Executive Summary

This case study examines the Flood Management and Drainage Improvement Project of Huai River Basin, with a particular focus on tracing the process of establishing Farmer Drainage and Irrigation Associations (FDIAs) along the Taidong River in Jiangsu Province. FDIAs are legally established local entities responsible for management and operation of small drainage and irrigation works, with membership composed of beneficiary farmers in a bounded drainage and irrigation area. This study examines how placing beneficiaries in charge of the management, operation, and maintenance of these small-scale water conservation projects led to improved operations.

Agricultural water conservation, drainage, and irrigation infrastructure in China has suffered from low construction standards, a lack of supporting facilities, and small-scale infrastructure such as roads and bridges. The facilities are old and damaged, contributing to flooding vulnerability that negatively affects agricultural productivity and impacts farmers' livelihoods in the Huai River Basin.

To confront this pressing development challenge, the government of Jiangsu Province (along with the Ministry of Water Resources, and the governments of

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1 Including irrigation ditches, dikes, drainage channels, pumping stations, sluice gates, bridges, and reinforcements to riverbanks.
Anhui, Henan, and Shandong Provinces), with support from the World Bank, sought to reform management and maintenance of the “last mile”\(^2\) in agricultural water conservation infrastructure. This project faced the significant delivery challenge of transforming the views of local government officials and farmers, as well as building the capacity of farmers’ self-organization and self-management skills in order to establish and scale up the FDIA approach.

The Provincial Project Management Office (PPMO), tasked with overseeing the project’s implementation throughout Jiangsu Province, adopted tailored strategies and interventions to tackle the “last mile” challenge. This included in-depth research that led to adjustments at the initial project design stage, including: scientific management methods accompanied by step-by-step guidance during operations, and systematic planning for multiple project components, with evidence and research used to determine the most critical project components.

To ensure the FDIAAs were well established and sustainable, the PPMO put considerable efforts into capacity building of local officials and farmer beneficiaries while adopting a pilot and scale-up approach. With close attention to unique local conditions and characteristics, the PPMO established FDIA pilots in each of the four provinces that fall within the Huai River Basin. Learning from the pilot experience, the PPMO established eight additional FDIAAs in each area, which helped to reach the goal of increasing farmland productivity and improving flood protection in predominantly poor rural areas of the Huai River Basin, and address the “last mile” challenges of water conservation facilities in the farmland.

**Introduction**

Ms. Zhang lives in Caoshe Village in Dongtai City, Jiangsu Province. Her family, like many in rural China, generates income partly from the family farm and partly from industrial work. Ms. Zhang’s husband produces and sells handicrafts while she works on the farm. During the summer harvest in 2012, Zhang started working before sunrise. Her farmland was visible from her house, but she had to sail through several crooked streams in order to reach the farm. A round trip to harvest her crops took at least an hour. She explained: “There are no roads or bridges that lead to the farmland. Harvesters are too big to fit in the farm. I have to sail through the streams on a small boat to get to the farm, cut the crops manually, make several trips to carry the crops with carrying poles and load the boat, sail back, and unload again!” Looking at a bridge being constructed by the local Farmer Drainage and Irrigation Associations (FDIA), Zhang said happily, “when they complete roads on the farmlands and bridges on the rivers, I can drive the harvester into the farm. It will then take me just about half an hour to harvest those several hectares of crops.”

Zhang’s family exemplifies the agricultural production and life of rural households in the Lixiahe region in Jiangsu Province. Industrial agriculture has been adopted in Dongtai City, one of China’s most developed county-level cities, for many years. However, due to a lack of roads and bridges that can accommodate large, modern farming machines, farmers still rely on traditional methods of farming. Flood management and drainage facilities are scattered in the fields, often too far away to be useful or not properly distributed. Moreover, most of the facilities were built twenty to thirty years ago, with no effective management or maintenance. They had low flood protection levels and are hardly able to provide support for modern agriculture.

To confront these critical issues, the government of Jiangsu Province (along with the governments of Anhui, Henan, and Shandong Provinces), with support from the World Bank, undertook the Huai River Basin Flood Management and Drainage Improvement Project. This project sought to reform management and maintenance of the “last mile” in agricultural water conservation infrastructure. The project established FDIAAs—legally established local entities comprised of beneficiary farmers in specific drainage and irrigation areas determined by hydrological characteristics—to maintain drainage and irrigation works at the last mile. Through this modality, as well as by helping to fund some infrastructure construction, the project strengthened both physical infrastructure and micro-institutional arrangements for water management. At the time of writing, almost 7 million people have benefitted from this project, experiencing improvements such as those described by Ms. Zhang, as well as protection from floods.

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2 Last mile water facilities refers to water conservation and irrigation facilities in the canal systems at the end of rivers, which are used in the drainage and irrigation of farmlands. See: CPC Central Committee 2011.
Development Challenge: Outdated Construction and Management of Small-Scale Agricultural Water Conservation Facilities That Led to Low Agricultural Productivity and Vulnerability to Flooding

Most of China's current agricultural water conservation infrastructure\(^3\) was built in the 1960s and 1970s, with low construction standards and without supporting infrastructure or provision for appropriate upkeep. The facilities have been in use for decades without being properly maintained. Severely damaged small-scale water conservation facilities and weed-blocked irrigation networks leave farmland vulnerable to flooding. Even if some earth canals can hold water, their performance is poor; when there are floods, leakage and spillovers, water resources are wasted and irrigation efficiency is decreased. The out-of-date infrastructure and poor management of local water conservation facilities at the “last mile” has become the weakest link in agricultural modernization.

