Ministerie van Buitenlandse Zaken

Dominican Republic
Water Sector Report 2021

Summary

Over the past few decades, the Dominican Republic (DR) has become known internationally for its world class tourism industry and for its steady economic growth. The DR is the largest economy in the Central America and Caribbean region. World Bank data indicates that between 2015 and 2019 the country´s annual GDP grew at an average rate of 6.1%. Tourism, remittances, foreign direct investment, mining revenues, free-trade zones, and telecommunications are listed as the main drivers of that growth[1]. The COVID-19 pandemic has severely impacted the DR economy, reducing GDP by about 5.1% according to CEPAL estimates. The Interamerican Development Bank[2] suggests that greater public investment and more efficient public expending will be needed to stimulate economic recovery. CEPAL projects the DR economy to grow 5% in 2021.

Even with its impressive economic performance, the DR is a country faced with major challenges, as poverty and inequality continue to impact a large percentage of the population. Also, the Dominican Republic is one of the world's most vulnerable countries to the consequences of global climate change[3], ranking 11th in the world for long term climate risk.

Investment in tourism, agriculture, urban areas, mining, and trade, have boosted the development of water infrastructure projects. At the same time, the DR water sector faces severe challenges related to the coverage and quality of drinking water and sanitation services, extremely limited urban wastewater treatment, wide gaps in coverage between urban and rural areas, insufficient monitoring of quantity and quality of water, deforestation, and watershed degradation. These challenges are increased by the significant water stress in some regions of the country due to increased demand and lower precipitation during the past decade. Climate models indicate that average precipitation in the country may decrease by over 15% in average by 2050[4], thus pointing to increased probability of water stress in the future.

In September 2020, the Dominican government established a special Cabinet for the water sector, as a mechanism to define, coordinate, and monitor water related policy, strategy, programs, actions, and budget. The country is also in the process of updating the National Hydrological Plan (PHN, by its acronym in Spanish) previously prepared in 2012. The new plan will provide updated data on water availability and demand by regions and economic sectors. The new PHN, which should be ready in 2023, will present a roadmap for prioritization of investments in the water sector, particularly oriented towards water resources management.

On February 27, during his annual address to the National Assembly, DR President Luis Abinader announced a commitment to invest US$8850 million over the next 15 years to improve water infrastructure and sustainability of water resources[5]. Drinking water supply and rehabilitation of irrigation systems have been identified as short-term priorities. The modernization of the institutional and legal frameworks for all aspects of water management, and the promotion of public-private partnerships are also key aspects of the current water agenda in the DR. This report presents a brief outlook of the DR water sector, highlighting opportunities where Dutch know-how and technology can support DR´s water sector improvement.

[1] World Bank 2021, DR Outlook
[2] IDB 2020, LAC post COVID-19
[3] ClimateLinks Dominican Republic
[4] DR Third National Communication to the UNCCC
[5] https://www.elcaribe.com.do/destacado/pacto-del-agua-sera-firmado-a-finales-de-este-mes/

Contents

List of acronyms

CAASD	Santo Domingo Aqueduct and Sewerage Corporation
CEPAL	United Nations Economic Commission for Latin America and the Caribbean
COAARABO	Boca Chica Aqueduct and Sewerage Corporation
COAAROM	La Romana Aqueduct and Sewerage Corporation
CORAAMOCA	Moca Aqueduct and Sewerage Corporation
CORAAPPLATA	Puerto Plata Aqueduct and Sewerage Corporation
CORAASAN	Santiago Aqueduct and Sewerage Corporation
CORAAVEGA	La Vega Aqueduct and Sewerage Corporation
CORAMON	Monseñor Nouel Aqueduct and Sewerage Corporation
INAPA	National Institute of Drinking Water and Sewerage
INDOCAL	Dominican Institute for Quality
INDRHI	National Institute of Hydraulic Resources
MEPyD	Ministry of Economy, Planning and Development
MINERD	Ministry of Education of the Dominican Republic
MMARENA	Ministry of the Environment and Natural Resources
MOPC	Ministry of Public Works and Communications
MSP	Ministry of Public Health
PHN	National Hydrological Plan

Water resources outlook in the Dominican Republic

The Dominican Republic (DR) occupies two-thirds of the island of Hispaniola (the second largest of the Greater Antilles in the Caribbean) with a land area of 48,671 Km^2 and an estimated[6] population of 10,847,910. DR is divided into 32 provinces and has a total coastline of 1,604.05 kms. Over 80% of the country´s population lives in cities. The largest being the Greater Santo Domingo metropolitan area, with close to 4 million people in 11 municipalities.

Figure 1: Dominican Republic

Per year
Total: 66,825 million m3
Average: 1500 mm

26° C average

The second largest city is Santiago, with 1.2 million. Dominican Republic has the highest and lowest elevations in the Caribbean, with Pico Duarte reaching 3,098 meters above sea level and Lago Enriquillo (a saltwater lake) at 46 meters below sea level. The country´s climate is subtropical, with exposure to storms during the Atlantic hurricane season. Within the country, precipitation varies significantly, from less than 350 mm per year in the south and north-western valleys to over 2000 mm per year in the north-central and eastern parts of the country.

