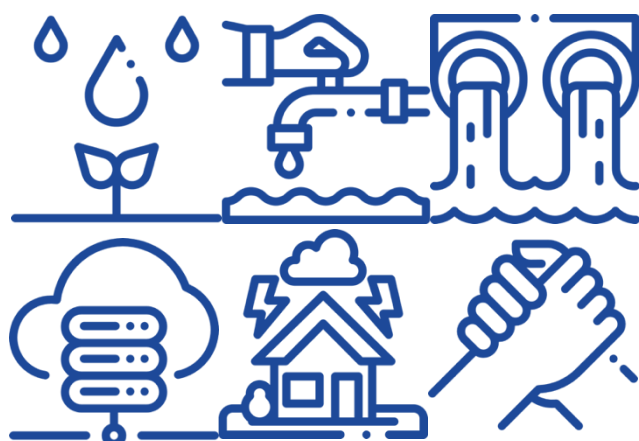


# Water Sector Study - Panama

January 2022







This report was commissioned by the Embassy of the Kingdom of the Netherlands in Panama and executed by the Netherlands Water Partnership (NWP), a network of app. 175 public and private internationally-oriented Dutch organizations. NWP is the first point of call internationally for anyone seeking Dutch expertise on water management issues or contact with the Dutch water sector.

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January 2022

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## 1. Introduction

Panama's exceptionally high levels of precipitation, rich watersheds, and abundant rivers make it one of the world's most water-rich countries. With approximately 33,000 m<sup>3</sup> freshwater per capita available, nearly six times the global average, Panama is well-endowed when it comes to this natural resource. However, Panama is currently facing various water-related challenges, even – paradoxically – water scarcity. Other challenges include equitable access to water and sanitation in rural areas, intense seasonal flooding, extreme levels of water consumption per capita, and marine and coastal challenges.

Water has become a strategic resource for Panama's socio-economic development. The Panama Canal, which has boosted economic growth and has provided Panama with a unique place in the global economy and in international affairs, is the flagship of Panama's water-driven economy. Due to the effects that water-related problems may have not only on Panama's economy and society, but on global trade, it is crucial that the country's water resources be managed adequately and sustainably.

This report is backed by insights from interviews with local stakeholders conducted by our local partner at the University of Panama in November 2021. The interviews were conducted with actors in different roles (public, private, NGO, and academia<sup>1</sup>) of the Panamanian water sector. Their goal was to gain deeper insights into the current state and needs of the sector, as well as understand the perspectives of the interviewees on prospective Dutch-Panamanian water cooperation. All interviews were conducted remotely. (For a summary of results from the interviews, please see Annex 1).

Results from both desk-research and the interviews conducted point to a need for integrated water solutions in the following areas: the water-agriculture nexus, data and monitoring, water availability and management, and wastewater and sanitation. Since many of the challenges found are driven or exacerbated by changing climatic conditions, an approach founded in climate resilience is also needed. The expertise and experience of the Dutch Water Sector (DWS) makes Dutch businesses prime candidates for entering the Panamanian market, which – even in the midst of the Covid-19 pandemic – enjoys a favorable business climate, high FDI, and is returning on its path to strong economic growth.

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<sup>1</sup> Interviewees were from the Universidad Marítima Internacional de Panamá (UMIP), an architecture and urban planning company, Wetlands International, Fundación Panama Sostenible (PASOS), three actors from the public sector with different roles within the Ministry of Health (Water and sanitation, and marginalized areas), and the National Aqueducts and Sewerage Institute (IDAAN).

## 2. Geographic overview and climatic conditions of Panama

On the isthmus which links the continent of North America to that of South America lies the Republic of Panama. Bordering Colombia to the east and Costa Rica to the west, the territory of Panama spans a total of 74,177 km<sup>2</sup>, and includes over 1,600 islands, mostly on its Pacific coast (Millet, et al., 2021). Panama is one of the countries in the world with the highest biodiversity when accounting for its relatively small land mass. To protect this biodiversity, over 30% of its land mass, and 12% of n protected under the National System of Protected Areas (*Sistema Nacional de Áreas Protegidas, SINAP*), mostly in the form of national parks and nature reserves, but also one biosphere reserve and two World Heritage sites (Ministry of Environment, 2020).



Panama has a population of 4,348,000 (2021), and is divided into 10 provinces, 5 indigenous reserves, 75 districts, and 621 *corregimientos*, or subdivisions of districts (Millet, et al., 2021).



Approximately one third of the Panamanian population (1.5 million) reside in the metropolitan area of its capital, Panama City (World Population Review, 2021).

Panama City lies near the southern entrance of the renowned Panama Canal, one of the world's most important maritime trade routes. The canal connects the Caribbean Sea and the Atlantic Ocean to the north with the Gulf of Panama and the Pacific Ocean to the south (see Figure 2). The 82 km long artificial waterway

allows ships to cross the isthmus in 8-10 hours, avoiding the lengthy and costly alternatives of circumnavigating around the continents of South America (Magellan route) or North America (Northwest Passage) (Gardham, 2021). The Panama Canal, together with the Colon Free Trade Zone, the world's second largest free trade zone behind Hong Kong's, assures the standing of Panama as a strategic player in global trade as well as in international affairs.

Panama's natural water formations include 52 river basins and approximately 500 relatively short rivers, of which the Chucunaque and the Tuira rivers are the longest. Both are approximately 230 kilometers long and flow into the Pacific. The third longest river in Panama is the Río Chepo (206 km), which flows into the Pacific as well and produces hydroelectric power via various dams. Rivers that drain into the Caribbean include the Chagres (125 km) which is also dammed, the Sixaola (146 km), and the Changuinola (110 km).

The damming of the Chagres river has produced Gatún Lake, Panama's largest lake (418 m<sup>2</sup>). Together with Alajuela (or Madden) Lake, Gatún Lake feeds the operations of the Panama Canal and provides much of the drinking water for Panama City and surroundings. In total, the Panama Canal watershed provides drinking water for around 55% of Panama's total population (Millett et al., 2021).

Whereas the area surrounding Panama City and the Panama Canal is situated in a depression, the rest of the mainland is bisected by two main mountain ranges. These are the Cordillera Central which includes the Tabasará Mountains in the west, and the San Blas and Darién mountain ranges in the east (See Figure 3). This division corresponds with the two main biomes of the country: tropical rainforest in the North, and tropical savanna in the south. The majority of the Panamanian population (70%) inhabits the Pacific side of this natural division.

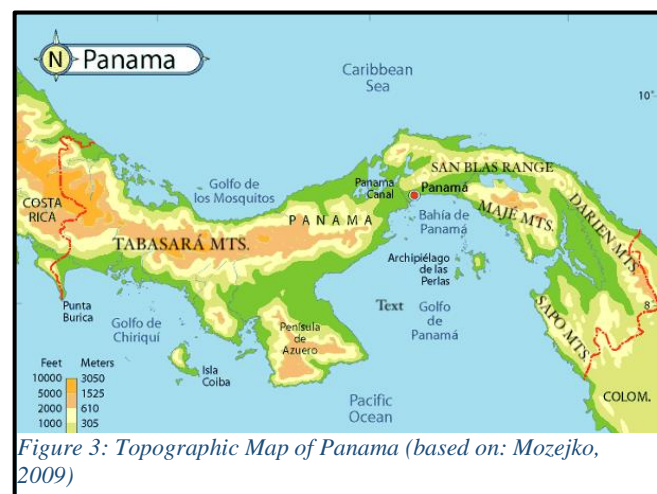


Figure 3: Topographic Map of Panama (based on: Mozejko, 2009)

It is Panama's diverse geographical conditions which also influence its climate. Panama has tropical temperatures, with temperatures ranging between 22°C and 30°C year-round. It is also one of the rainiest countries in the world, with an average annual rainfall of 2,107 mm, although this varies by region and season. The Caribbean side of the mountains receives approximately twice as much rainfall as the Pacific side due to the rain-carrying trade winds. Most rain falls during the rainy season from May to November (Millett et al., 2021).

