



Netherlands Enterprise Agency

Nicaragua

An Assessment of Business Development Opportunities in the Water Sector

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Nicaragua

An Assessment of Business Development Opportunities in the Water Sector

Project LED15SJO02



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Clients:
Royal Dutch Embassy in San Jose, Costa Rica
Rijksdienst voor Ondernemend Nederland-RVO

The Hague, March, 2016

COLOPHON

Assignment:

Nicaragua - Water Sector
Assessment of the business opportunities in Nicaragua

Client:

Rijksoverheidsdienst voor Ondernemend Nederland
(RVO)
Den Haag, Nederland
Kingdom of the Netherlands
Royal Netherlands Embassy in San José , Cost Rica.

Project number :

LED15SJO02

Submitted by:

Uytewaal Consultancies

Version:

Final document

Date:

31.03.2016

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Acronyms

AECID	Spanish Cooperation Agency
BCIE	Central America Bank for Economic Integration
B2B	Business to Business
CANATUR	National Chamber of Tourism of Nicaragua; <i>Cámara Nacional de Turismo de Nicaragua</i>
CAPS	Community-based water committees; <i>Los Comités de Agua Potable y Saneamiento</i>
CNC	Nicaraguan Chamber of Construction; <i>Camara Nicaragüense de la Construcción</i>
CIDA	Canadian International Development Agency
CIRA	Center for Research on Aquatic Resources; <i>Centro para la Investigación en Recursos Acuáticos de Nicaragua</i>
COSEP	The private sector council. <i>Consejo Superior de la Empresa Privada</i>
CPML	<i>Centro de Producción más Limpia</i>
DAAD	German Academic Exchange Program
EIB	European Investment Bank
ENACAL	Nicaraguan Water and Sewerage Enterprise; <i>Empresa Nicaragüense de Acueductos y Alcantarillados</i>
EU	European Union
G2G	Government to Government
GIZ	German Agency for International Cooperation
IDB	Inter-American Development Bank
INAA	National Water and Sewerage Institute; <i>Instituto Nicaragüense de Acueductos y Alcantarillado Sanitario</i>
INATEC	National Technological Institute; <i>Instituto Nacional Tecnológico</i>
INETER	National Institute for Territorial Studies; <i>Instituto Nicaragüense de Estudio Territoriales</i>
INIFOM	National Institute for the Promotion of Municipalities; <i>Instituto Nicaragüense de Fomento Municipal</i>
IWRM	Integrated water resources management
JICA	Japanese Agency for International Cooperation
JMP	Joint Monitoring Program (UNICEF/WHO)

K2K	Knowledge 2 Knowledge
KfW	German Development Bank
LuxDev	Luxembourg Agency for International Cooperation
MAG	Ministry for Agriculture and Life-stock; <i>Ministerio Agropecuario y Forestal</i>
MARENA	Ministry for Environment and Natural Resources; <i>Ministerio del Ambiente y los Recursos Naturales</i>
Nuevo FISE	Social Investment Fund; <i>Fondo de Inversión Social de Emergencia</i>
NWP	Dutch Water Partnership
OECD	Organization for Economic Co-operation and Development
PGIRH	Plan for Integrated Water Resources Management
PISASH	Integral Water and Human Sanitation Sector Program
PNDH	National Plan for Human Development; <i>Plan Nacional de Desarrollo Humano</i>
PRONicaragua	Official investment and export promotion agency of the government of Nicaragua
PPPs	Public private partnerships
RAAN	North Caribbean Coast Autonomous Region; <i>Región Autónoma del Atlántico Norte</i>
RAAS	South Caribbean Coast Autonomous Region; <i>Región Autónoma del Atlántico Sur</i>
RASNIC	Nicaragua's National Network for WSS; <i>Red de Agua y Saneamiento de Nicaragua</i>
SDC	Suisse Agency for International Cooperation
SIASAR	Rural Water and Sanitation Information System; <i>Sistema de Información Sobre Agua y Saneamiento Rural</i>
SINAPRED	Executive Secretariat for the Implementation of the National System for Prevention, Mitigation and Attention to Disasters; <i>Sistema Nacional para la Prevención Mitigación y Atención de Desastres de Nicaragua</i>
UMAS	Municipal Water and Sanitation Unit; <i>Unidad Municipal de Agua y Saneamiento</i>
UNAN	Autonomous University of Nicaragua; <i>Universidad Nacional Autónoma de Nicaragua</i>
UPANIC	Association of Agricultural Producers; <i>Unión de Productores Agropecuarios de Nicaragua</i>
UPN	Polytechnic University of Nicaragua; <i>Universidad Politecnica de Nicaragua</i>
WSP	World Bank's Water and Sanitation Program

WSS

Water supply and sanitation

1. Introduction

This report presents the results for Nicaragua of the fact-finding study “Water Business Development Study for Nicaragua & Guatemala” (LED15/SJO/02) commissioned by the Rijks Overheidsdienst voor Ondernemend Nederland (RVO), on request of the Royal Dutch Embassy in Costa Rica.

Both Guatemala and Nicaragua have been partner countries to the Dutch development cooperation program over the past several decades. However, due to a shift in the Dutch development cooperation policy, the traditional “aid” relation with both countries was concluded in 2013. Since then, and in preparation of implementation of the new Dutch “aid and trade” policy in both countries, the Embassy in Costa Rica identified the agri-food business, renewable energy and the water sector as the sectors with the highest potential for business development with involvement of Dutch actors.

The present study is expected to inform the Embassy in Costa Rica on a new agenda for collaboration in the water sector in both traditionally aid-receiving countries. The study therefore aims to identify the main strategic areas within the water sector in Guatemala and Nicaragua that present the best opportunities for business development with Dutch business involvement.

Besides assessing the needs for expertise, products, and services in the water sector of both countries, the study evaluates the existing knowledge and products of Dutch businesses that would respond to the identified demand, and appraises the potentiality for collaboration.

According to the Terms of Reference, the study covers the wide spectrum of the water sector including: integrated water resource management (IWRM, drinking water and sanitation services including waste water treatment and disposal, canal and drain infrastructure, flood risk management (FRM), and water (management) for agriculture. The prospects for business development related to the development of the Nicaragua Canal by the HKND group is beyond the scope of the present study.

The study was conducted over a four month period (October 2015 to January 2016) and entailed a (i) desk review of existing (online) information and documentation, (ii) a field mission to each locality, and (iii) the implementation of a Platform Meeting with participation of potentially interested and relevant Dutch enterprises and institutions.

The field mission allowed interviewing representatives of government institutions, branch-organizations and private companies, development banks, non-governmental organisations, academic institutions and individual resource persons. The list with the interviewees is attached in annex 1.

The platform meeting was organized and implemented with support from the Dutch Water Partnership (NWP for its Dutch acronym) and hosted by RVO in its premises in The Hague. The meeting convened forty representatives of Dutch companies and institutions. Annex 2 includes the meeting agenda and annex 3 provides the list of participants. The meeting provided the space to present and assess the main findings of the study. The identified strategic areas were further explored for future business opportunities. The meeting also collected the Dutch stakeholders’ concerns, i.e. perceived bottlenecks for doing business in the water sector in both Central American countries. Furthermore,

the results of the meeting included a set of recommendations and next steps for the different stakeholders (the Embassy, NPW, RVO and the Dutch business).

This document is organized around three main chapters. The first chapter includes an introduction and chapter 2 provides an overview of the water sector in Nicaragua, describes the main institutional framework including an identification of the main actors, identifies the main challenges in the sector and the existing plans to address those as well as the available funding in the sector. Chapter 3 elaborates on the scope for Dutch involvement in the water sector by assessing the demand for expertise and products in the water sector in Nicaragua , by providing a description of new opportunities and initiatives that provide interesting drivers or links for Dutch involvement, a description on the potential clients and existing competition for the Dutch sector in the identified areas, and a presentation of the main features of the business climate in Nicaragua. The 4 th, and closing chapter, summarises the potential niche for Dutch involvement in Nicaragua's water sector, and concludes with a set of recommendations and next steps for the different stakeholders to concretize and prioritize specific business area opportunities to follow-up on.

2. Assessment of the Water Supply and Sanitation Sector in Nicaragua

2.1 Facts and figures

Nicaragua is, with the exception of Haiti, the poorest country in the region. However, after decades of instability and natural disasters the country is registering significant economical recuperation and is now focusing on addressing innovative ways for sustained economic growth and combatting poverty (WB, 2014).

General Socio-Economic Information

Population	6,014 million (rural =2,562,776)
Extension	130,370 km ² (10,384 km ² water bodies)
Population growth	1.14% annual growth rate
GDP per capita	1,904.7 US dollars (2013)
Economic growth	GDP annual growth rate of 4.7%
Economic status (OECD)	Low-middle-income country
Poverty	Poor= 45.8% of the population Extreme poor= 15.1% of the population In rural areas, 2 out of 3 people are poor, with 27.4% living in extreme poverty.
Main sources of income (2012)	Agriculture:17.5% Industry: 25.8% Services: 56.7%
Main industries (2012)	Food processing, chemicals, machinery and metal products, knit and woven apparel, petroleum refining and distribution, beverages, footwear, wood
Main export products (2012)	Coffee, beef, shrimp and lobster, tobacco, sugar, gold, peanuts, cigars, automobile wiring harnesses, textiles and apparel
Doing Business ranking of economies (2016)	#123

Source WB, 2015

The following table provides an overview of the characteristics of water availability in Nicaragua.

Water Resources

Characteristics	Value	Observation
Water Availability		
Availability of Water per year	38,668 m ³ habitant/year	This value is above the Central American region average (31,064 m ³ habitant/year) The value represents four times the availability in the United States and in some European countries, e.g. Switzerland
Water use per capita	257.80 m ³ habitant/year)	This is around 1 % of the total available water sources in Nicaragua
Water scarcity	100 points	Environmental Performance Index; Yale Centre for Environmental Law and Policy, 2010)

As illustrated in the map below, Nicaragua’s main geographical areas are the Pacific region, the Central region, and the Atlantic coast. The Pacific region is divided into the North-western and Southern sub regions.



1. Managua and surroundings
2. Northwest region
3. Central highlands
4. Southwest region
5. Nicaragua Lake
6. Atlantic coast

The abundant surface water resources are distributed irregularly over these areas and are highly dependent on seasonal change:

- 51 rivers drain into the Atlantic, 12 rivers drain into the Pacific Ocean, 4 into Lake Managua (Lake Xolotlán), and 12 in Lake Nicaragua (Lake Cocibolca), which flows into the Caribbean Sea through the San Juan River.
- The Pacific Basin is smaller and its rivers are shorter. The country has two large lakes and 18 lagoons, of which 9 are in the Pacific region, 5 in the Central region and 4 in the Atlantic region.
- There are 4 large hydroelectric dams, 3 for generating electricity and 1 for irrigation and fishing.
- In the Pacific region (northwest and southwest), water supply is predominantly reliant on groundwater.
- In the Northern and Central region, surface water is the main source for water supply.

Water Uses

Water uses	Percentage of total water extract (2011)	Water sources
Agriculture	76.7%	Ground water sources
Industries	4.8%	
Municipal	18.5%	

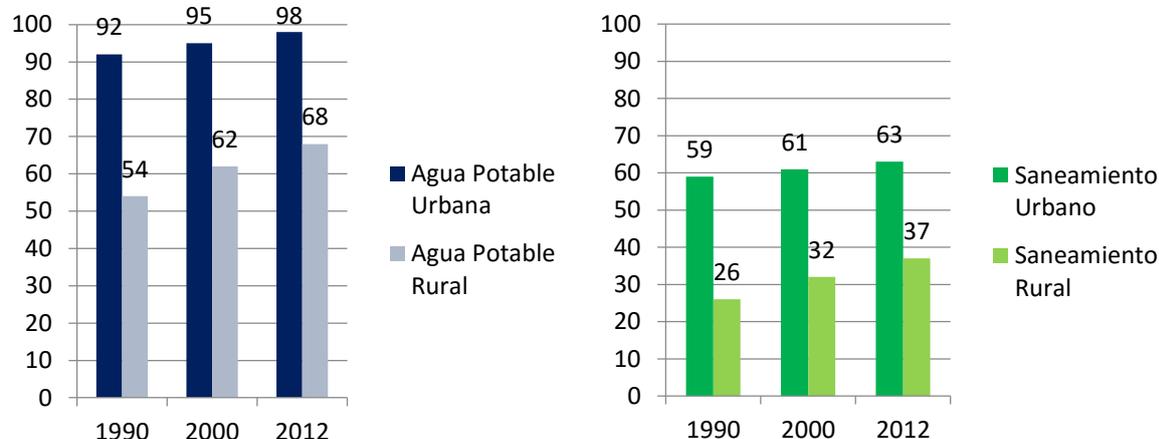
Source: Vammen (2014)

- 50 percent of the national territory is used for agriculture, of which 72 percent is used by small producers, representing 222,000 small farmers.

- In 2011, 4 percent of all farmers had an irrigation system in place. In 2015, this value doubled to 8 percent (UNIPAC, 2015), also including the larger farmers that employ irrigation for their crops.
- Irrigation system efficiency is calculated to be less than 20 percent. (Vlammen, 2014)

Drinking Water Supply and Sanitation Services

The graphs belows display drinking WSS coverage figures¹:



Unservd Population

	Unservd urban population	Unservd rural population	Total population
Drinking water	78,640	855,680	Urban 3,932,000 Rural 2,674,000
Sanitation	1,454,840	1,684,620	Total 6,606,000

Source: IRC elaboration a) ECLAC 2010, Latin America urban and rural population projections, b) JMP 2014

- The above figures show a significant increase in drinking water coverage, particularly in rural areas. Sanitation coverage is significantly lacking behind, particularly in rural areas, while the increase in urban coverage for sanitation has hardly improved over the last 20 years. Despite relatively high levels of investment, access to drinking water in urban areas has barely kept up with population growth.
- Despite improvements, albeit in a modest way, a significant share of the population still lacks access to water supply and sanitation (WSS) services. At the current growth rate, total coverage for rural drinking WSS is not expected to be met before 2053 (JMP).
- Sanitation services are still very poor, particularly in the rural areas. The urban population is in part connected to a sewage system, in the rural areas most of those with access have latrines. However, still a significant share of the population, 20 percent of the rural population and 4 percent of the urban population, practice outdoor defecation (JMP).

