



FSD Africa, UMOA-Titres

Feasibility Study on Deployment of Financial Instruments to Address Environmental and Climate Change Challenges in Saint-louis, Senegal



Report
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Executive Summary

FSD Africa and UMOA-Titres (UT) commissioned Genesis Analytics as a consulting partner to develop a study that determines the feasibility of deploying a financial instrument to address climate change, environmental and/or waste management challenges in the city of Saint-Louis, Senegal.¹ The study departs from a comprehensive assessment of the environmental challenges facing the city, and of its enabling environment through a SWOT analysis. A UNESCO World Heritage, where coastal erosion has become an existential threat, Saint-Louis main environmental challenges include exposure to climatic hazards (particularly severe coastal erosion and floods); land and ecosystem degradation; fishery decline and rarity of fish species; and poor waste management and other urban challenges.

After the initial diagnostic phase, the study maps the remedial initiatives that are best placed to tackle the identified challenges, and lists the financial instruments that could be deployed to implement such solutions. An initial group of eighteen financial instruments were considered so long as they could be deployed to execute some of the potential

remedies explored: The disaster risk finance toolkit; Nature-based Solutions (e.g., sustainable aquaculture, ecotourism, green roofs); Climate-Smart Agriculture (e.g., capture fisheries and aquaculture, energy Management); carbon markets (biodiversity protection); waste management initiatives and green urban initiatives. The instruments comprise typical funding tools (funds, bonds, securitization structures, etc), results-based finance mechanisms, and insurance.

The study concludes by pointing out that Saint-Louis Senegal, has the opportunity to capture a greater portion of the international climate finance flows available globally, through the deployment of Impact Bonds. This report provides an in-depth analysis explaining why this tool was chosen for the particular context of the city. Its flexibility in regards to scale and sector, its capacity to generate positive impact by fostering valuable partnerships, its great potential to be scalable and replicated once the first case is implemented, and its capacity to crowd in private capital, are some of the reasons that explain the choice.



Saint-Louis Senegal. Colourful pirogues under the trees on the beach.

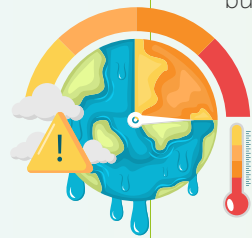
¹ In general, in this report we refer to "Saint-Louis" as the city and "Saint Louis" as the region for differentiation purposes.



1. Context

In Saint-Louis, former capital of Senegal and a UNESCO World Heritage site since the year 2000, the effects of climate change are posing an existential threat. Saint-Louis, or Ndar as it is called in Wolof, is the third city in Senegal and the capital of Senegal's Saint Louis Region²; it has a total estimated population of ~258,000 (~1.1 million in the region)³, of which approximately 80,000 (~30%) live in densely populated fishing neighbourhoods, and many live in a high-risk zone under constant attack from flooding and coastal erosion. This situation, although familiar to many coastal cities across the globe, is more acute and urgent in Saint-Louis: between 2019 and 2020 more than 2,000 people -mostly inhabitants of the fishing district of Guet N'dar, north of the city- lost their homes to the sea.⁴ The World Bank, which has provided significant support in the city, estimates that 10,000-15,000 people in the city are either already displaced or live within 20 metres of the high-risk zone.⁵

Informal commerce is the main source of employment, particularly for women and neo-urbanites, due to the low level of qualification and investment required. In general, since 1990, the tertiary sector (particularly trade, tourism and teleservices) has become an important component of economic activity.⁶ Fishery plays a fundamental role, but it is recently experiencing multiple threats. Agricultural activity in the city is scarce and concentrated in the new suburbs. As Thomas Maillard, an academic geographer illustrates: "Saint-Louis is not known for its agriculture. It is in the news for its colonial architectural heritage listed by UNESCO, its artisanal fishermen with colourful pirogues, and lately, coastal erosion which, with climate change, is increasingly threatening buildings and their inhabitants in the coastal neighbourhoods.



