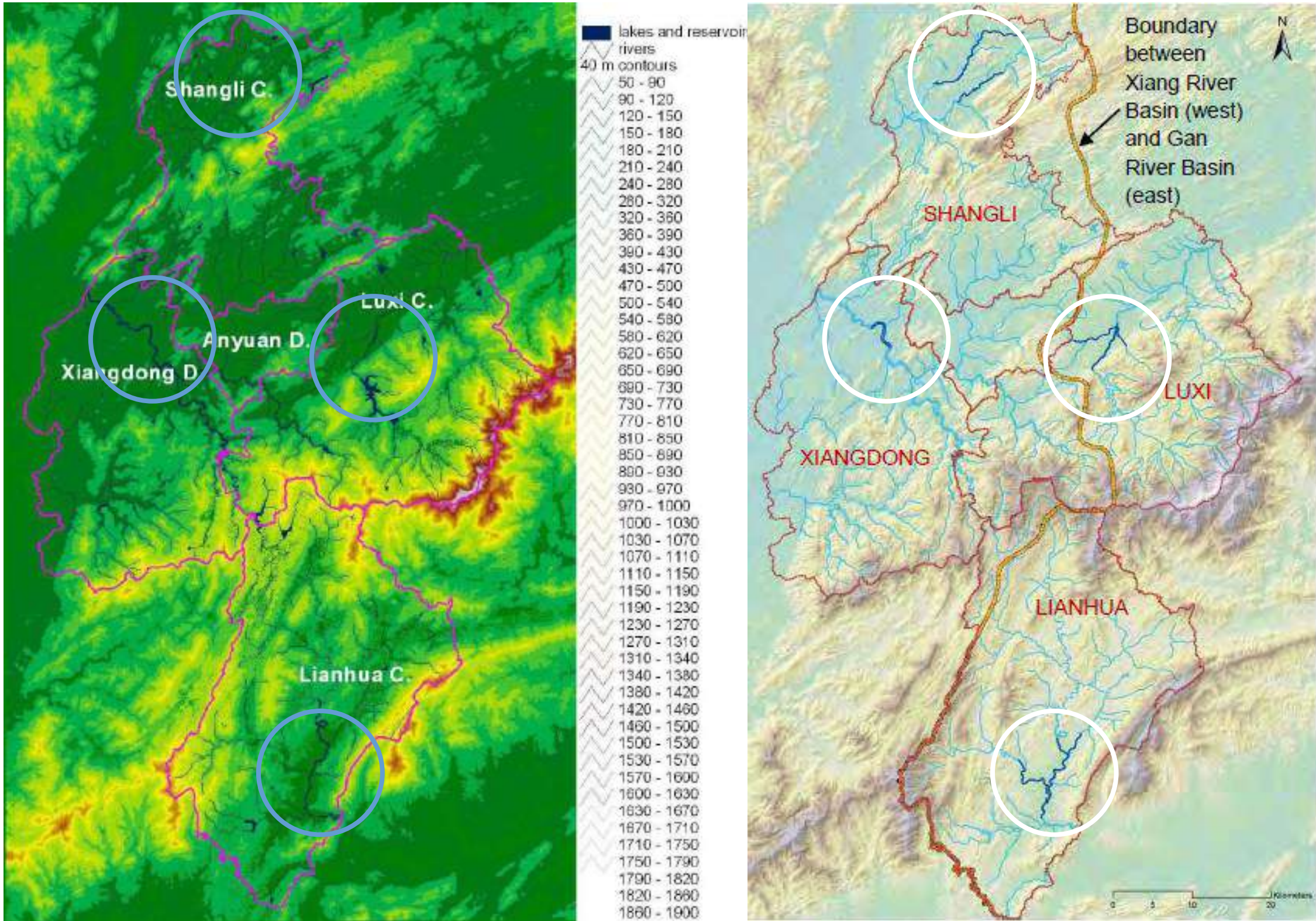
ADB ADDED VALUE: INTRODUCING AND CONVINCING GOVERNMENT AND ENGINEERS OF INTEGRATED GREEN INFRASTRUCTURE APPROACH

1. **ADB provided training on ecosystem-based flood risk management and integrated ecologically sound river management** (and sponge city pilot development) to local governments, stakeholders, and domestic engineers, including an initial review of the locally proposed gray infrastructure a
2. **ADB classified and qualified habitat types** and prepared inventory of plant and animal biodiversity and **identified environmental protection and sensitivity priorities** and opportunities also studying existing river edge conditions
3. **ADB analyzed threats to river ecology** from point and non-point **pollution sources**, solid waste dumping, and other threats - and water safety assessment and **identified improvement measures** including wastewater collection and treatment (part of project) and using ecosystems services to clean and filter water
4. **ADB reviewed original local design and proposed a maximum of ecosystem based adaptation and climate resilience improvements** including floodplain preservation and wetland rehabilitation and riparian landscape rehabilitation and replanting and ecological river embankments with planted soft water edges, agriculture shelterbelts etc. where ever adequate and possible.
5. **ADB worked directly with domestic engineers** and government to **achieve the maximum possible design transformation from gray to green infrastructure** directly including ADB proposals in amended and improved local FSRs (in the process ADB was literally struggling for every square meter of green and every tree)