Quality and Continuity in Service Delivery

Drinking water services are mainly provided by, either the Nicaraguan Water and Sewage Enterprise (ENACAL for its Spanish acronym)² or by one of the community-based water committees (CAPS).³

¹ JMP, 2014

² Empresa Nicaragüense de Acueductos y Alcantarillados, ENACAL

³ Los Comités de Agua Potable y Saneamiento, CAPS

Service providers	Water source
ENACAL provides 54 percent of total drinking water service delivery	85 percent of the systems using ground water depend on electric pumps, implying high investment and energy costs for operations
CAPS includes 5150 systems and serve in total 1 million people The total number of officially registered CAPS is 300	Supply is mostly through small systems, hand-dug wells, mini-aqueducts by electric pumping and mini-aqueducts by gravity and collection from springs

Source: Vlammen (2014)

Although the JMP (2014) states an average coverage level of 85 percent drinking water, ENACAL—the public utility responsible for provision of WSS services in urban areas—estimates that effective coverage is much lower due to insufficient and unreliable service.

- The poor quality and low efficiency of WSS service providers are a serious concern, also in the Managua region. Managua’s existing water supply fails to meet current demand due to high rates of leakage and wastage, which account for 55 percent of total water produced and distributed by the system.
- In 47 percent of the localities, water supply is monitored by the regulatory agency (INAA for its Spanish acronym⁴). These monitoring results show that 46 out of 96 systems are not continuous; this share is higher during the dry season, between the months of February and May, than in the wet season.⁵
- Only 46 percent of water supplied by ENACAL is billed annually.⁶ Interruptions in service provision are common, with some households receiving less than 2 hours of service a day. Only 42 percent of connections in Managua have meters operating in good condition.
- The Social Investment Fund (Nuevo FISE),⁷ with engagement of the local municipalities (through the providers of technical assistance, UMAS),⁸ monitor service levels in rural areas by means of a Rural Water and Sanitation Information System (SIASAR for its Spanish acronym).⁹ SIASAR data shows that an overwhelming majority of service providers are not complying with the national norms for service provision.
- A study conducted by UNICEF and the Canadian International Development Agency (CIDA) in 2003 revealed that 90 percent of the rural communities are exposed to micro-biological risks at household level due to inadequate hygienic and sanitary practices including deficiencies in water storage and treatment of collected water.

Wastewater Treatment

For now, there is no official data on the volume of wastewater produced in Nicaragua, likewise, updated data on wastewater treatment in Nicaragua is not readily available. Nevertheless, the following pieces of information, extracted from various sources, highlight a tendency of low levels of wastewater treatment.

- Up to 2005, 50 percent of the sewage wastes were treated. Since then, this value has gone down due to poorly operating treatment systems and a growing population.¹⁰

⁴ Instituto Nicaragüense de Acueductos y Alcantarillado Sanitario, INAA

⁵ Vlammen, 2014

⁶ Vlammen, 2014

⁷ Fondo de Inversión Social de Emergencia, Nuevo FISE

⁸ Unidad Municipal de Agua y Saneamiento, UMAS

⁹ Sistema de Información Sobre Agua y Saneamiento Rural, SIASAR. For more information refer to: http://www.siasar.org/p_nicaragua.php

¹⁰ Vlammen, 2014

- In 2007, the government of Nicaragua reported 42 percent coverage of household wastewater treatment in urban areas, with urban peripheries and rural areas mostly lacking access to the service.¹¹
- However, the operations of many treatment systems are poor as they discharge effluents that do not comply with the regulations for the control of pollutants.¹²
- In the city of Managua, 60 percent of wastewater is treated; this value is much lower in other cities.¹³
- Out of 215 Nicaraguan cities¹⁴, 36 cities have a sanitary sewage system, 27 of them have a wastewater treatment plants;¹⁵ only 12.5 percent of urban wastewater is treated.
- Out of the 27 treatment plants, 13 use stabilisation ponds.
- Wastewater is not treated in rural areas.¹⁶
- Untreated sanitary sewage is discharged into rivers and lakes. It is not uncommon to see waste and grey waters flow down the streets, avenues, and riverbeds of rural areas.

Pollution of Surface and Ground Water Sources

- Pollution of surface and ground water is prevalent throughout the country, due primarily to agriculture, discharge of non-treated domestic, industrial, and agro-industrial wastes into lakes and rivers, and due to erosion because of inappropriate land-use.
- Inadequate farming practices are the main cause of surface and ground water pollution. Currently, 90 percent of farmers in the country use pesticides and only 10 percent are endeavouring with environmentally friendly alternatives.¹⁷
- Arsenic from natural sources as a consequences of volcanic formations are polluting ground water sources in certain areas in the Central and Northern regions as well as some craterous lagoons in the Pacific area. Mercury used in (small scale) mining has been detected in groundwater and rivers close in the area of the mining activity.
- Domestic garbage and industrial waste are abandoned in areas, with no regulation of any kind. (Vlammen, 2014)
- Municipal dumps receive industrial solid waste that have previously not been classified. The polluting substances eventually reached groundwater sources and surface currents. (Vlammen, 2014)
- A great amount of non-collected solid waste is swept by currents in bodies of water.
- Household waste is mixed with untreated waste from laboratories, hospitals, industry, business, in the sewage system.
- Lake Xolotlán is the most affected lake.

Floods and Risks

- The Atlantic region is the most vulnerable to flooding.
- Floods are usually caused by the accumulation of surface water, from strong precipitation, in rivers that flow over land borders.

Other

Other risks related to extreme events include:

- La Niña, causing torrential rains and hurricanes; Nicaragua experiences an average of 9.6 tropical storms per year

¹¹ ENACAL, 2008

¹² Vlammen, 2014

¹³ ENACAL, 2015

¹⁴ In Nicaragua the administrative Division are: 15 Departments, 2 autonomous regions in the Caribbean Coast, approximately 153 Municipalities, and inside of those there are "cities", and " counties "(comarcas in Spanish)".

¹⁵ MARENA, 2014

¹⁶ Vlammen, 2014

¹⁷ Vlammen, 2014

- El Niño, causing periods of droughts and flooding
- Rising sea levels, with potential salinization of water sources
- Earthquakes

2.2 Institutional Framework and Actors

Institutional Framework for the Water and Sanitation Sector

Nicaragua's WSS sector counts with a relatively well defined institutional framework. The 1998 WSS reform aimed at specifying responsibilities and roles for each government institution, and a National Water Law was approved in 2007 that focuses on water resources and regulates water use within different sectors. However, the experience is that due to weak institutional capacities and insufficient inter-institutional coordination, enforcement of the full regulatory framework is still a challenge, particularly regarding the compliance with the specific norms for efficient water use and waste water management by all actors involved.

The 1998 reform for the WSS sector distinguished between policy, regulatory, and operation functions for the sub-sector of drinking WSS provision. Decentralization has been proposed for a decade, but implementation was very slow and was ultimately reversed in mid-2007 when the national water company took over two municipal systems. The National Water and Sewerage Institute, [INAA](#), is in charge of sector regulations, handling customer complaints, approving tariff increases and providing concessions for service providers.

According to municipal law, municipalities are responsible for the provision of WSS services in Nicaragua. However, very few municipalities actually provide these services in practice—50 percent of water users are served by [ENACAL](#) which serves most urban areas. [CAPS](#) provide services to a further 30 percent of the population in rural areas. Law 722 of 2010 recognizes and regulates the formal establishment of CAPS. [UMAS](#), the municipal WSS unit, are the technical arms of the municipal governments and responsible for addressing WSS matters, including the provision of technical support to the CAPS.

[Nuevo FISE](#) finances infrastructure and supports local communities in the management of infrastructure. In the WSS sector, Nuevo FISE has been particularly active in rural WSS; in fact, donor funds for service delivery in rural areas are channeled through Nuevo FISE.

Institutional Framework for Water Resources management

The 2007 National Water Law¹⁸ is the main, and first, legal instrument for the sustainable management of water resources, regulating water use by different sectors while prioritizing potable water supplies for domestic use. In this manner, the Law reflects the principle of water as a public good and the recognition of the human right to WSS included in Nicaragua's constituency. The Water Law and its norms aim to protect and preserve the country's water resources, and emphasizes the integrated management of water, based on hydrographic and hydrogeological basins, sub-basins and micro-basins as the main units for planning and monitoring conservation and development of the water resources. An important aspect of this Law is that it recognizes Lake Cocibolca as a national reservoir for drinking water—trying herewith to stop the pollution of the largest tropical Lake in the American continent. The Law establishes the creation of [ANA](#), the National Water Authority, in 2010 as the responsible entity for the nationwide administration and management of water resources, including the issuance of water permits. ANA is also accountable for the establishment of the Basin Agencies, responsible for integrated water management at the basin level.

¹⁸ La Ley No. 620, Ley General de Aguas Nacionales y su reglamento, Decreto No. 44-2012.

The 1996 National Law on the Environment and Natural Resources also includes various stipulations relevant to the sustainability of the water resources; it describes the various instruments for sustainable management of the environment, including the hydrological resources. The Law established that natural resources are a public good, and it includes 22 articles dealing with various aspects of water resources management. At institutional level, regulation of this Law is spread over different authorities, and defined by a number of specific Acts and technical norms. For example, the regulation of (domestic and industrial) wastewater involves the Ministry for the Environment and Natural Resources (MARENA for its Spanish acronym)¹⁹, INAA, ENACAL and ANA, each with specific responsibilities.

The Law for Municipalities establishes that municipal governments have competence in all matters relating to socio-economic development, conservation of the environment and natural resources—if within their territorial circumscription. At the same time, the National Law on the Environment and Natural Resources also establishes that autonomous governments and municipalities can determine the maximum amount of water to be extracted within their jurisdiction.

The National Institute for the Promotion of Municipalities (INIFOM) is a governmental institution that supports municipal governments in the development of their capacities to fulfil their respective roles and responsibilities.

MARENA (Ministry for Environment and Natural resources) has the responsibility of regulating environmental management efforts. MARENA is also charged with the duties of conservation, protection, and sustainable use of Nicaragua's natural resources and environment.

MAG (Ministry for Agriculture and Life-stock), among other responsibilities, also promotes the development and rational use of irrigation to improve the productivity of crops and life-stock and export of agricultural products.

INETER (National Institute for Territorial Studies)²⁰ is the agency that assumes responsibility for flood control. INETER's work is targeted at reducing Nicaragua's vulnerability to flooding resulting from tropical storms and hurricanes.

SINAPRED is the Executive Secretariat for the Implementation of the National System for Prevention, Mitigation and Attention to Disasters.²¹

PRONicaragua is the official investment and export promotion agency of the government of Nicaragua. It supports the government in implementation of its national strategy to reduce poverty and foster the country's sustainable development, promoting Nicaragua as a safe and stable destination for foreign investment. PRONicaragua also contributes to the improvement of the business climate to encourage investors and, ultimately, to generate employment opportunities, technology transfer, and improve the population's quality of life.

Universities and (Academic) Training Institutions

The Center for Research on Aquatic Resources, from the Autonomous University of Nicaragua (CIRA/UNAN for its Spanish acronym)²² not only conducts academic research, but also provides the

¹⁹ Ministerio del Ambiente y los Recursos Naturales, MARENA

²⁰ Instituto Nicaragüense de Estudio Territoriales

²¹ Sistema Nacional para la Prevención Mitigación y Atención de Desastres de Nicaragua

²² El Centro para la Investigación en Recursos Acuáticos de Nicaragua; Universidad Nacional Autónoma de Nicaragua, CIRA/UNAN

only Master study in Nicaragua on water sciences, focused primarily on the quality of water. This Master program is funded by the German Academic Exchange Program (DAAD). CIRA also provides diploma-level courses on water management, for example on the conservation of water sources and on the mitigation of climate change; these diploma courses are supported by the Suisse Development Cooperation and by the Dutch umbrella organization for the twining between Dutch and Nicaragua municipalities.

CPML, *Centro de Producción más Limpia*, based at the National University of Engineering (**UNI** for its Spanish acronym)²³ offers studies and training programs relevant for the water sector, but with a focus on environmental legislation.

Undergraduate degree courses in Civil Engineering from the different universities, such as at the UNAN, UNI and at the Polytechnic University of Nicaragua (**UPN** for its Spanish acronym),²⁴ include aspects relevant for the water sector such as on the design of infrastructure for water resources management, and drinking WSS systems and facilities. Similarly, degree courses in agriculture or related studies include modules on irrigation systems.

The National Technological Institute (**INATEC**),²⁵ provides technical and technological training; i.e. a vast majority of the technical staff in the municipalities are trained by INATEC. Recently, and with support of the German Agency for International Cooperation (GIZ), modules on WSS were developed and are now included in the curricula of some INATEC courses.

Non-Governmental Institutions

CPML, *Centro de Producción más Limpia*, provides technical assistance to private companies, supporting these to comply with the national norms on water use and wastewater treatment. CPML hosts the secretariat for the national commission for environmental safe production, integrating various government institutions, universities, and relevant branch organizations. CPML formulates and implements programs aiming at environmental conservation. In previous years, CPML has received support from the Dutch Embassy in Nicaragua for the development and implementation of several of their activities and programs.

Nicaragua's National Network for WSS (**RASNIC** for its Spanish acronym)²⁶ provides an information sharing platform between government institutions, donors, and civil society organizations active in the WSS sector in Nicaragua. RASNIC organizes advocacy and policy influencing activities. Examples include their involvement in establishing the regulatory framework for WSS services in rural areas (Law 722) and the presentation of a mapping exercise, in collaboration with ANA and the University of Delft, on the presence of arsenic in water resources in the country.

Several **other national and international NGO's** are actively involved in Nicaragua's water sector. Many such as the Spanish ECODES are guided by a broader environmental agenda including water resources as a sub-item, and others such as WfP, Water For People, have a more exclusive focus on water and on the provision and quality of drinking WSS services. There is a strong presence of Spanish NGO's, besides other European and North American based international NGO's. The Dutch SNV has a long track-record in Nicaragua, but the water sector has not been a focus area for them over the last years. However, SNV is considering their interest and possibilities for reincorporating WSS in their future work program.

²³ Universidad Nacional de Ingeniería, UNI

²⁴ Universidad Politecnica de Nicaragua, UPN

²⁵ El Instituto Nacional Tecnológico, INATEC

²⁶ Red de Agua y Saneamiento de Nicaragua, RASNIC

There is also extensive and long-standing non-governmental cooperation through churches, private bodies, political foundations, and town twinning arrangements—including various twinning arrangements with cities in the Netherlands.

Private Sector

The National Chamber of Tourism of Nicaragua ([CANATUR](#) for its Spanish acronym)²⁷, is the association of the the national tourism industry. It serves the tourist sector by supporting the competitiveness of micro, small and medium-size enterprises (mSMEs) working with or for the tourism sector. It embraces various sub- association such as the association of hotels.