However, when one goes eastward into the more recent suburbs, one comes across the agricultural belt of the town, which welcomes neither tourists nor journalists.⁷

Located downstream of the Senegal River delta, the city of Saint-Louis has physical characteristics that make it especially vulnerable. Geographically, the city comprises three entities: the district of Sor, the island of Saint-Louis, and the Langue de Barbarie (see Box 1). The latter is a coastal spit of sand that stretches for ~40 kilometres from Mauritania, through the south of Saint-Louis to the mouth of the Senegal River.⁸ The Langue de Barbarie acted as a natural barrier between the Atlantic Ocean and the Senegal River but prevented a rapid evacuation of water from the river during floods. In October 2003, to protect Saint-Louis from flooding during the rainy season, the Senegalese government ordered an artificial 4-metres breach in the Langue de Barbarie (hereafter "the breach") ~7 kilometres south from the island of Saint-Louis. Since then, the breach has been expanding and it is now close to 6 kilometres wide. Although the breach now allows the river's water to drain more quickly during floods, the environment has been severely disturbed, and closer to the estuary, the island of Saint-Louis is much more vulnerable to ocean tides and therefore to rising sea levels.⁹

2 The Saint Louis region has 3 departments, 7 sub-departments, 19 communes, 18 rural communities, making a total of 38 local authorities. See http://www.ansd.sn/ressources/ses/SES_Saint_Louis_2008.pdf

3 See Direction des Statistiques Démographiques et Sociales. https://www.ansd.sn/ressources/publications/Rapport_projection_version_12fev06.pdf

4 See Rigaud, Kanta Kumari; de Sherbinin, Alex; Jones, Bryan; Adamo, Susana; Maleki, David; Abu-Ata, Nathalie E.; Casals Fernandez, Anna Taeko; Arora, Anmol; Chai-Onn, Tricia, and Mills, Briar. 2021. Groundswell Africa: Internal Climate Migration in West African Countries. Washington, DC: The World Bank. Pg 119.

5 See World Bank: <https://www.worldbank.org/en/news/press-release/2018/06/07/senegal-world-bank-supports-10000-people-affected-by-climate-change>

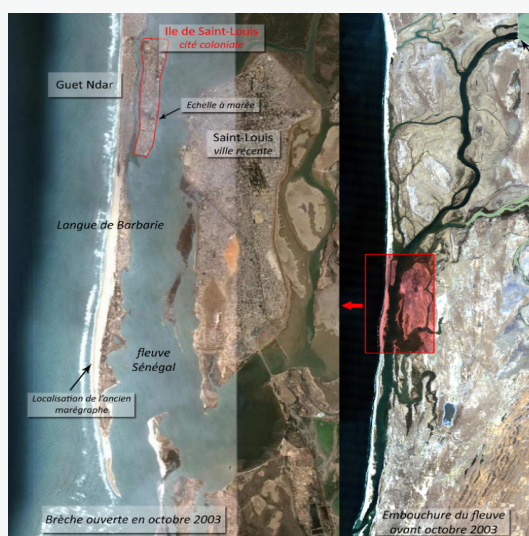
6 See Saint-Louis 2030, Nouvelle métropole africaine : Dossier d'analyse. https://www.academia.edu/36706327/Saint_Louis_2030_Nouvelle_m%C3%A9tropole_africaine_Dossier_danalyse.

7 See Maillard, Thomas (2018). Cultiver en ville, cultiver la ville : maîtriser l'urbanisation dans les quartiers agricoles de Saint-Louis (Sénégal).

8 See Lepoint.fr Changement climatique: l'avertissement venu de Saint-Louis du Sénégal https://www.lepoint.fr/afrique/changement-climatique-l-avertissement-venu-de-saint-louis-du-senegal-23-09-2020-2393320_3826.php

9 See Paul Durand, Brice Anselme et Yves-François Thomas, « L'impact de l'ouverture de la brèche dans la langue de Barbarie à Saint-Louis du Sénégal en 2003: un changement de nature de l'aléa inondation ? », Cybergeog : European Journal of Geography [En ligne], Environnement, Nature, Paysage, document 496, mis en ligne le 27 avril 2010.

