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WATER GLOBAL PRACTICE **CASE STUDY**

Assessment of Farmer-Led Irrigation Development in Niger

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Chapter 1

Introduction

Country Context

Niger is a large (1.267 million square kilometer), landlocked country whose northern two-thirds lies within the Sahara Desert, with a population of about 21.5 million people (Ministry of Finance 2014). Most of the population is concentrated in areas around the Niger River in the southwestern corner of the country and along its long (1,500 kilometer) southern border with Nigeria. Niger's economic activity is concentrated on traditional activities, primarily agriculture, livestock, forestry, and fishery but also informal trade and production.

The country has experienced declining average rainfall, desertification, recurring droughts, and deforestation. Undernourishment is widespread. Agricultural risks, primarily droughts in Niger, have severe economic consequences with wide repercussions. Drought reduces crop production and increases livestock morbidity and mortality, aggravation of conflicts, and price spikes of food commodities. This results in a decrease in farming household income, reduced consumption, higher food insecurity, and lower agricultural revenues and consequently a lower gross domestic product (GDP) growth rate in Niger. From the employment perspective, this concentration is even more striking, with about 80 percent of Niger's population employed in the rural sector and only a small share of the population in formal employment (Index Mundi, 2018).

Niger is one of the world's poorest nations. According to United Nations Human Development Index, Niger was ranked last in the world without discontinuity during the past 11 years (excepted in 2016, when it ranked second to last at 187 of 188 countries). Between 2005 and 2014, the incidence of income poverty fell from about 54 percent to about 45 percent. However, the absolute number of people living in poverty rose from 6.8 million in 2005 to 8.2 million in 2014, an increase of one-fifth, or 1.4 million people (United Nations 2018).

Rapid population growth could be dire, as the population of Niger is projected to increase to approximately 30 million by 2030 and 70 million by 2050. After declining to 4.0 percent in 2015, Niger's economic growth reached 5.0 and 5.2 percent (1.1 and 1.3 percent in per capita terms) in 2016 and 2017, respectively, largely due to a buoyant season in agriculture supported by favorable weather conditions and an expansion of crop irrigation.

Modest growth performance in 2015 reflected the influence of multiple shocks, including security challenges with growing social and humanitarian pressures, economic downturn in Nigeria, unfavorable weather, and the depressed level of commodity prices. Average inflation was almost flat (0.3 percent) in 2016 and increased to 2.4 percent in December 2017, well below the West African Economic and Monetary Union (WAEMU) target of 3.0 percent. This reflected a regional monetary policy that was tight in Niger's economic context, a good crop season (and hence low crop prices), and public food subsidies in 2016 and a somewhat loose monetary policy in 2017 (West African Economic and Monetary Union Report 2018)

Agriculture is a mainstay of rural livelihoods, providing the bulk of employment. Water is one of the country's most pressing needs, particularly in rural areas, for both water supply and irrigation.

Farmer-Led Irrigation

Farmer-led irrigation (FLI) in the Niger context could be defined as irrigation privately owned and managed by farmers in terms of (a) land and investment ownership and (b) decision-making responsibility for selection of crops (mostly based on market demand), extension services (mainly private), and provision of agricultural inputs.

Various technologies are in use for drilling, water abstraction, distribution, and on-farm application. Drilling methods include small polyvinyl chloride (PVC) drilling done manually by auger (conical or loam, depending on the consistency of the crossed geological layers) or by washboring for sandy layers. Water abstraction devices are composed of treadle pumps for area under 0.5 hectares and motor pumps for higher-irrigated area, as well as solar pumps. For water distribution, open-earth canal and low-pressure Californian systems using pipes are widely used. Drip systems are also part of the techniques used, Finally, for on-farm application, farmers mostly use open canals following the tertiary level and, to a lesser extent, drip irrigation.

Two major irrigation types developed in Niger consist of (a) public irrigation, which is divided into irrigation with total control of water and irrigated off-season crops, and (b) private irrigation. In terms of typology based on irrigated farm size, FLI in Niger consists mainly of micro irrigation (1 hectare or less) and small-scale irrigation. Some perimeters exceed 100 hectares but in limited numbers and could be included in the small-scale type (Stratégie nationale de développement de l'irrigation/Collecte des eaux de ruissellement, Relecture 2007/2008).

The interactions between the two types of irrigation are not well structured and instead occur in some areas in terms of transfer of technology (distribution and application of water to the farms, use of fertilizers and pesticides, collection and marketing of irrigated products, and so on). In this sense, the Kandadji Program plans to support both community and private irrigation, totaling 1,000 hectares, with more structured and systematic interrelations (Stratégie nationale de développement de l'irrigation/Collecte des eaux de ruissellement, Relecture 2007/2008).

The purpose of this study is to analyze the extent and the environment of FLI development in Niger, the challenges and constraints, and the business opportunities to be piloted. In terms of scope, the report covers three main activities: (a) assessment of the status of FLI, providing information on the extent of FLI, market, supply chain, and advisory services; (b) assessment of challenges and constraints (water and land resources challenges, technical challenges, socioeconomic and policy constraints, and so on); and (c) assessment of FLI business opportunities and development models to be piloted.

Chapter 2

Assessment of Farmer-Led Irrigation

Extent of Area Differentiated by Typology

The last almost-exhaustive estimate of private irrigation data in Niger dates back 10 years, at the completion of the World Bank's Second (Small-Scale) Private Irrigation Promotion Project (PIP2), which focused on areas developed by target beneficiaries. PIP2 followed the successful Pilot Private Irrigation Project (PPIP), which began in 1996 and ended in 2001. According to the PIP2 implementation completion report (ICR), 16,800 hectares of farmer-led irrigation (FLI) have been developed or rehabilitated (World Bank 2002).

In addition, the World Bank's Agro-Sylvo-Pastoral Exports and Markets Development Project (PRODEX), followed PIP2 with a component to support irrigation development and ended April 30, 2015. The PRODEX irrigation component, including additional financing, aims to establish or rehabilitate 7,550 irrigated hectares, with a particular focus on the regional market for onions. The scope of work was based largely on existing PIP2 planning, and PRODEX applied the same financial and administrative procedure developed under PIP2 through an integrated approach (focusing on regional markets, supply chains, and irrigation development). In total (through PIP2 and PRODEX), 24,350 hectares have been developed or consolidated (World Bank 2018, World Bank 2002). Many irrigation farmers still have not been surveyed under PIP2 and PRODEX. Since the end of PRODEX, FLI has been developed mainly through self-financing mechanisms but without being surveyed. Given the lack of monitoring of private irrigation development in Niger, it is not possible to gauge what has occurred in the past seven years in the respective zones with potential for irrigation.[1]

As a result, it is difficult to give an approximate estimate of the areas and production for FLI. With a significant margin of error, the total area of FLI can be estimated to be between 35,000 and 40,000 hectares, with the assumption that both projects, which were national in scope, targeted 50 to 70 percent of potential beneficiaries. Only a systematic inventory could confirm the exact data.

Crop Types and Extent of Production

The great majority of irrigated crops consists of vegetables (onions, pepper, tomato, cabbage, moringa, and so on) and a minor proportion consists of cereals, including rice, maize, and fruit trees (lemon, mango, guava, grapefruit, and so on). Based on a sample from PIP2 (257,561 tons over 11,252 hectares; see table 2.1) and total area assumptions for FLI, the total production would be in the range of 800,000 to 1 million tons of various irrigated products.

Table 2.1: Sample of Yield, Area and, and Production

	Yield[a] (tons/ha)	Area (ha)	Production (tons)
Tomato	28.8	805	23,155
Rice	3.7	1,240	4,548
Pepper	17.5	5,241	91,718
Cabbage	34.9	486	16,961
Onions	34.8	3,481	121,139
Total	N/A	11,253	257,561

Source: World Bank 2009

a. Yield data are lower than reported in this ICR, because it was adjusted for crop-specific production and storage losses, which are significant in Niger.

FLID Engagement and Potential

According to the PIP2 beneficiaries' survey, the total number of households engaged in FLI would be in the range of 50,000 to 64,000 (World Bank 2009). Table 2.2 summarizes the different places with potential for irrigation, including FLI development.

Table 2.2: Distribution of Irrigation Potential by Homogeneous Physical Unit

Physical unit and subunits	Renewable water volume (10^6 m^3)	Irrigable area estimate (ha)
Niger River Valley	30,000	142,450[a]
Lowland for rice		32,450
Terrace for horticulture		110,000
ADM		28,200
Maggia	123	10,840
Keita	100	11,010
Badaguichiri	30	2,230
Konni Plain	—	2,600
Tahoua Tadis	30	1,500
Tarka	140	7,000
Goulbi		10,430
Gabi	—	230
Maradi	80	8,100
Kaba	20	2,100
Dallol		39,000
Bosso	200	
Maouri	250	

Physical unit and subunits	Renewable water volume (10^6 m^3)	Irrigable area estimate (ha)
Korama	200	10,000
Aïr Irhazer plain and northern oasis	—	10,000
Komadougou, Chad Lake, and Mainé Soroa oasis	500	20,000
Other resources	2,000	—
TOTAL	34,500	270,000

Source: Ministry of Hydraulics and Sanitation 1999.

Note: ADM = Ader-Doutchi-Maggia;

— = not available

a. Downward revision (about 122,000 hectares) under the planned management model for the future Kandadji Reservoir.