The total volume of precipitation in DR is estimated at 66,825 million cubic meters per year. Average annual rainfall is 1500 mm with approximately 110 rainy days/year. The average annual temperature is 26 degrees Celsius without pronounced changes during the seasons, but with significant variation due to elevation. The mountainous topography develops some 4,000 streams that drain into 30 main basins and 17 coastal basins for a total of 47 hydrographic basins (see Figure 2), which are grouped in seven hydrographic regions (see Figure 3). Total freshwater availability (combined surface and groundwater) has been estimated at 27,659 million cubic meters (MCM) per year, to supply a demand of 12,315.44 MCM per year, for an average gross water stress of 45%[7]. On a per capita basis, freshwater availability in the DR is estimated at 2,258.35 cubic meters per person per year in 2014, a 35% decrease from 1992[8]. *Freshwater resources in the DR are threatened by pollution, overexploitation/wasteful practices, deforestation, land degradation and climate change. When combined with economic and population growth, some studies project water scarcity for three of the seven hydrological regions by 2025.*

Due to its geographical location, the DR is exposed to hydrometeorological threats such as tropical storms, floods, and droughts. These threats combine with the country´s vulnerability to create a risk profile that is at the same time intensive (events of low frequency and high impact) and extensive (more frequent events, of minor impact). The average expected annual damage (EAD) associated with disasters was estimated at about USD 420 million (0.69% of GDP)[9] and the probability that damages will reach USD 1.68 billion (2.7% of GDP) or more in any given year is 5% (on average once every 20

[6] https://population.un.org/wpp/
[7] Plan Hidrológico Nacional
[8] DR Third National Communication to the UNCCC
[9] World Bank, 2017. The Impact of Hurricane Strikes on Short-Term Local Economic Activity

years). *Increased occurrence of extreme events associated to climate change is likely, with the main threats being freshwater scarcity due to drought, damage to water infrastructure due to flooding (both riverine and coastal) caused by severe storms (worsen by sea level rise), and groundwater salinization accelerated by sea level rise*.[10]

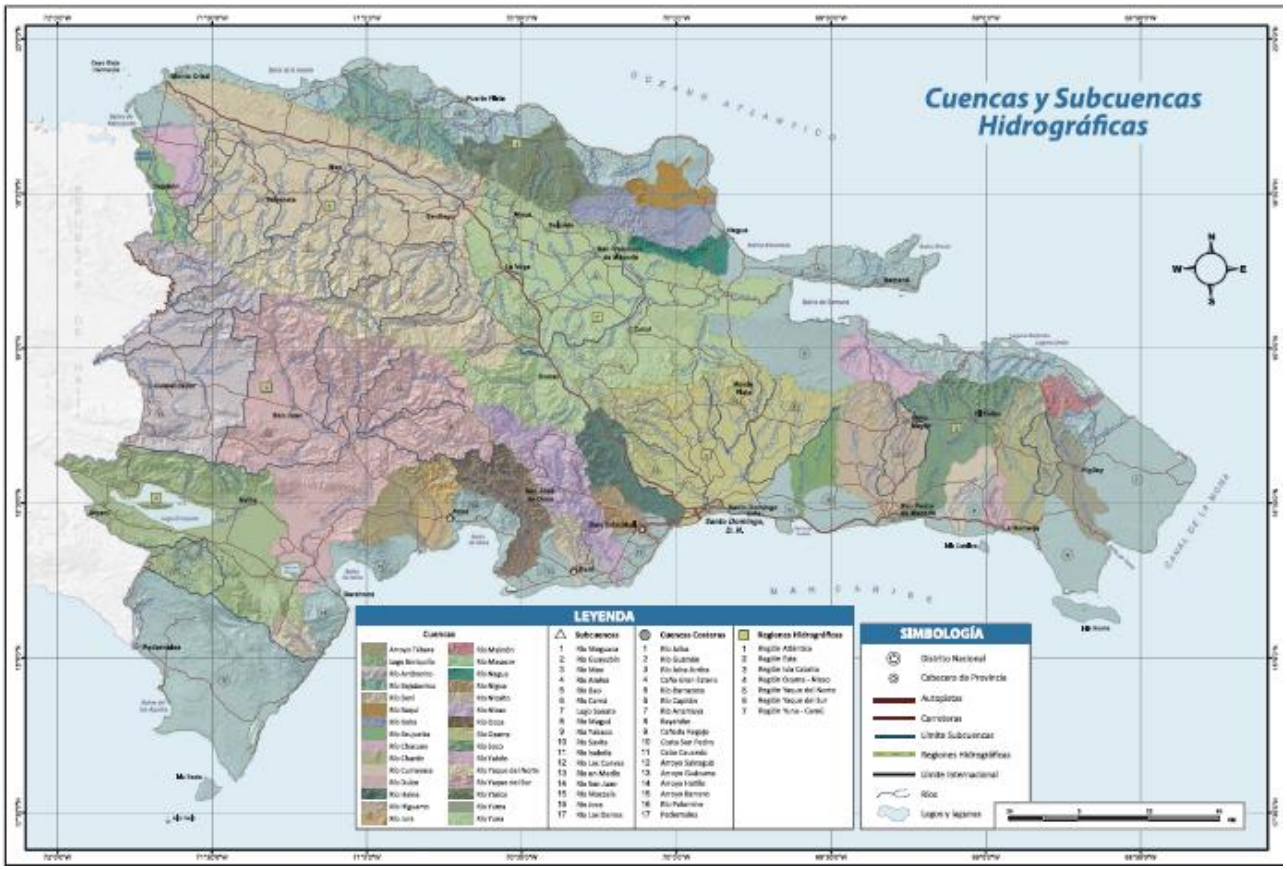

Figure 2 Hydrographic basins of the Dominican Republic. Source: Ministry of Environment and Natural Resources.