## 2.1. Impact of Climate change

Situated in the climate-vulnerable Central American region, Panama is a climate change hotspot. Since the 1970s, average temperatures in Panama have increased between 1°C - 3°C, on average (World Bank Group, 2021a). The latest IPCC report states that warmer temperatures have also increased climate variability and the intensity of El Niño and La Niña in the entire Central American region (IPCC, 2021). This has led to more extreme and unpredictable rain weather events in Panama such as tropical cyclones and floods which threaten the Panamanian economy, its infrastructure, and various livelihoods.

Climate change has also led to a decrease in rainfall in recent years and in prolonged periods of drought. For example, near the end of 2015 and beginning of 2016, due to an extreme El Niño phenomenon, Panama experienced the driest period in 100 years (EFE Servicios, 2019). Such dry spells have been markedly increasing in frequency and intensity in the past decades (EIU, 2020). The historical drought of 2019 was also the result of a reduction of rainfall by 20% compared to historical averages and critically reduced water availability for the population and the Canal. Decreases in average rainfall will continue to result in marked stream changes and water availability (IPCC, 2021).

The impact of a changing climate is also starkly visible at Panama's marine coastlines. Both Panama's mainland coasts and the shores of its islands are being threatened by rising sea levels, coastal erosion and increased salinity in estuaries. The waters off its Pacific and Atlantic coasts are additionally experiencing ocean acidification, warming waters, and facing pollution as well as destructive fishing practices – all of which threaten the area's rich biodiversity and unique ecosystems (World Bank Group, 2021a).

Climate change and other environmental concerns thus represent a pressing strain on Panama's water security and quality. To deal with this challenge, the Ministry of Environment prepared the [National Strategy for Climate Change 2050](#), the country's roadmap for transitioning to a low-carbon economy while ensuring social development and improving adaptation and mitigation strategies.

Panama's main water-related challenges, oftentimes exacerbated by a changing climate, will be outlined below.



### 3. Main water-related challenges in Panama

Panama is well-endowed when it comes to the natural resource of water. It is fifth in the world in annual precipitation levels – second in the western hemisphere. It is flanked by two oceans, has around 500 rivers within its territory, and has a large supply of renewable freshwater resources available per capita (33,000 m<sup>3</sup> in 2017), nearly six times the global average (WorldBank, 2021b). Despite this, Panama suffers from various serious water-related challenges. The main one, paradoxically, being water scarcity.

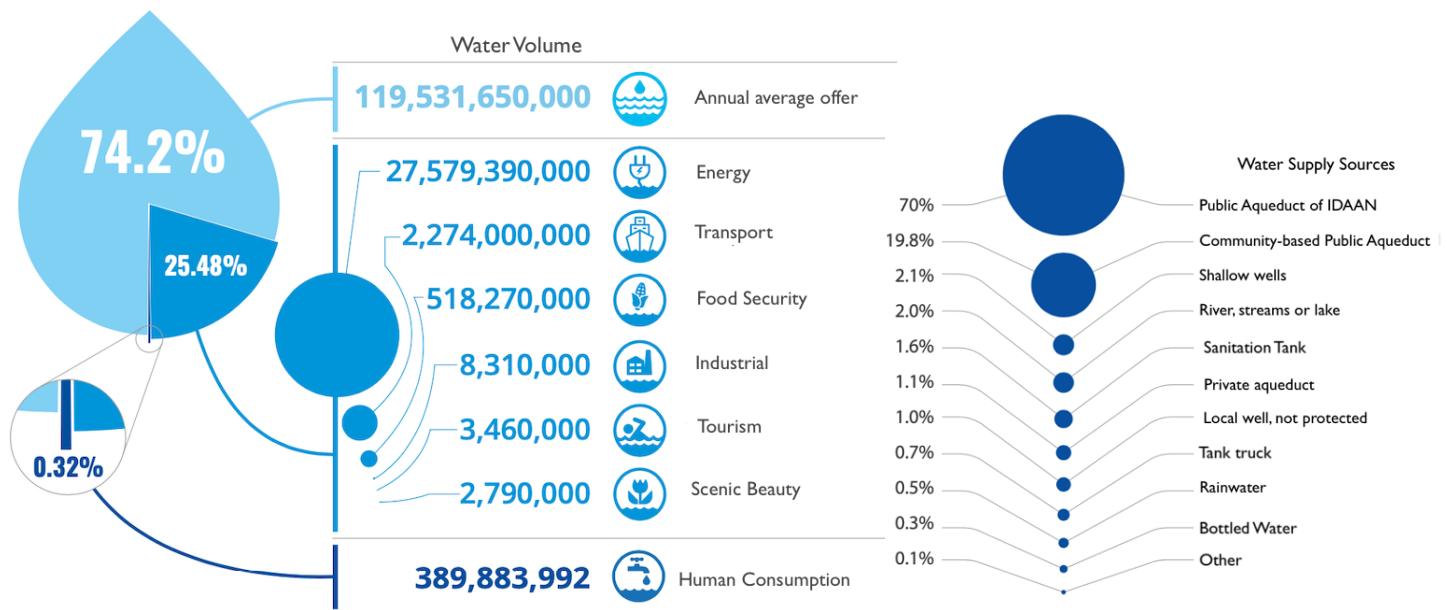


Figure 4: Water availability and use in Panama in m<sup>3</sup>, 2015 (Figure based on: Comité de Alto Nivel de Seguridad Hídrica, 2016).

#### 3.1 Challenge 1: Water scarcity and droughts

The main water-related challenge that Panama is facing is the low availability of freshwater, especially in the dry season. The most arid area prone to droughts is the 'Arco Seco' or the Dry Arch, which receives some of the lowest levels of rainfall of the country (950 – 1600 mm annually). Other critically dry and degraded areas include the Cerro Punta, and the indigenous reserve of Ngöbe Buglé and la Sabana Central Veragüense (See Figure 5).

As mentioned above, the decreasing levels of annual rainfall is a challenge partly exacerbated by climate change. However, both intense agricultural practices happening on 35% of the aforementioned dry lands and inadequate water-management are also large drivers of the arid conditions found here. Rivers, such as those in Darién province in the South-east of the country are also increasingly influenced by rising tides resulting in low quality, turbid, brackish waters.

**Opportunity for DWS:** Irrigation technologies, circular water use in agriculture, IWRM.

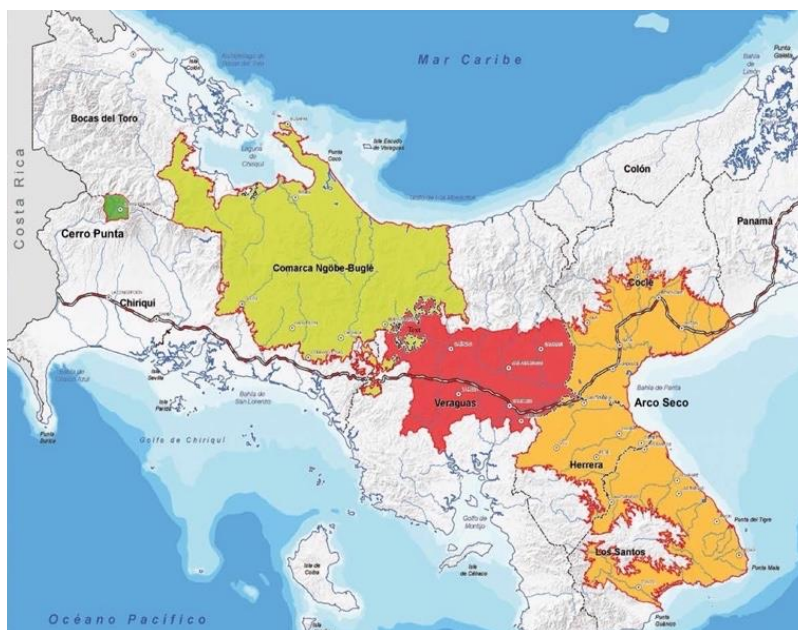


Figure 5: Map of dry and degraded areas of Panama (Source: Autoridad Nacional del Ambiente, 2009)

**Opportunity for DWS:** Desalination, dredging, marine contractors, NbS.

Intensifying freshwater scarcity and recurring droughts are leading to three sub-challenges in the following areas.

