Completion Report

GFDRR TF0A8646
Integrating Disaster Risk Management in China Urban Operations (P169232)

June 2020

Credit: Beijing Normal University

East Asia Urban, Resilience and Land (SEAU2)

GFDRR
Global Facility for Disaster Reduction and Recovery

WORLD BANK GROUP
Urban, Disaster Risk Management, Resilience & Land

Highlights

3.17 million beneficiaries (1.57 million women)

865,000 people provided with access to improved drainage and sanitation facilities

3 major knowledge products developed

40 Coastal & urban flood risk management investments informed

8 Cultural & natural heritage sites protected from disaster risk

5 Innovative resilient urban financing mechanisms developed

4 Earthquake reconstruction sub-projects

4 Former mine and industrial zones rehabilitated

GFDRR SUPPORT

The Global Facility for Disaster Reduction and Recovery (GFDRR) supported: (i) mainstreaming disaster risk management principles across 16 investment projects in the urban and DRM team's China portfolio; and (b) creation of three major knowledge products, one of them led by the China Water GP.

INVESTMENT PROJECTS SUPPORTED

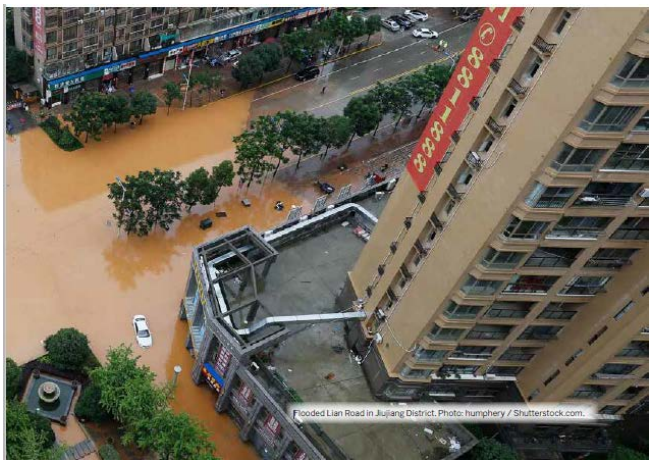
The 16 projects across China supported by the GFDRR embed resilience within themes covering: coastal and urban flood risk management, earthquake reconstruction, former mine and industrial zone rehabilitation, cultural and natural heritage and innovative urban financing mechanisms.

The total lending value of $2.10 billion across the 16 investment projects leveraged more than $1.75 billion in additional financing from non-World Bank financing. Two of these projects have successfully closed during FY20 with GFDRR support (IBRD support to these totaling $216million) while 14 projects are under supervision.

All 16 projects have adopted three or more disaster risk reduction and recovery principles under the GFDRR framework and promote resilient infrastructure and governance for risk-based planning and management. The projects develop new and rehabilitate resilient infrastructure designed to withstand the impact of high intensity climatic events like excess rainfall, floods, typhoons, landslides and earthquakes, common in the project areas, which lie within rapidly urbanizing municipalities, smaller towns and larger counties across inland and coastal provinces. In addition to structural measures, the projects also focus on non-structural measures such as support for multi-hazard early warning systems, hyrdomet services, disaster risk information and assessments, which include emergency preparedness plans and safety procedures among areas of extreme urban poverty.

For the 16 projects, GFDRR support primarily focused on the review of specific engineering infrastructure designs to ensure they not only added but met the standards of appropriate climate and disaster risk considerations, such as using higher seismic-proof standards and flood risk management codes. Equally important, the funds allowed for numerous training and capacity building opportunities for the clients and related teams on a variety of topics such as urban flood modeling, prioritizing risk-based planning and specific ways to embed climate and disaster risk considerations in policy planning and asset management. Although some delays ensured due to the COVID-19 pandemic, most projects were able to resume some part of its implementation in March and April 2020.

A summary of DRM-specific activities supported by GFDRR during FY 20 across each of the 16 projects is provided below.

