



SEEDING A CLIMATE-RESILIENT FUTURE:  
CREATING MARKETS FOR IRRIGATION TECHNOLOGIES IN NIGER

**CIF-GDI DELIVERY CHALLENGE CASE STUDY - JUNE 2020**





# PROJECT DATA

## **PARTNER ORGANIZATIONS**

World Bank Group's International Finance Cooperation (IFC)

## **ORGANIZATION TYPE**

International organization

## **DELIVERY CHALLENGES**

- Stakeholder engagement
- Skill transfer
- Financing mechanism

## **DEVELOPMENT CHALLENGE**

Scarce water resources

## **COUNTRY AND REGION**

Niger, West Africa

## **PROJECT TOTAL COST**

USD 1.5 million

## **PROJECT DURATION**

2014–2020

## **CASE AUTHORS**

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*Cover Photo: CIF Administrative Unit*

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# EXECUTIVE SUMMARY

*Photo: CIF Administrative Unit*

**Nestled in the Sahel, agriculture in Niger is severely impacted by climate change and scarce water resources.** Home to the fragrant onions that served the western African market, Niger showed significant potential to develop its agricultural sector as the primary source of its gross domestic product. With temperatures rising 1.5 times faster than the global average and with daytime highs soaring above 45 degrees Celsius, subsistence farmers across Niger struggled to grow food in the scorched, sandy soil. Scarce rainwater resources, rainfall variability, and repeated prolonged dry seasons were responsible for the underutilization of available land in Niger for

agriculture. Despite being the main employer of labor and a major source of income for rural dwellers, only 7 percent of land in the country was irrigated.

**To test the viability and sustainability of a commercial private sector approach to supply drip irrigation technology to farmers in Niger, the International Finance Corporation (IFC) implemented the Niger Irrigation Program (NIP).** With support from the Climate Investment Funds' (CIF) Pilot Program for Climate Resilience (PPCR), the NIP aimed at harnessing private sector solutions to the water conundrum through drip irrigation technology.

The Program would be implemented in two phases: Phase 1 would demonstrate the potential for improved irrigation systems by the Nigerien private sector. Phase 2 would scale up program impact and scope by investing IFC's own commercial finance together with PPCR concessional finance. This case study focuses on the implementation of phase 1.

**The use of drip irrigation technology would permit farmers, many of whom are women, to tap into the vast and underutilized aquifers<sup>1</sup> in Niger and depend less on rainfed farming.** The NIP worked to demonstrate the economic, agronomic, and environmental benefits of drip irrigation as a way to mitigate the effects of heat waves, water scarcity, and longer dry seasons. In partnership with Netafim, a private sector firm, the Manufacturing Agribusiness and Services Advisory team of IFC sought to address the challenges of optimizing water use, enhancing smallholder farmer capacity and yield, equalizing access to water resources across genders, and establishing the financial viability of a commercial irrigation market.

### **Three delivery challenges were identified:**

**1 | Misconceptions about drip irrigation:** Local communities and beneficiary stakeholders in Niger were skeptical about drip irrigation because of previous negative experiences with small-scale irrigation in past interventions led by the government and other development partners. To address this challenge, the private sector firm hired a local project coordinator, provided multiple hands-on trainings, and engaged with communities formally, through a multi-stakeholder workshop and informally, at mosques, markets, and other gatherings.

### **2 | Limited last-mile support to farmers in local communities**

Past interventions did not provide consistent day-to-day technical support, termed as "last-mile support," to farmers. To resolve this, the NIP assigned Community Field Assistants (CFAs) to each community plot or privately-owned project site. The locally grown talent pool of CFAs provided iterative training, support with day-to-day maintenance, linkage with buyers for farmed produce, fertilization, pesticides and other services.

### **3 | Financing constraints for rural farmers**

Smallholder farmers, particularly women, could not independently access finance for agriculture. As a solution, the NIP would demonstrate financial viability of drip irrigation and set the framework to identify the right financing mechanism tailored to male and female farmers seeking finance to purchase drip irrigation technology.

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1 | Underground water sources that can be tapped for agriculture



# INTRODUCTION

Photo: CIF Administrative Unit

It was the middle of a particularly harsh dry season in 2015. Oummou's day began at 8:00 am on the community farm in Kissin-Kissin, located about 60 miles from Niamey, Niger. She had already sent her eldest child to school, and now she was trying to do as much as she could before the relentless midday sun made fieldwork unbearable. She placed her year-old son on her back with a wrap and hurried to fetch water from a hand-built well located on her assigned plot. Balancing the bucket of water on her head, she walked to her patch of onions, checking the soil to make sure there was sufficient water. She carefully poured water in each area where the delicate onion seedlings were beginning to sprout. She would do this several times a day to make sure her plants were well watered and healthy.

Like most women in Niger, Oummou and the other 100 women farmers of Kissin-Kissin, do not own land.<sup>2</sup> Instead, the community allowed the women to plant small gardens during the dry season on land not



Oummou, female farmer. Photo: Nirritech

farmed due to lack of rainfall or access to irrigation. Oummou eventually got two sacks of onions and some vegetables from her 600 square meter plot (approximately one-tenth of a football field), much of which she used to feed her family, and the remainder she sold in the market.<sup>3</sup>

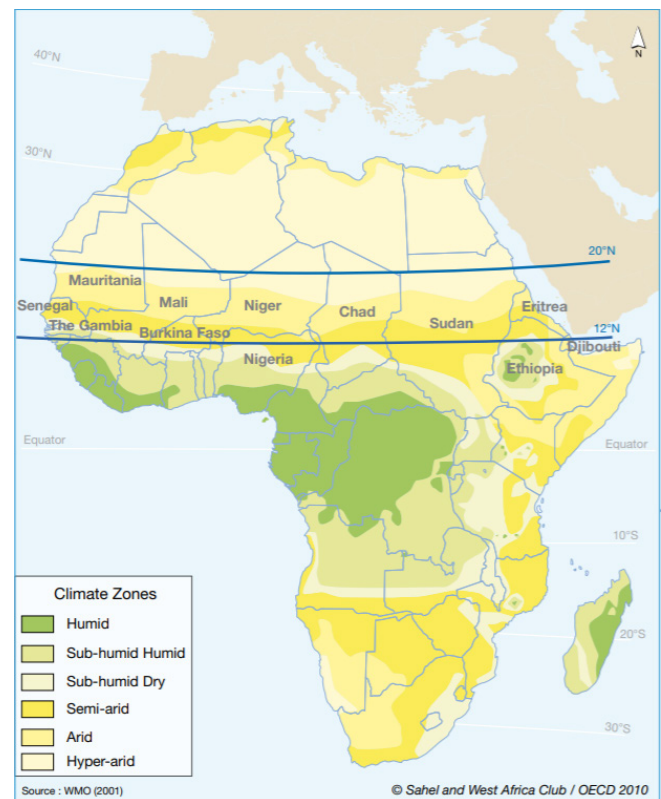
2 Niger country profile. Land Links. USAID. <https://www.land-links.org/country-profile/niger/>.