Box 1. Map of Saint Louis and the Langue de Barbarie



Source: <http://journals.openedition.org/cyberge/docannexe/image/23017/img-1.png>

- After the opening of the breach in 2003, the strip has grown wider (from 4 metres to close to 6 kilometres in 2021).
- The island of Saint-Louis is much more vulnerable to ocean tides and therefore to rising sea levels.
- The World Bank estimates that 10,000 people in the city are either already displaced or live within 20 metres of the high-risk zone.
- The Government of Senegal as well as the international community have embarked on several initiatives to reduce the vulnerability of populations to climatic hazards and to strengthen urban and coastal resilience.

In response, Senegalese authorities began building a sea wall in 2019, with an estimated cost of around USD 100 million, partly financed by France. The sea barrier will run 3.6 kilometres (~2.2 miles) along the coast.¹⁰ Furthermore, international institutions are also contributing with funding and local presence, and they have launched initiatives such as the following:

- The World Bank is financing a USD 30 million Saint-Louis Emergency Recovery and Resilience Project (SERRP) to reduce the vulnerability of 10,000 – 15,000 people threatened by flooding and coastal erosion that has left more than 2,000 people homeless and strengthen urban and coastal resilience planning in the city. The project includes the construction of temporary homes in a displacement camp in Djougop, inland.¹¹
- The Stormwater Management and Climate Change Adaptation Project (PROGEP), USD 90.6 million, is also partially funded by the WB and is being implemented by the Municipal Development Agency (ADM). The project started in 2012 and has received additional funding from the WB in 2015, and from the Global Environment Facility (GEF) through the Sustainable Cities Initiative (SCI) in 2017. It has completed a series of diagnostic studies in the two pilot sites contributing to a better understanding of the vulnerability and risks associated with climate change to which their territories are exposed.¹²
- The Africa Caribbean Pacific (ACP) along with the European Union (EU) Natural Disaster Risk Reduction (NDRR) are implementing a USD 400,000 project «Strengthening Urban and Coastal Resilience in Saint Louis», supporting the Government of Senegal by facilitating evidence-based decision-making for improving the living conditions of vulnerable communities and strengthening coastal zone management and urban planning in the city of Saint-Louis.¹³

10 See Senegal's old capital on the frontline against rising sea <https://nation.africa/kenya/news/africa/senegal-s-old-capital-on-the-frontline-against-rising-sea-3572300>

11 Ibid.

12 See PROGEP: From flood control to the promotion of sustainable cities. <https://www.thegpsc.org/sites/gpsc/files/adm-capitalisation-note-t2-en-web-191217.pdf>

13 See Strengthening Urban and Coastal Resilience in Saint-Louis <https://www.gfdr.org/en/senegal-strengthening-urban-and-coastal-resilience-saint-louis>

At the municipal level (the city is mostly funded by state transfers), the mayor of Saint-Louis (Monsieur Mansour Faye) has stressed that the municipal team will strive to make significant investments to ensure that the city regains its former glory and meet international standards.¹⁴ To do so, multiple infrastructure projects have been put in place, mostly funded by the Senegalese State and multilateral banks and development institutions, including:

- Multiple roads in the municipal area as well as other infrastructure projects such as Pikine Guinaw Rail site, a large performance hall, a modern bowling alley, a mini swimming pool, a basketball court, an IT space, an administrative building and modular rooms, financed from the consolidated State budget and from the proceeds of the sale of scrap from the Faidherbe bridge.
- Construction of the sanitation network, which was taken up throughout the island of Saint-Louis, financed by the Arab Bank for Economic Development in Africa.
- Landscaping and urban furniture will be carried out at the same time, thanks to the Tourism Development Program (PDT) and funded by the French Development Agency (AFD).
- The hydro base health post, built with

resources granted by the State to the municipality and whose site will soon be delivered to the town hall which will be responsible for completing the work and finding the necessary equipment for its commissioning.

- Other projects have started or will start in Saint-Louis, through the Support Program for Municipalities and Agglomerations of Senegal (PACASEN).