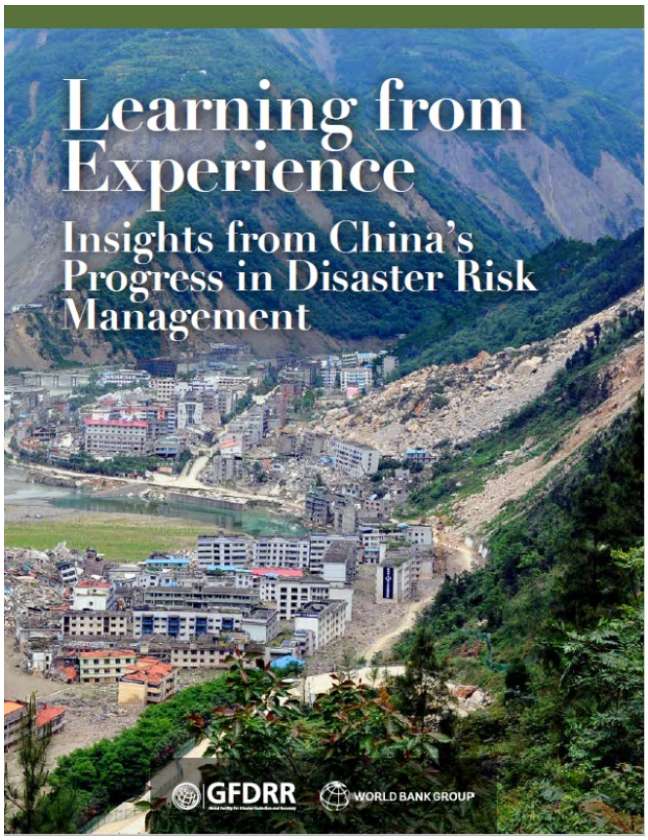

Flooded Lian Road in Jiujiang District. Photo: humphery / Shutterstock.com.

KNOWLEDGE PRODUCTS DEVELOPED

GFDRR supported enabled creation of three major knowledge products.

Learning from Experience: Insights from China's Progress in Disaster Risk Management

Learning from China's experience in dealing with disasters, including earthquakes, typhoons, floods, and droughts is critical to strengthening resilience building efforts in China and beyond. In that spirit, this publication distills lessons from China's progress in many areas of disaster risk management. The note focuses on topics that might be of particular interest to DRM practitioners globally.



Drawing on expert insights from China's disaster risk management community, key themes highlighted by this note include: ***(i) The evolution of national disaster risk reduction (DRR) planning***. Over the years, a shift from reactive to proactive disaster reduction, as well as a focus on reducing disaster mortality and direct economic loss, have figured prominently in the evolution of China's DRR plans; ***(ii) The rise of demonstration communities.*** Underscoring China's commitment to community-based disaster risk management, the country has been implementing a nationwide initiative to designate select communities as demonstration communities for raising awareness about the importance of DRR; ***(iii) Standardization of the disaster loss statistical system.*** Efforts to strengthen and standardize the disaster loss statistical system have led to a marked improvement in the ability of disaster risk managers to use and analyze the country's disaster loss data for risk-informed reconstruction and planning; ***(iv) Development of an agricultural insurance system***. China's agricultural insurance system has continued to develop rapidly, as evidenced by its growing market size, expanding list of insured perils, and increasing liability and coverage; ***(v) Establishment of a catastrophe risk insurance system.*** China has also made significant progress in establishing a catastrophe risk insurance system that allows for local innovations and pilots based on local characteristics; ***(vi) Development of a comprehensive space-based system of disaster and emergency monitoring***. The development of this capability has strengthened the country's disaster risk management practices, in part by enabling more timely, accurate, and comprehensive post-disaster assessments; and ***(vii) Rise of counterpart support for post-disaster recovery***. In response to the devastation of the Wenchuan Earthquake in 2008, the Chinese government established a counterpart support program for post-disaster recovery, which designated select provinces and municipalities to support some of the most severely affected counties and cities.

Valuing the Benefits of Nature-Based Solutions for Integrated Urban Flood Management (Led by the Water GP)

China is among the global most highly exposed countries to floods, which is expected to worsen under future climate change. More than 67 percent of its national population is located in flood-prone areas. Flood losses in China have more than tripled from about US$7 billion per year in the 1980s to approximately US$24 billion per year in the 2000s, with the largest annual damage recorded in 2010, amounting to a total loss of US$51 billion. On average, floods are estimated to result in losses equaling to 1 percent of Chinese GDP every year. In 2014, China introduced the Sponge City approach to improve integrated urban flood management (IUFM). This approach leverages nature-based solutions (NBS) and the use of 'blue' and 'green' spaces in the urban environment to address surface-water flooding, attenuate peak run-off,

improve purification of urban runoff, and enhance water conservation.

In addition to other sources, GFDRR support contributed to the development of a methodology framework to identify, evaluate and realize the comprehensive benefits associated with NBS for IUFM. This is pursued through five steps: (i) understanding the broader urban social-economic context within which the flooding occurs, including the objectives and challenges faced by the specific location; (ii) identifying the full range of flood management and mitigation interventions in urban landscapes across the spectrum of 'grey' to 'green' infrastructure solutions, along with other non-structural measures; (iii) systematically identifying the full range of potential social, economic and environmental benefits associated with 20 broad categories of a wide range of environmental, social and economic benefits that can be derived from NBS for IUFM; (iv) applying the developed methodology for evaluating the values associated with NBS for IUFM and to conduct comprehensive Benefit-Cost Analyses (BCA); and (v) developing agreed financial and policy mechanisms and models for realizing the values associated with NBS for IUFM.