Water balance 2025

Region	Availability (MCM/YR)	Demand (MCM/YR)	Balance (MCM/YR)
Yaque del Norte	3,086.46	3,192.27	-105.81
Atlantica	4,850.73	823.59	4,027.14
Yuna	3,836.96	2,347.69	1,489.27
Este	3,883.95	926.93	2,957.02
Ozama Nizao	4,916.08	1,958.38	2,957.70
Yaque del Sur	5,392.51	4,475.99	916.52
Total	25,966.69	13,724.85	12,241.84

Figure 3: Hydrological regions and projected water balance per region for 2025, using 2010 as baseline year and not considering climate change. Source: Plan Hidrológico Nacional 2010 (INDRHI, 2012)

[10] República Dominicana, 2017. Tercera comunicación nacional a la CMNUCC

A major weakness for water resources management in the DR is the lack of a hydrometeorological monitoring network with adequate spatial coverage by hydrographic basin, especially in basins that are characterized for having a marked topographic gradient. The country also needs to develop technical and human capacities in hydrology, integrated water resources management, water quality assessment, coastal engineering, and climate change adaptation.

Dominican Republic shares water resources with Haiti, which is the poorest country in the Americas and the only one considered to have insufficient water resources on a per capita basis in the region. With a similar population to the DR and about half the land area, Haiti´s natural resources are under severe stress. *Although analyzing Haiti´s water sector issues is outside the scope of this report, management of binational resources is an important challenge for the DR water sector and may become more so as development plans for the border provinces are implemented.* Increased population and climate change may result in water conflicts in the future.

The Dominican government has received support from AECID to develop a national plan for sustainable use of water resources. The work will be conducted between 2021 and 2023 by the National Institute of Hydraulic Resources (INDRHI) and a team of consultants. The study will focus on the planning and management of water resources, including a baseline survey, the development of management instruments for water resources and the updating of the National Hydrological Plan developed in 2012.

In September 2020, President Abinader created the Water Sector Cabinet[11] as an advisory council to guarantee higher levels of coordination and increased efficiency, effectiveness, and agility in decision-making for the sector. This Cabinet will coordinate data analysis and develop criteria to design policies, strategies and plans for the sector. The creation of the cabinet indicates that the sector is a priority for the new administration.

This report, written for the Dutch water sector, is organized in five main sections: institutional and legal framework; drinking water and sanitation; water for agriculture; water & energy; and sustainable watersheds. In addition, the Appendix includes a list of projects that have been identified as priorities in the 2012 Hydrological Plan and/or in the 2020 National Infrastructure Plan.

DR CLIMATE RISK

The DR has been ranked as the 11th country most at risk from climate impacts.

Average expected annual damage (EAD) associated with disasters in Dominican Republic was estimated by the World Bank at close to USD 420 million (0.69% of GDP) and the probability that damages will reach USD 1.68 billion (2.7% of GDP) or more in any given year is 5% (on average once every 20 years).

[11] DR Executive decree 498-20

Institutional and legal framework

The Dominican Constitution of 2010 establishes that water is a strategic resource and access to drinking water is a right and has priority for water resources allocation. It also defines water as a public good that cannot be privately owned.

Water resources management and water rights were initially regulated by law in 1962[12]; in 1965[13] the National Institute for Hydraulic Resources (INDRHI) was created and charged with the implementation of Law 5852 and with the development of water resources for agricultural use; groundwater use, and its protection, were regulated in 1969[14], also under INDRHI´s jurisdiction. These laws are mostly in effect to this day. In 2000, law 64-00 created the *Ministry of Environment and Natural Resources*, transferring rectorship over water resources and specific authority to regulate groundwater exploitation to the new Ministry. This created overlapping responsibilities and regulatory gaps.

Proposed legislation is currently being discussed to bring water resources management up to date, separating policy and regulatory levels from infrastructure development and operation/maintenance. The proposed water resources law seeks three major changes: 1) clarify the Environment ministry´s role and responsibilities regarding water resources policy, water resources planning and water quality protection; 2) the transformation of INDRHI into a regulator, managing water rights and monitoring both quantity and quality of water in the watersheds/waterbodies (leaving its role as infrastructure developer and agriculture sector water provider to other institutions); and 3) establishing the regulatory framework for the different large volume users (ie. drinking water and sanitation, agriculture, manufacturing, tourism, etc.). As of the date of this report, there is no consensus on the basic aspects of the new framework.

Drinking water and sanitation were first legislated in the 1930´s as part of the country´s first public health code. The 1962 law for the creation of the National Institute for Aqueducts and Sewage (INAPA)[15]is the first modern legislation on the subject. INAPA was created under the *Ministry of Public Health*, to provide drinking water and sanitation services nationwide. Later, as urban centers grew, new aqueducts and sewage corporations were created: CAASD in 1973 (for the capital city of Santo Domingo), CORAASAN in 1977 (for the second largest city of Santiago), and six others (collectively referred to as CORAAs) since 1997. Other institutions such as the Ministry of Economy, Planning and Development, the Institute for Quality Assurance and municipal governments are also involved with the sector. Figure 4 presents the current situation for the water and sanitation subsector. There is proposed legislation for reforming the drinking water and sanitation sub-sector. The focus of the proposed legislation is to clearly demarcate policy level roles from services regulation/superintendence from service provision.