RIVER SYSTEMS: PINGXIANG BETWEEN XIANG AND GAN RIVER SYSTEMS



PINGXIANG IS HEADWATER MUNICIPALITY: ALL ITS RIVERS ORIGINATE WITHIN

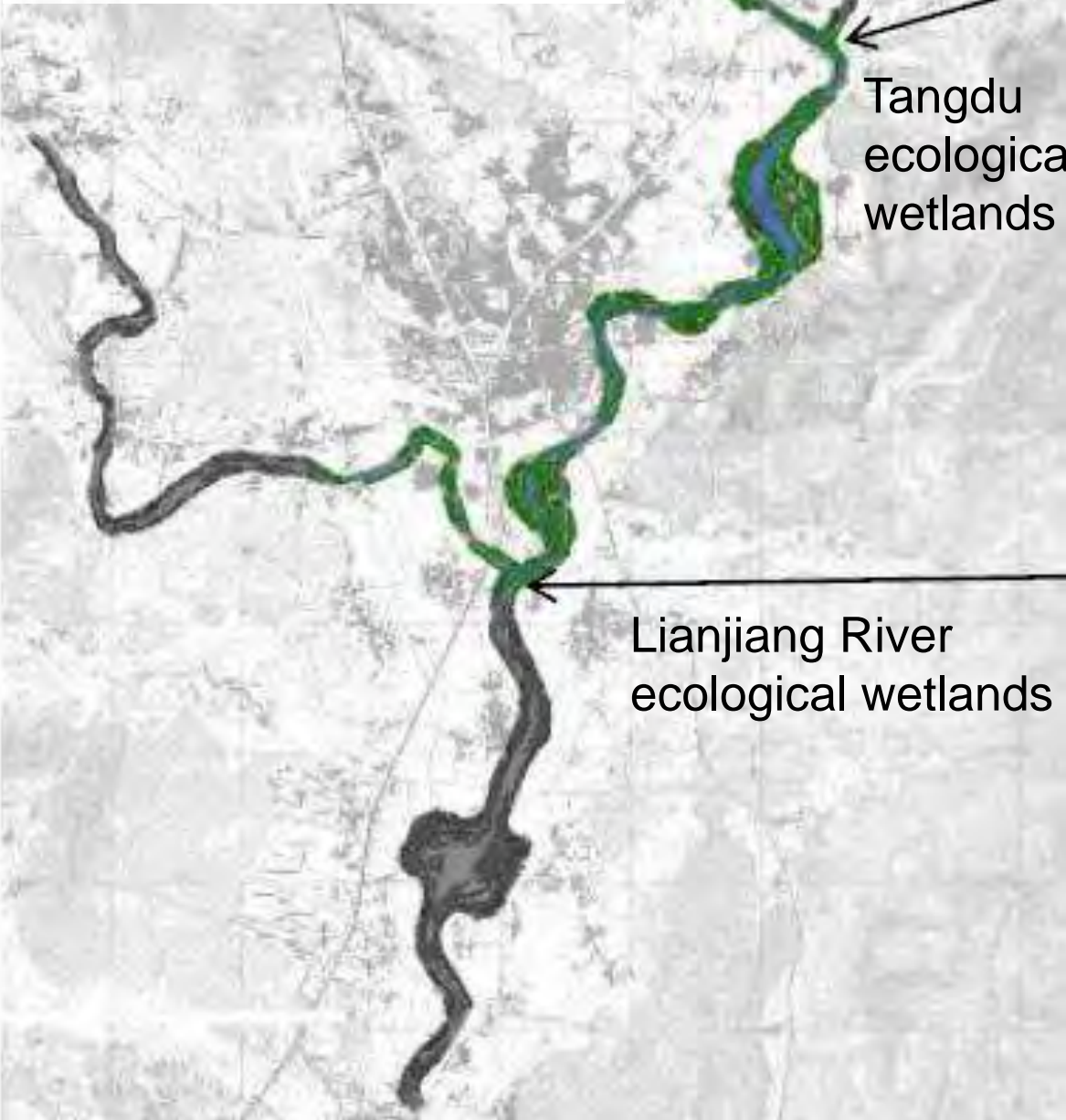


PRIORITY ENVIRONMENTAL PROTECTION AND REHABILITATION PROJECTS

LIANHUA AND LUXI RIPARIAN REVEGETATION AND WETLAND PROTECTION

Wetland Area	Area (ha)	1/5 year Flooded Area (ha)	1/10 year Flooded Area (ha)	1/20 year Flooded Area (ha)	Area of Re-vegetation (m2)
Ecological Wetland at confluence of Jin River and Lian River	17.2	6.4	9.7	17.2	91,000
Ecological Wetland at confluence of Bama River and Lian River	50	15.8	21.7	30	40,000
Waterfront Recreation Park, near Tangdu Village, downstream of confluence of Jin River and Lian River	111	5.3	11.8	19	300,341
Total	168.2				240,341

Source: FSR. ha = hectare, m2 = square meter.
Note: Earth embankments will be constructed on the other side of the piers to protect nearby settlements.