This methodology included two detailed hypothetical assessments and was applied to another two case studies in China (Shenzhen and Kunshan). These were supported through the Cooperative Research Center for Water Sensitive Cities (CRCWSC) and the capacity developed through a series of workshop and remote technical

assistance. The outputs provide an input into a broader assessment of the value associated with water, and the risks it imposes as part of the World Bank's collaboration with the Development Research Center under the State Council on evaluating and realizing the value of water in the construction of an ecological civilization. This work is supported through regular Bank budget as well as additional grant support financed through the Global Water Security and Sanitation Partnership (GWSP). The Australian Water Partnership is also launching a new initiative to extend the application of this framework to other cities in countries within the Mekong Region.

China's City Clusters and Metropolitan Regions: Rapid Assessment of Potentials and Exposure to Natural Hazards

The Government of China has declared 19 City Clusters across the country where urbanization is expected to converge. In addition, in early 2019 the government issued Guiding Opinions on "Development of Modern Metropolitan Circles" which recognize that urban agglomerations are an important platform for driving national economic growth, promoting regional coordinated development and participating in international competition and cooperation. The Guiding Opinions define the metropolitan circle as a spatial pattern of urbanization and takes megacities, super-cities or metropolis with strong radiating and driving functions as the center and one-hour commuting circle as the basic scope. GFDRR support enabled the China Urban & DRM team to assess potentials as well as exposure to natural hazards that such clusters and metropolitan regions are expected to face.

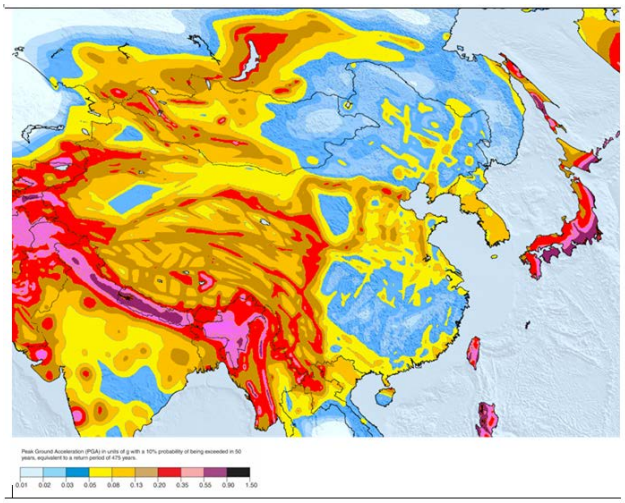


Fig. 52 Peak Ground Acceleration, RT = 475 years

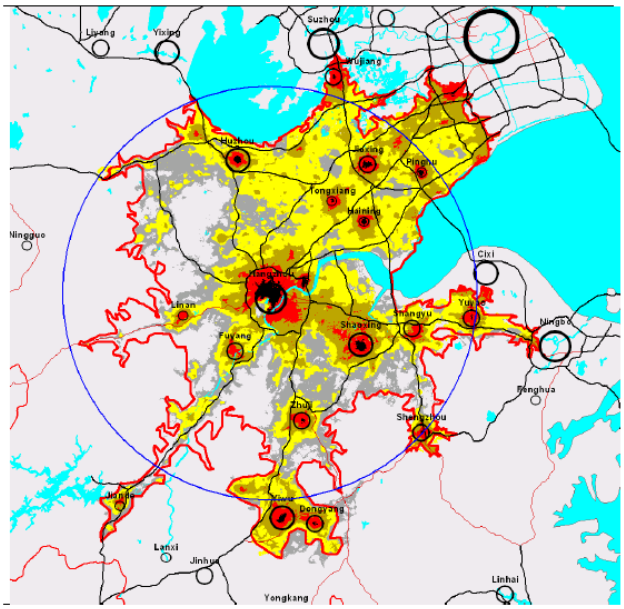


Fig. 26 Hangzhou Extended Metropolitan Region: Population Density (100 m cells), inh/ha; 2020, with 100 km radius from central Hangzhou; 2-hour Drive Time polygon extended to incorporate Yiwu and Jiande in south

The study enabled the team to: (a) assess, in a comparable way, urbanization trends in 19 city clusters recently identified by the GOC; (b) prioritize these clusters in terms of size and growth of population and GDP, and exposure to natural hazards; (c) analyze in the clusters facing the highest urbanization pressures, the intra-cluster dynamics of growth of extended metropolitan regions (EMRs / 'metropolitan circles') and prioritize these EMRs in terms of growth pressures, consumption, and exposure to natural hazards; and (d) identify EMRs in each of the city clusters for potential engagement by the Bank and GOC in programmatic support at the metropolitan region scale.