The National Hydrological Plan (INDRHI, 2012) in its analysis concluded that the performance of the DR Water Sector has been significantly impaired by an institutional arrangement which is characterized by the lack of definition of roles, coincidence of overlapping roles within the same institution, coincidence of roles in various institutions, among other aspects. The NHP points out that, in practice, existing

[12] Law 5852-62 about the Terrestrial Waters Domain
[13] Law 6-65 for the creation of INDRHI
[14] Law 487-69 about Control of the exploitation and conservation of groundwater
[15] Law 5994-62 for the creation of INAPA

rectorship and regulatory roles are not being fulfilled and the gaps/overlaps create an absence of effective planning at all levels.

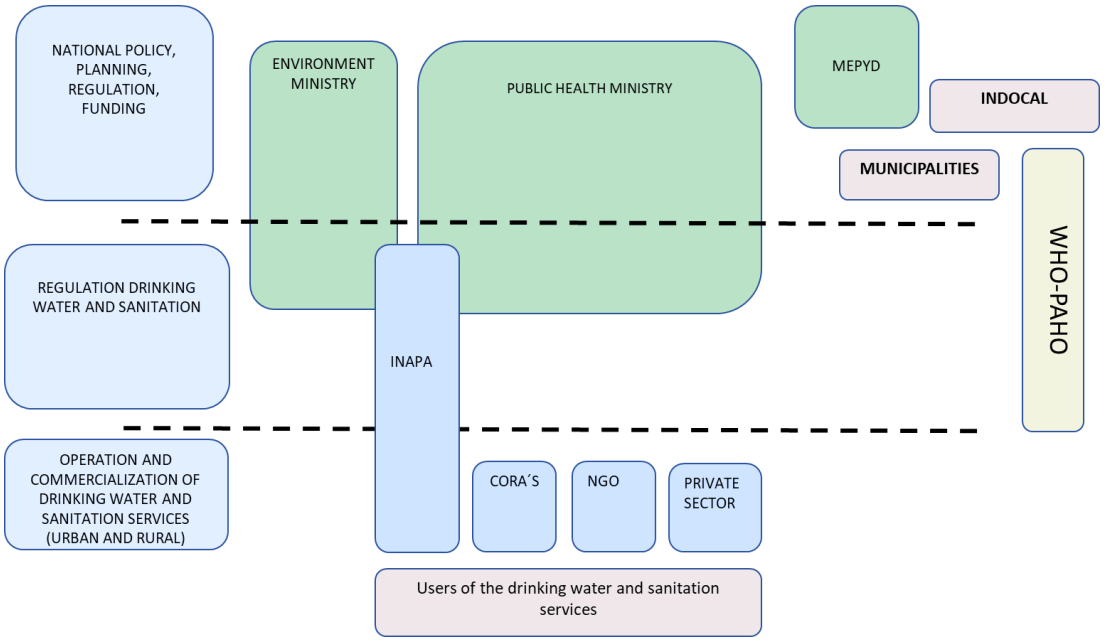

Figure 4: Current institutional structure for water and sanitation services in DR. Source: Adapted from National W&S strategy, Abreu (2016).

Drinking water and sanitation: investments needed for achieving SDG-6

Between 2000 and 2017, water coverage in the DR went from 90% of households to 97%; the rate of access to household sanitation went from 78% to 84% in the same period[16]. Despite this great progress, there is a significant need for additional investment to close the quality gap.

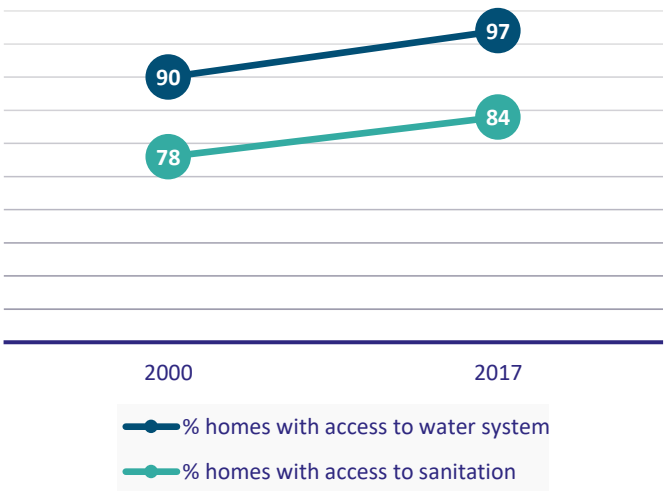

Figure 5: Change in the % of homes with access to water and sanitation, 2000-2017. Source: Oficina Nacional de Estadística

The Ministry of Economy, Planning and Development (MEPYD)[17] estimates that to close the coverage gap by 2030 a total investment of USD 621 million dollars will be needed. This would ensure 100% of homes in the DR have access to water inside the house (or at least inside their plot of land) as well as access to a toilet; but it would not ensure the level of quality and continuity of service required by the SDG6 or for wastewater to be collected and properly treated. The same report estimates that achieving sustainable and comprehensive service or

[16] WHO/UNICEF Joint Program, 2019
[17] MEPYD (2020) Plan Nacional de Infraestructura

-as the SDG6 words it- to "ensure availability and sustainable management of water and sanitation for all", would require an investment in the order of USD 8,938 million over the next ten years.