Delivery Challenges: The Need to Increase Stakeholder Engagement and Coordination; Increasing Farmer Buy-in to Enable Scale-Up of the FDIA Approach

The flood management and drainage improvement project of the Huai River Basin in Jiangsu Province worked not only on the main streams and tributaries of the Taidong River, but also sought to improve the long-term management of small-scale agricultural water conservation facilities in large rural areas. The project aimed to establish FDIA\(^s\) to take responsibility for the management and operation of small drainage and irrigation works in these areas along the Taidong River. The project also intended to help the FDIA\(s\) improve small-scale water conservation infrastructure in the farmland.

During project implementation, transforming the perceptions and attitudes of local officials and farmers emerged as a real challenge. Local officials and the farmers who were the intended beneficiaries of the project were skeptical of the FDIA\(s\), and reluctant to get involved in the management and activities of these new institutions. Reticence to participate in the FDIA\(s\) was rooted in historical patterns of local responsibilities and an overall lack of engagement by farmers. Since 1983, with the launch of the Household Contract Responsibility System in rural China, town and village governments have been in charge of the construction, management, and maintenance of agricultural water conservation infrastructure. Farmers who benefited from the infrastructure believed that the construction, management and maintenance of those facilities had long been the responsibility of government agencies instead of farmers themselves. In addition, with increasing belief in individual rather than collective economies, farmers were no longer willing to spend time and effort managing and maintaining flood management and drainage systems.

Moreover, the Rural Tax-for-Fee Reform of the late 1990s gave farmers longer-term contracts over their land and removed requirements for mandatory work,\(^4\) planting trees, and building infrastructure. Many farmers believed the end of mandatory labor meant that they were no longer required to contribute to the construction and maintenance of agricultural infrastructure, rather relying on local government to initiate projects. Meanwhile, farmers who did not directly benefit from the facilities did not believe the projects would benefit them and were therefore reluctant to participate.

Lastly, local officials held concerns about the establishment of FDIA. They thought FDIA\(s\) would be independent of village committees and thus more difficult to manage and control effectively, especially when organizing farmers to maintain the agricultural water conservation facilities. In addition, the increasingly outdated conservation facilities and broken drainage systems led to mounting debt; local governments had limited funds and large-scale infrastructure construction required substantial resources. Some officials also believed that it would be hard to complete large-scale construction in the short term. Moreover, they had seen that water conservation agencies had invested in irrigation

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\(^3\) This infrastructure includes irrigation ditches, dikes, drainage channels, pumping stations, sluice gates, bridges, and reinforcements to riverbanks.

\(^4\) Mandatory work comprised rural-volunteer work and cumulative-hours work. Rural volunteer work was the voluntary labor service required by the town government and village collective economic organizations when they conducted water conservation infrastructure constructions or afforestation. It was one of the major forms of internal labor service accumulation for village collective economic organizations. See Xiaofeng 2007.
and drainage infrastructure in recent years, but that this had little impact on farmers’ incomes. Taken together, these concerns meant that local officials would need considerable convincing to facilitate the FDIA approach.

Context

Flood Management in the Huai River Basin

The Huai River Basin is the third largest inland river basin in China and covers 270,000 km² across five provinces (Henan, Hubei, Anhui, Jiangsu, and Shandong). Low-lying plains comprise two-thirds of the river basin while the area produces one-sixth of the nation’s food. Major floods occur every three to five years, causing significant damage due to insufficient flood protection levels and drainage systems. The most recent serious flooding occurred in 2003 and left thousands homeless, causing direct economic losses of US$4.5 billion. Moreover, slow flood recession resulted in severe waterlogging, impacting agricultural production and thus local livelihoods. In response, all levels of government cooperated in order to strengthen water conservation projects by focusing on erecting main flood control structures along the Huai River and major tributaries. In recent years, due to heavy investment in flood management, China has greatly improved the flood protection levels of major rivers and the management of mainstreams and tributaries in the Huai River Basin. However, large-scale projects along mainstreams were well funded and built using higher standards, visibly contrasting with smaller-size water conservation facilities in the farmland.

Policy Background

Previously, the Chinese government’s flood management efforts focused on projects along rivers and major tributaries at the expense of infrastructure construction and management closer to farmers’ fields. To support food security and agricultural modernization, the government sought to improve outdated construction and management of farmland water facilities, in addition to unclogging rural streams and ditches in order for water to flow along the “last mile.” Since the eleventh five-year plan,5 the Chinese central government has increased investment in water conservation, flood protection, and irrigation. This has included putting more money into small infrastructure works and flood management and drainage improvement projects in the rural farmland. Investment in these small-scale projects has, to some degree, improved the farming drainage systems, strengthened flood protection, and improved conditions for agricultural production. However, in times of extremely heavy rains or floods, ensuring that the accumulated water in the farmland flows into the main ditches can be challenging. Several provinces, cities and counties have put considerable effort into rural water conservation infrastructure, resulting in some improvements, but many challenges remain.

Since the 1980s, China has extensively experimented with and implemented reforms in rural water conservation management systems. In 1993, the Yangtze River Basin Water Resource Project, funded by the World Bank, established the first Water User Association in Hubei Province, setting up a legal entity that would let farmers manage the drainage systems themselves. Since then, all agriculture irrigation projects funded by the World Bank in China include Water User Associations. In recent years the Ministry of Water Resources has disseminated guidance documents, including two opinions, to promote reforms in the management systems of small-size rural water projects.6 With the goal of encouraging engagement among users and increasing their ownership of water system infrastructure, both opinions explicitly state that all levels of government should: provide publicity, guidance, and support for rural-water-users cooperatives in various forms, including Water Users Associations; deepen reforms in farmland water conservancy management systems; continue to develop farmers’ water cooperatives; and facilitate well-functioning farmland conservancy projects.

