Innovating Eco-Compensation Mechanisms in Yangtze River Basin (YRB)

Part I: Project Information

GEF ID
10711

Project Type
FSP

Type of Trust Fund
MTF

CBIT/NGI
- [ ] CBIT
- [ ] NGI

Project Title
Innovating Eco-Compensation Mechanisms in Yangtze River Basin (YRB)

Countries
China

Agency(ies)
ADB

Other Executing Partner(s)
National Development and Reform Commission (NDRC)

Executing Partner Type
Government

GEF Focal Area
Multi Focal Area

Taxonomy
Indigenous Peoples, Stakeholders, Focal Areas, Civil Society, Biodiversity, Protected Areas and Landscapes, Terrestrial Protected Areas, Species, Threatened Species, Biomes, Tropical Dry Forests, Rivers, Lakes, Wetlands, Financial and Accounting, Payment for Ecosystem Services, Natural Capital Assessment and Accounting, Chemicals and Waste, Waste Management, Industrial Waste, Open Burning, Plastics, Sound Management of chemicals and waste, Persistent Organic Pollutants, Influencing models, Deploy innovative financial instruments, Strengthen institutional capacity and decision-making, Demonstrate innovative approache, Transform policy and regulatory environments, Convene multi-stakeholder alliances, Communications, Public Campaigns, Awareness Raising, Behavior change, Community Based Organization, Non-Governmental Organization, Type of Engagement, Participation, Information Dissemination, Consultation, Beneficiaries, Local Communities, Private Sector, SMEs, Individuals/Entrepreneurs, Gender Equality, Gender results areas, Access to benefits and services, Knowledge Generation and Exchange, Capacity Development, Access and control over natural resources, Gender Mainstreaming, Gender-sensitive indicators, Capacity, Knowledge and Research, Innovation, Knowledge Exchange, Knowledge Generation

Rio Markers
Climate Change Mitigation
Climate Change Mitigation 1

Climate Change Adaptation
Climate Change Adaptation 0

Duration
60 In Months

Agency Fee($)
726,604.00

Submission Date
10/16/2020

A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount($)	Co-Fin Amount($)
BD-1-3	GET	1,073,396.00	3,000,000.00
BD-2-7	GET	2,504,587.00	52,500,000.00
CW-1-2	GET	4,495,413.00	55,500,000.00
	Total Project Cost ($)	**8,073,396.00**	**111,000,000.00**

B. Indicative Project description summary

Project Objective

To promote innovative eco-compensation mechanisms which contribute to improved and sustainable terrestrial and freshwater ecosystem health in the Yangtze River Basin

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)
Developing Innovative Eco-Compensation Mechanisms	Technical Assistance	1. Eco-compensation implementation framework for healthy ecosystems in YRB developed	1.1 Eco-compensation enabling framework reviewed through multi-stakeholder processes (including private sector) 1.2 Gross Ecosystem Product (GEP) indicators developed to appraise eco-compensation performance in YRB	GET	300,000.00	2,000,000.00

Strengthening Biodiversity and Ecosystems Services in Chishui River Watershed	Investment	2. Biodiversity and ecosystems services in Chishui River Basin enhanced and supported by eco-compensation mechanism	2.1 Comprehensive protected area system for Chishui River Basin expanded by 80,000 ha from baseline 2.2 Ecological corridors created /improved in Chishui River Basin through restoration / rehabilitation of degraded forests, peatland, and riverian wetlands 2.3 Comprehensive management plan for Chishui River Basin protected area system established for all three provinces 2.4 Eco-compensation mechanism applied in Chishui River Basin to support “green” livelihoods	GET	3,200,000.00	63,000,000.00
Reducing Agricultural Field Plastic Pollution in the YRB	Investment	3. Agricultural field plastic pollution reduced in project areas of YRB and supported by eco-compensation mechanism	3.1 Supply chain and life cycle assessment of agricultural field plastics industry relevant to YRB 3.2 At least three local government-led plastics management actions plans integrated into master plans 3.3 Agricultural field plastics pollution reduction, recycling, disposal and substitution programs initiated in project areas, with eco-compensation mechanism drafted / established	GET	3,700,000.00	41,000,000.00

Enabling sustainable financing for eco-compensation mechanisms in YRB	Technical Assistance	4. Sustainable financing and knowledge management for eco-compensation mechanisms supported through natural capital lab in YRB	4.1 Eco-compensation monitoring system using GEP indicators developed 4.2 Sustainable green financing for YRB ecosystem health mobilized 4.3 Strategic partnerships and South-South knowledge transfer advanced 4.4 Knowledge management, project coordination, monitoring and evaluation conducted	GET	488,950.00	3,600,000.00
				Sub Total ($)	**7,688,950.00**	**109,600,000.00**
Project Management Cost (PMC)						
				GET	384,446.00	1,400,000.00
				Sub Total($)	**384,446.00**	**1,400,000.00**
				Total Project Cost($)	**8,073,396.00**	**111,000,000.00**

C. Indicative sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
GEF Agency	Asian Development Bank	Loans	Investment mobilized	110,000,000.00
Recipient Country Government	National DEvelopment and Reform Commission (NDRC)	In-kind	Recurrent expenditures	1,000,000.00
			Total Project Cost($)	**111,000,000.00**

Describe how any "Investment Mobilized" was identified

Through ADB-PRC Country Partnership Strategy and Country Operational Business Plan (COBP). Note: Additional co-financing from National and Local Governments in PRC and possibly private sector, will be confirmed during project preparation

D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)	Total($)
ADB	GET	China	Biodiversity	BD STAR Allocation	1,073,396	96,604	1,170,000.00
ADB	GET	China	Biodiversity	BD STAR Allocation	2,504,587	225,413	2,730,000.00
ADB	GET	China	Chemicals and Waste	POPs	4,495,413	404,587	4,900,000.00
				Total GEF Resources($)	**8,073,396.00**	**726,604.00**	**8,800,000.00**

E. Project Preparation Grant (PPG)

PPG Required ☑

PPG Amount ($)

183,488

PPG Agency Fee ($)

16,512

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)	Total($)
ADB	GET	China	Biodiversity	BD STAR Allocation	27,523	2,477	**30,000.00**
ADB	GET	China	Biodiversity	BD STAR Allocation	64,221	5,779	**70,000.00**
ADB	GET	China	Chemicals and Waste	POPs	91,744	8,256	**100,000.00**
				Total Project Costs($)	**183,488.00**	**16,512.00**	**200,000.00**

Core Indicators

Indicator 1 Terrestrial protected areas created or under improved management for conservation and sustainable use

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
560,834.00	0.00	0.00	0.00

Indicator 1.1 Terrestrial Protected Areas Newly created

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Total Ha (Achieved at MTR)	Total Ha (Achieved at TE)
80,000.00	0.00	0.00	0.00

Name of the Protected Area	WDPA ID	IUCN Category	Total Ha (Expected at PIF)	Total Ha (Expected at CEO Endorsement)	Total Ha (Achieved at MTR)	Total Ha (Achieved at TE)
			80,000.00			

Indicator 1.2 Terrestrial Protected Areas Under improved Management effectiveness

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Total Ha (Achieved at MTR)	Total Ha (Achieved at TE)
480,834.00	0.00	0.00	0.00

Name of the Protected Area	WDPA ID	IUCN Category	Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Total Ha (Achieved at MTR)	Total Ha (Achieved at TE)	METT score (Baseline at CEO Endorsement)	METT score (Achieved at MTR)	METT score (Achieved at TE)
			480,834.00						

Indicator 3 Area of land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
2000.00	0.00	0.00	0.00

Indicator 3.1 Area of degraded agricultural land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 3.2 Area of Forest and Forest Land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
2,000.00			

Indicator 3.3 Area of natural grass and shrublands restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 3.4 Area of wetlands (incl. estuaries, mangroves) restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 10 Reduction, avoidance of emissions of POP to air from point and non-point sources (grams of toxic equivalent gTEQ)

Grams of toxic equivalent gTEQ (Expected at PIF)	Grams of toxic equivalent gTEQ (Expected at CEO Endorsement)	Grams of toxic equivalent gTEQ (Achieved at MTR)	Grams of toxic equivalent gTEQ (Achieved at TE)
443.00			

Indicator 10.1 Number of countries with legislation and policy implemented to control emissions of POPs to air (Use this sub-indicator in addition to Core Indicator 10 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

Indicator 10.2 Number of emission control technologies/practices implemented (Use this sub-indicator in addition to Core Indicator 10 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	864,750			
Male	915,250			
Total	1780000	0	0	0

Part II. Project Justification

1a. Project Description

Global environmental problems, root causes and barriers

The Yangtze River is one of the largest rivers in the world and—flowing from its source high in the Tibetan Plateau through the economic heart of the Peoples Republic of China before emptying into the Eastern China Sea near Shanghai. The area covers 181 million hectares. The rich and complex terrains and climate have created a wide range of natural ecosystems that support important habitats for a number of charismatic species such as the snow leopard, giant panda, and Yangtze finless porpoise. The YRB also sustains large populations that benefit from the services provided, which include drinking water, farthrming, fisheries, and transportation. The critical role of the Yangtze River and the wider Yangtze River Basin (YRB) for the economy and for the environment of the PRC has been recognized by the development of the Yangtze River Economic Belt (YREB) development plan.

Numerous threats, including economic development – increased industrial activity - expanding populations, and uneven governance in the basin is putting a severe pressures on riverine ecosystems and services. Characterised by a history of uncontrolled development, sustainable development and economic growth in the middle and upper reaches of the YRB are still undermined by (i) slow transformation into green development and economic diversification; (ii) limited integration of waterways, ports, and intermodal logistics; (iii) increasing pollution and pressure on natural resources; and (iv) weak institutional coordination for strategic planning.

Decades of intensive land development and reclamation (the building of dams, dykes and polders) have allowed agriculture and urban settlements to encroach on areas which were formerly flood plains, wetlands and lakes. This unchecked development has lead to two significant challenges for the YRB: (i) The ongoing damage and destruction of many delicate ecosystems and habitats has negatively impacted the biodiversity of the YRB with some key species, such as the Yangtze Dolphin, the Yangtze Alligator and the Chinese Sturgeon feared to be extinct. (ii) The same areas of habitat which used to provide homes for the flora and fauna of the YRB also provide a crucial, natural process for the management of erosion, soil health, siltation, and flooding. Increasingly destructive flood events and loss of agricultural productivity are having a significant negative impact on the economy of the YRB. Loss of agricultural productivity from land degradation in the PRC amounts to an estimated $37.09 Billion per year[1]

To address the manifold environmental challenges facing the Yangtze River Basin (YRB), the Government of the PRC formulated the Yantgzte River Economic Belt (YREB) development plan 2016–2030, which stipulates the prioritization of ecological protection and promotion of green development as the guiding principle for the YREB development.

The YREB covers nine provinces and two specially administered cities within the Yangtze River Basin. It accounts for more than 40% of the entire PRC population, has 40% of the freshwater resources, serves as the drinking water resource for 400 million people, provides 60% of total fisheries production, has 20% of the total wetland area, and already contributes about 45% of the PRC's economic output.

The Asian Development Bank (ADB) and the Government of the PRC have agreed to adopt a framework approach, providing about $2.0 billion of funding in the YREB during 2018–2020 to strategically program ADB's lending support for development initiatives in the YREB with priority given to the following four areas: (i) ecosystem restoration, environmental protection, and water resources management; (ii) green and inclusive industrial transformation; (iii) construction of an integrated multimodal transport corridor; and (iv) institutional strengthening and policy reform.

These priorities are also consistent with the policy recommendations of a special study on "*Ecological Compensation and Green Development Institutional Reform in the Yangtze River Economic Belt"* advanced by the China Council for International Cooperation on Environment and Development (CCICED). Among these is the need to: i) adopt a "whole-of-ecosystem" approach from mountain to ocean for the YRB, ii) promote multi-stakeholder engagement with respect to communities and livelihoods, iii) design institutional frameworks to incentivize long term financial sustainability for ecological compensation and environmental protection programs in the YRB, and iv) establish appropriate legal and institutional mechanisms to enable sustainable development for YRB[2].

Non-Point Source Pollution in YRB

In the middle and upper reaches of the YRB, the traditional modes of economic development strongly rely on the rural economy and primary sector. However, unsustainable production practices continue to cause environmental degradation and limit the opportunities for improving rural livelihoods. This has severely impacted the water resources that the quality of the river water suffers from increasing non-point source (NPS) pollution because of excessive levels of agricultural chemical runoff. Agricultural intensification has degraded the land resources, driven by changes to land use, deforestation, diminished water availability and quality, soil erosion, and reduced soil quality from overuse of chemical fertilizers and pesticides. The loss of agricultural productivity as a result of land degradation in the PRC amounts to an estimated $37.09 billion per year. Moreover, agriculture is highly vulnerable to climate change. Coping with significant variability in future climatic impacts requires efficient water resource management, increased capacity of agricultural support institutions and stakeholders, improvement of the support services to farmers, and more resilient production and ecosystems.

Industrial emissions, traffic-related sources, treated urban effluents, and urban runoff can serve as point sources of metal contaminants for receiving waters. Land use can significantly impact the heavy metal contamination of soils, which leads to widespread pollution. Suspended sediments adsorb pollutants from the water and deposit them on the riverbed, thus lowering their concentration in the water column. Bottom sediments provide habitats and a food source for benthic fauna. The heavy metals in the water system can accumulate and be biomagnified to a high degree in water, sediment, and the aquatic food chain, resulting in sublethal effects and death in local fish populations

Biodiversity and Agricultural Development Challenges in the YRB

In the middle and upper reaches of the YRB, the traditional modes of economic development strongly rely on the rural economy and primary sector. However biodiversity in the YRB has been negatively impacted by the pace and scale of agricultural development, particularly deforestation and the often irrational use of intensive farming methods such as pesticides, fertilizers and plastic films. These production practices continue to cause environmental degradation and limit the opportunities for improving rural livelihoods.

Sustainable frameworks for rural development and coping with significant variability in future climatic impacts requires a strong foundation of efficient water resource management, increased capacity of agricultural support institutions and stakeholders, improvement of the support services to farmers, and more resilient production and ecosystems.

Intensive Use of Agricultural Field Plastics

There are essentially two types of plastics used for agriculture in many parts of the country. These include: i) agricultural plastic thin mulching films, and ii) drip tape used for water conservation during irrigation. Plastic film mulching technology is widespread in PRC, and has significantly improved grain crop yield and water conservaton by maintaining soil moisture, suppressing weeds, increasing temperature and improving cold tolerance. The technology has given rise to 20–35% increase in grain crop yield and a 20–60% increase in cash crop yield particularly in the upper reaches of the YRB where temperatures have traditionally limited growing seasons and crop choice.

While there are economic benefits from plastic film mulch technology, wide scale use has generated huge amounts of mulch residue, commonly referred to as 'white pollution'. Estimates vary, however approximately 20 million hectares of agricultural land in PRC regularly use plastic film mulching. The rate of growth of the technology is around 7% per annum, with over 1.65 million metric tons of plastic film mulch applied by 2018[3]. Plastic film mulch is made up primarily of polyethelyne, which does not readily degrade in soil. The problem is exacerbated by the extremely low rate of plastic film mulch recovery following the growing season. Excessively thin films (less than 8 microns), degradation, contamination and cost implications all combine to limit current recovery to less than 11%. Research into the major plastic film mulch use areas in China shows soil residual mulch levels of 50–260 kg hm−2 in arable lands with repeated long-term plastic film mulch cover (over ten years).

Long term use of plastic mulching film has also been shown to degrade the soil, impacting: i) moisture and nutrient transport in soil, ii) crop emergence and root growth, iii) additional salinization of soil, iv) increased introduction of harmful micro-chemicals such as phthalate esters, di-(2-ethylhexyl) phthalate, aldehydes and ketones,[4] and emissions of chemicals through burning and disposal in landfills of those plastic films recovered from the fields.[5]

The Government has increasingly promoted the use of water saving irrigation (WSI) as a way to increase efficiency and conserve water resourses in agricultural areas. Over the past few decades, increases in agricultural production, expansion of industrial output and rising population with lifestyles which are water-intensive, have all put pressure on water resources in the country. In view of the competition for water from urban and industrial sectors, the agricultural sector is likely to face serious future water scarcity problems, which are made more serious by the low economic output per cubic meter of water.

Plastic drip tape irrigation is one popular form of WSI.[6] There is very limted available data on extent of use, however anecdotal evidence suggests that this is widespread in many areas, through the Irrigation Districts and Water User Associations. Similarly, while the focus has been on water use efficiency benefits of the technology, there is limited information on disposal practices, even though the drip tape has a short usage life - and very often used in various combinations with the plastic mulch films.

Gaps in Effective Planning for Key Biodiversity in YRB -notably Chishui River Basin (CRB)

The upper reaches of the Yangtze have been identified as one of the global biodiversity hotspots by Conservation International and other organizations. These include the Himalayan Mountains and the River Valley of Yangtze River, Southern China -Vietnam subtropical evergreen broadleaf forests, Ecoregion Central Yangtze River and Lakes, as well as the Yellow River Ecoregion (Yangtze River Delta and Estuary as part of the ecoregion).

Most protected areas in PRC are nature reserves (the most strictly protected PAs, primarily for biodiversity conservation), spanning over 80% of all protected areas. In 2019 there were 11,800 protected areas established, covering about 18% of the country's land surface. Of these, 474 are national nature reserves (10% of land surface), and the remaining are local reserves, forest parks, wetland parks, and other types of protected areas. Within Chishui River basin, there are 32 protected areas (Figure 1), with the total area of 480,834 ha, which accounts for 24% of the whole river basin. However, most nature reserves have been created without a clear planning framework to maximize efficiency and representation of conservation targets. Assessments of the effectiveness of nature reserves in PRC have focused on ecological diversity, represented in designated ecoregions. About 50% of these ecoregions have more than 10% of their land area protected through the reserve system, while most natural vegetation communities are represented in at least one nature reserve. There is no known comprehensive analyses which has assessed biodiversity and ecosystem services in nature reserves, nor is there available documentation on how Key Biodiversity Areas (KBAs) juxtapose with the nature reserves. This is an important gap, given the need to align biodiversity targets and ecosystem services. Annex E provides information on status of identified species in YRB.

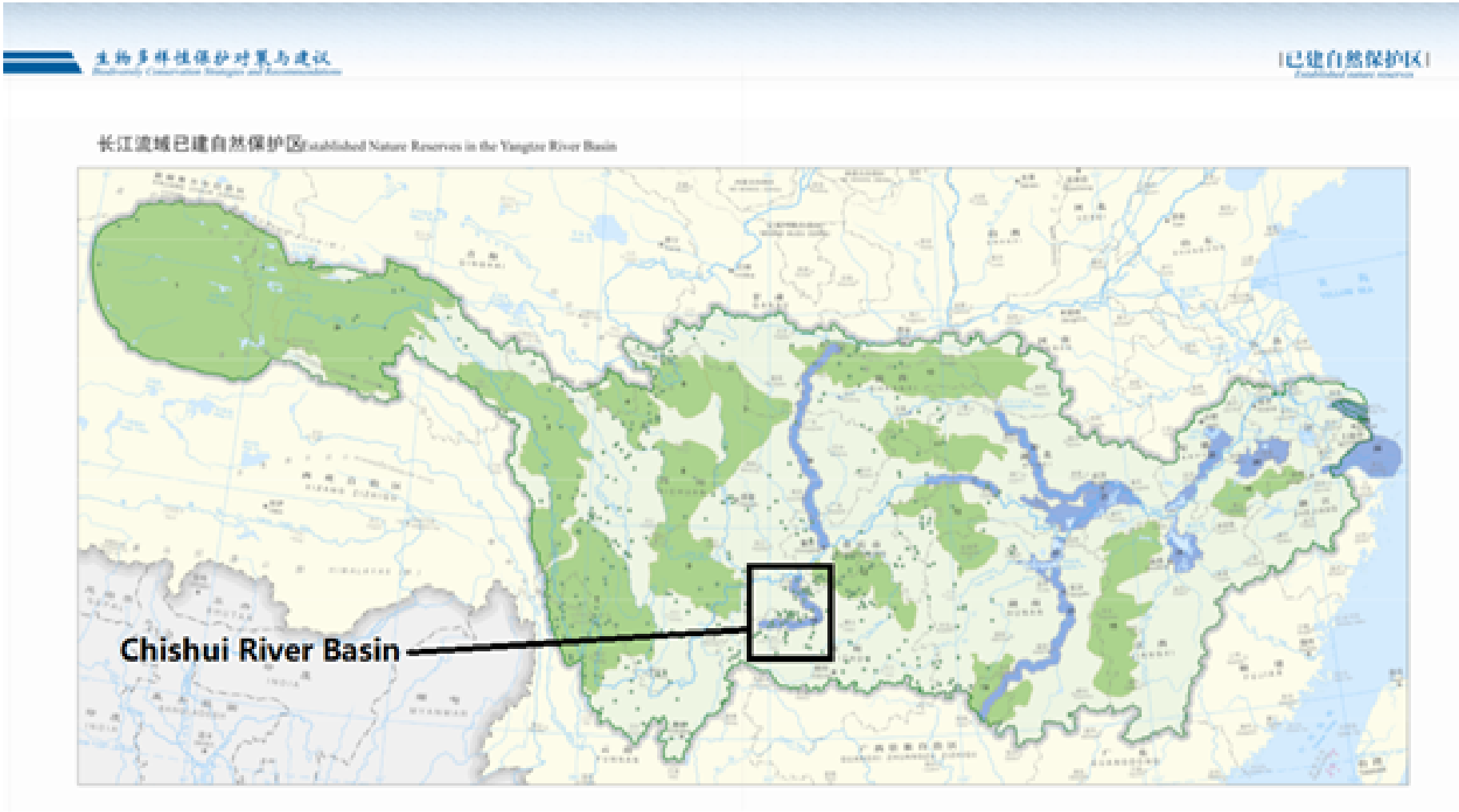

Figure 1: Map of Nature Reserves in Yangtze River Basin.

Figure 1 above illustrates nature reserves in the YRB. Each green dot indicates one nature reserve. All green coloured areas are priority for terrestrial biodiversity conservation, whereas the purple colored areas are priority for freshwater biodiversity conservation. Chishui River is one of the freshwater biodiversity conservation priority areas indicated in the quadrangle (Source: Chinese Academy of Sciences and WWF-China).Nature reserves within Yangtze River Basin are mostly located within the high priority areas of both terrestrial ecosystem and freshwater ecosystems (Figure 1, from Chinese Academy of Sciences and WWF China).

Freshwater fish

Chinese freshwater fish numbers are over 1000 species, and at least 717 species in 33 families inhabit rivers, and another 66 species spend part of their lives in rivers, while others are mainly confined to estuarine reaches but occasionally migrate to upstream. Information on freshwater fish biodiversity in the Yangtze River basin was synthesized. Over 370 species were found in the basin, of which 177 species are endemic to the Yangtze River and 25 species are categorized as endangered on the China Red Data Book for fishes. Around 80% of the species (including 124 endemics) in the Yangtze River occur in its upper course above the Three Gorges Dam.

Chishui River is one of the tributaries of Yangtze River, with the total area of 20,440 square kilometers, which is about 1.1% of the whole Yangtze River Basin. Total population of the Chishui River basin is around 6 million, which accounts for 1.5% of Yangtze River Basin, indicating the human development pressure on land is higher than the average for the Yangtze River.

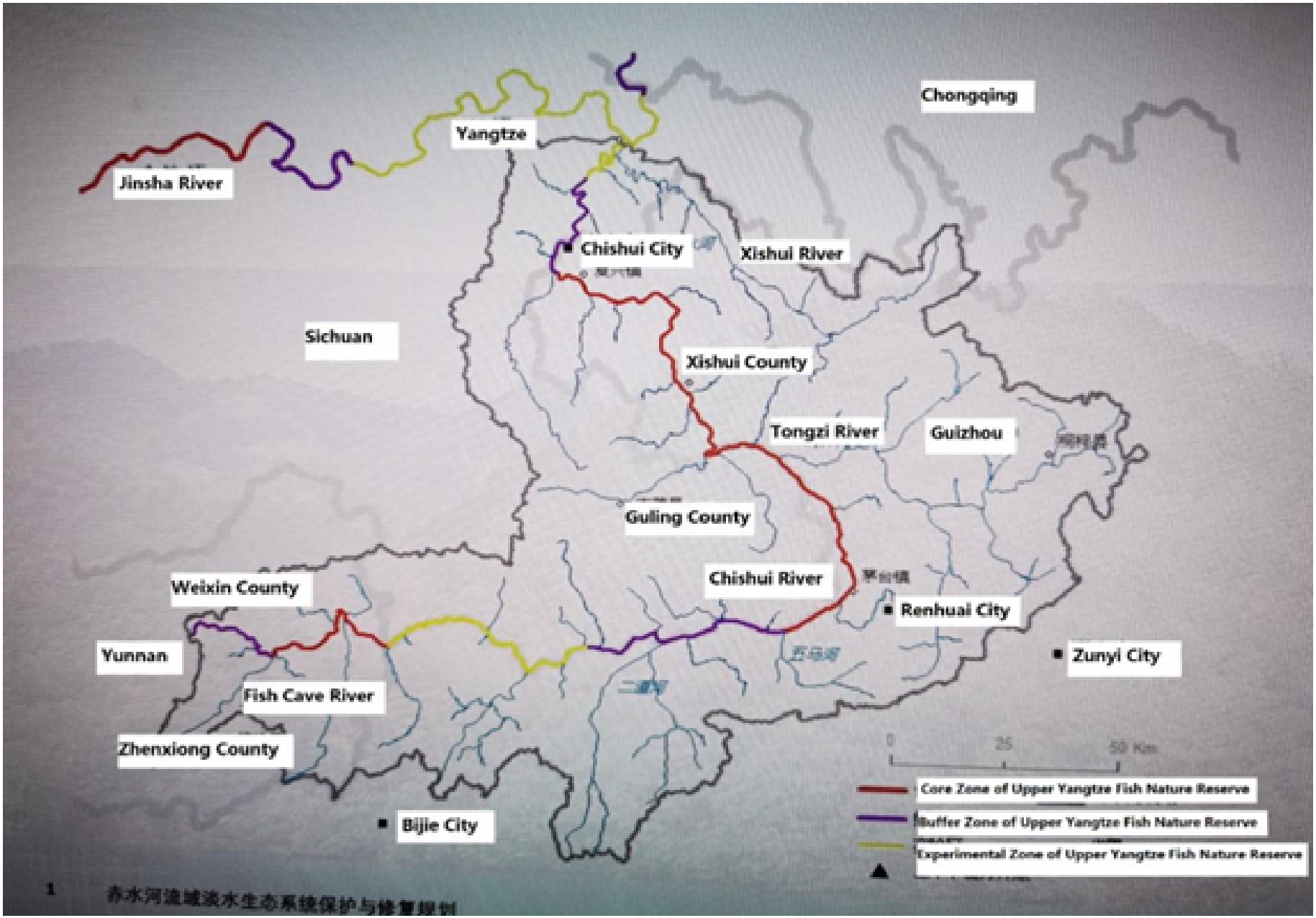

Figure 2: Map of Chishui River Basin, which features the Rare and Endangered Fish Nature Reserve. The nature reserve only covers the maintain river course, but all tributaries are not included.

Due to its unique geographical location, with sub-tropic monsoon climate, biodiversity of this region is extremely high despite severe human disturbance of land. The tributary recorded 112 species, among which 28 species are endemic to upstream Yangtze River, which accounts for 30% of the whole Yangtze river fish species (370), and 27.2% of the endemic species (103 endemic species). Three fish species are on the IUCN Redlisted threatened species, including 2 critically endangered and one vulnerable species (**Annex E-1**). Thirty-nine (39) species of plant species under national protection, among which 16 species are listed as IUCN Redlisted threatened species, including 6 endangered, 10 species of vulnerable species (**Annex E-2**). Thirty-five (35) species of animals (excluding fishes) under national protection, among which 9 species are on the IUCN Redlisted, including 2 species of critically endangered, 3 species of endangered, and 4 species of vulnerable (**Annex E-3**).

Chishui River ecosystem is special in PRC, due to the integrity of the river ecosystem which has not been affected by dams in the main river channel. Many of the endemic fish species that distributed in upstream YRB have been fragmented by dams, therefore, the only remaining free-flowing river plays a crucial role for the survival of these species. The PRC Government has declared Chishui River as a key area for the conservation of endemic and endangered fishes in upstream of Yangtze River. Another key feature of the river is its terrestrial ecosystems. As most of the local communities are depending on agriculture, land conversion and unstainable practices are major drivers of degradation of much of the natural forests. Soil erosion has been severe and contributes to high sand content in the freshwater ecosystem - the name “Chishui” means “red water”. Most of the natural forests are distributed along the river valley, whereas the plateau areas are combination of hills and agriculture landscapes, with forest coverage rate in upstream ranged from 15% to 30%, compared to 40% to 70% in middle reaches and lower reaches of Chishui River.

Threats to biodiversity in Chishui River basin include land conversion to agriculture, upstream agriculture pollution, mining, destruction of vegetation, and expanding tourism development. There are a number of challenges. Existing PAs are over-lapping (technical boundaries) with limited understanding or communications between and among local stakeholders, lack of technical and financial capacity to manage PAs effectively, subject to political issues among the three provincial governments, experience major gaps in species coverage and representativeness, characterized by fragmentation and degradation of ecosystem functions. Moreover, a ten year fishing ban in the Yangtze River will drive fishers to lose their livelihood, particularly within the upstream Yangzte River Rare and Endemic Fish National Nature Reserve.

The combined effects of pollution, habitat degradation, and overexploitation have reduced fish stocks dramatically. Hydrological alterations are perhaps the largest threat to fish biodiversity in the Yangtze River Basin, such as dam construction and disconnection between the river and its lakes. Conservation measures which were applied to protect the fish biodiversity in the basin. such as nature reserve establishment, artificial propagation, and releasing. While beneficial, these efforts have had their over impact limited by lack of interconnectivity across ecosystems. Therefore, in order to preserve fish biodiversity more effectively in this area, reserve networks, rather than disconnected, single national nature reserves, should be established.[7]

Wetlands

Around 600 Wetland Nature Reserves and 900 National Wetland Parks have been established in PRC covering 28 million ha. However, despite efforts to conserve and protect these areas, the annual loss rate of wetland ecosystems is about 1% - between 2003 and 2013, almost 4 million ha were lost. This is due to, among others, climate change, point and non-point sources of pollution, unsustainable exploitation of resources (e.g. fisheries etc), and land reclamation / expansion. Among these wetlands, 64 sites are designated as Wetlands of International Importance (Ramsar Sites), with a surface area of 7,344,600 hectares. Within the Yangtze River Basin ecological zone, there are 13 Ramsar wetland sites, covering 1,257,950 ha.

The extensive wetlands of the central, lower and estuary Yangtze are critical to the functioning of the whole Yangtze ecosystem, which in turn provides essential services to the hundreds of millions of people that live within the basin (e.g. regulation of water quality, fish production, flood control). These same wetlands also support a high concentration of rare and endemic species, including Chinese or Yangtze alligator (*Alligator sinensis* – assessed in the IUCN Red List of Threatened Species as Critically Endangered) and Yangtze finless porpoise (*Neophocaena asiaorientalis* subsp. *asiaorientalis* – also Critically Endangered), and provide the wintering grounds for over one million waterbirds of more than 100 species.[8]

Eco-Compensation Policy and Practice

Eco-compensation is similar to “payments for ecosystem services” (PES) models applied in other parts of the world, but has wider application. It can include: i) “direct payments by government to individuals and communities to ensure the protection and provision of ecosystem services, ii) programs that compensate households, communities, or regional governments for regulatory takings associated with environmental policy (such as a result of declaring protected areas or restricted development zones for conservation), iii) programs and policies that create horizontal frameworks of cooperation and financial transfers (e.g., frameworks for river management with agreed-upon systems of rewards and penalties for water quality) between different regional or administrative levels of government to provide incentives for ecosystem service provision and maintenance by clarifying and better apportioning responsibilities, rights, and costs, iv) regulatory reforms that adjust or introduce fees, levies, taxes, tax breaks or subsidies on resource use to raise funding for or to encourage conservation, environmental management, and/or restoration, v) increases in upper- to lower-level government financial transfers to better fund environmental management, especially of key ecological function zones; and vi) increases in compensation from the central government to less developed western regions for past and current extractive and environmentally damaging resource uses as part of the country’s economic development”.[9]

Improving the effectiveness of eco-compensation schemes in key designated ecological function zones became a priority of the People’s Republic of China in 2013, and the government has since made substantial investments to improve the ecosystem services of these zones using eco-compensation. Overall, government funding for eco-compensation in China increased from only 6.0 billion yuan in 2008 to 81 billion yuan in 2019. However, despite these large investments, which are transferred to local governments, no monitoring system has been established to assess the extent to which degraded ecosystems have been restored, largely owing to a lack of tools and approaches for conducting systematic monitoring and assessment. Another major issue is that there are no incentives for local governments to prioritize the effective implementation of eco-compensation programs. This is discussed further in Outcome 1 of the Alternative Scenario.

Baseline scenario

The PRC Government is implementing the “Ecological Environmental Protection Plan for Yangtze River Economic Belt”. The plan recognizes: i) the importance of the river, which provides about 995.8 billion m^3, or 35% of the total water resources in the country, ii) the importance of ecosystem functions of the Yangtze River Basin, which includes the Jinsha and Min Rivers upstream, the Danjiangkou Reservoir, the Jialing River, Wuling Mountain, Xin’an River, Xiang River, Zi River and Yhan River; the Wu and Chisui Rivers in the upper and middle reaches and other tributaries, and iii) the urgency to address the complex, manifold challenges related to environmental degradation of the YREB.

Guiding principles, objectives and targets are articulate in the Plan, primarily aimed at water use, restoration and conservation of ecosystems, management of water quality, addressing urban and rural air quality issues, and controlling environmental risks. Regional priorities are defined for Chongqing, Sichuan, Guizhous, Yunnan and others. Among others, the Plan places emphasis on: i) strengthening biodiversity management, particularly in protected areas, as well as key aquatic habitats (ie fisheries), ii) removal, monitoring and control of invasive alien species (IAS), iii) addressing chemical pollution in the river and associated lakes, with strict regulatory controls, iv) remediation and control of heavy metal contaminants in soils, v) increased focus on rural agriculture and related waste management infrastructure, vi) improved environmental risk assessment and response mechanisms, vii) integrated planning approaches, viii) comprehensive environmental monitoring at upper, middle and lower basin, ix) capacity development and stronger law enforcement, and x) establishment of a range of financing instruments such as environmental protection funds, conservation funds, public-private partnerships and compensation mechanisms.[10]

In the 13th Five Year Plan, PRC will spend up to USD 41 billion on river rehabilitation and USD 82.5 billion on waste water treatment (urban and municipal). The latter constitutes 0.75 percent of its GDP on its water treatment industry. This national level spending accounts for 0-30 percent of the total financing supply in this sector. In addition to national financing, China’s water treatment industry receives funding from the provincial/local governments, domestic banks and the private sector. Over the ten years, fiscal spending into the wastewater treatment industry has been primarily directed into municipal wastewater treatment projects or centralized wastewater treatment facilities located within industrial parks. Industrial/commercial in-factory or onsite wastewater treatment

facilities are typically built using private funding. With the growing shift towards environmental protection, demand for wastewater treatment facilities has increased across all sectors. The demand amongst industrial users has also been strong due to the more stringent environmental regulations and enforcement. Polluters have been shut down and smaller sized factories which could not afford to install wastewater treatment equipment might increasingly be forced into industrial parks with centralized pollution control facilities.[11]

PRC Government officially launched its National Green Development Fund in 2020 and has already raised 88 billion yuan ($12.59 billion) in its first phase, amid efforts to improve the economic policy system for ecological and environmental protection, with focus on green development of Yangtze River Economic Belt. Key areas include environmental protection and pollution prevention, ecological restoration and landscape engineering, energy conservation, green transportation and clean energy, etc.