Sources of Water for FLI

Niger depends on sources outside its boundaries for 90 percent of its water. Niger is located in two major transborder basins: the Irhazer Lullemeden and Chad Basins. The Niger River crosses the southwest of Niger and is the only permanent river in the country. Important wetlands within Niger (and crossing into neighboring countries) include Lake Chad and the W National Park, which is registered under the Ramsar Convention on Internationally Protected Wetlands.

Niger has 34.5 cubic kilometers per year of renewable water resources, of which 32.0 cubic kilometers consist of surface water and the balance (2.5 cubic kilometers) is groundwater (Ministry of Hydraulics and Sanitation and United Nations Development Programme 1999). An estimated 20 percent of the country's groundwater resources are currently being exploited. In addition, 95 percent of total water use is dedicated to agriculture.

As shown in table 2.2, water for FLI is available from rivers (the Niger River and Komadougou or Ader-Doutchi-Maggia seasonal flows) and underground (Goulbi, Dallol, Korama, Tarka, and the Aïr Irhazer plain and oasis). Underground water could be from shallow aquifers (Goulbi, Korama, Dallol Bosso, and oases) and deep aquifers (Aïr Irhazer plain and part of Dallol Maouri).

Technologies Used for FLI

The techniques in use for water drilling, abstraction, distribution, and on-farm application are summarized in table 2.3.

Table 2.3: Irrigation Technologies Used for FLI

Irrigation Basinsbasin	Water mobilization systems	Water abstraction systems	Water distribution systems
Niger River	• Supply main canals	• Motor pump • Electric pump	• Californian • Drip
Niger River right bank tributary valleys	• Small dams • Source capture	• Gravity • Gravity	• Gravity • Drip
Dallol Bosso	• Small PVC tube well • Small PVC tube well	• Solar pump • Motor pump • Treadle pumps	• Drip • Californian • Californian
Dallol Maouri	• Small PVC tube well • Small PVC tube well	• Pump • Solar pump	• Californian • Drip
ADM	• Microdams • Spreading and infiltration weirs • Well or tube well	• Gravity • Motor pump	• Water Spreading • Californian
Basse Vallée de la Tarka	• Small PVC tube well	• Motor pump • Solar pump	• Californian • Drip
Goulbi Maradi	• Small PVC tube well • Well	• Motor pump • Electric pump • Solar pump	• Californian • Drip
Korama	• Forage PVC	• Motor pump • Solar pump	• Californian • Drip
Komadougou-Yobé	• Pond control structures • Tube well	• Motor pump • Electric pump • Solar pump	• Californian • Californian • Californian

Source: Climate-Smart Agriculture Support Project 2016.

Note: PVC = polyvinyl chloride; ADM = Ader-Doutchi-Maggia.

Sources of Energy for FLID Practitioners

The sources of energy used for FLID include human energy (manual or treadle pumps for 0.5 hectare or less), and all-farm energy, thermal energy, electricity from the national grid (limited), and alternative energy sources (solar energy in particular).

FLID Initiatives

In Niger, FLID was developed through PIP2 and PRODEX with support from the World Bank. The government played a key role in agreeing for the first time to transfer the management of a

project financed from public resources to a private law structure. This structure is the National Association for the Promotion of Private Irrigation (ANPIP), whose board of directors is made up of about 10 people practicing private irrigation activities. One particular non-governmental organization (NGO), Enterprise Works Worldwide (EWW), played a major role in technology testing and development. The project provided support to microfinance institutions (MFIs) by creating a capacity-building fund to strengthen and develop MFIs and their umbrella organizations.

In formulating PIP2, the government of Niger and the World Bank jointly decided to emphasize the role of the private sector and favor small-scale irrigation rather than large-scale schemes. PIP2 expanded on PPIP, which began in 1996 and ended in 2001. The project design of PIP2 took advantage of the success of PPIP in piloting appropriate, often new, irrigation technologies and in working with the private sector and civil societies at the local level. The project design was thus built on lessons learned and on recommendations in new World Bank–supported analytical work. It was decided that the development of small-scale irrigation and the promotion of better agricultural techniques should be given top priority in Niger's harsh Sahelo-Saharan environment.

ANPIP, known as an association in the Niger legal context, was created in 1995 with management responsibility of the first PPIP under an agreement with the government. Full management responsibilities for PIP2 were subsequently delegated to ANPIP. The total costs of the two projects were US$6.50 million (PPIP) and US$48.00 million (PIP2).

The government lacked the capacity for strong oversight of the association and was not proactive about ensuring compliance with core fiduciary and management covenants (the association was responsible for managing public funds). Two of the key areas in which ANPIP failed to live up to expectations at the appraisal stage were its capacity to comply with World Bank's fiduciary standards and its capacity to continue to assure the government of Niger that it could manage comparatively large amounts of public funds. Managing public funds for a highly visible and strategically important project required transparency on financial and procurement issues. The political pressures against compliance with these responsibilities were underestimated. As a consequence of the original project design, ANPIP initially resisted stronger oversight. Although later audits found no evidence of mismanagement, ANPIP was not proactive in identifying and tackling fiduciary issues. The government struggled to resolve the managerial difficulties that ANPIP experienced during 2006 and 2007. After 18 months, the government finally succeeded in resolving the crisis by appointing a new national director for PIP2 and delegating the Ministry of Agriculture to gradually assume the management of the Project Implementation Unit in May 2017 (World Bank 2009). This development undermined the overall logic of PIP2, and the strategic approach chosen at the inception: a lead role for the private sector in developing irrigation.

EWW, a nonprofit NGO based in Washington, DC, has been a subcontractor with ANPIP, supported by PPIP. EWW Niger is responsible for the implementation of the Improved Manual Irrigation Component of the Private Irrigation Promotion Pilot Project financed by the World Bank. From March 1997 through December 2001, EW Niger provided training in 14 workshops to make eight models of human-powered irrigation pumps. These private sector manufacturers sold more than 1,200 pumps in Niger. In addition, EW Niger trained 14 teams of private-well drillers to install hand-augured wells and wrapped filters. These well drillers have installed more

than 800 successful tube wells and wrapped filters. The product line of manual irrigation technologies known locally as Niyya da Kokari (willingness and courage) is well known throughout Niger because of numerous publicity campaigns and demonstrations at rural markets and gardening sites.

Microfinance Institutions

The financing mechanism used by PIP2 was a matching grant because of the absence of rural credit in Niger to finance irrigation equipment and agricultural inputs. The role of the MFIs was therefore not to grant credit, but rather to mobilize savings and to receive the complement of the matching grant in favor of the beneficiaries at the local level. The system supported by PIP2 has yielded excellent results throughout the subprojects' funding phase.

Notes

1. The terms of reference did not allow field visits within the country to learn about the latest developments in irrigation activities

Chapter 3

Market Assessment of Potential for Expansion of Farmer-Led Irrigation Development

Water Availability

As shown in table 2.2 above, there is huge potential to utilize available water for irrigation in general and farmer-led irrigation development (FLID) in particular. The easiest resources for FLI are composed of surface water and shallow aquifers. Artesian (Irhazer) and semi artesian (Dallol Maouri) aquifers are potentially suitable water resources for FLI.

Land Availability and Suitability

The data on irrigation potential are based on the availability and the quality of soil. It is not possible to distinguish the development potential of public irrigation from that of FLI. Both forms complement each other and are funded according to funding opportunities. The total area not yet developed is on the order of 160,000 hectares for both types of irrigation (Ehrnrooth 2011). Approximately, 110,000 hectares are irrigable from surface water and 50,000 hectares are irrigable from groundwater.

Labor Availability

Niger's population is relatively young (50.1 percent of the population is between 14 and 30 years old). Most of this population lives in rural areas and works in agriculture, livestock, and natural resource exploitation. The annual population growth rate, which is the highest in the world (3.9 percent), has potential both in terms of future users of irrigation and for the consumption of irrigated products and hence the creation of a market.

Youth unemployment in rural areas is linked to a lack of productive employment. Irrigation should therefore target this dynamic population to the labor market's needs, training programs, and actions to support entrepreneurship. The government is committed to using the significant development potential of women (in 2010, 50.4 percent of the Nigerien population was female, according to the National Institute of Statistics) through a gender approach that will affirm the full participation of women in decision making by providing appropriate solutions to social burdens, with particular emphasis on accountability and empowerment of rural women. Promoting the Niger Strategy for Small-Scale Irrigation (SPIN) will be an important lever of this approach (Ministere De L'Agriculture 2013).

Energy Availability

The national power grid has a limited capacity for the development of FLI. While waiting for the construction of the Kandadji hydroelectric dam, most electricity comes from Nigeria. As a result, the development of FLI will essentially use thermal or alternative energy.

Domestic Market: Projected Demand

Table 3.1 shows imported commodities during the past three years. In terms of weight, imports totaled 470,000 metric tons on average, representing CFAF 100 billion (US$178 million). The population of Niger has the highest growth rate in the world (3.9 percent), and the same is true for food needs.