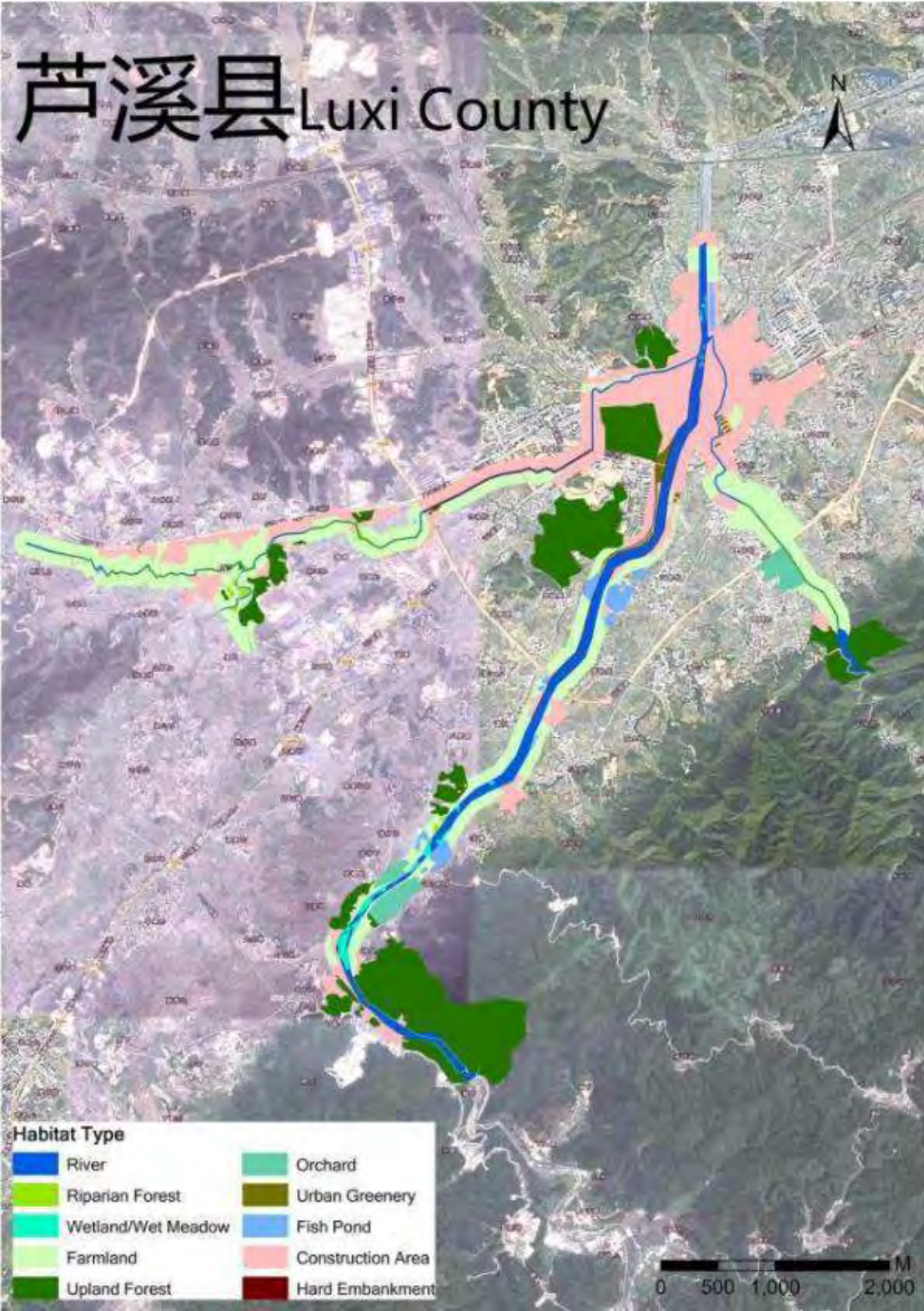
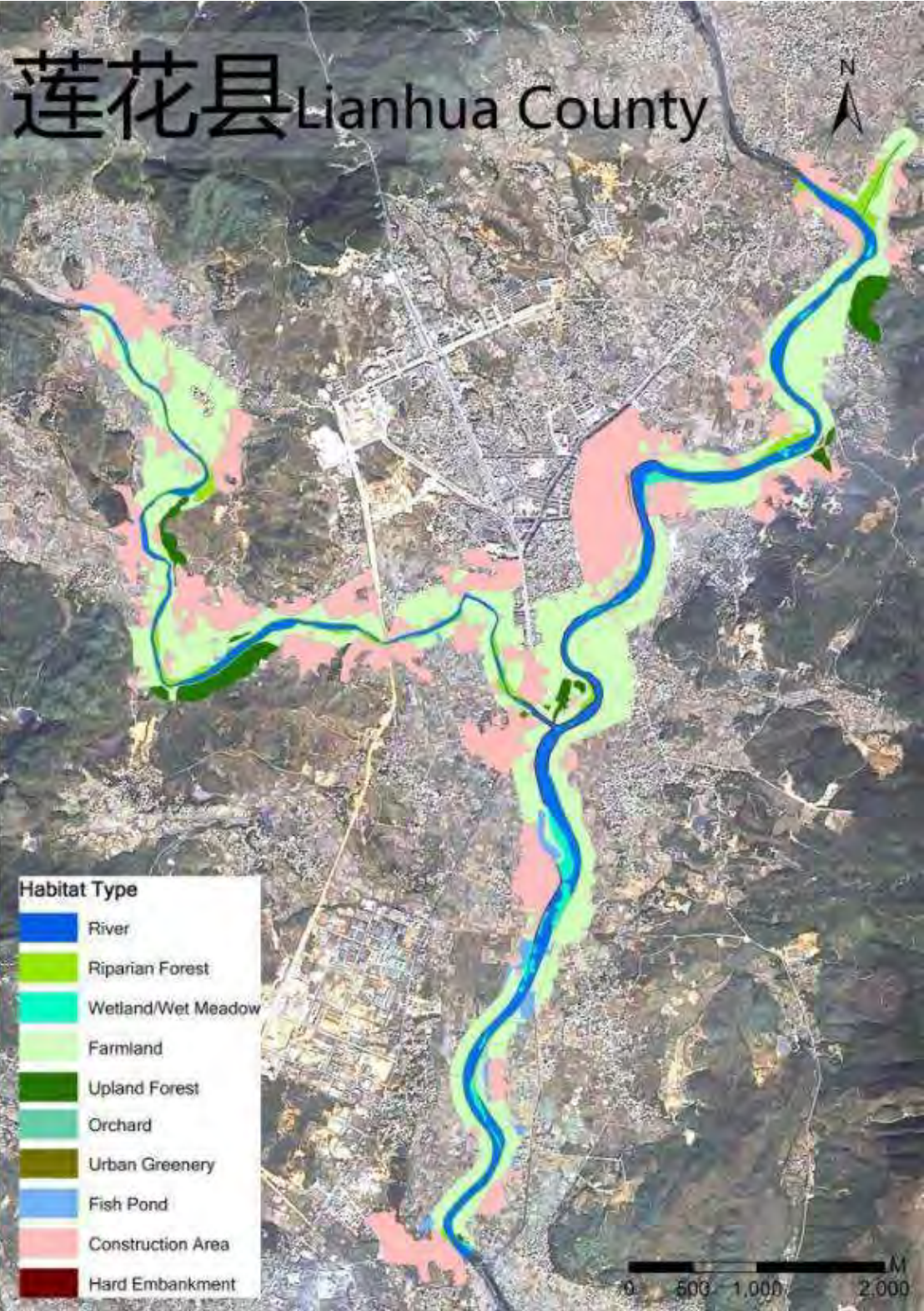
Zone	Area (ha)	Key Functions	Planned Works ¹
Forest Urban Gap Park Zone	5	Restore and protect the forests and build up natural landscaping.	Forest restoration along the river. Landscaping Parks along Yuan River. Water front platform and walkways.
Ecological Park Zone	20	Preserve the wild riparian condition and restore selected vegetation for a high quality of aesthetics.	Restore river riparian. Plant Chinese traditional flowers. Various view points as leisure area.
Urban Riparian Ecological Zone	14	Combine with urban flood control and urban green space to provide an area for leisure and recreation.	Recreate areas for local residents. Landscaping and vegetation along the residential area.
Yuan River Riparian Restoration and Rehabilitation Zone	4	Restore riparian system while conducting scientific research and monitoring, and convert area to a protection and conservation zone.	Restore riparian system. Release fish. Small islands restoration at the confluence of the Yuan, Xinhua and Tanshan River. Plant wetland plants.