Tracing the Implementation Process

Following the major floods of 2003, the Chinese government began plans to accelerate the construction of major flood management projects in the Huai River Basin. Using loans from the World Bank, the Chinese government designed the Huai River Basin Flood

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5 Since 1953, the national government of China has set five-year plans for the country’s short-to-mid-term policy trajectory.
Management and Drainage Improvement Project, with the goal of improving flood protection along the Huai River and its main tributaries, support small- and medium-size projects along smaller tributaries, and enable better flood protection measures in the poor, rural areas of the Basin’s four provinces. In 2006, the Chinese government and the World Bank designed a project framework that placed the FDIA Demonstration Area Project under the umbrella of the Huai River Basin Flood Plains and Depressions Improvement Projects. In order to tackle flooding, waterlogging, and drainage and irrigation problems in China’s rural areas, the World Bank proposed that the project launch one FDIA pilot in each of the four provinces. If effective, the project would subsequently scale up to eight more FDIAs in each province.

Meanwhile, the Bank invested in several auxiliary projects within the pilot areas to improve micro-size irrigation and water conservancy construction in the farmland that fell within the jurisdiction of the FDIA. These small projects were meant to provide quality services for local farmers and encourage autonomous management of irrigation and drainage systems to boost productivity and reduce property loss. This case study traces the challenges faced in setting up the FDIAs, and the adaptations and solutions developed in response by the Provincial Project Management Office (PPMO), the office mandated to oversee FDIA implementation.

Transformation of Traditional Views and Establishment of FDIA Project Obstacles and Adjustments

In 2011, at the initial stage of the Taidong River sub-component, several protests slowed dredging of the river. These demonstrations attracted considerable attention from the engineering team and local governments. The Taidong River was acknowledged as the “Mother River” by thousands of Taidong River Basin residents. Listed as a priority under the Huai River Basin Project, the Taidong River sub-component was intended to benefit the national economy as well as local residents.

Why did local residents voice their concerns about the project so strongly? As the PPMO sought to understand these concerns, it initially found most people attributed local frustration to dissatisfaction with relocation compensation and inconvenience caused by construction. The Taidong River sub-component caused almost 200 of Caoshe’s farming households to relocate, so officials assumed most complaints were about relocation compensation. However, as they investigated further, the PPMO learned more about residents’ underlying priorities. Locals fundamentally accepted building large water conservation projects but could not understand why those high-standard projects, which cost the World Bank and Chinese government a large amount of money, enlarged the rivers and beautified the river banks but made little impact on people’s daily lives. The PPMO found that the irrigation and drainage infrastructure closest to the farmers were poorly maintained, damaged, and dilapidated.

With the low efficiency of farmland water facilities, coupled with the farmland’s location within the water network in Lixiahe region, farmers undertook traditional ways of farming. The PPMO reported one farmer stating, “the government invests lots of money in major water conservation projects, but the water cannot flow into the farmland. Further, farmers still have to sail a boat to reach their farm and harvest crops because harvesters cannot fit in the field. During irrigation seasons in particular, despite floods upstream, downstream often faced water shortages and many times hundreds of farmers struggled with each other over access to pump water at pumping stations in order to irrigate the farmland. Local farmers will be satisfied once the government completes water projects in the farmland.” The PPMO uncovered the root cause of farmers’ concerns and interference with projects; people were most concerned with the water conservation projects that were closest to them. Therefore, the “last mile” of drainage and irrigation systems in farmers’ fields was the primary issue, as drainage and irrigation infrastructure was weak and management was outdated.

In order to tackle this issue, the Jiangsu PPMO again sent the research team to all local areas along the Huai River to convene conferences of farmers’ representatives in order to understand farmers’ thinking about problems with local irrigation systems and related infrastructure. These conferences found that farmers were well disposed toward the ultimate aims of the project, but skeptical of the FDIA mechanism.

Establishing the FDIA Project and Standardizing Management

Even though local officials and farmers looked forward to the improvement of farmland water conservation facilities through small-size projects, they were not willing or motivated to form FDIAs and participate in
project construction, management and maintenance. Particularly since Reform and Opening,7 rural communities generally perceived that government should be in charge of the investment in and management of rural small-size farmland water conservation projects. Despite the limited capacity of local governments and poor water management systems, which resulted in the mismatch between farmland water conservation and real demand of water, local officials and citizens were not confident in their ability to solve problems through autonomous farmers’ associations. As a result, although villages established the FDIA under the request of high-level government, most FDIA were not effective.

For a long time, the FDIA and its members focused on the management and maintenance of water conservation facilities taken over from previous village collectives, and despite not being able to show clear results, continued to request resources. In the first few conferences, farmers were pessimistic about the FDIA. They believed that the local governments and village collectives, long responsible for farmland water conservation projects, were establishing FDIA in order to pass on difficult issues to the farmers themselves. In many conferences convened by the FDIA, some representatives refused to participate, while others participated only reluctantly and were not yet convinced of the program benefits.