Table 3.1: Niger-Irrigated Products Imported, 2015–17

Year	Product	Value (CFAF)	Weight (metric tons)
2015	Rice	86,787,752,360	384,609
	Maize	4,593,868,928	66,818
	Mango	1,624,483,728	28,842
	Potato	620,481,330	4,468
	Tomato	305,828,434	2,482
	Banana	159,734,274	3,280
	Orange	128,810,478	2,105
	Chili pepper	43,789,083	350
	Onion	29,691,309	590
	Cabbage	10,601,869	48
	Carrots	2,278,800	15
	Lemon	1,882,688	9
Total 2015		94,309,203,281	493,615
2016	Rice	79,206,881,292	370,387
	Maize	1,997,408,657	24,682

Year	Product	Value (CFAF)	Weight (metric tons)
	Mango	1,702,445,896	24,966
	Potato	1,191,945,488	8,174
	Banana	183,568,442	3,594
	Tomato	116,410,386	1,825
	Orange	74,124,230	1,302
	Onion	38,447,165	1,003
	Cabbage	29,367,897	237
	Chili pepper	6,696,341	277
	Carrots	6,357,699	35
	Lemon	2,227,075	19
	Eggplant	524,445	5
Total 2016		84,556,405,013	436,506
2017	Rice	121,224,189,255	439,561
	Mango	1,164,538,853	20,793
	Maize	525,778,558	7,000
	Potato	411,465,755	4,782
	Banana	311,941,915	4,998
	Cabbage	68,576,291	409
	Orange	37,902,198	667
	Onion	35,546,530	612
	Tomato	34,858,176	419
	Chili pepper	7,973,472	163
	Lemon	1,600,329	4
	Carrots	624,167	1
2017	Eggplant	16,058	0

Year	Product	Value (CFAF)	Weight (metric tons)
Total 2017		123,825,011,557	479,409

Source: World Bank 26 May 2016 (Climate Smart Agriculture Support Project Working paper).

Export Markets

The main irrigated products for export are onions and pepper. Onions are produced mostly in Galmi Basin but also in other regions, including Tahoua, Tillaberi, and Maradi. Pepper production mainly takes place in the Diffa region, which has suffered instability for years because of Boko Haram terrorist attacks. Table 3.2 shows the data on onions during the past three years. Exports grew from 94,250 to 160,250 tons from 2015 to 2017.

Table 3.2: Onion Exports, 2015–17

Year	Product	Value (CFAF)	Weight (metric tons)
2015	Onion	9,134,103,733	94,250
2016	Onion	8,447,022,800	100,303
2017	Onion	12,821,372,583	160,250

Source: Niger Customs Directorate, 2018.

Pepper was the main cash crop in the Diffa region, with production of about 10,000 tons of peppers per year, or four-fifths of national production. About 80 percent of production is absorbed by the Nigerian market. National production was about 12,500 tons before the Boko Haram era, representing CFAF 9 billion to 10 billion. Production stopped because it became a financing source for the terrorist group.

The contribution of irrigated agriculture (mainly rice and vegetables) is estimated to be about 14 percent of the total value of agricultural gross domestic product (GDP). Earnings from exported irrigated crops (especially onion and pepper) exceed CFAF 10 billion. Despite the small share of cultivated areas, the irrigation subsector accounts for nearly 30 percent of the monetary value and is predominant, with 90 percent of export earnings of all crop production in Niger (National Institute of Statistics).

With the development of an additional 160,000 hectares (average estimate of the remaining potential), it is possible to generate significant monetary resources both for households (increase of income through the sale of irrigated products) and for the national economy (by export of onion, garlic, pepper, and so on).

Chapter 4

Enabling Environment for FLID

Policy Framework

Irrigation development in Niger is guided by two strategy documents: (a) the National Strategy for Irrigation Development and Water Harvesting (SNDICER), prepared in 2003 and updated in 2005 and 2008, and (b) the Niger Strategy for Small-Scale Irrigation (SPIN) adopted by the Government of Niger in 2015 SNDICER includes the full irrigation typology in Niger: (a) public irrigation, with full water control handled by the National Irrigation Authority (ONAHA), and (b) off-season irrigation, supported by the National Directorate of Agricultural Engineering (SNDICER 2005).

In terms of objectives, the development of irrigation should aim to (a) in the short and medium term, (i) improve the productivity of irrigated farms and make investments profitable and (ii) diversify and enhance irrigated production and increase the income of operators and (b) in the longer term, (i) professionalize the management of irrigated farms, (ii) sustainably improve the satisfaction of population's food needs, and (iii) preserve productive capital and natural resources.

The generalization of private irrigation and the professionalization of those involved should constitute the two guiding principles for the long-term vision of irrigation development. The institutional implications of these principles should lead to the promotion of irrigation as follows:

- Essentially driven and managed by the operators (the role of the state needs to eventually refocus on its sovereign functions)
- Low cost and focus on controlling and saving water
- Sufficiently valuing the cost-benefit ratio in terms of profitability
- Sustainable and respectful of the environment

The irrigation categories covered by the strategy are the ONAHA-supervised irrigation schemes (AHAs), off-season irrigation, private irrigation, and water harvesting.

SNDICER is a sectoral strategy that specifies the orientations (an irrigation development program) of special drawing rights (SDRs) in the field of irrigation (SNDICER 2005). For clarity and harmonization with SDRs, the national strategy for irrigation development and collection of runoff water is built on three axes:

- Establish an incentive framework for investment and promotion of private irrigation and value investments.
- Conduct integrated and sustainable management of productive capital (water and soil).
- Define the roles and strengthen the capacity of public institutions and private organizations involved in the development of irrigation and water harvesting.

To implement the broad strategic options proposed here, it would be appropriate at the operational level to focus on the following programs in the institutional, legal, technical, environmental,

economic, and financial areas. These programs, which we call subprograms of the irrigation development program, take into account the specificity of the irrigation sector and water harvesting and will be implemented in synergy with other sectoral programs.

Legal and Institutional Actions Subprogram

The legal and institutional subprogram aims to support the emergence of the different participants involved in the implementation of the strategy in a suitable legal environment. The findings show a weakness in the institutional and technical capacities and duplication of functions among subsector participants. This subprogram will be broken down into three complementary components that will allow a united approach to irrigation development in Niger:

- Organizational framework of irrigated agriculture
- Legal conditions for land and water
- Distribution and reinforcement of functions between public and the private sectors

As far as farmer-led irrigation development (FLID) is concerned, the institutional aspects are of primary importance, in particular the involvement of the private sector in the development of the supply chain. Key players should be private, including investors, suppliers, traders, and processors. In addition, project management should involve private sector organizations. The legal aspects, especially the land issue, are entry points for eligibility. The subprogram aims to clarify the role of the private sector and facilitate the mechanism of access to land.

Hydraulic Planning and Management Subprogram

The hydraulic subprogram is aimed primarily at valorizing the potential of Niger's irrigable land, as well as at securing and increasing production. The promotion of irrigation in Niger is therefore reflected through the multiplication of new structures for the collection of water, the rehabilitation of existing structures, and the matching of available irrigation systems to environmental constraints. The three components of this subprogram focus on the valorization of irrigation's potential:

- Production of new developments
- Development of small irrigation, including private irrigation at this scale
- Restructuring of irrigated perimeters with total water control

Agricultural Valorization of Irrigation Investment Subprogram

The poor performance seen at the level of irrigation development is partly explained by irrigation being poorly taken into consideration in agronomic research. The agricultural valorization subprogram should enable Nigerien research to develop this research theme (varietal improvement, efficiency of irrigation systems, management of technical itineraries, and so on). Research axes specific to the irrigation subsector will have to be defined in relation to the

constraints expressed by irrigators. To enhance the value of research results, this subprogram will have to respond to a need to strengthen the technical support mechanism for irrigators.

This subprogram, whose final purpose is to contribute to better profitability of irrigation, is based on two aspects:

- Research and development
- Strengthening of the distribution system

FLID may benefit greatly from research and development, notably in terms of technology.

Economic and Financial Subprogram

The issue of irrigation financing remains a major concern and is a prerequisite for the development of irrigation and the collection of runoff water. Financing mechanisms for irrigation and those of input supply require harmonization, depending on the origin of the financing, the objects of financing or supplies, and the investment capacity of the irrigators. The actions will be implemented through two components:

- Irrigation financing
- Supply improvement

The main result of the economic and financial subprogram is the creation of favorable conditions to enable irrigation farmers (community and private) to easily access financing for their activities and to ensure their sustainability.

Environmental Management of Irrigation Subprogram

The mobilization of water and irrigation creates effects in terms of landscape development and natural resources management, whether renewable or not. The main challenge of the environmental management subprogram is to ensure the development of irrigation by minimizing negative effects on the environment. This requires constant monitoring of the state of natural resources. In addition, in some areas of Niger, many irrigation sites are under permanent threat of extinction because of degradation of their immediate surroundings (deforestation, water and wind erosion, and so on). The environmental management subprogram of the irrigation subsector will be oriented in two directions:

- Global monitoring of natural resources
- Environmental protection of irrigation sites and watersheds

Action Plan

The action plan that is drawn up for a significant period will have to define each subprogram of the policy framework and outline the priority actions in the short and medium term, with precise results in terms of quantity and quality. SNDICER should have a national and local implementation

mechanism and appropriate financing mechanisms, in addition to its monitoring and evaluation (M&E) system. The implementation of SNDICER is conditioned by guiding principles that are the responsibility of all stakeholders in the irrigation subsector. These include the empowerment of public and private participants, long-term support for development partners, and regional integration of actions with respect for international commitments and good governance of natural resources (SNDICER 2005).