The Association of Agricultural Producers ([UPANIC](#) for its Spanish acronym)²⁸ functions as an umbrella organization representing thirty thousand active members of producer associations located throughout the country. UPANIC includes associations of coffee, sorgo, cotton, sugar, and rice producers and life-stock farmers. It is an active association which develops training and awareness raising programs, organizes (international) commercial fairs, undertakes studies and research, and manages an interesting data base.

The Nicaraguan Chamber of Construction ([CNC](#) for its Spanish acronym)²⁹ is the association of individual enterprises including suppliers, consultancy services, and contractors in the construction branch. CNC is actively involved in the elaboration of a new law on public private partnerships (PPP) that is expected to be adopted in early 2016 by the government of Nicaragua.

Bi-lateral Donors in Nicaragua's Water Sector

The [Spanish Cooperation](#) (AECID) focuses primarily on expanding the coverage of drinking WSS services, and allocates less attention to the sustainability of services and to the thematic area of public and environmental health. AECID also supports the development of integrated water resources management (IWRM) plans at the water basin level and provide support to programmes for conservation of the environment and natural resources.

The [Suisse Cooperation](#) (SDC) support is presently geared towards institutional strengthening.

The [German Cooperation](#), through [KfW](#) and [GIZ](#) for technical advice, has so far been one of the country's principal bilateral donors in Nicaragua's WSS sector. GIZ provides technical assistance to ENACAL.

The [government of Korea](#) is currently negotiating a contribution of USD150 million for the implementation of the Integral Water and Human Sanitation Sector Program (PISASH) .

Other bi-lateral donors with more limited and targeted support in the WSS sector include:

- Support from the [United States](#) is focused on sanitation and hygiene education programs, targeting particularly Nicaragua's Caribbean coast.
- The [Japanese Cooperation's](#) (JICA) funding for water supply is mainly directed towards the drilling of wells. JICA works directly with certified private companies in Nicaragua and not with the national government. However, not all private companies deliver quality work. The assignments are procured in their own country but Japanese companies look for Nicaraguan based representatives and counterparts.
- The governments of [Taiwan](#) and [China](#) provide technical assistance to the government of Nicaragua on technological innovation, such as on irrigation.

²⁷ Cámara Nacional de Turismo de Nicaragua, CANATUR

²⁸ Unión de Productores Agropecuarios de Nicaragua, UPANIC

²⁹ Cámara Nicaragüense de la Construcción, CNC

- [Luxembourg cooperation](#) (LuxDev) focuses on the tourism sector, also providing some support to water resource related projects. LuxDev also funds a national program for the strengthening of medium and small enterprises.

Main Development Banks Active in the Nicaraguan Water Sector

Current funding of the [World Bank](#) (WB), including the [Water and Sanitation Program](#) (WSP), focuses on sustainable rural WSS services, including a component on disaster risk management, i.e. to enhance disaster preparedness of rural WSS services.

The [Inter-American development Bank's](#) (IDB), loans focus on infrastructure project extensions or on the renovation of drinking water systems, sewage and wastewater plants, with particular funding designated towards drinking water treatment plants in the dry regions. The IDB's focus is on the urban areas, but there is some funding assigned to extend coverages of WSS services, particularly in the North Caribbean Coast Autonomous Region (RAAN) and South Caribbean Coast Autonomous Region (RAAS).³⁰ They also provide funding for environment and natural disasters, and through support to the agriculture sector, also invest in irrigation. IDB is providing some technical assistance activities to ENACAL and conducting studies to support integrated water management at the sub-water basin level.

The [Central America Bank for Economic Integration](#) (BCIE) co-finances implementation of PISASH by providing loans for drinking water treatment and supply as well as for wastewater treatment. The BCEI is among the main funders of large hydro-power projects.

The [German Development Bank](#) (KfW)³¹, gears its activities towards infrastructural investments for the expansion of national coverage, but also includes rehabilitation of existing drinking water treatment plants and networks, as well as sewage systems and waste water plants. KfW is one of the main funders of the Managua and Grenada wastewater treatment plants.

The [European Investment Bank](#) (BEI) supports implementation of PISASH.

2.3 Main Challenges

Further to the facts and figures presented in chapter 1.1, and based on a number of literature reviews and results of interviews conducted during country visits, the following main features—including trends, problems and challenges—have been identified for the WSS sector in Nicaragua:

- Emerging situations of water stress
- Inefficient water use
- Contamination of water sources
- Low Coverage Levels for WSS Infrastructures
- Low Level of WSS Service Delivery
- Limited capacity for wastewater treatment
- Low levels of wastewater management negatively impact human and environmental health
- Natural disasters and climate change preparedness

Underlying root causes to the main challenges include:

- Challenges in governance and in the institutional framework
- Weak organizational capacities and limited availability of skilled human resources

³⁰ Región Autónoma del Atlántico Sur (RAAS), Región Autónoma del Atlántico Norte (RAAN)

³¹ KfW is the German government-owned development bank

- Limited priority for information and knowledge management, and limited innovation capacity

Emerging Situations of Water Stress

Despite the abundance of water in Nicaragua, various water basins are already experiencing serious water stress—negatively impacting the availability and quality of the water source for the various users, particularly during the dry seasons.

The Pacific region is most vulnerable to water scarcity due to a combination of intensive agricultural practices, an increasing population, and a (expected) decrease in rainfall. Ground water quality is also under pressure because of untreated liquid waste discharge. Also, the country's Central region is considered to have medium-risk level in terms of water scarcity, while the situation in the Corredor Seco region is considered an urgent and critical matter as water availability, particularly during the dry season, has become a prevalent bottleneck for many water users. A contributing factor to the issue of water scarcity is the country's limited capacity of capturing and storing surface water, particularly in times of (heavy) rainfall. Lack of environmental planning and deforestation for extension of grassland and agricultural uses produces environmental decline, reducing the natural capacity of the watershed to detain water and prevent erosion. Lack of continuity in the availability of water is also becoming an increased concern for the private sector that rely on water as a resource in their production processes. Also, sustainability of drinking water services is acknowledged to be at stake when the availability of the water source cannot be guaranteed.

In 2014, ANA identified the following factors as the main contributors to the emerging situations of water scarcity: micro- biological contamination of the water sources; failure to register large users and conflicts over water use; reduced retention and infiltration of surface water; and, insufficient use of surface water for public water supply and lack of continuous monitoring, quality and quantity of water resources. (National Water Authority, 2014)

The inefficient use of water and the contamination of the water sources are important contributing factors to the water scarcity issue. The following sections take a closer look at this issue.

Inefficient water use

The agricultural sector is the largest water user. Despite the lack of detailed data on water use disaggregated by the different agricultural users from both a sector and water basin level, it is acknowledged that water use is highly inefficient. The lack of a sense of “water responsibility” by the users, the employment of rudimentary technologies for the production processes, and a weak institutional framework not capable of directing, setting standards and re-enforcing efficient water uses by the different users are contributing to the low efficiency of water use. Irrigation efficiency is calculated to be 20 percent, and ENACAL faces rates of up to 60 percent for unaccounted drinking water; technical deficiencies, including leakages, etc., are identified to be the main cause for unaccounted water and assumed to be the main factor for the inefficient use of water.

The above assessment is further exemplified and underlined by the following quotes, collected during several interviews with representatives of government institutions, private sector companies and their branch organisations, development banks, NGO's, academic institutions and individual resource persons between November 25 and December 4, 2015. .

“The private sector has a significant ‘water footprint’. There is a limited sense of ‘water responsibility’ by industries and (large) farmers including the (agro) industries—which drill their own wells to satisfy their own demand but neglecting to consider the impact on the water availability for communities and other users.” (Representative of a NGO, Managua)

“Cattle farms and dairy farms use a lot of water, predominately for cleaning purposes, and rely on rustic technologies, e.g buckets. The water consumption is 25 litres per cow and per day during the fattening process and 15 litres (energy and operations) to produce one 1 kg of meat.”

(Representative of a cattle and diary farm, Managua)

“Large industries have the tools to monitor the need and use of water for daily production. In the case of irrigation, industries rely on instruments to monitor levels of humidity and evaporation, while small and medium-size firms and farmers do not have access to such technologies and use water without any sense of measurement.”

(Representative of UPANIC, Managua)

Contamination of the Water Sources

Pollution of surface and ground water is prevalent throughout the country, due predominately to agricultural activity, discharge of non-treated domestic, industrial, and agro-industrial wastes into lakes and rivers, and due to erosion because of inappropriate land use. Inadequate farming practices are the main cause of surface and ground water pollution; deforestation for the extension of grasslands and agricultural uses further aggravates the problems of pollution.

The construction of the Managua³² and Granada wastewater treatment plants led to a capacity increase to treat sewage wastes in the respective cities. However, since 2005 the country is seeing a trend of decreasing sewage treatment levels, due to poor operating treatment systems and a growing population.

Sewage coverage in Nicaragua is low and, when latrines are available, they are not always connected to the sewage systems. Instead, untreated sanitary sewage is discharged into rivers and lakes. Waste from homes is mixed in the sewage system with waste from laboratories, hospitals, industry, business, without any prior treatment.

Domestic garbage and industrial waste are abandoned in areas with no regulation and a great amount of this non-collected solid waste is swept by currents in bodies of water. At the same time, municipal dumps receive industrial, yet unclassified, solid waste—these polluting substances eventually reach groundwater sources and surface currents.

Contamination of water sources by heavy metals from both human and natural sources worsen water quality. Arsenic from natural sources as a consequences of volcanic formations are polluting ground water sources in certain areas in the Central and Northern regions as well as some craterous lagoons in the Pacific area. Mercury used in (small scale) mining has been detected in groundwater and rivers close in the area of the mining activity.

The combination of the fast urban population growth witnessed over the past 15 years (the urbanization rate is among the highest in the Central America region) with the deficient sanitary

³² The Managua Waste Water Treatment plant was officially inaugurated in 2009

infrastructure for both solid and liquid waste, high population density, poverty, and the lack of land-use planning, has negatively impacted the natural environment, including the water sources and water quality. Deforestation, in response to an increased demand for agriculture and land for life stock farming, has resulted in an increase in pollution of surface waters by sedimentation, eutrophication, and pesticides, and in certain basins, of ground waters by pesticides.

The contamination of water sources and its impact on water quality and water use is illustrated by the following statement.

“RAAN and RAAS, although characterized for being inaccessible regions, are experiencing land extension for the cultivation of African Palms. New hydro-electric plants are emerging but are unknown by the authorities. Also, the displacement of communities as a direct result of mining is increasingly happening. As a result, the water source is increasingly contaminated having a direct impact on the quality of drinking water as most of the drinking water systems rely on surface water.”

(Independent resource persons, Managua)

Low Coverage Levels for WSS Infrastructures

Coverage levels for WSS services are very low and, with the exception of Haiti, the lowest in the Latin America region. Sanitation coverage is far behind drinking water coverage, and access to WSS services in rural areas is significantly lower in rural areas as compared to urban areas. Particular low levels of coverage are registered in RAAS and RAAN on the Caribbean coast, in the Atlantic region.

Existing infrastructure in the WSS sub-sector, both in urban and in rural areas, is often obsolete and in need of urgent replacement—putting an additional burden on the efforts to reach higher coverage levels. The low coverage levels in the rural areas are a reflection of the abandonment of the rural areas for drinking WSS service delivery, by the national government. Similarly, the sanitation sub-sector has never received the needed level of priority within the national development agenda.

Low Level of WSS Service Delivery

The coverage figures in WSS do not reveal the actual status of service delivery in terms of quality and sustainability in service provision. Information from both ENACAL and SIASAR, on urban and rural service delivery respectively, indicate low service levels, such that many systems are on the verge of collapsing and becoming obsolete.

Low service levels are expressed by poor water quality and lack of continuity in the service, and result in negative impacts on the environment because of the inadequate treatment of wastewater and faecal sludge.

The sustainability of the services are also at stake because of service provider’s poor management capacities, inadequate (cost intensive) technologies and service delivery models, inadequate planning and costing of the services over time, (temporal) unavailability, and contaminated water sources and lack of maintenance and support mechanisms for service providers, particularly the CAPs.

Lack of continuity in service provision – Continuity in service delivery, particularly in the dry season (February through May) is a serious problem in Managua but also elsewhere in the Pacific and Central region. ENACAL’s main problems affecting their ability to adequately provide services are caused by:

- Limited or no maintenance of the network system or pumping equipment
- High amount of leakages due to obsolete distribution networks

- Frequent power interruptions
- Unorganized network planning for expansion
- The gap between production and increasing demand by the population

Water supply by the CAPs face similar problems. Of particular concern are the high electricity costs, comprising up to 50 percent of the total cost for the provision of the services and therefore frequently prioritized over maintenance costs. Contaminated surface water forces exploitation of groundwater as the main supply source implying high distribution costs due to the energy needed to collect and send the water through the system.

Drinking water quality – The use of ground water has been encouraged as it tends to have lower levels of contamination. Water quality norms establish a simple treatment process with application of chlorine that seems insufficient for the treatment of contaminated water sources (ground water and surface waters) with arsenic and metals such as mercury. Some water sources and wells are highly contaminated with arsenic, and levels of mercury in groundwater exceed the World Health organization (WHO) standards. The present water treatment regulation does not adequately address the presence of arsenic.

Technology for the collection and purification of surface water lacks behind; one of every three purification plants are currently disabled because of high operations and maintenance costs.

This report finds that less information is available on the functionality of the sanitation facilities and its use at the sector level. Anecdotic information suggests sewage systems are not always connected to the houses and sewage collectors, and that households fail to implement hygienic practices when using sanitary facilities, resulting in the discharge of environmentally unsafe wastewater and faecal sludge.

The sector lacks a system to continuously monitor service delivery and information on drinking water quality, the continuity of the services, and the environmental impact of unhygienic sanitary practices. While the SIASAR system does aim to address this monitoring gap for service delivery in rural areas, the system has yet to become institutionalised and continuous.

The above findings are typified by the following experience shared by one of the interviewees.

Most rural drinking water systems were built with foreign aid but with insufficient precaution to ensure the sustainability of the services. For example:

“In 2000, the Japanese government donated 20 wells, of which none are functioning at present. While donors usually monitor the operation and maintenance for one year after delivery of the system, that was not the case here—the Japanese government did not commit to the needed maintenance. The local governments and communities do not have the needed technical capacities for operations and maintenance.”

(Representative of a construction company, Managua)

Low Levels of Wastewater Management Negatively Impact Human and Environmental Health

The first chapter on facts and figures displayed low levels for wastewater treatment in Nicaragua. Insufficient and obsolete infrastructure for wastewater management is a consequence of insufficient investments in building and or maintenance of infrastructure for drainage systems for surface water, treatment processes, transportation, and the safely discharge of wastewater. Insufficient investments

in wastewater infrastructure, the maintenance hereof, and the development of appropriate technologies for wastewater treatment can be explained by the low priority given to wastewater treatment in the agendas of the national government, the municipalities, and the private sector and their associations.