3 Plots owned by women in Niger yield 20 percent less per hectare than those managed by men. (World Bank. 2019. Economic Impacts of Gender Inequality in Niger.)

Subsistence farmers like Oummou barely eked out a living in Niger, one of the poorest countries in the world. Agriculture was a primary source of income, food, and employment nationwide, but productivity was low and climate change vulnerability is high, given that 80 percent of farming was rainfed. With the Sahara Desert covering nearly 80 percent of its landmass<sup>4</sup>, Niger was a dry country predicted to get drier with climate change (see Figure 1). It has seen mean temperatures rise and the number of multi-year droughts increase since 2000, spelling disaster.

In 2012, the Manufacturing Agribusiness and Services (MAS) team of the International Finance Corporation (IFC), the private sector arm of the World Bank Group, noted that, despite two decades of projects funded by international donors to develop Niger’s irrigation sector, only 7 percent of Niger’s cultivated land—a total of 107,000 ha—was irrigated.<sup>5</sup> Yet, the country was endowed with rich aquifers that were underutilized.<sup>6</sup> If Niger’s 2.5 billion cubic meters of groundwater could be exploited responsibly and sustainably, Nigerien farmers could increase yields and build resilience to climate change and access the needed water to support agricultural activities during long dry seasons and droughts.

Figure 1.  
SAHEL REGION ARIDITY



Source: Security implications of climate change in the Sahel Region: Policy considerations (OECD, 2010) <https://www.oecd.org/swac/publications/47234320.pdf>

4 Data reported by AfDB. National Climate Change Profile for Niger

5 SPIN – Strategie de la Petit Irrigation au Niger (2015) [https://reca-niger.org/IMG/pdf/SPIN\\_FINALE\\_Niger.pdf](https://reca-niger.org/IMG/pdf/SPIN_FINALE_Niger.pdf)

6 A destiny shaped by water – A diagnostic of water supply, sanitation and hygiene (WASH) and poverty in Niger <http://documents.worldbank.org/curated/en/849131559585844030/A-Destiny-Shaped-by-Water-A-Diagnostic-of-Water-Supply-Sanitation-and-Hygiene-WASH-and-Poverty-in-Niger>



## CONTEXT

Photo: CIF Administrative Unit

Niger's agriculture sector, which accounts for about 40 percent of Niger's GDP, is supported by the government's policy of *Nigériens Nourrissent les Nigériens* (or Nigeriens feed Nigeriens, 3Ni). It began in 2012 with the goal of achieving food self-sufficiency despite climatic hazards by increasing and diversifying agroforestry pastoral production<sup>7</sup>

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7 Integrated production systems for crop production, livestock, forestry, and aquaculture help minimize production failure risks under harsh environmental conditions.

In Niger's 3Ni strategy, gender inequality is addressed with specific measures such as micro-financing and small cattle distribution.

<http://extwprlegs1.fao.org/docs/pdf/ner145888.pdf>

and fish farming; regularly supplying rural and urban markets with agricultural and commercial food production; improving the resilience of Nigeriens to climate change, crises, and disasters; improving the nutritional status of Nigeriens; and creating an environment conducive to food security.

The agriculture sector is also supported by the national strategy on small-scale irrigation (*Strategie de la Petite Irrigation au Niger*, or SPIN). The government launched the SPIN in 2015 to help prioritize donor funding in the areas assessed to have the most impact, such as addressing the challenges of small- and medium-scale farmers. For decades,



Niger had received funding from various donors and development organizations, including the World Bank Group and the Food and Agriculture Organization (FAO), to support its agricultural sector, but success was uneven. The government's 3Ni and SPIN strategies provided coherence for addressing the agro-climatic constraints and other challenges that Nigerien farmers faced and for strengthening the agriculture-dependent economy's resilience to climate change. The SPIN, supported by donor organizations, conveyed

a strong call to action for the private sector to participate by developing and delivering solutions, which could serve businesses' bottom lines, provide direct benefits to the farmers, and ultimately reduce dependence on public sector funds.

The Niger Strategic Program for Climate Resilience (Box 1) provided the framework for a country-led programming process to integrate climate resilience into development planning and implementation.



*Photo: CIF Administrative Unit*

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**Box 1:**  
**NIGER'S PPCR STRATEGIC PLANNING**

Niger was among the first pilot countries of CIF's Pilot Program for Climate Resilience (PPCR). In 2010, the PPCR's governing body endorsed Niger's Strategic Program for Climate Resilience (SPCR), which was prepared by the Nigerien government in collaboration with the African Development Bank (AfDB), World Bank, and IFC. Through Niger's SPCR, the country addressed the imbalance between increasing food demand and low agricultural yields, improved climate resilience through enhanced sustainable land use and water resource management, increased the use of climate-related information to improve weather forecasting, and enhanced private sector participation in the agricultural sector. The preparation and implementation of the SPCR was an inclusive and consultative process. The document served as a platform for strengthening collaboration among development partners working in the country.

Over the past decade and into the next, Niger's SPCR has implemented a series of four interconnecting projects to address the imbalance between increasing food demand and low agricultural yields, improve climate resilience through enhanced sustainable land use and water resource management, increase the use of climate-related information to improve weather forecasting, and enhance private sector participation in the agricultural sector.



# DEVELOPMENT CHALLENGE

Photo: CIF Administrative Unit

## SCARCE WATER RESOURCES

In 2012 when the IFC team began developing the NIP, they recognized the challenges. Nigerien farmers relied on rain to grow their crops. However, insufficient and variable rainfall limited agricultural productivity. There was a lack of technology that would permit farmers to tap into the vast and underutilized water held in underground aquifers and ease their dependence on rainfed farming methods, particularly during the prolonged dry season from October to May. Women were disproportionately affected by shortage of rainwater for farming. They resorted to wells, which are labor-intensive, time-consuming, and unsafe.