¹ Includes overall plans for the park. The project to be supported by the ADB loan will be as follows.

Source: FSR. ha = hectare.



MAPPING OF HABITAT TYPES IN PROJECT RIVER AREAS



ADB BIODIVERSITY AND HABITAT ASSESSMENT: PLANT AND ANIMAL SPECIES INVENTORY



MEASURES RECOMMENDED TO CONTROL WATER POLLUTION

Pollution control measure	ADB Project scope
Expand wastewater collection system coverage in urban areas to maximize collection of domestic wastewater	Wastewater component for Lianhua and Xiangdong county-towns will improve water quality in the Lian, Baima, and Pingshui Rivers
In smaller settlements, promote the use of on-site septic systems or constructed wetlands for treatment of domestic wastewater prior to discharge	During Loan Implementation the consultants will provide training in assessment and planning, building and operation of local septic or wetland treatment
Avoid installing wastewater interceptors in river channels and ensure that any existing interceptors are separated from river water to the extent possible	Sewer separation/replacement is part of the proposed works for the Xinhua, Tankou, Yuan, and Pingshui Rivers
Restore riparian buffers along rivers to improve non-point source pollution control from agricultural runoff	In scope for Lianhua and Luxi project rivers. Ecological embankments in all project rivers
Implement solid waste collection at the town and village level, integrating these systems with the larger solid waste management system of county/district	Community Environment Supervision Teams proposed in pilot areas in the project area to promote awareness and action on environmental issues
Improve enforcement of environmental regulations to control point source such as mines	Loan assurance included to control industrial pollution from mines along Xinhua and Lishui Rivers
Regular maintenance of the rivers (localized removal of sediment, weeds, garbage etc.)	O&M programs will be developed as part of institutional capacity building for the river component
Stabilizing riverbanks to control soil erosion control	Revetment construction for all project rivers will help all
Building an isolated or wetland strip within certain distance near riverbank are surrounded by livestock and poultry farms, with benefits of prevention of pollutants flowing straight to the river, purifying water body and beautifying the environment.	Correlated to the ecological embankment work for all project rivers

RECOMMENDED PROJECT RIVER EMBANKMENT TYPES

Urban Waterfront Leisure Hard Embankment



Forest Protection With Gentle Slope Ecological Embankment



Bio-Engineered Erosion Control Embankment

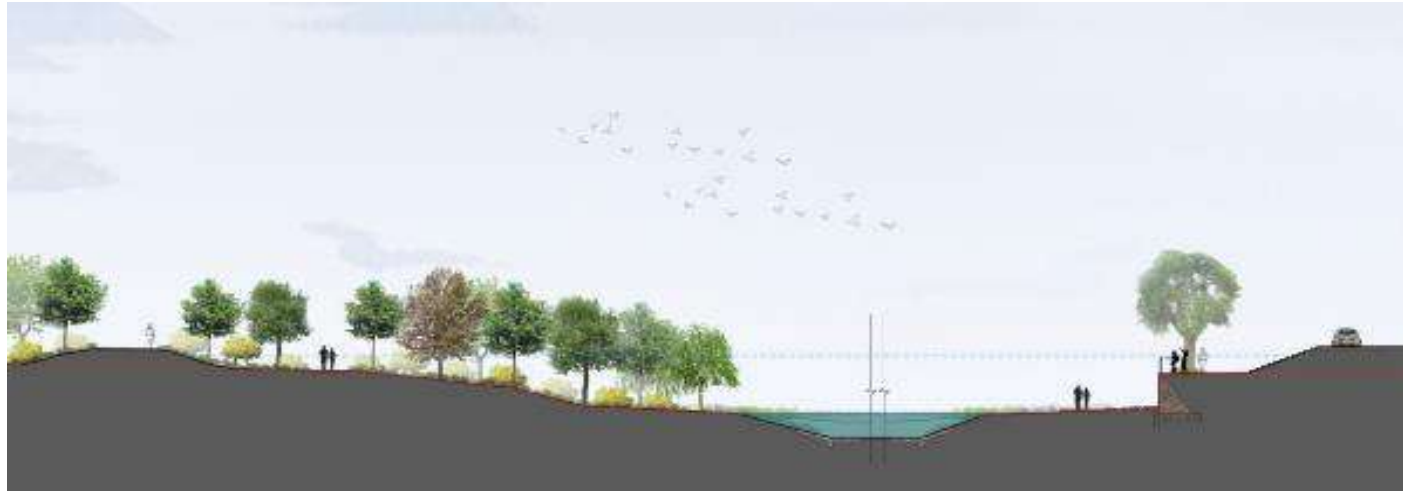


Forest Embankment With Hard Retaining Wall Embankment

RECOMMENDED BIO-TECHNIQUES, AND ECOLOGICAL REVETMENTS



DESIGN OF KEY NODES LIANHUA COUNTY 1



- Preserve new retaining wall on the southwest side, and raise the existing road to meet flood protection standards;
- Preserve large trees along the road on the southwest side, and plant more trees along the shoreline to improve connectivity of the riparian tree belt;
- Plant shoreline aquatic plants along the existing pebble beach on the southwest side to form riparian wetlands;
- Preserve existing forested areas on the northwest and north east sections, build up natural slopes to meet flood protection requirements;
- Preserve high quality wetland habitat at the confluence of the two rivers, and use wetland islands to improve landscaping and provide opportunities for leisure activities.