To solve this problem, the PPMO undertook a thorough campaign to help farmers understand the benefits of their involvement in managing water and infrastructure, and encourage them to participate more. This campaign included a presentation of the (relatively small) costs and (relatively considerable) collective benefits in order to persuade farmers to take ownership of these institutions that relied on farmers to compose and constitute them. The PPMO and the town cadres of the respective FDIA formed Implementation Improvement Lead Teams, stationed in the villages, to track the projects and help farmers better understand the objectives and intended impact of the projects, as well as their new responsibilities and the reasons for them. For instance, asset ownership changed, and the assets previously owned by village collectives were now owned by FDIA. Governments invested in the infrastructure, and the right to use those facilities belonged to the farmers. Using specific examples, the Lead Team explained to farmers that this meant they would need to take care of water conservation facilities near their own land, regardless of whether specific responsibility had been assigned by the FDIA, rather than waiting for specific orders from authorities to do this. Furthermore, regular maintenance would require little effort. What mattered was an increased sense of responsibility, and a commitment to make minor repairs as needed. These small contributions from all members of the FDIA would add up to a considerable collective good: functioning irrigation and flood protection systems.

Follow-Up Supervision and Highly Efficient Operations

Shuangchao Nanwei FDIA was the first pilot association established in Jiangsu Province. This area incorporated 433 farmer households, with a total population of 1362, and almost 214 acres of cultivated land. It involved three incorporated villages: Caoshe Village, Luo’er Village and Kaiyi Village, in the town of Zhendong, Dongtai City. Among them, Caoshe Village accounted for 80 percent of the entire project area. In the beginning of 2011, the World Bank planned to invest 16.11 million dollars in the FDIA pilot project.

This area was, in some respects, a challenging pilot site. Thanks to relatively well-developed private industry and solid economic conditions of this village, along with its achievements in fundraising and inclusion of projects in recent years, a large amount of small-scale irrigation and drainage works had been constructed. Due to this density of already-existing projects, the World Bank’s investment would cover less than five percent of the total investment needed on infrastructure in this area.

Prior to initiating the FDIA project, the village had made several investments in water conservancy and irrigation, but none of these projects had satisfactory effect. Both local government and the general public remembered these earlier disappointments, and were reluctant to place their trust in yet another project with uncertain results. This reluctance and the passive attitude of the general public presented an obstacle to the PPMO’s work. Then, the arduous task of leveraging a small amount of investment to improve the field construction work, and having an unprecedented demonstration effect, put a lot of pressure on the PPMO. Although the regulatory framework was established and responsibilities were distributed to the stakeholders gathered around the table at the founding meeting of the FDIA, the PPMO knew that it would be crucial to demonstrate the benefits of the

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7 Reform and Opening refers to economic reforms, which began in 1978 and introduced market principles.
project; if there were no tangible results for the public, it would be difficult to carry out follow-up work, and might even jeopardize the project.

During this crucial initial stage, the PPMO drew on experience and lessons from the past by appointing a highly proactive, responsible, and detail-oriented primary-level leader to take charge of the water conservancy and irrigation project construction work. After thorough field investigations, the PPMO found that previous water conservation and irrigation in Shuangchao Nanwei had produced insignificant overall benefits due to lack of farmer participation and improper planning. Most inhabitants did not have access to updated irrigation, drainage, and agricultural infrastructure.

The PPMO, along with the local water conservation and irrigation bureau, took the lead in the planning process, convening water conservation and irrigation planning experts, the heads of local water conservancy stations, village officials and FDIA members to form a "water conservation and irrigation planning working group." The working group conducted systematic research and produced a thorough long-term plan for water conservation and irrigation work in the pilot area. They decided to add another $15.38 million investment from the World Bank to the $16.11 million already invested. To avoid the problems that had been caused by scattered construction in the past, the working group focused on one particularly isolated area in which to fund infrastructure projects, including: the upgrade of one drainage station, the construction of three new machine-cultivated bridges, 2.39 kilometers of steel reinforced concrete road, five fixed machine ports, 1.89 kilometers of seepage control canal, one road culvert, and 70 convenient bridges over canals. The construction launched in 2011 and finished in the same year, with immediate benefits to the general public. Despite the relatively small monetary investment by the FDIA, local residents reaped tremendous benefits.

After the FDIA took charge of the drainage and irrigation work, conflicts increased among villages, as well as between households that primarily planted crops and those that raised livestock. Government officials from different villages maintained cordial but tense relationships. Those from less populated villages felt dependent on larger villages. Smaller administrative groups within the villages saw discord as well; for example, when one village group’s field works were severely damaged during flood season, while the other group’s were in relatively good condition, differences emerged over the cost allocation for fixing damaged works. Households that raised livestock and those that relied on planting crops also differed over their portion of water charges; livestock-raising households required water of higher quality than crop-planting households, which added to the cost of water diversion. In order to resolve these disputes, municipal and town-level supervision and guidance teams moved quickly to provide coordination support and guidance.

To address tensions among villages, the guidance team suggested that the FDIA adjust the administration and maintenance responsibilities below the head ditch level at the terminus of the drainage system. They put members of the FDIA who lived or had fields near the main body of the head ditch in charge of the operation and management of that entire section of infrastructure. For the contradictions among groups, the team suggested the FDIA abandon the original plan of allocating project costs by regions; instead, the FDIA would cover these costs. The guidance team proposed to resolve the disputes between crop-producing households and livestock-raising households by clarifying the basis for dividing the cost of water. Since households rearing livestock tended to have higher annual income, consume more water, and require water of higher quality, the FDIA determined that these households would pay more for water. While crop-planting households had more flexible requirements on water quality, they also consumed a much smaller volume of water than livestock-rearing households, so the portion of water charges they were responsible for should be smaller. Greater understanding of how costs were calculated and divided helped to smooth tensions among the farmers of the FDIA.