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***Farming smarter means farming better, which also leads to increased yield.***

*Chaibou Bakoye, Statistician, Ministry of Planning, Niger and PPCR Sub-Committee member*

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Small and medium-sized farmers in Niger were also impacted by other challenges, such as limited access to credit or effective agricultural inputs and equipment, no extension services to transfer knowledge and technical capacity to farmers and limited market access to sell agricultural produce. They also lacked integrated support and training to help them transition from labor-intensive seasonal farming to more productive climate-smart irrigation farming. As Chaibou Bakoye, a statistician with the Ministry of Planning and Niger’s Pilot Program for Climate Resilience (PPCR) focal point, expressed: “Farming smarter means farming better, which also leads to increased yield. Irrigation technology is the only way we can lift rural farmers out of poverty.”<sup>8</sup>

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8 Authors’ interview with M. Chaibou Bakoye, PPCR Sub-Committee member, December 17, 2019.



# THE INTERVENTION: TESTING A NEW BUSINESS MODEL

*Photo: CIF Administrative Unit*

The NIP was one of four projects funded by Niger's PPCR Strategic Program for Climate Resilience (SPCR). The purpose of the NIP was to test new small-scale irrigation techniques through the private sector that would engender beneficiary acceptance and promote sustainable agriculture, while creating conditions for private sector involvement in the agricultural sector through potential public-private partnerships (see Figure 2).

The NIP's initial design sought to utilize both underground and surface water resources to pilot private sector-led small-scale irrigation schemes in local communities in Niger. PPCR concessional finance

would be used to support these schemes, which could be replicated in the future without further subsidies. The NIP would also provide support in crop selection and planning to align farmers' operations with optimum market opportunities, as well as facilitating farmers' access to potential purchasers and local and regional markets.

The IFC team recognized that something different had to be done to sustainably and commercially provide technical support to farmers and to introduce drip irrigation technology as a supplement to rain-fed farming. The solution was a two-phased approach to test and implement the recommendations of the

Figure 2.  
OVERVIEW OF THE NIGER IRRIGATION PROGRAM



market study. The rationale for this approach was that market conditions did not exist to provide irrigation equipment on a fully commercial basis. Phase 1 of the NIP would demonstrate commercial viability of improved irrigation systems by the Nigerien private sector. Phase 2 would scale up program impact and scope by investing IFC’s own commercial finance together with PPCR concessional finance. This case study focuses on the implementation of phase 1.

Phase 1 provided technical assistance in the form of a three-year IFC Advisory Services program.<sup>9</sup> PPCR funding for this pilot phase of the project aimed to help at least 1,000 small- and medium-sized farmers increase their agricultural productivity by at least 30 percent from the established baseline for each site and strengthen their resilience to climate change. This would be achieved by identifying a private sector

company to install affordable, efficient irrigation equipment in two plots of 60 hectares (ha) each as demonstration sites designed to show the potential of the project and to help farmers adopt and sustain the technology. These 120 ha would have proximity to a bulk water source with government-provided boreholes, dams, or other public-sector provided water sources. The IFC forecasted that, based on efficient centralized irrigation system designs, there could be the potential to install equipment in 2,400 ha by the end of the first phase.<sup>10</sup>

Niger’s private sector operated largely informally, with a focus on small-scale, informal trading. The private sector’s involvement in agriculture was minimal, which meant that standard IFC business models would not apply.<sup>11</sup> Using an approach that was unprecedented in IFC, the NIP provided a PPCR grant to a competitively selected private sector company to provide irrigation

9 IFC Advisory Services provides support in the form of training, advice, dialogue, and problem solving. This support helps improve business standards, creates attractive business environments, and removes legal and technical obstacles that hamper private sector growth.

10 IFC FY14 Internal Review Document

11 IFC typically identifies a private sector client (investor) who would borrow funds and include their equity to implement agreed activities.

equipment to farmers and create the foundation for irrigation market development in Niger. Grants, which were not the usual mechanism to fund private sector programs, were justified because of the NIP's demonstration effects on communities and markets.

Several risks were inherent to the proposed project, including farmers' disinterest in borrowing for agricultural equipment, which historically had been subsidized by the government or provided free-of-charge by donors. Another major risk was related to the underdeveloped markets and value chain in Niger. The project had the potential to increase the harvested quantity of high-quality cash crops like onions and tomatoes, but storage and processing capacity would also need to be scaled up to capitalize on productivity gains at a national level. That capacity

was non-existent, and farmers' reliance on informal, local markets to sell produce meant they lacked the infrastructure, such as transport and storage facilities, to connect to larger markets. As a result, Niger imported produce that could be grown and traded locally.

Despite these risks, IFC's Advisory Committee approved the proposed approach after considering the extenuating circumstances and the potential of the project to reduce poverty and demonstrate private sector viability in promoting climate-resilient agriculture. In reviewing the project for approval, IFC management and the PPCR governing body took into consideration the NIP's strong technical advisory support component and its potential for replication and sustainability.



*Photo: CIF Administrative Unit*



# DELIVERY CHALLENGES

Photo: CIF Administrative Unit

Increased access to improved irrigation solutions would improve productivity of Niger's agricultural sector by extending the farming season. Market research revealed drip irrigation would be the most suitable solution for the NIP to implement, but to fully reap its benefits, the NIP would have to overcome the challenges of engaging a skeptical group of beneficiary stakeholders, addressing skill transfer gaps, and developing an appropriate financing mechanism for small-scale farmers.

## **DELIVERY CHALLENGE 1: MISCONCEPTIONS ABOUT DRIP IRRIGATION**

The project team had to ensure that farmers would participate in the project. This was difficult because some farmers had negative experiences with previous projects that used irrigation technology and were wary of trying it again. The team had to engage with community-based farmers, women groups, and potential program beneficiaries to understand these misconceptions about drip irrigation and to get farmers on board.

## **DELIVERY CHALLENGE 2: LIMITED LAST-MILE SUPPORT TO FARMERS IN LOCAL COMMUNITIES**

Daily support to the farmers would be needed to help farmers understand the use irrigation technology consistently. In addition to training, provision of technical support had to be addressed to ensure the uptake of irrigation technology.

## **DELIVERY CHALLENGE 3: ADDRESSING FINANCING CONSTRAINTS FOR RURAL FARMERS**

To successfully demonstrate financial viability of drip irrigation, financing constraints faced by small and medium holder farmers had to be addressed. Local commercial banks were hesitant to provide loans to farmers, particularly women, because of historically low repayment rates, poor cash flow, and existing practices of getting agricultural equipment for free.