So far, according to local consultations, there has been little involvement of the private sector at scale. High concentration of economic activity and investment in the capital Dakar, lack of access to initial capital (upfront investment) needed, lack of projects with a clear profit incentive, and lack of appropriate governance and local technical capacity, were commonly cited as potential causes. Instead, collective initiatives in Saint Louis compensate for the shortcomings of the state and the private for-profit sector, mainly in terms of employment and collective services. Low investment capacity on the part of the public authorities, leads local actors to enter into partnerships with the private cooperative sector and obtain financial support from donors without compromising their legitimacy.¹⁵

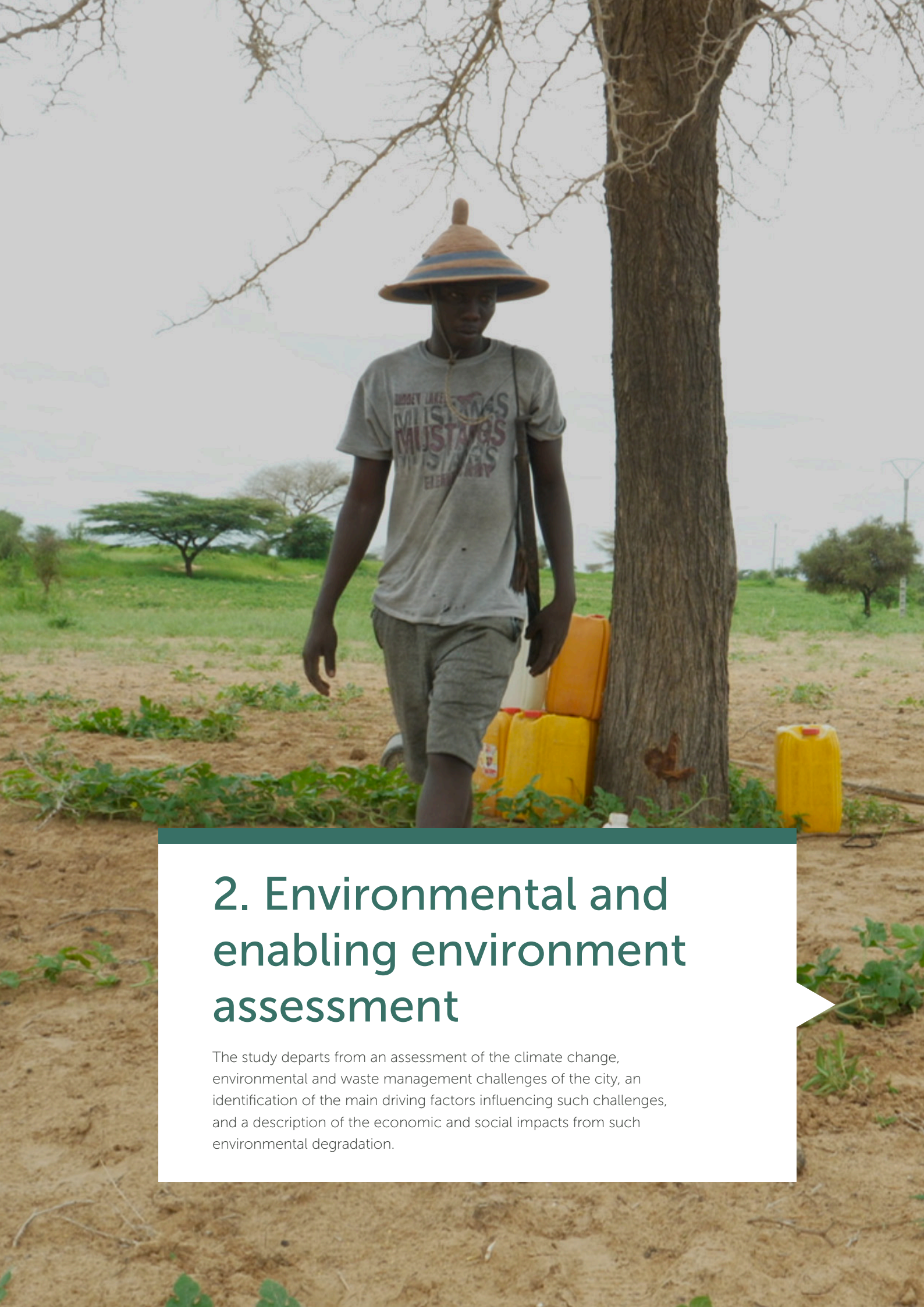


Saint-Louis, Senegal. Photos: Philippe Gagnebet (Reporterre le quotidien de l'écologie)