Loan 3281 People's Republic of China:

Jiangxi Pingxiang Integrated Rural-Urban Infrastructure Development Project

JIANGXI PINGXIANG PILOT SPONGE CITY IN PRC

The ADB logo is a dark blue square with the letters 'ADB' in white, serif font.

Wuhan Wastewater and Stormwater Management Project:

Loan \$100 million

Yangtze River and Han River are national-priority river basins for water pollution prevention and control.

Water pollution control targets for Wuhan for 2010:

- (i) 75% wastewater collection rate,
- (ii) 70% wastewater treatment rate,
- (iii) reduction in annual water pollutant loading of 48,150 tons of chemical oxygen demand and 4,520 tons of ammonia nitrogen,
- (iv) separation of wastewater sewerage and stormwater drainage in newly built-up areas, and
- (v) wastewater treatment rate of 80% in urban areas by 2010.



Wuhan Wastewater and Stormwater Management Project: Total Cost

Detailed Cost Estimates (\$)

Item	Appraisal	Actual	Changes as per Appraisal
A. Wastewater Treatment in Central Urban Areas			
Erlangmiao WWTP	22,236,294	32,067,640	44.2%
Nantaizi Lake WWTP	22,492,315	38,058,373	69.2%
Huangpu Road WWTP	14,738,165	33,652,529	128.3%
Subtotal	59,466,774	103,778,542	74.5%
B. Wastewater Treatment in Suburban Areas			
Dongxihu Sewer System	19,619,271	26,971,942	37.5%
Caidian WWTP	11,697,237	12,472,258	6.6%
Subtotal	31,316,508	39,444,200	26.0%
C. Stormwater System			
Drainage Works in Luojia Road Area	44,981,537	87,938,288	95.5%
Yangsigang Pump Stations and Pipe Works	10,285,313	27,425,672	166.6%
Tri-gate Connection Works in Dongxihu	38,299,911	121,737,355	217.9%
Changqing Pump Station Expansion	19,757,890	61,759,052	212.6%
Subtotal	113,324,651	298,860,367	163.7%
D. Project Management	1,223,000	1,747,925	42.9%
Total Base Costs	205,330,933	443,831,034	116.2%
Physical Contingencies	20,533,099		
Price Contingencies	13,233,616		
Total Project Costs	239,097,648	443,831,034	85.6%
Interest During Implementation and Commitment Charges	27,319,117	69,863,176	155.7%
Total Costs	266,416,765	513,694,210	92.8%

RRP = report and recommendation of the President to the Board of Directors, WMG = Wuhan Municipal Government, WWTP = wastewater treatment plant.

Wuhan Wastewater and Stormwater Management Project:

Stormwater Management.

Positive Social Impacts: Direct beneficiaries-3.1 million people of which 1.4 million benefit from improved wastewater management; 1.5 million from improved stormwater management

Indirect beneficiaries include 2.4 million persons living outside the project service areas but within built up area of municipality

Direct Beneficiaries include 270,000 poor persons (those earning less than Wuhan's official poverty line of CNY510 per month)



Wuhan Wastewater and Stormwater FIRR, EIRR and Number of Beneficiaries

- Positive social impacts. Direct beneficiaries - 3.1 million people, of which 1.4 million benefit from improved wastewater management 1.5 million from improved stormwater management, and 0.1 million from both.
- Indirect beneficiaries- included 2.4 million persons living outside the project service areas but within the built-up area of the municipality
- Direct beneficiaries include 270,000 poor people (those earning less than Wuhan's official poverty line of CNY510 per month).

Wuhan Wastewater and Stormwater Management Project:

Stormwater Management.

The component improved the drainage works of the Luoja Road area, box culverts and open channels, and Luoja Road pumping station

It constructed Yangsigang pumping station and 1 km stormwater pipelines and about 2 km of box culverts.

Three drainage control gates were connected in Dongxihu.

Dongxihu–Changqing pumping station

Institutional Development.

supported development of regional water quality model and carried out a pilot inflow and infiltration study.

training in financial management and operation of wastewater and stormwater facilities

a study on sludge treatment was carried out and supported a strategic plan for sludge management in Wuhan.



Wuhan Wastewater and Stormwater Management Project:

Figure 4 Implementing Ecological Restoration



Hefei Urban Environment Improvement Project

ADB Loan \$150 million

Component 2: River Rehabilitation and Flood Control Improvement

This component was designed to get flooding, water quality, and river and lake environment issues under control.

Five severe flooding events within 60 years had caused significant loss and damage.

The water quality of the rivers used to be much worse than class V.