The PRC Government and the Asian Development Bank (ADB) have adopted a "Yangtze River Economic Belt Framework Approach", where ADB would commit about USD 2.0 billion of funding during 2018–2020. The YREB is a distinctive and significant new way of approaching river basin management in a strategic way for China and a model for the rest of the world. The YREB program combines not only environmental considerations, but also includes social and economic factors in the overall planning and management of the river basin. The aim of the Framework Approach is to strategically program ADB's lending support for development initiatives in the YREB with priority given to the following four areas: (i) ecosystem restoration, environmental protection, and water resources management; (ii) green and inclusive industrial transformation; (iii) construction of an integrated multimodal transport corridor; and (iv) institutional strengthening and policy reform.

Relevant ADB loan projects

Anhui Huangshan Xin'an River Ecological Protection and Green Development Project (USD 100 million)

The Xin'an River is the main source of drinking water for the 10 million residents living in the urban and rural areas surrounding Qiandao Lake and Hangzhou. Xin'an River was the first demonstration case to pilot the innovative trans-provincial ecological compensation (eco-compensation) mechanism for protecting ecosystem in the PRC.

At the outcome level, the project aims to improve environmental conditions in the upstream Xin'an River, in particular; i) increasing the number of households with access to new or improved sewage services, ii) increased farmer adoption of organic farming, iii) green fund and eco-compensation fund established / invested, and iv) improved water quality (to phosphorous index standard). At the output level, the project will have: i) urban and rural point source pollution management installed, including decentralized, high technology sewage treatment facilities, ii) non-point source pollution control enhanced, with emphasis on organic fertilizer, low toxicity botanical pesticides, recycling of agricultural wastes etc, iii) green finance mechanism piloted, which would consist of a special green fund and an enhanced eco-compensation scheme to incentivize business and non-government economic participation, and iv) capacity for water environmental monitoring and regulation, flood forecasting and management enhanced, in line with the objectives of the river chief system.

Yangtze River Green Ecological Corridor Comprehensive Agriculture Development (USD 300 million):

The "Green Ecological Corridor" is an integrated management approach that aims to unite management and development priorities within the YRB. The project seeks to achieve: i) 115,000 ha of farmland with improved practice, ii) reduce chemical pesticide use by 17% (2018 baseline: 383.9 tons/year), iii) reduce chemical fertilizer use by 15% (2018 baseline: 41,499 tons/year).

Main outputs include: i) Modernization of farming infrastructure, including construction of irrigation, draining and water conservation systems, as well as climate-resilient crop and land management practices established on 13,711 ha (2018 baseline: 0 ha), ii) Strengthened waste management systems, including 600 m^3 farming waste collection facilities commissioned, at least 21,400 m^3 for animal and 20,308 m^3 for household waste treatment facilities

commissioned, at least 31 sets of watershed pollution monitoring equipment commissioned, at least 25,193 sets of integrated pest management materials and equipment commissioned, at least 11,000 ha of land reforested for ecological protection, at least 20,400 ha of economic trees planted, and 2,750 ha replanted, at least 950 km of riverbank, lakeside, dyke, and farm roadside protection and upgrades completed; and iii) capacity development and training on sound environmental and waste management techniques and approaches.

Chongqing Longxi River Environment Comprehensive Treatment and Ecological Protection Demonstration (USD 150 million):

The project will mitigate flood and environmental risks in the Longxi River watershed. Two key outputs (of four) will be: i) Wastewater management and pollution control infrastructure developed, including a wastewater management system, wastewater collection network, water pollution control measures, constructing a bio-shield (greenbelts) along the riverbanks to tap leached sediment and nutrients from farmlands, and installing solid waste collection bins along the riverbanks; and ii) Ecological conservation facilities improved, to include wetland conservation / restoration, landscaping, greening, and gardening along the river and lakes corridors, soil and water conservation, including riverbank protection and erosion control.

Sichuan Ziyang Inclusive Green Development Project (USD 200 million ongoing)

The project is aligned with the following impact: sustainable economic growth and environmental improvement in the YREB achieved, and aims to have the following outcome: economic and environmental conditions in Ziyang and the Sichuan Ziyang High Technology Development Zone (SZHTDZ) improved. It will support: i) Construction of ecological systems and environmental infrastructure. This includes building “eco-dike” or flood control embankment, a "sponge city" interventions to capture stormwater, developing and protecting a 25.7 ha wetland area, closing a landfill and transforming the land into 38.6 ha of green park, and creating a green wedge on 123 ha of undeveloped hills and gullies as a natural barrier, and preserving the ecology of eight bare hills that are at risk of erosion; ii) Broadening of facilities and programs to support the service industry. This includes establishing an R&D center for light industries, center for inspecting and testing equipment and materials; and Sichuan Ziyang township and village enterprise training center; and iii) Enhancing urban development planning and management capacity. It includes installing a computerized urban development planning and management component (intelligent park platform —a SMART information system—that provides modular, web-based, interactive, and decision-making support etc); and related governance systems for green development.

Chishui Watershed Protection (USD 200 million under development):

ADB loan will support both infrastructure investment and non-structural interventions for ecological protection and eco-compensation. It will give priority to support implementation and enhancement of the newly established trans-provincial eco-compensation scheme for Chishui River, and will attach priority to support of the efforts by the national pilot counties in developing innovative yet comprehensive eco-compensation schemes to promote ecological protection and ecologically friendly growth. Each province needs to select subprojects or project components from city, district or county located in Chishui River watershed. In general, ADB loan will consider priority to support infrastructure investment and non-structural interventions in the following areas: i) Strengthening trans-provincial ecological and environmental monitoring, information sharing for ecological and environmental management, trans-provincial coordination for planning and management;ii) Strengthening control and management of point source pollution in urban areas of Chishui River watershed; iii) Strengthening control and management of agriculture-based non-point source pollution in Chishui River watershed; iv) Strengthening rural sanitation infrastructure and service and improving and rehabilitating rural villages in Chishui River watershed; v) Rehabilitating and restoring ecosystem of Chishui River watershed; vi) Improving the watershed’s resilience and ability to deal with climate change and ecological risks; vii) Supporting the efforts to develop innovative eco-compensation schemes (including setting up financial incentive schemes or green investment funds) to engage farmers, farmer cooperatives, agriculture-oriented enterprises to promote ecological agriculture, modernized agriculture, and production supporting system for agricultural development; viii) Supporting the efforts to establish green investment funds, incentive schemes and/or other innovative financing mechanisms to engage SMEs, farmer

cooperatives and farmers to participate in ecological and environmental management and to promote eco-tourism and other ecologically friendly business, and ix) Support to conduct studies on major development challenges in any of the subject areas listed above and providing support for institutional strengthening and capacity development.

Yunnan Sayu River Basin Eco-Compensation Demonstration (USD 100 million):

Will focus on ecosystem restoration, environmental protection, and management of water resources in Sayu River basin. The project will have four outputs: i) Rural waste in the Sayu River Basin managed, including installation of wastewater pipes and small wastewater treatment facilities, four garbage pyrolysis plants with residue treatment facilities, garbage transfer stations with collection vehicles, public toilets, septic tanks for animal feces and aquaculture wastewater, ii) Soil erosion in the Sayu River Basin reduced, including 450 hectares (ha) of afforestation, soil erosion control works, 100 ha wetlands construction, iii) Agriculture-related nonpoint source pollution reduced, including high value environment-friendly and climate-smart agriculture in highland areas (about 1,300 ha), control of fertilizer release (about 200 ha), and iv) Financing mechanisms for, and capacities and public awareness on water pollution reduction strengthened, including improvement and expansion of the existing eco-compensation mechanism in the Sayu River Basin.

GEF Support for Chemicals and Wastes in PRC

GEF has supported a number of initiatives to address issues concerning chemicals and wastes in the country. These include (among others): i) "UPOPs Reduction through BAT/BEP and PPP-based Industry Chain Management in Secondary Copper Production Sector in China", ii) "Environmentally sound management and disposal of obsolete POPs pesticides and other POPs wastes in China" (GEF ID 2926), iii) "China's Compliance with Stockholm Convention" (GEF ID 5624), iv) "Improvement of DDT-based Production of Dicofol and Introduction of Alternative Technologies including IPM for Leaf Mites Control in China" (GEF ID 2629), v) "Reduction of POPs and PTS release by environmentally sound management throughout the life cycle of electrical and electronic equipment and associated wastes in China" (GEF ID 4862), vi) "Phase out of Endosulfan in China" (GEF ID 6054).

Some of these are completed and some under implementation. These projects have made good advances, for example updating the National Implementation Plan, treatment and disposal of pesticide POP stockpiles, location and crop specific chemical reduction initiatives, and support to the country to enable introduction of the new POPs covered by Stockholm Convention. PRC has taken great strides in the banning of lidane, endosulphan and DDT. However much more remains to be done. There is a need to: i) address direct reductions / elimination of unintential POPs which have more recently been added to the Stockholm Convention, ii) expand coverage of sound chemicals management approaches to underserved parts of the country, ii) strengthen capacity of provincial and sub-provincial governments in upper and mid YRB to address challenges in environmental risks associated with chemicals use , iii) adopt approaches to chemicals management which include local stakeholders such as farmers, agricultural cooperatives and extension workers, community organizations etc, iv) explore key supply chain issues related to manufacture, distribution, use, storage and disposal of pesticide POPs, and in particular, strengthen monitoring and law enforcement to curb illegal activities, v) review and update understanding with respect to new POPs (and those previously unknown), vi) apply principles of sound chemicals management to plastics, particularly plastic films which are used extensively for production and packaging in the agro-industrial sector, vii) gain deeper understanding of ecotoxicology issues related to pesticide POPs as well as food safety and health implications, vii) systematically advance use of alternative, environmentally sustainable approaches, including circular economy and "green chemistry" and iv) design and test, innovative performance based financing instruments, such as eco-compensation which apply to chemicals and plastics use, to advance long term solutions.

Prior GEF Support in Chishui Watershed

Links to GEF ID 5096 “Payment for Watershed Services in the Chishui River Basin for the Conservation of Globally Significant Biodiversity”: The referenced project implemented by UNDP has recently been technically and financially closed. The project was limited to Guizhou province, and had been focused on the water provision services of ecosystem through development of an eco-compensation scheme between upstream farmers and water users (industries) which was only piloted in one village along one tributary of the Chishui River in Guizhou, i.e. Wuma River. While the project achieved modest success, despite a number of challenges, it did not really link an eco-compensation scheme with biodiversity, and did not take an integrated ecosystems management approach (“whole of the ecosystem”). Progress was focussed on water provision service to the Maotai, PRC’s famous spirits factory, in establishing green eco-fund that supports the farmers’ association for organic farming. The project was in line with the objective of water quality control, and progress in biodiversity conservation was limited as this was not the primary focus.[12] The GEF Terminal Evaluation Review (TER)[13] suggests to establish a river basin eco-compensation fund that involves more stakeholders for the river basin management. This, as well as other recommendations, will serve as a good basis for the current ADB/GEF initiative. Annex F provides a summary table of how the current GEF project will provide value addition to the work supported through UNDP under GEF-5.

Alternative scenario

The desired “end state” for this proposed work is to achieve an ecologically healthy YRB where ecosystems are managed sustainably and able to support prosperity for populations which depend on its resources – by 2040. The GEF project will aim to advance two demonstration eco-compensation models that focus on protection and restoration of biodiversity and ecosystems services, and sound management of plastic wastes, notably agricultural field plastic films. The eco-compensation models will aim to internalize the notion of Gross Ecosystem Product (GEP) as a measurement and accounting tool and through this, examine the opportunities to apply financing mechanisms for better management of biodiversity and ecosystems services and ‘cleaner - greener’ agriculture in key areas - to support long term, sustainable solutions to drivers of environmental degradation in YRB.

As a microcosm of the growth challenges in the PRC, the YRB presents a valuable test bed for designing and piloting new instruments and approaches for sustainable financing and protection of natural capital assets, married with appropriate platforms to capture knowledge for scaling-up and deployment and mainstreaming across traditional land use management and planning systems for green and inclusive development. A virtual platform (depicted in Figure 9 under Outcome 4) is being created, and will be launched during the CBD COP 15. Key among this constellation of partners is the China Ecological Compensation Policy Research Center (CECPRC), a research institution created in 2013. which will provide advice and guidance on policy tools related to eco-compensation, which aim to strengthen / establish equitable and effective socio-economic links between ecosystem service providers and beneficiaries. This would promote coordinated development between the ecological environment and the social economy, as well as between different regions and different communities.

Proposed Project Areas

The proposed GEF project would cover five provinces: Guizhou, Sichuan, Yunnan, Hubei, Hunan and the municipality of Chongqing.[14]

Project objective, outcomes and outputs

With this in mind, the proposed GEF project objective will be:

To promote innovative eco-compensation mechanisms which contribute to improved and sustainable terrestrial and freshwater ecosystem health in the upper and mid-Yangtze River Basin

An initial, light, Theory of Change (TOC) has been presented below (Figure 3) which articulates a project objective to be achieved by 2030. Various versions of the TOC have been reviewed and discussed with government stakeholders and specialists (see Annex H on Stakeholders Consulted). Due to restrictions related to Covid-19, it was not possible to have direct consultations with local communities and private companies. The TOC is an interative process and will continue to be refined through project preparation.

The Alternative Scenario presented below, presents a suite of actions which would give rise to: a) a more systematic and innovative approach to long term financing for natural capital management, b) new ways to monitor and measure performance with respect to strengthening ecosystems services, c) design and implementation of two eco-compensation mechanisms which will generate significant GEBs, and hold promise for replication and scale, and d) launching of a novel virtual platform – the natural capital lab – which will disseminate knowledge, incubate ideas, accelerate good practice models, and sustain 'green' financing.

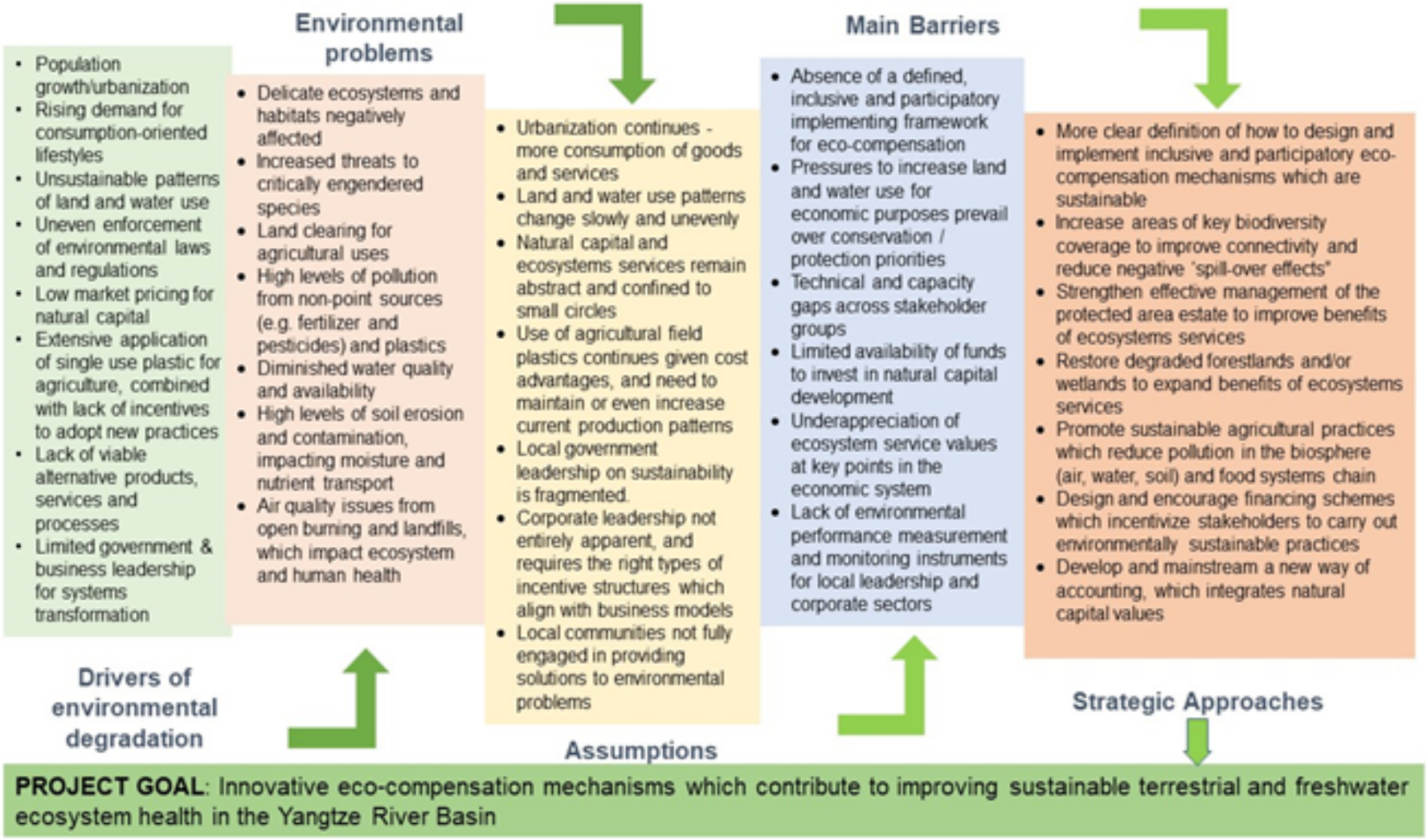

Figure 3 Theory of Change

The project will be structured around 4 interlinked component outcomes (See Figure 4a) based on the logic presented in the Theory of Change above:

Outcome 1: Eco-compensation implementation framework for healthy ecosystems in YRB refined.

Outcome 2: Biodiversity and ecosystems services in Chishui River Basin enhanced and supported by eco-compensation mechanism

Outcome 3: Agricultural field plastic pollution reduced in project areas of YRB reduced and supported by eco-compensation mechanism

Outcome 4: Sustainable financing and knowledge management for eco-compensation mechanisms supported by natural capital laboratory in YRB

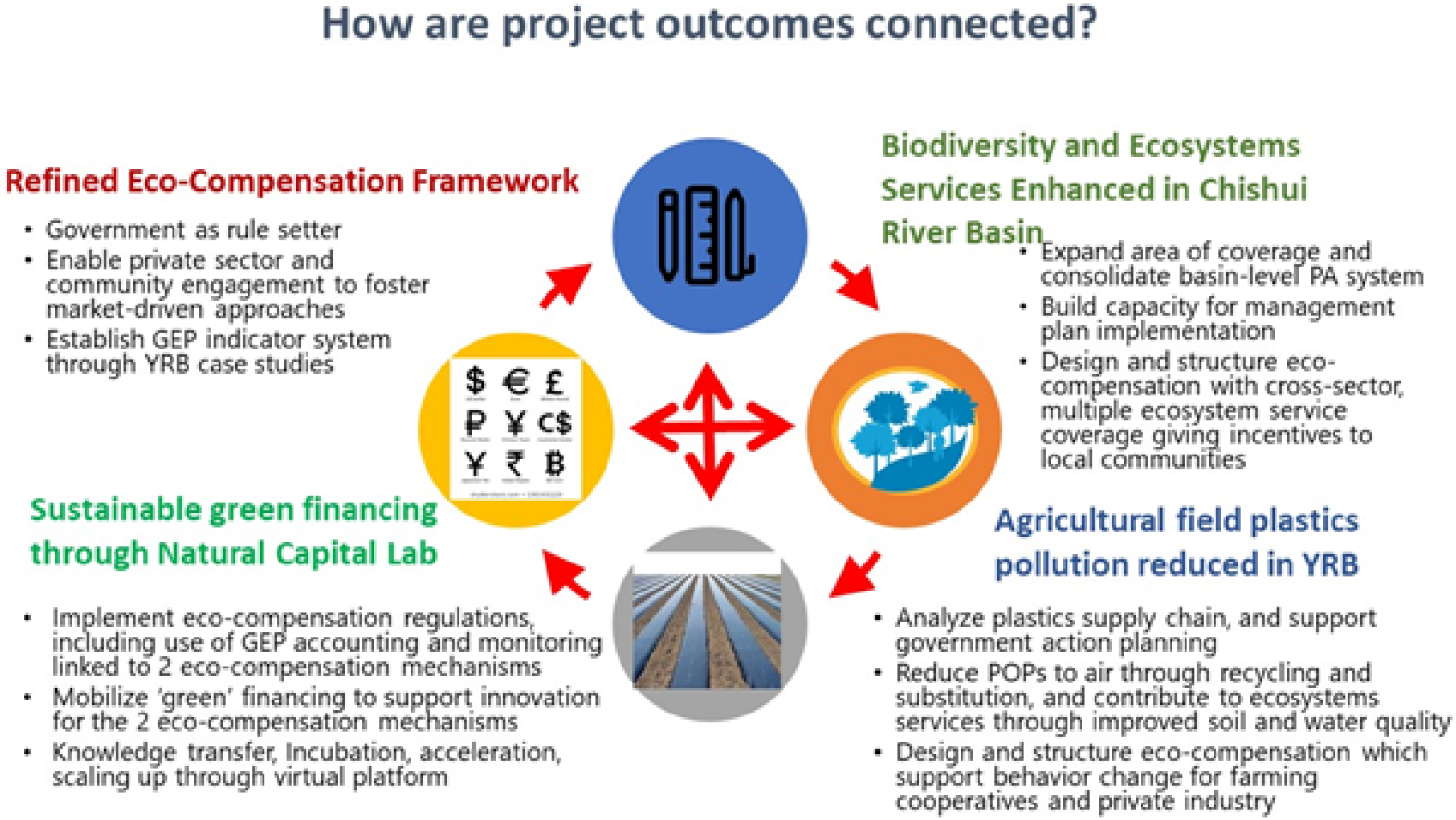

Figure 4a: Illustration of how project outcomes are linked

Outcome 1: Eco-compensation implementation framework for healthy ecosystems in YRB refined

[This outcome will be led by the NDRC, in collaboration with other key Ministries]

Work under this outcome will refine the implementing framework for "eco-compensation in PRC, and in particular inject some new elements into the design, structure and implementation of programs in the YRB. These include, among others: i) strengthening local government, community and private sector participation, ii) diversifying sources and modalities of finance, and iii) introducing Gross Ecosystem Product (GEP) as a way to monitor environmental performance.

"Eco-compensation", is a term specific to the PRC context covering a range of potential policy directions and approaches to integrated ecosystem management with the aim of "improving outcomes by taking into account the costs and benefits of environmental goods and services in economic activities." In 2007, then PRC identified four targets for eco-compensation pilots: nature reserves, key ecological function zones, mineral development areas, and watersheds. The principles of "the developer protects, the damager rehabilitates, the beneficiary compensates, and the polluter pays" – applied. Following this, the National Development and Reform Commission in 2016, developed a more robust regulatory framework, which referred to "eco-compensation" to include: i) rewards for protecting ecosystems and natural resources, ii) compensation for environmental damage, and iii) fees charged to those who pollute the environment.[15]

Eco-compensation principles have been embodied in some legislation, including the the Forest Law, the Law on the Prevention and Control of Water Pollution, and the Water and Soil Conservation Law - and now the Environmental Protection Law. Central government ministries have supported eco-compensation pilot projects since 2000, mainly in grasslands, forests, and watersheds. Some provincial, municipal, autonomous region, city, and county governments have also initiated eco-compensation initiatives, primarily in watersheds, wetlands, marine areas, and mining areas.

A study conducted between 2011 and 2013 recognized the need for consideration of numerous issues when developing eco-compensation regulation; and advanced a number of lessons learned based on experiences with the limited number of pilots. These are reasonably well documented in an ADB publication, in terms of overall lessons as well as lessons for individual ecosystem type. PRC has legally mandated eco-compensation in amendments to the Environmental Protection Law, however efforts to develop the national eco-compensation regulations need to be stepped up.

Recent directives from the PRC Ministry of Finance encourage efforts to strengthen ecological restoration and protection in the Yangtze Economic River Belt. Policy support will aim to: i) increase the "ecological weight of balanced transfer payment distribution", ii) increase the "direct compensation in YREB by transfer payment in key ecological function areas", iii) implement incentive policy for water quality "protection liability mechanism between upstream and downstream provincial governments", iv) support the wide range of integrated ecosystems management approaches for forests, soil, wetland management, v) increase investments in eco-compensation mechanisms, particularly for provincial and sub-provincial government finance departments in transfer measures, vi) customize eco-compensation schemes to correspond to local conditions, with priority given to enhancing biodiversity and ecosystems services for water, soil and forests; as well as special attention to "emissions consuming areas", to include industrial pollution, agricultural NPS pollution, urban sewage, waste disposal, and related water governance systems, vii) improve performance inventive management and "restriction" mechanisms, encouraging intra-departmental cooperation at provincial government level, viii) establish eco-compensation mechanisms between "upper and lower reaches of the basin", and through incentives, encourage provincial and city level cooperation, ix) improve the "fiscal system" for local governments to be able to apply the right types of measures and corresponding rates, and, x) "fully guide the role of the market, through a range of innovative approach pilots, "diversified investment and financing mechanisms" and encouraging wider "social" participation.[16]

Output 1.1: Eco-compensation enabling framework reviewed through multi-stakeholder processes (including private sector)

This output will investigate institutional and regulatory reforms that can help the government to better leverage its pre-existing conservation investments to diversify financing sources to include business / private sector, among others. The GEF project will support the formulation/ revisions of implementing rules and regulations on eco-compensation at national and regional level, Activities will include the drafting of legal documents, consultation workshops, public hearings, field pilot test, and finalization of the regulations, in combination of a series of polices (e.g., policy on third party monitoring, evaluation, public participation etc, etc.) that will support the effective enforcement of the national regulations on eco-compensation. These will create enabling conditions for the work under Components 2 and 3 on eco-compensation mechanisms.

The PRC government faces shortfalls in its ability to finance conservation for the YRB and needs to identify avenues to widen the funding base for conservation finance and eco-compensation systems. The government has signaled its commitment for establishing market-based and diversified eco-compensation mechanisms, envisaging a shift in its role from implementer to policy and rule-setter.[1] Market-based eco-compensation mechanisms would not only relieve the burden of public finance, but also render the existing schemes more efficient and effective. Key approaches under consideration include: (i) customizing compensation schemes based on the ranking and prioritization of pollutants and emissions; (ii) assessing suitable business models for establishing a regional green fund to provide incentive payments for environmental protection programs; and (iii) scaling-up water rights trading schemes based on the portfolio of successful models, such as the South to North water transfer scheme. Lessons from ADB's YREB program, which include selected eco-compensation pilot components, will also be included to improve policy mechanisms and inform next generation market-based innovations and environmental improvement programs

A key feature of this component is encouraging and promoting financial innovations through customized financing arrangements and instruments to attract private sector investments and participation in ecological restoration and environmental initiatives in order to create an enabling environment to accelerate natural capital investment flows. In short, there is plenty of information on what needs to be done, however, more clarity on the mechanics of implementation (the "savoir-faire" or "how to do") is required.

[1] The NDRC, MEE, Ministry of Finance and six other government agencies jointly released the most recent policy paper titled 'Action Plan for Establishing Market-Oriented and Diversified Eco-Compensation Mechanism' in January 2019.

Output 1.2: Gross Ecosystem Product (GEP) indicators developed to appraise eco-compensation performance in YRB

This output will build a foundation by which the notion of Gross Ecosystem Productivity (GEP) can be applied to help provide objective values of ecosystem health, and can be internalized into GEP accounting approaches (as proposed in Output 4.1). The perennial challenge of eco-compensation systems is effectively measuring the impacts on the target ecosystems. In order to create such a system of measurement, there is a need for a robust, reliable and generally agreed set of indicators or parameters by which performance can be tracked and assessed. The proposed GEF project will, in this connection, consider establishment of a "GEP indicator" system, through a combination of scientific case studies and multi-stakeholder consultations.

The purpose will be to establish some baseline indicators, demonstrate the methods for GEP-linked accounting to local governments and other stakeholders, and inform the activities outlined in Outcomes 2 and 3, which deal with creation of enabling conditions and establishment of eco-compensation mechanisms. This will also be linked to Output 4.1, and build on ADB-supported work to continue to develop and refine a suite of performance-based metrics for natural capital accounting and determination of Gross Ecosystem Product (GEP) to encourage innovative approaches to conservation finance.[1]

A number of possible directions for these consultations are under consideration, including: (i) sharpening and/or expanding the suite of existing ecosystem service mapping and valuation approaches; (ii) expanding GEP to include a broader portfolio of indicators (e.g social indicators); (iii) improving the design of valuation methods to balance scientific rigor with practical feasibility, especially for local governments that face capacity gaps; (iv) scenario-building as a tool to better mainstream conservation programs in economic planning processes; and (v) building measures of scientific and economic risk and uncertainty into current metrics.

[1] It is likely that GEP and GDP will continue to be parallel systems, as full integration is a long term challenge.

What is Gross Ecosystem Product (GEP)?

Similar to Gross Domestic Product (GDP), Gross Ecosystem Product (GEP) is a measure of the aggregate monetary value of ecosystem-related goods and services (hereafter "ecosystem services") in a given region in an accounting period." GDP is a globally accepted measure due to its simplicity and expression in single monetary terms, which is understood by decision makers. Although economies are very complex, with hundreds of thousands of goods and services, GDP uses market prices and proxies for market prices to calculate the accounting value of goods and services into a measure of aggregate income. In this same way, as elaborated in a ground-breaking study supported by IUCN, ecosystems are also complex and contribute to human well-being in a wide range of dimensions. GEP can also use market prices and proxies for market prices to determine the accounting value of ecosystem services and aggregate them into a measure of the contribution of ecosystems to an economy. The allure of the GEP concept is that is uses similar methods for its construction as those which determine GDP.

In cases where market prices for ecosystem services are non-existent, it is possible to utilize a range of nonmarket valuation techniques to generate ecosystem service accounting prices. For example, using measures of avoided cost or replacement cost, when ecosystems filter nutrients, providing clean water to downstream users. The value of this service can be calculated using the (avoided) cost of removing nutrients via water treatment plants. However, these cost-based methods are only applicable under certain conditions, including that the replacement method is the lowest cost alternative and that people would be willing to pay the cost of replacement to provide the service.[1] While GEP is still considered abstract by many outside the science community, some practical applications are discussed further in the context of the natural capital lab, under Outcome 4.

In GEP accounting, direct use value is estimated using the market value of ecosystem products. For example, evaluations of provisioning services mainly use the market price method. Meanwhile, indirect uses are mainly valuated using the surrogate and simulated market methods. For example, evaluations of regulating services mainly use the surrogate market method, and evaluations of cultural services mainly use the surrogate and simulated market methods.[2]

By developing and testing a framework for the use of GEP as a measurement tool this output will illustrate the use of GEP in both measuring existing activities but also in the evaluation of future eco compensation activities. Through effective measurement using GEP, this output will explore opportunities for policy and regulatory reforms, in particular building on the national government's established "eco-compensation" policy framework, to better incentivize local governments to achieve targeted conservation outcomes, as well as to catalyze greater innovation by localities. It will also look at how the government, through existing regulations and new policy innovations, can better catalyze business sector participation in eco-compensation schemes.

GEP will run in parallel with, or mirror GDP, with a view to facilitating a smooth transition from the pre-existing system for evaluating local and provincial government performance to one that incorporates environmental and ecological indicators. The government should thus first focus on establishing an ecological performance-based system based on GEP and natural capital accounting, and then refine this system once it has been put in place. Under this output, the following steps will be supported: i) create a leading group comprised of key national ministries, ii) set up a scientific or technical committee to guide the development and refining of technical norms for GEP estimation, iii) work with the Central Government to consider options to restructure or develop a new department within the National Bureau of Statistics for the purpose of developing and refining GEP and other ecological indicators, iv) convene a series of multi-stakeholder consultations to advance GEP using empirical knowledge.

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[1] Zhiyun Ouyang et al. "Gross Ecosystem Product to Value Nature in Decision-Making", February 2020. www.pnas.org/cgi/doi/10.1073/pnas.1911439117. This is linked to the IUCN work on GEP [1] https://www.iucn.org/asia/countries/china/gross-ecosystem-product-gep%EF%BC%89.

[2] Asian Development Bank (ADB). "Developing Gross Ecosystem Product Accounting for Eco-Compensation". TA 9040-PRC Report. 2017.

Outcome 2: Biodiversity and ecosystems services in Chishui River Basin enhanced and supported by eco-compensation mechanism

[GEF activities under this Component will be aligned mainly with the ADB "Chishui Watershed Protection" loan project, which is still under development, and will be coordinated with NFGA]

In line with the objective of improved terrestrial and freshwater ecosystem health in the Yangtze River Basin, this outcome will focus on strengthening biodiversity and ecosystems services in the Chishui River Basin(CRB). This will be done through a suite of actions which will increase effectiveness of protected area management.. These actions will culminate in the design and structuring of an eco-compensation mechanism to encourage protection and promote sustainable use of biodiversity through 'green' livelihoods and 'nature-positive' approaches. The eco-compensation will build on lessons learned from past experience, and will be integrated along the lines of the "one vertical and multi-horizontal" model suggested by the China Council for International CICED. GEF support would be concentrated on creating the enabling conditions for the eco-compensation mechanism through a number of activities described below. Financing for the actual eco-compensation mechanism will be considered under the proposed ADB "Chishui Water Protection" loan, the National Green Development Fund[1], and a proposed sub-fund elaborated under Output 2.4). These funds – the "one vertical" - will provide key incentives to local governments and communities to be actively engaged in addressing "multi-horizontal" aspects of strengthening ecosystem services associated with key biodiversity areas in CRB.

Relevance to Response to Covid-19 crisis and mitigation of future pandemics[2]

Outcome 2 in particular, has direct relevance as it will make efforts to ensure that protected areas are structurally connected and that "nature-positive" approaches are supported. The implications are that efforts could possibly: i) contribute to reducing likelihood or prevention of further such outbreaks, and ii) present wider opportunities to "build forward better". Central dimensions of resilient 'build forward better" approaches are inclusiveness (focus on people), and long term policy supported by finance aimed at 'green growth'[3]. Green recovery financing of nature-based solutions, driven by eco-compensation mechanisms could hold promise to generate incentives for community livelihoods which hinge on a well managed protected area system

[1] The National Green Development Fund was launched in July 2020 by the Ministry of Finance and 11 provinces/ cities along the YREB – amounting to around CNY 88.5 billion (USD 13 billion). The fund is an important instrument to promote green development and support pollution reduction and industry transformation, with YRB as a priority area

[2] Refer to GEF draft discussion paper on "Project Design and Review Considerations in Response to the COVID-19 Crisis and the Mitigation of Future Pandemics", 27 August 2020.

[3] An ADB publication offers interesting perspectives. Ilan Noy et al. "Build Back Bettter. What is it? What should it be?" ADB Economics Working Paper Series No 600. Mandaluyong: December 2019.

Output 2.1: Comprehensive protected areas system for Chishui River Basin (CRB) expanded by 80,000 ha from baseline

This output will enhance biodiversity and ecosystem services in CRB through consolidation efforts. Two major activity sets proposed, are crucial to achieve this. First, support for the Bureau of Forestry (within NFGA) at provincial and local level to bring these areas from an overlapping management into a single management system, trough: i) mobilization of stakeholders, ii) capacity building for institutional reform, iii) mapping of key biodiversity, iv) community co-management, and v) monitoring / learning systems. Secondly, to support to local governments and local communities for the establishment of additional areas for protection that fill in conservation gaps at the river basin scale.