As a result of the low priority given to this issue by the national government, compliance with the national regulatory framework are hardly monitored by municipalities and the private sector.

There are limited technological options for wastewater management and fecal sludge management. The commonly used methods of today concern outdated practices promoted during the 1980s. In rural areas, the traditional oxidation ponds methods were commonly used for wastewater treatment as water treatment plants, particularly those located in urban areas, are often complex to operate and cost intensive in its maintenance.

There is limited information and knowledge available in Nicaragua on alternative technologies and methods for wastewater management and re-use of wastewater and faecal sludge.

Natural Disasters and Climate Change Preparedness

Nicaragua is prone to different kinds of natural hazards, including earthquakes, torrential storms, hurricanes, floods, and droughts. Current infrastructure and water management practices are not resilient to the effects of natural hazards and the consequences of climate change. Government institutions SINAPRED³³ and INETER³⁴ deal predominantly with the direct consequences of natural hazards but have limited capacity for the prevention of major impacts on the water management. The country lacks skills and knowledge on the design of WSS targeted infrastructure and technologies that are resilient to natural hazards and climate change.

Perceptions on the impact of climate change are exemplified by the following statements collected during the interviews.

“The mayor challenge of today concerns facing the environmental changes and reducing its impact on water resources—we can’t change the climate change but how can we reduce our dependency on the water resource (less use and optimize its use).”

(Representative of the industrial branch organisation, Managua)

“We have never had such prolonged drought periods in the country. At the same time, flooding has become more frequent and more intensive during the last decade.”

(Government representative, Managua)

“The last couple of years has seen a reduction in the capacity of hydro-electric plants due to climate change and droughts.”

(Government representative, Managua)

³³ SINAPRED is the Executive Secretariat for the Implementation of the National System for Prevention, Mitigation and Attention to Disasters.

³⁴ INETER (National Institute for Territorial Studies)³⁴ is the agency that assumes responsibility for flood control. INETER’s work is targeted at reducing Nicaragua’s vulnerability to flooding resulting from tropical storms and hurricanes.

“Faeces and contaminated pluvial water affect public health. Sewage systems in the cities of Managua, Granada, and Leon collapse in situations of heavy rainfall, which because of the climate changes, are more intense than in the past.”

(Representative of a construction firm, Managua)

Following, the root causes, or general cross-cutting features underlying the main challenges witnessed in Nicaragua’s WSS sector are expanded on.

Challenges in Governance and the Institutional Framework

Nicaragua’s institutional framework is relatively clear as it spells out the roles and responsibilities of the different sector players. The WSS sector and its sub-sectors also rely on a relatively solid regulatory framework, yet experience disparities at the institutional level where the sector responsibilities are rather fragmented over different ministries—accentuated by the lack of effective coordination mechanisms between the government institutions at national level and between actors at national and decentralised levels. Few water basins have (functioning) Basin Agencies,³⁵ responsible for integrated water management at basin level, in place.

Although the WSS sector relies on a solid regulatory framework, there are still gaps to be addressed. An example concerns the present regulation of water quality and water use that does not consider contamination of water sources by arsenic and heavy metals. The main challenge however is the low priority given by the government to monitor and enforce compliance with the regulatory framework. Lack of monitoring and enforcement is also partly due to the weak capacities in the government institutions to effectively fulfil this responsibility.

Weak Organizational Capacities and Limited Availability of Skilled Human Resources

The implementation capacity of government institutions such as Nuevo FISE and ENAGUAL is low due to their limited planning and procurement capacities. Government institutions are often poorly equipped, lacking the necessary hardware (computers, vehicles) and the adequate software (methods, tools) to fulfil their role in policy formulation and regulation, and in the planning and monitoring of developments in the sector. Also, weak capacities in the local governments (UMASH) inhibit local governments to fulfil their responsibilities in terms of water management and WSS service delivery.

Limited management and technical capacities in the decentralised offices of ENACAL and the CAPs are responsible for poor performance in drinking WSS provision in urban and rural areas respectively.

The ENACAL case provides an example of the limited capacities in Nicaragua’s WSS sector:

The technical capacities of ENACAL’s staff are limited. ENACAL has 42 wastewater treatment plants in the country, employing 4 to 5 different technologies, yet only relying on 5 technicians.

(Representative of the donor community, Managua)

³⁵ The National Water Law of 2007 assigns Basin Agencies with the responsibility of integrated water management at the basin level. The Basin Agencies are accountable to ANA.

The sector in Nicaragua offers limited opportunities for mid-level technical skills training relevant for the WSS sector. Therefore, the availability of technical knowledge and technically skilled staff for the sector is limited, also largely due to the lack of active participation of the private sector. Government institutions and their decentralised office, municipalities and CAPS have limited options for providing incentives for motivating improved staff performance.

Limited priority for Information and Knowledge Management, and Limited Innovation Capacity

Nicaraguan universities are predominantly theoretically oriented, and weaker in applied research and generating new knowledge for the water sector, for example on generating knowledge on technical innovations based on concrete experiences and local challenges. With the exception of some universities that provide some specific courses on water management or that do include some water specific modules in the curriculum of civil engineering or agricultural studies (refer to section 1.2, subtitle *Universities and (Academic) Training Institutions* of this document), the universities do not contribute much to the country's WSS sector.

Some institutions, such as the ANA, have some information on the WSS sector, yet this information is not necessarily systematized, available, and accessible. Limited information is scattered among the various actors in each of the different sub-sectors. There is no one single point of reference—a place to go to for information on the current status of the WSS sector and on existing experiences and knowledge. Next to the limitations concerning the accessibility of the existing information, there are significant information and knowledge gaps in the WSS sector in general, at water basin level and in the various institutions. Examples include the lack of information on the water balance in the different aquifers. For example, basic and in-depth information on the water source in the Corredor Seco aquifer is needed for elaboration of the development plan for this geographical area. As a result, individual institutions and organizations lack the needed systems, tools, and evidence for monitoring and decision-making.

There is a lack of documented experiences on the use of different technologies, approaches, and models in the sector that would allow for greater insights in what works and what does not work, and lesson learning for scaling up successful approaches beyond the pilot and other small scale experiences.

RASNIC has the ambition of playing a central role in information and knowledge management for the WSS sector in Nicaragua, but does not have the capacity yet to fulfil this role. For example, they do not have the necessary frameworks, such as a knowledge management strategy, for the sector. The sector is clearly lacking an enabling environment where the priorities lie on systematically documenting, assessing and developing new knowledge based on evidence and existing experiences. This is evidenced by the low priority of the sector organizations for providing support to RASNIC and its subsequent donor dependency.

The statement below is a good example of the challenges in information and knowledge management found in the water sector in Nicaragua.

“An example is that ENACAL doesn't know (with exception for some cities like in Managua and Matagalpa) how much water it is producing. But the knowledge gap also entails the water demand by the different households and industries.”

(Representative of an academic institution, Managua)

2.4 Existing Plans

The [National Plan for Human Development \(PNDH for its abbreviations in Spanish\)](#)³⁶ sets out the main government policy priorities for the development of the country. PNDH covered the period 2007-12, and has been updated for the period 2012-16. Its overarching goal is to reduce inequality by increasing poverty reduction spending and boosting investment in social sectors and rural infrastructure.

PNDH proposes WSS investments to improve the social infrastructure in the country. The plan's objectives focus on enhancing access to WSS services, improving service delivery, ensuring maintenance of existing systems and infrastructure and efficient water management and the promotion of more social behaviours of the population in the use and access to water sources.

Improved coverage and services levels in drinking WSS will be achieved through i) the rehabilitation of existing networks for WSS that are in poor physical conditions; ii) the implementation of a plan to control and avoid pollution and to promote the co-responsibility in the use of the existing systems and facilities; iii) the boosting of an intensive policy for monitoring water and wastewater quality and the protection of the water source; and, iv) enhancing the number of communities connected to the water supply systems.

In addition, the Plan identifies a number of targets for improved access to WSS in urban and rural areas. However, these targets are little ambitious as they were, according to the data provided by JMP, already achieved in 2012. However, the rural sanitation target of 53 percent coverage by 2016 implies a gap of 16 percent to be covered in the period 2012-16. Part of this gap is proposed to be bridged by the construction of 1,322 ecological toilets and 1,083 latrines.

The socio and economic development of the Caribbean Coast is identified as one of the priority strategies in the PNDH. For this region, the Plan proposes developing the water catchment and storage capacity to better take advantage of the available water resources running through the region (93 percent of all rivers in Nicaragua lead to the Caribbean Ocean).

Furthermore, the PNDH proposes increasing access to safe drinking water in urban and rural areas through the improvement of the water supply systems in the two regional centers in the region. The Plan also emphasizes the importance of reaching the most vulnerable groups in the region and protecting the ecosystem, including the main water sources.

The PNDH also includes a chapter on Water Management, where the main objective is to improve the water catchment capacity in the country, particularly during the raining season, and to distribute the available water resources over the different uses including irrigation according to the national regulatory framework. For this, the Plan proposes the approval of a new national water policy (PNRH for its abbreviation in Spanish); the implementation of a national research program on the availability and demand for the water source by different users; the development of a National Water Catchment Program to be implemented at the water basin level, and; fostering awareness among the population on the importance of conserving water sources.

The [Integrated Sector Program for Human Water and Sanitation \(PISASH\)](#), was launched in 2014. PISASH is the government's strategy for the WSS sector, covering a period of 20 years. The program, designed to benefit the population in 36 cities with improved access to WSS services, is an important instrument for the coordination and negotiation of donor support to the WSS sector in Nicaragua. Phase I of the program (period 2014-19) will mainly be implemented by ENACAL and will address improved WSS services in 22 municipalities, and support rural water systems managed by the CAPS,

³⁶ Plan Nacional de Desarrollo Humano, PNDH

mainly in monitoring water quality. ENAGUAL and Nuevo FISE are both in the process of elaborating and implementing PISASH for WSS service delivery in urban and rural areas respectively.

The Plan for Integrated Water Resources Management (PGIRH) is an important instrument established under the National Water Law. It provides the framework and promotes the development and implementation of integrated water resources plans at water basin level. The first plan developed is the Integrated Water Resources Management Plan for the Sub-basin of Mayales. The Mayales Plan addresses the supply side as well as the demand for the water resources (water balance), the provision of water services, and the conservation and protection of the water sources. The Plan is seen as an important ‘model’ for integrated water resource management to be taken into account when developing the integrated plans for other (sub) water basins.

Further to the PGIRH, the government of Nicaragua is also engaged in:

- The elaboration of a national irrigation plan that aims to enhance the efficient use of water in irrigation and at the same improve the access to irrigation systems by small farmers.
- The development of a national water catchment plan for water catchment- providing opportunities for technological innovations. Through the MAG, the government is preparing a specific plan to address water catchment in the Corridor Seco area.

A new initiative is a large program to address the water management challenges in the Corredor Seco region. The government has requested World Bank support in this region, entailing 65 municipalities. The World Bank is planning to conduct a workshop in March, 2016, with among a few others participation of the Inter-American Development Bank (IDB) and the Suisse Development Cooperation (SDC) and would appreciate the Dutch government’s participation as well.

2.5 Financing

The table below provides a rough overview on the financial resources available for the water sector for the coming years. Note that the values presented are estimates and do not intend to provide neither complete nor precise information. The amounts allocated to the water sector, both by national governments and donors, reflects the acknowledgement that much remains to be done, both in terms of adequate infrastructure as well as in terms of governance and management of the different aspects related to the WSS sector. As mentioned, PISASH is the main instrument for coordinating donor funding to the water sector. The total allocated budget for implementation of PISASH reaches near USD 500 million for the period up to 2019.

Main Programs	Total Budget	Break-down of Main Sources of Funding	
PISASH (urban)	Around USD 500	BCIE, IDB, EU, KfW and the Spanish Agency for Development Cooperation (AECID for its acronym in Spanish)	USD 400 million
		Government of Korea (under negotiation)	USD 150 million
		GIZ (mainly institutional support)	USD 6 million
PROSAR rural WSS	USD 32 million	World Bank	Including USD 2 million for new and appropriate technologies
Adaption of rural WSS projects to climate change	USD 6 million)	World Bank (or GEF)	
National fund to improve Nicaragua’s water catchment	USD 12 million	National government	

capacity; for the construction of water reservoirs			
Irrigation programs	USD 100 million earmarked in loans	Private banks	
	€ 100 million	Expected to be captured by Spain through the European Union (EU)	Spain has € 4 million to leverage EU funding
Municipalities allocate 7.5% of their budget to WSS and 5% of their annual budget to the conservation of the natural environment			

The Inter-America Development Bank (IDB), The Spanish Cooperation (AECID) and the Central America Bank for Economic Integration (BCIE) together allocated around USD 400 million to ENACAL (period 2014-19) to i) improve access to WSS services in 22 municipalities, and ii) support rural water systems, managed by the CAPS, monitor water quality. An additional USD 150 million from the government of Korea to be invested in one particular geographical area, is currently under negotiation.

GIZ supports the WSS sector. This support is almost exclusively focused at institutional strengthening of ENACAL through technical assistant for WSS service delivery in urban areas. Funding allocated to this support for the period 2016-2018 is USD 6 million, what is mainly meant to give continuity to the activities undertaken in the first phase of the programme (USD11 million).

The World Bank made USD 32 million available to Nuevo FISE for implementation of PISASH in the rural areas trough the Sustainable Rural Water Supply programme (2014- 2019). The WB supported PROSAR programme includes USD 2million for support to the development of new and appropriate technologies.

Additional to funding for implementation of the PISASH programme resources are available for environmental programmes and programmes addressing climate change. An example is the programme for adaption of rural water and sanitation projects to climate change, implemented through MARENA and Nuevo FISE with funding (USD 6 million) from the Global Environment Fund.

Municipalities allocate according to national regulation 7.5 percent of their budget to WSS services and 5 percent of their annual budget to the conservation of the natural environment.

The government has a national fund with USD 12 million to improve the country's water catchment capacity - for the construction of water reservoirs. Their vision is to build small reservoirs, the private sector however prefers larger loans.

The government has also mentioned a large irrigation program. UPANIC is developing an irrigation program with the support of technical expertise from the United States, to cover part of the Corredor Seco region and some of the Pacific region. The study currently being implemented includes water catchment, reforestation, and technologies for more effective water use and irrigation. AECID has 4 milllion Euros to capture a USD 100 million program from the European Union.

The private banks have earmarked US\$ 100 million for irrigation, however the loans are for short term and against relatively high interest rates.