**Innovation and Scale-Up**

Based on the success of the pilot in Shuangchao Nanwei, the Jiangsu PPMO began to scale up the model with the establishment of eight more FDIA along the Taidong River. The World Bank proposal had envisioned providing funds for infrastructure construction only for the pilot phase; by supporting infrastructure construction by the Shuangchao Nanwei FDIA, the Bank team hoped to establish the pilot FDIA as a successful model. For the other eight FDIA in Jiangsu Province, the World Bank project would provide support only to the establishment of the FDIA, without
additional investment in local infrastructure. This led to the PPMO taking additional responsibility for the scale-up process. The PPMO conducted research in the areas where the new FDIA areas were to be established, and found that local mindsets could pose an obstacle to scaling up. Some village-level government officials thought that there was no need for a new organization, as they saw the local political landscape already replete with local bodies including the village-level party branch, villagers’ committee, and collective economic stock cooperative (companies owned by the village, in which farmers are equity holders). Moreover, farmers’ associations had been established in the past, with functions similar to the proposed FDIA areas. These were seen, however, as empty shells with limited effect, and this influenced how local governments and citizens perceived the FDIA. This led village-level officials to oppose or ignore the proposal to establish FDIA.

Through field investigation and research, the PPMO realized that government and the general public of the selected eight drainage and irrigation areas were not keen for the FDIA to be established. It would clearly be necessary to change peoples’ outlooks to allow the successful establishment of the FDIA. In particular, it would be critical to change mindsets among the farmers from whom FDIA membership would be drawn, otherwise it would be impossible to achieve the goal of putting them in charge of the management and maintenance of small-scale rural water conservancy and irrigation works.

Faced with skepticism toward the FDIA, the Jiangsu PPMO used five strategies to alleviate this situation and change perceptions of the program.

The first measure taken was the arrangement of field trips. Town-level and village-level government officials from the eight proposed FDIA areas conducted field visits in which they held workshops to share the related national policies on the structural reform of small-scale rural drainage and irrigation project management, and presented the development of Water Users Associations around the country. The PPMO also invited village-level government officials and FDIA members to the field to present their successful experiences of constructing water conservation and irrigation infrastructure. This helped alleviate the concerns of key town-level and village-level government officials and add to their enthusiasm and motivation towards the establishment of FDIA, encouraging them to take a leadership role.

Second, the PPMO worked to strengthen administrative support. With the guidance of the Provincial Water Resources Bureau and local government counterparts, the town-level government, along with the Bureaus of land, water resources, finance, agricultural economics, and villagers’ committee of the polder area, together formed the planning and preparation working group of the FDIA. This team was charged with supervising implementation, and providing support in the form of policy guidance. Working with town-level government officials in charge, this team also helped to resolve the coordination problems among various sectors and agencies involved in establishing the FDIA.

Third, the PPMO developed a strategy to disseminate accurate information about the purpose and goals of the FDIA, and the various benefits that would come through its establishment. The PPMO used multiple tools and dissemination activities in the eight new FDIA areas simultaneously, including meetings, broadcasts, television subtitles, slogans, and brochures. Meanwhile, the PPMO convened panels and training sessions to enhance communication with the villagers and provide them with an enhanced understanding of the FDIA. This included raising awareness of the trend of placing FDIA in charge of small-scale drainage and irrigation works.

The fourth measure was the application to project investment. The PPMO had received requests for improvements to local drainage and irrigation systems from people living along the Taidong River. After comprehensive research and analysis, the PPMO concluded that it was critical to prioritize investment in “last-mile” drainage and irrigation works that required urgent construction and maintenance, and were located within the areas of the eight scale-up FDIA areas. This measure was seen as crucial to improve staff motivation and gain their support. Taking each FDIA area’s financial condition into consideration, the PPMO requested the World Bank to provide additional investment in field works in the eight scaled-up FDIA areas during mid-term adjustment in 2013. The Provincial Development and Reform Commission and Provincial Department of Finance of Jiangsu provided political support and funding to ensure that the scaling-up process moved smoothly and expeditiously. This further improved the motivation of the government and the villagers, and transformed their reluctance about the project into active requests for establishing FDIA.

Finally, the PPMO worked to establish model processes and compile good practices for the establishment of FDIA.
FDIAs. As local officials struggled with establishing the new organizational structures for the FDIAs, the Jiangsu PPMO invited the staff of the pilot FDIA to compile a comprehensive set of detailed sample materials on the establishment, operation, and management of the FDIA. The contents were extremely thorough, including: request for establishment, documents issued by the town government, construction plans, dissemination materials, materials from the Civil Affairs Bureau, principles of the association, management systems, launch materials, materials for membership applications, sample member’s handbooks, and training materials. These reference and guidance materials were distributed to FDIA working groups in the eight areas.

Through the strategies mentioned above, the eight FDIAs were effectively established. However, even though the PPMO had raised considerable money for each FDIA (from tens of thousands up to $1.46 million) as an investment on field works, this relatively modest amount of funds could not cover the full cost of a drainage and irrigation systems. This in turn could still create obstacles to the operation and management of the newly formed associations. The Jiangsu PPMO introduced two strategies to deal with these obstacles.

First, given the shortage in construction funding and the lack of project budget, the PPMO of Jiangsu Dongliwei FDIA (the first to be established after the initial pilot) diversified its fundraising strategy. Little by little, contributions came in from: the National Development Fund, the municipal budget, construction work contributed by other projects (through coordination with other policy-driven water conservation projects funded by the government) and donations from village-level activities. Meanwhile, taking advantage of the implementation of this World Bank lending project, which could encourage additional investment, more capacity would be leveraged in the construction of drainage and irrigation projects in the field. Drawing from a variety of sources, including donations from major local business owners and wealthy households, as well as equity financing from FDIA member households, the funding gap closed. The strategy was internally promoted as a model for other FDIAs to follow.