The Bureau of Forestry, is the responsible government agency for the management of protected areas, and they provided detail information of protected areas consolidation plans. There are 32 protected areas in the Chishui River Basin (reference **Annex D for summary information on PAs),** with the total area over 480,834 ha. Among these, 15 protected areas are located in Zunyi municipality and consist mainly of forest ecosystems, with 14 protected areas located within Luzhou municipality, and three are located in upstream Chishui River in Yunnan Province. Most of the protected areas in the river basin have been focus on forest ecosystems and geological and landscape scenic areas, very few focus on the conservation and management of wildlife habitat. Many of the representative wild animal species, such as Pangolin (*Manis pentadactyla*), global critically endangered species, and forest musk deer (*Moschus berezovskii*), a globally endangered species, as well as Clouded leopard, *Neofelis nebulosi*, a vulnerable cat species, *Cuon alpinus* an endangered Asian wild dog, *Python*

molurus a vulnerable species, as well as two species of monkeys, *Macaca mulatta*, *Macaca thibetana*, depend on large scale natural subtropical forests. Expansion of nature, or near nature forests will help to enlarge protected areas, and minimize "edge effect" for the wildlife species. Several amphibian species, in particular, endangered wattle-necked softshell turtle, *Palea steindachneri*, as well as other aquatic species require primival streams in the forests. Chinese giant salamander*, Andrias davidianus*, critically endangered, is fully depend on undisturbed rivers.

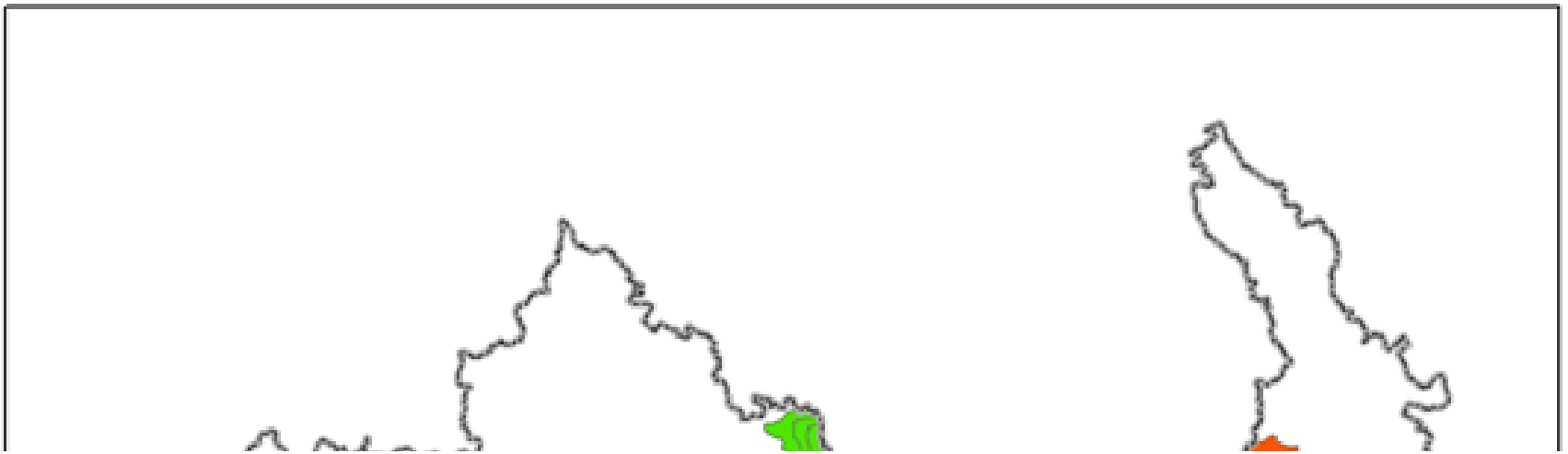
Historically in the CRB, the same ecosystem may be managed by five or six different Ministries or Departments. This has resulted in protected areas boundary overlaps and management policy conflicts among different types of protected areas. To overcome these drawbacks, the Chinese government launched a nation-wide program to consolidate the national protected areas and streamline into one single management system , while ensuring the total conservation areas are maintained. The most updated protected areas consolidation plan in Zunyi and Luzhou municipality indicates that, to effectively maintain the national target, at least additional 80,000 ha of nature forests and wetlands need to be included into the protected areas system. How to add 80,000 ha of new protected areas remains a major challenge for local governments, since most of the land in the region is collectively owned by local communities. Therefore, an innovative eco-compensation scheme is needed, with corresponding need to build capacity for protected areas management. It will be important to provide incentives to local communities if the government plans to declare their land as nature reserves, or any other types of protected areas.

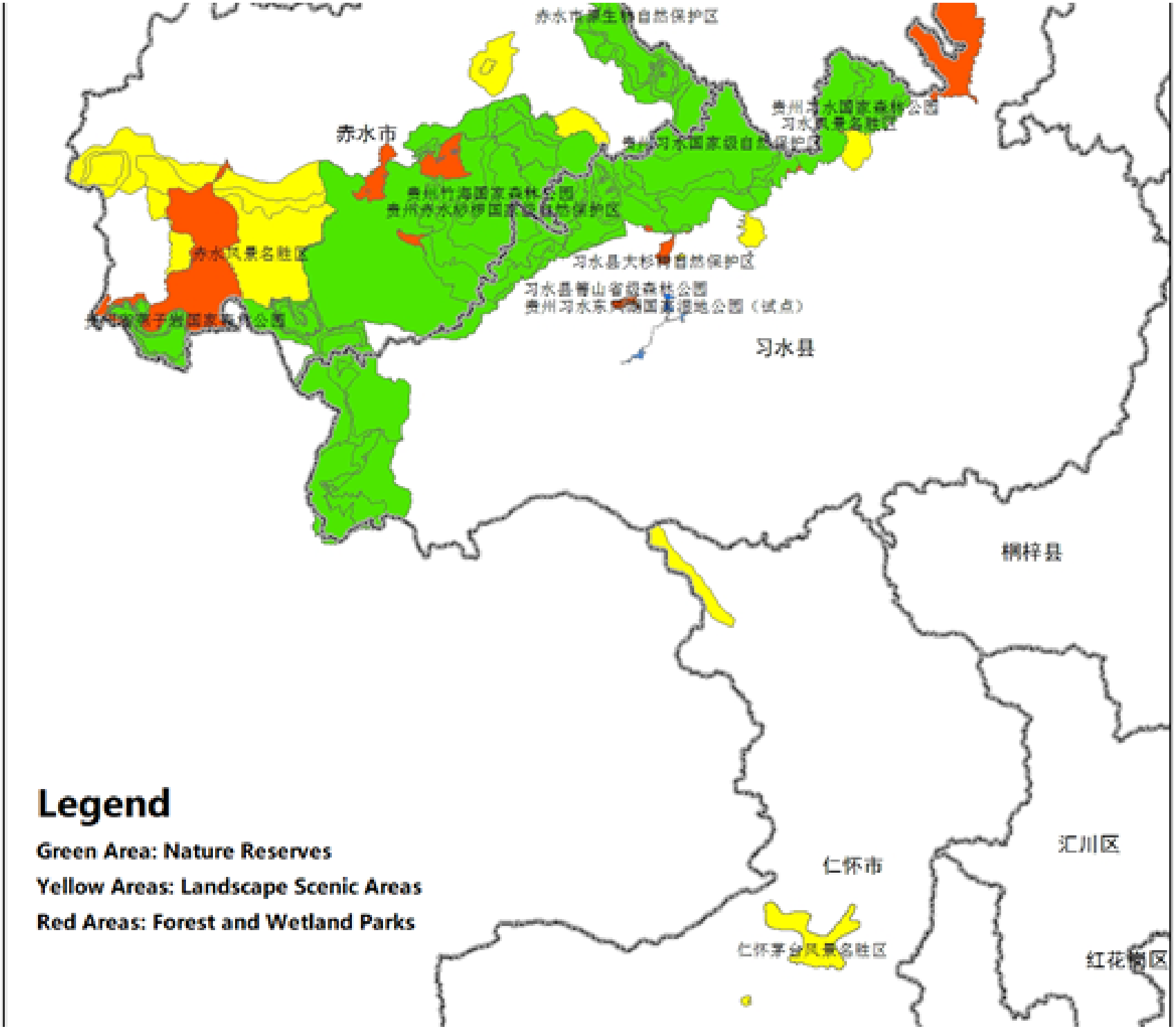
In order to identifiy conservation gaps in the Chishui River basin, the GEF project will support conduct of a comprehensive key biodiversity assessment (KBA) for the entire Chishui River Basin. KBA will be conducted by interdisciplinary team that consists of hydrology, geology, ecological / biodiversity sciences, as well as social science specialists, including gender and safeguards. Most of the existing protected areas are focused on forest ecosystems and the in the main course of the Chishui River, significant spatial and biophysical gaps remain, in particular, the upland peatland marshes, grassland, and tributary of Chishui River, with the river valley (Figure 4a). Figure 4a illustrates the river valley has been very well protected, whereas the upland remains largely unprotected.

On basis of the KBA, combined with the Output 2.3, e.g., consolidation of protected areas management in the Chishui River Basin, local governments within Chishui River Basin will add 80,000 ha of natural forests and wetlands, through: i) expand existing PAs, that covers all key habitat for rare and endemic fishes at tributaries of Chishui River (Figure 4), as well as forests, or ii) establish new PAs with necessary support to development management and patrolling, monitoring facilities.

The project will ensure the effective conservation of ecosystems, promote ecosystem connectivity and habitat for the national protected wildlife species, in particular, for the 26 species of IUCN Redlisted critically endangered, vulnerable species.

Map of Protected Areas in Zunyi Municipality, Guizhou Province




赤水市
赤水风景名胜区
习水县
桐梓县
仁怀市
汇川区
红花岗区
仁怀茅台风景名胜区
Legend
Green Area: Nature Reserves
Yellow Areas: Landscape Scenic Areas
Red Areas: Forest and Wetland Parks

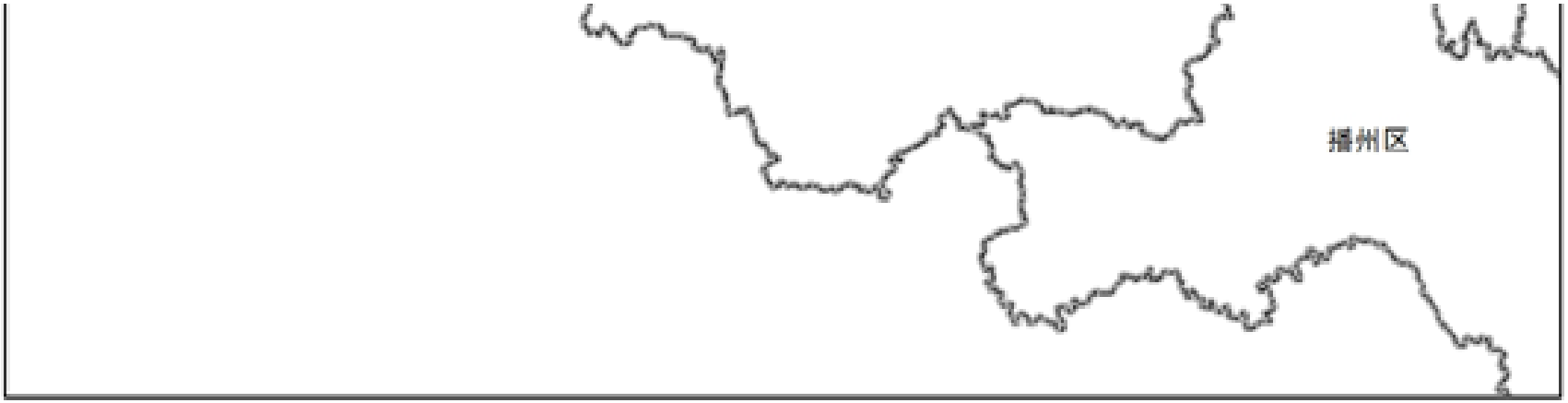


Figure 4b Map of protected areas in Zunyi Municipality, Guizhou Province.

Output 2.2: Ecological corridors created / improved in Chishui River Basin through restoration / rehabilitation of degraded forests, peatland, and riverian wetlands

Output 2.2 will reinforce Output 2.1., and contribute to efforts to ensure better connectivity across ecosystems within the protected areas of CRB. Currently, the landscape within Chishui River has been disturbed by human activities, such as urbanization, reclamation of forests on sloping land for agriculture. As a result, much of the primeaval subtropical forests has been fragmented, and only exists in patches. Initial review and consultations during PIF preparation have identified some areas where rehabilitation / restoration will contribute to establishment of strategic ecological corridors.

Upstream of the river belongs to Yunan-Guizhou Highland, with shrubs and peatland marshes, whereas middle and lower reaches of the Chishui River is featured by high valley and steep slope subtropical forests with high biodiversity. However, both upper stream highland and lower valley subtropical forests are fragemented. With reference to the KBA under Output 2.1, it is anticipated that remnant natural forests have been distributed within agriculture landscapes, and degraded forests and artifical bamboo forests. In these areas it will be essential to restore ecological corridors to allow free movement for Chinese Pangolin (*Manis pentadactyla*), global critically endangered species, and forest musk deer (*Moschus berezovskii*), a globally endangered species, as well as Clouded leopard, *Neofelis nebulosi*, a vulnerable cat species. All these threatened species are very sensitive to human disturbance, and depend on large scale natural subtropical forests, and therefore, restore ecological corridors are important to maintain connectivity among patchily distributed natural forests.

Gulin County of Luzhou municipality has identified, provisionally, around 2,000 ha of degraded forests among clusters of nature reserves, forest parks, and scenic areas, which will provide habitat for threatened wildlife, and ecosystem function in water retention, slope stability, flood prevention.

Key agencies to facilitate this work include the Bureaus of Forestry in Luzhou and Zunyi municipalities. Stakeholder consultation workshops indicated there are also plans in Zunyi municipalty as well as in Luzhou municipality to return sloping cultivation land, bamboo forests into nature forests. Detail of areas identified for restoration and the methods by which this will be carried out, will be assessed in the project preparation stage. The key for the restoration of ecological corridors is scientific information on the movement of endangered species (linked to Output 2.1), as well as the agreement with local communities on their land for restoration. It should be noted that Zunyi district is also contiguous with Bijiang district – both in Guizhou province - where some work on agricultural field plastics under Output 3.3 will be conducted, and may give rise to some positive "spillover effects" (see map in **Annex A**).

Output 2.3: Comprehensive management plan for Chishui River Basin protected area system established for all three provinces

Output 2.3 will build on the two other outputs. It will bring together the three provinces and support multi-stakeholder processes to develop an overaching management plan for the single, Chishui River Basin protected areas system, The single management plan will integrate the disparate elements of previous, fragmented plans; and apply a "whole of ecosystem approach" to the existing 480,834 ha conservation areas and thus contribute to the overall project

biodiversity objectives.

In order to ensure effective arrangement for a trans-provincial eco-compensation to support river basin cooperation in managing natural capital assets in Chishui River, the GEF project will work with the protected areas management authorities at national, provincial, municipal and county level to support the following actions:

i. Mainstream biodiversity and natural capital accounting into provincial government operational structures, through specialized policy study, pilots subproject demonstration, and capacity development and training (see iv below)

ii. Develop trans-provincial river basin management plan based on Outputs 2.1 and 2.2, including a river basin institutional coordinating mechanism, which provides governments, protected area management agencies, local communities a platform to develop joint management plans and actions. The coordination mechanism for the river basin is foundamental for the joint biodiversity conservation and development of monitoring, evaluation and eco-compensation mechanism implementation. Such coordination mechanism would require legal support, e.g., legislation that developed and approved by Guizhou, Sichuan and Yunan Provincial legislation body (People's Congress of each province)

iii. Create a consolidated protected area system in Chishui River Basin within a single management framework, with new boundary demarcations, etc covering the entire 480,834 ha of protected areas.

iv. Develop and deliver a capacity building program for Chishui River Basin protected area's management authorities. On basis of Output 2.1, the consolidation and integration of all different types of protected areas into one catchment ecosystem approach also offers opportunity for administrative authorities and protected area site managers for the institutional capacity building and administrative reform, e.g., a trans-provincial, Chishui River conservation committee, with special working groups that can coordinate and implement joint protected area management plans, biodiversity monitoring and assessment, community development, and joint Communications, Education and Public Awareness (CEPA) programs (knowledge management).

v. On basis of capacity building, the protected area authority will a management plan that covers conservation objectives, threats analysis, strategies and priority actions (protected area based legislation, management protocol, capacity development, monitory, patrolling, community co-management, fund-raising, and eco-compensation implementation, and CEPA).

vi. Develop and consolidate a sub-management system for the Upper Yangtze Endangered and Endemic Fish National Nature Reserve. This nature reserve is very special due to its spatial coverage extends to three provinces, and one municipality, but there is no united management system in place so far. An eco-compensation mechanism that supports conservation of forests, restoration of forestlands and wetlands will have direct benefits to aquatic ecosystems which support fish populations.

Output 2.4 Eco-compensation mechanism applied in Chishui River Basin to support 'green' livelihoods

All the Outputs above (including those under Outcome 1) will converge into the design of an eco-compensation scheme, and implemented through policy support at the river basin scale. GEF will contribute to the formulation and improvement of an innovative eco-compensation mechanism for biodiversity conservation in the Chishui River Basin. The innovation will not only build on, and add value to the existing eco-compensation fund (see Annex F), but also aims to introduce better incentives to local communities for alternative 'green' livelihoods consistent with approaches to sustain a "biodiversity-positive" agricultural landscape.

Local communities will contribute their collective owned land for conservation. Under new protected areas management guidelines, part of the land will be designated as core protection areas, and part will become "regulated use areas" (similar to buffer zone) where traditional farming and related activities are permitted. In the core conservation areas, human activities will be disallowed or very limited.. The eco-compensation mechanism will aim to offset any lost income from the new conservation priorities.

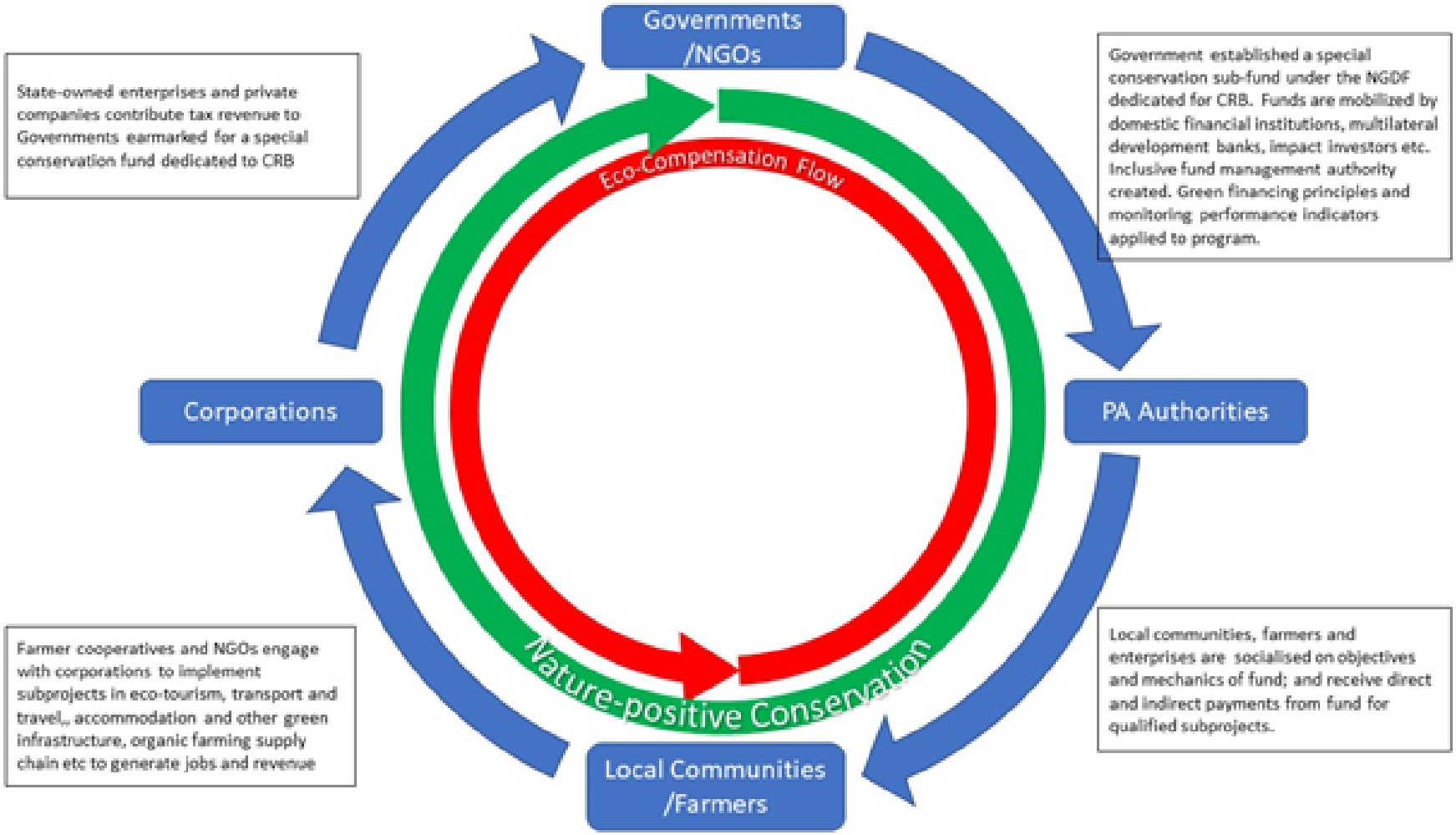


Figure 5: Conceptual illustration of eco-compensation in Chishui River Basin

Figure 5 illustrates conceptually, how an eco-compensation mechanism might work. Under the NGDF, the proposal will be to create a sub-fund – a 'Green Incentive Fund' - which would provide financial support and compensation to incentivize businesses, non-governmental organizations, and communities for protecting the environment (e.g. green farming, watershed protection schemes, and eco-tourism initiatives). In addition to existing resources under the NGDF, the new sub-fund would moblize additional funding from a range of sources, including the ADB Chishui Watershed Protection Project. The Green Incentive Fund could provide a combination of grants and small loans. Guidelines on the fund management and operations will be further developed during project preparation and into implementation based on the work carried out under the project. The criteria will also focus on social inclusiveness, including gender equality, and build on good practices. GEF support will be directed towards: i) establishment of 'green financing' principles and opeations for the fund, ii)

ecosystem valuation and technical support for smart and resilient green farming in “regulated use areas” of the PA system (this could be through the value chain, and be linked to work under Outcome 3.). These elements would form part of the “build forward better”, “build forward greener” (nature-based solutions) approach which is consistent with the GEF guidance on addressing Covid-19 and future pandemics.

Outcome 3: Agricultural field plastic pollution reduced in project areas of YRB and supported by eco-compensation mechanism

[GEF activities under this component will be aligned with the ADB “Comprehensive Green Ecological Corridor Agricultural Development” project which is ongoing and implemented in coordination with Ministry of Agriculture and Rural Affairs]

This outcome will focus on improving understanding of the plastics supply chain, strengthening local capacity to carry out plastics management action plans, and initiating an innovative eco-compensation mechanism which will contribute to reduced dioxin emissions from traditional ways of disposal of agricultural field plastics in areas covered by the project. The targets under this outcome will be to (i) support the adoption and integration of thicker mulching films into the agricultural systems of the YRB, (ii) promote the increased recovery of plastic mulching films and plastic drip tapes from the fields, (iii) divert recovered agricultural field plastics away from landfills and burning, by offering recycling, re-use and alternative disposal options, iv) promote alternative farming methods which reduce the negative impacts on soil, water and air, and v) create an innovative eco-compensation mechanism which features Extended Producer Responsibility (EPR) and other payment schemes which incentivize farmers. Refer to Annex G for more detailed analytical perspectives.

In 2017 the Ministry of Agriculture and Rural Affairs (MARA) initiated an “Agricultural Film Recycling Action Plan”, which was piloted in Gansu, Xinjiang and Inner Mongolia across corn, cotton and potato crops. The main features of the action plan included: i) reduction of film cover, ii) standardization of film products, iii) mechanization of film collection, iv) promotion of recycling processes and systems in cooperation with farmer cooperatives and enterprises. Some lessons learned from the early implementation have been interwoven into the activity sets under this outcome.

On 22 January 2020, the NDRC and MEE issued Circular No. 80 “Opinion on Further Strengthening the Control of Plastic Pollution”. Alongside many new guidelines focusing on the avoidance of consumer plastics and their leakage into the environment there is specific focus on agricultural mulching films and other agricultural plastics (which presumably includes drip tape). The Circular states that the production and sale of low density polyethylene agricultural mulch with a thickness of less than 10 microns will be prohibited. This measure is recommended in order to promote the increased recovery of plastic mulch films at the end of each growing season. Industry estimates place the ability to recover 8 micron film at <11% where as with 10 micron film the recovery rate increases to 32%. The Circular also calls for parties to establish and improve the waste agricultural film recycling infrastructure. The Circular is less prescriptive on other agricultural plastics such as fertilizer and pesticide packaging, and the plastic drip tape.

Despite ongoing reforms agricultural field plastic waste continues to enter the ecosystems of the YRB and other areas in large quantities. Some large cities have been able to initiate recycling programs which cover plastics, and do include agricultural plastic mulch films, and possibly plastic drip tapes. However in other areas there are a number of challenges, which include: i) remoteness of locations, ii) steep slope terrain, iii) lack of awareness of new regulations, iv) unwillingness of farmers to consider new approaches (including switching), v) limited if any, infrastructure, vi) difficulties with collection and transport, vii) lack of financing, viii) unproven economic models - which can be crop-specific (in some areas this recycling is done as a micro/small enterprise), and iv) treating plastics which suffer from photodegradation or contamination from soil, crop and pesticide residues.

Without significant investment to support the adoption of thicker films and in the recycling technology and infrastructure necessary to recycle this material any increased in recovered film will be directed to landfill and combustion based disposal options. The substitution of biodegradable mulch in key film-utilising areas also offers an option for the reduction of plastic waste entering the agricultural ecosystem however the additional costs remain a major barrier to adoption. e types of agricultural field plastics which will be considered under this project are elaborated below:

Type of agricultural field plastic[28]	Materials	Stockholm Convention Chemicals	Observations
Mulch film	Polyethylene (PE)	Polychlorinated dibenzo-p-dioxins (PCDDs) and Polychlorinated diben zofurans (PCDFs)	Typical disposal for these plastics on the farm, is low temperature open burning or smouldering which pro motes the generation of Di oxins
Drip tape (irrigation)	Polyvinyl Choride (PVC)	Polychlorinated biphenyls (PCBs). Polychlorinated dibenzo-p-dioxins (PCDDs) and Polychlorinated diben zofurans (PCDFs)	Without properly controlle d combustion PVC + Plasti cizer (added for flexibility) is acknowledged as a sign ificant source of Dioxins. F arm disposal is observed as low temperature and s mouldering combustion

Figure 6: Agricultural field plastics in YRB

Output 3.1 Supply chain and life cycle assessment of agricultural field plastics industry relevant to YRB

GEF-supported work under this output will focus on: i) understanding the economics and consumer behaviour of the agricultural field plastics supply chain within the YRB; and ii) estimating volumes of plastic mulch and drip tape currently in the system, and expected anticipated production.

Field plastics are widely used around the world to improve agricultural outputs, extend growing areas and seasons, and promote water use efficiency. Plastic fertiliser and pesticide packaging are also a ubiquitous element of intensive agriculture Based on the scale of the industry and the parallel environmental challenges faced by all users there is a solid justification, and some initial research to support the initial understanding of the challenges in the YRB.

Developments in the thickness of plastic mulching film in the YRB have a range of challenges. Thicker plastics have a higher cost and make their use economically challenging for farmers. Once used in the field the process of recovery adds a further economic challenge. Plastic drip tape, used for irrigation, is often used in varying combinations with mulch films.

The term “recovery” in this context means “collected from the field”. Economically viable recovery of agricultural films drops to 11% for films between 5 and 8 microns. This increases to 32% for 10 micron plastic, the new proposed minimum thickness in China. Based on experience around the world, agricultural film need to be at least 25 microns to allow 90%+ recovery from the field. Below are global industry averages of recovery rates for different thickness of plastic mulch film.

Micron	Percentage Recovered from Field[29]
25	90%
20	75%
15	55%
10	32%
5	11%

Estimates also place the cost to recover plastic mulching film at @40% of the original purchase price and approaching 16 hours labour per Ha.both of which represent a huge burden to small farmers.

A further environmental challenge with mulching films is the high percentage of soil and crop residue contamination. This decreases the value of the recovered film and increases the challenges for recycling making plastic film mulch much more likely to be sent to landfill, open burned on site or used for refuse derived fuel than other plastics. Without the motivation of a “value” for recovered plastics farmers are less willing to undertake the work of recovery.

The high levels of soil contamination also reduce the attractiveness of mulching film and drip tape for waste to energy or solid recovered fuel applications other than cement production. The increased inerts levels translate directly to ash content reducing the efficiency of any grate or fluidised bed system in which it is used.

In connection with this, it is important to understand that the supply chain for agricultural field plastics is a subset of the larger web of plastics and chemicals supply chains. In order to address the challenges of managing agricultural plastics waste, and formulate intervention options, it will be essential to have a deeper understanding of the value chain in specific areas of PRC. Most analyses focus mainly on how the plastic wastes are generated and then treated. There are few studies which look further upstream:

· Raw material extraction and production - resins are derived from oil, natural gas, and increasingly, from bio-based sources. Resins are processed at petrochemical plants

· There are different types of resins, but “commodity thermoplastic” resins are those polymers which are softened by heat, and hardened by cooling in their final state as a finished product. They can be re-softened to their original condition by heat, allowing them to be recycled. The most common commodity thermoplastics include polyethylene, polypropylene, polystyrene, and polyvinyl chloride (PVC)

· Plastic resins can be moulded, extruded, or shaped into different forms and apply to a wide range of functions. Resin manufacturing starts by transforming raw materials (monomers) into polymers, mostly in the form of pellets, prills, powder, or flake. Pellets are often combined with additives, such as colorants, stabilizers, or UV protection, and sold to customers who then shape the pellets into objects through a range of processes, such as injection, blow moulding, extruding etc.

· Intermediate and final products enter the various downstream markets, such as household / municipal, agriculture, manufacturing, auto parts or electronics

· Once used, the waste pathways are different depending on the product. The schema below is illustrative:

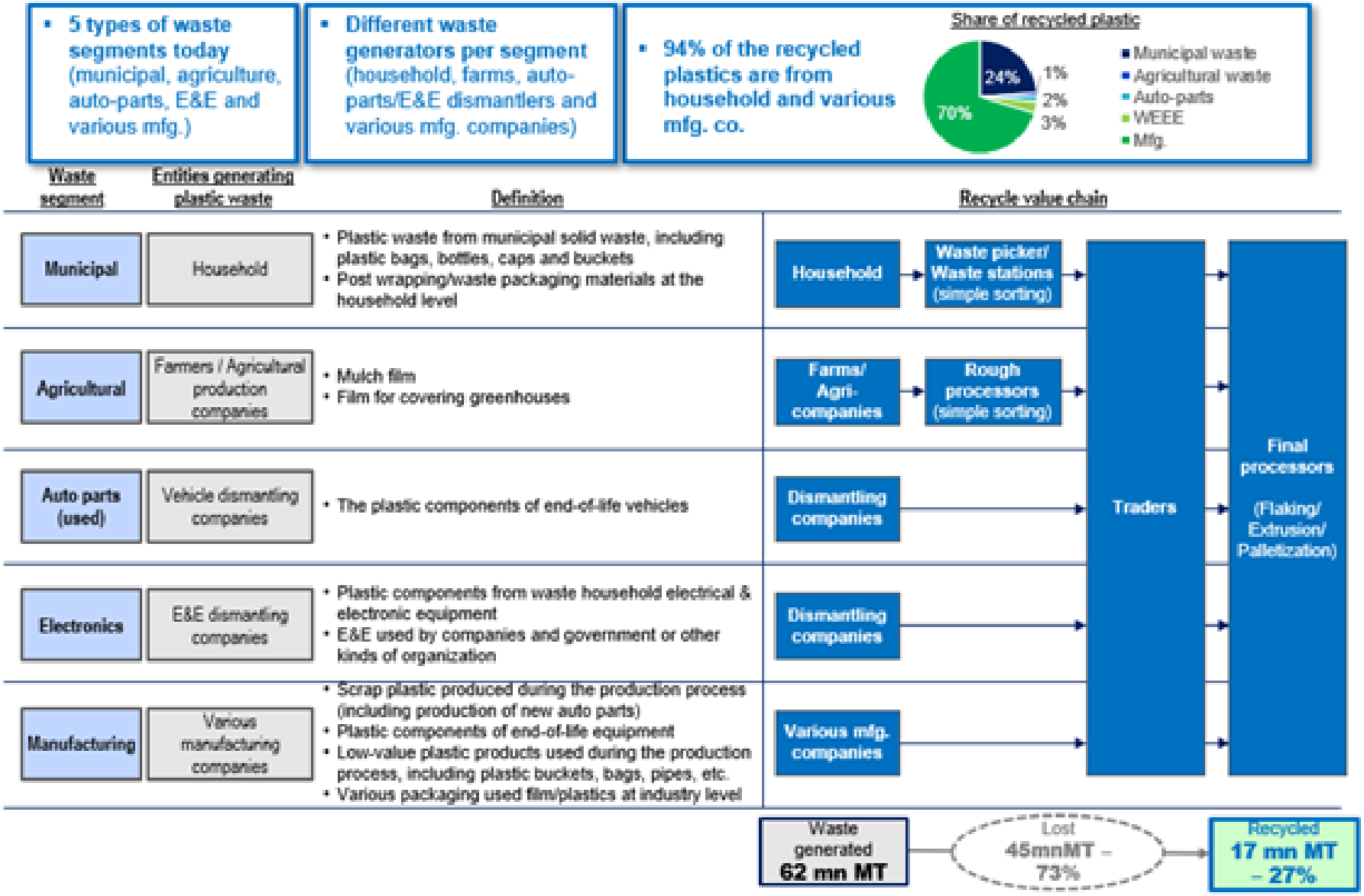


Figure 7 Plastic waste pathways in China
Source: https://www.saiindustrial.com/plastics-recycling-industry-in-china/

This work will be undertaken in cooperation with the government ministries responsible for agriculture and irrigation. The knowledge will contribute to design and implementation of other project outputs. The study will extend upstream from raw materials production to end use and beyond in one defined area,. It will include: i) materials flow assessment, including identification of raw material processing and resin production sources, ii) survey of production, transport, storage and distribution of agricultural field plastics, iii) consumption practices at farm level (mulching, drip, greenhouse etc), and estimation of volumes of field plastic applied in the identified area, iv) examination of current plastic waste management practices, including collection, transport, disposal etc, v) assessment of environmental impacts of residual or unmanaged plastic waste on land and water resources, and vi) industry / government / community workshops to discuss and validate key findings

Output 3.2 At least three local government-led plastics management actions plans integrated into master plans

Under this output, the GEF project will develop / strengthen at least three government-led agricultural field plastics actions plans. These plans could be at provincial, district/county and/or city/municipal levels. Criteria for selection of areas will include: i) spatial relevance to YRB, ii) prevalence of agribusiness and agricultural industries, iii) significant levels use of pesticides, insecticides, agricultural field plastics, and fertilizers, iv) expressed willingness from relevant governments / leadership, iv) enabling conditions, including governance mechanisms and agricultural co-operatives or buying groups, in place, v) identifiable environmental issues (e.g. water quality, soil contamination, white pollution etc), along with supporting data, among others.

The PRC government has made some remarkable advances at the national level in developing a sound policy framework, tools and approaches to achieve goals in sound chemicals management. These have, collectively, contributed to protecting human health and the environment. However, there are concerns that current approaches are at times complex, slow and show uneven progress. Some provinces such as Hunan, Hubei, Guizhou, Yunnan, Sichuan, as well as Chongqing municipality have advanced some efforts to support chemicals management approaches. But there are a number of gaps in implementation. These are varied, and include financial, technical, political and capacity issues; as well as the need to integrate chemicals management with land and water use management plans. Importantly, in the area of agricultural field plastics, there is a need to support interventions at the farm level.