Drinking water and sanitation in DR presents four major gaps:

1. While 84% of the population has access to sanitation overall, less than 20% has access to a sewage system with wastewater treatment, and only between 4 and 7% of wastewater produced receives secondary treatment. Even in urban areas, most facilities are connected to septic tanks. The country also lacks infrastructure for septage treatment and safe disposal.
2. Quality of service: only about 35% of the population receives water service 24/7.
3. Less coverage and lower standards of service for rural areas, particularly in the poorest regions, such as the border with Haiti; and
4. Lack of sufficient and timely information for service management and decision making. Water losses as high as 60% are estimated, but the systems lack instrumentation to determine actual efficiency.

Drinking water and sanitation service is provided by nine different decentralized government institutions that cover different areas of the country (INAPA, CAASD, CORAASAN, CORAMOCA, COAROM, CORAAVEGA, CORAABO, CORAAMON and CORAAPPLATA -see Figure 4-). Each of these entities achieves different levels of efficiency in terms of the potability index, percentage of losses, service coverage, collection levels, treatment of drinking and wastewater, among others. Of the 1,272 public water systems in operation as of 2019, 829 are small systems operated by users' associations under the supervision of INAPA.

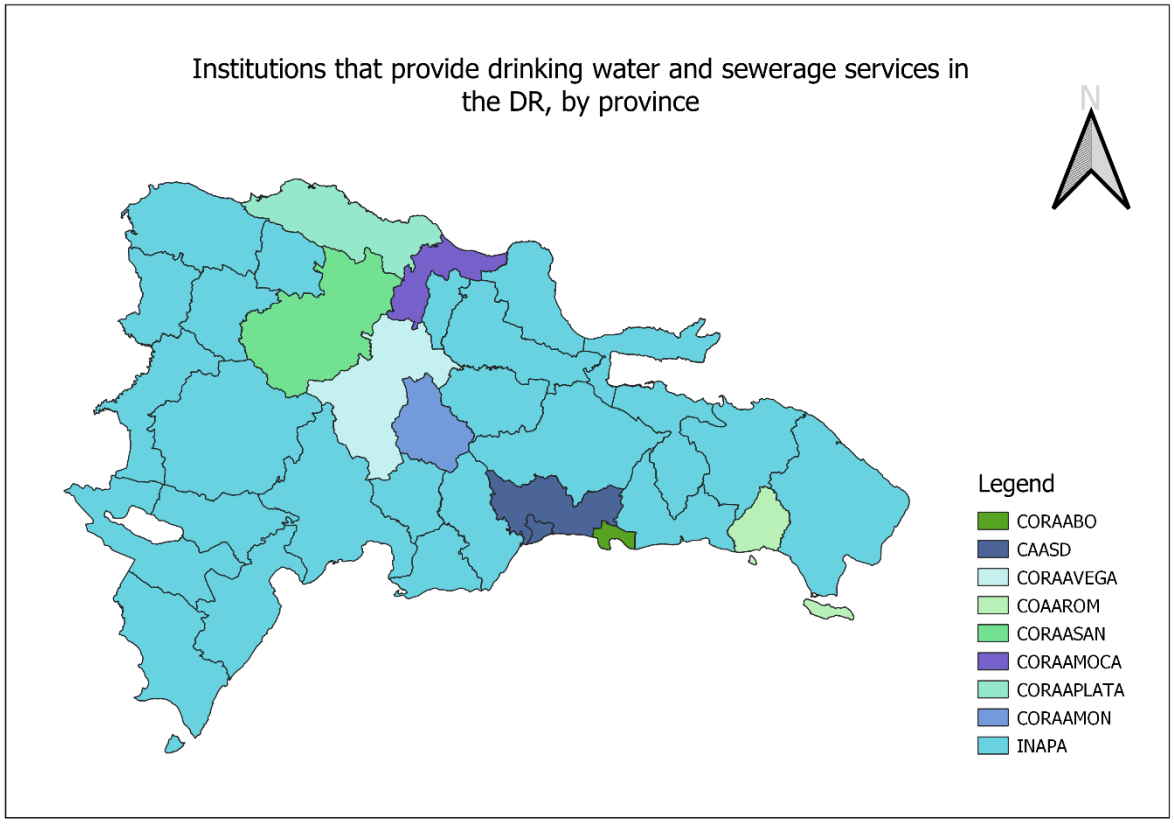

Figure 6: Map of drinking water and sanitation institutions

The biggest of the drinking water and sanitation institutions, in terms of amount of population served and budget, are Instituto Nacional de Agua Potable y Alcantarillado (INAPA), Coorporación del

Acueducto y Alcantarillado de Santo Domingo (CAASD), and Coorporación del Acueducto y Alcantarillado de Santiago (CORAASAN): INAPA has jurisdiction in 24 provinces, serving approximately 4 million people. CAASD operates in the Greater Santo Domingo area and serves more than 3.2 million people. While CORAASAN serves the metropolitan area of Santiago -the country's second largest city- with a population of around 1 million.

As indicated above, the DR´s current Government (2020 -2024) has prioritized drinking water and sanitation. Currently, the various institutions within the sector are developing their action plans to ensure the effective and efficient provision of drinking water and sewerage services. One of INAPA's main plans is the so-called INAPA National Infrastructure Rescue Plan, which consists in carrying out immediate interventions for the expansion, rehabilitation, maintenance, improvement and recovery of the existing aqueduct and sewer systems.