FLI should take part in respecting environmental balances, in particular by contributing to the sustainable management of natural resources (rational use of pesticides, prohibition of overexploitation of aquifers, respect of the rights of downstream users in access to water resources, and so on).

SPIN focuses on three types of irrigation: (a) small private irrigation projects; (b) large and medium commercial irrigation, which does not exist at present; and (c) off-season perimeters. Starting from SNDICER, it is a matter of making this category of irrigation more operational.

The guiding principles of SPIN are defined by targeting, engagement, ownership, decentralization, deconcentration, and sustainability. More specific and operational approaches will be circumscribed either by complementary studies or by choices adopted and approved in the SPIN action plan.

Although all links in the small irrigation chain are weak, it is undeniable that the direct target of SPIN is the farmer. The farmer can be an individual (male or female and young or old), a producer group (associative or cooperative), or a legal entity practicing small-scale irrigation. However, actions are essential for SPIN-related targets and are addressed to the suppliers of advisory services, input supply structures, agricultural training and research institutions, private investors (young graduates, agro-entrepreneurs, business leaders, and champions), artisan drillers, companies installing small-scale irrigation systems to structures downstream of the value chain (conservation, processing, marketing, and so on), and municipalities. SPIN must also create synergy with other sectoral strategies (seeding strategy, input strategy, training strategy, and so on) to bring about an overall dynamic and ensure the harmonious development of small-scale irrigation systems.

Women and youth, alongside men, are the main people involved in irrigation projects, because they are active in the whole small-scale irrigation chain, in which they carry out production activities in all sectors (seed production, market gardening, small business based on the transformation of products, sale of fuels, repair of motor pumps, and so on). Thus, in all local markets, women market many speculations, such as sorrel, nutsedge, sesame, corn, onions, tomatoes, cabbage, carrots, and eggplants. They must therefore be a prime target of SPIN and fully benefit from investments in small-scale irrigation.

Commitment Characterized by Motivated Demand

The approach recommended in SNDICER is to move beyond traditional forms of irrigation projects, in which actions are planned in advance before even knowing the needs or concerns of

farmers (SNDICER 2005). The state, the commune, and the umbrella organizations (network of regional chambers of agriculture, federations and unions of producers, and so on) must respond to demand and accompany it in its implementation. The small-scale irrigation projects that need to be financed must therefore reflect solutions to actual production problems.

Viable and Sustainable Ownership

The satisfaction of demand goes through a technical and economic analysis of profitability of the requested investment. The profitability objective must be seen in relation to the types of contributions requested and on the basis of a simplified technical environmental assessment to be defined with the ministry in charge of the environment. The choice of requested technologies must be based on the cost-effectiveness criterion and adapted to the potential of water resources, agropedological conditions, capacity, and availability of labor force and financial capacities (debt and so on).

Investments in small-scale irrigation projects must target actions for the sustainable management of land and water resources, which constitute the production bases. The construction of structuring works (spreading weirs, mini-dams, rural roads, and so on) will optimize production, increase water productivity, and ensure sustainable management of resources. The fertilizers and pesticides used must be in compliance with the criteria of the environment. The nature of the environmental challenges underlines the importance of advisory services to farmers for the sustainable management of production inputs and to strengthen the proposed or requested environmental mitigation measures in the planning document (environmental assessment or environmental impact notice).

Decentralization and Deconcentration

Municipalities are among the gateways favored in the implementation of SPIN. Thus, applications must receive an opinion at the municipal level to certify the administrative origin before support measures outside the municipal budgets can be taken into consideration. The process involves an awareness of the community and allows applicants to continue taking steps for support or advice without being bound by a formal communal acceptance. The authorization will be issued later, if the nature of the investment so requires, during the validation process of the investment grant.

Better ownership and empowerment of local communities are thus targeted to achieve developmental success at the grassroot level. However, after their effective installation in 2004, the municipal authorities are not quite operational. Most of the resources they should have, as provided by the texts, and that should allow them to fulfill their mandate remain largely theoretical. Several implementing decrees on the transfer of competences to communities have not yet been adopted. Moreover, most local communities do not have the financial and human resources necessary for the normal exercise of their functions. However, to fulfill their mission, the law allows local communities to resort, on the basis of conventions, to the competences of the state's deconcentrated technical services. Although deficient in human resources, the representation of the state's technical services at the local level is satisfactory: the technical services of the rural

development sector are present in almost all 54 departmental headquarters. Thus, in the long run, decentralization must be coupled with a real deconcentration of agricultural and rural engineering agents from the departmental level to the communal level (services) and village level (for agriculture agents).

The emergence within the country of private advisory services (PASs) is an opportunity for local supervision of rural irrigation farmers. These services will constitute privileged access to advisory services for demands, selection, and hierarchy of needs. An effort to strengthen organization support will be necessary so that they can play their roles fully.

On the organizational level, the rural community has been structured since the beginning of 1990. Thus, producers and other professional bodies organized themselves under the supervision of the state, a project, or a nongovernmental organization (NGO), depending on whether they were associations or groups at the village level, unions at the departmental or regional level, or federations at the national level. Despite being embryonic, there are now some federations and unions of powerful farmer organizations at national level. Most of these organizations have accreditation to act as a legal entity. This is an advantage in the context of SPIN, because the irrigators' organizations represent collective interests through which capacity-building and investment actions can be carried out. However, these organizations have both organizational and functional shortcomings, because they are mostly created to meet the requirements of a project, an NGO, or a donor to access funding. To alleviate this situation, unified actions will be promoted and subsidized to make professional organizations effective and to truly service their members. These actions are specified in SPIN's action plan (Ministere De L'Agriculture 2013).

SPIN will contribute to setting up a decentralized financing and monitoring mechanism capable of making producer organizations and other stakeholders dynamic, operational, and sustainable, with the support of the agriculture chambers. Particular emphasis should be placed on strengthening irrigation organizations at the grassroot level so that they can carry out their missions and become the reviving center of agricultural production. These organizations must play a vital role in the application process from the expression of basic needs, that is, a demand from the operator or producer.

Laws and Regulations

Laws and regulatory frameworks on land and water benefit all types of irrigation, FLI in particular. They determine the conditions of access to land and land security and the conditions of access to the water resource and its exploitation. They also include the institutional aspects of irrigation in general through clarification of role distributions between public and private participants.

In 1993, the government of Niger adopted the Principles for the Orientation of the Rural Code as a basic instrument for a rural land policy.[1] Various implementing texts followed the approval of this ordinance, which puts the same level of validity on customary law and written law on land appropriation. Land tenure recognition procedures are established and functional, and land transactions have been greatly facilitated. In addition to the well-developed body of legislation, decentralized institutional arrangements (region, department, and town or rural communes) have

been added. After 20 years of application of the texts, a review has been done and proposals for reforms have been made at both the legal and the institutional levels to adapt to the needs of users.

At the legal level, it is a matter of creating and making a functional permanent framework for examination of the coherence of the texts of public policies concerning the land or bearing aspects related to the land tenure. At the institutional level, it will be necessary to (a) reform the framework of land governance (Land Governance Analysis Framework), the institutional anchoring of the national Rural Code steering structures, and the completion of this system with a specialized training center in land management and natural resource management (more than 15,000 agents to be trained over time) and other institutions and (b) improve the operational and organizational measures and tools of the Rural Code structures, in particular support for basic land commissions (facilities and capacity building).

In terms of land security, it is paramount to (a) improve the land management system and land security measures, to take into account the growing complexity of land issues and challenges, and (b) harmonize and standardize the procedures, techniques, tools, and supports for establishing land security acts, to take into account new demands related to land, current, and future land issues and challenges.

For the water resource, the water regime was determined by ordinance in 1993, modified by law in 1998, and supplemented by implementation texts and legal corpus, which were designed to allow implementation in the field of water resources of the guiding principles of the Rural Code, including the securing of existing rights. However, the law is deficient and does not allow for clear management arrangements for the irrigation resource. For AHAs, the organization of water management and maintenance is a major constraint to the sustainability of investments and their development because of the failure of cooperatives. The situation is easier for small-scale irrigation. For FLI in particular, farmers have to ensure maintenance works and equipment renewal themselves.

The water resources of the Niger River, Komadougou-Yobe, and Goulbi Maradi are shared by several countries. As a result, international agreements must be respected under the Niger River Basin Authority and the Lake Chad Basin Commission, whether for public or for private irrigation.

Government Incentives and Subsidies

In accordance with donors, and the World Bank in particular through the Second Private Irrigation Promotion Project (PIP2) and subsequent irrigation operations, FLI has been rehabilitated and developed in Niger with a high level of subsidy on investment (70 and 90 percent for individuals and groups, respectively) because of poverty and constraints on access to credit. Advisory services also have been granted to farmers (100 percent) with the aim of preparing, implementing, and managing investment and business plans. The matching grant mechanism was the only operational one to allow such development in this context (World Bank 2002)

Fiscal Incentives for Imports

The government is making efforts to abolish customs duties on agricultural inputs and equipment. Only value added tax (VAT) (19 percent) is subject to taxation except in the case of importation under an exempt project. A joint order of the ministers in charge of energy and finance focused on imported renewable energy equipment to be exempt from all import duties and taxes with the exception of the statistical fee, the community levy, and the Community Solidarity Levy, which combined total about 7 percent of the value of the goods (Ministry of Mines and Energy and Ministry of Economy and Finance 2017). Trade regulation within the West African Economic and Monetary Union (WAEMU: Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal, and Togo) is defined by Additional Act No. 04/96, instituting transitional preferential tariff regime exchanges within WAEMU and its method of financing. The statistical tax is levied for the compilation of import and export statistics of agricultural equipment and inputs, as well as on agricultural products. The Community Solidarity Levy, which is transferred to the WAEMU Commission, is applied to imports from all WAEMU member countries on products from third states, that is, non-WAEMU states. For the need to raise funds for the implementation of community projects and programs, Economic Community of West African States (ECOWAS) has set up the community levy mechanism.