### 3.1.1 The Panama Canal

The first of these 3 sub-challenges: these issues are threatening the proper functioning of the Panama Canal, the engine of the Panamanian economy. The historically low levels of precipitation of recent years have begun to critically deplete Gatún Lake and Alajuela Lake, which sustain the Canal. These rain-fed artificial lakes were respectively 1.4 and 2.2 meters below their average levels in the dry season of 2019, a critical year for the canal (EIU, 2020). Gatún lake has additionally lost extra volume through evaporation since the temperatures of its waters have increased by 1.5° C in the past decade (EIU, 2020). A depleting and warming lake not only threatens the functioning of the entire Panama Canal, but also the biodiversity in the lake's waters, and the local drinking water supply.

**Opportunity for DWS:** Integrated solutions, environmental conservation, surface water management.

In response to the drought of 2019, the Panama Canal Authorities (ACP) resorted to reducing the number of ships allowed to pass through the canal per day from 32 to 27, as well to reduce the maximum weight of their cargo (ACP, 2020a). This resulted in lower fuel efficiency, higher costs, and increased pollution (Pérez, 2021). The 2019 drought led to \$15 million USD in lost revenues (about \$40 million USD were lost as a result of the historical 2015/2016 drought) (EFE Servicios, 2019). To make up for loss of revenue a “freshwater” fee of \$10,000 USD was also implemented in February of 2020 for ships longer than 38 meters, plus a surcharge depending on the water levels of Gatún Lake at the time of transit. These are, however, short-term measures which in the

long run can only narrow the clientele of the canal, harming not only the Panamanian economy but global CO<sub>2</sub> levels as well with much lengthier maritime routes being the only current viable alternatives.<sup>2</sup>

Another short-term response to the decreased levels of water of the Panama Canal, included the suspension of generation of hydroelectric power at Gatún. With more than half of Panama's energy production stemming from hydropower, this solution has increased price of hydroelectricity, and in turn increased the dependence on non-renewable, but more polluting sources of energy such as coal and oil. Long-term solutions for guaranteeing water availability for the canal are being [investigated](#) by the ACP and include finding other water sources for the canal through building new reservoirs and pumping or desalinating seawater.

**Opportunity for DWS:**

Decarbonization of maritime sector, renewable energy generation, digitalization of processes.

It is relevant to note that in April of 2021, the ACP announced plans to become carbon neutral by 2030, with plans of investing approximately \$2.4 billion USD in the modernization of its infrastructure and equipment to achieve this goal (ACP, 2021). Other planned investments include \$2.8 billion USD in maintenance and \$500 million in digitalization (ACP, 2021).

### 3.1.2 Drinking water and sanitation levels

The need to supply the Canal with the 7.5 billion litres of freshwater per day required to lift vessels across it, must be balanced with the need to guarantee drinking water for the Panamanian population – representing the second main challenge related to water scarcity in Panama. The population of Panama has more than doubled in the past 40 years from 1,978,000 in 1980 to over 4 million in 2021. Combined with a quickly developing economy, rapid industrialization and urbanization, this population growth has increased demand for water greatly.

A compounding factor is that Panama faces high levels of water consumption per capita (507 litres per person per day), more than 2.5 times the global average (189 litres) and the highest in Latin America (IDB 2020). A [study](#) by the Inter-American Development Bank (IDB), showed that when measuring three variables with usually a high correlation for water consumption (income per capita, rate of urbanization, price of water), Panama's water consumption should theoretically only be about around half of its current rate (250 litres per person per day). Three compounding factors explain this: the low price of water in Panama, and the high levels of non-revenue water (NRW) which arise due to low metering<sup>3</sup>, frequent non-payments, and aging infrastructure.

**Opportunity for DWS:**

Recycling and reuse of domestic water, urban resilience solutions, rainwater harvesting, water pricing, NRW management.

<sup>2</sup> It is estimated that ships crossing the Panama Canal have allowed a reduction of 13 million tons of CO<sub>2</sub> when compared with alternative trade routes such as the Magellan Route or Northwest Passage (Panama Canal Authorities, 2021).

<sup>3</sup> The [study](#) by the IDB investigated water and Sanitation Services in Latin America. It found that Panama is an outlier in

These inefficiencies in water consumption are, problematically, also coupled with inequalities in distribution of water and sanitation services. In 2020, nearly 94% of the population had access to basic drinking water in Panama, which is higher than countries in the same regional context, such as Guatemala (87%) and Nicaragua (79%), but lower than countries with similar levels of GDP per capita, such as Costa Rica and Chile (both over 99%). A similar pattern emerges when comparing access to safely managed sanitation services, which 85% of the Panamanian population had access to in 2020 (JMP, 2021) (See Figure 6).

However, stark differences appear between rural and urban areas in the country, as well as between different socio-economic classes when it comes to levels of drinking water and sanitation.

For example, while nearly all of urban areas have access to drinking water (98%), only 86% of rural areas have access. One-third of rural populations also do not have access to basic sanitation services, whereas in urban areas, this percentage is less than 7% (JMP, 2021) (See Figure 6). Results from the interviews reaffirm a need for better sanitation services as well as waste-water treatment plants as domestic and industrial waste flows currently contaminate the drinking water sources of many communities.

**Opportunity for DWS:**

Waste-water treatment and service provision.

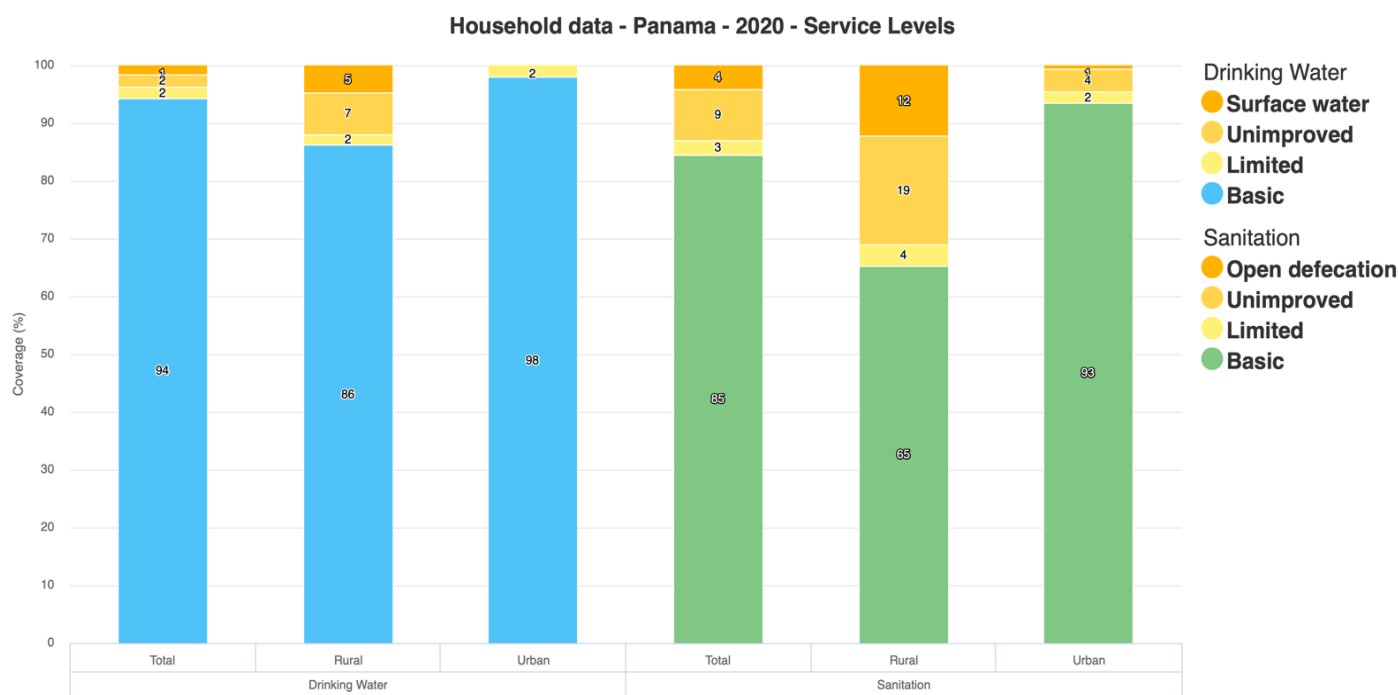


Figure 6: Total, urban and rural access to drinking water and sanitation in Panama (JMP, 2021)

terms of metering levels. Whereas in the other 18 Latin American countries surveyed, a majority of respondents reported having access to and using individual water meters, the share of Panamanian respondents reporting *no* access to meters is nearly the same as the share who *do*. This makes monitoring of (own) water consumption difficult, and efficient payment schemes challenging. The study mentions, however, that the installation of meters is often not the responsibility of the consumer, but a decision of the water provider.