# TRACING THE IMPLEMENTATION PROCESS

*Photo: CIF Administrative Unit*

To achieve the NIP goal of increasing private sector participation in agriculture, the IFC team engaged with a variety of public and private stakeholders, identified and selected a private sector technology firm, identified sites, recruited and trained community field assistants, installed demonstration farms, and trained beneficiaries. They also worked to ensure that a sustainable ecosystem of Nigerien companies was being built to provide drip irrigation services to Nigerien farmers and establish the platform for scale up. Figure 3 highlights milestones along the implementation timeline.

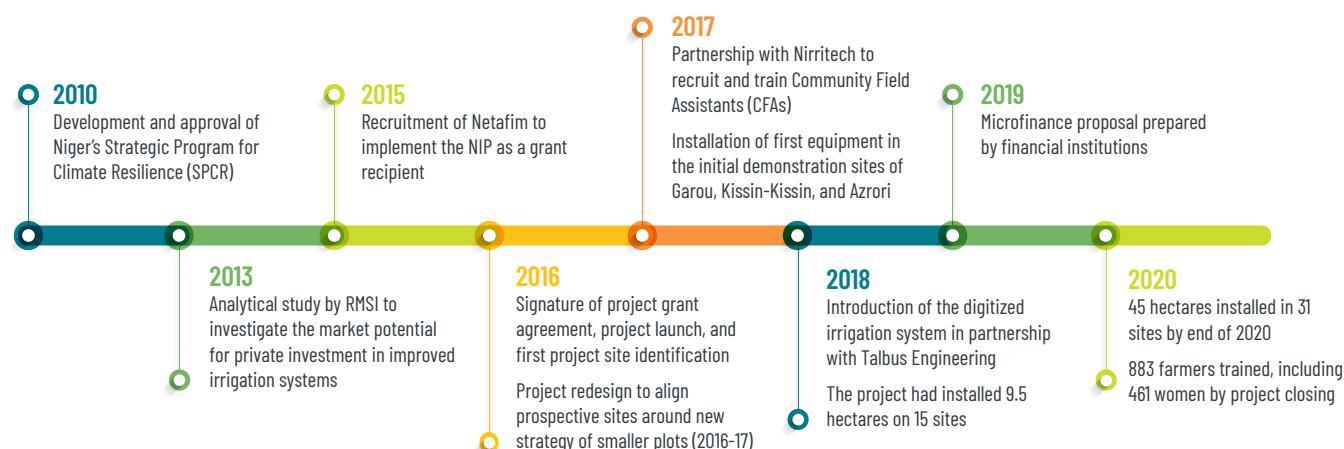
## **DESIGNING THE PROGRAM**

Following endorsement of Niger's SPCR, IFC's agribusiness team contracted an independent consulting firm, RMSI, to investigate the market potential for private investment in improved irrigation systems. The study, which was the main tool used to inform the design of the NIP, found that subsurface drip irrigation was highly suitable for high-value crops, such as okra, tomatoes, potatoes, and onions that need light and frequent irrigation.<sup>12</sup> The study

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<sup>12</sup> RMSI. 2013. Private Sector Investment to Build Climate Resilience in Niger's Agricultural Sector

Figure 3.  
TRACING THE NIP IMPLEMENTATION TIMELINE



recommended a combination of interventions to provide equipment, fertilizers, and training for the cultivation of high yield crops in areas close to the aquifers. This supported data from previous World Bank-funded irrigation projects in the country, which showed that yields for irrigated crops were four to eight times higher using drip irrigation than for farmers practicing rainfed agriculture.

### SELECTION OF A PRIVATE SECTOR FIRM AND PROJECT LAUNCH

With funding from PPCR, IFC selected Netafim, an Israeli manufacturer of irrigation equipment, to implement the project as a “grantee.” Netafim had proven expertise in drip irrigation technology and prior experience in Niger. Netafim was to collaborate with other national and international stakeholders to identify and set up two large demonstration plots of 60ha each, provide training and relevant agricultural extension services, identify potential clients, install improved irrigation systems at the demonstration sites, and link men and women farmers to credit so they could purchase irrigation equipment and improved agricultural systems.<sup>13</sup>

The planned project launch date of October 2015 was delayed by a World Bank Group travel ban resulting from security restrictions in Niger, which also made

some of the recommended intervention locations inaccessible. The IFC and Netafim teams had to adjust the program to target safer, more accessible areas, delaying the start of project activities by almost a year. Soon after, Netafim began mobilizing its team in Niger and hired a project coordinator. IFC ratified and signed the grant agreement with Netafim in May 2016. The first field mission took place in August 2016 to start discussions with local stakeholders and government counterparts and to identify alternative sites for implementation.

### PROGRAM REDESIGN AND SITE SELECTION

Demonstration plots were a critical part of the initial project design. Contractually, Netafim was required to identify two large demonstration plots of 60 ha each based on a pre-negotiated set of criteria: proximity to underground aquifers (to lower borehole digging costs), proximity to existing projects of development partners (to avoid duplication of efforts and enhance complementarity), and security considerations. Based on the initial design, farmers would access water from an efficient central bulk-water source (community borehole, dam, etc.) and would work with an agribusiness or commercial entrepreneur who would buy their produce. Farmers would be responsible for their crops and potentially a portion of the bulk water supply infrastructure.

13 Information from IFC internal project document

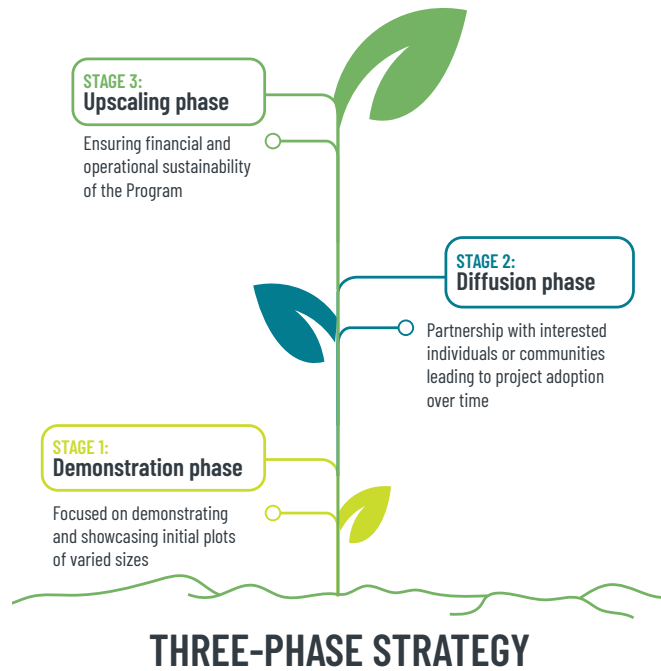


However, Netafim discovered during its initial mission that two large blocks of land were not readily available. According to Ganda Seyni, NIP Project Coordinator, “despite being a vast country, land in Niger largely belongs to the communities and it was not possible to find two single plots of 60 ha each with a single owner and with equally easy access to aquifers or other water sources.”<sup>14</sup>

The solution was to redesign the NIP. Netafim, in close collaboration with the Ministry of Agriculture and Livestock’s Department of Rural Engineering and the Ministry of Planning, began a process to identify other potential implementation styles involving small-scale irrigation and closely aligned to Niger’s Small-Scale Irrigation Strategy (SPIN). Following field visits and consultations with agribusiness entities, small and medium-scale farmers, and local communities, a new project design was agreed. Its implementation was to be executed according to a three-phase strategy to ensure the commercial development and replicability of the project (see Figure 4).