INTEGRATING DRM IN 16 URBAN PROJECTS IN CHINA

Listed in alphabetical order

1. Anhui Yellow Mountain New Countryside Demonstration Project ($100 million IBRD)

GFDRR supported implementation of infrastructure in line with disaster risk management principles in Huangshan Municipality and helped the project exceed many of its original targets. Detailed reviews were held on the engineering designs and plans to ensure that riverbank protection facilities were up to standard. Two consultants, one international and one local, provided comprehensive feedback to client partners to validate application of proper resilience adaptation measures. Flood control and land slide prevention measures, and soil erosion protection were considered in the designs of related investments. These investments include river enhancements and embankment upgrading, drainage systems for waste and stormwater management, the rehabilitation of small damns, ponds and canals for irrigation and drainage and the improvement to public spaces, among others, and are encompassed under Component 1, Infrastructure Improvement and Component 3, Enhanced Economic Opportunities.

Sponge canals

Achievements: As of June 2020, the number of project beneficiaries with access to improved infrastructure services, including access to all-season roads, improved flood protection rivers, stormwater storage ponds, safe and reliable water supply, and improved sanitation, reached 145,788, going beyond the final target by 145,400 people. Out of the 145,788 beneficiaries, 66,972 were women. Increased quality water supply and irrigation areas built under Component 1, Infrastructure Improvement, have exceeded of their respective targets by an average of 20%. The length of water supply pipelines (256 km), wastewater treatment capacity (1,921 m3) and length of roads (426 km) constructed or rehabilitated, land area with improved access to irrigation and flood control (4,198 ha) have also exceeded their end of project targets. All infrastructure investments were screened against disaster risk management principles. All new small wastewater treatment plants were screened against mitigation measures to ensure adoption of mitigation measures that maximize energy efficiency and reduce operating cost.

2. Anhui Xuancheng Infrastructure for Industry Relocation Project ($90 million IBRD)

GFDRR helped the project finish up its implementation towards the loan closing date by setting up the framework to build systems for resilient industrial zones in Xuancheng Economic and Technological Development Zone in Anhui Province. One international consultant was hired to provide technical inputs to the newly added

Interface of the Real-time Environmental Monitoring System

investments such as an early-warning emergency response and evacuation management system, a real-time environmental risk monitoring system and an underground pipeline monitoring system. The consultant also helped shape the maintenance and prevention system for public utilities. Robust revisions to the client's plans were given in order to help the project meet its new closing date of August 31, 2020.

Under Component 2: Wastewater conveyance, treatment and discharge, the main wastewater treatment plant has been in official operation since September 2018. The real-time Environmental Monitoring System was established in December 2018 and has been undergoing testing operations. A second phase of this environmental monitoring system is being built under this project to expand its coverage for more enterprises in the zone.

Emergency Management Equipment

Achievements: As of March 2020, the project has created 6,449 new jobs. Number of people in urban areas provided with access to improved water sources and improved sanitation facilities under the project reached 18,813 persons. Coverage of wastewater treatment service reached 100% and the ratio of water quality complicate under monitoring was at 85.7 % as compared to the end target of 75%.

3. Fujian Fishing Ports Project ($60 million IBRD)

GFDRR helped the project continue its progress in implementation to reduce the vulnerability of fishing communities to extreme weather events in selected counties in Fujian Province. Much attention this year has been brought to ensure the early warning and emergency response system details and related training and capacity plans are following the previous year's guidance. Two local consultants with specializations in disaster risk management and port engineering reviewed the technical specifications for the system and evaluation follow-ups as it is being implemented by a chosen consulting firm. The selected six ports had intensive quality checks within this year to ensure that they were adequate to protect fishing vessels from being lost or damaged during typhoons and seasonal storms. Changes are expected as the project is in the process of being restructured. Reviews on relevant plans and facilities such as berthing areas, access roads and trestle bridges were also reviewed by the consultants. Training and capacity building have progressed to further the effectiveness of emergency awareness and preparedness among fishermen and related members of the community.

Protecting fishing port from storm surges

Achievements: The direct project beneficiaries target as of May 2020 the direct project beneficiaries are about 40% or a population of 25,485 out of the target of 63,800. Under Component 3, Training and Capacity Building, a number of contracts and procurement have been underway with capacity building and equipment for formal trainings and curricula development solidified. The completion progress of the Early Warning and Emergency Response System under Component 2 of the same name is estimated to be about 43% and is expected to make significant headway in the coming months.

4. Gansu Cultural Heritage and Natural Heritage (Second) Project ($100 million IBRD)

GFDRR provided support on infrastructure investments located in mountainous regions that consistently experience geotechnical hazards in Gansu Province. Under Component 1, Heritage Conservation and Tourism Services Improvement, technical input was given to ensure that the implementation of disaster risk management and climate change adaptation measures against landslides, floods and other natural hazards were built into the design of the natural heritage conservation sites. Two consultants, one international and one local, reviewed the water supply and drainage schemes under both Component 1 and Component 2, Community Basic Services Delivery, and helped the client consider specific, sound engineering techniques that would protect these and other project assets from disaster risk and safeguard their sustainability.