Institutional Arrangements for FLI

Institutional responsibility for the organization of technical support to FLI participants falls on the National Directorate of Agricultural Engineering. These include support for the preparation of investment projects and the search for funding, organization of technical support by calling on the economic interest groups and NGOs of consulting services—about 20 were supported through the Pilot Private Irrigation Project (PPIP) and PIP2 funded by the World Bank—and provision of technical information available at the request of stakeholders (World Bank 2009). In addition, ONAHA has been given the mission of supporting the development of private irrigation unit areas reaching or exceeding 10 hectares.

<A head>Notes

1. Principles for the Orientation of the Rural Code, Niger ordinance 93-015 (March 2, 1993).

Chapter 5

Analysis of Supply Chain

A supply chain has been described as a system whose constituent parts include material suppliers, production facilities, distribution services, and customers, linked together via a feedforward flow of materials and a feedback flow of information (Stevens 1989). Agricultural supply chains encompass all input supply, production, postharvest, storage, processing, marketing and distribution, food service, and consumption functions along the farm-to-consumer chain. This is applicable for all forms of a given product (consumed as fresh, processed, and/or food service provided), including the external enabling environment (Lalonde and Masters 1994).

The irrigation supply chain analysis study carried out by International Finance Corporation (IFC) and RMSI in 2013 is still valid in terms of existing main supply businesses, agricultural inputs, and irrigation equipment supplied.

Supply Chain Used in Farmer-Led Irrigation

Two key suppliers of improved seed and irrigation equipment in the country include AINOMA and MANOMA.

The activities of the Ainoma seed farm are as follows: (a) multiplication, packaging, and marketing of improved seeds; (b) facilitation of all operations for the import and export of agricultural products; and (c) brokerage, warehousing, storage, transit, and transport on the local market of equipment and various agricultural inputs. The farm specializes in the production of basic seeds and certified fruit plants, demonstration varieties, vegetable production, and fruit production.

The activities conducted by Manoma are as follows: (a) various operations related to import, export, marketing, and brokerage; (b) marketing of vegetable seeds, such as onion, pepper, garlic, tomato, and lettuce; (c) production of medical plants and extraction of medical products and essences, along with export, consignment, storage, transit, and transport on the local market of equipment, agricultural inputs, and various phytosanitary products; and (d) conditioning of agricultural inputs in formats adapted to the needs of the market and seeds according to the criteria defined and agreed on for the satisfaction of the customers.

The two companies supply irrigation equipment like drip systems and provides technical support to private irrigation farmers. They have outlets throughout the country covering the main irrigation areas.

Major solar equipment suppliers for irrigation and water supply include Consultation Plus and Benafsol (Benalya Afrique Solaire). Equipment includes solar panels, converters, and pumps for solar pumping solutions (small and large irrigation).

Apart from supply chain and irrigated product marketing, there is not enough data to elaborate on the other segments of the supply chain (storage, processing, distribution, food service, and consumption).

The previously mentioned suppliers have outlets for seed and other input distribution in all irrigation basins. For irrigation equipment, they have developed the capacity to import materials from Europe (Spain, Germany, and so on), China, India, and Turkey. Other supply chain participants include transporters, processors, wholesalers, and retailers.

Availability of Financial Services

Eleven commercial banks and one financial institution operate in Niger. The system is characterized by the over liquidity of the banks and their hesitancy to make medium- or long-term loans. The banking system is served by four medium-size local banks—Banque Internationale pour l'Afrique (BIA) Niger, Société Nigerienne de Banque (SONIBANK), Ecobank, and Bank of Africa—which share 80 percent of the market.

BIA has a large international network in Africa and Europe (Brussels, Paris, and London) with capital of CFAF 7 billion (approximately US$14 million). Its customers range from big industries and commercial and agricultural companies to small and medium-size companies, and it has offices throughout the country. BIA's market strategy is focused on its larger clients. BIA is the largest local bank, with 45 percent of the banking market and a large, stable clientele. With its long experience, the bank tends to tailor its services to the needs and constraints of its customers

SONIBANK has a large international partnership network (Natix Bank Paris, BNP Paribas, Credit Lyonnais, Credit Suisse, Nederlandse Waterschapsbank London, DG Bank Frankfort, Bank of Montreal, Brussels Bank, and Union Tunisienne de Banque) with capital of CFAF 12 billion (US$20.5 million). Its client base includes small enterprises; distributors; insurance companies; manufacturing and mining industries; water, electricity, and petroleum companies; transport companies; construction and agricultural companies; nongovernmental organizations (NGOs); and donor-funded development projects. SONIBANK's market strategy focuses on its network of smaller clients.

Ecobank has a wide network spread throughout West Africa and parts of Central Africa. Its main customers include businesses, NGOs, international organizations, development projects, some local companies, and households. Bank of Africa caters to small and medium-size companies, projects, NGOs, international organizations, businesses, and private individuals. There are several smaller commercial banks operating in the country as well.

Suppliers, as formal businesses, have no problem accessing bank facilities for exports. In general, they can meet the banks' conditions for credit, including various types of guaranties. For farmer-led irrigation (FLI) farmers, the problem is different. Despite some promising initiatives involving farmers' organizations, such as the Federation of Cooperative Unions of Rice Producers (FUCOPRI) and the Federation of Vegetable Cooperatives of Niger (FCMN-Niya), there is unanimity that the performance of agro-silvo pastoral activities remains low in Niger, mainly

because of an insufficient and inappropriate supply of financial resources. Financial institutions such as the Agricultural Bank of Niger (BAGRI), other banks, and decentralized financial systems are struggling to engage in agricultural lending because of high service costs and remoteness of service outlets, lack of adapted banking methodologies, insufficient guarantees offered by farmers (land issue and land pledge), production and market risks (uncertainties related to climate change, price volatility, and random repayment capacity), and lack of insurance mechanisms to mitigate risks and reduce costs.

All of these elements have justified engagement by the Office of the High Commissioner for the Nigeriens Nourish Nigeriens (3N) Initiative and its partners in a process of agricultural finance reform and the launch of the Investment Fund for Food and Nutrition Security (FISAN). FISAN is a harmonized framework of (a) financing, (b) linking different financing sources (financial institutions, public institutions, projects and programs, producer organizations, and so on), and (c) ensuring coherence among different tools and forms of financing (grant, credit, public action, private action, public-private partnership, and so on).

There are three facilities in FISAN, including agricultural financing. This facility involves public support for credit. It is aimed at private developers, individual producers, groups or cooperatives, and small and medium-size companies. It is based on the financing mechanisms of banks and decentralized financial systems. For beneficiaries, it offers interest subsidies and grants backed by credit. For financial institutions, it offers guarantees (via the Sahelian Financing Company, known as Sahfi) and concessional credit lines.

The facilities propose policy support for agricultural financing using credit through financial and structuring mechanisms and accompanying measures. These mechanisms aim to:

(a) create a unifying framework for agricultural financing related to shared-vision principles and consensual rules, all likely to create conditions for a sustainable financial service offer;

(b) enable financial institutions to offer more financial products suitable for rural participants (farmers and others involved in agricultural value chains);

(c) facilitate access to appropriate financial resources by financial institutions to allow them to grant more medium- and longer-term credit and to reduce the cost of credit;

(d) reduce rural participants' mistrust of credit by improving the readability of offers of credit and the transparency of applicable costs;

(e) increase the control of agricultural producers and enterprises over their potential investment and growth through appropriate advisory services;

(f) increase the self-financing capacity of loan applicants to improve their eligibility for credit; and

(g) improve the security of the credit granted, allowing financial institutions to reduce their level of risk and thus increase their commitment to agricultural credit.

Role of Donors in Supply Chain Development

The donors' role in the agricultural sector limited to financial support to projects' beneficiaries to gain access to irrigation technologies, seeds, fertilizers, and pesticides. Greater contribution is expected from donors to make FISAN more effective so that it can start resolving the issue of access to required financial resources for FLI and for the agricultural sector in general.

Local Manufacturing Capacity for Equipment and Accessories

Duraplast Niger was created in 2000 by Duraplast-Ghana (established in 1969). Duraplast-Ghana and companies located in Côte d'Ivoire can also supply Niger with irrigation equipment. Local artisans participate in irrigation equipment manufacturing of treadle pumps and manual drilling of wells and tube wells.

Competitiveness of Retail Pricing

Retail prices vary greatly depending on the availability of products in different irrigation areas, as well as on the distance to the point of entry of products into the country. Other factors may influence deviations, such as the level of security in the area. Given all these factors, the differences between wholesale and retail prices can range from 20 to 100 percent. It is therefore a profitable business for field operators.