In the demonstration stage of the project, the main change was to the size of the demonstration plots. As part of this stage, Netafim was to develop 30 to 40 demonstration plots varying in size from one to six hectares each instead of two 60-hectare plots as initially designed. These plots were either community-owned (pooled community land managed by the village chief), privately owned, or privately owned but ceded by their owners for use as community plots in the dry season. Demonstration plots had to have an accessible water source to reduce cost. Where a water source was not available, boreholes were drilled for water. Sites in the same geographical areas as other irrigation projects were also prioritized. These demonstration plots would be the primary method for showing the local community how it was possible to increase yield and continue farming in the dry season. It was also a way to mitigate the delivery challenge of raising awareness about irrigation technology.

Figure 4.  
NIP THREE-PHASE STRATEGY



14 Interview with Ganda Seyni, National Project Coordinator, Netafim on December 3, 2019

Another important element of the redesign proposed by Netafim was to incorporate other companies in implementation. As solar-powered water pumps were a desired element of the project, Netafim identified

Talbus Engineering, a local distributor of Lorenz solar water pumps. Digitization of irrigation management, described in Figure 5, was a salient feature of the water pumps.<sup>15</sup>

Figure 5.  
**DIGITIZING IRRIGATION MANAGEMENT**



**Lorenz Solar water pumps systems – PumpScanner and pumpMANAGER applications – provided farmers:**

- 1** Low-bandwidth cloud-delivered service equipped with sensors and Bluetooth technology
- 2** Mobile applications to access real-time or historical data on pump performance
- 3** Water monitoring - amount of water pumped, water pressure, energy use and savings
- 4** Data to advise farmers on irrigation practices and to resolve technical issues
- 5** Remote pump monitoring and adjustments
- 6** Mobile alert when system malfunctions
- 7** Flexibility to schedule drip irrigation and manage their farms remotely

<sup>15</sup> Lorenz is a global leader in solar powered pump technology based in Germany and Talbus is their distributor in Niger.



# ADDRESSING DELIVERY CHALLENGES

Photo: CIF Administrative Unit

## **DELIVERY CHALLENGE 1: MISCONCEPTIONS ABOUT DRIP IRRIGATION**

Lack of information and previous negative experiences with drip irrigation hindered the adoption of the technology and led to misconceptions among target populations. Rural smallholder farmers in Niger had participated in drip irrigation projects led by the World Bank and the Nigerien government in the 1990s and the early 2000s, but these efforts did not specifically target women and did not address the low technical capacity of local communities or the underdeveloped equipment supply chain. Previous projects had not prioritized training and capacity building. Only 15 percent of the farmers using improved irrigation equipment provided by these projects were trained to operate and maintain the systems. As part of the project redesign, consultations held with local communities, women groups, and potential project beneficiaries highlighted their reluctance to participate in the project due to negative experiences from previous use of irrigation systems.

According to Moussa Amadou, Director General of Rural Engineering in the Ministry of Agriculture, “Rural smallholder farmers abandoned the equipment because it could not successfully support their agricultural activities. In some cases, they could not afford the fuel and in others, they did not know what to do when the equipment broke down.”<sup>16</sup>

## **SOLUTION: RAISING AWARENESS THROUGH COMMUNITY-BASED STAKEHOLDER ENGAGEMENT**

NIP explored local dissemination techniques to raise farmers’ awareness of the benefits of drip irrigation, demonstrating how the technology would allow them to save time and resources and to farm in the dry seasons. The selection of Seyni, an experienced Nigerien agricultural hydraulic engineer who had previous experience working for the Nigerien Ministry of Agriculture and Livestock helped the community outreach process. He was familiar with Netafim’s work and its drip irrigation technology and

16 Authors’ interview with Moussa Amadou, Director General of Rural Engineering (Directeur-Generale du Genie Rural), Nigerien Ministry of Agriculture and Livestock, December 5, 2019.



Photo: CIF Administrative Unit

**Community Field Assistants (CFAs) like Ahmadou Gandah Tiaou above, come from the local communities they serve. CFAs provide training, maintenance services, link to markets, and other day to day support to small holder farmers.**

had the advantage of a native’s understanding of the language and cultural nuances of the country. “Ganda understood the project, he understood our agricultural policy, and he understood the people,” said Amadou. “This made it so much easier for everyone to overcome their initial concern about drip irrigation.”<sup>17</sup>

**The team set up demonstrations in local markets during market days and in local gatherings,** including at mosques, to disseminate information about the project and its benefits. Stakeholders reported that these sessions helped to allay the concerns of farmers and landowners and showcased the capacity building element of NIP, which had not been present in previous irrigation projects. According to Netafim, these sessions, supported by the demonstration sites, paid off by increasing local demand among small-holder farmers, particularly among women farmers who appreciated the potential to increase yield in the dry season.

**The NIP also partnered with other projects including the World Bank Climate Smart Agriculture Support Project (PASEC),** an irrigation project using a pressurized sprinkler irrigation technology that worked with medium- to large-scale farmers. In some sites, such as the Bangoubi PASEC cooperative farm, Netafim installed the NIP drip irrigation side-by-side with the sprinkle irrigation to allow farmers to compare both technologies. It was also an opportunity to enhance the PASEC project impact by introducing both irrigation technologies and providing farmers with a choice.