Some of the main problems in the distribution of drinking water are the great losses that occur in the networks without being measured. *In this area, INAPA has prioritized macro and micro measurement pilot projects in the neighborhoods with good line pressure. Another important priority for INAPA is real-time monitoring of water supply systems (aqueducts), allowing for leaks identification and correction. Also of interest to service providers is the maintenance and rehabilitation of aging of storage infrastructure, maintenance of treatment plants and disinfection equipment*.

The commercial aspects of drinking water supply and sanitation services are another major area of opportunity for improvement. Rates are in general insufficient to cover the costs of operation and maintenance of the systems and are not usually linked to measured consumption. Service providers estimate that less than 30% of their operational costs are recovered. The systems are heavily subsidized. One objective stated by the new government is to make the subsidies transparent and focalized to those in need. For example, at INAPA less than 50% of the users served are registered in the cadastre, and the collection of the rate is estimated at 50%, with around 30% clandestine connections. Efforts were made in the late 1990´s to make service providers more commercially efficient, including public/private partnerships for the installation of meters and collection of fees with very limited success.

There is strong public opposition to the notion of privatizing drinking water and sanitation services in the DR. At the same time, there are exceptionally low confidence levels on the quality of the water provided. Which, ironically, translates in people spending relatively larger amounts (as a % of income) in bottled water for drinking and cooking[18]. As much as 91% of the population buys bottled water daily for use at home.

Water resources and Irrigation

While agriculture accounts for about 5% of GDP, it is responsible for about 70% of total water demand in the DR. The country has a significant irrigation infrastructure that covers an area of 330,402 hectares and serves 89,317 users in 288 irrigation systems. Overall irrigation efficiency has been estimated at 20%[19].

[18] https://www.eldinero.com.do/132016/el-acceso-a-agua-potable-afecta-el-presupuesto-de-los-hogares-dominicanos/

[19] The National Hydrologic Plan (INDRHI, 2012) defines overall irrigation efficiency as the amount of water that is derived from the supply source and reaches the root zone of the crop and that is used by plants.

Surface irrigation (both by gravity and driven by pumping systems) represents 96% of the total. Of the irrigated land, 47% have drainage and salinity problems. In the DR 13% of the irrigated area is supplied by groundwater, 54% from intakes of reservoirs and 33% of direct intakes from rivers and streams. 26 of the 32 existing dams serve 150,800 ha suitable for irrigation. The regions that present greater water stress (Yaque del Norte and Yaque del Sur) are also the areas with largest irrigation systems.

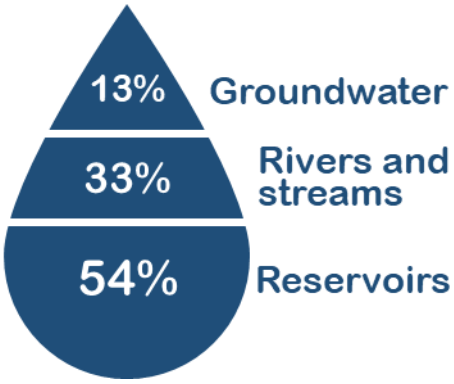

Figure 7: Sources of water for Irrigation

The 32 existing dams have an aggregate storage capacity of 2,191 MCM. The impact of sedimentation in the reservoirs amounts to an annual loss of close to 1% of the total volume on average. The regions with the greatest endowment of storage infrastructure are, in order, Yaque del Norte, Yuna-Camú, Yaque del Sur and Ozama-Nizao, in which there are also the largest water demands for irrigation and other uses.

Of the 32 existing dams, 17 are multipurpose, 5 are exclusively to regulate flows for hydroelectric plants, 8 are exclusively for irrigation and 2 are tailings dams. Of the multipurpose dams, 26 serve irrigation zones with an area of approximately 150,000 hectares and 12 serve drinking water systems. A new multi-purpose dam is under construction in the Yaque del Sur watershed (the Monte Grande dam), and three more have been identified as priority projects: Guayubin, which is in the environmental impact assessment stage (Yaque del Norte region); Guaigüí and Alto Yuna, both in the Yuna region, are still in planning stage.

According to the 2015 National Agricultural Pre-census, there were 319,676 productive units in the country with a total area of 1.88 million hectares. Of this total, 7,214 hectares were dedicated to agricultural production, 562,724 hectares to livestock, 460,880 hectares to animal husbandry and agricultural production and the rest to forests and ornamental plants. About 80% of the value of agricultural production is generated by annual crops. By crop groups, 28% of the productive units are dedicated to cereals (rice and corn), 24.6% to fruits and nuts, and the 17.45% to crops for beverages and spices. Rice is produced mainly in areas under irrigation and is one of those responsible for high water consumption.

In recent years, there´s been some investment in climate smart agriculture supported with funds from international cooperation agencies and private entities. The DR government is starting to include concepts such as Increased efficiency of agricultural water use, increased crop resilience, and index insurance in its sectoral planning.

Measures to improve agricultural sector resilience and improve water efficiency in the DR include:

- Protection of water-producing areas with adequate forest management
- The use of artificial ponds for storing water for irrigation and livestock consumption; this is being promoted as a drought management measure and to improve the operation of irrigation systems, avoid losses and facilitate irrigation shifts.
- The extension of irrigated areas to soils particularly suitable for horticultural crops.
- Update information on the agricultural areas devoted to sugarcane that are not included in INDRHI statistics.
- Zoning the use of agricultural land, to prevent it from being used for crops that are not appropriate for the soils and climate.

- The density of the country's drainage systems must be increased (from 200 m/ha to 500 m/ha, according to FAO) to conserve soils and avoid their degradation.
- Promote the change of irrigation technology to substantially improve the efficiency of water use.
- Protect low lying areas used for rice production in the Yuna region from sea level rise.