Income levels are also important determinants of access to sanitation, with 47% of the poorest sector lacking any basic levels of sanitation (around 389,000 people), compared to less than 1% of the richest (JMP, 2021) (See Figure 7).

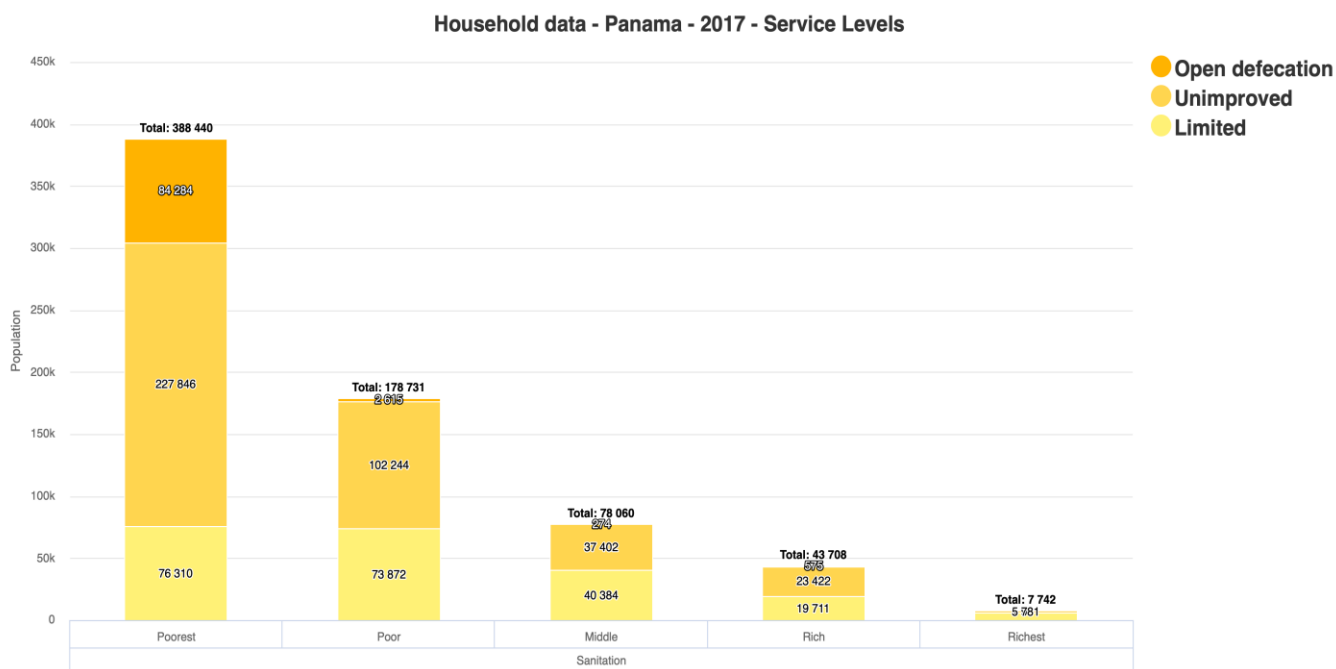


Figure 7: Population lacking basic sanitation by income levels, 2017 (JMP, 2021)

These inequalities intersect with the marginalization that indigenous communities already face. In 2010, more than 61% of the population in the Ngöbe Buglé indigenous reserve did not have access to drinking water (INEC, 2010), and more than 59% did not have access to any sanitation service system (Ministry of Health, 2015). One of the interviewees of this study confirmed the specific need for maintenance of WSS in the Ngöbe Buglé reserve and in other rural, low-income communities living in close proximity to wetlands. Indigenous and rural communities often play an important role in the conservation of critical natural areas but are the ones most at risk of suffering from water insecurity and its related health hazards.

**Opportunity for DWS:**  
Rural water & sanitation programs, capacity building.

This challenge is also, however, an opportunity for the reduction of poverty and inequality, since access to properly managed water resources are a critical source of socio-economic development. As a report by the World Bank on the impact of climate change on Panama stated: “The potential impacts of climate change on Panama’s most vulnerable population should be prioritized” (World Bank, 2021a). Having adopted the United Nations Sustainable Development Goals as a roadmap for development, Panama should be advancing urgent progress to attain SDG6, universal and equitable access to drinking water and sanitation for all in the coming eight years (reaching the SDG timeline of 2030).

### 3.1.3 Food security

A final sub-challenge stemming from water scarcity in Panama is food insecurity, which threatens the attainment of SDG 2 of 'Zero Hunger'. Around 30% of Panama's land is used for agriculture. Most of this land can be found in the west, where a majority of the country's dry and degraded lands are found. For example, much of the country's rice, one of its main food staples, is farmed in the Arco Seco and Chiriquí province. Since 85% of the Panama's rice crop is rainfed (FAO, 2019), this situation results in high food insecurity. The vulnerability of the Panamanian agricultural sector to climate variability is an important challenge that must be tackled.

**Opportunity for DWS:** Water-food nexus, irrigation, circular agriculture, resilience.

## 3.2 Challenge 2: Flooding

Intense flooding caused by intermittent extreme rain events is a second water-related challenge that Panama is facing. More intense downpours are in part occurring due to climate change. However, the extreme damage caused by these events to infrastructure, agriculture, and livelihoods can be traced to three more proximal sources.

**Opportunity for DWS:** Resilience, flood protection, DRR.

First, as was reported by the Minister of Environment in 2018, a main cause of destructive flooding in Panama is the country's aging infrastructure, specifically outdated storm drains (Moreno, 2018). The consequences of extreme weather events in the wet season intensify when basins and storm-water runoff are inadequately managed.

A second factor which is increasing risks from flooding is deforestation. According to the last official statistics on forest cover from 2019, Panama has one of the highest forest covers in the Central American region (65%) (Ministry of Environment & GIZ, 2020). However, between 2001 and 2020, Panama has lost 441,000 hectares of its tree cover, of which 19% was primary forest (Global Forest Watch, 2021). Most deforestation in Panama is found in the provinces of Veraguas, Darién, and Panamá, in which Panama City and the Panama Canal are located (Ministry of Environment, 2019). Deforestation is mainly driven by the expansion of agricultural activities such as cattle ranching, but also by illegal logging.