Saibou Mahamadou, who coordinated the joint PASEC-NIP site, compared the irrigation systems: “We found the drip irrigation much simpler to operate and easier to manage. With the spray irrigation, the volume of water cannot be controlled, so it washed away the topsoil. We had to weed more with spray irrigation because parts of the soil which did not have seeds were getting water, which encouraged weeds. Also, with the scheduling and mobile-smart capability of the NIP system, we did not have to be physically

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17 Authors’ interview with Moussa Amadou, December 5, 2019.

present. We could set the schedule based on the training we received. Our harvests have increased significantly.”<sup>18</sup>

## **DELIVERY CHALLENGE 2: LIMITED LAST-MILE SUPPORT TO FARMERS IN LOCAL COMMUNITIES**

Successful implementation of the NIP required hands-on technical training to ensure adoption and sustenance of drip irrigation technology in local communities. Field-based, day-to-day practical support, also referred to as “last-mile support” would be needed to enhance technical capacity of farmers in Niger and ensure the uptake of irrigation technology. USAID reported that cooperatives and other interest organizations in Niger have advocated for “last-mile” extension and advisory services.<sup>19</sup> Agricultural extension officers were available, but not in sufficient numbers to provide the hands-on technical training required for adoption and sustenance of drip irrigation technology. Like regular agricultural extension services—those provided by organizations to train male and female farmers and build their capacity extends to day-to-day assistance to translate knowledge into everyday irrigation practices.

Donor-funded projects in Niger had tested an approach using village-level volunteers supported by local field agents, as intermediaries, to introduce new livestock management practices. These initiatives were helpful, but drip irrigation required additional technical expertise that village-level volunteers and the limited crop of agricultural extension workers could not provide. While universities and technical colleges helped to prepare agricultural engineers and other specialists to serve the broader needs of the sector, small irrigation extension services and practical experience from farmers, who could play a key influential role, remained limited in Niger.



Photo: CIF Administrative Unit

“

***I am so grateful to the project because it has given me the opportunity to provide education and healthcare for my children. When I first started on the project, my husband was very skeptical. He said I was wasting my time. When he saw how much money I made in the first year, he started to pay attention and is now helping me on the farm, along with my brother-in-law.***

Rahina

”

18 Authors' interview with Saibou Mahamadou on December 5, 2019

19 Feed the Future: Strengthening Private Sector Extension and Advisory Services [https://www.agrilinks.org/sites/default/files/dlec\\_strengthening\\_private\\_sector\\_extension\\_and\\_advisory\\_services\\_full\\_report.pdf](https://www.agrilinks.org/sites/default/files/dlec_strengthening_private_sector_extension_and_advisory_services_full_report.pdf)

## **SOLUTION: ENHANCED TRAINING AND USE OF COMMUNITY FIELD ASSISTANTS (CFAS)**

Netafim worked on addressing the skill transfer gap by providing advisory and extension services at the community level. It partnered with Nirritech, a newly incorporated Nigerian company, to provide training before and during the installation of the irrigation equipment. These gender-specific training sessions were held with all potential beneficiaries and covered the details of installing, operating, and maintaining the irrigation equipment. The training sessions also provided a gauge to evaluate and screen final program beneficiaries which consisted of either a group of women farming in community plots (see Box 2) or individual farmers.

Working with Nirritech, Netafim introduced a training and capacity building program in agricultural colleges, including the Practical Institute of Rural Development (IPDR) and the University of Niamey. To ensure practical application and hands-on learning, demonstration sites were also set up within the university campuses. Nirritech then identified and recruited local technical and sales agents, called Community Field Assistants (CFAs), and led “train the trainer” sessions with them. These CFAs, mostly agricultural engineers from Niger, received in-depth

training on installing, maintaining, removing the irrigation equipment at the start of the rainy season, as well as on customer service and community engagement.<sup>20</sup>

**CFAs were assigned to specific community or privately-owned farms for which they would have full technical responsibility.** They usually lived on site and spoke the local language. Their primary role was to provide retraining to the farmers on an ongoing basis, provide maintenance services, and widely disseminate information about the project. CFAs supported the installation of irrigation equipment, helped supervise the digging of boreholes, collaborated with Talbus (the solar pump distributor) on installing solar powered irrigation pumps, and provided after-harvest support to the women on community farms such as identifying buyers for their produce. Site identification, training, and installation were continuous processes throughout the project.

Netafim also partnered with Agrimex, its local distributor in Niger, to provide fertilization and pesticides to NIP sites and training on how to use them. This was also coordinated by the CFAs.

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<sup>20</sup> Irrigation equipment was removed during the rainy season when it is not needed and reinstalled during the dry season.

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### **Box 2: FARMING ON COMMUNITY PLOTS**

In Niger, private land ownership was very limited. Most of the land was owned by the communities and managed by the Village Heads. During the rainy season, the land was farmed by community members and leaders for a profit. In the dry season, community farms were usually offered to women to farm, such as in Kissin-Kissin. The NIP introduced a second type of community farm. Netafim negotiated with some private landowners to provide their land for use as community plots during the dry season. An example is in Garou where Dan Adi, a physician, gave one hectare of his land to 40 women of the community for dry season farming of high yield cash crops such as moringa, okra, and onions. Each woman, after training, was allocated three rows (equivalent to 300 sqm) for her crops.

Women on these community plots received equipment and services for free. As a pilot, the NIP installed the irrigation equipment (drip irrigation kit, bore holes, and solar water pumps) on each community plot. The project also covered the cost of services provided by Agrimex (pesticides, fertilizer, and training). CFAs ensured that the women operated the equipment as they were trained to. The women worked together to share the responsibility for periodic cleaning of the water pump filtration system. They also purchased spare parts, such as drippers (emitters) or patching (connectors), from the CFAs for an average of USD 0.50 per part. The cost was usually subtracted from their profits after sale of their produce. In Garou, for example, women earned up to USD 120 at the end of dry season, more than double their usual earnings before the NIP.

### DELIVERY CHALLENGE 3: ADDRESSING FINANCING CONSTRAINTS FOR RURAL FARMERS

Local commercial banks were reluctant to provide financing to smallholder farmers for irrigation equipment and women could not independently access finance for agriculture. The banks perceived such financing as too risky because of low repayment rates and climate-related risks such as droughts. Financing irrigation equipment required collateral and good cash flows, which smallholder farmers were unable to provide. Rural farmers did not qualify for traditional financing and financial institutions were aware that agricultural equipment was usually provided by the government and other donors as part of development efforts. There was, therefore, hesitation about the viability of financing schemes for irrigation technology. In addition, irrigation equipment providers and distributors had limited access to working capital needed to import technology manufactured overseas and had limited outlets for distribution in Niger.