Protection of heritage sites from landslides and soil erosion

Achievements: As of June 2020, the number of project beneficiaries has reached 33,012 (of which 16,506 women) primarily due to the completion of the sewer network in Tanchang. About 20,085 people in project areas have improved access to community services, which exceeds the 2019 target of 19,200. About 68km of sewage pipelines were improved, exceeding original targets. Five sites implemented soil erosion and landslide risks adaptation measures, exceeding the original target by one. All new treatment plants were screened against mitigation measures to ensure adoption of mitigation measures that maximize energy efficiency and reduce operating cost.

5. Gansu Revitalization and Innovation Project ($180 million IBRD)

GFDRR supported the project's early stage of implementation. This new project, whose preparation and appraisal benefited from GFDRR in terms of disaster risk management and climate co-benefits measures and design, became effective on November 11, 2019. Two consultants, one international and one local, reviewed all engineering designs and plans to ensure the that all proposed investment subproject to be financed under Components 1 and 2 incorporated the disaster risk management and climate co-benefit outlined previously in their designs. Component 1, Increased Access to Financial Services for medium and small enterprises. Component 2, Urban Rural Regeneration of the project. The international consultant provided significant guidance and confirmed compliance on the adaptation and mitigation requirements in technical design and operations for environmental remediation, water management and infrastructure improvements in the context of sustainable and resilient brownfield redevelopment in five cities along Gansu Silk Road. Some new infrastructure designs related to WASH are also screened to support resilience to COVID-19.

As the project became effective in November 2019, achievements are expected to come in the coming months.

6. Green Urban Financing and Innovation Project ($200million IBRD)

GFDRR helped the project's early stage of implementation. Support went to the preparation and evaluation of water subprojects within the project to increase access to sustainable financing

for green investments that benefit local governments in the Yangtze River Delta (YRD) region. As the YRD region is prone to water resource shortages, water degradation and urban flooding, the project is increasing access to financing for urban resilience to smaller cities and towns and the loans will be on-lent to end borrowers via the financial intermediary, Shanghai Green Urban Financing and Service Company (FSC). FSC invests in water and wastewater sectors to improve raw water availability and reduce water loss, as well as enhance city resilience against urban flood risks by improving drainage systems and wastewater treatment. The work this year focused on reviewing FSC's green investment pipeline to ensure that the selection is technically sound and in alignment with green strategies laid out during project preparation. The project supported one local consultant who has a background in environmental engineering and experience with resilient infrastructure projects.

As the project was approved in May 21, 2019 and just became effective months ago, achievements are expected in the coming months.

7. Guangxi Laibin Water Environment Project ($80 million IBRD, closed at $66million)

GFDRR helped support the project's successful closure on reducing flood risks and improving drainage in selected areas of Laibin city on January 31, 2020. The help this year went into ensuring an integrated approach to risk and confirming the final quality control of the construction and operation of the dikes, pumping stations, and the separation of sewer and storm drainage systems and met standards reduce flood risks. Since the was project restructured in January 2019, effort was made to ensure technical aspects in all three components (Component 1, River Flood Risk Reduction, Component 2, Improving Urban Drainage, and Component 3, Technical Assistance and Capacity Building) were in line with the changes. Two consultants, one local and one international, guaranteed an integrated approach to flood control was carried out until the end of the project, by combining high standards for river flood protection and a robust advanced early warning system.

Neighborhood Infill Parks for Urban Flood Management
Guangxi Laibin Water Environment Project
Source: https://mp.weixin.qq.com/s/2r1tohChClguwwnk4bsrnA

Achievements: By project closing all targets were met and some exceeded the original or revised targets—by January 2020, 199,600 persons directly benefitted from the project, with 48% being women. The population within existing urban area vulnerable to 1-in 50-year river floods was reduced from 72% (as the baseline) to 23%. The total area subject to inundation by 1-in-50-year river floods was reduced from 30 km2 (as the baseline) to 8.21 km2. The urban area serviced by exclusive and improved drainage system was 4.17 km2 (originally 0 km2), and 127,500 persons (48% women) benefitted from improved drainage/sanitation facilities constructed by the project.

8. Huainan Mining Area Rehabilitation Project ($100 million IBRD)

GFDRR continued to support the implementation of the project to remediate and develop a public space at a mining site in Huainan city. Compliance on the technical designs and operations for environmental remediation, water management and infrastructure improvements were conducted in the context of sustainable and resilient brownfield redevelopment. One international consultant was supported to review if the holistic approach towards geotechnical stability, infrastructure resilience and environmental remediation introduced last year was incorporated well into the systems. The support significantly helped to implement the remediation activities and planning of the site reutilization. Changes are expected as the project is in the process of being restructured.