Finally, intense agricultural practices in the region have degraded natural ecosystems, reducing the soil's ability to store water, leading to higher risks when floods occur. Deforestation also has other impacts, however: A loss of forest cover is directly impacting the water quality in Panama's watersheds due to increased levels of sedimentation in rivers and basins. Deforestation also threatens water availability in various areas. For example, the rainforest in the Panama Canal Watershed, which helps to regulate the canal's water levels during the dry season, has decreased in size substantially – contributing to the water instability previously mentioned threatening the

functioning of the Panama Canal (Ministry of Environment, 2019). However, various conservation measures are being taken to protect water basins and regulate the hydrological cycle, mitigating also the effects of climate change.<sup>4</sup>

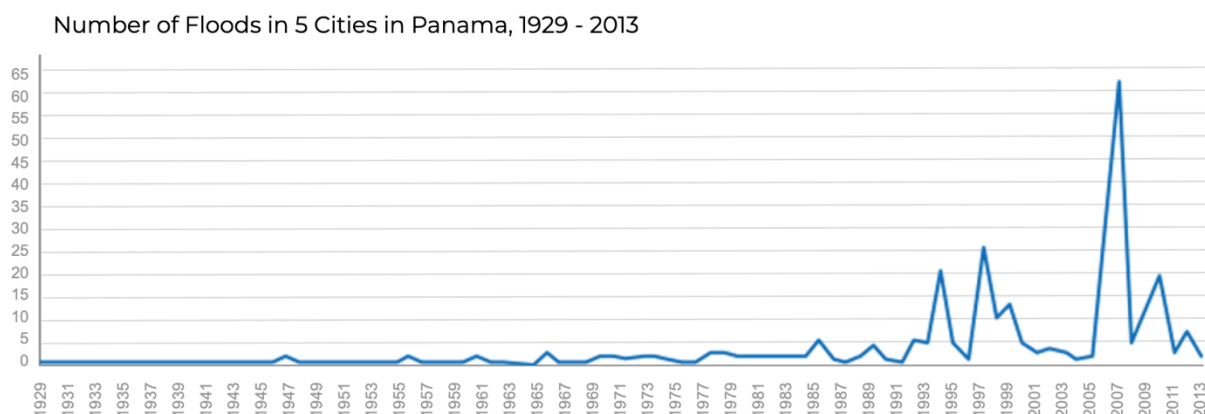


Figure 8: Number of Floods in 5 major cities in Panama from 1929 - 2013 (Based on: Comité de Alto Nivel de Seguridad Hídrica, 2016).

### 3.3 Challenge 3: Coastal and Marine Deterioration

The final water-related challenge affecting Panama is with regards to its coastal stability and marine ecosystems. Due to rising sea-levels, coastal erosion is threatening coastal settlements and habitats. Increased salt-water intrusion is contaminating aquifers and Panama's rich mangrove zones which form a natural barrier against storm surges have decreased by more than half since 1980 (Autoridad de los Recursos Acuáticos de Panamá, 2019). Panama's coasts, especially on the Pacific, are resource-rich and high in biodiversity. The waters offshore act as a feeding ground for many marine species, including endangered fish stock and 14 species of marine mammals of which 12, such as the blue whale, fin whale, and sperm whale, are also threatened (Smithsonian TRI, 2021). However, pollution starting upstream and inland is increasingly ending up in Panama's waters. Ocean acidification, warming waters, and (illegal) fishing resulting in biodiversity depletion are also growing problems. In response to this, Panama has recently made strides in ocean conservation measures, including tripling the size one of its protected areas (The Cordillera de Coiba) to 67,742 square kilometers in 2021 – a size almost

**Opportunity for DWS:**  
Coastal management, monitoring mechanisms, data-driven analytics.

<sup>4</sup> These conservation measures are spearheaded by the Ministry of Environment, civil society, and (inter)national NGO's, and the other actors in Panama's WSS institutional framework (summarized in chapter 3). Conservation projects include the goal of reforesting 1 million hectares between 2015-2035, the National Programme for Forest Restoration (*Programa Nacional de Restauración Forestal, PNRF*), and the regional (Latin America and Caribbean) 20x20 initiative. These measures aim to align Panama with the REDD+ framework and the goals set out by the 2015 Paris Agreement.

equivalent to that of its entire land mass. With this recent development, Panama is set to protect at least 30% of its waters before 2030, meeting the 30x30 standard set to protect at least 30% of global oceans by 2030. This is in line with achieving SDG 14, or securing the conservation and sustainable use of oceans, seas and marine resources. However, to guarantee the protection of this new area, effective monitoring practices and tech-driven monitoring tools are needed (Maldonado, 2021).

The abovementioned water-related challenges that Panama faces threaten the country's economy, its infrastructure, and the livelihoods its inhabitants. They expose an increasing need for improved and climate resilient water management. Panama's legal and institutional framework with which such water challenges are addressed will be explained in greater detail in the following section.

### 3. Political environment

#### 3.1 Legal framework of the Panamanian water sector

Panama knows various legal mechanisms regulating water resources management and water rights. The 1972 Constitution, last amended in 2004, establishes the fundamental right to water and defines the obligation of the Panamanian State to guarantee this right within a healthy environment free of contaminants (Art. 118). It defines the state's obligation to regulate and secure the rational benefit of waters, to avoid their misuse, and to ensure their preservation, renewal and permanence (Art. 120). It also, importantly, states that water is public good which may not be privately appropriated (Art. 258). Title 14 of the Constitution is dedicated entirely to the Panama Canal. It appoints the Panama Canal Authority (ACP) as responsible for the administration, maintenance, use and conservation of the watershed of the Canal, including water from its lakes and tributaries.

The Panamanian Water Law (*Ley 35 Sobre el Uso de las Aguas*), approved in 1997 is the main body of national law regulating the right to the use of water resources, and their management. Two other relevant mechanism of law are the General Law on Environment of the Republic of Panama (*Ley 41, Ley General de Ambiente de la República de Panamá*) of 1998, and the Law 44 of 2002. The first promotes the sustainable use of the country's natural resources by establishing the main principles and norms of protection. The second establishes an administrative regime for the management, protection and conservation of watersheds in Panama. It also proposes the creation of watershed committees and integrative management plans.



## 3.2 Institutional framework of the Panamanian water sector

Four bodies dominate the WSS sector of Panama: the National Aqueducts and Sewerage Institute (*Instituto de Acueductos y Alcantarillados Nacionales, IDAAN*), the National Authority for Public Services (ASEP), the Ministry of Environment (MiAmbiente, formerly ANAM), and the Ministry of Health (MINSa).

### 3.2.1 IDAAN (and JAAR)

The main water provider in Panama City is the IDAAN created in 1997 by Law 98. This government owned company is responsible for supplying drinking water and wastewater management in urban areas and rural communities with over 1.500 inhabitants. It operates 56 water treatment plants that provide services to 197 corregimientos (subdistricts). In total, it serves approximately 2,6 million people, or 68% of Panama's total population.

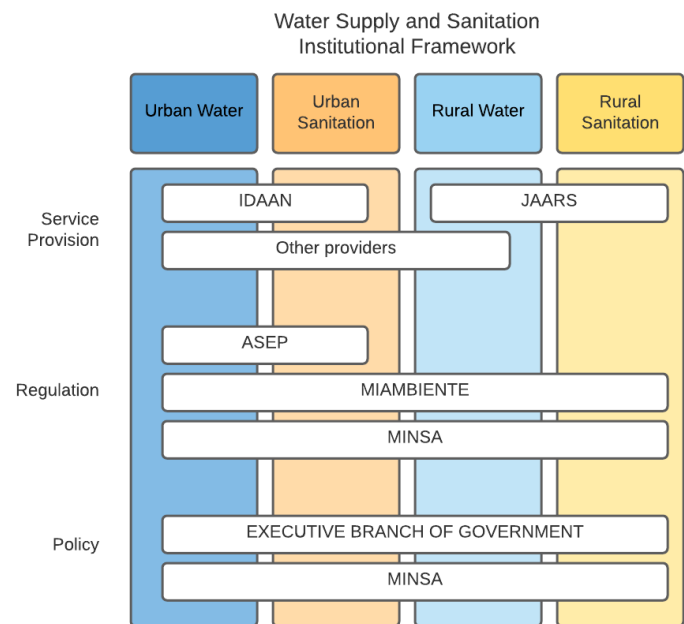


Figure 9: Institutional Framework Water and Sanitation Sector (Based on: RVO, 2018)

The remaining rural 32% not covered by IDAAN, where most of Panama's marginalized and indigenous populations reside, have access to water and sanitation only through locally organized water committees named JAAR (*Juntas Administradoras de Acueductos Rurales*). Although data on the workings of these committees is largely absent, it is known that their organizational strength varies greatly, that water supply is intermittent, and concerns over water quality arise frequently (Castillero, 2019; Arosemena & Grau, 2016; World Bank et al., 2016).