Postsale Assistance and Maintenance Services

Technical training in the use of irrigation equipment as a post-sale service works well in general. Such services are provided by suppliers and form part of the supply contract. This is the case for the use of motor pumps and solar pumping equipment, the latter representing innovations with a high level of sophistication. For traditional heat pumps, mechanics have been trained in all areas of project intervention, and the Second Private Irrigation Promotion Project (PIP2) in particular, and can carry out all repairs and monitoring of equipment. For solar equipment, interventions require a high level of qualification that only approved suppliers possess. Remote monitoring of the operation of solar pumps and monitoring of key technical parameters are in effect at some irrigation sites and drinking water production locations.

Chapter 6

Advisory Services

Adequacy of Research and Extension Services

Before the World Bank assisted in private irrigation projects such as through the Pilot Private Irrigation Project (PPIP) and the Second Private Irrigation Promotion Project (PIP2), the only research on small-scale irrigation technologies was handled by non-governmental organizations (NGOs) like Lutheran World Relief (LWR), which worked on the first tube well drilling trials and treadle pump manufacturing tests. Adequacy between adaptive research and extension was then established. Research actions in favor of irrigated agriculture have been always limited because of a shortage of funds, although for some years, an irrigation department at the National Agricultural Research Institute of Niger has included well-trained researchers.

More recently, one of the main reform actions expected from the government of Niger is revision of the legal framework of the National Irrigation Authority (ONAHA), the agency responsible for large-scale irrigation schemes, to establish decentralized water management and extension services provided by private operators. This is expected to lead to improved advisory and oversight services by ONAHA, which would contribute to higher agricultural output. The government has developed a coherent strategy for the development of agricultural production and a food security program, titled the Nigeriens Nourish Nigeriens (3N) Initiative. This program aims to increase production by, among other things, improving the use of research results and building resilience to change, particularly through the development of irrigation. In this context, the government has put into place a strategy whose components relate to the following:

- Strengthening research and extension services
- Improving the regulatory framework for irrigation development
- Creating an effective value-added system in the livestock sector

The development of irrigation has been hampered by, among others, insufficient investment and inefficient irrigation infrastructure. In this context, off-season crops[1] and small-scale irrigation have been favored amid intensification of agricultural production and income-generating activities for women. Women organized into groups have benefited from small collective perimeters but with unitary areas that are too small to make visible the positive effect. As a result, the declared objectives of the government have yet to be implemented to provide women with perimeters in economically viable areas.

The government has taken (in theory) measures to improve the institutional framework of irrigation, notably through restructuring ONAHA based on the findings of a study. An order signed January 3, 2014, dedicated this ONAHA reform. This ordinance emphasizes the complementary

role of private agricultural community organizations in accordance with the action plan for the implementation of the 3N Initiative.

Provision of Water Data or Information

Water data accessible to farmers and private irrigation developers are available at national and intergovernmental levels as follows:

- Ministry of Hydraulics and Sanitation for surface and underground water at the National Directorate of Water Resources and the eight regional directorates of hydraulics (Agadez, Diffa, Dosso, Maradi, Niamey, Tahoua, Tillaberi, and Zinder).
- Niger Basin Authority for Niger River Basin surface water resources (headquarters in Niamey, Niger)
- Liptako Development Authority for groundwater resources in the Liptako area (headquarters in Ouagadougou, Burkina Faso)
- Lake Chad Authority for Lake Chad Basin surface and groundwater resources (headquarters in Ndjamena, Chad)
- Niger-Nigeria Joint Cooperation Commission for transboundary water resources (headquarters in Niamey, Niger)

For information on markets and prices, a few projects and NGOs have put into place monitoring systems that worked only during the lifetime of the funded operations. The need for regular and sustainable prices and market monitoring led the government of Niger to set up the agricultural market information system (SIMA). SIMA provides a weekly newsletter related to cereals, fruit, and vegetables and a monthly bulletin on food security and agricultural products. Volatility is the key word for prices. Samples of information generated by the system are shown in box 6.1.

Box 6.1 Weekly Bulletin No. 335, Fruit and Vegetable Component

Week 11 from Wednesday to Tuesday, March 14 to 20, 2018

Prices increased for most horticultural products. Unlike the prior week, the current situation in horticultural markets is marked by higher prices for most products: cabbage (+29 percent), fresh pepper (+23 percent), squash (+5 percent), banana (+4 percent), and date and fresh tomato (+2 percent each). However, average prices are down 12 and 1 percent for lemon and orange, respectively. As for the average price of potato, it remains almost constant compared with the levels of the prior week.

Compared with the same week in 2017, prices are lower by 30 percent for fresh pepper and fresh tomato, 7 percent for orange, and 3 percent for banana and head cabbage. However, average prices record respective increases of 26, 22, 12, and 7 percent for potato, squash, lemon, and date compared with their levels from the same period last year.

Source: World Bank data.

In addition to the formal SIMA system, the common but efficient way of providing this information is through the informal use cell phones by market operators across the country.

Notes

1. “Cultures de contre-saison” are so-called irrigated crops that grow from November to March, alternating with rainfed crops on land lent to communities by landowners on a seasonal or multiyear basis. If the rainy season is good, communities may not engage in off-season irrigation.

Chapter 7

Challenges and Constraints to Farmer-Led Irrigation Development

Water Resource Availability

Surface and underground water resources are managed according to the Water Code, which imposes levy authorizations that are granted after verification of the implications for other uses and users. This provision makes it possible to prevent and avoid conflict in the use of the water resources regardless of the situation. In addition, irrigation development projects such as the Pilot Private Irrigation Project (PPIP) and Second Private Irrigation Promotion Project (PIP2) put into place shallow aquifer water table monitoring mechanisms using piezometers, as well as chemical monitoring to detect possible contamination of aquifers by chemical agents contained in pesticides and other fertilizers.

Land Availability

Land for irrigation, including for FLID is available in many rural areas (see table 2.2). The provisions of the Rural Code that relate to the management of rural land make it possible to reduce the risk of conflict in promoting FLI. The procedures for recognizing land rights are clear, from the point of view of custom and that of written law. The same is true for possible dispute-resolution procedures, from traditional customary officials in charge of conciliations, to the different courts, the Council of State is the last process step.

Policies and Institutions

According to a Transparency International review (2017), in the context of political instability and weak institutions, most international governance indicators point to systemic corruption permeating all levels of society in Niger. However, businesses and citizens report significantly less corruption than in other countries in the region.

Corruption takes many forms, ranging from petty and bureaucratic corruption to grand and political corruption. Lack of training and resources and petty corruption affecting the police and security forces are important areas of concerns, undermining domestic stability in a context of volatile security. Corruption can negatively affect the development of FLI, because it can lead to distortion of the rules of good governance of support projects and, in particular, the application of eligibility criteria for grants to subprojects.

The government is largely credited with being committed to addressing widespread corruption. New anticorruption institutions have been set up, a dedicated telephone hotline has been created to report allegations of corruption and the 2010 Nigerien Constitution provides for the declaration of personal assets by government officials and greater transparency in natural resource management. However, the credibility of this commitment has come under question.

According to the Business Anti-corruption Portal, Niger's anticorruption framework is inadequate and underdeveloped; the country has no specific anticorruption legislation. The fundamental constitutional law of Niger contains some provisions regarding corruption, but nothing is concrete. However, the government is committed to tackling corruption and is attempting to align Niger's legal framework with the United Nations' Anti-Corruption Convention, which it has accessed (UNODC 2015)

To address corruption, the government has established two anticorruption agencies: the Bureau of Information, Claims, and Fight Against Corruption and Bribery at the Ministry of Justice (to tackle corruption within the judiciary) and the multisector High Authority to Combat Corruption and Related Infractions (HALCIA).

Financial and Banking Services

Access to financial services remains limited in Niger. As of 2014, about 6.7 percent of the population had formal accounts—one of the lowest rates in the West African Economic and Monetary Union, although it amounts to 34 percent for the Sub-Saharan African Region. Because of prohibitive costs, the perceived cumbersomeness of banks with high documentation requirements, and a lack of proximity, only 3 percent of the population have access to commercial banking services. The microfinance sector has better outreach than the banking sector. In 2014, the number of people with a bank account was 438,170, compared with 722,322 adults with a microfinance account, confirming the strong role microfinance institutions (MFIs) play in providing financial services in Niger. MFIs provide credit to farmers, but this is mainly limited to agricultural input provision, so investment financing is a huge funding need. The largest MFIs have been placed under the supervision of the state regulatory authority.

Output Markets and Pricing

Agricultural markets and prices in Niger are characterized by high volatility, as is the case in many countries in Sub-Saharan Africa. This volatility is related to variations in the availability of products in the market and to demand, which itself depends on harvest periods and purchasing power.

Input Markets and Pricing

Agricultural inputs include selected seeds, fertilizers, and pesticides. Fertilizer supply and distribution are the main unresolved problems because of the unequal role of the Central Supply of Agricultural Inputs and Equipment (CAIMA). Fertilizer is too expensive and is not available everywhere and in a timely manner. A recent study conducted with the support of MCA-Niger in 2018 concluded the need for a reform of the fertilizer sector. The institutional and regulatory framework of the reform will include the establishment of regulatory bodies and the development

or revision of regulatory texts to ensure a responsible reform that results in a smooth transition to a liberalized fertilizer market that can meet the needs of low-cost, high-quality fertilizers.