Water & Energy

Hydroelectricity accounts for close to 13% of total installed capacity for electricity generation (623.3 MW out of 4,921.0 MW total system capacity). Overall, renewable sources are close to 24% of installed capacity, with wind, solar and biomass making up the other 11% (558.2 MW)[20]. Actual participation in generation varies by month; Figure 8 shows % of total generation by type in December 2020. High initial costs, lack of local expertise and lack of supporting infrastructure/policies, have been highlighted as the major barriers for faster adoption of renewables. The DR government announced on February 26, 2021, the approval of 10 new projects for a total of 800 MW of additional capacity of renewable energy (mostly wind and solar). *Less conventional sources such as tidal and waves energies, although would seem obvious options for an island nation, are not currently part of any public plans*. This is identified as an area of opportunity to be explored.

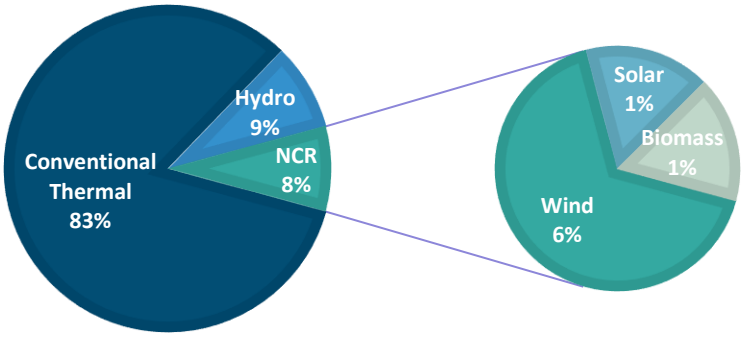

Figure 8: Participation of Non-conventional renewables (NCR) in power generation during the month of December 2020. Source: Ministry of Energy and Mines

Climate adaptation and sustainable watersheds

As indicated above, the DR is a country particularly vulnerable to climate change. It is also a very biodiverse territory[21], with 2 irreplaceable key biodiversity areas and the largest number of priority sites within the Caribbean islands' biodiversity hotspot. The island has extremely high species richness and endemism, and more than 181 species are listed as threatened, mainly due to habitat destruction.

Unsustainable development practices have severely impacted natural ecosystems needed for water production and climate adaptation. In the upper watersheds, unsustainable agricultural practices often lead to deforestation, erosion, and pollution that ultimately affects the marine environment. Cities, which house 80% of the country´s population, have severe deficiencies in wastewater and solid waste management. The tourism industry, which is one of DR´s main economic drivers, have negatively impacted large portions of the country´s coastal ecosystems. Regulatory gaps, low enforcement capacity and institutional overlaps, contribute to further exacerbate this situation.

Nature-based solutions have been identified as key for reducing vulnerability in the context of climate change adaptation. The two largest cities of the DR (Santo Domingo and Santiago) have undertaken to apply this approach by establishing Water Funds and are part of the Latin American Water Funds

[20] Monthly report on renewable energy. Energy transition project, DR Ministry of Energy and Mines / GIZ
[21] ECOSYSTEM PROFILE: THE CARIBBEAN ISLANDS BIODIVERSITY HOTSPOT, CEPF, 2019

Partnership[22]. These public-private initiatives promote Innovative financial mechanisms to ensure the sustainability of upper watershed conservation. The country has also engaged in several projects with collaboration from international agencies to implement nature based and ecosystems-based adaptation solutions in several pilot areas[23].

The Ministry of Environment with support from GEF and World Bank, is preparing to launch the *Integrated landscape management in priority the watersheds project*, which will strengthen integrated landscape management and expand the area under improved land use practices in specific watersheds of the Dominican Republic. It is based on a multisectoral and integrated spatial approach for the sustainable management of natural resources, considering the upstream and downstream impacts in the Yaque del Norte and Yuna basins (see Figure 9).

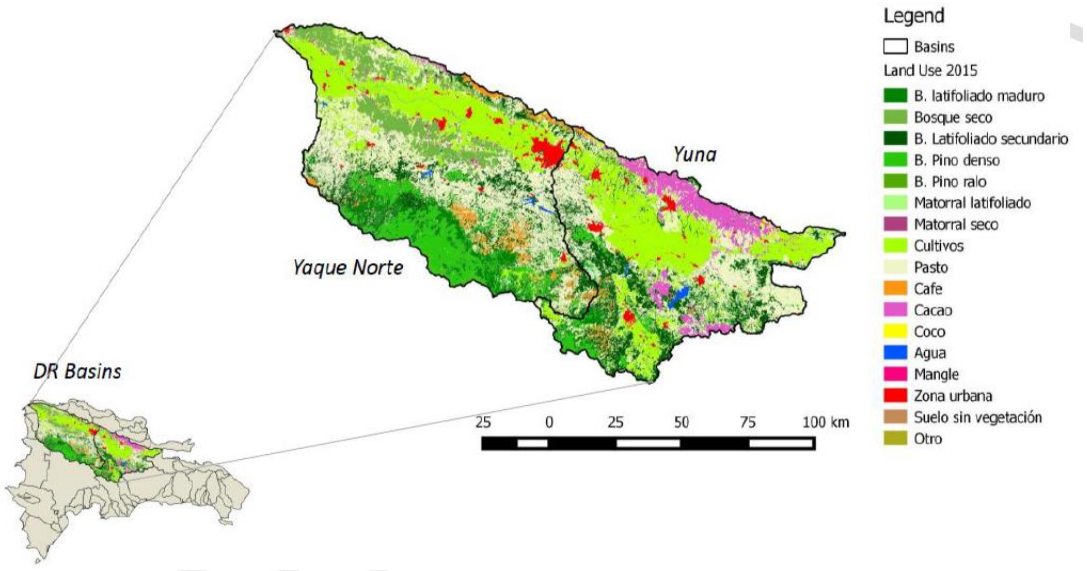

Figure 9: Priority watersheds for the Integrated Landscape Management Project. Source: Ministry of Environment