Complementing the strategy of increasing local fundraising, the PPMO narrowed the scale of construction in order to get the most benefits from relatively limited funds and lay the foundation for future operation and management. Seven principles were established to help select the construction areas of the eight FDIAs.

1. The FDIA should be located in an agricultural area;
2. The streams of the river basin should not be blocked;
3. The FDIA area should contain areas that are able to conduct irrigation without impinging on other plots of land;
4. The area should include a certain amount of well-functioning infrastructure;
5. There should be canal systems that are easy to transform;
6. The amount invested must be limited; and
7. The area should be conducive to achieving quick gains.

While in the process of scaling up, the PPMO drew on the experience of the pilot area. It actively sought the opinions of local farmers, establishing their sense of ownership, and followed through with putting them in charge of the field water conservation and irrigation works. The eight FDIAs have made considerable progress: significant gains have been made in the construction of infrastructure and auxiliary facilities, road transportation is smooth and the new bridges are convenient for residents, and drainage and water supply have been integrated in the FDIA areas. The cost of planting crops has been significantly reduced and meets the target set by the Jiangsu PPMO.

**Lessons Learned**

**Importance of Transforming Views of Local Officials and Farmers to Enable the Establishment of Group Projects**

When the PPMO faced obstacles caused by skepticism on the part of local officials and residents, it adopted three main measures to address these issues. The first measure was field visits and training. The PPMO organized site-visits and training for local government officials at the town or village level, during which the government officials learned about successful experiences with the development, operation, management and maintenance of farmland drainage and irrigation works. The PPMO also introduced policies and instructions on: small-scale rural drainage and irrigation project management, the development status of farmers’ water associations and agricultural water conservation and irrigation across the country, as well as the trend of agricultural water
conservancy and irrigation in the future. Discussion and analysis of the issues caused by outdated infrastructure in the “last mile” in rural water conservation and irrigation successfully conveyed the importance of the development and management of agricultural water conservation and irrigation to officials and farmers. In turn, they started to pay attention to the issue more seriously.

The second measure was improving farmers’ faith in self-management through sound planning. In the past, rural fieldwork planning and development often proceeded in an ad hoc fashion, with little in the way of a unifying strategy or plan. The PPMO had learned from experience that the benefits of local development projects would not be fully realized if the project planning and design were incompatible or inconsistent. To coordinate planning, the PPMO formed a working group of various stakeholders, including local government members. The working group conducted thorough investigations in the field, soliciting the opinions of farmers and other stakeholders. The planning process of all field works within the service area of the FDIA followed a step-by-step strategy to develop short-term, mid-term and long-term plans for the construction of field works. The working group selected a piece of farmland that could be managed without impinging on other plots of land in the area. Leveraging the small amount of money invested in an attempt to produce maximum benefits, the working group built a demonstration point with a whole set of agricultural water conservancy and irrigation facilities, made it a typical model of effective construction, and ultimately convinced local government officials and citizens of the robustness of the approach.

The third measure involved transforming local ideas about management. In the past, the system of managing small-scale rural drainage and irrigation at the town and village level suffered from poorly defined management and maintenance responsibilities. As a result of this lack of clarity, many of the farmland water conservancy and irrigation works had been minimally supervised since the 1980s. With support from the World Bank geared toward enabling self-management of the FDIA, the Jiangsu PPMO tailored arrangements for management and maintenance based on local context. Designating specific FDIA members to perform maintenance and allocating a maintenance budget effectively prevented the phenomenon of “construction done, maintenance none,” which had characterized past agricultural drainage and irrigation projects.

Establishing the FDIA, and Actively Involving Beneficiary Farmers in Decision-Making and Management

Since the 1980s, farmers seldom participated in the villages’ collective affairs. To encourage greater participation, the Jiangsu PPMO employed a four-step strategy to move local farmers from passive involvement to active participation in the establishment of the FDIA. The first step was signing up the farmers as founding members of the FDIA. By facilitating the democratic election of the president and representatives of the association, the PPMO laid the groundwork for increased participation by farmers.

The second step was to provide a variety of means of dissemination and training during the formation stage of the association. At the same time, through the establishment of communication mechanisms and accompanied exercises presenting the advantages of the FDIA approach, the PPMO increased awareness of how the construction, management and maintenance of the field water conservancy and irrigation facilities immediately addressed farmer priorities. This appeal to farmers’ interests increased their active engagement in the project.

The third step was to address the information asymmetry in planning that previously existed during construction of farmland water conservancy and irrigation, and set up schemes to stimulate and apply farmers’ opinions in decision-making. Typically, professional construction personnel were well informed about the planning and end goals of the construction, while the users and beneficiaries often had little knowledge about the planning or the expected benefits of the project. This lack of information left farmers and other users less willing to actively cooperate or contribute ideas. To overcome this challenge, the PPMO reached out to grassroots and FDIA members during the construction of the FDIA facilities and listened to their opinions. The township water station and villagers’ committee began implementation only after getting the approval of the majority of farmer members. Throughout the planning and construction period, the implementation team helped the farmers feel their needs were being addressed; farmers were more likely to get actively engaged in the decision-making and management of the association when they felt respected and consulted.

The fourth step was to improve the farmers’ skills in operating and maintaining water conservation
facilities during the operation and management of the project. Training was conducted on management and maintenance, safe operation, flood and drainage control, rescue and relief work, and scientific irrigation. During the FDIA’s process of decision-making on important internal issues, member representatives participated throughout the process. The democratic style of decision-making helped build their sense of ownership in the association, and helped them feel responsible for the work of the FDIA.