Under this output, the GEF project will develop / strengthen at least three government-led agricultural field plastics actions plans. These plans could be at provincial, district/county and/or city/municipal levels. Criteria for selection of areas will include: i) spatial relevance to YRB, ii) prevalence of agribusiness and agricultural industries, iii) significant levels use of pesticides, insecticides, agricultural field plastics, and fertilizers, iv) expressed willingness from relevant governments / leadership, iv) enabling conditions, including governance mechanisms and agricultural co-operatives or buying groups, in place, v) identifiable environmental issues (e.g. water quality, soil contamination, white pollution etc), along with supporting data, among others.

Proposed activities would be consistent with technical guidance from Basel Rotterdam Stockholm Convention Secretariat, the Environmentally Sound Management (ESM) of Hazardous Wastes Toolkit, the Strategic Approach to International Chemicals Management (SAICM), recommendations in Global Chemicals Outlook II, among others. The action plan process would align with the MARA 2017 action plan priorities, be inclusive and participatory, and target government, industry, community, academe / research and financial institution stakeholders. GEF-supported work would include the following suite of action-planning and capacity development activities (subject to refinement during project preparation):

i. *Market-based instruments*: i) applying eco compensation based incentive or reward systems, ii) industry-led standards and certification, iii) judicious combination of market with regulatory approaches to “phase in” thicker plastic films or substitute biodegradable alternatives to thin film plastics use, iv) design and implement extended producer responsibility (EPR) schemes to promote recovery and recycling of agricultural films

ii. *Reducing plastics pollution*: i) implementing waste minimization and source reduction approaches, ii) accurate quantification and data analytics, iii) circular economy, primarily through recycling, to divert wastes away from landfills and combustion, iv) feasibility of 'waste to energy' investments, v) improving technologies related to recycling (eg. baling equipment, storage, transport etc), vi) use of digitized water and nutrient control systems, vii) promoting 'proof of concept' and application of alternatives to plastics for agriculture and food industry uses, and

iii. *Knowledge management*: i) audience-segmented behaviour change campaigns (government, producers, traders, farmers, extension workers, health care workers etc), ii) gender-sensitive public awareness initiatives, iii) establish measurement and monitoring systems consistent with the GEP and healthy river indicators under Outcomes 1 and 4.

Output 3.3 Agricultural field plastics pollution reduction, recycling, disposal and substitution programs initiated in project areas, with eco-compensation mechanism drafted / established

GEF support under this output will contribute to putting in place a circular economy system which applies to agricultural field plastics. It would culminate in the design and initiation of an eco-compensation scheme which would incentivize farmers to adopt good practices. Measures under this output will complement or "piggyback" those being supported under the ADB loan "Yangtze River Green Ecological Corridor Comprehensive Agricultural Development Project" (referred to as "Green CAD" loan), which aims to establish "services centres" through which the project can provide technical, knowledge and the extension of support for farming communities in selected agricultural areas of the YRB. Annex A provides geolocation information for at least four of these proposed centres. Part of the ADB loan funds will be dedicated to working with agricultural co-operatives to promote the adoption, use and recovery of the new thicker mulching films.. GEF financing will provide additionality to the Green CAD loan in this process, and also design and install pilot systems for recycling of agricultural field plastic wastes in selected areas.

Usage of agricultural plastic mulch film has risen significantly in past decades. Overall in China, usage increased from 1,335,446 metric tons in 2000 to around 2.6 million metric tons in 2017. Between 2000 and 2017, around 36,877,497 metric tons of agricultural plastic was used around the country.[30] Data on recovery rates is limited and variable. Some indicative data on usage of agricultural plastics for the 6 target provinces is presented below, which shows the trend:

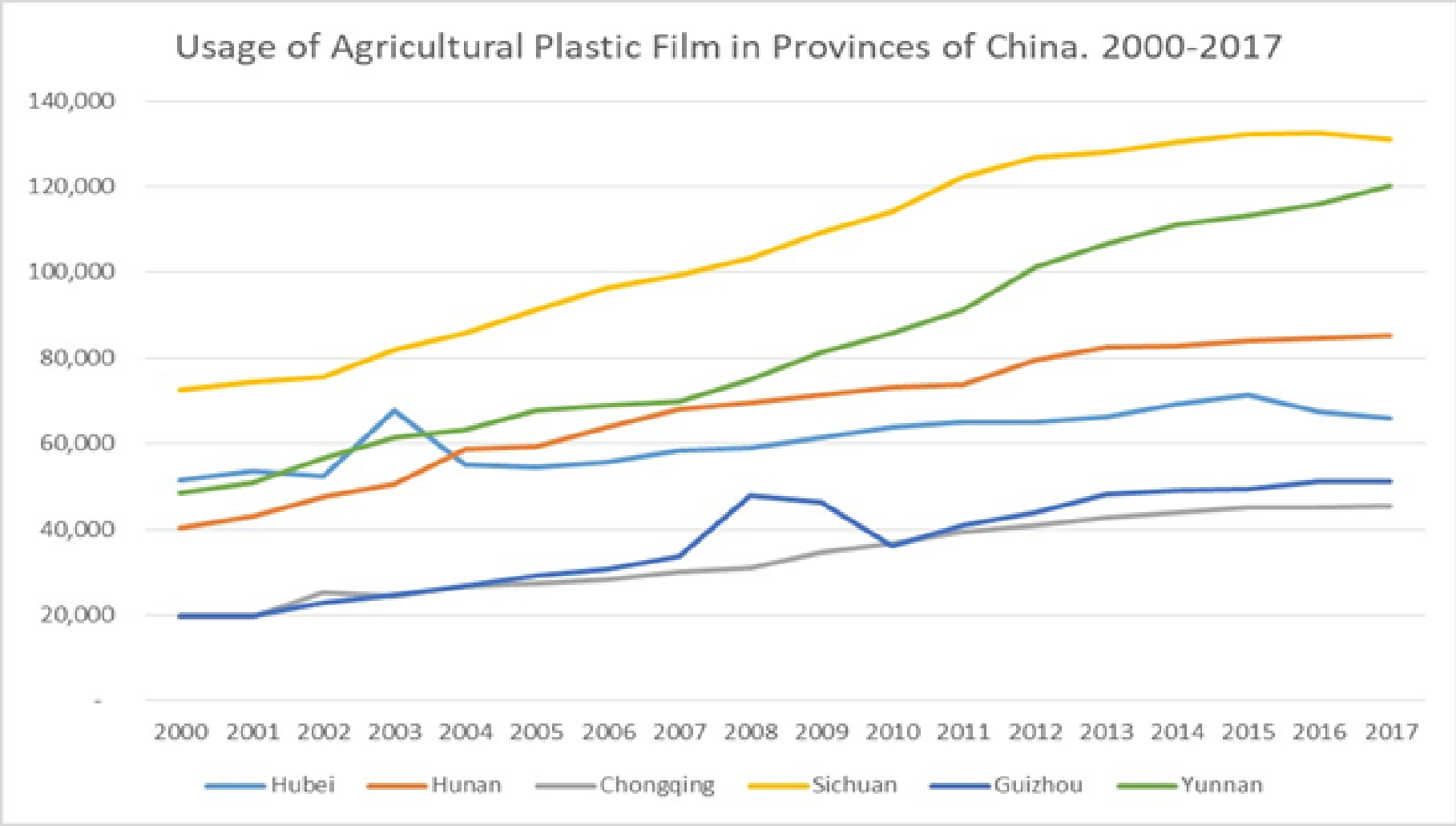


Figure 8: Usage of agricultural plastic mulch film in selected provinces per year (in Metric Tons)
Source: PRC National Bureau of Statistics, Statistics of Agriculture in New China for 60 Years)

Some provinces have experimented with substitution methods for agricultural plastic mulch films. Traditionally, films of 0.008 mm (8 micron) thickness have been used for a number of reasons, primarily cost. These 8 micron films have traditionally been left in the fields and degrade into the soil, causing "white pollution", and eventually end up in aquifers and waterways. However, new standards articulated by the NDRC (and referenced above) now mandate use of films of 10 microns which offer higher rates of recovery.

The GEF project will identify sites in each of the key project provinces in consultations with local governments, notably the Provincial Offices for Comprehensive Agricultural Development (POCADs), which serve as PMUs for the ADB loan. The profile of the sites selected would be similar to the case in Box 1, Kaizhou District described below.

Activities under this output would support pilot agricultural plastics waste management and recycling initiatives in areas around the ADB-supported service centres in YRB sites (as described in Box 1 below). These would include: i) baseline assessment of surrounding farming areas to determine volumes of agricultural field plastics used, and for which crops and crop cycles, ii) review of policy, regulatory and fiscal options, including subsidies/incentives for farmers, and secondary markets for plastics, iii) design and implement demonstration program for farmers to use plastic films and drip tapes "scientifically", with on-site guidance, iv) test, validate and promote alternatives to use of plastics as mulch film (e.g. degradable mulch films specific to the type of crop), and if feasible, for plastic drip tapes, v) establish agricultural field plastic film receiving stations, strategically located throughout the farming areas, vi) discuss and agree on non-point source commitments with farmers / large scale growers, vii) designate and train collection, storage and transfer agents / businesses, viii) support plastics recycling enterprises and processing plants (e.g. balers, grinders, washing systems, extruders, pelletizers etc), ix) design and carry out a behaviour change campaign at the level of the supply chain (as informed by Output 3.1), and x) encourage knowledge sharing, replication and scaling up to other provinces, districts, municipalities / cities.

Box 1: Potential agricultural plastic processing site in Kaizhou District, Chongqing Muncipality

Kaizhou District is a designated national agricultural green development zone in Chongqing, and is also one of the nine counties in Chongqing, which will b e implemented the ADB Yangtze River Comprehensive Green Ecological. Corridor Agricultural Development Project.

The district is making efforts to carry out the new standards for agricultural plastics films, and increase recovery efforts of used films. The district hopes to expand the construction of the agricultural plastic film recyling network, gain an understanding of the value chain ('who produces, who sells, who uses, w ho recycles'), and put in place a management system which will identify key areas of responsibility across the chain. The district estimates that utilization r ate of agricultural plastic film will reach 80% and generate 500 tons of waste per year.

The district plans to launch a series of actions, including: i) public campaigns, ii) field trials to encourage uptake of thicker and biodegradable films, iii) put i n place a point to point recycling system using farming cooperatives and digital technology applications for traceability, iv) establish agreements with coop eratives to create agricultural plastic waste collection units, with accurate record keeping, v) consider subsidies for procurement of mechanical farmland d ebris collection / pick up equipment, vi) create a reward / incentive system for farmer cooperatives through the District Agricultural and Rural Commission, vii) build and operate an agricultural plastic film recycling granulation plant.

Further actions, to be defined during project preparation, will support steps to advance an eco-compensation mechanism specific to agricultural field plastics, possibly in the form of extended producer responsibility (EPR) initiative. One option to be considered could be a "rental scheme". The manufacturer rents the plastic to the farmer for a growing season. At the end of the season the manufacturer / recycling partner collects the plastic and recycles it back to the manufacturer for fresh production. A similar system operated as "deposit scheme" could also be considered. To promote adoption the Government could provide the guarantee/deposit coverage for the farmers. This would also drive the use of thicker films and overall increase in recycling/recovery rates.

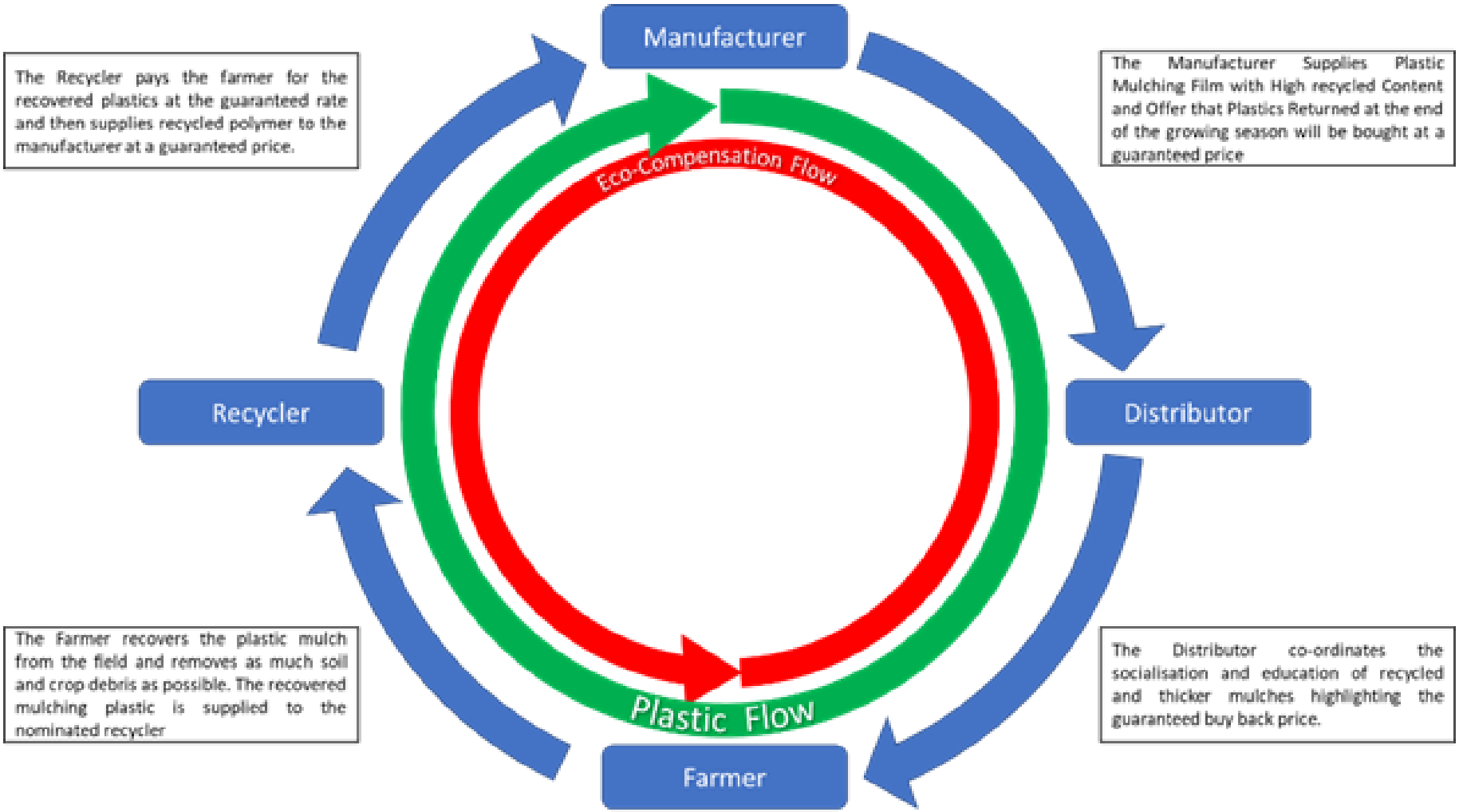


Figure 9: Conceptual illustration of eco-compensation mechanism related to agricultural field plastics

There are a range of implementation mechanisms for ecosystem ranging from market and value-based systems as illustrated in Figure 9, to direct, cashless mechanisms where farmers are issued credits through the distributor for redemption in the next growing season. To innovate beyond the Government driven Eco-Compensation model into a Government Supported Eco-Compensation model there must be a perceived and real value to for the stakeholders. Policy instruments, such as Extended Producer Responsibility (EPR), allow the government to artificially favour products with a high recycled content. Through manufacturers and distributors this market correction can be passed onto farmers through competitive prices for recycled products. Consumption driven by lower prices can be further capitalised through credit or redemption schemes where recovered mulching films are credited against the farmers account. This also provides the recycler and manufacturer with a benefit as they can source their recycled content from their own returned materials. This reduces the risk of contamination from other polymers and also acts as an incentive to make the mulching stronger and with higher quality additives.

Linkages with Biodiversity and Ecosystems Services (Outcome 2)

Plastic mulch has reached levels of usage up to140 Kg/Ha. in some areas of the Yangtze River Basin. Located in the top 30 cm of the soil this plastic pollution has a direct, negative effect on the soil structure, nutrient pathways and fertility of the crop root zone reducing plant growth and yields. These effects accounts for an annual 8% drop in PRC national agricultural productivity with a cash value of $92 Billion USD.[31] The presence of field plastic pollution in the upper soil strata makes it prone to water run- off and wind-blown transportation. When entering the water ways, larger plastic pieces can contribute to the blocking of flood control systems increasing the likelihood of flood events whilst smaller particles and micro plastics impact the river ecosystems and fisheries productivity through food substitution and damage to spawning ground substrates.[32]

Innovation in eco-compensation activities which bring together commercial businesses with Government initiatives, to implement the reduction of plastic pollution through increased plastic mulch / drip tape recovery at the end of each growing season will have a direct positive impact on biodiversity. This would be through increased agricultural productivity of the Yangtze River Basin and decreased interference of plastic film particles in the ecosystem of the land and river systems. Increased soil fertility from regenerating soil structures and natural nutrient pathways facilitated by the reduction of plastic pollution in the topsoil will allow the reduction in the use of artificial fertilisers and other intensive growing methods. The return to a healthy soil and the associated invertebrate populations will increase overall productivity of the ecosystem through the food chain. The reduction of plastics and fertiliser run off entering the river systems will equally allow the regeneration of the aquatic fauna and flora, allowing a return to contribution of the rivers to the overall ecosystem productivity of the Yangtze River Basin, its biodiversity and its flood mitigation effects.

Outcome 4: Sustainable financing and knowledge management for eco-compensation mechanisms supported through natural capital lab (NCL) in YRB

This outcome will support a suite of activities under the YRB “natural capital lab” (NCL) - which is a living, virtual platform to incubate, accelerate and scale up holistic solutions for:

i) Enhancing natural capital accounting by strengthening mechanisms and modelling tools to value nature as an asset

ii) Strengthening eco-compensation policy and regulatory frameworks to incentivize and regulate natural capital investments, and

iii) Catalyzing financial innovation by blending financing tools and designing catalytic funds to leverage private and public finance.

The lab will accelerate the realization of environmental outcomes through knowledge management actions (See Section 8 below), incubating, piloting and scaling innovative approaches from the public and private sectors. As the solutions to many natural capital problems will be cross-cutting, a multi-sectoral approach will be adopted drawing on expertise from partner organizations, in addition to projects, knowledge, and partnerships of multilateral organizations[1]. Figure 10 illustrates the proposed platform partnership in this regard. As mentioned above, this will be launched at the CBD COP15, which will be hosted by PRC.

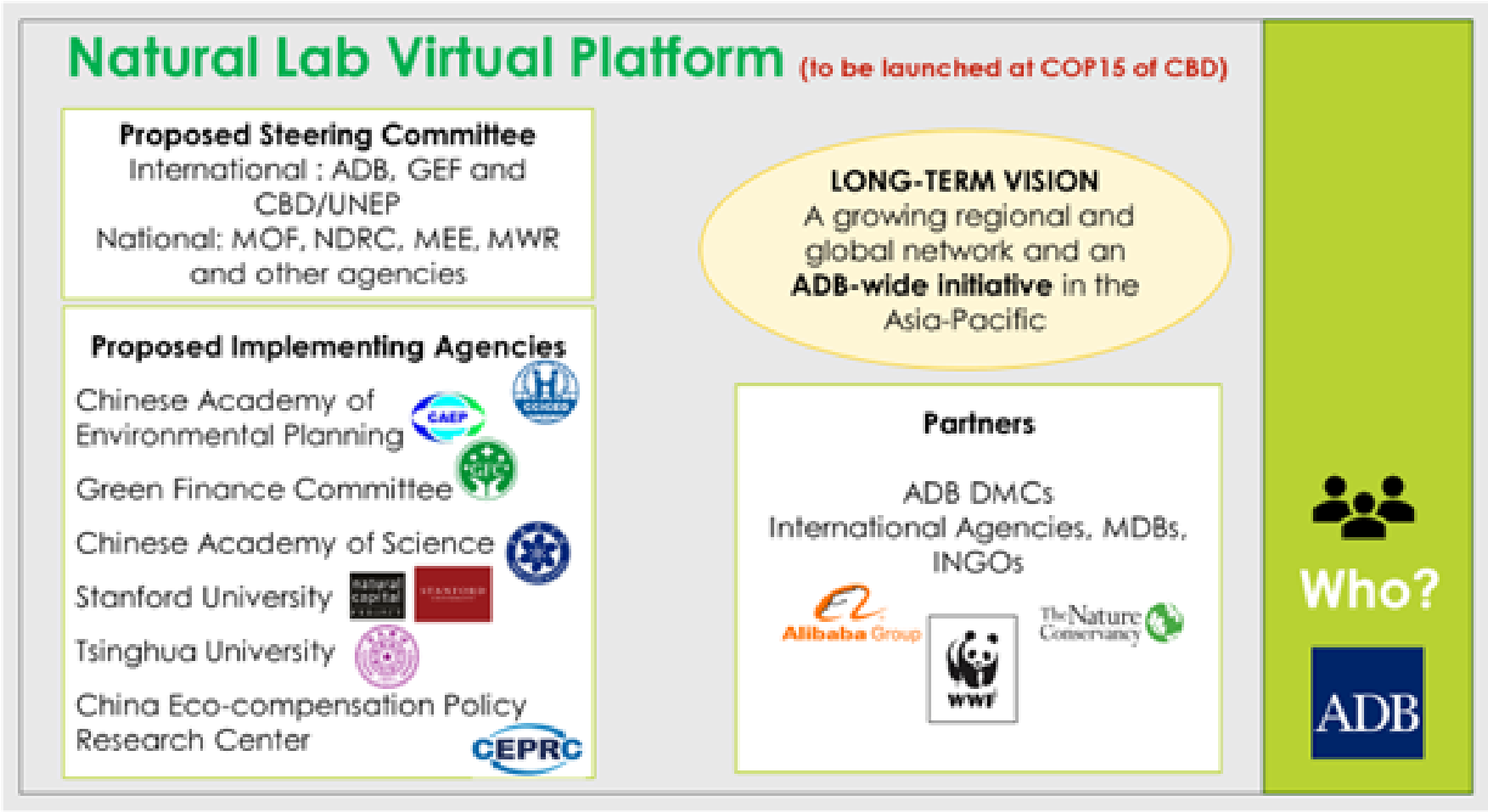


Figure 10: Natural capital laboratory virtual platform

Output 4.1: Eco-compensation monitoring system using GEP indicators developed

This output will build on Output 1.2, and refine / advance a monitoring system to support eco-compensation programs designed under Outcomes 2 and 3. The parameters for monitoring would correspond to a number of proxy indicators, including net primary productivity (NPP), normalized difference vegetation index (NDVI), status of threatened and endangered species, water supply, water retention, flood mitigation, improved soil structure and productivity, pollutions loads (e.g. POPs, COD etc), levels of public participation among others.

The monitoring system would be refined through peer consultations, scientific case study reviews and capacity development workshops in the context of the natural capital lab. The aim will be to use a robust monitoring system to support integration of GEP into the assessment of government performance and policy. It will also aim to promote the directional adjustment and transformation of the current GDP-based assessment system to better guide the conservation efforts of local governments – a type of "healthy ecosystems resport card" - and will simultaneously promote economic, social, and ecological progress. This will be designed in more detail during project preparation.

Output 4.2: Sustainable green financing for ecosystem health in YRB mobilized

In connection with the above, efforts under this outputs will be made to set standards, 'crowd-in" and accelerate 'green financing' in the YRB. The initial focus will be on the National Green Development Fund and a possible "Green Incentive Fund" leveraging the ADB Chishui Watershed Protection loan project (referenced in Outcomes 1 and 2). GEF funds will be used to facilitate these processes, through support for workshops, seminars and knowledge products which convene stakeholders from government, private industry and the financial sector.

This activity will investigate institutional and regulatory reforms that can help the government to better leverage its pre-existing conservation investments to mobilize additional financing sources from the business sector. A key feature of this output will be encouraging and promoting financial innovations through piloting of customized financing arrangements and instruments to attract private sector investments and participation in ecological restoration and environmental initiatives in order to create an enabling environment to accelerate natural capital investment flows.

Market-based eco-compensation mechanisms would not only relieve the burden of public finance, but also render the existing schemes more efficient and effective. Key approaches under consideration include: (i) customizing compensation schemes based on the ranking and prioritization of pollutants and emissions; (ii) assessing suitable business models for establishing green funds to provide incentive payments for environmental protection programs; and (iii) catalyzing the 'greening' of supply chains to assist private sector transformation.

Some additional pilot project opportunities which could spin-off from NCL work could include: i) Yangcheng wetlands conservation and protection for Asian flyways, ii) Silk Road ecological restoration and rehabilitation (Loess Plateau / Yellow River Basin), and others.

Output 4.3 Strategic partnerships and South-South knowledge transfer advanced

This is an overarching output which will draw on data, good practices, knowledge and lessons from all other Outputs within the GEF project framework. With GEF support, the natural capital lab will undertake outreach activities through: i) facilitating policy dialogues with government agencies, ii) detailing the business case for investment in green industries in the YRB with private sector, iii) promoting awareness of rural vitalization and ecological protection in the YRB; and iii) partnering with large global initiatives that convene leaders in technology, science, conservation, and business to develop dialogues on natural capital innovation, with emphasis on cooperation and knowledge sharing with other important, priority river systems in Asia region. These activities will be aligned with those in Output 4.2.

This work will also be relevant to ADB's current assistance framework for the YRB, and will serve as an important vehicle for incorporating these components under the lab. It will also serve as a platform for resource mobilization to strengthen support and broaden the range of collaborating institutions and organizations. This includes establishing a network of ministries of finance, agriculture, natural resources and environment etc., key intergovernmental bodies and specialized institutions, and the Secretariats of Multilateral Environmental Conventions, notably the Convention on Biological Diversity. The aim would be to internalize or mainstream some of the work supported through the lab into dialogues such as Conference of the Parties, and technical working groups involved in providing guidance, direction and setting of targets..

Piloting new approaches in the YRB will have value for other river basins in China, for example the Yellow River, as well as for countries faced with similar issues. The lab will be a virtual and digital regional platform to build on the experiences from YREB, and will upscale/capture the knowledges/case studies from Yellow river and also from developing member countries (DMCs) within the Greater Mekong Subregion (GMS). It will serve as a forum for expanding collaboration and knowledge sharing between the PRC and other developing countries to address regional and global public goods, such as addressing food security, climate change and the growing problems associated with waste management, especially plastics pollution where the Yangtze River is a significant contributor. With ADB's existing portfolio of projects already in place, the lab offers tremendous opportunities to demonstrate the feasibility of innovative financing models and market-based approaches through application of valuation tools and policy mechanisms to attract private sector financing and innovation, and regional knowledge sharing.

Output 4.4 Knowledge management, project coordination, monitoring and evaluation conducted

This output will support implementation of the knowledge management strategy, for which some activities are captured across all project Outcomes and some specific Outputs (e.g. 1.2, 2.3, 3.1, 3.2, 4.1, 4.2, 4.3). It will also support budgeted project coordination and budgeted M&E plan.

The approach to knowledge management is outlined in Section 8 below. Detailed plans for project coordination with other key GEF projects in YRB are presented in Section 6 below. This, in addition to the institutional arrangements, will be further elaborated during project preparation. In order to ensure proper coordination of the GEF project with other programs and projects in the YRB, notably the IUCN, FAO, World Bank and UNDP, the project budget will allocate resources in the range of $ 50,000- 60,000 for related activities.

A project monitoring system will be created to capture key information and measure project progress throughout implementation, in line with GEF's monitoring policy. Elements of a project monitoring framework will be elaborated during the project preparation phase. Budget allocations for monitoring will be distributed across Outcomes 2,3 and 4, with a view to committing around 3% of the total GEF grant.

Mid-term review will be conducted during Year 2 of implementation, followed by Terminal Evaluation Review towards the end of project. Indicative amount of $ 75,000 is being considered for these activities (combined), and will be confirmed in the final project CER budget presentation.

Alignment with GEF Focal Area and Impact Programs

Chemicals and Wastes: The project will be relevant to the objectives of the Agricultural Chemicals sub-program. It aims to divert waste agricultural plastic mulch film and plastic drip tape/pipes away from combustion and landfills through a combination of recycling and adoption of alternative or substitute methods of farming. It will address key POPs which result from mis-management (burning, landfilling) of agricultural field plastics (both polyethylene and polyvinyl chloride), which include: Polychlorinated biphenyls (PCBs). Polychlorinated dibenzo-p-dioxins (PCDDs) and Polychlorinated dibenzofurans (PCDFs). [2]

Biodiversity: The project will be relevant to the program on Mainstreaming Biodiversity, through emphasis on spatial and land-use planning related resource use to maximize production without undermining or degrading biodiversity. This will be linked to actions to sustain protected areas and their conservation objectives, through technical capacity building and implementation of financial mechanisms that incentivize actors to change current practices that may be degrading biodiversity; and relevant policy and regulatory implications. It is anticipated that this would cover about 30% of the biodiversity work under this project.

It will also have direct relevance to the program on Natural Capital Assessment and Accounting with respect to the Gross Ecosystem Product (GEP) and natural capital accounting activities supported under Components 1, 2 and 4. In addition to support for valuation of multiple ecosystems services in the CRB, actions under Component 4 which target specific decisions or policy concerns in order to be as impactful as possible. This work would also be relevant to

reducing or eliminating the drivers of degradation of natural capital assets; and support positive financial and relevant policy incentives to sustain these assets; as well as mobilize 'green' financing mechanisms through the eco-compensation programs. It is expected that this would cover about 70% of the project work.

Incremental Cost Reasoning

Under this project, GEF will play a catalytic and enabling role. It will go beyond the business as usual, and add value to prior and ongoing investments by creating conditions for the design and initiation of 'green' financing initiatives through a newer generation of eco-compensation mechanisms. These mechanisms will be packaged differently. They will feature: i) a stronger market orientation, ii) focus on integrated management of biodiversity and ecosystem services at watershed scale, iii) increased participation of local communities and the private sector, iv) potential for better remuneration for beneficiaries; v) support through a Gross Ecosystem Product metric that will help monitor and measure performance; and vi) links to the natural capital lab, as an incubator and accelerator for knowledge transfer and uptake, strategic partnerships and 'green' resource mobilization for scaled approaches.

Component 1: An examination on how to establish a Gross Ecosystem Product (GEP) and additional metrics related to determining the value of natural capital at a river basin scale under the GEF project proposed, will provide a value addition to ongoing and planned environmental investments. Under the business as usual and baseline investments, PRC will encounter challenges in systematically addressing the drivers of environmental degradation and the manifold consequences. The balance between land use expansion and conservation has been tenuous. More recently the outbreak of the Corona virus has brought to the fore, the need to manage human-nature interaction more effectively. Efforts to address the environmental challenges in the YRB have generally been fragmented, and have not systematically promoted an understanding of the economic value of ecosystems services and how these can be considered alongside accounting practices associated with Gross Domestic Product.

Component 2: The GEF intervention is key, in that it will add a layer of additionality by bringing into perspective the coverage and management of a consolidated systems of protected areas and strategic ecological corridors, which will contribute to protection of globally significant biodiversity. Challenges within the Chishui River Basin protected area management have been well documented in the PIF. Baseline investments of ADB and PRC Government in Chishui River watershed focus on waste management infrastructure, village rehabilitation, and strengthening of ecosystems services in key areas, particularly with respect to water supply and flood control, and agribusiness. These will deliver some local and perhaps national level benefits, upon which the GEF project will build.

Component 3: The GEF project will contribute to pilot efforts to put in place recycling and alternative use scenarios to reduce pollution resulting from combustion and landfilling of agricultural plastic wastes, supported by a market-oriented eco-compensation mechanism. It is unlikely that significant investments would take place in the absence of this type of accelerator, especially given the enormous challenges faced by PRC to maintain high levels of agricultural output. There are few incentives to halt, or reduce significantly, the use of plastic mulch film and irrigation drip tape, until the recent guidance in January 2020, While this project will not be able to address the 'legacy' plastics – that is the 8 micron, thin plastic films traditionally used for farming, it will address issues related to the mandated use of thicker 10 micron plastic films..Without this intervention the effect of the new regulations would be – at best - to reduce the plastics left in the fields but increase the hardship experienced by farmers, reduce productivity and increase the tonnage of recovered agricultural field plastics combusted through open burning and the associated increase in Stockholm Convention POP's. [Refer to the illustrations below on the pathways in Annex G for the thinner (8 micron mulching film) and the newly mandated, thicker (10 micron) mulching film.]

Component 4: GEF financing can play a key catalytic role in supporting a basin-wide transformative ecosystems management approach, which will have valuable lessons for other river basin areas in PRC and the Asia region. The natural capital lab platform can play key role in this regard. Given the scale and complexity of the environmental issues faced, this project is unique in that it promotes a "whole of river basin" approach, supported by a Gross Ecosystem

Product (GEP) metric for considering natural capital values alongside traditional ways of measuring national economic productivity.

[1] Stanford University's Natural Capital Project, the Chinese Academy of Sciences, and the Chinese Academy of Environmental Planning have expressed interest to partner with ADB on the lab initiative. ADB and the Chinese Academy of Environmental Planning are also co-chairs on a Special Policy Study on ecological compensation and green development institutional reform in the YREB under the China Council for International Cooperation on Environment and Development.

[2] Costner, Pat et al. 2005 "Estimating Releases and Prioritizing Sources in the Context of the Stockholm Convention". UNEP, UNIDO, GEF, UNITAR, SDC.

Global Environmental Benefits (GEBs)

<table>
<tr><th>Current Scenario</th><th>Alternative Proposed by GEF Project</th><th>Anticipated GEBs</th></tr>
<tr><td>Unclear implementation guidance for ecosystem compensation</td><td>Establish implementing framework to guide eco-compensation mechanisms</td><td rowspan="6">Terrestrial protected areas newly created (hectares): 80,000 ha

Terrestrial protected areas under improved management effectiveness (hectares): 480,834 ha

Area of forest and forest land restored (hectares): 2,000 ha

Reduction, disposal/destruction, phase out, elimination and avoidance of chemicals of global concern and their waste in the environment and in processes, materials and products (thousand metric tons of toxic chemicals reduced). 443 g/TEQ*

Tonnage of agricultural field plast</td></tr>
<tr><td>Limitations to the way eco-compensation mechanisms have been implemented in the past, including measurement and monitoring</td><td>New ways to design and structure eco-compensation mechanisms which are inclusive, participatory, market-driven and cover multiple ecosytems services over wider spatial areas</td></tr>
<tr><td>Underappreciation of ecosystem service values at key points in the economic system</td><td>Valuation of ecosystem services contribute to GEP metrics and natural capital accounting</td></tr>
<tr><td>Pressures to increase land and water use for economic purposes prevail over conservation / protection priorities</td><td rowspan="2">Consolidation and expansion of protected area estate in Chishui River Basin, with eco-compensation which incentivizes sustainable practices for local communities</td></tr>
<tr><td>Continued unsustainable land and water use, combined with ineffective and fragmented approaches to managing key biodiversity areas</td></tr>
<tr><td>Technical and capacity gaps acro</td><td>Strengthened management planni</td></tr>
</table>

Technical and capacity gaps across stakeholder groups which diminish ability to adopt and scale sustainable practices	Strengthened management planning with focus on targeted capacity building for effective implementation (e.g. local governments, front liners, etc)	Tonnage of agricultural field plastics diverted from landfill and combustion = 2,480,817 MT
Limited availability of funds to invest in natural capital development, especially for local governments	ADB co-financing through loan packages Actions to mobilize and 'crowd in" green financing to support eco-compensation, including private sector participation	
Continued use of agricultural field plastics to increase productivity at effective cost, without understanding and incentive to adopt alternative practices or participate in pollution reduction actions	Focussed investments on promoting circular economy for agricultural field plastics, supported by an eco-compensation mechanism that features 'extended producer responsibility" (EPR) and other instruments	
Lack of environmental performance measurement and monitoring instruments for local leadership and corporate sectors	Natural capital lab supports GEP and natural capital accounting combined with stronger monitoring of ecosystems improvements	

The GEF interventions in the Chishui River Basin under Component 2 will culminate in: Terrestrial protected areas newly created (hectares): 80,000 ha; Terrestrial protected areas under improved management effectiveness (hectares): 480,834 ha; Area of forest and forest land restored (hectares): 2,000 ha. For Component 3, using the current baseline of agricultural field plastic management and projecting for the 5 year project period and the 10 year extended benefit period the overall reduction in emissions in the target 6 provinces amounts to 443 g/TEQ through project support of recycling and diversion from combustion of baseline and additional recovered plastic film mulch and plastic drip tapes /pipes. The key POPs from burning of agricultural field plastics include: Polychlorinated biphenyls (PCBs). Polychlorinated dibenzo-p-dioxins (PCDDs) and Polychlorinated dibenzofurans (PCDFs)[37]

Please refer to annexed Core Indicator Worksheet for detailed elaboration on methodology for C&W indicators. The calculations were made using the UNEP-UNIDO-GEF methodology referenced below.