A lake which serves as a rainwater retention feature with improved water quality has become a new habitat for migrant birds

Achievements: The direct project beneficiaries has reached 85% of the 2019 targets, or about 17,000, mostly due to land remediation and dump site closures. Surface water quality has improved, achieving the target ahead of the schedule. Furthermore, groundwater quality is steady and improving, with positive results due to the clearance of the solid waste and closure of the previous informal dumpsite using good practices.

9. Hubei Jingzhou Historic Town Conservation Project ($100 million IBRD)

GFDRR facilitated the project's steady progress toward achieving its objective of conserving critical cultural heritage sites and improving water quality and tourism services in Jingzhou Municipality. One local urban consultant was supported to guide detailed designs on how to build resilient infrastructure in the context of cultural heritage conservation in Jingzhou city. Although there is a delay in the project restructuring, the engineering designs and bidding documents for five contracts proposed in the projects have been approved by city level administrative agencies, including some that consider disaster risk-prone areas near the exhibition hall and their proper management.

Achievements: The project has benefited a total of 682,000 residents and tourists, 50% of whom are women, already exceeding final target of 600,000 beneficiaries. The satisfaction rate of tourists from tourism services in project areas is at 80%. The water quality in the moat meets expected standards as a result of completion of moat and lake dredging as well as installation of wastewater interceptors. In addition, all 28 bus stops and 12 pedestrian crossings in the Historic Town have been upgraded as planned.

Despite Jingzhou being one of the hardest hit cities in Hubei Province by the COVID-19 pandemic which caused delays in the implementation of planned investments, most construction has resumed in April 2020, following an incremental reopening agenda. All original project activities are expected to be completed by the current closing date of June 30, 2021.

10. Liaoning Coastal Economic Zone Urban Infrastructure and Environmental Management Project ($150 million IBRD, closed at $141million)

GFDRR helped the project to close on a positive note by successfully building resilience into Liaoning Province's water system and improving its urban transport. The support finalized a lot of the achievements in final implementation year of the project. One international consultant to provide technical support on the upgrading of the wastewater treatment plant processes, improving of sewers to double wastewater collection capacity and the construction of recycled water supply facilities. Quality checks were conducted to ensure the infrastructure could withstand urban flooding and extreme weather events like typhoons, common in the project area. The support from GFDRR was very influential in helping to achieve the many project's goals before its completion.

A dry lake restored and replenished with reclaimed wastewater and flood management

Achievements: The direct project beneficiaries have surpassed the final target (213,200), with 350,340 at project completion on September 30, 2019. By project closure, six major industrial users had signed up long-term agreements to buy recycled water with total amount of around 20,000 m3/day at full-cost recovery at the competitive market price of US$0.36/m3 or 60 percent of the municipal tap water tariff for industrial users. Also, by project closure, all old diesel engine buses were replaced with 60 gas-fueled and 80 hybrid-fueled buses with low emissions, and initial surveying and big data show that these lines have increased passenger volumes by 30%. It is estimated that operating costs on fuels were reduced by 5.5 million RMB (US$0.8 million) per year.

Now that the recycled water has become an alternative water resource of the city, the environmental benefits are also notable: Access to municipal wastewater collection has almost doubled since the project's start date: from 50 percent of coverage to 90 percent of the urban population. Consequently, water pollution is greatly reduced. Industrial water users are supplied with recycled water for their operations, which significantly reduces the depletion of the groundwater and secures the urban water resilience in this seriously water scarce region.

Recycled water is also used to help regenerate the urban landscape. About 10,000m3/day of recycled water is used to replenish an urban lake and the Daling River, which used to be polluted by untreated wastewater flowing downstream to cities. The recycled water is helping to restore the urban water ecosystem, establish riparian habitats, and ultimately increase urban biodiversity, while also reducing extraction and pollution of groundwater.

To date, over 12 million m3 of recycled water have been sold, earning US$4.3 million in revenue and saving around US$3.6 million in operating costs for industries, and resulting in more significant economic value for the local development. As the municipal government has witnessed the benefits from the water recycling project, the decision to build the second wastewater treatment plant has already been made.