The commercial banks opened "green budget lines" for loans for development and investment in environmentally friendly technologies and conservation of the environment.

The Luxembourg cooperation is interested to fund a new program (2016-20) on tourism and environmental conservation. They have already funded a program with micro- entrepreneurs located in the Ruta de Café, including rain water harvesting, ecological latrines and bio-digesters.

3. Scope for Dutch Enterprises and Institutions

3.1 Demand

During the interviews, sector players identified a set of needs to be addressed in response to the challenges described in chapter 1.3. The expressed demand³⁷ for potential Dutch expertise and products is organized in the tables below and categorized around the following main areas of interest:

- (Integrated) Water Resources Management
- Water Use Optimisation
- Improved Water and Sanitation services
- Wastewater Management
- Preparedness for Natural Hazards and Climate Change

(Integrated) Water Resources Management

Competency Areas	Specifics
Technical assistance (knowledge and skills)	<ul style="list-style-type: none"> • Development of a common and long-term vision on water resources management with the different stakeholders; taking an integrated approach towards land-use and the natural environment including the conservation and use of water resources at water basin level. • Advice to Water Basin Agencies and municipalities to elaborate and implement integrated water resources management plans (<i>Planes Integrales del Recurso Hídrico-PIGRH</i>). • Development of an operational strategy to address WSS services in conditions of climatological change.
Development of planning, monitoring and evaluation, and information management systems and tools.	<ul style="list-style-type: none"> • Support the development of the strategic framework for the program in the Corredor Seco region. The program will require a differentiated framework for i) poor rural areas, and ii) areas with more capacities and options for PPP's. The framework will also imply three different pillars: i) Climate risk management (vulnerability , monitoring , knowledge, GIS), ii) the Agro Sector(food Security and Safety; irrigation systems (collective and individually); water harvesting; iii) the Water sector including Water and Sanitation Services . • A sector information system would be a basic instrument to enable evidence-based decision-making, being essential for improved governance in the sector. It is expected that more transparency in the sector entailing a clear baseline on the water source, the water balance and water service delivery, providing insights in the investments made and the results achieved will support the reduction of political interference in the sector. • Support the elaboration and implementation of an integrated water resources program for the Corredor Seco region—including the implementation of studies, introduction of new technologies, incorporation of environmental education, and involvement of municipalities and local communities.

³⁷ The demand as expressed by the interviewees captured in the tables is not necessarily directed to the potential supply from the Dutch sector.

	<ul style="list-style-type: none"> • Support ANA and the Basin Agencies with the elaboration of land use plans (implying the need for a cadastre). • Establish a solid baseline on the water balance and water demand at national and at watershed level for planning and monitoring purposes, keeping track on water use (by large users) and conflicts among water uses. • Monitor ground water quality, mitigation mechanism for rural communities, and climate change. • Improve information sharing and knowledge management on available experiences and innovation in infrastructure and practices for water catchment. • There is also a need to make investments in information systems on the availability and quality of the water resources in Nicaragua.
Research	<ul style="list-style-type: none"> • Research is needed to identify and study the availability of all water sources in the country; i.e generation of information on what the actual hydrological capacity is at the basin level. • Provide the government of Nicaragua with a solid diagnoses on water resources in the Corredor Seco region, for improved financial decision-making on the loan to be taken for the Corredor Seco sector program with the World Bank. The generation of information and a better understanding of the physical, natural, and economic conditions of water resources, together with the establishment of the institutional and legal conditions for good water management are vital to promote the country's development.
Capacity and skills development	<ul style="list-style-type: none"> • Support in establishing a technology (smart) center for development and training on environmental friendly technologies. • Support ANA in developing the needed instruments that can guide them in decision-making on incoming requests for water licenses (land-use plans). • Capacity development for integrated water resources management at central government, municipal and local level. • Enhance capacity to enforce national legislation regarding the use of water and wastewater treatment. • Strengthen capacities in the national government, local governments and civil society in monitoring and holding (illegal) industries accountable for compliance with national legislation.
Technologies and products/Technical advice	<ul style="list-style-type: none"> • Development of appropriate technologies and practices for water catchment (mini-dams etc) to enhance the country's capacity to retain water. • Technologies and technical advice for water catchment, wells and small reservoirs, transport and distribution channels, water treatment plants and waterways.
Awareness raising and advocacy	<ul style="list-style-type: none"> • Promotion of a more conducive culture and practices in the population on integrated water resource management.

	<ul style="list-style-type: none"> • Support in responsible water management through an intensive debate involving government institutions, civil society organizations and the private sector.
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Water Use Optimization

Competency Areas	Specifics
Technical assistance (knowledge and skills) Development of planning, monitoring and evaluation, and information management systems and tools	<ul style="list-style-type: none"> • Improve the national capacity to monitor water use by the different user groups in the different geographical areas
Research	<ul style="list-style-type: none"> • Conduct small studies on the water print (actual water use) of the different agricultural crops and (agro) industries and the demand for water for enhanced productivity in agriculture. • Overcome the technological challenges by fostering innovation and the sharing of information on more efficient technologies in the production process (requiring lower levels of energy and water consumption) as well as in accessing water particularly for small and medium-size producers. • Foster innovation and good practices by collaborating with universities and the private sector through their branch organizations. • There are thousands of small producers and a strong need to work with them, possibly through their branch organisations, on optimum use of water in the value chain of the total production process. • Support the generation of data and information to support the government’s lobbying and communications activities, and efforts to monitor water consumption and the costs of contamination– it must be ensured these items remain on the national agenda.
Technologies ³⁸ and technical advice	<ul style="list-style-type: none"> • Introduce simple systems for water harvesting • Introduce (simple) technologies for efficient water use in micro-irrigation systems, particularly for small and medium size farmers • Introduce and scale-up rain harvesting methods and other methods for water harvesting; also for small scale irrigation • Introduce low cost technologies for irrigation and conservation; particularly for the northern region of the country • Introduce simple and low cost technologies for well-drilling, targeting industries

³⁸ The main demand is for small scale, simple to operate and low maintenance- costs technologies appropriate for the specific context in Nicaragua.

	<ul style="list-style-type: none"> • Examples of need for technical assistance and water efficient technologies include: Water consumption for cattle (fattening). They bring water to the stables, use pressure vessels, and bore wells Cattle- meat industry- water use is inefficient
Awareness raising and advocacy	<ul style="list-style-type: none"> • Lobby on improving productivity with a smaller water footprint • Create a more encouraging environment, including incentives for actors in the private sector (industries and farmers) as well as drinking water service providers to economize the use of water • Foster dialogue between the public and private sector on a more responsible use of the water source • Ensure the monitoring of water consumption and the costs of contamination remain on the national agenda

Improved Water and Sanitation Services

Competency Areas	Specifics
Technical assistance (knowledge and skills)	<ul style="list-style-type: none"> • Improve regulations, for example, address the fact that the present water treatment regulation does not adequately address the presence of arsenic. • Develop a financing strategy that establishes how WSS service delivery will be financed, taking into account all costs categories for ensuring a sustainable service and the relative contribution of public funding, external transfers and tariffs in covering the total costs. • Strengthen the institutional capacity of ENACAL—improving its financial and institutional sustainability • Support ENACAL with the implementation of a Master Plan for Managua city and other cities—particularly concerning the reduction of unaccounted water (physical losses of water) and improved efficiency in reducing energy costs. • Support the commercialization of water.
Development of planning, monitoring and evaluation, and information management systems and tools	<ul style="list-style-type: none"> • Address the need for monitoring information on service levels; generating and managing of information on alternative technologies e.g. technologies that are not reliant on the unreliable and very costly electric energy, and the innovation in marketable technologies and artefacts for sanitation. • Develop financial schemes for the sustainability of the CAPs.
Research	<ul style="list-style-type: none"> • Invest in the development of new and innovative methods, and scale these up, so they can successfully reach the rural dispersed populations and those living in difficult accessible areas such as in the autonomous areas in the RAAN and RAAS at the Caribbean coast and also those living in pockets of poverty in urban areas. • Conduct the needed studies to develop a knowledge chain. What are the capacities of the different methods and technologies for water treatment?

	<p>What investments are needed and what are the costs for operations and maintenance of each technology? We need more knowledge to inform selection of the most adequate technologies and methods according to the specific conditions in each place.</p>
<p>Capacity and Skills Development</p>	<ul style="list-style-type: none"> • Strengthen FISE’s institutional capacity, particularly in developing partnerships with NGO’s and the private sector in reaching increased access to improved service levels in rural areas. • Develop knowledge among sector professionals and sub- contractors, particularly on the inclusion of sustainability criteria in the design and implementation of new systems for drinking WSS; ii) enhance technical skills for installation, operation, and maintenance of drinking WSS facilities. • Foster the professionalization of service provision both in urban areas (by ENACAL) and by strengthening the capacities of community based service providers. • Strengthen the capacities of municipal governments in monitoring and providing technical assistance to community-based service providers. • Strength INATEC’s capacity by developing similar schemes as Colombia’s Human Resources Development by including WSS service delivery and water resources management in INATEC’s curriculum (including operators of water treatment and wastewater plants, and the knowledge and skills in human resources needed by the private sector and in national and local government institutions). • Support INATEC train and certify local technical staff and local artisans such as plumbers etc. • Capacity development of municipal and community-based service providers. • Improve the capacity for knowledge management and innovation in the sector’s main organizations. • Support ENACAL ensure the needed equipment, staff and a GIS system to detect and manage the high levels of unaccounted water.
<p>Technologies and products</p>	<ul style="list-style-type: none"> • Introduce new and appropriate technologies and service delivery models to reach the rural dispersed population and the poor in urban, mostly peri-urban, areas. • Introduce more sophisticated knowledge and technologies for well drilling in rural areas. • Introduce appropriate technologies for drinking water treatment— improving the household filters to treat arsenic contaminated water. • Introduce alternative service technologies and models for drinking water supply. Fifty percent of the total production costs for drinking water supply by the CAPS are designated to cover the high-energy costs for pumping groundwater and the respective distribution of the water through the networks.

	<ul style="list-style-type: none"> • Strengthen the supply chain including small hardware stores, certification of small entrepreneurs, for example local artisans. • Technologies and instrument for ensuring and control of water quality particularly in the rural areas where superficial water is used. • Support in setting-up a supply chain.
Awareness raising and advocacy	<ul style="list-style-type: none"> • Implement campaigns to promote the adequate use of drinking WSS facilities, including environmental awareness. • Promote behavioural changes in sanitation and hygiene practices. • Implement campaigns and educational programs to raise awareness and promote a paradigm shift in the present culture and public behaviours regarding sanitary safe and hygienic practices (for instance in dumping solid waste in latrines, rivers, etc.).

Wastewater Management

Competency Areas	Specifics
Development of planning, monitoring and evaluation, and information management systems and tools	<ul style="list-style-type: none"> • A national system that allows for information sharing on alternative technologies and exchange of experiences with alternative methods of wastewater management. • Development of early warning systems for particular toxics in the water source.
Research	<ul style="list-style-type: none"> • Applied research on alternative and scalable options for waste water management. • Conduct studies to develop a knowledge chain. What are the capacities of the different methods and technologies for wastewater treatment? What are the investments needed and the costs for operations and maintenance of each technology? This information will allow for informed decision-making on the selection of adequate solutions for wastewater treatment. • Investigate into methods and technologies for more efficient wastewater management and re-use of faecal sludge; impact of contamination on the biodiversity in Nicaragua.
Capacity and skills development	<ul style="list-style-type: none"> • Support the collaboration with government institutions and industries in the re-use of the faecal sludge. In Managua this would represent a good example for wastewater management and the re-use of faecal sludge management in the other municipalities (and even in the CA region)- with the private sector taking on a catalyser role.
Technologies and products	<ul style="list-style-type: none"> • More technological options and alternatives to the technologies from the 1980's. • Introduce environmentally safe wastewater treatment technologies allowing for the re-use of wastewater and faecal sludge.

	<ul style="list-style-type: none"> • Biological treatment of waste water particularly for the highly contaminated (use of chemicals) waste water of large (banana) plantations, biodigesters etc. • Need for “green technologies”. • Need for advanced technologies but simple to operate and low cost in maintenance. • Waste water treatment in urban and rural areas.
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Preparedness for Natural Hazards and Climate Change

Competency Areas	Specifics
Technical assistance (knowledge and skills)	<ul style="list-style-type: none"> • Risk management (main objective is to reduce the impact of natural hazards, including due to the climate change, on the natural environment, the economy and society). • Risks mitigation.
Development of planning, monitoring and evaluation, and information management systems and tools	<ul style="list-style-type: none"> • Early alert systems for decision taking on enhanced preparedness, prevention, mitigation and or mobilisation.
Research	-
Capacity and skills development	<ul style="list-style-type: none"> • Capacity development for improved disaster preparedness, including an early warning system.
Technologies and products	<ul style="list-style-type: none"> • New technologies adaptive to the effects of climate change.
Awareness raising and advocacy	<ul style="list-style-type: none"> • Awareness of civil society, private sector and policy makers on climate change preparedness.

3.2 Opportunities

A number of opportunities have been identified that will provide the enabling factors needed to address the challenges and respond to the demand in the Water sector in Nicaragua.

National development priorities and funding

- Nicaragua is a country where there is a lot to be done, starting with the existing infrastructure which needs to be enhanced at least by three or four times its size. The national government has prioritized the infrastructure and transport sector.
- There are resources available for ENACAL and Nuevo FISE for the extension of WSS infrastructure, targeting those areas where they are not existent yet. The funding available (USD 470 million) from AECI, BCEI, IDB and World Bank are not restricted to suppliers from determined countries only.
- Nuevo FISE has included social, environmental and institutional criteria in their programs, providing more opportunities for the introduction of new technologies and alternative methods and models.
- The governments’ agricultural policy prioritizes support to enhancing the productivity of small farmers.