The IDAAN also aims to address Panama's water-related problems, explicitly promoting awareness in the Panamanian population regarding rational water use through environmental education campaigns,<sup>5</sup> reducing non-revenue water through enforcement and replacement of infrastructure, increasing drinking water and sanitation coverage, and optimizing water purification and wastewater treatment plants (WWTP) (IDAAN, 2019). In 2021, with a new director, its transformation is focused on digitalization, and technology-driven innovation.

**Opportunity for DWS:**  
Technology and data-driven knowledge exchange, WWTP.

<sup>5</sup> Including the [AGUA ¿Quién te dijo que será para siempre?](#) (WATER, who told you it would last forever?) campaign of 2020. Other similar campaigns such as the *MiAmbiente en tu Barrio* (Environment in your Neighbourhood) and environmental awareness programmes have been carried out recently by collaborations between the Ministries of Environment, of Health, and of Education.

Various concerns regarding the functioning of the IDAAN have been identified. The World Bank (2017), for example, identified that less than half of the *corregimientos* that should be covered by IDAAN (those with over 1.500 inhabitants) actually are being covered, leaving smaller and rural populations at the periphery of clean water and sanitation provision. Second, water tariffs have not been updated since 1982. This, in combination with the low levels of household metering and NRW are have been found to contribute to the extreme levels of per capita water consumption outlined earlier (Garcimartín et al., 2020).

### 3.2.2 ASEP

The National Authority for Public Services (*Autoridad Nacional de los Servicios Públicos, ASEP*) supervises and regulates the provision of services, including the provision of drinking water and sanitation. Other services regulated by ASEP are the provision of electricity, telecommunications, radio and television, and natural gas. ASEP was created by Law 10 in 2006 as an autonomous body of the State with legal personality and its own patrimony, with the right to administer it and with separate and independent funds from the Central Government by reforming the 1996 of the former Regulatory Entity of Public Services (*Ente Regulador de los Servicios Públicos*).

### 3.2.3 MINISTRIES OF ENVIRONMENT AND HEALTH

The National Authority of the Environment (*Autoridad Nacional del Ambiente, ANAM*) was created in 1998 through Law 41 and was dedicated to regulating and monitoring the compliance with laws, policies and regulations on the country's natural (water) resources. In 2007, the ANAM also started the [National Plan of Integrated Water Resources Management](#) (*Plan Nacional de Gestión Integrada de los Recursos Hídricos, PNGIRH*) which seeks the efficient and sustainable management of water by orienting and coordinating the actions of the public sector, private sector, civil society, and all actors involved with the country's water basins. It was financed by the IDB-Netherlands Water Partnership (INWAP).<sup>6</sup> In 2015, ANAM was renamed into the Panamanian Ministry of Environment (*MiAmbiente*), which has taken over its activities.

The Ministry of Health (*Ministerio de Salud, MINSA*) also plays an important role in water provision via its Directorate of Drinking Water and Sanitation (*Dirección del Sub-sector de Agua Potable y Alcantarillado Sanitario, DISAPAS*). DISAPAS formulates, coordinates, and implements the policies and strategies of the drinking water and sanitation services sector. It also focuses specifically on coordinating and promoting service delivery in rural areas.

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<sup>6</sup> In 2002, the Inter-American Development Bank and the Ministry of Foreign Affairs of the Netherlands set up IDB-Netherlands Water Partnership (INWAP) – not to be confused with the Netherlands Water Partnership (NWP) – with the aim of improving the work of the IDB on integrated water management, helping the banks borrowing member countries to improve their technical capacity, enhancing coordination among donors, and mobilising resources.

Together with the IDAAN, the Ministry of Health also started the [Panama's Sanitation of the City and Bay Programme](#) (*Programa Saneamiento de Panamá*) in 2015 which aims to improve the sanitation, environment, and health of the population in the metropolitan area of Panama City, especially in low-income neighborhoods, by treating wastewaters and avoiding contamination of urban rivers and coastal zones.

**Opportunity for DWS:**  
Tenders for wastewater and sewage Panama City and Bay 2022 – see more information in chapter 5.

### 3.3 National Water Security Plan 2015-2050

In 2015, the IDAAN, ASEP, the Ministries of Health and Environment, together with the ACP and other ministries (Economy and Finance, Agriculture, Public Works) were consolidated into the High Level Committee on Water Security. This Committee was tasked with preparing the [National Water Security Plan 2015-2050: Water for All](#), a short-, medium-, and long-term roadmap for improving quality of life, ensuring inclusive socio-economic growth, and safeguarding the integrity Panama's water resources. It provides a diagnosis of Panama's current water situation, and identifies 5 national goals which mirror the challenges identified in the current study:

- Goal 1: Universal access to high quality water and basic sanitation services
- Goal 2: Water for inclusive socio-economic growth
- Goal 3: Preventative management of water-related risks
- Goal 4: Healthy river basins and ecosystems
- Goal 5: Water sustainability and prevention of water-related conflicts

The National Water Security Plan also created a national water council (Consejo Nacional del Agua (CONAGUA), responsible for coordinating and guaranteeing the development and implementation of the National Water Security Plan.

## 4. Economic environment and investment climate

This chapter will provide a general overview of the economic environment in Panama, which is necessary to subsequently identify opportunities for the DWS. This will be done by providing an overview of the macro-economic situation in the country, including the impacts of Covid-19, discussing the most vital economic sectors on which the Panamanian economy is built, and describing the investment climate.

## 4.1 Macroeconomic Overview

Panama's USD-based economy has been developing rapidly in recent years, spurred by the latest expansion of the Panama Canal in 2016 (Focus Economics, 2021). Before the Covid-19 crisis, Panama was one of the strongest growing economies in Latin America and the Caribbean (LAC) with an average annual growth of 4.7% between 2014 and 2019 (World Bank, 2021b). The LAC region, on average, only grew at a fifth of this rate (0.9 %) (World Bank, 2021b). Despite the setbacks caused by Covid-19 (described in more detail below), Panama continues to be a regional hub for trade, logistics, and finance.

The abovementioned growth has helped to reduced poverty levels. However, it has not benefited all (socio-economic) groups equally. With a Gini coefficient of 49.8 (2019), Panama is one of the countries in Latin America with the worst income distribution (SEDLAC, 2021). More than half of the country's income share is held by the richest 20% and around 5% of its population still lived below the poverty line of \$3.20 a day in 2019 (the average for Latin America living below this poverty line was 9% in the same year) (World Bank, 2021b; Our World in Data, 2021).

Panama has been described as a 'dual economy', comprised of two highly segmented economic sectors. One is the productive, fast-growing, and internationally oriented services sector, accounting for 65% of the country's GDP in 2019 (World Bank, 2021b). The Panama Canal, the Colon Free Trade Zone (CFZ), and Panama's banking and financial centre are the flagships of this sector. This sector stands far removed in terms of productivity, development, technology, and investment from the rest of the economy, resulting in profound economic and regional inequalities (Puerta et al., 2020).

The rest of the economy includes the industry, which contributes to nearly 30% of GDP in 2019, the manufacturing sector contributing to 6% of GDP and the agriculture, forestry and fishing sector which contributes to 2% of GDP and employs over 14% of the labour force (World Bank, 2021b).<sup>7</sup> This sector is especially vulnerable to natural disasters: Hurricane Eta in November 2020 caused an estimated \$11 million USD in losses in the agricultural sector alone (Coface, 2021).

INDICATOR	2019 (BEFORE COVID-19)	2020 (DURING COVID-19)
GDP (US \$)	66,787,900	52,938,100
GDP Annual Growth Rate	3.04%	-17.9%
GDP per Capita (US \$)	15,728.0	12,269.0
Inflation (CPI)	-0.355%	-1.6%

Figure 10. Overview Economic Indicators Panama (World Bank, 2021b).