### SOLUTION: EXPLORING MICROFINANCE AS A PORTAL TO UPSCALING

Due to the delayed start of implementation of the Phase 1 of the NIP, in 2017, IFC and the Government of Niger determined that the initial USD 10 million PPCR allocation for Phase 2 of the NIP, which was to cover the investment and possibly microfinance aspects of the project, may not be spent within the timeline required. This was because the PPCR had instituted a pipeline management policy that required unspent funding to be reallocated to other projects. This funding was reallocated to the ongoing World Bank Community Action Program for Climate Resilience (CAPCR), one of the four projects identified in Niger's SPCR.<sup>21</sup>

21 Community Action Project for Climate Resilience (CAPCR), Water Resources Mobilization and Development Project (PRO-MOVARE), Climate Information Development and Forecasting Project (PDIPC) are all PPCR-funded projects in Niger

In the later years of NIP implementation, Netafim was focused on the sustainable commercialization of the project and provision of microcredit to farmers. Netafim and IFC are exploring possible microcredit schemes with the government of Niger, financial institutions and the private sector. An irrigation financing workshop in May 2020 will be focused on identifying workable financing avenues for farmers' investments in irrigation systems.



Photo: CIF Administrative Unit

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***We are proud of this project. It was not implemented with a budget of hundreds of millions, yet it was efficient. The project showcased how we can have results through small-scale financing. Now we have qualified staff that can help design similar projects and ensure efficient installation and maintenance of irrigation equipment.***

Moussa Amadou, DG, Rural Engineering Unit

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## PROJECT RESULTS

*Photo: CIF Administrative Unit*

The NIP project had tested the expansion of drip irrigation through partnership with the private sector, demonstrated that private sector participation in the agricultural sector in Niger was feasible, and paved the way to build Nigerien farmers' climate resilience using irrigation technology. Netafim plans to stay engaged in Niger. As of December 2019, the company had requests to install 1,500 ha of additional irrigation equipment in partnership with the government of Niger and a pipeline of commercial requests, including a commercial farm with upgrades to net

houses<sup>22</sup> and other technologies in addition to drip irrigation.

The IFC team expressed pride that in piloting the NIP approach with just USD 1.5 million, they were able to take risks that might not have been acceptable to a larger project. The project attracted the interest of other Development Finance Institutions interested in

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<sup>22</sup> A net-house is a naturally ventilated climate-controlled net structure held in place by galvanized steel, which allows required sunlight, moisture, and air to pass through the gaps. The nets provide protection from insects and are used to grow fruits, flowers, and vegetables. Combined with drip irrigation, they are especially suitable for cultivating in hot areas with low rains, like Niger.

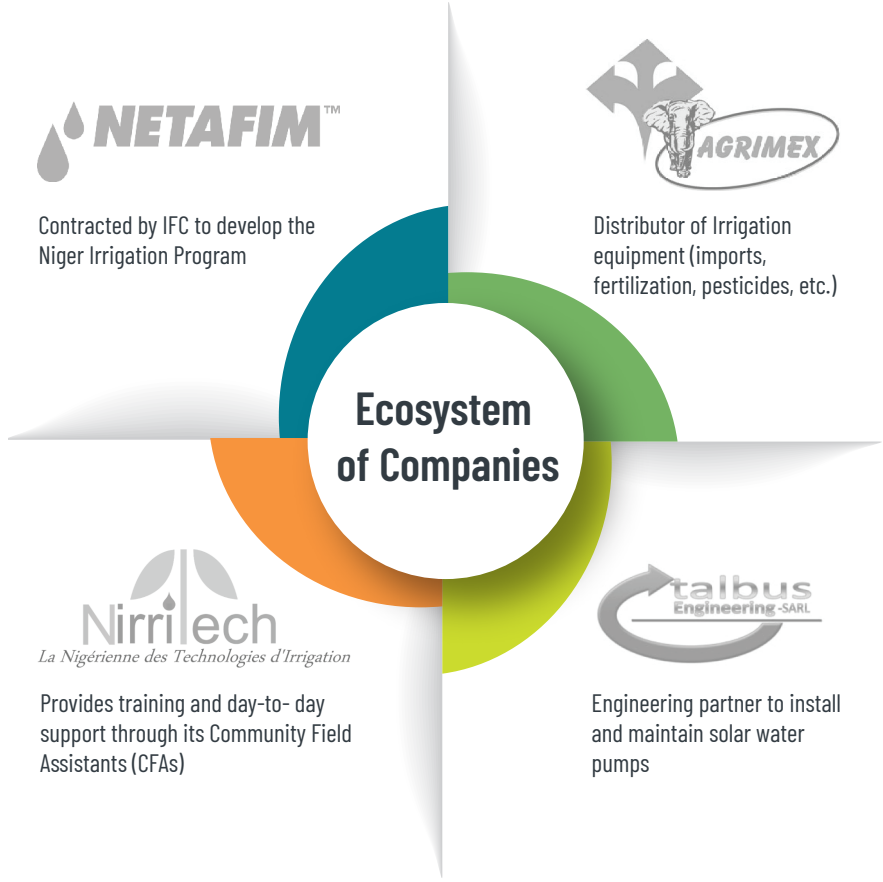


scaling up the successes of the NIP. “The team faced multiple setbacks and had to learn from a few failures on the outputs side, but it has succeeded in delivering the outcomes and supported our clients and the government to change the way irrigation technology is delivered to farmers,” Colback, the IFC team leader, said.<sup>23</sup>

The NIP achieved results well beyond the scope of the initial funding provided by the PPCR, notably in the establishment of a network of Nigerien companies with the capability to deliver commercial solutions (see Figure 6).

By mid-2018, irrigation equipment was installed in 15 hectares out of the revised design, which had targeted 45 hectares to be installed by that timeframe.<sup>24</sup> In addition, 461 women and 422 men had been trained within communities in Niger. IFC adjusted the final project targets (hectarage and number of persons trained) based on what was ultimately possible within the redesigned project scope and design, accounting for delays, and need for additional water infrastructure (boreholes). IFC was also working on extending the project until December 2020 to allow for post-implementation surveys to compare with the initial base line survey results.

Figure 6.  
ECOSYSTEM OF COMPANIES



23 Interview with Richard Colback, November 15, 2019

24 Fiscal Year 18 IFC Internal Implementation Records



# LESSONS LEARNED

Photo: CIF Administrative Unit

## 1 | **Effective engagement with local communities helps to bridge the knowledge gap**

Innovation and out-of-the-box thinking are necessary to bridge the knowledge gap in projects that introduce new technologies, systems, or practices. Teams should be open to engage innovatively with communities in their own language and in their local space where web and technology-based options are scarce. Taking the latter into consideration, the NIP team targeted locations frequented by Nigeriens to promote the project. They used religious gatherings and market days to demonstrate the advantages and viability of drip irrigation technology. They also used these community events as avenues to demonstrate the technology in an informal setting and allow potential beneficiaries to experience the “look and feel” of the irrigation equipment and to pose questions. This helped to convince any skeptic farmers of the viability of this non-traditional irrigation system. By collaborating with academic institutions, the NIP highlighted the differences between unsuccessful irrigation technologies and the new technology introduced

by the project. In addition, by engaging with other irrigation projects in the local community, the NIP was able to show side-by-side comparison of drip irrigation with a different irrigation technology.