Innovation, Scaling Up and Sustainability

Innovation: The project approach is innovative as it proposes a whole of ecosystem approach and consolidates a package of investments around the Yangtze River Basin and its tributary system. It also aims to introduce new forms of measurement, such as Gross Ecosystem Product, supported by a suite of "healthy river basin indicators" which takes into consideration the economic value of natural capital assets. This in itself is innovative, but will also contribute to scaling up and ensuring sustainability, once efforts are made to internalize these in key Government agencies at local and central levels.

This project innovative, because it goes beyond traditional payment for ecosystems models, and builds on PRC's experience and lessons learned in eco-compensation to date. Few, if any, schemes to date have directly targeted application of agricultural field plastics, so this will be a new endeavor. For eco-compensation application in biodiversity conservation, innovation is illustrated well in Annex F, which shows the value addition which the ADB/GEF project will provide against the prior work pioneered under a GEF/UNDP project in Chishui River Basin.

Innovative approaches include: i) stronger role for local governments (especially sub-provincial) with devolved responsibility for environmental management, ii) wider ecosystems services applications, iii) market-based compensation arrangements, iv) enhanced participation of private sector and local communities, v) natural capital value assessments and indicators which support performance monitoring of eco-systems improvements, and vi) support for knowledge uptake and behavior change. Eco-compensation, based on the new MOF guidelines and NRDC Action Plan, two applications - one linked to improving management of protected area system in the Chishui River Basin, and another to improve efficiency and effectiveness of agricultural practices by reducing pollution caused by combustion and landfilling of agricultural field plastics – which include the mulch film and drip tape /pipe - across a number of provinces. The lessons from this will serve as a springboard to support lessons learned, replication and scaling up.

Scaling up: The project also aims to promote the YRB as a 'natural capital lab" through support for: i) institutional, policy and governance reforms, ii) innovation and integrated solutions, iii) promotion of science-based third party monitoring and evaluation, iv) knowledge sharing, and v) strategic partnerships for multi-stakeholder and private sector engagement. The GEF project will complement ADB resources and help to catalyze the natural capital lab to serve as: i) way to convene stakeholders, ii) forum for thought leadership, iii) policy advocacy and change with respect to eco-compensation, iv) establish a way to monitor and evaluate the performance metrics of local governments and other stakeholders, and v) crowd-in donors and investors to look at blended finance approaches.

The natural capital lab will capture the knowledge and approaches supported under the GEF project, and provide a platform for dissemination. This would be supported by the project Knowledge Management Strategy (anticipated). Specifically, the aim would be to replicate similar eco-compensation models in other protected areas across the country (in cooperation with such partners as IUCN, TNC, UNDP etc); as well as accelerate the uptake of technologies for recycling and/or substitution of agricultural field plastics (in cooperation with such partners as FAO, World Bank, AEPW etc). At the river basin level, it is hoped that this model will be scaled to the Yellow River Ecological Corridor and other river basins in Asia and the Pacific.

Sustainability: The GEF project promotes squarely, the financial sustainability issues which are commonly faced by governments. Eco-compensation mechanisms will structured to have a long term outlook,with market-based incentives, and built in monitoring to track progress and make any course adjustments. All 4 components are designed to 'lean into' the entire green financing movement. Technical sustainability will be addressed through the capacity building and training, as well as knowledge management which will target: i) civil service ranks in local governments, ii) front line practitioners, including forest dwelling families, farmers, fishers, extension workers, etc.and iii) local leaders in order to instill a sense of urgency managing natural capital assets.

[1] X. Deng and Z. Li. 2016. Economics of Land Degradation in China. In E. Nkonya, et al. *Economics of Land Degradation and Improvement: A Global Assessment for Sustainable Development*. Pp. 385-399. Beijing: Springer International Publishing

[2] CCICED Special Policy Study 2-2. "*Ecological Compensation and Green Development Institutional Reform in the Yangtze River Economic Belt".* Policy Recommendations and Principles. Internal document 2019.

[3] China Plastics Annual Book. 2018.
[4] Liu, E. K et al. "White revolution' to 'white pollution'— agricultural plastic film mulch in China" in Environmental Research Letters, 9 (2014) 091001 (3pp); and He Wenching et al. "The benefits and challenges of plastic film mulching in China" in World Agriculture, 2017.
[5] This project will not be concerned with the 'legacy' plastics which are already in the soil and water. It will deal with the substitution of the thin (8 micron) plastic film with the thicker (10 micron) plastic mulch film which is mandated by the Government.
[6] Yao, Liuyang et al. "China's Water-Saving Irrigation Management System: Policy, Implementation, and Challenge" in Sustainability. 2017,92339.

[7] Liangliang Huang and Jianhua Li. "Status of Freshwater Fish Biodiversity in Yangtze River Basin, China". National Natural Science Foundation of China. June 2016.

[8] Weiqing Meng, et al. "Status of Wetlands in China: A Review of Extent, Degradation, Issues and Recommendations for Improvement", in Ocean and Coastal Management, Vo. 146, September 2017.

[9] https://development.asia/explainer/eco-compensation-and-what-it-means-world

[10] National Development and Reform Commission (NRDC). Ecological Environmental Protection Plan for Yangtze River Belt, 2017.
[11] https://www.waterworld.com/articles/wwi/print/volume-33/issue-1/technology-case-studies/china-s-13th-five-year-plan-what-role-will-wastewater-play.html
[12] Reference GEF Project Implementation Review (PIR), 2018.

[13] Karki, Madhav and Dai, Rong. " Terminal Evaluation Report: Payment for Watershed Services in the Chishui River Basin for the Conservation of Globally Significant Biodiversity" UNDP, 2019.

[14] The areas have been under the ADB loan processing based on geographical diversity, crop production, and point and non-point sources of pollution, so that the success from the project can be disseminated to other provinces of similar conditions. The project provinces are all in upper and middle reaches of Yangtze River. All provinces have similar climate and geographical conditions and social environment. Work on enabling eco-compensation under this project will also have implication for other areas in Longxi River, Sayu River and Yellow River (the latter is an emerging priority).

[15] https://k-learn.adb.org/learning-events/5th-international-conference-eco-compensation-and-payments-ecosystem-services

[16] Ministry of Finance. "Guiding Opinions on Establishing and Perfecting the Long Term Mechanism of Ecological Compensation and Protection in Yangtze River Economic Belt". 13 February 2018. An action plan has also been advanced by the NDRC however not translated to English at time of PIF preparation.

[17] The NDRC, MEE, Ministry of Finance and six other government agencies jointly released the most recent policy paper titled 'Action Plan for Establishing Market-Oriented and Diversified Eco-Compensation Mechanism' in January 2019.

[18] Zhiyun Ouyang et al. "Gross Ecosystem Product to Value Nature in Decision-Making", February 2020. www.pnas.org/cgi/doi/10.1073/pnas.1911439117. This is linked to the IUCN work on GEP [18] https://www.iucn.org/asia/countries/china/gross-ecosystem-product-gep%EF%BC%89.

[19] Asian Development Bank (ADB). "Developing Gross Ecosystem Product Accounting for Eco-Compensation". TA 9040-PRC Report. 2017.

[20] It is likely that GEP and GDP will continue to be parallel systems, as full integration is a long term challenge. This is discussed briefly under Output 1.2

[21] The National Green Development Fund was launched in July 2020 by the Ministry of Finance and 11 provinces/ cities along the YREB – amounting to around CNY 88.5 billion (USD 13 billion). The fund is an important instrument to promote green development and support pollution reduction and industry transformation.

[22] Refer to GEF draft discussion paper on "Project Design and Review Considerations in Response to the COVID-19 Crisis and the Mitigation of Future Pandemics", 27 August 2020.
[23] An ADB publication offers interesting perspectives. Ilan Noy et al. "Build Back Bettter. What is it? What should it be?" ADB Economics Working Paper Series No 600. Mandaluyong: December 2019.
[24] Data from Province of Sichuan Department of Agriculture and Rural Affairs.
(http://nynct.sc.gov.cn//nynct/c100632/2019/8/26/d8e7a0e384b1416d8a2eaa26ef82c0f2.shtml)

[25] Anecdotal evidence during project consultations. See also Liuyang Yao et al. " China's Water-Saving Irrigation Management System: Policy, Implementation, and Challenge" in Sustainability, 9, 2017, p2339.
[26] See: i) https://www.alibaba.com/showroom/recycled-drip-tape.html;ii) https://driptips.toro.com/recycling-irrigation-plastics/, iii)
https://www.environmentalleader.com/2014/08/dripline-manufacturer-offers-free-recycling/

[27] Ruisen Zhong et al. Planting and Irrigation Methods for Cotton in Southern Xinjiang, China", in Irrigation and Drainage. 2016. John Wiley and Sons. A few other references include: Xi-Ping Deng et al. " Improving Agricultural Water Use Efficiency in Arid and Semiarid Areas of China. Proceedings of the 4th International Crop Science Congress, 26 Sep – 1 Oct 2004, Brisbane, Australia; and Zhuomin Wang et al. "Food–Energy–Water Analysis at Spatial Scales for Districts in the Yangtze River Basin (China)", in Environmental Engineering Science, V. 36, No 7, 2019.

[28] Greenhouse films also qualify, but have not been factored into this metric due to the long term usage.

[29] Zhang, Dan et al. "The status and distribution characteristics of residual mulching film in Xinjiang, China" in Journal of Integrative Agriculture 2016, 15(11): 2639–2646; and OWS nv. "Expert Statement on Bio-degradable Mulching Films, Belgium, 2017.
[30] PRC National Bureau of Statistics. Statistics of Agriculture in New China for 60 Years.

[31] Norse,D.:Ju, X. Environmental costs of the China's Food security. Agric. Ecosyste. Environ. 2015,209 5-14

[32] Rist, S. E. et al. Suspended micro-sized PVC particles impair the performance and decrease survival in the Asian green mussel Perna viridis. Marine Pollution Bulletin 111, 213–220 (2016).

[33] Stanford University's Natural Capital Project, the Chinese Academy of Sciences, and the Chinese Academy of Environmental Planning have expressed interest to partner with ADB on the lab initiative. ADB and the Chinese Academy of Environmental Planning are also co-chairs on a Special Policy Study on ecological compensation and green development institutional reform in the YREB under the China Council for International Cooperation on Environment and Development.

[34] https://www.iucn.org/asia/countries/china/gross-ecosystem-product-gep%EF%BC%89

[35] The National Development Reform Commission, Ministry of Ecology and Environment, Ministry of Finance and six other government agencies jointly released the most recent policy paper titled 'Action Plan for Establishing Market-Oriented and Diversified Eco-Compensation Mechanism' in January 2019.

[36] Costner, Pat et al. 2005 "Estimating Releases and Prioritizing Sources in the Context of the Stockholm Convention". UNEP, UNIDO, GEF, UNITAR, SDC.

[37] Costner, Pat et al. op. cit.

Annex D Protected Areas within Chishui River Basin (Guizhou, Sichuan and Yunnan Province)

	PA name	Area (ha)	Conservation Objectives
1	Upper Reach of Yangtze Rare and Endemic Fish National Nature Reserve	33,174.2	70 species of rare and endemic fish and their habitats. 189 fishes species and their habitats in Guizhou, Yunnan, Sichuan and Chongqing
Guizhou Province			
2	Guizhou Chishui *Alsophila spinulosa* National Nature Reserve	13,300	Rare plants e.g. *Alsophila spinulosa*, *Camellia luteoflora* and subtropical evergreen broadleaf forests
3	Chishui Primitive Forests and Wildlife Resource Nature Reserve	29,341	Subtropical forest ecosystem
4	Chishui Scenic Areas	30,000	landscape and Danxia landform
5	Guizhou Bamboo Sea National Forest Park	11,930	Subtropical forests and wildlife
6	Guizhou Yanziyan National Forest Park	11,945	Subtropical evregreen broadleaf forests, geological landscapes, including cliffs and rivers, 25 endemic fish species and other terrestrial wildlife (1668 species incldluing 39 rare and endangered species)
7	Guizhou Chishui Danxia National Geopark	13,457	Danxia landscape
8	Huairen Maotai Scenic Areas	4,450	local tourist attractions, e.g. red culture, wildlife etc.
9	Huairen Naizishan Provincial Forest Park	1,068.69	wildlife, sky landscape
10	Guizhou Xishui National Nature Reserve	51,911	Subtropical forests and wildlife
11	Xishui Taxodiaceae Nature Res	9.16	Taxodiaceae plants and their habitat

	erve		Taxodiaceae plants and their habitat
12	Guizhou Xishui Provincial Scenic Areas	8,813	natural and cultural landscape
13	Guizhou Xishui Dongfeng Lake National Wetland Park	249.06	Sphagnum and its habitat
14	Guihzou Xishui National Forest Park	14,027.46	Subtropical forests and wildlife
15	Guizhou Xishui Qingshan Provincial Forest Park	203.83	Subtropical forests and wildlife
Sichuan Province			
16	Nantan Bailulin Nature Reserve	511.6	Egret and its habitat
17	Sichuan Fobao Nature Reserve	58,706	subtropical evergreen broadleaf forest ecosystem
18	Fobao Scenic Areas	43,310	subtropical evergreen broadleaf forests
19	Fobao National Forest Park	11,000	subtropical evergreen broadleaf forests
20	Bijia Mountain Scenic Areas	1030	subtropical evergreen broadleaf forests
21	Sichuan Huagaoxi National Nature Reserve	23,827	Subtropical evergreen broadleaf forests, including ancient relics species, such giangt fern (Alsophila spinulosa), and many other rare and endangered wildlife species
22	Danxia Scenic Areas	15,900	Danxia Geological landscape and subtropical forests, in particular, giant fern (*Alsophila spinulosa*)
23	Sichuan Yuhuangguan Forest Park	593.3	forest ecosystem
	Gulin Huangjing Provincial Leve		Most primival subtropical evergreen broadleaf forests, with more than 40 rare and endangere

24	Gulin Huangjing Provincial Level Nature Reserve	36,522	d species, such as Metasoquia, David Dove tre e, giant fern, panthera leopod, monkey, and bla ck bear
25	Gulin Huangjing Shijie Waterfall Scenic Areas	43,338	Well preserve Danxia Landscapes within subtro pical evergreen broadleaf forests
26	Gulin Huangjing National Fores t Park	9,122.6	It is one part of the Huangjing Provincial Natur al reserve, mainly consists of national tree far m forests
27	Erlang Nature Reserve	1,500	subtropical evergreen broadleaf forest ecosyst em
28	Langjiu Tianbaodong Provincial Natural and Cultural Heritage	1,836	Limestone caves and history of wine storage
29	Huoxingshan Forest Park	19.3	subtropical evergreen broadleaf forests
	Yunan Province		
30	Zhenxiong Yila Nature Reserve	685	Subtropical forests patches
31	Zhenxiong Yuanjiawan Nature Reserve	1,634	David dove tree communities and secondary fo rests
32	Yunan Weixin Tianxing Forest P ark	7,420	Famous for the giant fern and Chinese fir, withi n secondary broadleaf forests and bamboo for ests
Total Area (ha)		480,834	

ANNEX E: Baseline information on biodiversity in YRB:

Fish species and its special contribution to global biodiversity conservation. Due to high percentage of endemism in fishes, population status of them have not been assessed. According to IUCN Redlist, two species are critically endangered, and one species is vulnerable, and the rest are mostly lack of data. Table 1 lists the status of endemic fish species

Annex E-1: Status of endemic fish species in YRB

Species	Threatened Status	Chisui River	Endemic to Upstream of Yangtze River
Acipenser dabryanus	CR	√	√
Sinibrama changi	-	√	√
Ancherythroculter kurematsui	-	√	√
A. wangi	-	√	√
A. nigrocauda	-	√	√
Hemiculter nigromarginis		√	√
Schizothorax prenanti	-	-	√
S. chongi	-	√	-
S. davidi	-	√	-
Procypris rabaudi	-	√	√
Sinoqastromyzon szechuanensis	-	-	√
Sinogastromyzon sichangensis	LC	-	√
Euchiloglanis davidi		-	√
Paracobitis potanini		√	√
Botia reevesae		-	√
Parabotia bimaculata		√	√
Leptobotia elongata	VU	√	√
Leptobotia rubrilabris		√	√

Hemimyzon abbreviata		-	√
Metahomaloptera omeiensis		-	√
Megalobrama pellegrini		-	√
Coreius guichenoti		-	√
Rhinogobio cylindricus		-	√
Rhinogobio ventralis		-	√
Platysmacheilus nudiventris		-	√
Sinilabeo rendahli		-	√
Sinocrossocheilus guizhouensis		√	-
Psephurus gladius	CR	√	√

Annex E-2: Status of protected plants in YRB

Species	IUCN Redlist	Protection Class	Endemism	
Alsophila spinulosa		I		
Gymnosphaerea meteniana		II		
Cycas revoluta	LC	I		
Metasequoia glyptostroboides	EN	I		
Taiwania flousiana	VU	I		
Ginkgo biloba	EN	I		
Camellia chrysantha	EN	I		
Pseudolarix amabilis	VU	II		
Cibotium baromet		II		
Fokienia hodginsii	VU	II		
Taxus chinensis	EN	I		

Taxus mairei	VU	I		
Bretschneidera sinensi	EN	I		
Liriodendron chinense	NT	II		
Michelia wilsonii	DD	II	*	
Tetracentron sinense		II		
Cercidiphyllum japonicum	NT	II		
Eucommia ulmoides	VU	II		
Rehderodendron macrocarpum	NT	II		
Emmenopterys henryi		II		
Qiongzhuea tumidinoda		II		
Machilus pingii		II		
Phoebe zhennan	VU	II		
Cinnamomum camphora		II		
Cinnamomum longepaniculatu		II		
Ormosia hosiei	NT	II		
Ormosia henryi	LC	II		
Camptotheca acuminata		II		
Magnolia officinalis	EN	II		
Amentotaxus argotaenia	NT	III		
Tapiscia sinensis	VU	III		
Euptelea pleiospermum	LC	III		
Coptis chinensis		III		
Acer catalpifolium		III		
Pterostyrax psilophyllus	VU	III		
Pteroceltis tatarinowii	LC	III		

Trillium tschonoskii		III		
Dysosma versipellis		III		
Gastrodia elata	VU	III		

Annex E-3: Status of endemic animals in YRB (excluding fishes)

Species	IUCN Redlist	Protection Class	Endemism	Remarks
Panthera pardus	VU	I		
Neofelis nebulosa	VU	I		
Moschus berezovskii	EN	II		
Macaca mulatta	LC	II		
Macaca thibetana	NT	II		
Cuon alpinus	EN	II		
Selenarctos thibetanus		II		
Martes flavigula		II		
Lutra lutra	NT	II		
Viverricula zibetha		II		
Viverra indica		II		
Felis chaus	LC	II		
Profelis temminck		II		
Capricornis sumatraensis	NT	II		
Naemorhedus goral		II		
Manis pentadactyla	CR	II		
Aix galericulate		II		
Milvus migrans	LC	II		

Accipiter gentilis	LC	II		
Accipiter nisus	LC	II		
Buteo bute	LC	II		
Circus cyaneus	LC	II		
Aquila danga		II		
Falco tinnunculus	LC	II		
Tragopan temminckii	LC	II		
Lophura nycthemera	LC	II		
Syrmaticus reevesii	VU	II		
Chrysolophus pictus	LC	II		
Chrysolophus amberstia e		II		
Otus bakkamoena	LC	II		
Strix aluco	LC	II		
Glaucidium cuculoides	LC	II		
Andrias davidianu	CR	II		
Python molurus	VU	I		
Palea steindachneri	EN	II		

ANNEX F

Value addition from ADB/GEF project to UNDP/GEF work in Chishui River Basin

Objectives	UNDP / GEF project results	ADB / GEF increment building
Overall objective: Development of Eco-compensation mechanis	Partially achieved, mainly focus on water quality within the envir	Building on water quality eco-compensa tion success, and expand to overall river

m for river basin biodiversity co nservation and enhance enviro nmental quality	onmental sector	basin ecosystem management
Innovation	Link the watershed service prov iders to the water users directly	To introduce the Gross Ecosystem Prod uct (GEP) metrics, which was not includ ed in the UNDP project, but is essential f or a large scale eco-compensation mec hanism such as this one To introduce the Natural Capital Lab Init iative to integrate the green financing an d knowledge sharing into the eco-comp ensation mechanism; To include more than the watershed ser vices in the eco-compensation mechani sm. Account for biodiversity conservati on more explicitly.
Eco-compensation framework developed	Payment for Watershed Service framework for water quality dev eloped and promoted to imple mentation by the department of environment protection in Zunyi	Eco-compensation mechanism develop ed for the whole river basin that extends from Yunnan, Guizhou and Sichuan prov inces. The mechanism is expanded to n atural resources and land use, agricultur e, forestry, water resources, tourism sec tors, and thus become an operational co mprehensive eco-compensation frame work.
Pilot demonstration	Local and very small scale. Wat er provision services that link to 22 household for their 6.7 ha sl oping cultivated farmland resto red	Large at river basin scale. Two pilot de monstrations, one is river basin protecte d area eco-compensation mechanism, a nd the other one is for agriculture field p lastics pollution control in middle reach es of Yangtze River that covers 6 provin ces
Implementation capacity	Training and institutional capac ity for the department of enviro nment protection	Training for all key stakeholders, and est ablish natural capital lab that ensure sol id science based, fair and transparency by third party monitoring and evaluation
Global environmental benefits	Fish biodiversity conservation f or three threatened fishes, inclu ding 2 critically endangered thr ough development of environm ental protection policy.	On all 27 threatened species, including 6 critically endangered, 9 endangered a nd 12 vulnerable species, expanding pro tected areas by 80,000 ha and restore 2, 000 ha of forests/ forestlands, and impr oving management effectiveness acros s over 480,000 ha of protected area. As complement to this, there will be avo

		idance of additional plastic pollution in agricultural areas of 3 provinces.
Direct beneficiaries	Highly localized (no numbers av ailable)	1.787 million estimated in CRB

ANNEX G

More detailed analytical perspectives on agricultural field plastics use in YRB

Currently, provincial agencies have limited opportunity to cooperate on natural resource management, and to coordinate economic development across the YRB because of (i) fragmented responsibilities for natural resource management across the various agencies, (ii) competing priorities and policies within and across sectors, and (iii) limited options and mechanisms for upstream–downstream coordination. Given the manifold, interrelated and cross-boundary issues that need to be addressed, a new approach to achieve integrated environmental management and green development is needed. This revised approach – and eco-compensation mechanism - underpinned by Gross Ecosystem Productivity (GEP) measurements, should balance natural resource management with improved agricultural productivity, maintaining food supply security and increasing the resilience of the environment and people. This will require (i) synergies with other social, economic, and environmental objectives; (ii) enhanced cooperation and coordination within and between provinces beyond administrative barriers; (iii) responsible and inclusive governance; (iv) organized planning; and (v) stronger institutional capacity and cooperation.

In 2017 the Ministry of Agriculture and Rural Affairs (MARA) initiated an "Agricultural Film Recycling Action Plan, which was piloted in Gansu, Xinjiang and Inner Mongolia across corn, cotton and potato crops. The main features of the action plan included: i) reduction of film cover, ii) standardization of film products, iii) mechanization of film collection, iv) promotion of recycling processes and systems in cooperation with farmer cooperatives and enterprises. Some lessons learned from the early implementation have been interwoven into the activity sets under this outcome. The action plan experience will also serve as the reference basis for activities under Output 3.2 (three government-lead action plans).

Despite ongoing reforms, agricultural field plastic waste continues to enter the ecosystems of the YRB and other areas in large quantities. Efforts to meet obligations under international conventions and voluntary instruments have reduced the risks of some types of chemicals and wastes in PRC, but progress appears to be uneven, with some implementation gaps. Some large cities have been able to initiate recycling programs which cover plastics, and do include agricultural plastic mulch films, and possibly plastic drip tapes. However, in other areas there are a number of challenges, which include, remoteness of locations, steep slope terrain, lack of awareness of new regulations and unwillingness of farmers to consider new approaches (including switching), limited if any, infrastructure, difficulties with collection and transport, lack of financing and unproven economic models (in some areas this recycling is done as a micro/small enterprise).

During PIF preparation, municipalities such as Anzhou, located in the remote far north of Sichuan Province reported limited progress in their efforts to address agricultural field plastic use and recycling. This is attributed both to the need for plastics for their agricultural productivity and water use efficiency; and the remote location preventing the export of recovered plastics for recycling. Another factor stated is the crop species. Those farmers with higher value, fast growing crops such as tobacco are better able to absorp the additional costs of thicker film during purchasing and disposal. Growers of crops with a lower profit margin such as cotton and red sorghum are less likely to adopt thicker plastics films continue to combine plastic mulch with plastic drip tapes, or undertake the expensive recovery processes.

Addressing these gaps should continue to be a priority, especially when initiatives are able to take account of the Gross Ecosystem Product (GEP) in the assessments of both baseline and impact assessments and use this as a foundation for the use of innovative financial mechanisms in addressing the challenges of the YRB. By building capacity and curating existing knowledge of the ecosystems, agricultural environment and biodiversity, holistic solutions can be identified and implemented.

On the pressing matter of plastics pollution, the NDRC and MEE issued Circular No. 80 on 22 January 2020 an "Opinion on Further Strengthening the Control of Plastic Pollution". Alongside many new guidelines focusing on the avoidance of consumer plastics and their leakage into the environment there is specific focus on agricultural mulching films and other agricultural plastics (which presumably includes drip tape). Previous efforts to reduce the use of plastics have yielded mixed results, but the government has indicated that this new policy provision be more serious and systematic in tackling these issues.

Circular No. 80 states that the production and sale of low-density polyethylene agricultural mulch with a thickness of less than 10 microns will be prohibited. This increase in thickness has been mandated to promote the increased recovery of plastic mulch films at the end of each growing season. Industry estimates place the ability to recover 8 micron film at <11% whereas with 10 micron film the recovery rate increases to 32%. The circular also calls for parties to establish and improve the waste agricultural film recycling infrastructure. The Circular is less prescriptive on other agricultural plastics such as fertilizer and pesticide packaging, and the plastic drip tape.

The thicker mulching films have a price penalty for the farmers and as such encouraging adoption of the new materials will be challenging. In addition, the cost of recovering the plastic mulch from the fields and disposing of it is significantly higher than the current practice of leaving it in the soil. Some crops, such as Tobacco are better able to absorb this additional cost, while cotton and red sorghum have lower profit margins and so experience lower adoption rates for thicker films.

Plastic mulching films and drip tapes recovered from fields are severely contaminated with soil, crop and pesticide residues. The films and tapes will have also suffered photo-degradation from exposure to the sun and elements. These issues make the recovered agricultural field plastics extremely difficult to recycle and, as such, unattractive to recycling companies. The difficulty associated with recycling recovered plastic mulch combined with the 21% increase in tonnage driven by the new government policies means that existing recycling technology and facilities will not be able to successfully recycle this material. The municipality of Anzhou has been identified as a potential project focus to address overall plastic management compliance issues ,whilst the Chishui Rvier Basin, famous for its Moatai industry, has a signficiant area of Red Sorghum production, a crop which is struggling to adopt new legislation and offers an opportunity to use eco-compensation in addressing an "industry" from raw material, through manufacturing to waste management. This also allows an overlap with other ADB CAD loans and the biodiversity element of this GEF project.

In some areas, such as "Zero-Waste Cities", the recovery rates have been increased, and there are ongoing recycling programs to support this. In Leshan, Sichuan province, for example, recycling volume has been increasing year by year. In 2018, the recovery rate of used agricultural plastic film was 74.8%, 10 percentage points higher than that of 2016 although details on the destination of this material is not available. The city has implemented a strategy for active recycling of agricultural plastics which has included training, on-site guidance, awareness creation, strengthened monitoring, restrictions on use of ultra thin film, use of alternative materials and introduction of new cropping cycles. [1]

In the target 6 provinces the increase in plastic recovery rates of plastic mulch film will translate into an additional 5,000 tons of recovered plastic films per year at the start of the period rising to 55,000 tons as the new 10 micron regulation takes effect. Plastic drip tape use is expected to remain steady or increase significantly because of the water saving qualities. In fact there is very little data on use of plastic drip tape in PRC. These is not apparent central repository of information, and statistics on PVC use in general are not disaggregated. There is however, acknowledgement of concerns in many countries, including PRC[2] In some countries, suppliers of plastic drip tape are now implementing grower compensation programs and "smart solutions" which include collection and recycling of plastic drip tape in the service offering to farming clientele.[3]

There are very few scientific studies in YRB on the extent of integration of drip tape /pipes with plastic mulch film, and the disposal practices. One study in Zinjiang, provides some insights - for some crops for which irrigation is used, such as cotton, there are a range of planting methods, including: (i) one film + no tape + four rows; (ii) one film + single tape + four rows; (iii) one film + double tapes + four rows; and (iv) double films + double tapes + four rows. The four

types of cotton field irrigation methods are as follows: (i) winter irrigation (spring irrigation) + routine flooding irrigation; (ii) winter irrigation (spring irrigation) + drip irrigation under mulch; (iii) seeding after drip irrigation + drip irrigation under mulch; and (iv) dry seeding before drip irrigation + drip irrigation under mulch. [4] Accurate estimates of drip tape use volumes and disposal practices in project areas will be undertaken during project preparation.

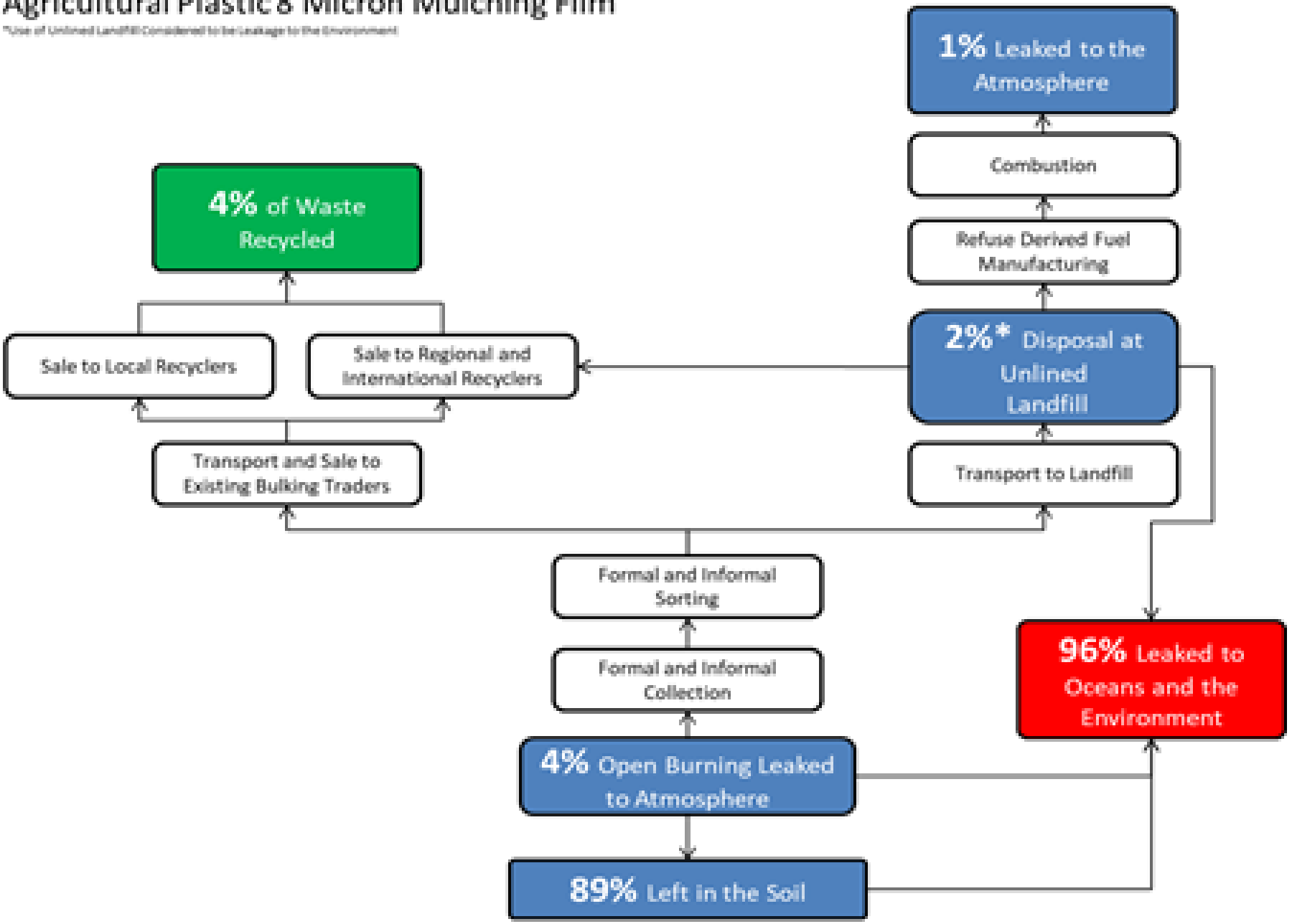
Without significant investment to support the adoption of thicker films and in the recycling technology and infrastructure necessary to recycle this material any increased in recovered film will be directed to landfill and combustion-based disposal options. The substitution of biodegradable mulch in key film-utilizing areas also offers an option for the reduction of plastic waste entering the agricultural ecosystem however the additional costs remain a major barrier to adoption..

In order to comply with the changing legislation local governments will need to advance the revision of relevant laws and regulations, and incorporate the prevention and control of plastic pollution elements, promptly update and release the catalogue of bans on plastic products, develop green design guidelines for plastic products, improve the quality control standards of recycled plastics and regulate the uses of recycled plastics, develop and revise standard identification of degradable materials and products, and establish and improve green management and evaluation standards for companies in key sectors of the economy. What is now needed are steps to articulate this into law and provide implementing rules, regulations and guidelines to get these into practice and avoid negative consequences. The outputs and actions below are consistent with the emerging policy on plastic pollution.

The targets under this outcome will be to (i) support the adoption and integration of thicker mulching films into the agricultural systems of the YRB, (ii) promote the increased recovery of plastic mulching films and plastic drip tapes from the fields, (iii) divert recovered agricultural field plastics away from landfills and burning, by offering recycling, re-use and alternative disposal options, and iv) promote alternative farming methods which reduce the negative impacts on soil, water and air. Without this intervention the effect of the new regulations, will be to reduce the plastics left in the fields but increase the hardship experienced by farmers, reduce productivity and increase the tonnage of recovered agricultural field plastics combusted through open burning, and the associated increase in Stockholm Convention POP's. Refer to the illustrations below on the pathways for the thinner (8 micron mulching film) and the newly mandated, thicker (10 micron) mulching film.