¹⁴ See Lequotidien <https://lequotidien.sn/saint-louis-reponse-a-ses-adversaires-mansour-faye-fait-son-bilan-pour-janvier-2022/>

¹⁵ See Maillard, Thomas (2018). Cultiver en ville, cultiver la ville : maîtriser l'urbanisation dans les quartiers agricoles de Saint-Louis (Sénégal).



2. Environmental and enabling environment assessment

The study departs from an assessment of the climate change, environmental and waste management challenges of the city, an identification of the main driving factors influencing such challenges, and a description of the economic and social impacts from such environmental degradation.



2.1 Environmental assessment: the extent of damage, causes and consequences

The region of Saint Louis has a Sahelian-type climate with a dry season alternating between freshness and heat from November and June, and a hot and humid rainy season from July to October. The city is located in the tropic and is also part of the Sahelian zone, in a desert border separating the dunes of the Sahara from the savannas (see Box 2). The soil is frequently windswept by the hot and dry wind that emanates from the Sahara Desert, creating sandstorms most often during the Harmattan period between November and March. During the rainy season the river overflows its banks and the city is surrounded by flood basins, attracting multiple species of birds.¹⁶ The average annual temperature in the city is 34, and its annual amount of precipitation is 379 mm. The highest point of the city is ~3.9 metres above sea level. Located in the mouth of the Senegal River, Saint Louis faces the risk of long periods of drought and flooding during rainy seasons, river overflow, and severe coastal erosion. In 2008, UN-Habitat designated Saint-Louis as the African city most threatened by rising sea levels due to climate change and the opening of the breach.¹⁷

The consequences of increased temperature, evapotranspiration, and decreased precipitation have contributed to desertification in dryland areas in Sub-Saharan Africa.¹⁸ Earlier versions of the Intergovernmental Panel on Climate Change (IPCC) already reported that increases in global mean surface temperature relative to pre-industrial levels affect processes involved in desertification (water scarcity), land degradation (soil erosion, vegetation loss, wildfire, permafrost thaw) and food security (crop yield and food supply instabilities). In fact, desertification and land degradation are among the main causes of low agricultural productivity in Senegal. This partly explains why close to 67% of

the country's population resides in the urban coastal zone, along with 90% of its industrial production. Senegal's coastal area is characterised by low-lying, rapidly expanding, high population suburbs, high water tables and poorly planned drainage systems.¹⁹

Sea levels on the West African coast are rising by between 3.5 and 4 millimetres annually.²⁰ The technical summary of the Special Report on Ocean and Cryosphere in a Changing Climate (SROCC), informs on the regional hazards and impacts across the Tropical Atlantic Ocean where the Saint-Louis coastline is located. The special report claims a "high degree of attribution confidence" that i) greenhouse gases (Ghg) have caused ocean pH to decrease (decreasing pH corresponds to increasing ocean acidification), and ii) climate change has had a negative impact on the coral ecosystem. (see Box 3).