## 2 | **Last-mile support is an essential practice to ensure sustained use of new technology**

In a developing country context, providing daily maintenance and service support is critical to ensure diffusion and sustainable use of new technology and guarantee ongoing maintenance and functionality of the infrastructure. When beneficiaries have a community-based project focal point, such as the Community Field Assistants (CFAs), who speaks their language and who is available to provide assistance, maintenance, and daily support, they feel empowered to learn better and faster. “Train the trainer” initiatives should not only focus on technical capacity building, but also on the softer aspects of relationship building.

CFAs in the NIP project worked and lived in the communities, so they could easily adopt

personalized practices to share project information and provide customized support. They understood the culture, the language, and the people who have lived and worked on the land using rainfed systems for generations. CFAs also went beyond their technical role, providing leadership for community demonstration plots, resolving disputes, and, in some cases, supporting women on community farms with financial planning and additional social guidance and support

### **3 The importance of continued collaboration with the government and other development partners**

In rural agriculture, coordination with government agencies and other development partners throughout the project lifespan ensures critical buy-in and coordination of development efforts to achieve maximum benefit for the local populace. It is even more critical to work with the government in the project design phase to confirm assumptions, obtain relevant approvals, and anticipate potential issues in working with a private sector firm.

In the NIP project, coordination with other bilateral and multilateral partners ensured that planned activities would take advantage of other projects and learn from the implementation experience of other partners. Research shows that such coordination ensures better alignment of donor priorities with a country's development strategies, improves mutual accountability, and avoids duplication of efforts.<sup>25</sup>

### **4 In-country management improves the flow of communication, knowledge, and decision making**

A key lesson for projects like NIP, which involved continuous coordination with several actors in both the private and public space, is to have staff on the ground throughout the project cycle, but importantly during project implementation. At the beginning of the project, a core team based in IFC's headquarters in Washington, D.C. carried out project management and coordination, supplemented by IFC technical resources based in other West African countries. This lack of direct oversight caused delays in implementation, which IFC resolved by hiring a field-based coordinator. This also signaled deepening relations with the government of Niger, strengthened coordination and synergy with project teams of other development agencies, and allowed for timely and efficient decision making. The presence of a local project representative highlighted IFC's flexibility and the institution's interest in engaging further in Niger.




























Photo: CIF Administrative Unit

25 Bourguignon and Platteau (2015). *The hard challenge of aid coordination*. Science Direct. <https://www.sciencedirect.com/science/article/pii/S0305750X13002957>

# ANNEX 1: LIST OF INTERVIEWEES

NAME	POSITION	ORGANIZATION
Marcel Waongo	General Director	Agrimex, Niger
Rahina Adamou	Smallholder Farmer	Garou Farms
Dr. Dan Adi	Smallholder Farmer	Garou Farms
Ellysar Baroudy	Lead Natural Resources Management Specialist	International Bank for Reconstruction and Development (IBRD)
Richard Colback	Senior Operations Officer	International Finance Corporation (IFC)
Liudmila Pestun	Project Coordination Consultant	International Finance Corporation (IFC)
Montaha Hassan	Operations Officer	International Finance Corporation (IFC)
Valentin Uwayo	Operations Analyst	International Finance Corporation (IFC)
Jussi Tapio Lehmusvaara	Operations Officer	International Finance Corporation (IFC)
Moussa Amadou	Director General of Rural Engineering	Ministry of Agriculture and Livestock, Niamey, Niger
Bachir Ousseïni	Permanent Secretary of the SPIN (Stratégie de la petite irrigation pour le NIGER)	Ministry of Agriculture and Livestock, Niamey, Niger
Yakoubou Maman Sani	PPCR Focal Point	Ministry of Planning and Community Development
Dan Bakoye Chaïbou	Statistician, and PPCR Sub-Committee member representing Niger	Ministry of Planning and Community Development
Frederic Dollon	Agronomic and Projects Coordinator for West Africa	Netafim
Ganda Seydou Seyni	Operational Project Manager and General Director	Nirritech, Niger
Ahamadou Gandah Tiaou	Community Field Assistants (CFAs)	Nirritech, Niger
Chétima Mahamadou Manla	CEO	Talbus Engineering, Niger
Saïbou Mahamadou	President	Young Farmers of Bangoubi, PASEC

# ANNEX 2: INSTALLED SITES, NIP

MODEL	TOTAL ACREAGE INSTALLED	AGRICULTURAL PRODUCT	WATER SOURCE	WATER CONVEYANCE
Community Sites	12.750			 
Private Farmer	31.100	  	  	  
Smallholder (Female)	0.500	 		
Smallholder (Male)	0.725	  	 	  
<b>TOTAL</b>	<b>40.075</b>			

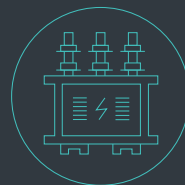
## KEY:



Arboriculture



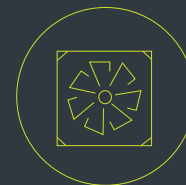
Boreholes



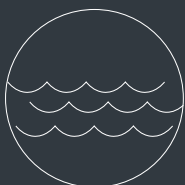
Generator



Moringa



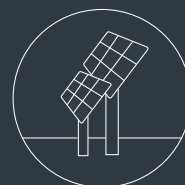
Motor pumps



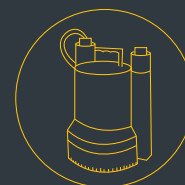
River



Small garden



Solar pumps



Submersible pumps



Wells



# THE CLIMATE INVESTMENT FUNDS

The Climate Investment Funds (CIF) accelerates climate action by empowering transformations in clean technology, energy access, climate resilience, and sustainable forests in developing and middle-income countries. The CIF's large-scale, low-cost, long-term financing lowers the risk and cost of climate financing. It tests new business models, builds track records in unproven markets, and boosts investor confidence to unlock additional sources of finance.



[www.climateinvestmentfunds.org](http://www.climateinvestmentfunds.org)

*Photo: CIF Administrative Unit*

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