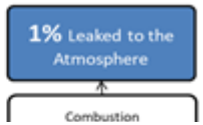
Agricultural Plastic 8 Micron Mulching Film

*Use of Unlined Landfill Considered to be Leakage to the Environment



Agricultural Plastic 8 Micron Mulching Film

*Use of Unlined Landfill Considered to be Leakage to the Environment



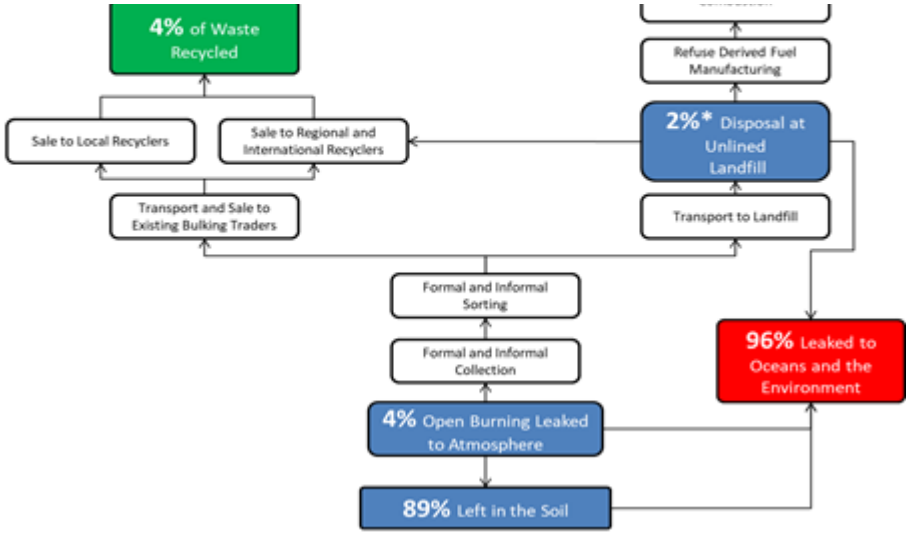


Figure 11: Pathways for 8 micron and 10 micron plastic mulch film

[1] Data from Province of Sichuan Department of Agriculture and Rural Affairs. (http://nynct.sc.gov.cn//nynct/c100632/2019/8/26/d8e7a0e384b1416d8a2eaa26ef82c0f2.shtml)

[2] Anecodotal evidence during project consultations. See also Liuyang Yao et al. " China's Water-Saving Irrigation Management System: Policy, Implementation, and Challenge" in Sustainability, 9, 2017, p2339.

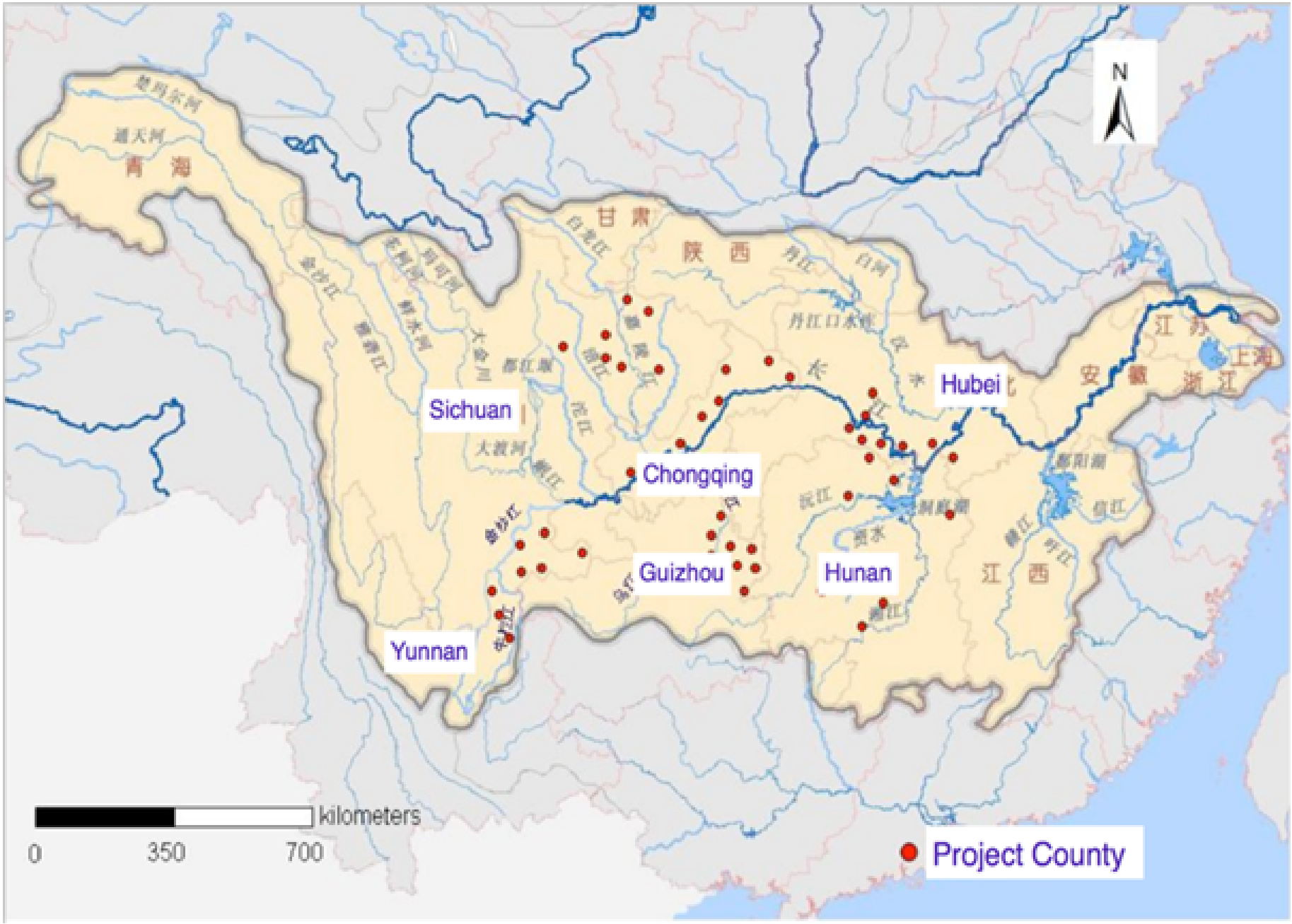
[3] See: i) https://www.alibaba.com/showroom/recycled-drip-tape.html;ii) https://driptips.toro.com/recycling-irrigation-plastics/, iii) https://www.environmentalleader.com/2014/08/dripline-manufacturer-offers-free-recycling/

[4] Ruisen Zhong et al. Planting and Irrigation Methods for Cotton in Southern Xinjiang, China", in Irrigation and Drainage. 2016. John Wiley and Sons. A few other references include: Xi-Ping Deng et al. " Improving Agricultural Water Use Efficiency in Arid and Semiarid Areas of China. Proceedings of the 4th International Crop Science Congress, 26 Sep – 1 Oct 2004, Brisbane, Australia; and Zhuomin Wang et al. "Food–Energy–Water Analysis at Spatial Scales for Districts in the Yangtze River Basin (China)", in Environmental Engineering Science, V. 36, No 7, 2019.

1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.

YRB General Project Areas

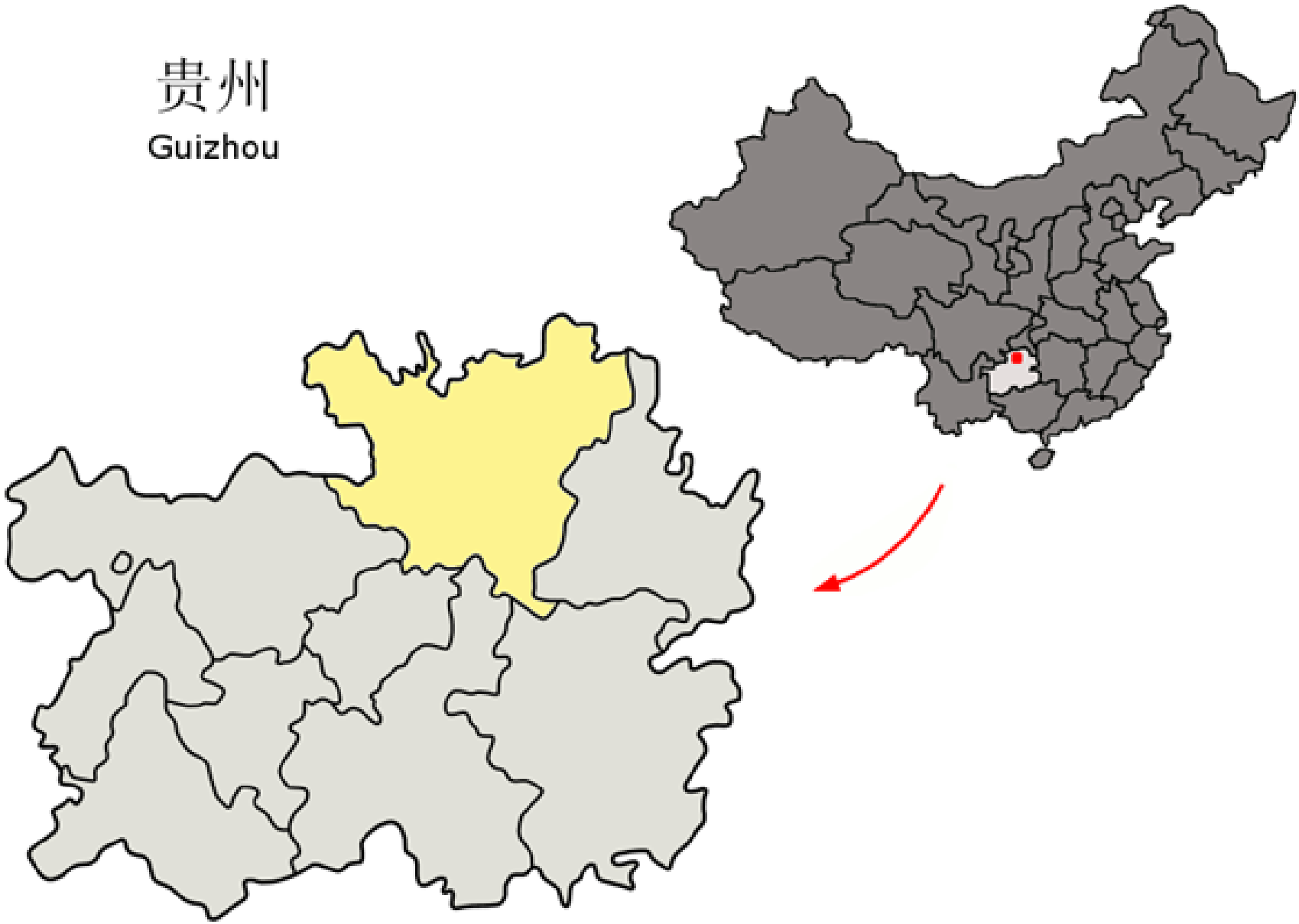


Coordinates for a good part of the work under Outcome 2

Zunyi Municipality, Guizhou China

27° 43' 19.2" N, 107° 1' 51.6" E

Location of Zunyi City jurisdiction in Guizhou

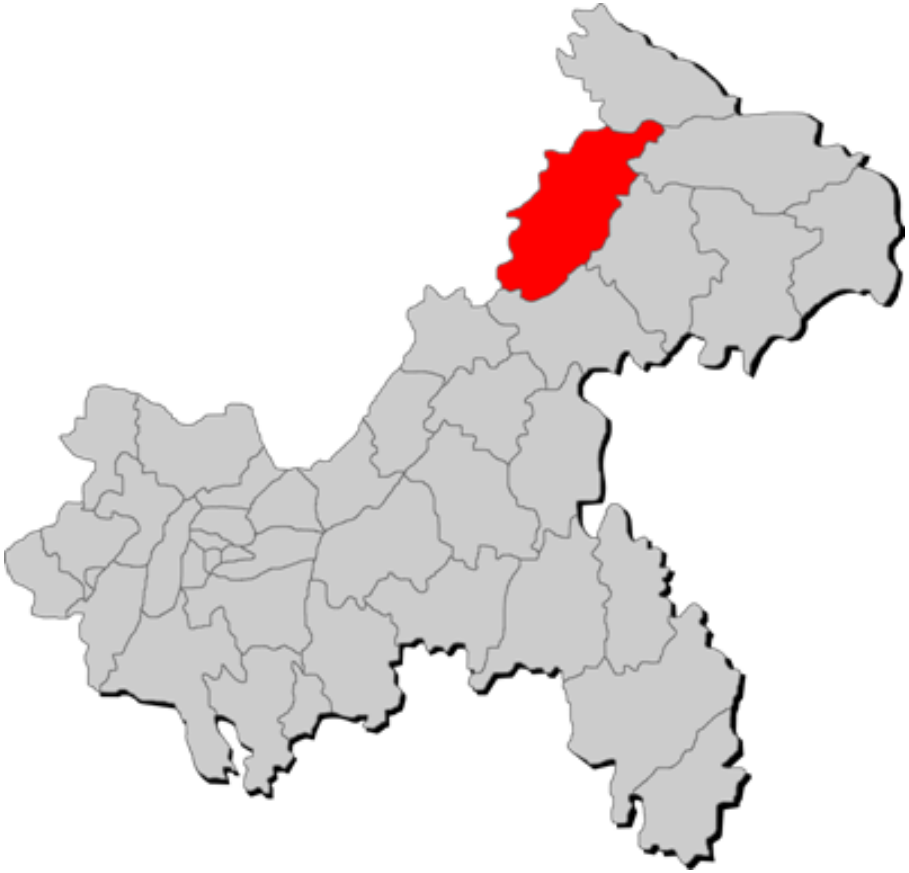


Coordinates for 4 of 6 project areas under Outcome 3 (agricultural field plastics)

Kaizhou District of ChongQing Municipality

31° 12' 39.96" N, 108° 24' 25.2" E

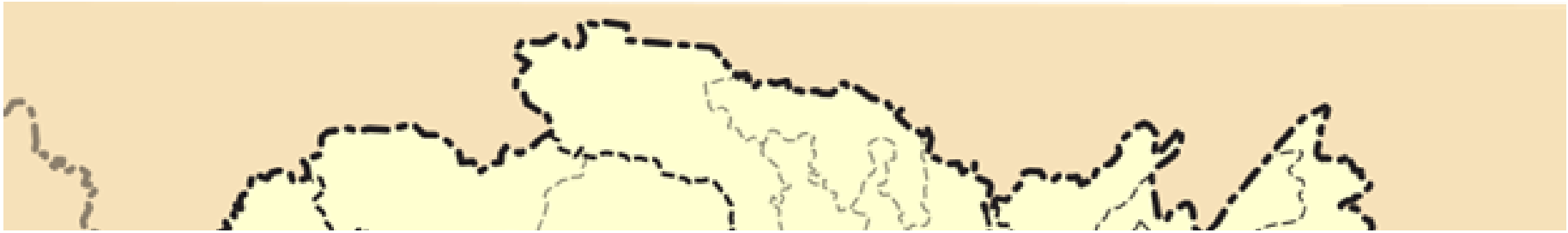
Location of Kaizhou in Chongqing

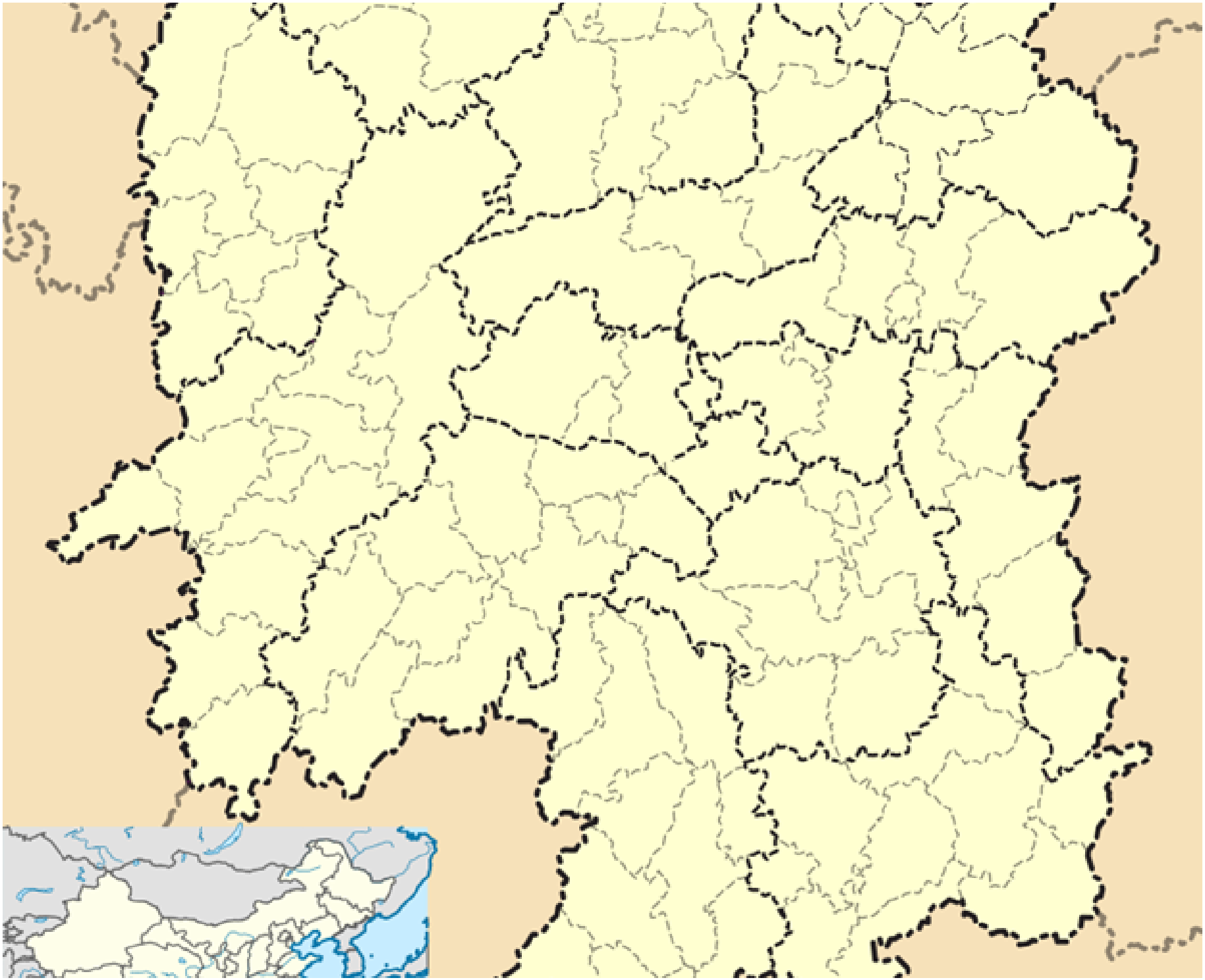


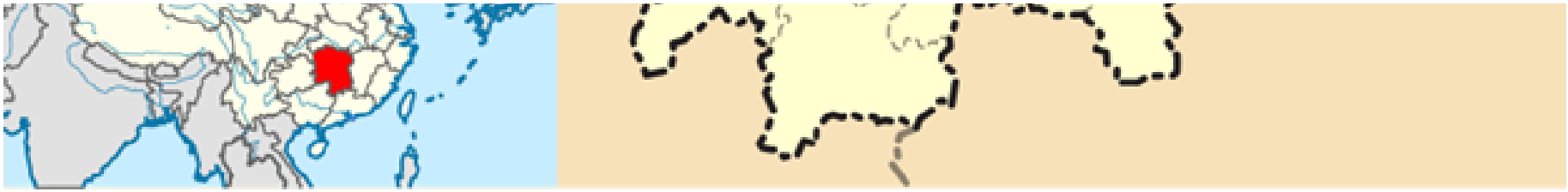
Lengshuitan District of Yongzhou City, Hunan Province

26° 27' 12.24" N, 111° 35' 32.64" E

Lengshuitan located in Hunan



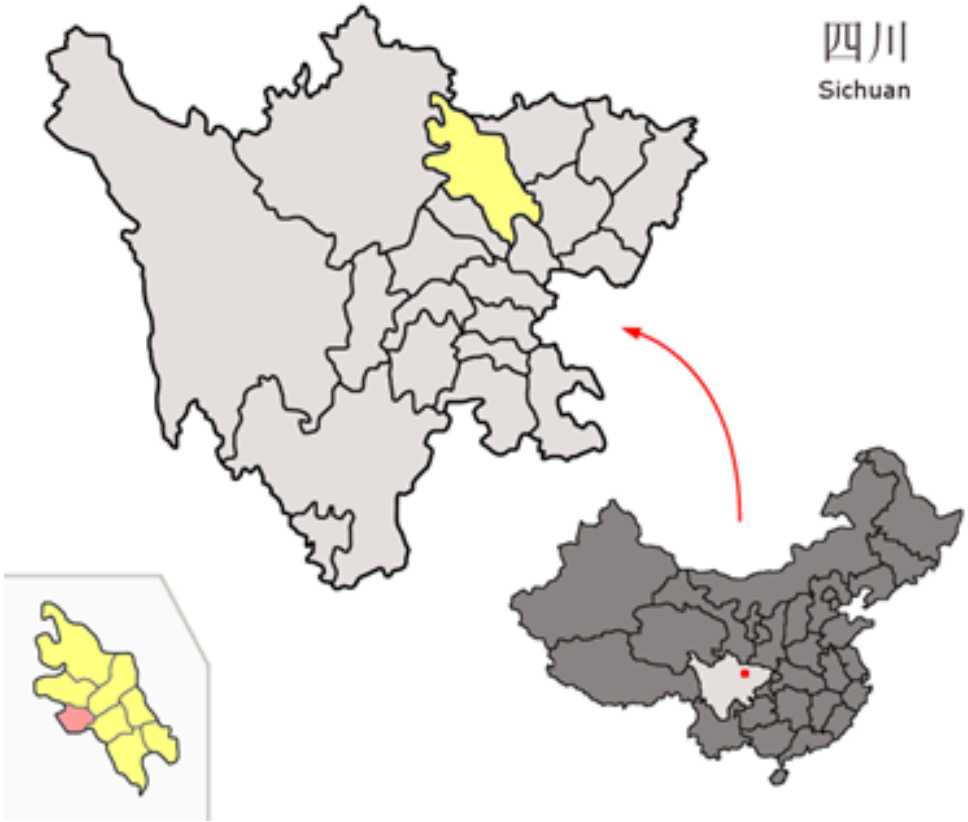




Anzhou District of Mianyang City, Sichuan Province

31° 32' 5.64" N, 104° 34' 1.92" E

Location of Anzhou District (red) within Mianyang City (yellow) and Sichuan

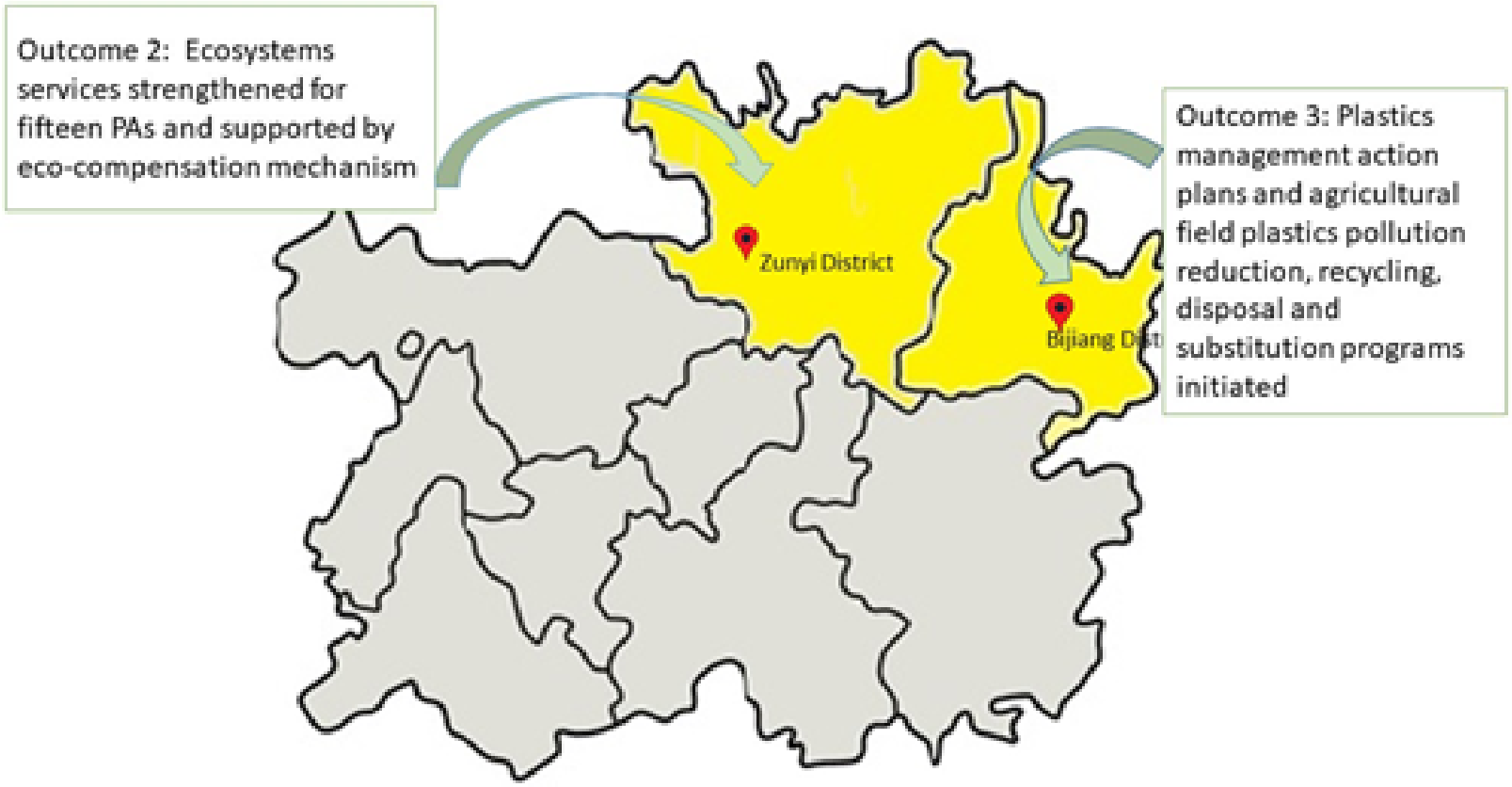


Bijiang District of Tongren City, Guizhou Province.

27° 43' 53.76" N, 109° 11' 22.2" E

Tongren in Guizhou

Map of Contiguous Project Areas in Guizhou


Outcome 2: Ecosystems services strengthened for fifteen PAs and supported by eco-compensation mechanism
Zunyi District
Bijiang Dist
Outcome 3: Plastics management action plans and agricultural field plastics pollution reduction, recycling, disposal and substitution programs initiated

2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities Yes

Civil Society Organizations Yes

Private Sector Entities Yes

If none of the above,please explain why:

Stakeholder Engagement

Annex H provides information on stakeholder consultations undertaken in the preparation of the PIF. Below is a table which summarizes the key stakeholders and anticipated roles, which will be elaborated in a plan during project preparation.

Organization	Anticipated Role
Government	
Ministry of Finance (MoF)	Overall supervision and GEF coordination Engagement: Reporting and participation on PSC
National Development and Reform and Commission (NRDC)	ADB and GEF Executing Agency Chair, GEF Project Steering Committee Engagement: PSC advisory, provincial/local departments participate in project activities
Ministry of Ecology and Environment (MEE)	Implementing partner and member, Project Steering Committee Engageement: PSC advisory, provincial/local departments participate in project activities
Ministry of Agriculture and Rural Affairs (MARA)	Implementing partner and member, Project Steering Committee Engagement: PSC advisory, provincial/local departments participate in project activities
National Grassland and Forestry Administration	Implementation partner and member, project Steering Committee

y Administration	g Committee Engagement: PSC advisory, provincial/local departments participate in project activities, under Outcome 2; and coordination with other GEF BD projects
Provincial Governments	Implementing partners; recipients / beneficiaries of technical assistance and capacity development
District /City/Municipal Governments	Implementing partners; recipients / beneficiaries of technical assistance and capacity development
GEF Agencies	
ADB	General technical and oversight and fiduciary management through the project cycle. Reporting to GEF and MOF
WWF – China	Coordination with Yantgtze Protected Area Network, plastics pollution management (Smart Plastic Cities) initiative
UNDP	Coordination with projects in managing Chemicals and Wastes (including E-Wastes); and biodiversity project in upper Yantgze River Basin (Outcome 2)
World Bank	Coordination with FOLUR work and various loan projects in similar areas
IUCN	Knowledge sharing with respect to GEP (reference Output 1.2) Coordination agreement with GEF-7 PFD on Yangtze River Biodiversity.
UNDP	Close consultations to build on and follow up the TER recommendations from the GEF ID 5096 in relation to Chishui River Basin. Coordinate with GEF 7 biodiveristy project in Dali and National Giant Panda Park
UNIDO	Coordination and sharing of knowledge on Chemicals and Wastes initiatives, including plastics
FAO	Coordination with proposed project under GEF FOLU

FAO	Coordination with proposed project under GEF PULSE R as per agreement (see Section 6)
Civil Society / Multi-Stakeholder / International Organizations	
Basel and Stockholm Convention Regional Centre for the Asia and Pacific Region in China	Coordination with BRS Convention Secretariat activities and source of technical data and knowledge related to Outcome 3
The Nature Conservancy (TNC)	Potential implementation, capacity development and knowledge partner for protected area management in Chishui River Basin
China Eco-Compensation Policy and Research Center (CEPRC)	Inclusion Under Outcome 4 to provide policy guidance and advice on eco-compensation in the context of Natural Capital Lab
China Council for International Cooperation on Environment and Development (CCICED)	Policy advisory and knowledge partner, particulary for Outcome 4 on Natural Capital Laboratory
Farmer Cooperatives (Green CAD loan project areas)	Source of data on use and disposal practices related to agricultural field plastics Inclusion in project activities under Component 3 – with respect to preparation of action plans, training, capacity development, and efforts to reduce agricultural field plastics pollution.
China Plastic Reuse and Recovery Association	Collaboration under Outcome 3. Links to working through the plastics supply chain
Beijing Forestry University	Capacity development and knowledge partner, particularly for Outcome 2 on biodiversity conservation.
Industry and Private Sector	
SMEs	Potential beneficiaries under the eco-compensation mechanisms being designed
Other enterprises	Potential beneficiaries under Outcome 3 – related to pollution reduction and agricultural field plastics

ANNEX G: Summary of Stakeholders Consulted

Subject Matter Experts (convened by Ministry of Finance)

LI Jianmin, Deputy Director General/ Professor, Department of Farmland Enhancement

YAN Changrong, Professor, The Institute of Environment and sustainable development in Agriculture, Chinese Academy of Agricultural Sciences

JIN Leshan, Professor, College of Humanities and Development Studies, China Agricultural University (CAU) and Executive director, China Eco-compensation Policy Research Center (CEPRC)

JIANG Nanqing, Secretary General, China Plastic Reuse and Recovery Association

CHEN Yuan, Professor, Basel Regional Center of MEE and Tsinghua University, Beijing

ZHOU Chuanbin, Associate Professor, Research Center for Eco-Environmental Science, Beijing

Ministry of Finance

Mr Wang Peng, Deputy Director and GEF Operational Focal Point
Ms Wu Yali

National Development and Reform Commission

Mr. Liu Tong, Department of Regional Vitalization
Chen Zhiying, Department of Regional Vitalization
Hou Linchun, Department of Regional Vitalization

Zunyi City, Guizhou Province

WANG Zhenfei, Zunyi Municipal Development and Reform Bureau
ZHAO Yi, Zunyi Municipal Bureau of Nature Resources
FENG Yuhui, Zunyi Municipal Bureau of Agriculture and Rural Affairs
LI Daixun, Zunyi Municipal Ecological Environment
LIU Bo, Zunyi Municipal Forestry Administration
Zunyi Municipal Agriculture Development Office
Xishui National Nature Reserve
Chishui Suoluo National Nature Reserve
Members of Yangtze River Upper Reach Rare and Endemic Fish National Nature Reserve
Enforcement Officers of UNDP project and World Bank project on Chishui River.
YANG Hui, Development and Reform Bureau of Xishui County
MU Zhixia, Nature Conservation Bureau of Xishui County
DAI Zhanbing, Development and Reform Bureau of Chishui County
LIU Dingming, Forestry Administration of Chishui County
LIU Bangyou, Administration of Chishui Cyatheaceae National Nature Reserve

Luzhou City, Sichuan Province

SHI Xinyu, Guizhou Provincial Development and Reform Commission
DING Xiangyu, Guizhou Provincial Development and Reform Commission
ZHANG Yixian, Luzhou Municipal Development and Reform Bureau
ZHAN Yong, Luzhou Municipal Bureau of Nature Resources and Planning
WANG Jing, Luzhou Municipal Ecological Environment
XIE Fang, Luzhou Municipal Bureau of Water Affairs
ZHAO Yao, Luzhou Municipal Bureau of Agriculture and Rural Affairs
ZHANG Lei, Luzhou Municipal Forestry and Bamboo Industry Administration
WANG Xiaoqian, Deputy Governor of Hejiang County
RAN Anjian, Deputy Governor of Xuyong County
TAN Xin, Development and Reform Bureau of Gulin County

Chongqing Municipality

MIAO Wei, Development and Reform Commission of Chongqing
WU Peng, Development and Reform Commission of Chongqing
GAO Renwei, Chongqing Supply and Marketing Cooperative
LI Ming, Nature Resources and Planning Bureau of Chongqing
FAN Weiguo, Ecological Environment Bureau of Chongqing
WU Chenghong, Chongqing Forestry Administration
WANG Wei, Administration of Chongqing Rare and Endemic Fish National Nature Reserve
ZHOU Tao, ADB Project Management Unit for Green CAD loan

National Forestry and Grassland Administration

Wang Zhigao, Director General, Department of Protected Areas
Yuan Jingzheng, Director, Wildlife Protection Division, Department of Forestry, Guizhou Province
Tang Xiaoping, Deputy Director, Office for National Park Pilot

Beijing Forestry University

Prof. Lei Guanghan
Dr Zeng Qing

Ministry of Agriculture and Rural Affairs (MARA)

LI Jianmin, Deputy Director General, Professor, Department of Farmland Enhancement
Yan Changrong, Professor. Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences

Ministry of Ecology and Environment (MEE):

Yuan Chen, Professor, Basel Regional Center of MEE and Tsinghua University
Fang Yu, Professor, Chinese Academy of Environmental Planning of MEE
Jin Leshan, Prof., College of Humanities and Development Studies, China Agricultural University (CAU), Executive director, China Eco-compensation Policy Research Center (CEPRC), NDRC

Chuanbin Zhou, Associate Professor, Research Center for Eco-Environmental Science (plastics specialist)

United Nations Development Programme (UNDP)

Christine Wellington-Moore, Programme Advisor Montreal Protocol Unit/Chemicals (now re-assigned), UNDP Regional Office for Asia and Pacific (ROAP), Bangkok
Han Yan, Programme Coordination Officer, UNDP Resident Mission, PRC
Chaode Ma, Programme Director, UNDP Resident Mission, PRC
Gabriel Jaramillio, Regional Technical Specialist, Ecosytems and Biodiversity, UNDP ROAP, Bangkok

IUCN

Zhang Yan, Programme Director, IUCN, PRC

The Nature Conservancy (TNC)

Robert Tansey, Senior Advisor, External Affairs & Policy, Northeast Asia and Greater China
Jin Tong, Science Director, China Program
Li Kai, Director of External Affairs, TNC China

China Plastic Reuse and Recovery Association

JIANG Nanqing, Secretary General

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.