Moving from Pilot to Scale-Up with Inputs from Multiple Stakeholders

Following the success of the pilot FDIA, the PPMO organized site-visits and carried out workshops to share experiences among the local government officials of the eight areas chosen to scale up the FDIAs. The Provincial Water Resources Bureau, alongside local government counterparts, the town-level government, the village committees of the polder area, and the Bureaus of land, water resources, finance, and agricultural economics formed the planning and preparation working team of the FDIA. Multiple forms of tools were used in a wide series of dissemination activities in the eight scaling-up FDIA areas simultaneously, including meetings, broadcasts, television subtitles, slogans, and brochures. The PPMO made requests to the World Bank, asked for additional investment in field construction in the eight scaling-up FDIA areas, and raised the enthusiasm of local government officials and citizens. The PPMO invited the major construction staff of the demonstration area of the FDIA to compile the sample material on the establishment, operation, and management of the FDIA. This knowledge base facilitated the subsequent scale-up of the FDIA approach. The PPMO assisted with fundraising in various ways and helped build the auxiliary field construction.

It took approximately seven years to complete the pilot FDIA in Shuanchao Nanwei. As a testament to the success of the pilot approach, the PPMO mobilized multiple stakeholders to work together to accelerate the scaling-up process, establishing the rest of the FDIAs in a relatively short timeframe of three years and delivering significant benefits, both in Jiangsu and throughout the entire project area. At the time of writing, flood protection and drainage had been improved throughout the Huai River Basin. Almost seven million people benefitted from this infrastructure, and the FDIAs laid a foundation for sustainable maintenance and governance of infrastructure and water resources.
## Annex 1: Timeline of the FDIA Program

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Rationale of being listed and relevance</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>The Huai River flood disaster</td>
<td>The flood brought great disaster to the rural areas, with thousands of people left homeless.</td>
<td>Turning point</td>
</tr>
<tr>
<td>2003–2005</td>
<td>Preparation and completion of the Feasibility Study of the Huai River Basin Flood Plains and Depressions Improvement Project</td>
<td>Chinese national government established an Accelerated Emergency Plan, implementing 19 major projects and added three additional sub-programs. The Flood Plains and Depressions Improvement Project, using loans issued by the World Bank, was an integral part of the three sub-programs.</td>
<td>Change</td>
</tr>
<tr>
<td>2005–2007</td>
<td>The World Bank's plan to assist with the project</td>
<td>The World Bank formed assistance memos for the Flood Plains and Depressions Improvement Project through observation, evaluation, and pre-assessment.</td>
<td>Start of program</td>
</tr>
<tr>
<td>2007</td>
<td>Establishment of the Shuangchao Nanwei FDIA (pilot area)</td>
<td>This signaled the start of the FDIA program.</td>
<td>Turning point</td>
</tr>
<tr>
<td>2007–2012</td>
<td>Establishment and improvement of the FDIA systems</td>
<td>The project explored and collected experiences establishing the FDIA.</td>
<td>Adjustment and improvement</td>
</tr>
<tr>
<td>2011</td>
<td>Second planning and design of farmland projects</td>
<td>Local officials adopted a more systematic approach to project planning and encouraged farmers’ participation, as both officials and farmers changed their attitudes toward participating in the FDIA.</td>
<td>Adjustment</td>
</tr>
<tr>
<td>2011</td>
<td>Farmers’ protests and officials’ concerns</td>
<td>The project started to focus on the real needs of farmers and identified and clarified misunderstanding among officials.</td>
<td>Obstacle</td>
</tr>
<tr>
<td>2012</td>
<td>Election of new FDIA management</td>
<td>This signaled a new turning point for the development of the FDIA pilot area.</td>
<td>Adjustment</td>
</tr>
<tr>
<td>2011–2012</td>
<td>Establishment of farmland projects in the pilot area</td>
<td>Farmland projects were implemented according to the new planning process and were approved and supported by farmers.</td>
<td>Turning point</td>
</tr>
<tr>
<td>2013</td>
<td>Members’ unwillingness to manage farmland projects</td>
<td>Traditional views again impeded the FDIA's functioning.</td>
<td>Obstacle</td>
</tr>
<tr>
<td>2013–2015</td>
<td>Promotion of eight new FDIA s</td>
<td>FDIA s were implemented according to the context of different areas, and the impact of FDIA s improved.</td>
<td>Innovation</td>
</tr>
<tr>
<td>2013–2015</td>
<td>FDIA fundraising and increase in FDIA investment</td>
<td>The attitudes and actions of local officials and farmers changed.</td>
<td>Feedback</td>
</tr>
</tbody>
</table>
## Annex 2: Process Mapping of the FDIA Program

**Cause:** In 2003, a great flood occurred in the Huai River Basin and brought huge disaster to large rural areas. In recent years, the Chinese government has increased investment in water conservation in the Huai River Basin and built large-size infrastructure along the Huai River and projects in smaller tributaries, but the farmland water facilities were outdated, inefficient, and poorly maintained. Thus, inundation of farms still occurred. The “last one mile” farmland water conservation remained a pressing issue.

**Ideal final outcome:** Through government planning and policy support, scale up establishment of FDIAs in Jiangsu Province and nationally; increase farmer’s income through improvement of irrigation facilities; facilitate agricultural production at a larger scale; and ultimately overcome the “last mile” challenge.

**Intermediate results:** Promote 8 FDIAs, deepen reform and innovation, collect experiences and maximize impact.

**Theory of Change:** Small-size farmland water conservation facilities are numerous; they cover a large area and thousands of households; and they need farmer participation in management and maintenance.