Irrigation equipment (including equipment for FLI) is sold exclusively by the private sector and includes motor pumps, solar pumping equipment, low- and high-pressure polyvinyl chloride (PVC) pipes, drip kits, tractors, tillers, and metallic fencing. This equipment is exempt from taxation, except for the statistical fee and community levies for the Economic Community of West African States (ECOWAS) and West African Economic and Monetary Union (WAEMU). Equipment quality control is normally done at the country border before entry authorization. A professionally conducted bidding process allows farmers to obtain competitive prices and quality equipment.

Infrastructure

FLI development is hampered in many areas by lack of infrastructure, including (a) gaps in secondary roads to open production basins for agricultural inputs and production and (b) storage facilities for inputs and production.

Energy

The low level of availability of energy in Niger is highly unfavorable for the development of FLI and for the processing of products. It is important to support the development of irrigation, with energy support ranging from extension of the national network to development of renewable energy sources.

Chapter 8

Assessment of Business and Financing Models

Models Used in Expanding Farmer-Led Irrigation Development

Second Private Irrigation Promotion Project

The last large project that helped farmer-led irrigation (FLI) development was the Second Private Irrigation Promotion Project (PIP2), which took place from its implementation on January 4, 2002, to its completion on December 31, 2008. The financing model was a cost-sharing system, and the typical matching grants were 80 percent from PIP2 and 20 percent from farmers (World Bank 2009). The project was successful apart from a few cases of concern. The main problems were:

i) Better-off farmers who tried to benefit disproportionately from the grant,
ii) Farmers who bought motorized pumps rather than manual pumps even if their farming conditions did not require mechanized pumping,
iii) Crowding-out effects for other rural programs that could distort the rural financial sector (based on a complaint from the European Commission to the Ministry of Agriculture), and
iv) Failure of the National Association for the Promotion of Private Irrigation (ANPIP) in the last implementation year on fiduciary management aspects.

According to the implementation completion report (ICR), the internal rate of return and net present value (NPV) are significantly higher than given in the project appraisal document (including costs for capacity building and environmental protection). The project shows an excellent overall economic rate of return of 27 percent, compared with the estimate at the appraisal stage (15 percent). The financial rate of return has effectively doubled from 12 to 24 percent. Both the financial and economic NPVs are positive and significantly higher than at the appraisal stage, with economic NPV from US$7.22 million to US$10.11 million and financial NPV from US$2.76 million to US$8.19 million (World Bank 2009). The favorable price environment and exceeded targets for the key performance indicators, in particular with respect to irrigation area, crop yields, and corresponding production volumes, can explain the high rate of economic and financial return.

Climate-Smart Agriculture Support Project

Since the end of PIP2, the World Bank-assisted Climate-Smart Agriculture Support Project (PASEC) with co-financing from the Millennium Challenge Corporation (MCC) of the U.S. government aimed to support irrigation development, including private irrigation and inclusive enterprise development activities. PASEC is seen as an anchor operation under the Nigeriens Nourish Nigeriens (3N) Initiative. It aims to deliver on the triple outcomes of climate-smart agriculture (CSA): food security by supporting sustainable increases in productivity and farm

income, adaptation by contributing to strengthening resilience to the effects of climate, and mitigation by reducing greenhouse gas emission intensity and increasing sequestration.

The project covers 60 municipalities located in the regions of Dosso, Maradi, Tahoua, Tillaberi, and Zinder in the bioclimatic zone between 400 and 600 millimeters of rainfall, and is highly vulnerable to food insecurity but has huge potential for increasing agricultural productivity and resilience of production agro-silvo pastoral systems.

The project design is based on the following core principles of flexibility to respond to the emerging needs of beneficiaries and clients, the scalability of the most promising technologies and interventions from World Bank–-funded and other donor projects in Niger, and the value chain approach to work across the commodity value chains (input, production, processing, output markets, and so on) and provide support to participants (enterprises and producers).

The positive list of eligible activities includes water resource mobilization and infrastructure (weirs, wells, and boreholes), promotion of alternative energy sources (biogas, solar, and so on), development of new small-scale irrigation schemes, rehabilitation of small- and medium-scale irrigation schemes, promotion of water and energy conservation technologies for water lifting (possibly solar, treadle, and energy-efficient pumps), promotion of water conservation technologies for water distribution (drip irrigation and California system), and interventions that reinforce protection of irrigation schemes and availability of water.

Successful Models That Can Be Scaled Up

Because most local commercial banks and the public agricultural bank, the Agricultural Bank of Niger (BAGRI),[2] do not provide funding to FLI, the only financing mechanism to consider and scale up from the PIP2 experience is the matching grant. Irrigation development in Niger must be a largely private initiative because (a) the pace of development is slow in the public sector and expensive[3] and (b) the parcels allocated to the peasants are too small to be economically viable. This is why the proposal will include technical and economic models ranging from 1 to 6 hectares that will offer farmers interesting economic opportunities to rise above the poverty level with other participants.[4]

Outlines for a Pilot Expansion Operation

A proposal for a pilot FLI operation in Niger is based on lessons learned from private irrigation development in terms of reliable and cost-effective technologies, institutional arrangements, financial model, and technical support to FLI promoters in the design, installation, and operation of irrigation equipment. If the World Bank approves the draft outlines, an in-depth preparation will follow involving the key FLI participants; a better technical, economical, and institutional assessment, and a social and environmental evaluation, among other features.

Development and Specific Objectives

The development objective of the pilot FLI operation is to consolidate and expand the development of private irrigation, which received significant support in the 1990s and 2000s. More specifically, the pilot operation aims to (a) improve technical options using a homogeneous zone in favor of financially viable, water-saving, and environmentally friendly technologies; (b) improve the technical support system for FLI farmers by involving the private sector as much as possible; (c) support the FLI supply chain and the commercialization of irrigation products; and (d) put into place a progressive financing system of FLI by connecting potential beneficiary farmers to local agricultural and commercial banks.

Project Components

The proposed pilot project will have three components: (a) irrigation supply chain support through equipment provision, input supply, advisory services for production, storage, and marketing; (b) support for a government private irrigation policy, including studies on the assessment of FLI extent, appropriate institutional framework, the financing system linking potential farmers to local banks, and access to land for youth and women; and (c) coordination encompassing the project's fiduciary management and M&E.

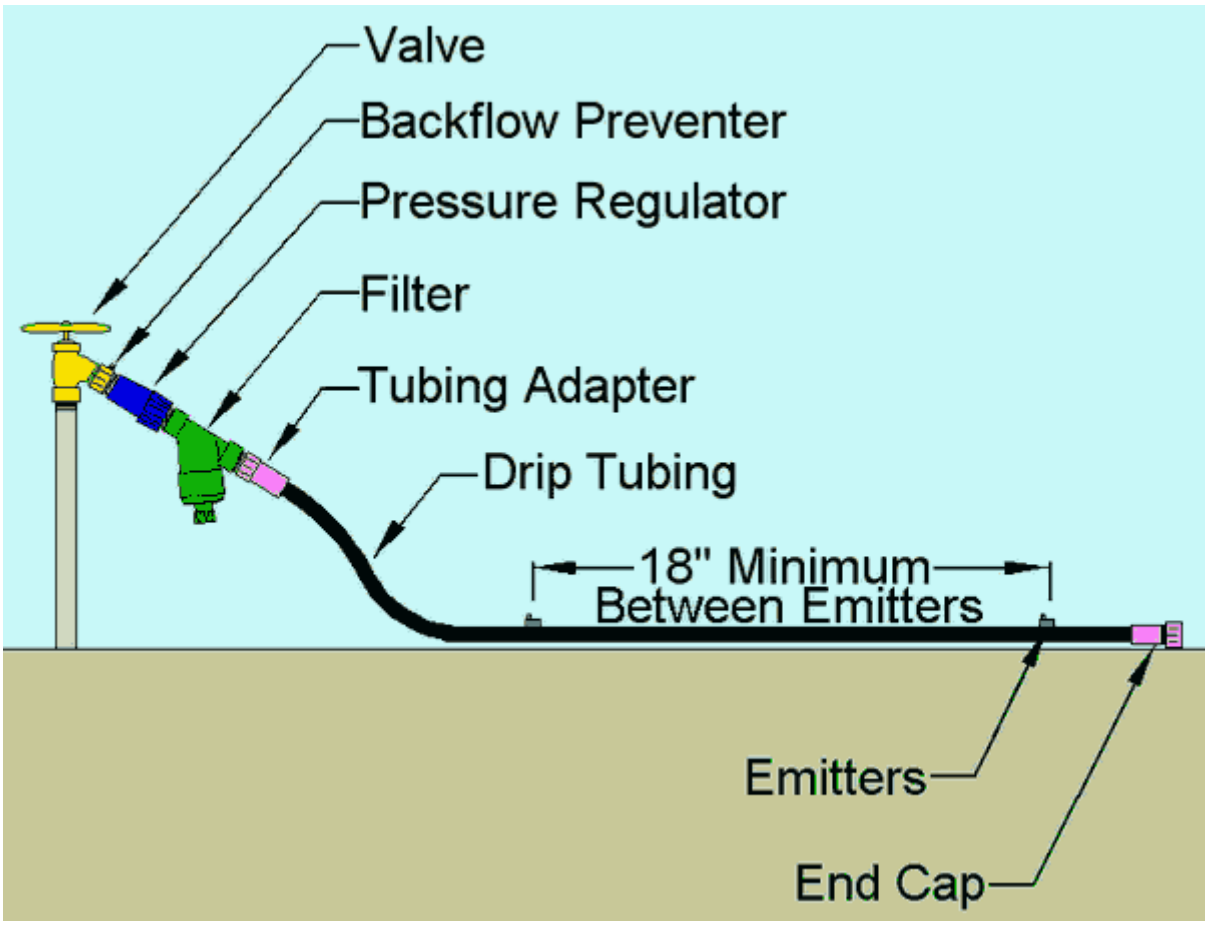
Component 1: Irrigation Development Supply Chain Support (US$18.5 Million)

Subcomponent 1.1: Irrigation and Storage Facilities (US$16 Million).