11. Lushan Earthquake Reconstruction and Risk Reduction ($300 million IBRD)

GFDRR directly supported the implementation of the project and helped contribute to the significant progress on the risk reduction of rural roads, priority of urban and emergency infrastructure and the development of a robust disaster management and preparedness system. Technical support on the

design of the multi-hazard disaster risk management system in Shimian County is expected to be expanded to a municipal-wide system once the project restructuring process is complete, which will substantially scale-up project impact. Detailed improvements were made on the emergency infrastructure and road construction in select municipalities in Sichuan Province, and after further evaluation over the last few months, additional infrastructure such as a several urban emergency shelters, upgraded floodways and river embankments are also planned under the project restructuring. The funds provided direct support to every component in the project including a local disaster risk management specialist and two urban specialists, one local and one international. The support from GRDRR was instrumental in all the achievements in improving access to disaster resilient infrastructure and strengthening risk reduction in the selected areas of Sichuan Province thus far. Changes are expected as the project is in the process of being restructured.

Flood prevention works under construction

More specifically, the support allowed for the achievements above and for consultants to provide detailed technical specifications to ensure that the disaster risk management information management platform system would be operationalized successfully in Shimian county, as well as specific guidance on the best approach to expand the program to the whole municipality as intended during project restructuring. With the pending new system to span to 6 counties and 2 districts of Ya'an Municipality, the consultants worked closely with the clients to explain how to alter the system design to scale-up the existing mechanisms, to ultimately increase project impacts. The expansion of the system supports national goals and the national-level ministry formed in 2018, the Ministry of Emergency Management; the consultants ensured the objectives in the new system align closely with the ministry's objectives. The consultants also reviewed the specific progress and plans of built infrastructure, such as the emergency evacuation squares, river embankments and roads and drainage, and provided direction on how they could be strengthened from a safety and usability point of view. This guidance also served improving the designs of those that have not yet been built. Finally, the consultants helped to restructure the results framework to ensure that the indicators could properly measure intended disaster risk management results.

Achievements: The direct project beneficiaries has reached 124,425 as of April 2020, exceeding the original target of 115,808 for this year. The number of people in urban areas provided with improved drainage conditions has also exceeded the original target of 78,100, at 148,300 also as of April 2020. The design of the intended disaster risk management information system management platform was completed in December 2019 and procurement of intended disaster risk management equipment and software is expected to start in the spring/summer of 2020 under Component 3, TA for Strengthening of Disaster Management and Preparedness in Shimian County. Under Component 2, Upgrading of Priority Urban and Emergency Infrastructure, three emergency evaluation shelters have been completed 3 counties, supporting 16,300 people from the three counties of Mingshan, Yucheng and Lushan. The population with improved access to emergency shelters is expected to increase in the coming months as other disaster risk priority infrastructure gets built. Under Component 1, Upgrading and Risk Reduction of Rural Roads, the

construction and upgrading of the risk-reduced rural roads are well underway, with one of the main roads at 30% completion and others to follow. Significant progress has been made this past year and despite the COVID-19 pandemic, most of the work has resumed in late February 2020.

12. Ma'anshan Cihu River Basin Improvement ($100 million IBRD)

GFDRR continued to support the implementation of the project to improve drainage and flood protection capacity in urban areas of Ma'anshan Municipality. Technical contributions from one international consultant was supported in addition to the guidance on the construction of the structural components of the project. The consultant reviewed the urban flood management practices conducted by the client and directed design reviews of the constructed project facilities, building off of the prior year. Finally, the consultant also provided guidance on hydraulic modeling and reviewed how the clients integrated water resource management on flood control, water quality management and urban infrastructure resilience.

A tributary under rehabilitation

Achievements: Project beneficiaries who now have improved drainage capacity, reduced inundation and an improved urban environment have reached exactly 100% of the final target, or 1,300,000 people, as of April 2020. Under Component 1: River rehabilitation and drainage improvement, all five pumping stations have been commissioned with full design capacity of 34m3/m for flood discharge. Under Component 2: Rehabilitation of tributaries and drainage canals, 100% of the final target has been rehabilitated, or 43km long of drainage canals and tributaries plus over 40km additional sewers/ drainage networks. Completed last year, the water quality monitoring system under Component 3, Environmental Management and Monitoring, is now being used by the Environmental Protection Bureau and its subsidiaries to evaluate water quality, train staff and verify water quality improvement.

13. Ningbo Sustainable Urbanization Project ($150 million IBRD)

GFDRR supported the full appraisal of the project's third batch of investments, mainly flood risk management activities in Ninghai Country of Ningbo Municipality. Two consultants, one local civil engineer and one international hydrologist, helped improve the analytical work that informed the design of flood risk management subcomponents. The consultants reviewed the client's flood risk assessments and hydrological modeling for Xiangshan and Ninghai Counties and provided comments for an improved set of baseline assumptions and refined models.