<table>
<thead>
<tr>
<th>Intervention: Establish an FDIA pilot area and collect experiences and lessons learned.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation Strategy: Build secondary projects, improve irrigation facilities, and encourage farmers to actively participate in management.</td>
</tr>
<tr>
<td>Implementation Strategy: FDIA members fully participate in planning and design of farmland projects and ensure those projects reflect member priorities.</td>
</tr>
<tr>
<td>Implementation Strategy: Divide the pilot area into several irrigation areas; start with the smaller systems to build the FDIA, and follow with the larger, more difficult ones; implement one FDIA at a time and in order—when one FDIA is built, it can be put into use and managed; draw on evidence to produce real impact and in turn demonstrate the impact of the project.</td>
</tr>
<tr>
<td>Implementation Strategy: Register FDIAs; decide on the scope of the pilot area according to farmland limits rather than the administration limits.</td>
</tr>
<tr>
<td>Implementation Strategy: Town governments organize all relevant agencies to form FDIA Preparation Lead Team and facilitate work.</td>
</tr>
<tr>
<td>Implementation Strategy: Implement assets assessment and change of ownership; enable farmers to take charge and take on management tasks while enjoying the rights and responsibilities attendant on autonomous local management rights.</td>
</tr>
<tr>
<td>Implementation Strategy: Use various publicity methods such as conferences, discussions, broadcasts, television subtitles, slogans, brochures and flyers to promote the idea of FDIAs and fundamentally change the views of local officials and farmers.</td>
</tr>
<tr>
<td>Implementation Strategy: Establish tasks for different roles and build a stable, effective management system for farmland management; convene FDIA conference to discuss approval of those rules.</td>
</tr>
</tbody>
</table>
Annex 3: Stakeholder Map

Guide
In the figure, the innermost semi-circle stands for key stakeholders; the middle one stands for major stakeholders; and the outer one stands for secondary stakeholders.

Figures:
- Circle: key stakeholders who have immediate impact on the project
- Ellipse: the degree of the key stakeholders and major stakeholders’ impact on issues and reform target
- Rectangle: secondary stakeholders who are not directly involved in the project but still might have impact
- Arrow: the direction of subordinate relationship and mainstream relationship
- Double-line: contract-based alliance and cooperation
- Single-line: indicates close relationships in information sharing, frequent communication with aligned interest
- Dotted-line: indicates the relative weakness in the frequency of information sharing
## Annex 4: List of Interviewees of the FDIA Program

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Title</th>
<th>Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genyi Lu</td>
<td>Hongqi FDIA, Agricultural Development District, Taizhou City</td>
<td>Director</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Kaihua Tang</td>
<td>Hongqi FDIA, Agricultural Development District, Taizhou City</td>
<td>Vice President</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Cailin Wu</td>
<td>Hongqi FDIA, Agricultural Development District, Taizhou City</td>
<td>Secretary-General</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Yulin Huang</td>
<td>Hongqi FDIA, Agricultural Development District, Taizhou City</td>
<td>Water Fetcher</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Zengding Lu</td>
<td>Hongqi FDIA, Agricultural Development District, Taizhou City</td>
<td>Water Fetcher</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Rujin Zhao</td>
<td>Hongqi FDIA, Agricultural Development District, Taizhou City</td>
<td>Water Fetcher</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Sanwang Lu</td>
<td>Nanshe Village, Agricultural Development District, Taizhou City</td>
<td>Chief of Village</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Qingzhong Jiang</td>
<td>FDIA, Jiangmao Village, Taizhou City</td>
<td>Member</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Rulin Yuan</td>
<td>FDIA, Jiangmao Village, Taizhou City</td>
<td>Member</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Yu Yuan</td>
<td>FDIA, Jiangmao Village, Taizhou City</td>
<td>Member</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Xingwen Hang</td>
<td>FDIA, Shuangchao Nanwei, Dongtai City</td>
<td>Executive Chairman</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Xueguang Sun</td>
<td>FDIA, Shuangchao Nanwei, Dongtai City</td>
<td>Vice President</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Shuquan Ji</td>
<td>Water Station, Zhendong Town, Dongtai City</td>
<td>Chief of Station</td>
<td>11/04/2015, morning</td>
</tr>
<tr>
<td>Jinru Wang</td>
<td>FDIA, Oujia Village, Taizhou City</td>
<td>Executive Chairman</td>
<td>04/14/2016, afternoon</td>
</tr>
<tr>
<td>Bingwen Li</td>
<td>FDIA, Oujia Village, Taizhou City</td>
<td>Member</td>
<td>04/14/2016, afternoon</td>
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<tr>
<td>Faqiang Yang</td>
<td>FDIA, Oujia Village, Taizhou City</td>
<td>Member</td>
<td>04/14/2016, afternoon</td>
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<tr>
<td>Fubao Liu</td>
<td>FDIA, Oujia Village, Taizhou City</td>
<td>Member</td>
<td>04/14/2016, afternoon</td>
</tr>
<tr>
<td>Guowang Li</td>
<td>FDIA, Oujia Village, Taizhou City</td>
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<td>04/14/2016, afternoon</td>
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<tr>
<td>Shouding Li</td>
<td>FDIA, Oujia Village, Taizhou City</td>
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<tr>
<td>Songgui Wang</td>
<td>FDIA, Oujia Village, Taizhou City</td>
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</tr>
<tr>
<td>Yingchun Li</td>
<td>FDIA, Oujia Village, Taizhou City</td>
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<td>04/14/2016, afternoon</td>
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<tr>
<td>Xingzhu Li</td>
<td>FDIA, Oujia Village, Taizhou City</td>
<td>Member</td>
<td>04/14/2016, afternoon</td>
</tr>
</tbody>
</table>
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