¹⁶ See <https://www.saintlouisdusenegal.com/geographie-climat-de-saint-louis-senegal/>

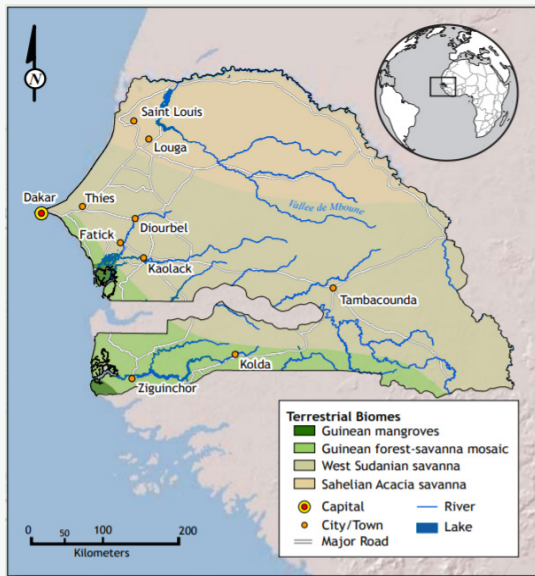
¹⁷ See Disaster Risk Reduction (UNDRR). <https://www.unisdr.org/campaign/resilientcities/cities/senegal/saint-louis.html>

¹⁸ See IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

¹⁹ USAID. Climate change risk profile Senegal. https://www.climate-links.org/sites/default/files/asset/document/2017_USAID%20ATLAS_Climate%20Change%20Risk%20Profile%20-%20Senegal.pdf

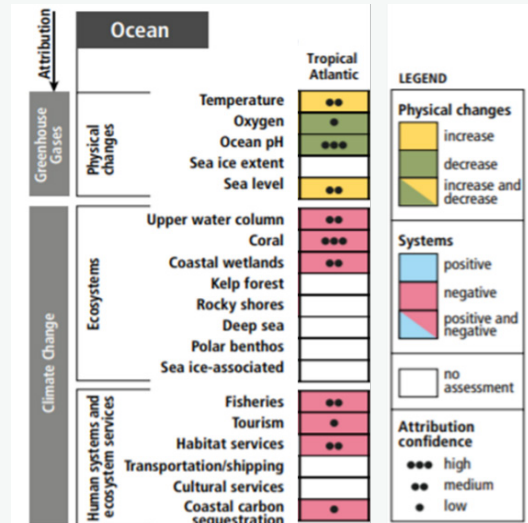
²⁰ See IPCC, 2019: Summary for Policymakers. In: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems.

Box 2. Map of the climatic variations of Senegal



Source: World Bank. Climate Risk and Adaptation Country Profile, 2011.

Box 3. Synthesis of observed regional hazards and impacts assessed in Special Report on Ocean and Cryosphere in a Changing Climate (SROCC)



Source: IPCC, 2019: Technical Summary. Special Report on the Ocean and Cryosphere in a Changing Climate Pg. 14/34

Going beyond the former macro-climate regional tendencies, a body of academic journals as well as local consultations and journalistic articles addressing the environmental situation in Saint-Louis, have led us to list the following environmental challenges as the most pressing for the city. For each of these factors, the study identifies the extent of the damage, a list of immediate causes, the driving factor type, the consequences and impact and the SDGs that are directly affected (see Table 1). It is worth noting that due to the closely related causal interlinks, most of these challenges are intertwined, and can be seen both as causes and consequences of one another.

1. Exposure to climatic hazards: coastal erosion, floods, drought, rising water.
2. Land and ecosystem degradation: saline water intrusion and desertification.
3. Fishery decline and rarity of fish species.
4. Poor waste management.
5. Other urban challenges.





1. Exposure to climatic hazards: severe coastal erosion, floods

Climate change is causing sea level rises, heavier rainfall and higher temperatures in Saint-Louis.²¹ Between 2000 and 2018, there has been a retreat of the Saint-Louis coastline by 0.35 metres per year, and IPCC scenarios of sea-level rise of 1.5 metres and 2 metres would lead to flooding on 12% and 15% of the territory.²² The villages of Doun Baba Dièye (~700 inhabitants) and Keur Bernard (~250 inhabitants) have already disappeared, and inhabitants of the neighbourhood of Guet N'dar, north of the city- lost their homes to the sea due to inundations in 2019.²³ So far, journals report that over 2,500 people have been displaced inland to a camp at Khar Yalla.²⁴ As indicated above, the World Bank has estimated that 10,000-15,000 people in the city are either already displaced or live within 20 metres of the high-risk zone.²⁵