Analytic results from the flood risk assessment for Ninghai County shared with other cities of China, International Workshop for Green and Resilient Development, Ningbo City, October 2019

Due to misalignment between modeling results and proposed solutions in some of the assessments and feasibility study reports, the consultants provided comprehensive trainings on integrated flood risk management to help improve their understanding

of how to manage floods in all stages of the cycle, from prevention to reconstruction. During the mid-term review mission in September 2019, the flood risk assessment report was in good shape and the technical design of the investment activities were found to reflect the report findings and included both structural and non-structural measures. The analytic results from the flood risk assessment for Ninghai County were shared with a wide audience from other cities of China during the International Workshop for Green and Resilient Development, held in Ningbo City in October 2019, which was partially sponsored by this GFDRR grant.

Achievements: The direct project beneficiaries were 145,278 by end of 2019 and the end target is 365,665 people. The flood risk management subcomponent just started implementation and is expected to reduce flooded area within 24 hours after a major - 1 in 10 years – rain event by 217.60 hectares and increase area provided with new and improved drainage services by 9,036 hectares upon completion.

14. Shaanxi Small Towns Infrastructure Project ($150 million IBRD)

GFDRR helped support implementation and assisted the project to exceed its target in providing access to clean and safe water resources. By supporting a "resilience versus response" approach towards systems to improve service delivery, all seven project counties of Chengcheng, Chencang, Hanyin, Hantai, Wugong, Xunyi, and Liquan completed their urban utility asset management systems. Under Component 2, Town Management Improvement and Project Implementation Support, the equipment and method of gathering inventory had improved since their development plans from last year. Two urban consultants, one local and one international, closely reviewed the working mechanisms of the systems and confirmed its sustainability by ensuring enough staff were trained on its full utility. Work was also done to check that the storm drainage and water supply pipelines incorporated detailed specifications from the original plans that supported key urban water resilience principles, all under Component 1, Infrastructure and Services Upgrading.

Urban flood management works

Achievements: About 154,000 people now have access to improved water sources as a result of the completed water supply related work. The project has also provided access to improved sanitation facilities to 185,400 people, or almost 78% of the final population target, as a result of rehabilitating and building 24 square kilometers of new and improved drainage. Finally, the project also increased the area of access to newly built or rehabilitated roads to 11.4 square kilometers, reaching 78% of its final target. These last three targets are expected to be fully achieved within the next few months.

15. Shaanxi Sustainable Towns Development Project ($100 million IBRD)

GFDRR supported the project's early stage of implementation. Work went into reviewing the plans put in place during the preparation phase to mainstream resilience into local urban planning, regeneration and financing in the southern region of Shaanxi province was followed. Two urban consultants, one local and one international, were supported to ensure that disaster risk management and climate adaptation best practice guidance from the project was carried out in all implementation components. Building on the work from last year, the consultants worked closely with the clients and teams on the specific working mechanism of the Southern Shaanxi Region Collaboration Platform (also the name of Component 1) and ensured that

the intended disaster risk management elements were incorporated in the official documentation. The technical designs for the civil works from the project, including those from Component 2, Resilience Strengthening, such as emergency shelters and evacuation routes, improved storm and drainage pipelines, pumping stations and low impact sustainable drainage applications, are in the process of being developed. The consultants provided technical support to these and reminded clients and teams in this phase that construction drawings should be prepared in complete alignment with technical designs proposed in final feasibility study reports, including special considerations for the resilience needs of the varying county contexts. They also directed the teams towards ensuring that the three parts of the technical documents (construction drawings, bill of quantities and BD technical specification) were in sync to meet flood risk management goals.

Achievements: In July 2019, the Southern Shaanxi Region Collaboration Platform was officially established at both the provincial level under the Development Reform Commission and at the municipal level in Ankang, Hanzhong and Shangluo counties. Other achievements are expected from the coming months and have been delayed as a result of the slowdown from the COVID-19 pandemic and postponed communications with co-financier KfW. Aside from civil works aspects of the project, the clients showed a strong understanding of the importance of a long-term approach towards resilience.

16. Sichuan Chongqing Cooperation: Guang'an Project ($100 million IBRD)

GFDRR continued to support the implementation of the project and ensured that the risk-based planning and resilient design of the waterbodies introduced last year were properly incorporated into the components. The project continued to adapt a green risk management infrastructure approach for the upstream of the Luxi River. The funds provided support to one international consultant to ensure a holistic approach was understood and actualized by the counterparts. The investments in roads and wastewater treatment in Linshui County and Qianfeng District were enhanced with resilient best practices related to stormwater management.

Achievements: As of May 2020, the number of people provided with access to improved sanitation facilities increased to 200,000, almost reaching its final September 2021 target of 216,000. As part of the sub-project of improving the upstream section of the Luxi River, the 166,400m2of public green space and 51,986m2of water surface in Xiejiawang which was rehabilitated last year was cited to be a livable space by the surrounding public and residents. More achievements are expected in the coming months with the close follow-up and oversight from the World Bank Task Team.

Emergency information signpost at River Viewing Pavilion Park, Chengdu. Photo: symx.

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