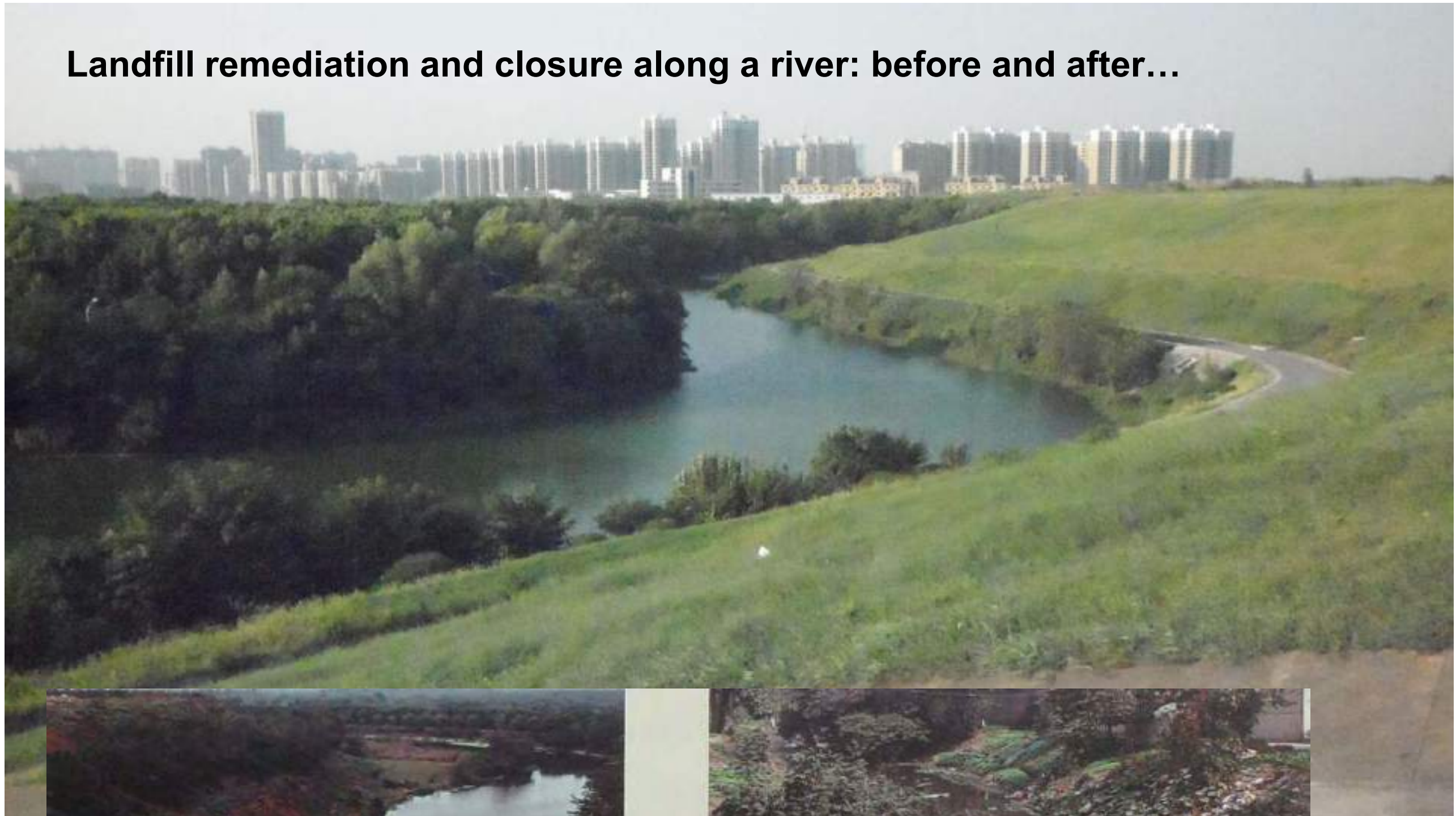
The river environment was characterized by eroding banks littered with solid waste, and the riverbed was polluted by sediments.

Key point-source pollution and non-point source control measures were put in place



Hefei Urban Environment Improvement Project

Landfill remediation and closure along a river: before and after...



Hefei Urban Environment Improvement Project

**Flood risk
management and
river rehabilitation**



DISASTER PREVENTION



Loan-PRC 2491

Guangxi Wuzhou Urban Development Project



VIET NAM

initiative.



Wuzhou City, Guangxi PRC



Project Background

Ineffective geohazard management

- Geological and geographic constraints on urban development
- Densely populated valleys classified as geohazard-prone zones (landslides, slope collapse)
- Traditional control measures were not economical and optimal solutions

New approach: shift from disaster rehabilitation to prevention

- Relocation of people
- Conversion of evacuated valleys into geohazard free areas
- Stronger geohazard forecasting and early warning capability



Project Cost/Duration

- \$260 million with a \$100 million ADB loan
- 2009 to 2016 implementation period

Project Impact

- Sustained urban development and improved quality of life for Wuzhou city

Project Outcome

- Reduced geohazard threat on life and property and reduced geohazard constraint on urban development in Wuzhou city



Project Output 1

ADB

Pingminchong valley: geohazard resettlement and prevention

- About 1,721 families and 24 enterprises (6,505 persons) have been evacuated from the geohazard-prone Pingminchong valley and properly relocated to a newly constructed resettlement community in Zaochong, with quality housing and municipal infrastructure.
- Geohazard-prone Pingminchong valley is treated with anti-geohazard engineering measures to become 21 ha of landslide-free land ready for urban redevelopment.