The DR Water Cabinet has announced that by the end of March 2021, a National Water Pact will be signed[24]. The agreement will recognize that "it is everyone's responsibility to create bridges and open doors to new ways of doing things, recovering trust, uniting wills, dialogue, promoting policies and collaborative solutions that allow us to build together the future of water for our country". The pact will serve as a social contract between the government and civil society, creating the policy framework for some 8,500 million US dollars in expected investment. The pact will emphasize four strategic objectives:

1. Water resources management and institutional framework, as the fundamental mechanism that mobilizes and enables solutions in the short and long term.

2.Protect and conserve our rivers and water systems, since they are the fundamental basis for life and any possible development.

[22] https://www.fondosdeagua.org/en/
[23] https://infoclima.intec.edu.do/
[24] https://canal4rd.com/director-de-la-caasd-revela-que-pacto-del-agua-sera-firmado-a-finales-de-este-mes/general/

3. Efficient and strategic use of water resources, where the demand for water must be managed responsibly.

4. Guarantee the human right to water, the protection of vulnerable sectors and productive diversification.

The following are a summary of measures and areas of interventions identified by the DR government as priorities:

- Water supply: measures aimed at increasing the supply or availability of water through the construction of new hydraulic infrastructure, including dams; forestation and conservation of catchments and water yielding areas.
- Water demand: Measures to reduce or manage the demand for water. Education plays an important role, but also metering and rates that reflect real costs.
- Water quality: Improved sanitation; pollution prevention and control from agriculture, mining and other industries; monitoring; groundwater protection; solid waste management.
- Institutional strengthening: Measures aimed at achieving improvements in the legal and institutional framework and technology, research, training.
- Agricultural practice: Measures in which farmers make decisions to modify the management of crops and their crops.
- Flood prevention: Measures aimed at providing protection against floods that endanger lives and livelihoods. Ecosystem based adaptation has been prioritized so far, but coastal and low-lying areas will need a mix of EbA and infrastructure. Also, non -structural measures such as the installation of early warning systems, monitoring and planning.
- Market: measures whose purpose is to create protection mechanisms for families and producers, such as agricultural and housing insurance.
- Governance: Reduced availability of water increases conflict. Measures aimed at establishing participatory and social accountability mechanisms for water resources management and water services.

Sea level rise, increased severity of storms and tidal surges due to climate change pose significant risks to coastal infrastructure, tourism, and cities in the DR. Pilot projects using ecosystem-based solutions, mainly coral nurseries and mangrove planting, are being implemented with modest success. This type of projects is almost exclusively implemented by non-profit organizations and have very little government support at this time. The government announced the building of coastal protection infrastructure on the northern coastal town of Puerto Plata for this year. Overall, the country lacks a comprehensive response plan for coastal protection in the context of climate change.

Conclusions and recommendations

The Dominican Republic has been one of the most consistently performing economies in the Latin American and Caribbean region for the past couple of decades. On the aftermath of the pandemic, the country is expected to prioritize public investment as a driver of economic recovery. The water sector in the DR faces significant challenges related to historical factors that are exacerbated by climate change.

The country must prioritize several areas that represent opportunities for collaboration with the Dutch water sector:

- Monitoring of surface and groundwater.
- Development of water resources information systems.
- Training and knowledge transfer in all aspects of water resources planning and management.
- Smart agriculture.
- Hydraulic infrastructure planning and design.
- Reduction of non-revenue water (loss detection and repairs).
- Water and wastewater treatment, pollution prevention and control.
- Demand side management.
- Waves/tidal energy development
- Coastal protection.
- Ecosystem based adaptation/ nature-based solutions.

An important first step is to make Dutch technology and solutions better known to Dominican institutions and professional organizations. To this end, universities in the DR can be an important ally.

The DR´s public procurement process can be confusing. Contracts above a certain threshold (currently DOP$4,846,824.00 for goods and services, and DOP$394,299,738.00 for building contracts) must be procured thru a competitive building process open to national and international bidders. The thresholds are revised annually and established in Dominican Pesos (DOP) thru a resolution from the Dirección General de Compras y Contrataciones (https://www.dgcp.gob.do/), which is the main authority for government procurement in the DR.

Bidders must be registered as government suppliers, but the registration can be completed just before presenting the bid. The process and all necessary resources can be found on-line, but only in Spanish (https://www.dgcp.gob.do/servicios/registro-de-proveedores/). Dominican law only requires bidding processes be published in national newspapers. A collection of daily publications can be found here. A summary of the different processes, referencing pertinent legislation and deadlines can be found here.

Projects financed by multilateral financing entities such as World Bank are usually subject to the financing entity procurement procedures. The WB site Doing Business offers an excellent summary of procedures, as well as updated information for establishing a business in the DR.

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More information

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