Adjustments in the policy and regulatory framework

- The national law on wastewater management is presently under revision; it is expected that the revised law will be stricter in nature.
- A new law on PPPs is currently in elaboration, and is expected to be adopted by the government of Nicaragua in the first months of 2016. The government of Nicaragua is aware that they alone cannot solve the issue of the enormous backlog in infrastructure. It is expected that enhanced public investments will also enhance private sector investments. As a result, a new and very ambitious transport plan for the country has been developed with support from the Japanese government. However, Nicaragua doesn't have the financial and operational capacity to implement this plan. The proposal is to implement the plan through PPP constructions—hence the new law in development, which is expected to come in force in the beginning of 2016. There are few, if any, similar experiences to this in the Nicaraguan WSS sector. However, there is recognition of the value of partnerships for achieving the water sectors' objectives and development of PPP's in the water sector can draw on the experiences in the broader infrastructure sector.
- New policy for integrated water resources management provides opportunities for:
 - Promotion of an adequate cultures
 - Strengthening community-based capacities in response to disasters
 - Strengthening an early alert system and institutional responsiveness
 - Mitigation and recuperation
 - Planning and development of investments that take along criteria for integrated disaster reduction and management
 - Knowledge management

Existing experiences provide for interesting learning opportunities:

- A limited number of positive experiences with integrated resources management at micro-water basin level. An example is the elaboration and implementation of an integrated water resources management plan at micro-water basin level by the municipality of Condega. The plan is supported by a solid study and evidence about the availability and quality of the water source—with identification of concrete projects in the framework of integrated resources management.
- Some positive examples of experiences with re-use of wastewater include the use of wastewater for the improvement of soil, positively contributing to the productivity of crops, and experiences with oxidation ponds and re-use of sludge for production of biogases (life-stock farmers). Large sugar cane factories use crops waste on the land for the generation of biogas; the challenge is to ensure energy production during the lame periods (when there is no harvest).
- The private sector is slightly more advanced in wastewater treatment process and in the re-use of wastewater and faecal sludge.
- The wastewater treatment plant in Managua is the only treatment plant in Central America and is considered a positive example and source of inspiration for national and regional municipalities addressing wastewater management. The municipality of Managua is now negotiating to address the re-use of sludge for agricultural purposes with involvement of the private sector.

New government plans

- A major opportunity at the moment is a proposal for formulation of a new programme for addressing the challenges in the water sector in the Corredor Seco region, for which the government of Nicaragua has requested World Bank support. The program is expected to entail 65 municipalities and the total budget is currently estimated at USD 300 million. The

program is currently in its design phase; more details on the content and scope of the initiative will be available around mid 2016. The World Bank is planning to conduct a workshop in April 2016, with participation of IDB, SDC and others and have expressed they would like to see the Dutch government participate as well.

New multi-stakeholder initiatives

- AVINA, UNIRSE, and the FUNDAMIC Alliance advocate and lobby for the reduction of the industry water footprint—such as the agro industries, breweries, and bottler industries.
- The country has some experiences in PPPs, for example with joint ventures for the coffee production.
- Many (Spanish) NGO's in Nicaragua are a member of the regional Water Alliance “PROAGUA” that strives for water and sanitation services and capacity strengthening applying a sector (system) approach and a human right perspective

Private sector-branch organisations

- Some corporate businesses have incorporated interesting social responsibility projects, for example the construction company Aquatec that collaborates in the cleaning up of the lagoons of Tiscapa and Xiloa.
- Awareness programs in water catchment, irrigation, and water efficiency provide for good perspectives for PPPs, as it will enhance the productivity, sales, exports and thereby the country's GDP.
- Opportunities for business-to-business cooperation by addressing the supply chain; 100,000 small farmers/producers are in need of enhancing their efficiency and productivity.
- Some nationally based enterprises (including Llansa Ingenieros S.A) have experience with Dutch funding through the ORIO programme.

Growing interest for sustainable land use and agriculture

- Many enterprises are already a member of the Rain Forest Alliance—an international non-profit organization that works to conserve biodiversity and ensure sustainable livelihoods that certifies environmental friendly production.
- Nicaragua is about to join the Global 20x20 initiative that aims to bring 20 million hectares of degraded land in Latin America and the Caribbean into restoration by 2020. By joining this regional initiative, Nicaragua will commit itself to reforestation that will have a positive impact on the natural capacity for water recharge. By joining this initiative, Nicaragua is expected to increase its accessibility to financial resources.

Secondary effects of the development of the Nicaragua canal

- While the direct business opportunities emerging from the development of the Nicaragua Inter-Oceanic canal are beyond the scope of this report, it is clear that there will be secondary effects impacting the challenges but also the opportunities in the WSS sector in Nicaragua at large. The Hong Kong based HKND group that has the area for development of the Nicaragua canal in concession, has already started procurement for the construction of the first wharf on the Pacific coast. Social housing projects will need to be developed to offer housing to the labour force. Green, sustainable, and accessible housing could potentially be developed under a PPP construction. Through demonstrative housing projects the interest for the development of green (sustainable) infrastructure can be generated.

Initiatives and events being developed by branch organizations:

- The industrial branch organization is planning to set-up an ‘industry observatory’ where the monitoring on the availability and use of the water resources could be an important component.

- Every year, UPANIC organizes, in collaboration with some private banks, a congress and fair on Agriculture. The next event is to take place in May 2016—more than 3,000 producers from the Latin American and Caribbean region are expected. The central theme of discussion in the upcoming event will be on their preparedness for climate change. Those are interesting platforms for Dutch companies to participate to exhibit and share their products, technologies and expertise.
- An event on Energy and Climate Change will be organized by the Industry branch organization in March 2016; there is the possibility for Dutch experts to present on the themes of drilling, pumping and irrigation, among others.

3.3 Potential Clients and Competition

This chapter identifies the potential clients for Dutch expertise and products. It also gives some first indications of the possible competition from companies and institutions from other countries. The information in the below tables gives a first indication, a market study for the different sub-sectors would be needed to obtain a more thorough understanding of the potential market including the envisioned competitors for specific Dutch expertise or products.

Potential clients

Potential clients	Examples of Type of Demand
Government institutions	
Nuevo FISE, ENACAL	<ul style="list-style-type: none"> • Introduction to simple technologies for (small scale) water treatment • Support to the introduction of alternative technologies and service delivery models in rural dispersed areas and peri-urban areas • Introduction of alternative technologies for wastewater and faecal sludge management • Technical assistance in professionalization of service provision (addressing no-revenue water, costing, client management etc.) • Methods, tools and capacity development for use of (improved) information and knowledge management, including monitoring
MARENA, MAG, ANA	<ul style="list-style-type: none"> • Technical assistance and studies for the development of land-use plans • Technical assistance and introduction to technologies and approaches for water catchment and storage • Technical assistance and introduction to irrigation systems for small and medium size farmers • Technical assistance and information on technologies for water treatment and quality testing • Methods, tools, and capacities for information management
SINAPRED and INETER	<ul style="list-style-type: none"> • Technical assistance on appropriate technologies resilient to natural disasters and climate change • Information technologies and software for information management and early warning systems
Municipalities³⁹ and Basin Agencies	<ul style="list-style-type: none"> • Technical assistance for development of integrated water resources management and land-use plans

³⁹ Generally speaking the municipalities have limited resources but some of them have the capacity for leveraging additional resources through their association with other municipalities.

	<ul style="list-style-type: none"> • Technical assistance and appropriate technologies for water catchment and storage • Support in ensuring the supply chain and availability of inputs such as chlorine, spare parts, technical assistance, etc. for the CAPS • Technical assistance and alternative small scale, simple and low cost technologies/solutions for sanitation services and wastewater treatment and re-use • Methods, tools and capacities for information management (monitoring service delivery and water balance)
NGO's	<ul style="list-style-type: none"> • Simple technologies for drinking water treatment • Alternative solutions for sanitary practices and small scale, low maintenance wastewater treatment and re-use
Private sector	
Branch organizations: CNC, CANATUR and UPANIC	<ul style="list-style-type: none"> • Technical assistance and introduction of technologies for water efficiency and wastewater treatment
Farmers (crops and life-stock), agro-industries, construction firms (urban developers), consultancy firms, industries, hotels, tax free zones ⁴⁰	<ul style="list-style-type: none"> • Technical assistance and technologies for irrigation, targeting large scale and small farmers • Technical assistance and technologies for more efficient water use in the production process, for instance in the meat industry • Technical assistance and technologies for drilling and water catchment • Technical assistance and technologies for waste water treatment and re-use • Technical assistance and technologies for climate change preparedness. • Introduction of green technologies (low on water and energy use), including pumps, etc • Equipment, artefacts, spare parts for maintenance of above mentioned equipment
Construction firms	<ul style="list-style-type: none"> • Construction material (pipes, valves, mediators) • Energy efficient pumps, etc • Equipment for surveying, measuring, etc • (Small scale) wastewater treatment technologies • Green technologies • Appropriate technologies and artefacts for drainage and water catchment
Development Banks: BCEI, IDB, WB	<ul style="list-style-type: none"> • Technical assistance and studies, e.g for the development of the Corredor Norte region programme
Universities : CIRA/UNAN, CPML UPN and INATEC	<ul style="list-style-type: none"> • Curricula development • Exchange programs

The technologies for wastewater treatment most frequently employed by municipalities and small farmers include :

- InnHoff tank with a bio filter

⁴⁰ While the main demand is for small scale, easy to operate and low maintenance costs technologies there is also a demand for more high -tech technologies by a limited number of large companies. Large companies such as the meat industry and sugarcane and other large (agro-) industries are interested and have the resources for use of high- tech (Dutch) technology. They are actually already using and buying such technologies, but no yet from the Dutch. The Dutch will therefore need to make their products and knowhow more visible to those large companies in Nicaragua.

- Stabilisation ponds
- Anaerobic filters

The technologies are usually locally designed and the material is also locally available. However, more sophisticated components, such as the degeneration and extraction bars, are currently being imported from countries in the European Union.

There is a gap in the water sector for appropriate technologies, adaptable to the local context, that are not dependent on spare parts from abroad and are not dependent on electricity and on highly qualified staff for its operations. Examples are:

- There are only two glorification systems available in Nicaragua for drinking water treatment. There is a need for equipment to produce chlorine locally, for instance equipment for chlorine production based on solar energy.
- There is a need, but no local supply, of:
 - Small mobile dredging pumps
 - Small-decentralized systems for water treatment and re-use of wastewater (design and technology) related to themes such as reforestation, food security and renewable energy.
 - Demonstration projects for introduction of the new technologies for irrigation and wastewater treatment together with a replication or scaling-up strategy.

Examples of national companies

Aquatec (a construction firm operating at the Central American level) purchase pumps, engine blowers, for drinking water treatment from the Netherlands; Aquatec buys directly from the company. The delivery time from Europe is very long (the prices are competitive but transport makes it more costly).

Aquatec and **MacGregor** drill wells, but have shortcoming in conducting studies. Although they have a big pool of individual consultants, they are in absence of a certification process, resulting in varying levels in delivered quality. Additionally, they often lack the adequate tools and instruments, e.g. equipment for surveying and measuring among others.

Llansa Ingenieros S.A. is one of the largest construction firms in Nicaragua and is engaged in implementation of the PISASH program in two municipalities. Some building material and artefacts are bought through national or regionally based warehouses, in other occasions material purchases are made through the internet, e.g. from a large French firm. In Llansa, the management is insufficiently aware of the supply available in the Netherlands.

Potential Competition

The below tables summarises in the middle column the existing organisations and companies already providing technical assistance, technologies and other services in the specific demand areas (column 1).

Technical Assistance on Water Governance and Management		
Specific areas	Companies	Specifics
Technical assistance to ENACAL	GIZ	Has a strong reputation in the country-with particular good entrance to the national government and policy makers.

Elaboration of a number of plans for water resources management at water catchment level	GIZ and SDC	GIZ brings (predominantly German) consultants and companies that bring their own equipment, such as meters, etc.
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Technical Assistance and Irrigation Technology		
Specific areas	Companies	Specifics
Irrigation systems	Israel	Technologies for drinking water treatment. These are advanced technologies that arrived assembled and are offered in catalogue.
	Other Latin American countries (including Venezuela) and the United States	Large industries are not tied to nationally available technologies as they search on the internet for purchase of technologies.
	Verots, a Spanish firm	Verots wants to donate two irrigation systems; UPANIC proposes the systems to be donated to the cooperatives of farmers for the irrigation of two parcels, one with corn and one with beans (both crops haven't increased their productivity over the last 50 years) and to be used as demonstration projects for small and medium size farmers.

Information Technology		
Specific areas	Companies	Specifics
Development of models for the monitoring and evaluating of water source quality.	Government of Taiwan	Works with CIRA/UNAN on the use of high-tech (satellites) for modelling monitoring and evaluation of water quality

Drinking Water Supply		
Specific areas	Companies	Specifics
Drilling of wells	National companies	But the equipment and experts are imported. International companies seek national counterparts for participation in international procurement processes.
Equipment for the monitoring to ensure the proper functioning of water wells	Aquatec is associated with a Canadian enterprise for the sale of artefacts and equipment	
Infrastructure- construction of water treatment plants, distribution networks, sewage systems, etc.	International (construction) companies- China, Spain, Colombia, Brazil and Argentina	They make national alliances to meet the procurement criteria (legal, administrative and economical)
Construction material (tubes, etc.)	Are acquired by national construction firms through the internet such as from a large French firm (Jobain), through its distribution center in Costa Rica	

Supply of spare parts for drinking water systems such as valves, micro mediators and filters.	Are bought from USA/Italian and Colombian suppliers	
	Israel Municipalities buy their material such as pipes and valves from the following providers: AMANCO. Their factories are based in Costa Rica and Guatemala Durman Esquivel. The factory is based in Mexico CAPSA. They offer the best price and are nationally accredited but their products are usually of inferior quality compared to the other providers	
Water treatment plants	USA technology (including pumps, valves, meters) Israel (drinking water treatment plants including mechanical and electronic plants	
Water pumps	USA and Japan	
Equipment for chlorination and water pumps	Casa de Mongrevo	Supplies the equipment for chlorination and water pumps installations with Grunsven technology.

Sanitation Services		
Specific areas	Companies	Specifics
Hardware – biodigesters and artefacts	La Casa del Tanque —supply of bio digesters and artefacts. The factory is located in Costa Rica. Rotaplas —Mexico Plastitanque —a national enterprise.	La casa de Tanque has accessible prices. Out of the three options, Rotaplas is almost three times more expensive in comparison to the other two providers.
	Incesa Standard —This is a national enterprise and provides toilet pots, sinks, taps and other related artefacts.	

Capacity development		
Specific areas	Companies	Specifics
HR development and (academic) courses	Availability of on- line courses on water resources management particularly by universities in Brazil	Participation is supported by ANA and co-financed by AECI

There is a strong presence of large Spanish construction firms. Spanish construction firms won the tenders in the PISASH programme in 5 or 6 municipalities. Two tenders were won by LLansa

Ingenieros, a national firm, and the others were won by construction firms from other Central American countries.

Competition for national construction firms include, besides Spanish firms, construction firms from China, the United States, Russia Federation and other Latin America countries.

3.4 Potential niche role and added value of Dutch expertise and products

Further to the in chapter 2.1 identified strategic areas for Dutch involvement in the water sector in Nicaragua and the subsequent identification of the opportunities, potential clients, and competition, the following areas are identified as the potential niche areas⁴¹ where Dutch business can potentially add most value.