Pingminchong Valley back in 2009



24 JUN 2009

Landslides in Pingminchong Valley



Landslides in Pingminchong Valley



Resettled community in Zaochong in 2012



Engineering works on Pingminchong valley in 2011



Land redevelopment in Pingminchong valley in 2014



Project Output 2

Geohazard forecasting and early warning system

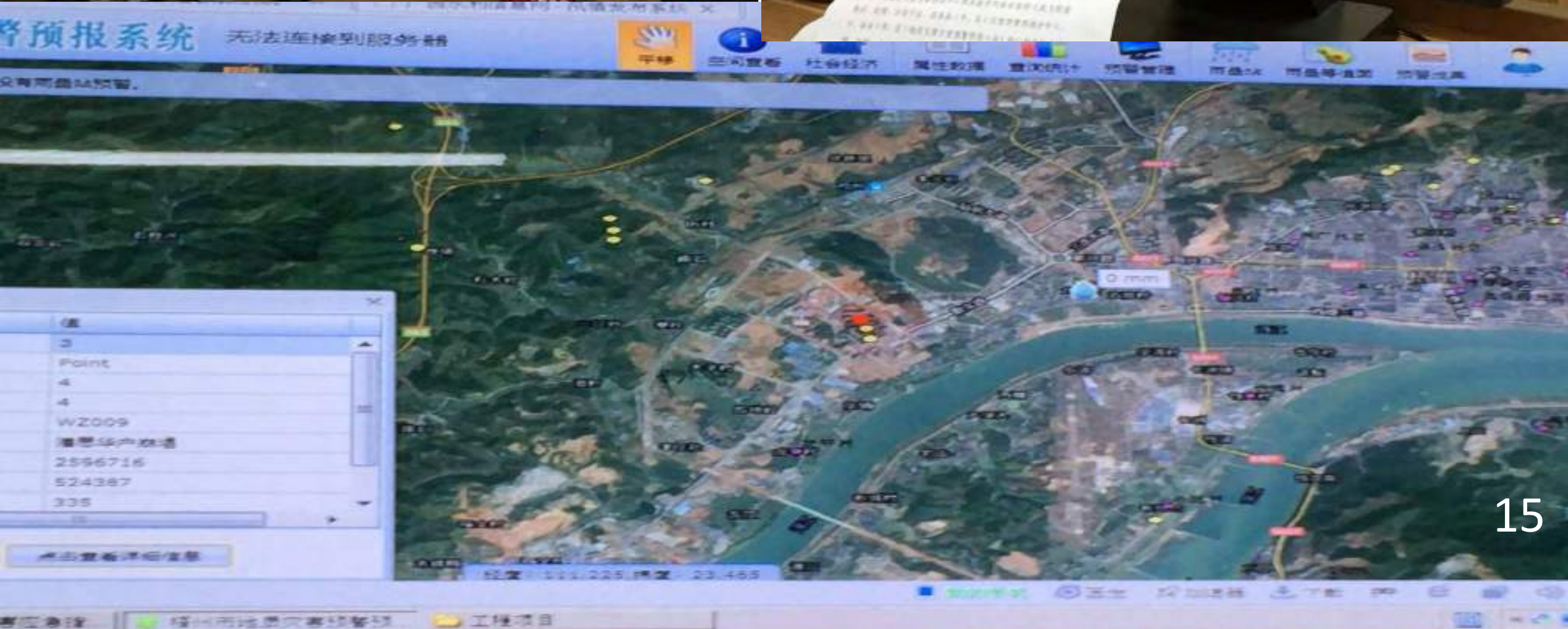
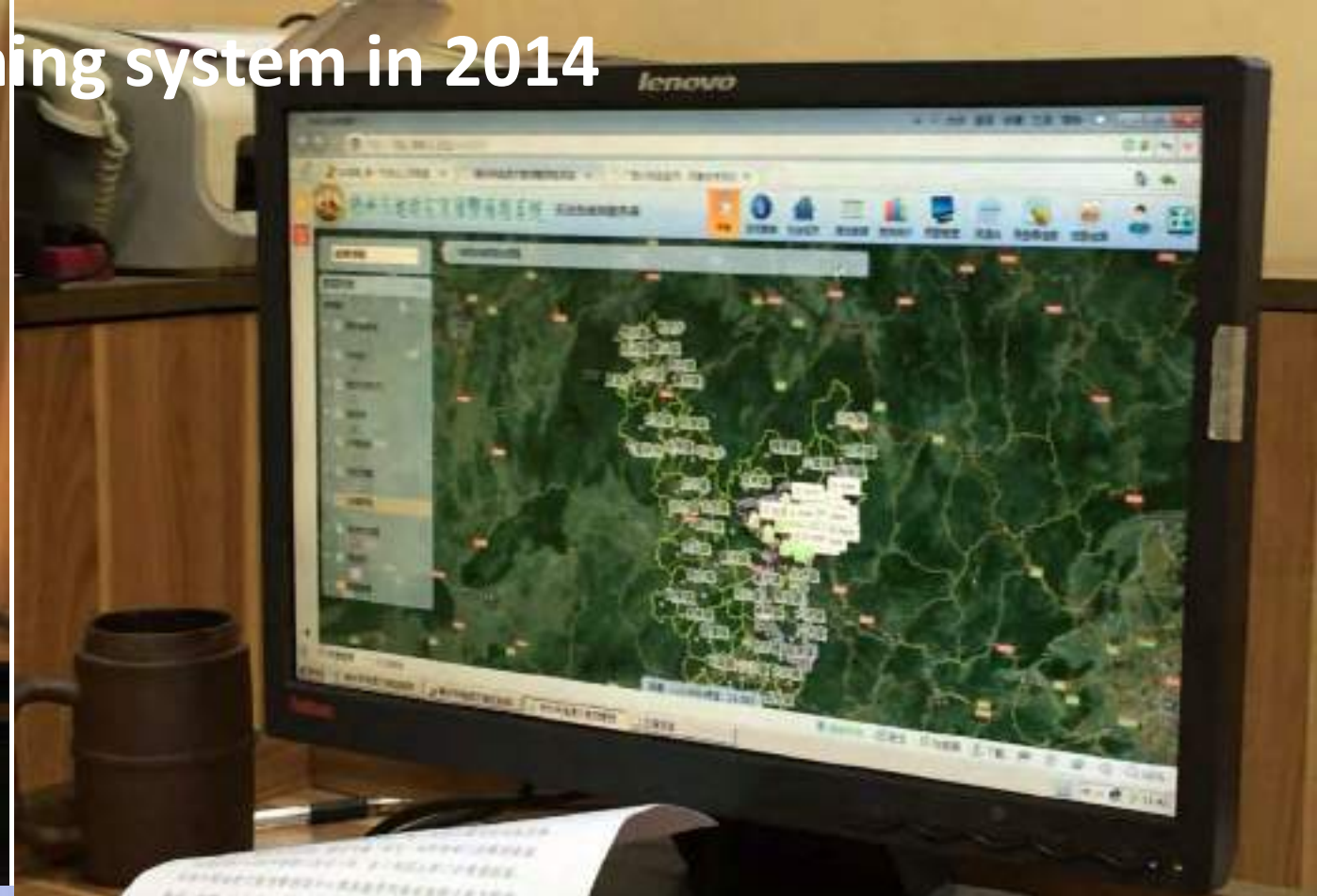
- Developed a geographic forecasting and early warning system (GEFWS) compatible with a geographic information system (GIS)
- Training in geohazard management for the municipal government
- Improved public awareness of geohazards and geohazard management
- Reduced emergency response time by 80%