Preparation of the ADB loan for Yangtze River Green Ecological Corridor Comprehensive Agricultural Development, included consultations which led to drafting of an Ethnic Minority Development Plan (EMDP).

The EMDP is made based on relevant laws and regulations of the People's Republic of China (PRC), and in accordance with the Asian Development Bank's (ADB) Safeguard Policy Statement (2009) and policies on social dimensions; and prepared by the State Office for Comprehensive Agricultural Development (SOCAD) in coordination with the Provincial PMOs for Guizhou Provincial Office for Comprehensive Agricultural Development (POCAD) and the Yunnan POCAD, the Tongren City Office for Comprehensive Agricultural Development (CAD), the Qujing City Office for CAD, the Zhaotong City Office for CAD, and the 10 County Offices for CAD (COCADs), as well as relevant departments of local governments; and with the assistance of the transaction technical assistance (TRTA) social development specialists. Based on social analysis, ten counties will be covered by the plan under this loan. The overall objectives of the EMDP are to ensure that (i) the project does not cause adverse impacts to ethnic minorities; (ii) the project provides the opportunity for the local residents, including ethnic minority groups, women, and the poor to reap project benefits; (iii) the project benefits for the ethnic minorities are equal to, or greater than, the mainstream ethnic group in the PRC—the Han; and (iv) ethnic minorities, women, and the poor participate fully in the project planning and implementation. The EMDP actively strives to incorporate mechanisms into the project component planning and design that will ensure the equal or enhanced enjoyment of project benefits by ethnic minority groups, women, and the poor.

Of the total 145,541 beneficiaries living in the project area of Guizhou Province, 64,318 persons are ethnic minorities or 44.19% who will benefit from the construction of modernized farming systems, strengthened waste and environmental management systems, and strengthened institutional capacity and coordination. Of the total 58,444 beneficiaries living in the project area counties of Yunnan Province, 6,050 persons are ethnic minorities or 10.35% who will benefit from the construction of modernized farming systems, strengthened waste and environmental management systems, and strengthened institutional capacity and coordination.

In the Guizhou Province, Miao, Tujia, and other minorities represent 44.19% or 64,318 population. Among these ethnic minorities, Tujia minority is the dominant ethnic minority group. In the Yunnan Province, Miao, Yi, and other minorities represent 10.35% or 6,050 persons. Of these ethnic minorities, Miao minority is the dominant ethnic minority group.

The EMDP contains detailed data on: i) socio-economic characteristics of ethnic minorities, ii) distribution by district, iii) religious beliefs and cultural profiles, iv) industrial structure by province and county, v) gender status of ethnic minority groups, and vi) poverty profiles.

According to the feasibility studies, the loan project aims to increase the forest coverage of the project area to over 70%, and local farmers' per capita income by over CNY500, and reduce the area affected by water loss and soil erosion by 50%, fertilizer consumption by 15%, and pesticide consumption by 20%. According to the fieldwork and the collected data, farmers and cooperatives in the project area are beneficiaries. Due to the serious shortage of agricultural infrastructure, local agricultural production relies heavily on natural conditions, and involves extensive labor input, but with low output and income, so agricultural production is for self consumption mainly.

The emphasis in the EMDP is on ensuring social inclusion. The objective is to ensure that ethnic minority people are given the opportunity to fully participate in all stages of the project cycle, to ensure that they have the opportunity to take advantage of project benefits and that all the strategies developed to mitigate against the negative project impacts are sensitive to the culture and situation of all affected-minority groups.

In the loan project areas of Guizhou and Yunnan provinces, women are playing an increasingly larger and important role in ecology and agriculture. The project will have significant benefits for women, similar to ethnic minorities and other population.

The GEF project will be closely aligned with the implementation of this EMDP, and contribute to benefits for target ethnic minority populations, including: i) job creation, ii) agricultural modernization, iii) reduction in non-point sources of pollution, including exposure to chemicals, and iv) capacity development.

3. Gender Equality and Women's Empowerment

Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).

Preliminary Gender Assessment

The GEF and ADB initiatives combined, will cover Hubei,, Hunan, Chongqing, Sichuan, Guizhou and Yunnan – six provinces (including municipality of Chongqing), 47 counties (cities, districts), 142 townships, involving a total of 716 administrative villages, 1,787 million people, including 864,750 women and 142,212 poor.

Rural society in China has undergone significant social transformation over the past decades. The advent of rapid urbanisation, the introduction of transitory and permanent migration to urban centres, emigration from the countryside, an increase in basic literacy levels, and new economic linkages with emerging urban areas have had a contributory impact on women. All of these changes have had an impact on women in project areas affecting the social norms, impinging on various aspects of lifestyle and livelihoods, about employment and responsibilities of women within the village

In the past, women have received support from government policy, financial resources and technical training and it is envisaged that this GEF project will further such support in these areas for women living in agricultural areas. According to ADB-supported surveys, and interviews with the villagers, the economic position of women in their families is increasing, and they have more rights in family decisions, such as child education, house construction, or purchasing goods and consumables

General Issues for Women's Development

According to interviews and field surveys, it was found that women in the project area had less time to participate in capacity development, education and training activities carried out by the local governments or other departments. This is due primarily to the priorities of housework, child care and elderly care. The GEF project will take account of the special circumstances of women when proposing capacity development and training.

Secondly, in the project areas, the vast majority of men go out to work, with women remaining close to home. It is difficult for them to accept new technology and knowledge, because of the need to combine household duties with agricultural or other forms of casual work, such as construction – for wages in the order of 100 CNY (USD 14.30) a day.

Women in the project area generally have less environmental awareness and understanding of markets. For example, women tend to use pesticides and fertilizers more than men. This limited agricultural technical knowledge and understanding results in relatively high use of chemicals, with adverse impact on the environment. Insufficient agricultural infrastructure, including lack of paved roads and mechanization, adds to the burden. Women are also less skilled in use of e-commerce applications to promote sale of agricultural produce.

Gender and Ecosystems Services

Women and men often have differential access to and differential benefits from ecosystem services; hence their understanding of ecosystem services also differ. Policies aimed at promoting equitable access and distribution of benefits from natural resource management will need to take these factors into account. International studies suggest that there are gender differences depending on the type of ecosystem service and the sector or subsector being considered.

Provisioning services

Fuel and timber. Women and men focus on different elements. Men appear more likely to have a higher awareness or perceived a higher value for firewood, charcoal and timber for profit-earning purposes, while women appear to have knowledge of direct use of domestic fuel supply, as well as a higher dependency on these services, but less so than men in extreme circumstances such as when crop failure or livestock losses occur.

Food: In some countries, men give higher importance to fisheries than women, although there are indications that women are more likely to pay for these services. Women clearly give more importance to domestic food supply – and most often work with men towards food production and security. Men are likely to own agricultural assets and make decisions on food production, while women play a key role in ensuring nutritional needs are met. In some countries, China included, gendered crop disaggregation (ie men and women associate with different crops) does occur.
Water supply: In most cases women value water supply services more than men or have higher willingness to pay for this service.

Medicinal products: Women are more active in valuation of medicinal products, primarly due to roles as household caregivers

Regulating services

Water quality control: Women generally have more knowledge and accord higher value to water quality control. However, in some parts of China, women with lower economic status are more likely to be attentive to costs and not willing to pay for wetland restoration that would contribute to better water quality

Erosion control and soil formation: Men and women appear to have equal appreciation of these services

Extreme event mitigation: Men are more likely than women to value this service, mainly because women have restricted access to information.

Cultural services

Recreation and tourism: There is no significant gender difference in this type of ecosystem service.

Aesthetic: No conclusive evidence available, however anecdotal evidence suggests that women see greater value in aesthetic services

Supporting services

Habitat conservation and biodiversity management: Women have greater awareness of and appear to be more willing to invest time and effort for habitat conservation and biodiversity maintenance than men. This applies to all ecosystem types: forest / agroforestry, waterbodies, mangroves and marine areas.

Gender and agricultural field plastics

Men and women can be equally at risk from hazardous chemicals during plastic production, usage and disposal. While there are few studies which look at gender differences, the negative health effects are likely to be equal. Workers in these industries can be exposed to a toxic mix of chemicals found in manufacturing environments. During these processes, plastic resin enters the workplace in the form of pellets, powders, granules, liquids or syrups. During the manual handling of the bulk product by opening, pouring, scooping, and subsequent stirring, mixing and grinding, sanding and buffering-dust, fumes and air contamination can lead to workers being exposed through a variety of methods.

Secondary microplastics (0.001 – 5 mm) are derived from plastic matter such as thin agricultural films, plastic bags, bottles or fibres (from clothes) due to physical and decomposing processes. The rate of fragmentation and decomposing of large plastic items is dependent on several variables such as weathering (UV radiation) and the plastics formulation. The causes and sources of marine pollution with microplastics are highly dependent on location, the level of waste management, cultural habits, industrial and other human activities. Depending on the habits of men and women, they may or may not contribute to marine pollution with microplastics, or be exposed to microplastics.

Plastics, which form part of municipal solid waste, are most commonly managed through landfilling, with high volumes being processed in PRC despite the ban on imports. Incineration is a part of plastics management and in PRC, these practices can be under controlled or uncontrolled conditions. Women and children are commonly active in waste picking at landfill sites, and hence subject to increased exposure.

Recycling of plastics does take place in many parts of PRC, particularly when imported wastes were still being processed. In many parts of the country plastic scraps are recycled in small family-owned workshops These small entrepreneurs wash, melt, extrude, and chop polyethylene into pellets that could be re-melted and turned back into plastic films. Safety equipment is not commonly used, and pollution controls are weak. The water and chemicals used to cleanse the plastic run directly into local rivers. These types of recycling business are more likely to be led by men., although women are commonly engaged in collection efforts.

Project Impacts on Women – Elements of Gender Action Plan (GAP)

As women play a significant role in the ecological environment and agriculture, the GEF project needs to account for the needs of women in the implementation process and ensure equitable benefits for women and men. An early assessment of the different effects of women, brings forward the following points:

i. During the implementation of the GEF project, and in the design of eco-compensation schemes, jobs can be created to absorb a portion of the labour force and provide more employment options for the local population, especially for women, ethnic minorities and the poor. This would supplement job creation opportunities provided by the ADB loan projects.

ii. Modern agriculture: Under the ADB loan, tractor roads, irrigation canals and other agricultural infrastructure will save women's time spent on agricultural production, reduce their labor intensity, and allow them to participate in social activities. Water tanks will help alleviate droughts, reduce women's labor costs, and increase output; stalk recycling will improve land fertility and the local ecological environment, and reduce fertilizer consumption. The GEF co-financing will continue to strengthen the capacity of women to understand and adopt good agricultural and ecological practices. These will be built into the design of the eco-compensation schemes.

iii. Non-point source pollution control: Under the ADB loans, purchase of pest control equipment, soil testing and formulated fertilization, and bio-pesticide and organic fertilizer extension will reduce the consumption of pesticides and fertilizers, improve the quality and competitiveness of farm products, and reduce women's labor input. The loans would contribute to reducing environmental pollution; conservation forests, revetments and river green belts will prevent floods, landslides and other natural disasters, reduce water loss and soil erosion, and crop damages, and protect women's personal safety and income. Under the GEF project, support will be provided for agricultural plastic mulch film recovery and recycling; which will offer enterprise opportunities for women, at various points in the chain.

iv. Capacity building: Offering training on crop cultivation, environmental protection, water and soil conservation, marketing, cooperative operation, etc. to local residents and cooperative leaders, including women, will improve women's cultivation skills, strengthen market and environmental awareness, and improve the operating level of cooperatives.

To maximize gender impacts, the GEF project has been designed to meet the ADB's Effective Gender Mainstreaming (EGM) categorization, and will be aligned with GEF Gender Equality Policy. A GAP, to be prepared during project preparation, would focus on:

i. ensuring women's equitable participation in project-related community-level and public consultations

ii. incorporating gender-responsive features in the design of eco-compensation schemes – particularly with respect to access and benefits from improved management of natural capital

iii. promoting increased employment and business opportunities for women, for example in mulch film recycling industries

iv. supporting women as 'agents of change' with respect to adopting new, environment-friendly practices and technologies

v. building institutional capacity with executing partners at provincial / county levels (ie Provincial Offices for Comprehensive Agricultural Development) for gender mainstreaming

vi. incorporating gender targets with the project results framework, and

vii. engagement of a gender equality specialist during project implementation.

Additional work on gender assessment and action plan will be supported during the PPG phase.

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes

closing gender gaps in access to and control over natural resources; Yes

improving women's participation and decision-making; and/or Yes

generating socio-economic benefits or services for women. Yes

Will the project's results framework or logical framework include gender-sensitive indicators?

Yes

4. Private sector engagement

Will there be private sector engagement in the project?

Yes

Please briefly explain the rationale behind your answer.

One element of a private sector engagement strategy under the project will be to explore opportunities to incubate public private solutions for conservation in the context of structuring of eco-compensation mechanisms. This draws from the IDB experience related to Natural Capital Lab.[1] Such a lab, under Outcome 4, would catalyze financial innovation, including work with anchor corporations to value and leverage natural capital in their supply chains. It would also serve as a forum for strategic dialogue and alliance formation, which would substantiate the economic case for investment in natural capital sectors, partner with large global initiatives that convene leaders in technology, science, conservation, and business to develop dialogues on natural capital innovation, and develop a network of ministries of finance and international actors, such as the parties to the Convention on Biological Diversity, to discuss how natural capital can be an asset and driver of development, not a cost. This could be timely in view of PRC's anticipated hosting of the 2020 CBD Conference of the Parties; as well as the hosting of the Ramsar Convention COP in 2021.

ADB and Alibaba (China) Co. Ltd signed a "Memorandum of Umderstanding for Development Partnership" (MOU) on 19 November 2019. The MOU identifies a number of areas for cooperation, some of which are relevant for this GEF project: i) promoting agricultural circulation efficiency and supply side reform through e-commerce and digital technologies, ii) establishing agricultural products traceability system on blockchain technology, iii) financing waste management, including re-use and recycling through goods exchange platforms, and iv) financial services technologies for environmental services payments and crowd-funding of ecological protection and reforestation. The GEF project is exploring the possibility of collaboration the Alibaba Group in setting up e-commerce marketing outlets for featured farm produce and rural tourist attractions.[2] Collaboration will also be forged with the ecological poverty reduction activities being undertaken by Alibaba's Ant Financial Services Group and the Ant Forest Application.[3] The Ant Forest application can (i) expand the geographic footprint of the proposed project by linking up with an established 'green finance' platform; and (ii) tap into the e-commerce payment mechanism for ecosystem restoration activities.

Discusssions have also been initiated with the Alliance to End Plastic Waste (AEPW) - USA, Europe and Singapore teams - to explore collaboration across the 3 GEF- supported projects in which ADB proposes to undertake work on plastics pollution.[4] For PRC, the AEPW is preparing a project ($ 6 million) which will invest in plastics pollution reduction in one urban area (focus on recycling of plastics in mixed waste); and one rural area, in Hubei province which aims to promote recycling of different forms of agricultural films. AEPW will work with GIZ, the China Petro Chemical Industry Federation (CPCIF) and draw on specialized expertise from its corporate members. In principle, AEPW will invite ADB to participate as ad hoc member of a project steering group, while ADB would invite AEPW to participate ad hoc in the Technical Advisory and Coordination Committee (TACC) (See Section 6 on Coordination). ADB and AEPW will share concepts once finalized, and use this as the basis to clarify the collaboration further.

Private sector co-financing opportunities will be explored further during project preparation.

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[1] s://www.iadb.org/en/news/idb-launches-natural-capital-lab-incubate-public-private-solutions-conservation

[2] Alibaba's DoubleCores + N Services Strategy develops *taobao* villages—rural areas with grassroots businesses and scalable e-commerce ecosystems.

[3] Ant Financial Services Group provides more than 500 million Alipay users with an online "carbon account" to measure how individuals' daily activities reduce carbon emissions. Plans are afoot to expand the focus into poverty-stricken areas through setting-up special protected areas, supplementary cash tree planting and livelihood support through growing honey and other products. Ant Forest works with the satellite firm GaGo to monitor the trees.

[4] Endplasticwaste.org

5. Risks to Achieving Project Objectives

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

Risk	Mitigating Options
Limitations in availability of usable data	This is a significant challenge, particularly with respect to data with respect to agriculture sector and the plastics industry. One specific challenge with respect to agricultural field plastics is that data is both fragmented across agencies, and not disaggregated by type / characteristics / use. Project prepareation activities will undertake some 'gap analyis' in this respect and propose some better definitions and metrics by product classification. For work on biodiversity, most data is maintained by local governments, which suggests the need to strengthen information sharing and institutional coordination both vertically and horizontally
Interprovincial relationships will be difficult to establish at working level for eco-compensation schemes	The NDRC will play a key role in creating the enabling conditions through its national and provincial level presence. NDRC will ensure that all the parties are brought together and that institutional arrangements are clear and fair to all parties.
Commitment of project agencies to cooperate and coordinate efforts to link environmental protection and agriculture development weakens because priorities change	The project steering committee will need to address these kinds of concerns. At the level of project implementation, it will be incumbent on the team to reiterate and demonstrate the direct and indirect benefits from interventions and the relevance to the overarching PRC policy objectives related to 'ecological civilization'.
Farmers, particularly small holders, are reluctant to adopt new technologies and practices	This could be addressed on multiple fronts: i) well designed behaviour change campaigns, ii) extension activities which clearly demonstrate benefits of adhering to good practices, and, iii) policy and regulatory interventions, including incentives and subsidies, to encourage engagement
Agricultural field plastics recycling difficult to implement	Efforts will be made to accelerate the collection process, which is critical in the chain. The more quickly a recycler can accumulate large qua

ycling difficult to implement due to market challenges	cal in the chain. The more quickly a recycler can accumulate large qua ntities of a particular material, the more likely he or she will be to: i) fin d a market, ii) realize transportation efficiencies, and iii) avoid lengthy s torage durations
Turnover of project personn el	Establish project administration system which rewards good performa nce, and maintains remuneration just above fair market rates. Encoura ge inclusiveness and diversity in the workplace
Climate change and variabili ty affects progress of projec t implementation	Capacity development will include disaster prevention and risk manag ement activities, for example how to respond in cases of flood, drough t, earthquake or other emergency situations. This will be coordinated w ith local governments and agencies as appropriate.
Issues with respect to land use rights arise with indigen ous people (including ethnic minorities)	The project will adhere to principles of Free and Prior Informed Consen t (FPIC) as per GEF minimum requirements. In particular the project wil l ensure: (i) mutually accepted consultation processes between the th e GEF project executors and affected communities and (ii) evidence of agreement between the parties as the outcome of the consultations. See attached Rapid Environmental Assessment and the narrative on a pplicable safeguards and proposed mitigating work during project prep aration.
Involuntary resettlement	Activities under Outcome 2 on expansion of protected area coverage might give rise to voluntary and/or involuntary resettlement concerns. I n this case, project design should eliminate resettlement issues by exp loring project and design alternatives; to enhance, or at least restore, th e livelihoods of all displaced persons in real market terms relative to pr e-project levels; and to improve the standards of living of the displaced poor and other vulnerable groups (e.g. through the eco-compensation). More details are provided in the attached Rapid Environmental Assess ment and mitigating initiatives during project preparation.
Threats to human health (C ovid-19)	The CoVID-19 situation has bought some stark challenges to the initial design of the project, and will also influence implementation. The pan demic created logistical challenges for the project team due to the hea vy restrictions on travel; and also limited the ability of local stakeholder s, notably ethnic minorities, farmers and local community members, to participate in full consultations due to lockdown situations, coupled wi th poor internet connectivity. Towards July and August 2020, in person government-related consultations were possible in Beijing, through fac ilitation from the Executing Entity and ADB PRC Resident Mission.

	Although PRC's Covid response measures appear to be well organized. should this situation persist during project preparation, the project tea m will work with the NDRC and other Agencies to develop work around solutions. As a matter of principle, the project will follow international and national guidance in its approach to managing risk and exposure t o the health hazards posed by the virus, as well as future pandemics at all times.

Initial Climate Risk Screening

The Yangtze River covers more than 2 million square kilometers; geographically one-fifth of the country; an d accounts for over 40% of the PRC's total population, and about 45% of the gross domestic product. It is o ne of the busiest inland rivers for freight traffic worldwide, is home to the largest hydropower plant in the w orld; and is the source of water for the South–North water transfer project. Nine provinces and two speciall y-administered cities make up the Yangtze River Economic Belt subregion, which includes three major urba n agglomeration areas: (i) the Yangtze River Delta Global Mega Agglomeration focused on Shanghai, (ii) th e Middle Yangtze City Cluster focused on Wuhan, and (iii) the Yangtze Upper Reaches focused on Chongqi ng.

Iin addition to environmental concerns outlined in the Project Justification section of this PIF, climate chan ge impacts have contributed to the reduction of lakes and wetlands, particularly in the middle and lower re aches. Preliminary climate risk screening, conducted through literature review, indicates that the Yangtze Ri ver Basin has been warming at a faster rate than the global average for more than a decade, with the conse quences being already apparent from the source to the estuary, including land degradation, drying wetland s, longer droughts, frequent and intense rainstorms, flooding, declining crop yields, and sea level rise. The Y angtze River Basin is affected by climate change in multiple ways; but most notably at the local level, throu gh the intensification of extreme events leading to floods, droughts, and soil erosion. The impact of climate change on agricultural industries of the region will be significant and profound, with declining water resour ces and rising temperatures potentially affecting crop production and influence the performance of the pro ject outputs (e.g., agricultural practices which are sensitive to water and temperature, restoration / reforest ation activities etc).

Hence, a preliminary *medium–high* risk rating could be assigned to the GEF project (corresponding with th e ADB loan classifications), which may require a more detailed climate change assessment for the GEF pro ject during project preparation in accordance with ADB and GEF practices.

Climate change risks were assessed by ADB, based on CMIP5[1] climate modelling outputs for 2050 (2041 –2060) under the RCP4.5 and RCP8.5 climate change scenarios.[2] For climate risk and vulnerability asses sment, the 47 project counties were grouped into six climatic regions based on river basins and geographic locations. It was projected that the annual mean temperature will increase by 2°C for the Yunnan project re gion and by above 2°C for all other river basins under the RCP4.5 climate change scenario. Under the high climate change scenario (RCP8.5), temperatures were projected to increase by 2.5°C for the Yunnan projec t region; while the other regions were also projected to increase by 2.6°C–2.7°C. Annual total precipitation was also projected to increase by 2%, 2%, 3%, 3%, 4%, and 4% under RCP4.5 scenario and by 0%, 3%, 2%,

was also projected to increase by 2%, 2%, 3%, 3%, 1%, and 1% under RCP 4.5 scenario and by 3%, 3%, 2%, 3%, 3%, and 1% under RCP8.5 scenario for the project regions of Yunnan, Sichuan, Guizhou, Chongqing, Hu bei, and Hunan, respectively.

Temperature increase is consistent over months and seasons. Change in the monthly distributions or seas onal patterns of projected precipitation and temperature across all project regions was not projected. Risin g temperatures were projected to cause higher potential evaporation and water demands from crops. It wa s estimated that water demands from crops will increase to 2% and 4% in 2050 under RCP4.5 and RCP8.5 climate change scenarios, respectively. Projected increase in precipitation will result in increased water flo w in rivers; and hence, more available water resources, including more recharges to groundwater. It was est imated that total water resources will increase slightly in 2050 under RCP4.5 and RCP8.5 climate change s cenarios, offsetting water demand increases in 2050. There is an observed trend in more severe storms in the last few decades. The CMIP5 climate models are projecting that precipitation is likely to have fewer but more intensive rainfall events in 2050; although, changes in monthly totals are not significant. Under the RC P4.5 scenario, projected maximum 24-hour rainfalls at 10-year return interval (which is the standard used f or designing infrastructure in the project preliminary design) will increase by 24%, 31%, 33%, 13%, 36%, and 14% for project regions of Yunnan, Sichuan, Chongqing, Hubei, Guizhou, and Hunan, respectively.

Actions to address climate concerns will be examined during project preparation. Under Outcome 2, there will be implications for selection of species, and siting (e.g. on gentle slopes) of tree crops used for restora tion of degraded forestlands. Expansion of the protected area system may help mitigate both flood and dro ught risks; and contribute to improved temperature control. Under Outcome 3, it is likely that farmland infr astructure and cropping patterns will be made more climate resilience through the ADB Green CAD loan in puts, however, it will be important to ensure that use of agricultural plastic mulch film and drip irrigation do es not increase significantly; or replaced by more sustainable, substitute measures.

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[1] Coupled Model Intercomparison Project (CMIP) is a standard experimental protocol for studying the output of atmosphere-ocean general circulation models (AOGCMs). CMIP provides a community-based method in support of climate model diagnosis, validation, intercomparison, documentation and data access. improvement.

[2] Representative concentration pathways (RCPs) are four greenhouse gas (GHG) concentration (not emissions) trajectories adopted by the Intergovernmental Panel on Climate Change for its fifth assessment report in 2014. The four RCPs—RCP2.6, RCP4.5, RCP6.0, and RCP8.5—are named after a possible range of radiative forcing values in the year 2100 relative to pre-industrial values (+2.6, +4.5, +6.0, and +8.5 W/square meter, respectively). The RCPs are consistent with a wide range of possible changes in future anthropogenic (i.e., human) GHG emissions, and aim to represent their atmospheric concentrations. RCP2.6 assumes that global annual GHG emissions (measured in carbon dioxide-equivalents) peak between 2010–2020, with emissions declining substantially thereafter. Emissions in RCP4.5 peak around 2040, then decline. In RCP6.0, emissions peak around 2080, then decline. In RCP8.5, emissions continue to rise throughout the 21st century

6. Coordination

Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.

Institutional arrangements:

The project institutional arrangements will be defined in greater detail during project preparation based on the Figure below. The overarching project oversight and technical guidance will be supported by a Project Steering Committee, chaired by the NDRC and consisting of key representation from the Ministry of Finance, Ministry of Ecology and Environment, Ministry of Agriculture and Rural Affairs, National Forestry and Grassland Administration and and other stakeholders. The Technical Advisory and Coordinating Committee, as mentioned below, will be multi-stakeholder in composition, but also include a local representation, project management team and technical specialists. Project management units (between 3 and 6) would be hosted at the provincial government level, for example, the Provincial Offices for Comprehensive Agricultural Development (POCAD).

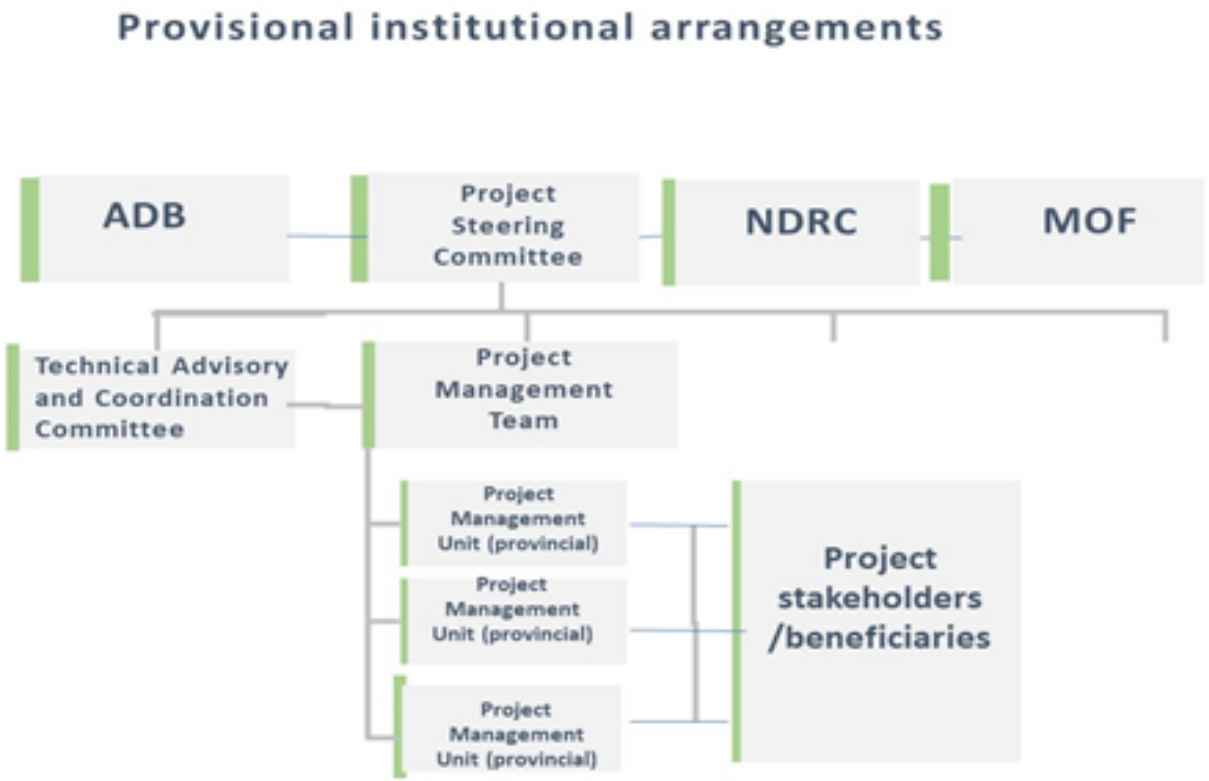

Figure 12 Provisional institutional arrangements

Coordination with other Agencies working in YRB

Given the special focus and high concentration of investments in the Yangtze River Economic Belt (YREB), special attention will be paid to coordination across the GEF portfolio in this area. There are three GEF-7 financed initiatives involving 4 GEF Agencies that have bearing on Yangtze River Basin. These include:

ADB: "Innovating Eco-Compensation Mechanisms in Yangtze River Basin (YRB)" – the current proposal with NRDC as Executing Entity (EE)

IUCN: Under the proposed "Yangtze Biodiversity Program Framework" two child projects include: i) "Strengthening in-situ Biodiversity Conservation in the Yangtze River Economic Belt" with NFGA as EE, and ii) "Mainstreaming biodiversity in the Development of the Yangtze River Economic Belt" with MEE as EE

FAO: " Innovative Transformation of China's Food Production Systems and Agro-Ecological Landscapes Towards Sustainability" under the FOLUR Impact Program (in collaboration with World Bank)

All the GEF Agencies have had had consultations and shared project documentation, with a view to complementarity, leveraging the comparative advantage of each Agency, avoiding duplication of resources / geographies and maximize impact and global environmental benefits in the Yangtze River Basin. A "coordination framework" is being developed which will outline areas of cooperation and coordination (as per graphic below) – and will be included in greater detail during project preparation.

Early consultations indicate that ADB and IUCN would ensure: i) Clear demarcation of geographies (as explained under Outcome 2), where IUCN will not engage in Protected Areas in Guizhou province as per agreement with NFGA, ii) Coordinated capacity development and data/information management across local governments, where relevant, iii) Joint monitoring activities and programs, particularly through use of digital platforms, iv) Sharing of good practice on agricultural biodiversity and protected area management, v) Sharing of good practices on integrated river basin management; and eco-compensation mechanisms as relevant, and v) creation of a Technical Advisory and Coordination Committee (TACC), which would include representatives from respective EEs, local governments / PMUs, and key project technical specialists from ADB-GEF project and IUCN-MEE-NFGA projects. Further, IUCN would be invited to participate in activities related to the Natural Capital Lab. ADB would also maintain linkages with the EA for GEF ID 5096 (UNDP) while IUCN would foster links with the GEF-6 project on protected areas managed by UNDP.

Similarly, there will be opportunities for the ADB-GEF project to coordinate with the FAO-World Bank project: i) Sharing of good practice from the FAO-WB work on payment for agro-ecological services incentive mechanisms (FAO Output 1.2.1) which may have implications for eco-compensation, ii) Sharing of good practices and possible joint activities on plastic pollution reduction and landscape management (e.g. soil health / white pollution) (FAO Outputs 2.1.1, 2.2,1 and 2.2.2)), iii) possible coordination on ecological restoration (establishing green corridors and vegetative cover) and agricultural biodiversity (FAO Output 3.1.2), and iv) links to the Natural Capital Lab Virtual Platform (FAO Output 4.1.2). FAO and WB have created a Technical Advisory and Coordination Committee (TACC) for coordination across their two sub-projects. At a more formal level, structured consultations could take place between the ADB TACC and the FAO-WB TACC (refer to illustration).

It should also be noted that under GEF 7, the UNDP is the GEF Agency for a proposed project on “Transformational wildlife conservation management in China”, with proposed sites in Dali, Yunnan and the 3 provinces covered by the Giant Panda National Park (Eastern Sichuan, Guizhou, Eastern Yunnan). These areas are over 500 km from the Chishui River Basin area as indicated in the map under Annex A. Regardless information sharing will be sought, particularly with respect to proposed activities under UNDP project Outcome 2 – which deal with increasing management effectiveness of Pas and connectivity across wildlife habitats

7. Consistency with National Priorities

Is the Project consistent with the National Strategies and plans or reports and assesments under relevant conventions

If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc

13th Five Year Plan

Chapter 39 of the Plan is directly relevant to this project as it gives strategic priority to the ecological and environmental development, and ecosystems restoration around the Yangtze River. The plan calls for efforts to promote coordinated development along the upper, middle, and lower reaches of the river, as well as interaction and cooperation between the Yangtze River areas in the eastern, central, and western regions, and help these regions serve as models for ecological progress, innovation and coordinated development.

Ecological Protection Plan for the Yangtze River Economic Belt

The relevance of the GEF project has been explained in the above sections. This is further strengthed by the project's relevance to recommendations articulated in a special policy study for the China Council for International Cooperation on Environment and Development (CCICED). Among others, the study recommends prioritization of the "*80/20 areas of concern*". "While the environmental challenges in the YREB are significant, strategically focusing efforts on specific areas that have disproportionately large impact on the health of the overall river basin is important. Two areas identified that require special attention are solid waste management and plastic pollution. The management of solid waste in rural areas is a major environmental challenge, as its improper treatment and disposal contributes to air, water, and soil pollution, as well as basin-wide ecosystem degradation Total solid waste in the PRC is projected to rise to 600 million tons by 2030 (from 300 million tons in 2011). Due to the scarcity of landfill sites and waste-to-energy schemes, urban municipalities have typically resorted to incineration. In rural areas "white" or "plastic pollution" is widespread and implementing solid waste management represents a difficult change as there has been an inability and reluctance to pay additional costs associated with their collection and disposal. Insufficient public engagement, outreach and education programs also hinder implementation of new regulations, requirements, and waste management programs. Among other things, the plan supports efforts to reduce plastic pollution and promote greening of supply chains.[1]

National Agricultural Sustainable Development Plan (2015–2030)

The GEF project is consistent with the PRC National Agricultural Sustainable Development Plan, 2015–2030 focuses on tackling the major causes of degradation and pollution, and promoting sustainable land and resource use.[2] The measures include (i) protecting the farmland, and upgrading or rehabilitating the irrigation infrastructure; and constructing on-farm infrastructure to strengthen agricultural production capacity; (ii) developing types of agriculture suited to local geographical conditions; (iii) updating and using high-level technology; and (iv) promoting water-saving techniques, use of eco-friendly fertilizers and pesticides, and other pollution-mitigating measures.

National Implementation for the Stockholm Convention on Persistent Organic Pollutants: The project is relevant to the updated National Implementation Plan (NIP) as it will build on PRC's experience in conducting inventory of POPs and support execution of the plan. The focus will be on elimination / reduction / substitution of POPs listed under the Stockholm Convention, which are emitted due to disposal in landfills and combustion. It will explore newer areas of dioxin sources in the handling of agricultural field plastics, and will address the following chemicals: Polychlorinated biphenyls (PCBs). Polychlorinated dibenzo-p-dioxins (PCDDs) and Polychlorinated dibenzofurans (PCDFs).