<sup>7</sup> GDP composition percentages may exceed 100. Manufacturing is included in the Industry figures and is also reported separately because it plays a critical role in many economies (Global Edge).



#### 4.1.1 Significance of Panama Canal

The opening of the Panama Canal in 1914 opened the country to international trade and accelerated its economic development, especially after control was handed over from the United States to Panama in 1999. Currently, 6% of all global trade passes through the canal. The Panama Canal closed its fiscal year 2021 with a record 516.7 million tons CP / SUAB (volume measure of the Universal System of Ships of the Panama Canal) of cargo (ACP, 2021). In 2020, the Canal contributed 27.6% of the government's total revenue, or \$1,8 billion USD (ACP, 2020b).

Other large publicly funded infrastructure projects have also driven economic growth in recent years, including new and improved highway and public transportation networks, and the expansion of the Tocumen International Airport (Focus Economics, 2021).

As one of the most important global trade routes, and the backbone of the Panamanian, economy, any disruptions in the workings of the Canal can result in major instabilities. Therefore, a significant priority and challenge is to ensure the working and efficiency of the Canal in the context of abovementioned water-related challenges of weather and water extremes.

#### 4.1.2 Impact of Covid-19.

Panama was one of the countries in Latin America hardest hit by the Covid-19 pandemic. GDP contracted 17.9% in 2020, and labour market income reduced by 18% (World Bank, 2021c). The government responded with various public spending measures including [Panama Solidario](#), which helped to mitigate the pandemic's negative socio-economic effects (World Bank, 2021c). With growing vaccination rates and lessened restrictions, economic activities started to recover throughout 2021. Between January and June of 2021, GDP reached an accumulated growth of 10%, with an important expansion of GDP being achieved in the second quarter (40.4%) (Ministry of Economy and Finance, 2021).

### 4.2 Investing and Doing Business in Panama

In general, Panama's central and accessible location, dollarized economy, strong and consistent economic growth, and various tax incentives have attracted strong levels of foreign investment. Panama is the country receiving most Foreign Direct Investment (FDI) in Central America, with a record \$5,891 billion USD of FDI in 2019 (The World Bank, 2021b). Panama's top trading partners are China, the United States, and Ecuador, but the Netherlands and Panama are also important partners (The Observatory of Economic Complexity, 2021). The Netherlands was the second biggest destination for Panama's exports in Europe, and its 6<sup>th</sup> biggest export partner worldwide for 2020 (DataSur, 2021). In 2019, Panama exported \$280 million USD to the Netherlands, while the Netherlands exported \$125 million USD to Panama (The Observatory of Economic Complexity, 2021).

Global Competitiveness Index (2019)	61.64/100
Ease of Doing Business Index (2020)	86 <sup>th</sup>
Global Corruption Index (2020)	111 <sup>th</sup> /180
Top 5 countries of FDI (2018-2020)	United States, Colombia, Switzerland, the United Kingdom, and Spain
Top exports Panama - to Netherlands	Bananas (\$197M), Rubber Tires (\$50.2M), and Melons (\$13M)
Top imports Panama - from the Netherlands	Engine Parts (\$11.8M), Rolled Tobacco (\$11.3M), and Packaged Medicaments (\$9.31M)

Figure 11. Investment and Trade Indicators Panama (Schwab, 2019; World Bank Group, 2020; Transparency International, 2020; The Observatory of Economic Complexity, 2021)

The Ease of Doing Business Index by the World Bank ranked Panama 86<sup>th</sup> in the world in 2020. The index identified that the main challenges to doing business in Panama include contract enforcement, protecting minority investors, and resolving insolvency (See Figure 13). Additionally, understanding and managing Panama's territorial tax system and labour laws are important pre-requisites to doing business in Panama. A significant concern, voiced in the study's local interviews, is the high administrative burden (in terms of obtaining local funds) of the country's bureaucratic governing system. As such, it could present a challenge for achieving Dutch investment in Panama.

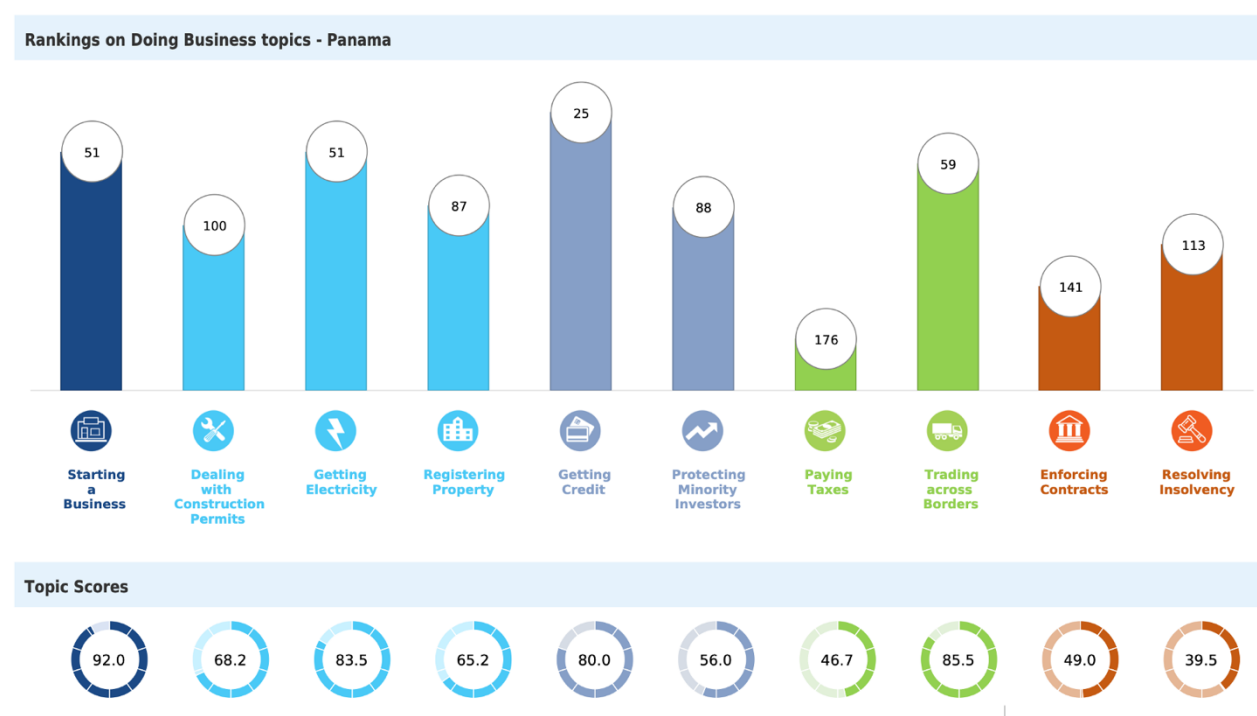


Figure 12 - Ease of Doing Business Index Results for Panama 2020 (World Bank, 2020). Rankings (top) show the standing of Panama on a global level. Topic Scores (bottom) show scores (0-100) attributed by the Index to Panama for each Doing Business topic. of Economic Complexity, 2021)

The Netherlands Water Partnership (NWP) and the Embassy of the Kingdom of the Netherlands in Panama are close collaborators in terms of disclosing market access for the Dutch water Sector in Panama. Another valuable local contact is [Holland House Panama](#), the Dutch-Panamanian Chamber of Commerce, directed by Remco de Bruijn. Holland House Panama has identified that apart from opportunities in the fields of agro-logistics, maritime, retail, and the services sector, one of the main opportunities for Dutch companies in Panama lie in the water sector, particularly in the context of resilience (Holland House, 2021).

## 5. Water-related opportunities for the Dutch water sector

Given the Netherlands' position as a frontrunner in water-management and innovation, this study and the interviews with local stakeholders point to the following opportunities for the Dutch water sector in Panama.