The niche areas will be formulated around a number of key focus areas that will include:

- Technical assistance on IWRM
- Technologies and knowledge on small- scale , easy to operate low cost (appropriate but advanced) technologies with artefacts, spare parts and other construction necessities
- Technical assistance and technologies for optimum use of water
- Technical assistance and technologies on Water and Sanitation service delivery
- Technologies and technical assistance on Waste Water Management
- Technical assistance on Floods management, disaster management and climate change
- Capacity development and knowledge management

The most direct and concrete opportunity is the development of the Dutch in the development and implementation of the Water Plan for the Corredor Seco that is still in its initial stages (pre- project) and will encompasses all sub-sectors and have opportunities in each of the above mentioned focus areas for Dutch involvement.

(Integrated) Water Resources Management	
Specific areas	Clients
Technical assistance and support in implementation of base lines studies on water availability, water use and water balance as well as the socio- institutional context at Water Basin level	With developments banks , the research centers (CIRA), ANA and the Basin authorities.
Technical assistance (advisory) on institutional strengthening for IWRM particularly in formulation of IWRM plans at (micro-) Basin level	With the National Authority for Water (ANA)and the Basin Agencies (preferably at micro- basin level) , (associations) of municipalities and with NGO's
Technical assistance in process management/ facilitation of implementation of IWRM plans	With Water Basin Authorities, associations of municipalities and NGO's
Concrete requests/ project ideas for follow-up	In the Corredor Seco (with national government and WB/IDB). The World Bank is planning to conduct a workshop in March 2016, with participation of IDB, SDC

⁴¹ Niche areas to be understood as those areas in which there is a potential match between the demand in the sector in Nicaragua, the existing opportunities, and where actors from the Dutch sector have a potential comparative advantage in relation to the existing “suppliers” (including national and international actors). The tables match the existing supply at the Dutch side (the Colum on the left) with the potential clients in Nicaragua (right column).

	<p>and others and have expressed they would like to see the Dutch government participate as well. Scope for Dutch expertise and services are mainly in the areas of:</p> <ul style="list-style-type: none"> - Proposal development - Research- establishing a base-line - Strategy and Plan development for the different sub -sectors in the Corridor Seco area - Institutional strengthening of ANA and the Basin Agencies, including relevant municipalities - With ANA, development of instruments for IWRM
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Small- scale , easy to operate low cost (appropriate but advanced) technologies with artefacts, spare parts and other construction necessities	
Specific areas	Clients
<p>Introduction of appropriate technologies, alternatives to the conventional methods and technologies for :</p> <ul style="list-style-type: none"> - Community based or household drinking water treatment - Drinking water provision (using groundwater or surface water)- e.g. Energy saving electric pumps or use of renewable energy (e.g solar energy), equipment for local production of chorine - Waste water treatment and re-use - Technologies for water-catchment and storage - Equipment for small scale dragging (rivers, oxidation ponds) 	<ul style="list-style-type: none"> - Municipalities and their associations, cooperation's of farmers or other small producers - NGO's - With the Universities and academic centers for further innovation - MAG and MARENA Ministry of Agriculture and Ministry for Environment
<p>Making the supply of construction material, artefacts, spare-parts and other inputs necessary for construction, maintenance and operations of the alternative technologies, locally available</p>	<p>Municipalities and local construction firms (particularly for implementation of the PISASH programme) NGO's</p>
<p>Concrete requests/ project ideas for follow-up</p>	<p>Setting-up a smart technology center with RASNIC and Water for People for introduction and training of new technologies</p>
	<p>Participation in the UPANIC fair for exposition of Dutch technologies and products (see in the table below for more information on the UPANIC fair)</p>

Expertise , technical assistance and technologies for optimum use of water	
Specific areas	Clients
<p>Technical assistance and introduction of technologies (reducing water footprint) for environmental safe production (green technologies) for efficient water catchment, efficient use of water in the production process</p>	<p>Large (agro) industries, farmers (agriculture and life-stock), Branch organisations of farmers and industries CPML and other organisations providing advisory services on environmental sage production</p>

of large industries and farmers and for waste water management and re-use)	
(advanced) micro- irrigation schemes for medium and small scale farmers	With branch organisations (UPANIC), cooperatives
Concrete requests/ project ideas for follow-up	Every year, UPANIC organizes, in collaboration with some private banks, a congress and fair on Agriculture. The next event is to take place in May 2016 —more than 3,000 producers from the Latin American and Caribbean region are expected. The central theme of discussion in the upcoming event will be on their preparedness for climate change. Those are interesting platforms for Dutch companies to participate to exhibit and share their products, technologies and expertise.
	An event on Energy and Climate Change will be organized by the Industry branch organization in March 2016 ; there is the possibility for Dutch experts to present on the themes of bombeo and irrigation, among others.
	With UPANIC setting up demonstration projects with (advanced) irrigation schemes for small farmers especially for enhanced productivity of traditional crops such as beans and maiz

Water and Sanitation service delivery	
Specific areas	Clients
Introduction of small scale, easy to use and low cost technologies for water catchment, water supply and waste water management (household and community based)	<ul style="list-style-type: none"> - Municipalities and their associations - ENACAL
Technical assistance and institutional strengthening for professionalization of service delivery (planning, financing and monitoring service provision etc)	<ul style="list-style-type: none"> - Municipalities and their associations, NGO's - ENACAL - CAPs and their associations - INATEC
Technical assistance in development of new interventions models for service delivery particularly for rural disperse areas, the poor, indigenous groups etc in the RAAN and RAAS areas	<ul style="list-style-type: none"> - Development Banks (WB, IDB) - ENACAL and Nuevo FISE
Concrete requests/ project ideas	<ul style="list-style-type: none"> - Engage with the WB in development of an integrated WSS plan for the Corredor Seco

Waste Water Management	
Specific areas	Clients
Introduction of small scale waste water treatment plants and re-use, alternatives to the conventional practices and treatment plants (Technologies for waste water treatment and re-use for (Agro-) industries	<ul style="list-style-type: none"> Municipalities and their associations Private enterprises Branch organisations

Concrete requests/ project ideas	Demonstration and exposition of the alternative technologies making use of the above mentioned fairs and expo's
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Floods management, disaster management and climate change	
Specific areas	Clients
Technical advice on Flood management and prevention- introduction of adequate land-use practices (government, municipalities , communities) Technologies for water catchment and storage (government institutions and municipalities)	Government (INETER, SINAPRED and MARENA) Basin Agencies, municipalities and their associations NGO's and their networks Private sector
Introduction of technologies for water catchment, transports and storage	Government (INETER, SINAPRED and MARENA) Basin Agencies, municipalities and their associations NGO's and their networks Private sector (construction firms)

Capacity development and knowledge management	
Specific areas	Clients
Human resources training at government institutions, municipalities and construction firms (sustainability criteria in project design)	INATEC (training institution)
Technical assistance in knowledge management (including action research, base lines studies, monitoring and evaluation as well as training etc) in all sub-sectors (IWRM, WSS and waste water management)	INATEC, CIRA and research institutions on the specific agri (food) farmers associations (sugarcane, coffee, Africa palm) Government institutions (MAG, Nuevo FISE, MARENA, ANA) CPML RASNIC and other NGO's WSS service providers including municipalities
Concrete requests/project ideas	See above mentioned idea for setting- up "smart" centers for training/ introduction of alternative technologies
	Plenty of ideas for addressing knowledge management and learning (innovation) in the design of the Corredor Seco plan development.

3.5 Business Climate

Nicaragua, the largest and most centrally located country in the Central American region, is generally known for being a friendly country, where its peoples are receptive towards working with Dutch staff, institutions and enterprises. Nicaragua was until recently a Dutch "aid " county and therefore has a strong track record of collaboration for over 35 years with Dutch institutions. We have 14 twin cities

between the Netherlands and Nicaragua, that contributed to creating a bond of mutual trust and knowledge between both countries. Furthermore, the country provides a safe and secure working and living environment for international staff.

The Nicaragua Economy is growing strong, despite regional slowdown. Between 2012 and 2015, Nicaragua's GDP grew an average of 4.7% per year. In the past nine years, foreign direct investment in Nicaragua increased five times, reaching USD 1.5 billion last year. Between 2012 and 2015, Nicaragua's gross domestic product (GDP) grew by an average of 4.7% per year, a figure well above the 3.7% average throughout Central America. During the period, formal sector workforce increased from USD 500,000 to USD 783,000, and tax revenues more than doubled from a mere USD 926 million to USD 1.9 billion. Particularly the construction business is booming and the major drivers of economy, it seems, is tourism. According to Prensa Latina, as many as 1.4 million tourists visited Nicaragua last year, generating about USD 450 million in economic activity (Nearshore Americas, 2016)

More specifically, the business environment in Nicaragua is considered being very stable and characterized by the following economic, financial and administrative properties: Free capital flows ; Free trade agreements with Mexico, USA, China and Taiwan, and countries from the European Union (including the Netherlands) and Latin American and Caribbean regions; Guaranteed legal security and Fixed exchange rate and fiscal incentives (PRONicaragua, 2015).

In 2014, Nicaragua ranked as the third most pacific country in the Central American and Caribbean region in the Global Peace Index, published by the Institute for Economics and Peace. The report measures factors such as the level of safety in society, the level of international conflicts, and the level of militarization.

Nicaragua has a strongly centralized government, where municipal governments have limited autonomy. Processes through the national government are bureaucratic and maybe slow. The government is also characterized for having weak technical staff, particularly at the local level.

The above described positive business climate for Dutch investments is further highlighted by the following statement of a representative of the Embassy of Nicaragua in the Hague.

"As we have heard today we, in Nicaragua, we have a lot of challenges to face.... which of course can be translated into cooperation, business and investment opportunity. It is a fact that the Nicaraguan government wants to expand water treatment and water related investments, such as irrigation program, dredging programs, optimisation of water use, water sanitation, clean energy, waste water treatment, technical assistance, climate change and others".

So, why is Nicaragua at its best moment to invest? Here are some points that need to be empathize:

- 1. Stable Economic Growth of 5% level for three years running*
- 2. Macroeconomic stability, increased employment and poverty and inequality reduction*
- 3. Exports have doubled and investments have increased 4.7 times compared to 2006*
- 4. An investor portfolio 2012-2016 of US\$ 10.9 billion*
- 5. Lowest cost of living in Latin America and the Caribbean*
- 6. Best safety in the region*
- 7. Strong social cohesion "*

By Mr. Edgardo Sobenes, Nicaraguan Embassy in the Hague.

Accessibility

Nicaragua's accessibility is also positive:

- Daily flights from the Netherlands to Nicaragua – via connecting flight through various cities in the USA or through Panama (with KLM) for less than € 1000 for a two way flight ticket (economy class).
- Its proximity to other Central America countries, Mexico and the USA is also interesting and a visit to Nicaragua is therefore easy to combine with a visit to Panama, Mexico or the USA
- No specific visa requirements for short visits. A tourist entry is awarded upon arrival at the airport.
- Nicaragua is perfectly equipped for tourism and has in the capital Managua and other main cities ample hotel facilities for all budgets.

PRONicaragua, the Nicaragua institution for business development and export promotion is an important contact detail for any company interested in doing business in Nicaragua. PRONicaragua supports the organisation of expos, fairs, conferences, hosts incoming trade missions and organises outgoing missions.

The Nicaraguan Embassy in The Hague is also available for assistance and for the provision of additional information such as on incentives, costs, and regulations. The embassy can also facilitate the communication and coordination between companies abroad with the private and public sector in Nicaragua.

4. Conclusions and Recommendations

4.1 Summary and Conclusions

Despite a relatively clear institutional and regulatory framework in Nicaragua with a very central role for the national government, the overall institutional capacity is still very weak. Challenges in governance, organisational capacities and human resources, as well as a weak information base and lack of systems for evidence-based decision-making are underlying factors to the present challenges in the sector. Notwithstanding the abundant availability of water in Nicaragua, the country faces many challenges in managing the water sources. The main challenges include emerging situations of water stress particularly in some geographical regions and in the dry season. This is partly explained by the inefficient use of water, primarily during irrigation, by industries and communities, and by the high levels of contamination of both ground and surface waters. The WSS sub-sector show low levels of service provision particularly in the rural areas and for sanitation services in general; and low levels of waste water management negatively impact human and environmental health. The country is prone to natural hazards and the effects of climate change but it is not yet armed to prevent, manage, and mitigate the effects of natural events on the availability and use of the water sources.

Acknowledging the backlog and obsolete status of the present infrastructure in the country, the national government is prioritising investments in social infrastructure, and will be doing so for the coming years. Development of the water sector has a relatively high priority in the national development agenda and is further guided by specific national programmes and plans such as PISASH (for urban WSS), and the Plan for Integrated Water Resources Management (PGIRH). Furthermore a number of new plans such as a national irrigation plan and a national water catchment plan are currently under development. These plans have attracted significant funding through the main development banks and some bi-lateral donors, with a total estimated amount of approximately USD 1 billion. Particularly interesting is the development of a new programme for the “Corredor Seco”

region, presently under development with support from the World Bank, expected to make another USD 300 million available.

There is ample scope for Dutch expertise and products particularly in the areas of: technical assistance in integrated water resources management; the introduction of small-scale, easy to operate, low cost appropriate but advanced “green” technologies that offer an alternative to the conventional practices and technologies for water catchment, transport, storage, drinking water treatment and supply, and for waste water treatment and re-use; local supply of construction material, artefacts, pumps, spare parts for the alternative small-scale technological options; professionalization of WSS; technical assistance in optimisation of water use in the production process by large companies and farmers (reduction of the water footprint) and more efficient use of water for irrigation by small farmers; technical assistance and capacity building for design of water and sanitation infrastructure resilient to natural hazards and climate change; and research and knowledge management in all subsectors including the strengthening of knowledge institutions.

The majority of the funding available for the water sector in Nicaragua concerns loans issued by the development banks that will thus be available through public tendering. Therefore, partnerships with locally based institutions and private sector actors will be important to access the financial resources. Notwithstanding, there are possibilities for Dutch companies to provide direct technical assistance to the development banks in development of programme proposals, studies and evaluations. The purchasing power of individual NGOs and municipalities in Nicaragua is not strong when looked at individually. However, through their associations, their collective purchasing power is significant. Some large private sector companies and farmers and construction firms have sufficient financial resources, individually or in partnerships through their branch organisations for acquisition of Dutch expertise and or products.

The Nicaragua business climate offers many enabling factors for Dutch business involvement in the water sector. However, in some of the identified areas, Dutch expertise and products will need to compete with companies and institutions from other countries with comparative advantages including established relationships, a long-standing reputation, and a track record in their respective competence areas. The study however identified a number of niche areas in which the Dutch have a relatively unique position for adding value to the existing knowledge and products available for the water sector in Nicaragua.