The project will develop 500 hectares of new small-scale irrigation and will consolidate 2,000 existing hectares in four selected areas: the Niger River, Dallol, Goulbi, and Korama valleys. Storage facilities and protection fences will be used for irrigation systems as needed. The new irrigation with be provided by drip or California distribution systems, using solar pumps as much as possible to minimize the environmental impact and motor pumps to a lesser extent (Niger River valley). They will serve mainly as sites for demonstration, training, and dissemination. M&E will be set up to capture all required technical and economical parameters and thus improve the different options. The sites will be identified during implementation and upon demand and will be subject to detailed studies.

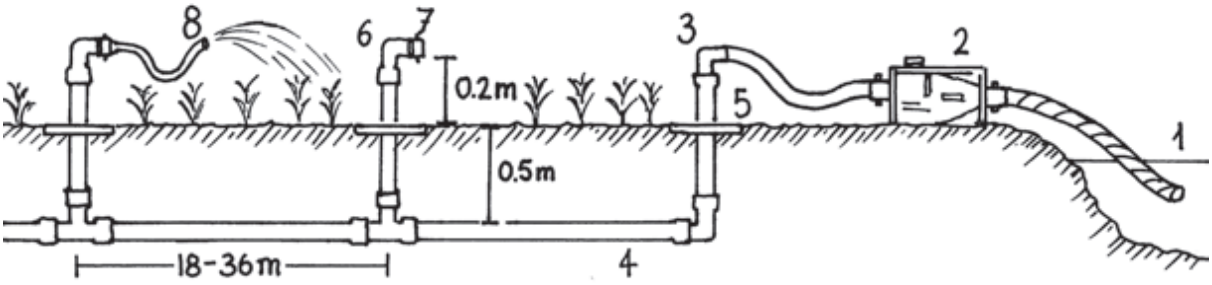
Drip irrigation is the most efficient method of irrigating, with typically 90 percent or higher water efficiency. That means less wasted water. In addition, it is easy to design and to install, and it can reduce the disease problems associated with high levels of moisture on some plants.

Figure 8.1: Drip Irrigation System Design



The low-pressure distribution system known as the Californian system is also reputed to be a highly efficient small-scale irrigation technique, with about 80 percent water efficiency. The principle of the Californian system is to distribute the water to the crops by underground rigid polyvinyl chloride (PVC) pipes (40 to 50 millimeters in diameter). The pipe network is buried 0.5 meters deep to protect them from ultraviolet (UV) damage and agricultural work. Water intakes are connected to these rigid pipes at regular intervals (18 to 36 meters). A 14-meter flexible hose is attached to the water intakes to irrigate individual plots and crops. The pipe network can be installed by local plumbers.

Figure 8.2: Californian Irrigation System Design



Subcomponent 1.2: Input Supply, Advisory Services for Production, and Marketing (US$2.5 Million)

The project will support FLI farmers in agricultural input supply according to their needs, as well as in technical support and advice for quality production and in the marketing segment by supporting the professionalization of certain crop markets, such as pepper and tomato.

Component 2: Government Private Irrigation Policy Support (US$1.5 Million)

The project will support the government in implementing the FLI (private irrigation) policy, including studies on (a) assessment of the extent of FLI, covering all potential irrigation areas of the country; (b) an appropriate institutional framework to analyze the ANPIP outcomes and other private irrigation farmers' bodies that have emerged since; (c) a financing system linking potential farmers to local banks, which could allow further scaling up of FLI development activities, excluding credit lines and heavy subsidies; and (d) access to land for youth and women in the context of Rural Code implementation and decentralization of land management.

Component 3: Coordination of Project Fiduciary Management and M&E

The project will provide resources to support coordination activities, fiduciary management, and a robust M&E, which will be key for monitoring of the results framework and lessons to be learned.

Key Agribusiness Sectors with Potential for Replication

The import and export statistics referred to earlier show the significant potential of agribusiness using FLI. The objective, through the expansion of this type of irrigation, is to compensate the production deficit that is at the base of massive imports of irrigated vegetables and grains, as well as to seize the opportunities of a subregional market that represents imports by neighboring Nigeria

(a market of 200 million inhabitants) and other West African coastal countries, such as Cote d'Ivoire and Ghana, all members of West African Economic and Monetary Union (WAEMU) and Economic Community of West African States (ECOWAS).

Following the introduction and adoption of various affordable irrigation techniques through PIP2 and good structuring by the Agro-Sylvo-Pastoral Exports and Markets Development Project (PRODEX) for the regional market of certain products, such as onion, it becomes possible to relaunch the development of FLI with the financial package proposed later.

Effective Open Market without a Centralized System

In terms of the supply chain, there are no major potential obstacles to the revival of FLI in Niger. The demand for irrigated products is stronger than ever, and the supply conditions for agricultural inputs and irrigation equipment are favorable.

Possible Sources of Financing

FLID's relaunch will require matching grant–type financial support through Investment Fund for Food and Nutrition Security (FISAN) mechanisms and, in the longer term, a viable bank financing system that will be assessed through the project activities. The grant grid proposed in table 8.1 takes into account the nature and size of investments and the investors' profile (women and youth). According to FISAN principles, the total grant may not exceed 40 percent of the cost of the subproject.

Three classes of FLI investment will be distinguished: (a) from less than 1 hectare to less than 3 hectares, (b) from 3 to 6 hectares, and (c) investments for women and youth. The first class will receive more grant funding than the second one, and women and youth will receive the highest subsidies because of their lack of means; FISAN rules should not apply to this category of beneficiaries. Water-saving and environmentally efficient technologies also may receive more support.

Subsidies will be made available to beneficiaries at decentralized MFIs, at which their contributions will also be deposited according to the mechanism used in the implementation of PIP2. These institutions will be solicited by recipients to obtain campaign credits to access seasonal agricultural inputs.

Table 8.1: Grant Grid for FLI Development

	Class 1: less than 1 ha to less than 3 ha (%)	Class 2: 3 to 6 ha (%)	Class 3: women and youth (%)
Feasibility and detailed studies	100	50	100
Advisory services	100	80	100
Motor pump	30	20	80
Solar pumping equipment	40	30	90
Tractor and tillers	—	80	—
PVC pipes (low and high pressure)	30	20	90
Drip equipment	40	30	90
Metallic grilled fencing	50	800	90
Agricultural inputs	0	0	0

Source: World Bank data.

Note: — = not available.

Institutional Arrangements for Implementation

The pilot project will be handled by the PASEC under implementation, which (a) has fiduciary, coordination, and M&E capacities, with capacity strengthening for specific needs; (b) has a project coordinator and technical staff who worked under PIP2; and (c) works in many areas with high FLI potential. PASEC's coordination and fiduciary management capacities will be strengthened at the central level with the recruitment of an irrigation engineer, who will assist the PASEC coordinator in coordinating the pilot project activities; an accountant, who will ensure separately accounting and financial management; and an M&E expert, who will monitor indicators. FLI activities, including subproject studies and implementation support and studies related to government policy support, will involve the private sector, such as consulting firms and specialized nongovernmental organizations (NGOs), as much as possible. Arrangements will be agreed upon at the decentralized level, with PASEC and MFI regional offices to facilitate the proper implementation of field activities.

Role for Government and NGOs in Expanding FLI

The promotion and consolidation of FLI in Niger should result from a combination of efforts by the private sector and the government. International NGOs could also play their part. The private sector here encompasses all participants of the supply chain dealing with FLI promotion, input supply, production, postharvest, storage, processing, marketing, and distribution, among others. They must play a determining role in the process.

The government has a critical role to play in creating an enabling environment by implementing its irrigation policies, which include FLI for technology development and uptake for small-scale irrigation. The details of measures to be taken and made operational are included in the two core policy and strategy documents: (a) the National Strategy for Irrigation Development and Water Harvesting (SNDICER), prepared in 2003 and updated in 2005, and (b) the Niger Strategy for Small-Scale Irrigation (SPIN) from 2013 (SNDICER 2005; SPIN 2013).

Notes

1. Pilot Program for Climate Resilience (PPCR) and the Family Farming Development Program (PRODAF) funded by the International Fund for Agricultural Development; National Resilience Priority (NRP) prepared under the Global Alliance for Resilience-Sahel and West Africa (AGIR) and supported by the European Union.

2. This bank is in the process of privatization.

3. The unit cost for a medium- and large-scale development ranges from US$15,000 to more than US$20,000 per hectare.

4. Supply chain participants as listed.

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