### Water-Agriculture Nexus



For dry and degraded soils arising from intense agricultural practices (chapter 3.1), there are opportunities for irrigation technologies and the promotion of circular water use in agriculture for fostering drought resilient agricultural practices. The interconnectedness between intense agriculture practices, soil degradation, flooding, water scarcity and food insecurity (chapter 3.1) calls for Integrated Water Resources Management backed by the appropriate infrastructure, knowledge, and public participation.

### Data & Monitoring



Panama's protected marine areas and watersheds demand effective monitoring practices and tech-driven monitoring tools (chapter 3.3). Interviews with local stakeholders also indicate a high demand for technological tools in other areas for the monitoring, planning, and design of all water-related projects. For example, the need for integral monitoring networks in the country's basins, and for calculating water balances so as to determine and regulate flows for users and avoid competition, was mentioned.

### Water Availability, Supply, and Resource Management



To tackle the challenge of water scarcity in Panama – and therefore reduce its impact on the Canal, water and sanitation, and food security – there is a need for better management and storage of excess water during wet seasons and wet years. In short, to reduce Panama's vulnerability to extreme weather events, its dependence on rain, and increase efficiency in terms of water use. This has been confirmed by the interviews conducted in this study. Dutch expertise and innovations can support efforts at identifying 'new' sources of water for Canal and the population of the area, for example through desalination

technology, rainwater harvesting, circular use of water, storm-water management, dam, reservoir, and river-flow management and improved groundwater management and monitoring.

Given the government's measures and attempts at growing awareness of the value of water, there are also ample opportunities for companies focused on the recycling and reuse of water in domestic and public spheres, such as in houses, apartment blocks, schools, hospitals and offices. The interviews with local stakeholders furthermore confirmed the need for more investment in water projects in difficult to access rural communities, as well as for the maintenance of aqueducts and capacity building in these areas.

### Wastewater and sanitation



There is a need for improving access to sanitation and the treatment of industrial and residential wastewaters, both in rural and urban areas (chapter 3.1.1.). Interviewees also specified this need, as well as better water treatment technologies for the management of hospital-derived waste flows. Two tenders have also recently been put out by the Sanitation of the City and Bay Programme. The Embassy of the Kingdom of the Netherlands in Panama has signaled these as promising opportunities for Dutch companies. The tenders are for:

1) Designing and constructing a wastewater collection system in one of Panama's most polluted rivers (Matasnillo River). The project is worth \$60 million USD and is financed by the Inter-American Development Bank. Deadline for submitting proposals: March 1, 2022.

2) Validation of construction plans, operation and management of the sewage systems of three cities/corregimientos in the province of Panama Oeste (West Panama). It is worth \$80 million USD and is financed by the Latin American Development Bank (CAF). Deadline for submitting proposals: January 14, 2022.

For more information see [here](#).

### Climate and resilience



As a response to increasing prevalence of extreme weather events, flood protection measures are needed to timely and effectively manage such events. Solutions must importantly factor in the effects of a changing climate, integrate disaster-risk planning and systematize climate resilience measures. Thus, Dutch expertise and technology in (urban) resilience, adaptation and mitigation, NbS, and stakeholder management can aid. This may be done within the frameworks of the **Resilience Strategy of the Municipality of Panama** and/or **National Strategy for Climate Change 2050** which mentions the need for (technical)



cooperation with international actors in various issue areas – drinking water, inadequate pluvial infrastructure, rainwater drainage networks early warning systems, meteorological monitoring mechanisms, irrigation systems, groundwater management, coastal and marine resource management, coastal infrastructures.

The interviewees also pointed out that one of the main needs of the Panamanian water sector was the integration within urban design of green and blue infrastructure which is able to withstand the effects of climate change and manage the risk of natural disasters. One interviewee mentions that the vision of water management only comprising of water and sanitation is already shifting to one of long-term sustainability.

### Partnerships



The abovementioned areas of water and agriculture, data and monitoring, water availability and management, wastewater and sanitation, and climate and resilience are those with highest priority and opportunity for collaboration between the Netherlands and Panama. In any such collaboration, three considerations must be considered:

- > It is imperative that knowledge transfer occur both ways. As one of the interviewees indicated, the ecosystemic, social, political, and legal context of Panama is different than that of the Netherlands. Therefore, it is essential to make use of local knowledge when initiating a venture in Panama.
- > There are opportunities for obtaining a better understanding of the functioning of CONAGUA, the national water council created by the National Water Security Plan and aligning Dutch involvement with their interests.
- > The public actors interviewed considered that large companies have the greatest room and best prospects for investments in Panama. The academic and the private sector interviewees agreed. The non-governmental actors interviewed, however, also highlighted the possibility of Dutch companies to invest in SME's since these are usually more flexible and adaptive, and the post-pandemic effect has created a job niche to boost these companies. However, the interviewees from the NGO sector also recognize that high (perceived) costs of Dutch collaboration may be a prohibitive factor for Panamanian SME's to collaborate with larger Dutch companies.

## 6. Conclusions

This report aimed to present an overview of the water-related challenges and opportunities found in the Panamanian water sector in order to inform DWS actors interested or active in Panama. If interested in further guidance or information, please contact the **Netherlands Water Partnership (NWP)** or the **Embassy of the Kingdom of the Netherlands in Panama**.

This report backed by interviews with local stakeholders found that the value of water for Panama and its 4.3 million inhabitants is great. Their battle with extremes – from abundance to scarcity, and flooding to droughts – presents a challenge, especially in the face of worsening climate change. But, as this report finds, the opportunities for improvement, especially in the areas of water & agriculture, data and monitoring, wastewater and sanitation, and climate resilience, are promising. The DWS stands well positioned to enter the market and provide the expertise, technology, and tools necessary to meet this demand.

In doing so, the DWS can help secure year-round and equitable water security, especially in marginalized and underprivileged areas, and ensure the health of critical watersheds and ecosystems. It thus fits within Panama's broader strategy for sustainable development, and the UN-SDG's. Panama – Netherlands cooperation in water also greatly benefits both country's economies and when in line with optimizing water availability for the Panama Canal, can even contribute to impacting global trade.

## 7. Annex - Further analysis of interviews with local stakeholders

The interviewees recognized the added value that Dutch investments would bring to the Panamanian water sector but also recognize possible challenges for effective collaboration. These results are summarized in the table below.

<p>Perceived strengths of DWS seen by interviewees as opportunities for Panama's water sector</p>	<ul style="list-style-type: none"> <li>&gt; Water and sanitation infrastructures (and other public works that may help reactivate the economy post Covid-19), process systematization, water quality monitoring.</li> <li>&gt; Ecosystem and mangrove restoration, use of recovered ecosystems to promote its ecosystem value.</li> <li>&gt; Strengthening of institutions for more effective water governance.</li> <li>&gt; Market mechanisms for more effective water governance.</li> <li>&gt; Community and stakeholder involvement.</li> <li>&gt; Capacity building of communities for local water management and of technical staff, for example of DISAPAS.</li> <li>&gt; Collaboration with academia: one interviewee from the nongovernmental sector proposes the DWS to invest in human capital and mentions the possibility of creating study conventions and scholarships through the Secretaria Nacional de Ciencia, Tecnología e Innovación (SENACYT) with the aim of generating 500 water specialists by 2050 for water management within context of economic development.</li> </ul>
<p>Perceived challenges to Dutch – Panamanian water cooperation</p>	<ul style="list-style-type: none"> <li>&gt; A challenge mentioned by one of the interviewees from the private sector is that in the urban planning in Panama, considerations for water and its value are not yet at the forefront as they are in the Netherlands. This might prohibit or at least slow down innovation in climate-resilient designs.</li> <li>&gt; A challenge mentioned for implementing blue and green infrastructures in urban areas is that much urban development is occurring on leveled or destroyed grounds, making it challenging to incorporate existing green spaces into new urban design.</li> <li>&gt; Another challenge mentioned by an interviewee from the nongovernmental sector is reaching the implementation phase of plans. She indicates that there is a need for better long-term planning to strategically guide projects from beginning to end.</li> <li>&gt; One interviewee mentions that transparency in business can be improved by adopting, implementing and following international standards for transparency to facilitate business, both with local and international partners.</li> </ul>

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