Summarising, it can be stated that there is ample demand and scope for Dutch business development in the water sector in Nicaragua. The study identified many areas for involvement including concrete ideas for short-term follow-up activities and project development, and also more general strategic areas each of them needing further exploration. The identified opportunities offer options in the whole spectrum of government-to-government (G2G), knowledge-to-knowledge (K2K), business-to-business (B2B), and for public-private partnerships (PPPs) collaboration between Nicaragua and the Dutch.

The Platform Meeting,⁴² conducted in the Netherlands with the participation of Dutch companies and institutions, allowed presenting and discussing the study results. The identified strategic areas for business development in the water sector in Nicaragua resonated very well among the participants, and many of them expressed their interest in further exploring these strategic areas.

⁴² The Platform Meeting, convened by NWP and hosted by RVO, took place in The Hague (the Netherlands) on January 27, 2016. The programme and list of participants are attached in annex 2 and 3, respectively.

More specifically, the participants in the Platform Meeting are offering expertise in the areas of IWRM, planning and (surface- ground water and or service delivery) monitoring , modelling and forecasting water stress, flood control, asset management, capacity development, data management and expertise in the water and food nexus.

Next to these expertise areas that would contribute to further consolidating the governance as well as organisational and institutional capacities in the sector in Nicaragua, the participants in the meeting also offer the supply of hardware and artefacts including (temporary) solutions on drinking water and waste water, (waste)water treatment systems, pre-treatment, drinking water and irrigation reservoirs, water treatment plants (mobile systems), sewage solutions; water quality control (specifically algae control), drainage, manufacturer of PVC connections/fitting, custom made solutions for non-pressure, underground/street level pipe systems.

All in all, there is an excellent match between the demand and identified niche areas for Dutch business development in the water sector in Nicaragua, and the expertise and products the Dutch parties are interested to offer. The Platform Meeting also concluded that more specific market information relevant for each specific expertise areas and products would be an important next step in further concretising the identified business options. Similarly, the identification of local contacts, the development of local networks and the establishment of partnerships with local counterparts were underlined as important aspects in further exploring concrete business ideas.

Opportunities for Dutch expertise and products include short-term concrete activities and projects ideas as well as options requiring further exploration implying more time and long-term investments. It is expected that Dutch expertise can contribute to strengthening governance and the institutional and organisational capacities in the water sector in Nicaragua, eventually leading to more investments and enhanced demand for Dutch expertise and products.

It is recommended to avoid an ad hoc approach by only responding to the immediate and short-term opportunities but to rather set-out a long-term strategy in which the (limited) available resources, including the economical instruments available at RVO for support to business development in the water sector in Nicaragua, are employed in a strategic way. The long-term strategy will aim to leverage as much short and long-term investments to foster an optimised and enduring business relation between the Dutch and Nicaragua, with the ultimate aim of achieving a better performing water sector in Nicaragua.

The following chapters provide recommendations for each of the main stakeholders: the Dutch Embassy in Costa Rica, the Dutch Water Partnership (NWP) and RVO, and Dutch businesses and institutions.

4.2 Recommendations for the Royal Dutch Embassy in Costa Rica

The study and the Platform Meeting did not only identify and validate ample opportunities for business development, but also generated lots of expectations and interest, both among the actors in the water sector in Nicaragua, as well as among the Dutch actors. Its therefore important for the Embassy to give due follow-up by taking a two tier approach, by:

- I. Developing a framework for enabling mid- and long term business relations between the Dutch and the water sector in Nicaragua
- II. Responding to the immediate request and short term business ideas

Developing a framework for enabling mid- and long- term business relations between the Dutch and the water sector in Nicaragua (putting the aid and trade agenda into action)

Developing such a framework will necessarily imply the involvement and commitment of the national government in Nicaragua. The framework is expected to identify a number of priority areas in which the Dutch can play a significant role and the framework will therefore initially focus on consolidating the existent governance and capacity in the water sector in Nicaragua, possibly through Government to Government (G2G) and Knowledge to Knowledge (K2K) arrangements. The framework will, at the mid- and long- term, focus more and more on commercial relationships through Business to Business (B2B). In short, the framework will give direction in decision taking on the priorities in employment and leveraging of the limited (present and future) resources available at the Embassy.

An instrument to formalise such a long-term framework for fostering commercial relations and business development in the water sector in Nicaragua is a Memorandum of Understanding (MoU) between the Netherlands—through the Royal Embassy in Costa Rica and the Nicaragua government, perhaps with involvement of the private sector through COSEP, the private sector council. Such a MoU would need the support of a jointly agreed-upon strategy document or work plan to guide the activities and investments to be made.

The MoU will give direction to the employment of the different economic instruments the Embassy has at its disposition, and would specify concrete activities such as the organisation of trade missions, participation in relevant fairs, targeted market scans, expos and conferences. Furthermore, the strategy or work plan is proposed to include:

- A structured information flow on developments in the water sector in Nicaragua to the Dutch actors and vice-versa. This would apply streamlining the employment of the different information products and mechanisms available at the Embassy, NWP and others. Such as newsletters, platforms meetings and others.
- Support activities in enabling visibility of Dutch companies' products and knowledge relevant for the water sector in Nicaragua and vice-versa
- Engagement of the Dutch Embassy in Costa Rica with development banks active in the water sector in Nicaragua, for introduction of Dutch actors and assessment of opportunities for leveraging funding (through the economic instruments)
- Activities in support to adoption of a joint approach of Dutch actors in response to specific business opportunities

It is important for the Embassy in Costa Rica to involve the expertise of a Senior Water Advisor with ample experience in strategy and plan development, and with a solid network in the water sector in the Netherlands, in the development of the strategic framework and the preparations for the MoU.

Responding to the immediate request and short term business ideas

Anticipating on the above-proposed strategy, the following concrete steps could already be considered for the short-term:

- Enable a structured and continued information flow on opportunities and developments in the water sector in Nicaragua to the sector in the Netherlands
- Enable the appointment of an advisor at NWP to act as the focal point for the Dutch actors interested in doing business with Nicaragua and to coordinate with the responsible official for water in the Embassy in Costa Rica and with the local representative of the Embassy in Nicaragua

Other short-term follow-up actions include:

- Conduct follow-up with the World Bank on the developments of their activities in the Corredor Seco region. Engage Dutch expertise—through a Senior Water Advisor with experience in Nicaragua and in dealing with development banks—in the preparatory process (i.e. programme formulation) to seek involvement of Dutch actors (expertise and products) in base line studies, and plan the development and implementation of the programme.
- Encourage, through NWP, a joint approach of Dutch actors for involvement in the Corredor Seco programme
- Enable interested Dutch actors to participate in the fairs and expos to be hosted by CADIN and UPANIC in March and May 2016
- Organize a trade mission to Nicaragua with a match-making component between Dutch and Nicaragua based enterprises and institutions

The elaboration of an immediate action plan will allow coordinating and structuring the above mentioned short-term follow-up actions.

Furthermore, the Embassy in Costa Rica is encouraged to engage with the Embassy in Panama to jointly assess the options for a regional approach to the promotion of Dutch involvement in the water sector in Central American countries. Such an approach could be useful to extend the scope for the Dutch sector by ensuring more economies of scale. Based on the authors' knowledge of the water sector in other countries of the region (Panama, Honduras, Costa Rica and El Salvador) we can conclude that that main challenges of the water sector in each of these countries are very similar. However, the specific business opportunities will differ depending on the differences in sector governance and the institutional and organisational capacities in each country. It is recommended to explore the benefits of the adoption of a regional approach with a quick scan to map out the potential of such a regional approach.

In any case, collaboration with the Embassy in Panama in enabling the appointment of an advisor for Central America countries (Nicaragua, Guatemala, and Panama) at NWP would already underscore the benefits of collaboration between both embassies.

4.3 Recommendations for NWP and RVO

The recommendations for NWP include both short-term immediate actions, as well as longer term strategic activities. For the short term, it is important to conduct follow-up on:

- The participants in the NWP meeting by developing an immediate action plan to further explore the concrete demand and project ideas by enabling the interested Dutch partners in identifying local contacts, counterparts and in undertaking specific market scans.
- The negotiation of resources for the appointment of a kern advisor for Nicaragua and Guatemala and/or Panama at NWP
- The continuation of the Platform for Central America to keep the information flow between the Embassy in Costa Rica, the water sector in Nicaragua, and the Dutch sector
- The coordination of a follow-up meeting (i.e. a master class for interested parties) for a more in-depth assessment of business opportunities in Central American countries

- Enabling a possible collective approach of Dutch actors for further exploration of some of the identified strategic areas. A joint approach can be facilitated by follow-up meetings to jointly further explore the concrete project ideas and existing concrete opportunities, jointly involving consultancy services for further in-depth study and exploration of the concrete opportunities identified, organisation and implementation of joint “trade” missions with a clear common goal.

The long-term approach will be informed by the strategy for Nicaragua to be developed by the Embassy in Costa Rica.

Also, NWP and RVO are recommended to jointly review the available spectrum of economic support instruments applicable for Nicaragua, and to recommend adaptations or proposals for new instruments, according to the specific needs for Dutch business development in Nicaragua.

RVO to support and enable future trade missions to Nicaragua.

4.4 Recommendations for the Dutch Private Sector

As a Dutch actor, you are recommended to:

- Study the direct opportunities listed in this report, in particular for B2B (Business to Business opportunities)
- Approach the contact persons at Uytewaal Consultancies, NWP and the Dutch Embassy in Costa Rica for further information on direct project ideas and potential contacts, counterparts, and networks in Nicaragua
- Conduct specific market scans
- Make yourself and your expertise and products visible to potential clients, for example by participating in expos, fairs, etc. This requires investments in visibility to ensure Dutch technologies, products and knowledge are visible and readily available in Nicaragua
- Consider engaging a local based agent to represent their business in Nicaragua
- Seek support in finding, establishing, and nurturing local counterparts/or local agents
- Engage in a collective approach towards further development of some of the identified project ideas and/or strategic options
- Participate in the next Platform Meetings on business opportunities in Central American countries
- Invest in demand creation through demonstration projects and the sharing of successful examples on the use of your expertise or products to actors in Nicaragua
- Acknowledge the entry points and consider how to contextualise the opportunities
- Participate in a follow-up trade mission to Nicaragua in coordination with the Dutch Embassy, NWP and Uytewaal Consultancies

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6. Annexes

I. List of interviewees

Día	Entrevistas	Día	Entrevistas
Jueves 26 November	Participation in the XXIX AIDIS congress for Central American	Martes 1 December	BCIE/Banco Centroamericano de Integración Económica - Ing. Carolina López - Especialista en Agua y Saneamiento
	Fundación AVINA .- Lic. Edgard Bermúdez		Sra. Nienke Swagemakers de ECODES - Representante Oficina en Centroamérica
	PRONICARAGUA - Javier Chamorro		UPANIC ampliación de reunión con Sr. Michael Healy, Presidente Ejecutivo.
	Dr. Francisco Burbano - Director Programa GIZ - PROATAS Nicaragua		BM - PAS - Sr. Nelson Medina Rocha Coordinador Programa Agua y Saneamiento
Viernes 27 November	WaterAid - Joshua Briemberg	Miércoles 2 December	CANATUR - Lic. Elsie León Quesada - Directora Ejecutiva
	UPANIC - Unión de Productores Agropecuarios de Nicaragua Lic. Michael Healy Lacayo - Presidente		Señora Eliette González Ingeniera Ambiental y Sanitaria Proyecto Futuragua Brabant Water Enacal YEPwater
	Iamsa Ingenieros Ingeniero Benjamín Lanzas		SNV - Director. Lic. Emmanuel Béjar
	Camára Nicaragüense de la Construcción - CNC Ing. Bruno Vidaurre .- Gerente General		CIRA/UNAN Managua - Centro de Investigación de Recursos Acuáticos Sr. Luis Moreno Delgado.- Sub - Director Msc. Silvia Fuentes Huelva - Jefa de Área Analítica
	SUKARNSUKARNE /Ganadería Integral Lic. Carlos Gallardo Rivera Director CentroaméricaE/Ganadería		RASNIC /Red de Agua y Saneamiento de Nicaragua- Lic. Xiomara Medrano - Secretaria Ejecutiva
	CADIN Lic. Juan Carlos Amador - Director Ejecutivo Lic. Fernando Calvo - Coordinador de Proyectos		CPML /Centro de Producción más Limpia Ing. Silvia Aguilera .- Coordinadora de Asistencia Técnica
			Sra. Ivette Morazán. Directora Water for People / ONG
Lunes 30 November	AQUATEC Ingeniero Félix Estrada - Gerente de Proyectos	Jueves, 3 de Diciembre	MARENA - Ministerio del Ambiente y de los Recursos Naturales/ MAG - Ministerio Agropecuario/ ANA - Autoridad Nacional del Agua / ENACAL - Empresa Nicaragüense de Acueductos y Alcantarillados / NUEVO FISE Participantes: Yadira Meza - Viceministra de MAG José María Sánchez- Director de Políticas MAG Ana María Zeledón, Secretaria General MAG Teresa Sequeira- Secretaria General MARENA Jamil Robleto- Director de Recursos Hídricos, Nuevo FISE Eduardo Núñez - Director de Inversiones ENACAL Irana Venerio, MINREX - Responsable Dirección de Cooperación Europa. ANA (que llegaron tarde y no indicaron sus nombres).
	AQUALIMPIA - Ing. Adolfo Mejía		
	Quenca Consulting Group, S.A - Lic. Dannette Robinson Ubau- Gerente de Proyectos		

II. Agenda Platform meeting (January 27, 2016)

For details and the full program [click here](#).

III. List of participants in the Platform meeting (January 27, 2016)

ATTENDANCE LIST
CENTRAL AMERICA PLATFORM MEETING
WEDNESDAY JANUARY 27th 2016



Rijksdienst voor Ondernemend
Nederland



NETHERLANDS
WATER PARTNERSHIP

	NAME	ORGANISATION
1	Laura Roverts	Akvo
2	Hielke Wolters	Aquanet
3	Marcel Van Der Haar	Brabant Water
4	Gart Van Leersum	CARE
5	Marta Faneca Sanchez	Deltares
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This publication was commissioned by the ministry of Foreign Affairs.
© Netherlands Enterprise Agency | Januari 2017

Publication number: RVO-006-1701/RP-INT

NL Enterprise Agency is a department of the Dutch ministry of Economic Affairs that implements government policy for agricultural, sustainability, innovation, and international business and cooperation. NL Enterprise Agency is the contact point for businesses, educational institutions and government bodies for information and advice, financing, networking and regulatory matters.

Netherlands Enterprise Agency is part of the ministry of Economic Affairs.