Geohazard forecasting and early warning system 2014

Geohazard forecasting and early warning system in 2014





Involuntary Resettlement

Adapting solutions during implementation

- June 2009, a land slide incident happened in Pingminchong Valley
- The WMG decided to take advanced action to evacuate the affected peoples (APs) to ensure their safety.
- While the Zaochang community was still under construction the WMG provided Aps with a “transitional arrangement”
- The WMG purchased 2,690 existing housing apartments in 8 different locations within the city
- The WMG provide them as immediate geohazard-free accommodations to the APs with affordable price and arrangement

Involuntary Resettlement

Transitional arrangement

Issue

- Comprehensive transitional arrangement necessary for the APs who plan to relocate to the Zaochong resettlement community

ADB's approach

- Ensure the APs receive enough rental allowance to rent a transitional housing (CNY 10 per m²)
- Hold AP consultation meetings during loan review missions to ensure adequacy of transitional allowance

座落地址	户型结构、面积	装修	月租金(元)
凤路五楼	六房两厅二厨一卫50m ²	已装修	10
凤路六楼	四房二厨一卫60m ²	已装修	10
凤路六楼	特设大房10m ²		2.3
中路五楼	四房二厨一卫60m ²	已装修	10
中路三楼	特设四房一卫73m ²	未装修	10
中路二楼	特设大房27m ²	已装修	3.5
石街一楼	特设二厨一卫57m ²	已装修	5
墨池楼七楼	四房二厨一卫65m ²	已装修	13.3
中路二楼	四房二厨一卫60m ²	未装修	12
中路三楼	四房二厨一卫66m ²	已装修	15
中路二楼	特设一厨一卫43m ²	已装修	6
中路六楼	四房三厨一卫80m ²	已装修	13
中路一楼	特设二厨一卫52m ²		7.5
中路四楼	四房二厨一卫63m ²	已装修	13
仁路	特设大房61m ²		8.5
中路八楼	四房二厨一卫73m ²		12.8
中路五楼	特设二厨一卫60m ²		7.8
中路八楼	特设一厨一卫38m ²		5
中路	三房私宅特设38m ² 屋		9(整屋)
中路四楼	特设二厨一卫50m ²		4
二路五楼	四房三厨一卫78m ²		12.5
中路七楼	特设二厨一卫58m ²		6.8
中路三楼	四房二厨一卫54m ²		6.3
一路五楼	特设大房30m ²		3.2
上路八楼	四房二厨一卫76m ²		12.5
二路五楼	特设大房30m ²	已装修	3.2
二路五楼	特设一厨一卫50m ²		8
大路一楼	四房三厨一卫91m ²		12
二路八楼	特设二厨一卫74m ²		10
中路	特设二厨私宅100m ²		10
二路八楼	四房二厨一卫60m ²		7.5
大路	特设三厨私宅68m ²		8
二路七楼	四房二厨一卫76.5m ²		8.6
石路	特设三厨私宅70m ²		7.3
二路三楼	四房三厨三卫一卫80m ²		12.5
中路	特设一厨私宅48.3m ²		2.8
二路八楼	特设二厨一卫53m ²		8
石路	特设三厨私宅160m ²		18
二路五楼	特设一厨一卫43m ²		5
二路八楼	特设二厨一卫55m ²		7.8
二路八楼	四房二厨一卫60m ²		7.5
二路二楼	四房二厨一卫66m ²		11.2
中路三楼	三房三厨三卫二卫69m ²		13
石路	特设三厨私宅100m ²		15
二路七楼	四房二厨一卫70m ²		15.5
二路四楼	四房二厨一卫67m ²		12.5
二路九楼	四房二厨一卫67m ²		12.5
二路五楼	特设一厨一卫32m ²		4.5
二路二楼	四房二厨一卫76m ²		14

租

座落地址	户型结构、面积、家具	月租金(元)
建行对面二楼	四房一厨一卫加一厨60m ² 配有热水器、家用电器	350
教工公寓一楼	四房一厨一卫50m ² 装修、有床	280
三楼	特设两房一卫50m ² 装修、有家电	350



Involuntary Resettlement

Ensure Affordability

Issue

- Low income people/households might not be able to afford rent/ownership in any 8 locations

ADB's approach

- Ensure a 'vulnerable group' receives a rental allowance in addition to the compensation and ensure the amount is enough to cover a rent in low-cost rental housing.
- Ensure enough units are available in economy & low-cost rental housings for the APs.
- Ensure the people living in the house smaller than 12 m²/person will be compensated/offered a new house with at least 12 m²/person.



Project Replication

- WMG is replicating the Pingmingchong model to three adjacent valleys
- A total of 81.2 ha of geohazard-free lands are being made ready for future urban development and 34,959 people (in 7,419 households) and around 50 enterprises are being relocated to safe urban areas
- WMG also plans to extend the GEWFS coverage to the entire Wuzhou municipality benefiting more than 3 million residents
- The geohazard management systems provided under the Wuzhou project were also viewed by the Ministry of Land Resources as a “good experience and good practice” for national replication, providing a change from passive reaction to proactive prevention

Thank you

Sangay Penjor, Director
Urban and Social Sectors Division / East Asia Regional Department