National Biodiversity Conservation Strategy and Action Plan (NBCSAP) 2011-2030: Due to the areal extent of the Yangtze River, it crosses a number of the 8 identified eco-regions in the PRC NBSAP. The main ones include Eco-Region # 6 – the hilly regions of central, south and west China, and Eco-region #7 the hilly plain region of east and central China. A number of priority sub-areas for coastal and marine biodiversity conservation relevant to the YRB are identified in the East China Sea and Taiwan Strait Protected Region.

Action #6 is most relevant to this GEF project as it aimes to "reduce impacts of environment pollution on biodiversity" while Action #13 calls for strengthening the conservation in the Hilly Region of western Central China with focus on the flora and fauna in the limestone (Karst) areas in west Guangxi and south Guizhou, and improving the conservation in the Hilly Plain Region of East and Central China with focus on the lake wetlands along the middle and lower reaches of the Yangtse River, ancient rare plants still retained in some parts of the region as well as rare and endangered fish species.

Relevance to eco-compensation is captured under "Supporting Measures" to increase investments, diversify sources and mechanisms of funding, improve operational efficiency of funding mechanisms are clear priorities, which will be addressed in the GEF project.[3]

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[1] CCICED *op cit*. 2019.
[2] Released on 20 May 2015 by the ministries of agriculture, environmental protection, finance, land resources, science and technology, and water resources; the National Development and Reform Commission, and the State Forestry Administration.
[3] NBCSAP. Pp 17-38.

8. Knowledge Management

Outline the Knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

A knowledge management strategy will be developed in greater detail during project preparation. It will combine ADB's Finance ++ strategy with the various KM platforms supported by the GEF. Knowledge management actions have been embedded throughout various Outputs in the Alternative Scenario. The KM Strategy will consider the following elements:

Documenting good practices in: (a) protected area management, (b) climate smart, resilient agriculture, (c) new generation of eco-compensation mechanisms, (d) integrated river basin management, € circular economy for agricultureal field plastics etc.

Internalize key messages in capacity development and training: The design and roll out of training and upskilling curricula in both Components 2 and 3, will embed key concepts and approaches in natural capital management, targeting the specific beneficiaries, in particular the front line practitioners. Training methods will use a combination of approaches, including experiential methods (ie. learning by doing).

Use of multimedia methods to bring together communities and disseminate knowledge: (a) social media and related platforms (e.g. WeChat, Facebook etc), (b) apply principles related to digital economy and deployment of ICT tools and methods (especially for measurement and monitoring) to create "digital dashboards", (c) support audience-segmented behavior change campaigns to targeting stakeholders participating in eco-compensation schemes, (d) convene high level policy fora (through partnership with CCICED and others), (e) encourage industry roundtables on key topics of concern, (f) support peer-to peer learning and communities of practice, particularly in cutting edge research fields, (g) support international conferences, workshops, virtual webinars and knowledge sharing events, and (h) strategic publications and knowledge products.

Forging / strengthening new strategic alliances to help incubate, synergize, catalyze and enable the flow of ideas; as well as contribute to scaling up of knowledge and technology. In addition to the GEF Partnership, the project will aim to work more closely with farmer cooperatives, non-government organizations (e.g. TNC, IUCN, WWF, etc), regional intergovernmental bodies, such as the ASEAN Plus Three or Network of Asian River Basin Organizations (NARBO), private sector industry, for example, through the AEPW in the petrochemical and waste management services sector; the Global Plastics Action Partnership (GPAP), Alibaba in the ICT sector, among others.

9. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification*

PIF	CEO Endorsement/Approval	MTR	TE
Medium/Moderate			

Measures to address identified risks and impacts

Provide preliminary information on the types and levels of risk classifications/ratings of any identified environmental and social risks and potential impacts associated with the project (considering the GEF ESS Minimum Standards) and describe measures to address these risks during the project design.

Environment and Social Safeguards

An environment and social safeguards assessment will be conducted during project preparation which, among others, addresses some mitigation issues identified in the Rapid Environment Assessment (REA) (See attached). This will be specific to the GEF intervention, but also be aligned with ESS assessments and safeguards plans implemented for the ADB loans associated with the project. Below are some perspectives.

-

Safeguard standard relevant to project	Risk Rating (Low, Medium, High)	Notes / Comments
Gender equality	Low	A gender equality specialist will be engaged to support project – including a more detailed gender assessment and a gender action plan (GAP). The GAP will actively support ADB's Strategy 2030 Operational Priority no. 2 "Accelerating Progress in Gender Equality" and meet ADB's classification for an 'Effective Gender Mainstreaming' project; as well as aligned with the GEF Gender Equality Policy. In general, the project would intend to achieve the following strategic priorities: (i) women's economic empowerment increased; (ii) gender equality in decision making and leadership enhanced; and (iii) women's time, poverty and drudgery reduced.
Biodiversity and natural habitats	Low	The project will support proactive efforts to improve management and coverage of biodiversity; inclu

		ding actions which rehabilitate / restore ecosystem functions in key areas. There may, however, be safeguards issues with respect to involuntary resettlement, if there are local communities affected by the work under Outcome 2 related to expanding coverage of protected areas. ADB's Safeguards Policy and practices would come into play – see below.
Resource efficiency, pollution prevention, chemicals and wastes management	Low	Resource efficiency, pollution prevention and reduction will be key elements in: i) constructing metrics for Gross Ecosystem Product and other instruments, ii) building a system to recyle agricultural field plastics and incentivize the shift to alternative / substituted methods, iii) diverting agricultural field plastics from landfills and burning, iv) promoting alternative / substitutes to agricultural field plastic use, v) improving management of biodiversity and ecosystem services in large landscapes.
Involuntary resettlement	Medium	Activities under Outcome 2 on expansion of protected area coverage might give rise to voluntary and/or involuntary resettlement concerns. No GEF resources shall be used for activities that directly or indirectly result in voluntary or involuntary resettlement. In this case, project design should eliminate resettlement issues by exploring project and design alternatives; to enhance, or at least restore, the livelihoods of all displaced persons in real market terms relative to pre-project levels; and to improve the standards of living of the displaced poor and other vulnerable groups (e.g. through the eco-compensation. More details are provided in the attached Rapid Environmental Assessment and mitigating initiatives during project preparation.
Indigenous peoples and ethnic minorities	Medium	Based on initial screening, the proposed project is not expected to have negative impacts for indigenous peoples. The ADB Safeguards Policy Statement (SPS) establishes a framework for avoidance and/or minimization of impacts on indigenous communities, provision of culturally appropriate benefits, and recognition of indigenous peoples rights to participate in project decision-making. Among others, A

		DB will follow GEF minimum standard requirements for FPIC in this regard. More details are provided in the attached Rapid Environmental Assessment and mitigating initiatives during project preparation.
Occupational health, safety and labour conditions	Low	The project will not use child labour, nor will it decrease employment. It will aim to improve health, safety and labour conditions through capacity development and training for local communities, including the informal sector engaged in plastics recycling. The Project would adhere to GEF and other internationally recognized standards, such as those of the International Labour Organization (ILO). The overall ESS assessment during project preparation will include screening of occupational health and safety concerns for this sector, including a monitoring component.
Physical cultural heritage	Low	There may be historical, cultural, artistic, traditional or religious values and beliefs that will need to be recognized and protected in relation to the two eco-compensation demonstrations. Strategies to identify, protect and adhere to such values will be jointly developed through participatory processes with stakeholders and local communities and institutions.
Economic sustainability	Low	The project will not have direct negative impacts on livelihoods for local communities. Rather, it seeks to understand and demonstrate a more 'market-driven' approach to eco-compensation, which incorporates 'green principles' and metrics. In this way the project aims to catalyze a transformation of economic activities to those which integrate environmental and social considerations.

The following links provide more information as per ADB due diligence with respect to the Green CAD loan:

Initial Environmental Examination
https://www.adb.org/sites/default/files/project-documents/51116/51116-002-iee-en.pdf

Ethnic Minority Development Plan
https://www.adb.org/sites/default/files/project-documents/51116/51116-002-ipp-en.pdf

Due Diligence Report on Land Use Rights Transfer and Land Acquisition and Resettlement https:/www.adb.org/sites/default/files/project-documents/51116/51116-002-sddr-en.pdf

Supporting Documents

Upload available ESS supporting documents.

Title	Submitted
GEF ID 10711 Rapid Environmental Assessment	

Part III: Approval/Endorsement By GEF Operational Focal Point(S) And Gef Agency(ies)

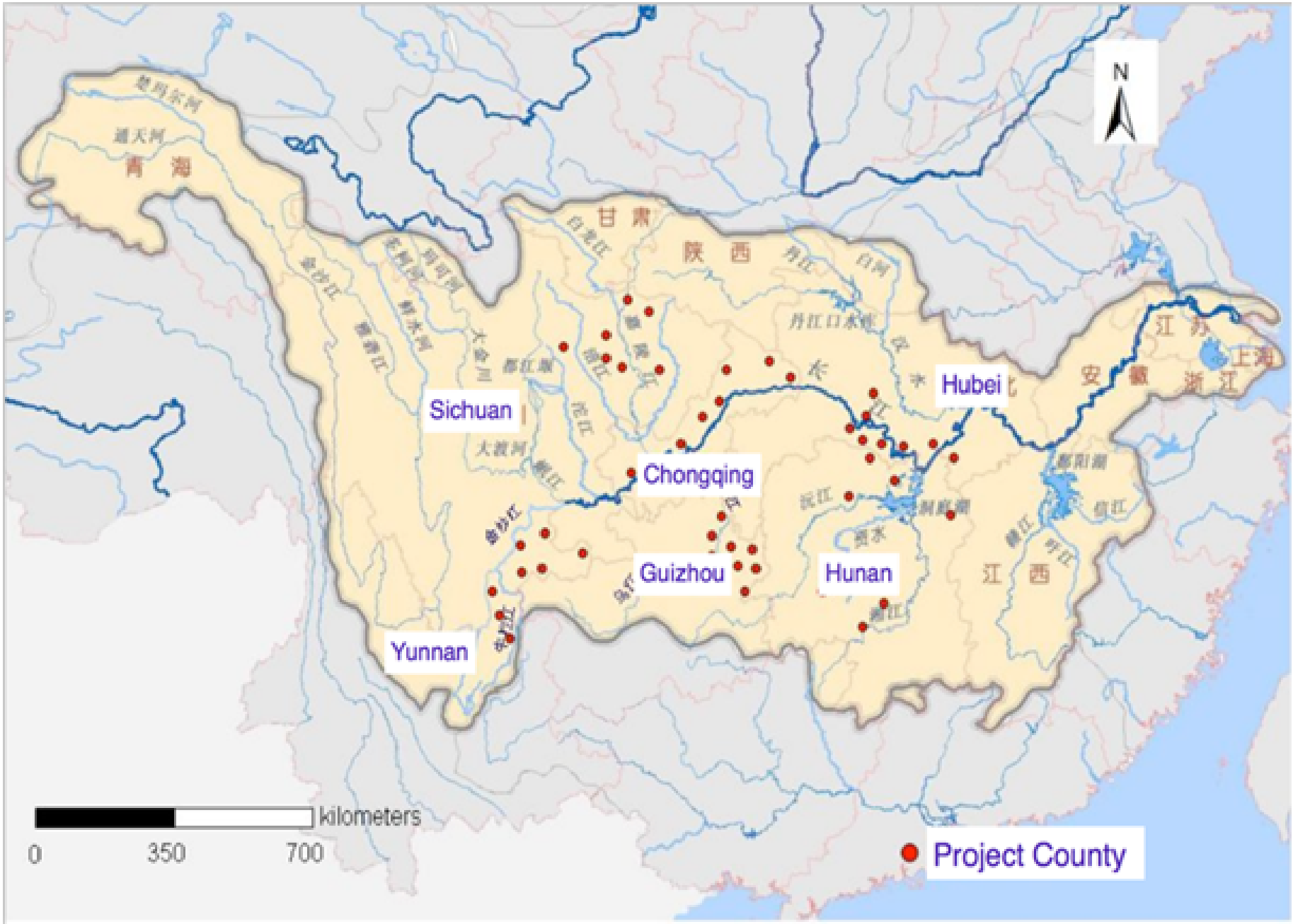
A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

Name	Position	Ministry	Date
Xiang Peng	Deputy Director	Ministry of FInance	

ANNEX A: Project Map and Geographic Coordinates

Please provide geo-referenced information and map where the project intervention takes place

YRB General Project Areas

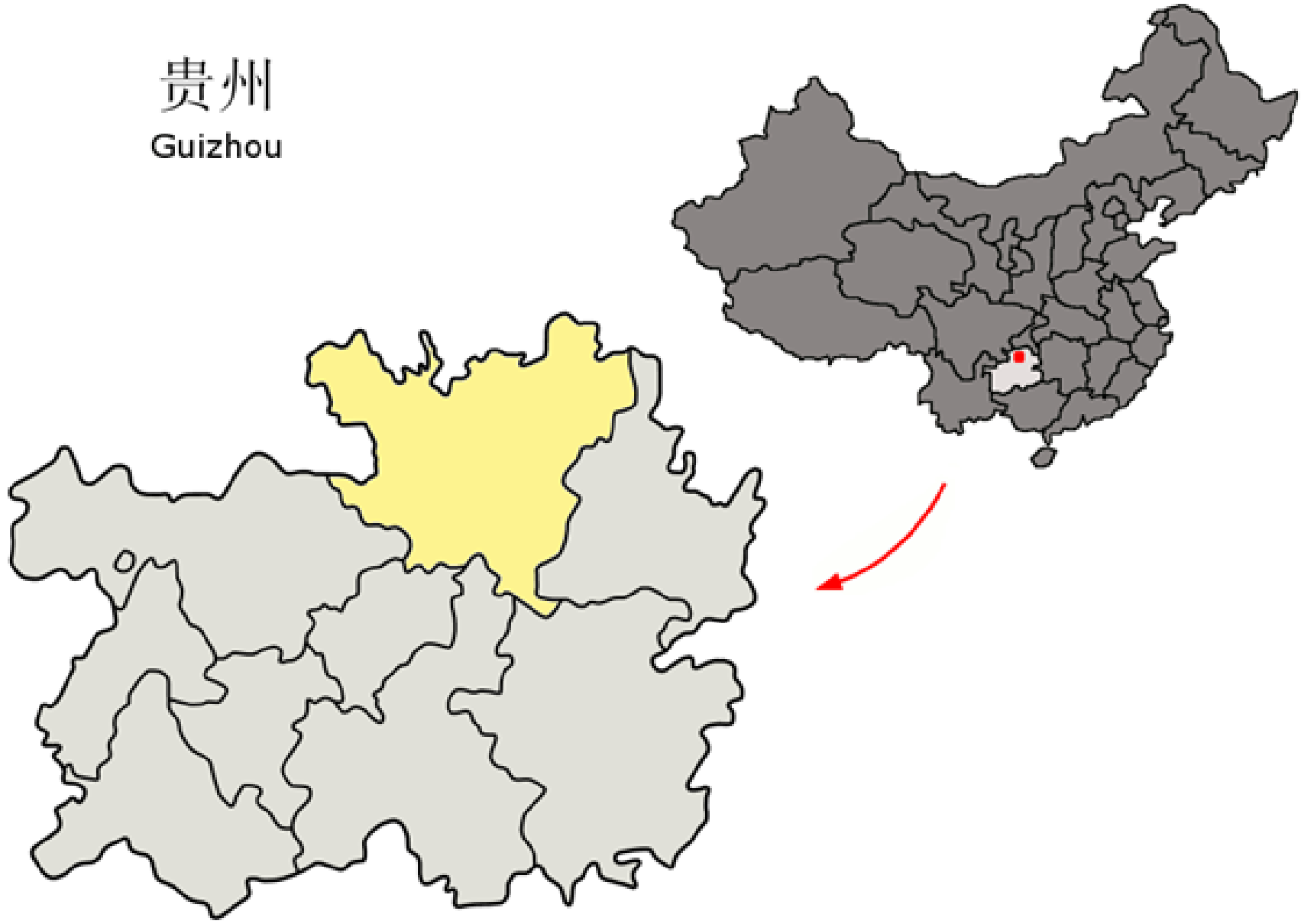


Coordinates for a good part of the work under Outcome 2

Zunyi Municipality, Guizhou China

27° 43' 19.2" N, 107° 1' 51.6" E

Location of Zunyi City jurisdiction in Guizhou

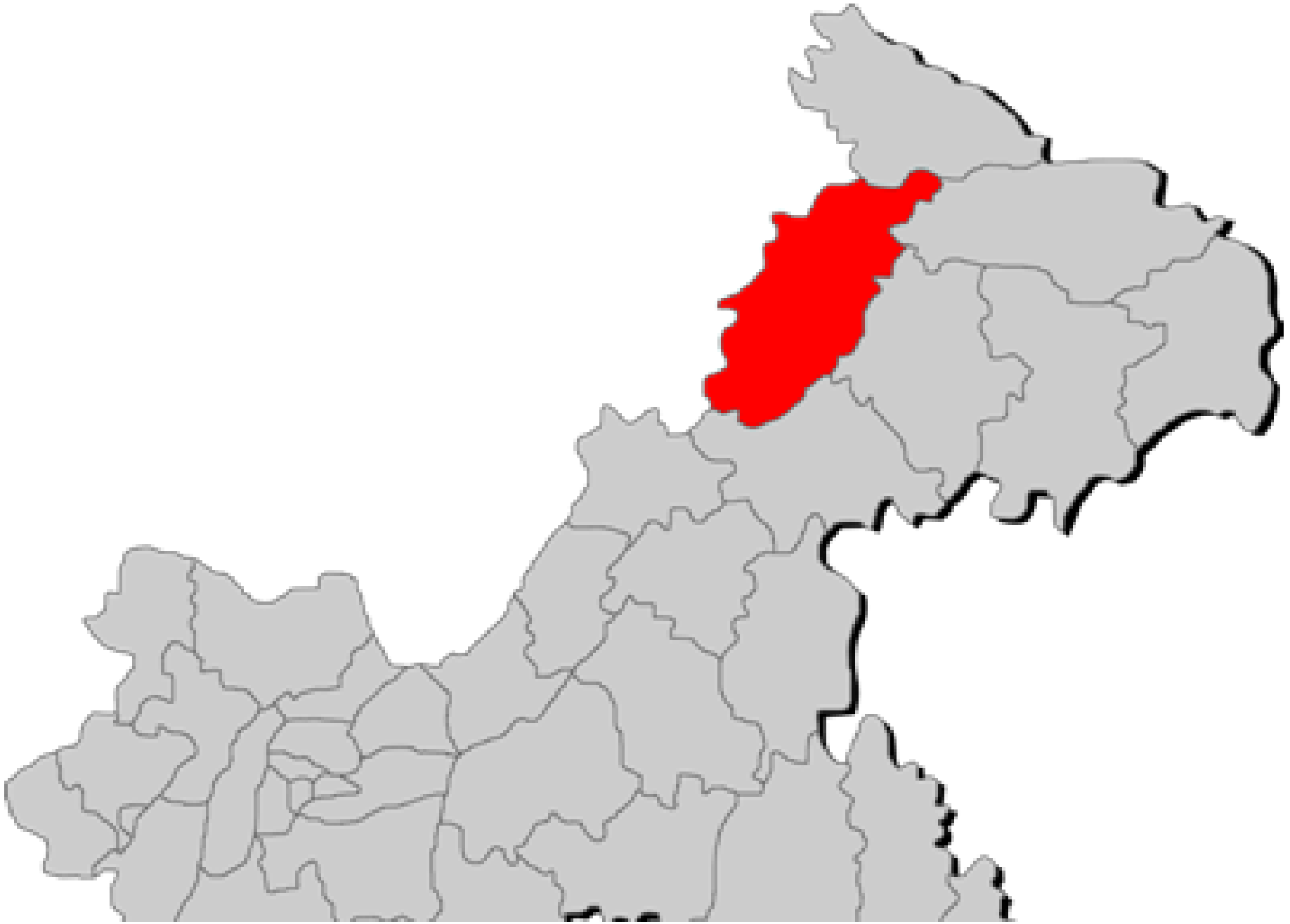


Coordinates for 4 of 6 project areas under Outcome 3 (agricultural field plastics

Kaizhou District of ChongQing Municipality

31° 12' 39.96" N, 108° 24' 25.2" E

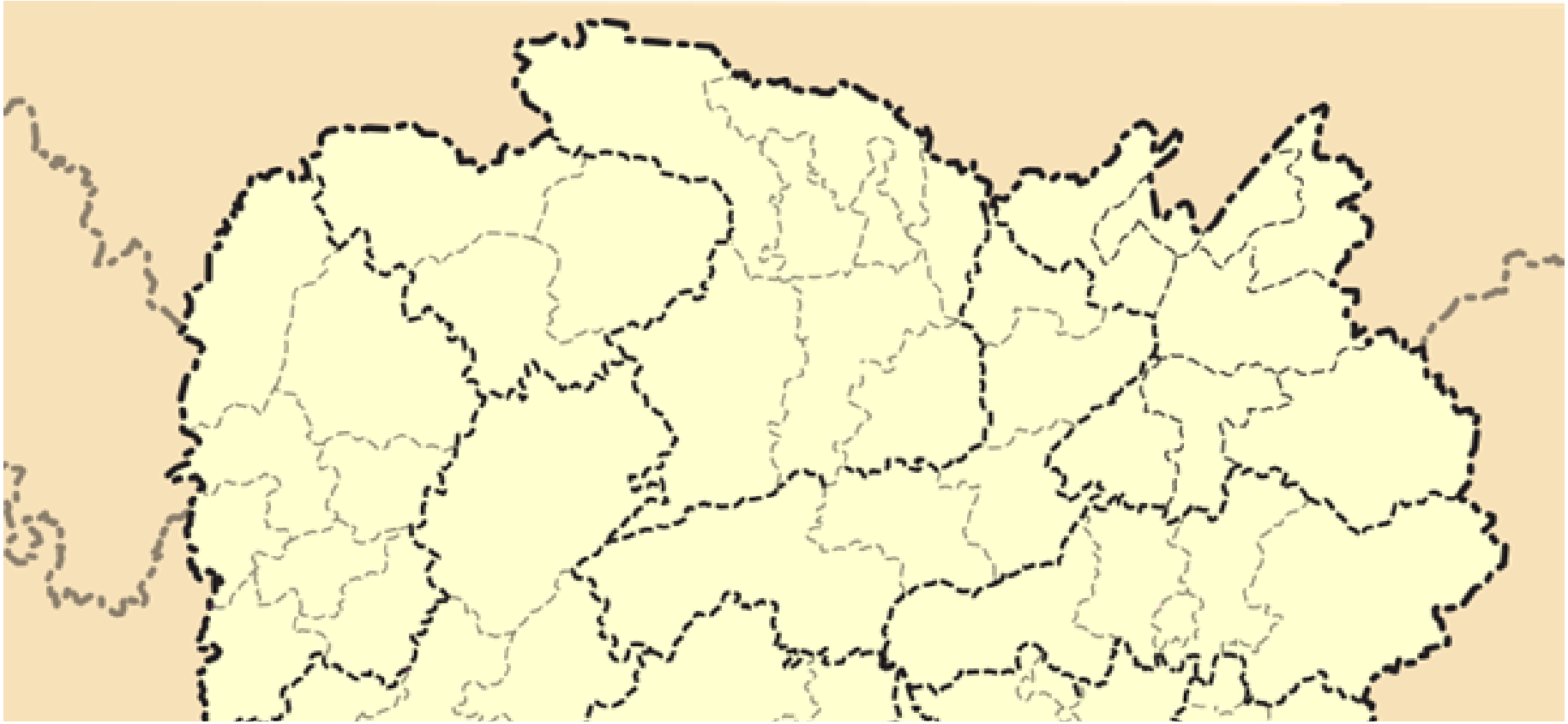
Location of Kaizhou in Chongqing



Lengshuitan District of Yongzhou City, Hunan Province

26° 27' 12.24" N, 111° 35' 32.64" E

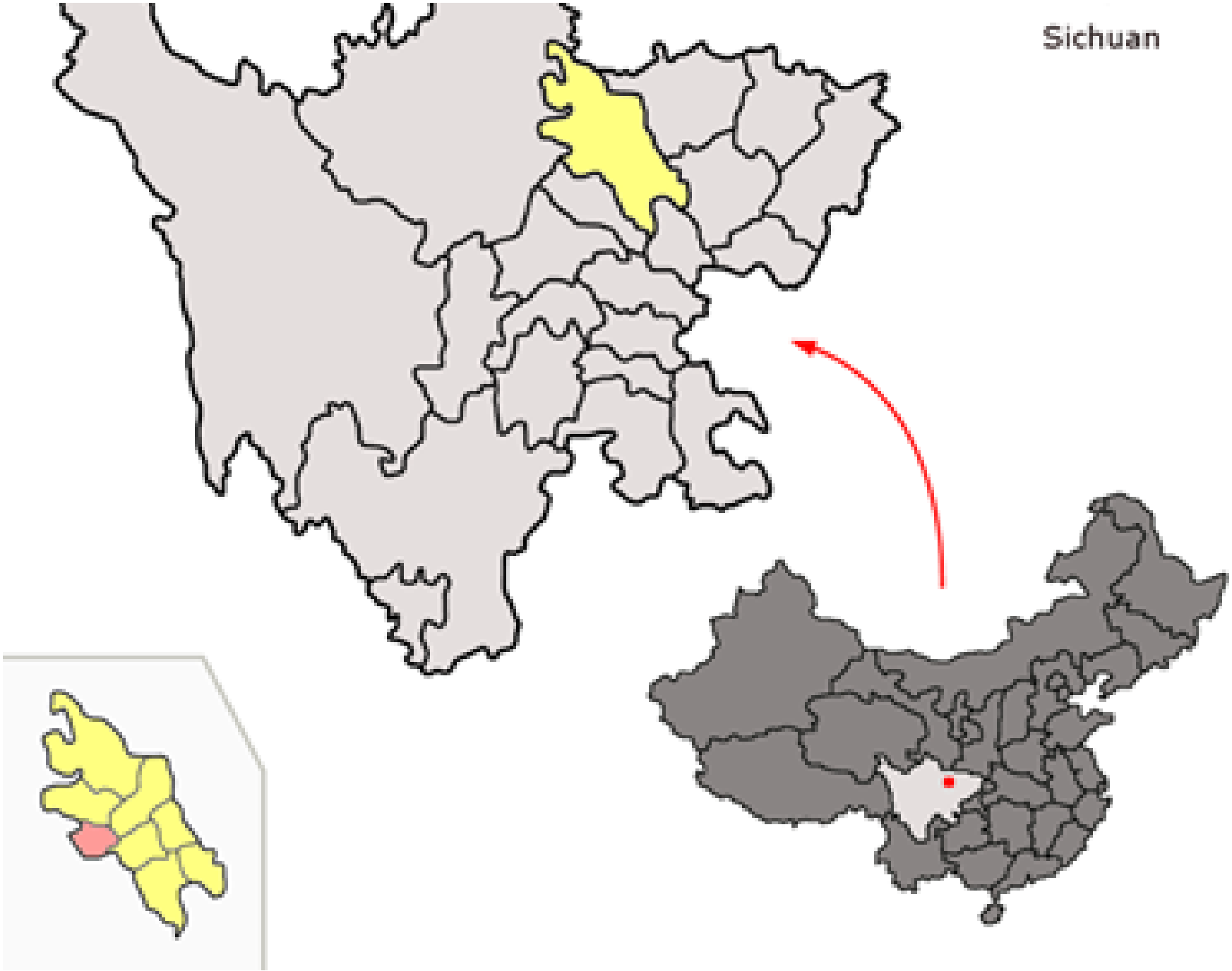
Lengshuitan located in Hunan



Anzhou District of Mianyang City, Sichuan Province

31° 32' 5.64" N, 104° 34' 1.92" E

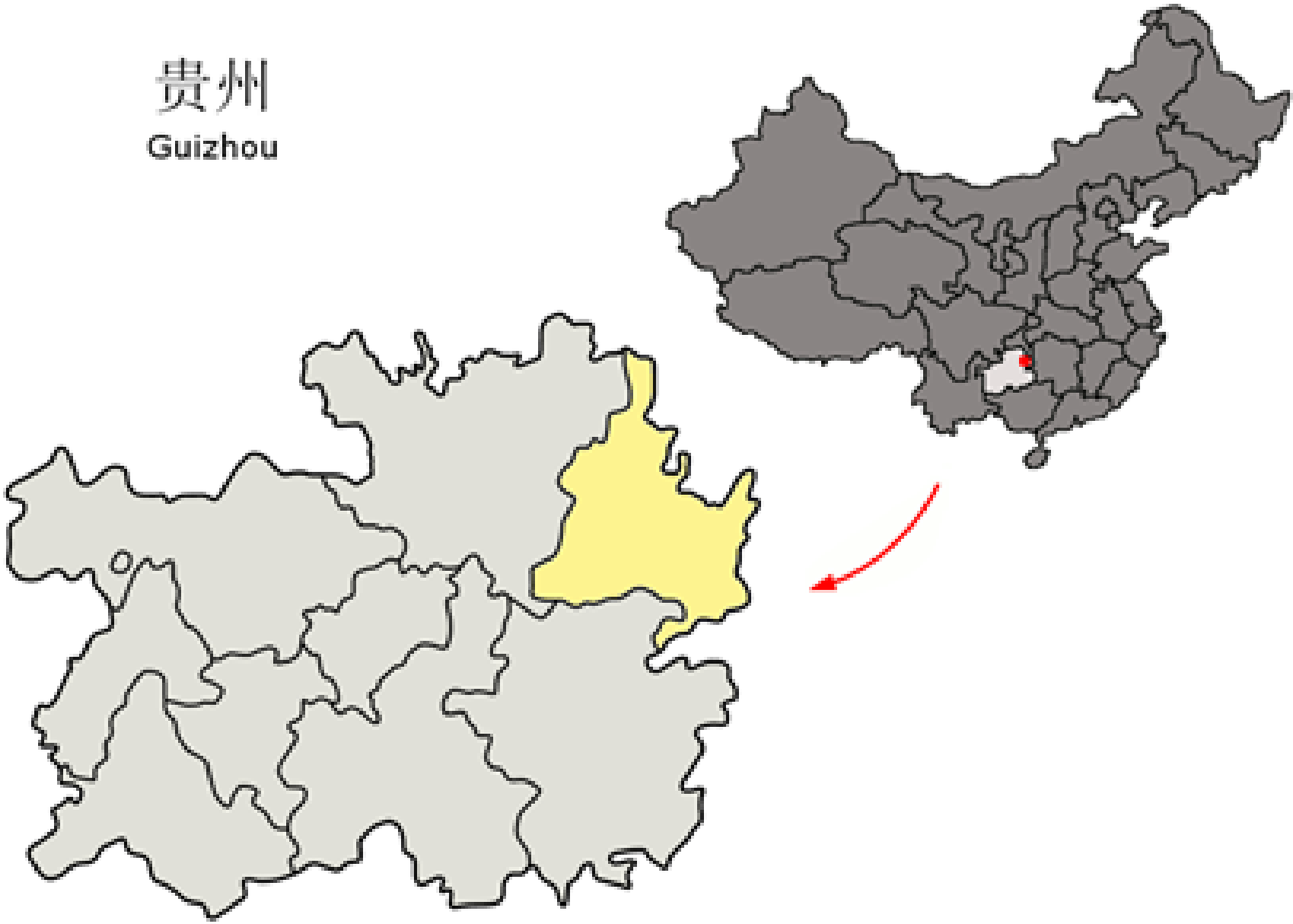
Location of Anzhou District (red) within Mianyang City (yellow) and Sichuan



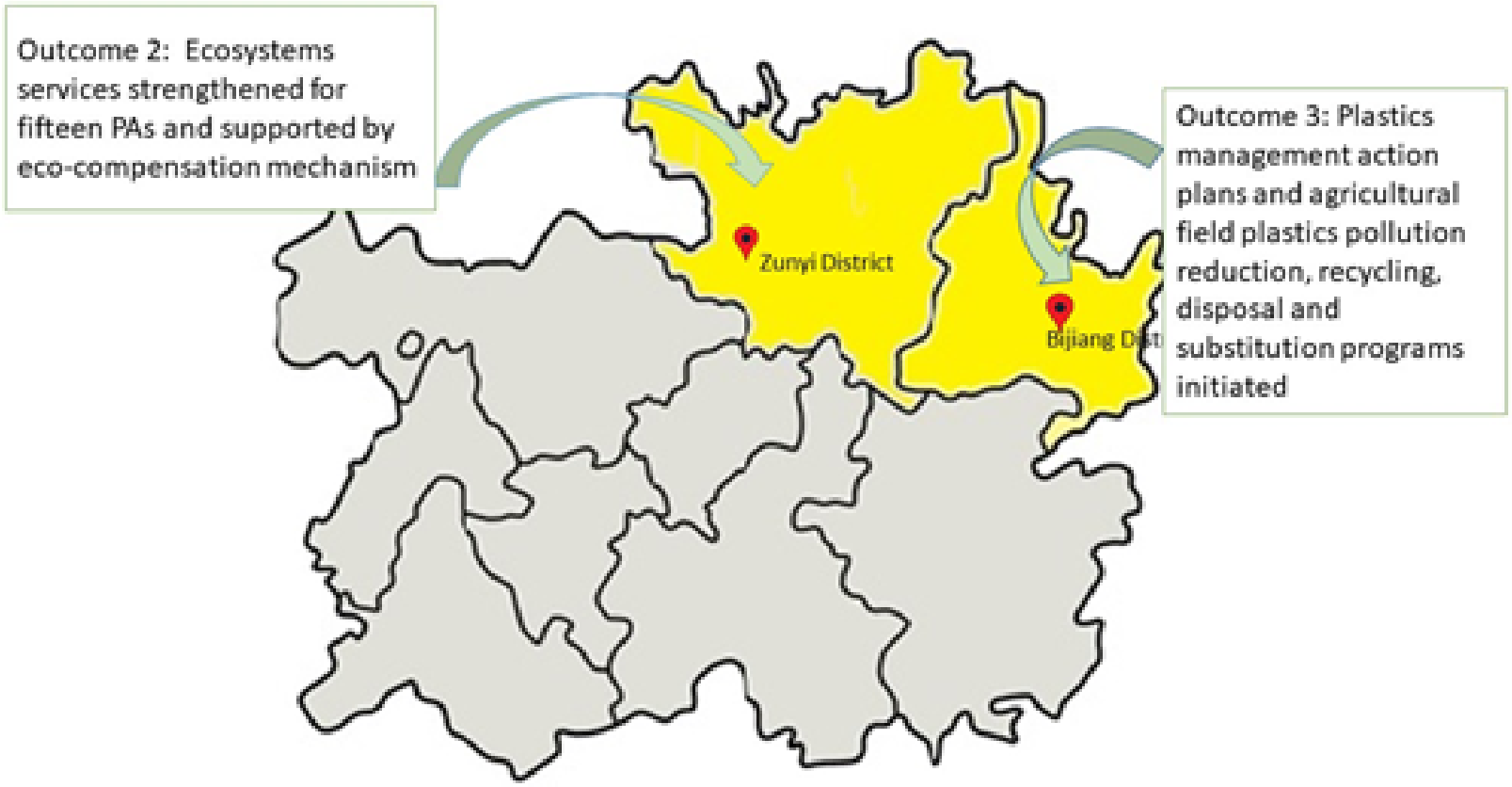
Bijiang District of Tongren City, Guizhou Province.

27° 43' 53.76" N, 109° 11' 22.2" E

Tongren in Guizhou



Map of Contiguous Project Areas in Guizhou


Outcome 2: Ecosystems services strengthened for fifteen PAs and supported by eco-compensation mechanism
Zunyi District
Bijiang Dist
Outcome 3: Plastics management action plans and agricultural field plastics pollution reduction, recycling, disposal and substitution programs initiated