Causes	Driving factor by type	Consequences - Impact	SDG's affected
<ul style="list-style-type: none"> - Climate Change and global warming causing sea level rise. - Opening of the breach of the Langue de Barbarie. - Influence of distant high-energy events (storms) in the North Atlantic impacts wave climate of the West African coast.²⁶ 	<p>Mostly external.</p> <p>Mainly natural (climate and geophysical forces) exacerbated by anthropogenic factors (opening of the breach).</p>	<p>-Affected livelihoods, displacement and increased vulnerability of the population.</p> <p>-Infrastructure loss and damaged. Wave erosion of the residual spit has led to the destruction of villages, tourist facilities and infrastructure.²⁷</p>	<p>13: Climate Action</p> <p>3: Good Health & Well-Being</p> <p>5: Gender Equality</p> <p>10: Reduce Inequalities</p>

21 Jonathan Silver, Cheryl McEwan, Laura Petrella & Hamidou Baguian (2013). Climate change, urban vulnerability and development in Saint-Louis and Bobo-Dioulasso: learning from across two West African cities, *Local Environment: The International Journal of Justice and Sustainability*,

22 See SAMBOU Djiby, FALL Aïdara Chérif A Lamine, DIALLO Mamadou Aguiou, MBAYE Mamadou Lamine. «Résilience socio-écologique des communautés vulnérables du delta du fleuve Sénégal face au changement climatique», *Foundation Croix-Rouge française, Les papiers de la Fondations*; and Paul Durand, Brice Anselme et Yves-François Thomas, « L'impact de l'ouverture de la brèche dans la langue de Barbarie à Saint-Louis du Sénégal en 2003: un changement de nature de l'aléa inondation? », *Cybergeo : European Journal of Geography*.

23 See Le Monde 2013, https://www.lemonde.fr/planete/article/2013/12/11/pres-de-saint-louis-du-senegal-la-mer-engloutit-les-villages_3529136_3244.html

24 See Minority Rights Group International. Senegal: the impact of the climate crisis on the fisher community of St. Louis. <https://reliefweb.int/report/senegal/senegal-impact-climate-crisis-fisher-community-st-louis>.

25 See World Bank <https://www.worldbank.org/en/news/press-release/2018/06/07/senegal-world-bank-supports-10000-people-affected-by-climate-change>

26 See Mamadou Sadio, Edward J. Anthony, Amadou Tahirou Diaw, Philippe Dussouillez, Jules T. Fleury, Alioune Kane, Rafael Almar and Elodie Kestenare. "Shoreline Changes on the Wave-Influenced Senegal River Delta, West Africa: The Roles of Natural Processes and Human Interventions". *MDPI Journal. Water* 2017.

27 Ibid.



2. Land and ecosystem degradation

In the south of the Sahelian strip temperatures are rising 1.5 times faster than the global average, worsening the region's existing issues of droughts, desertification and erosion; furthermore, with growing water scarcity, pastoralists are looking for new pasturelands and farmers are facing lower crop productivity.²⁸ Additionally, reduced natural vegetation, with increased human presence and badly designed human protection measures, has exacerbated dune erosion.²⁹ The former is mostly true for the region of Saint Louis. According to local consultations, the share of agriculture in the economy of the city has been shrinking because the territory for agriculture within the city is very limited and has been decreasing due to rapid urbanisation and saline intrusion. Nevertheless, the city of Saint-Louis has an ancient history of urban agriculture. The suburbs of Sor, which are now very densely built up, were born on market gardens, and eastward, in the most recent suburbs at the outskirts of the city, even today, there are cultivated spaces camouflaged in the landscape and hidden behind palisades.³⁰

Causes	Driving factor by type	Consequences - Impact	SDG's affected
<ul style="list-style-type: none"> - Opening of the breach.³¹ - Extraction of beach sand.³² - Soil erosion due to climate characteristics and fluctuations. - Unsustainable land uses. - Overgrazing and inappropriate agricultural practices.³³ 	<p>External and internal. Mostly anthropogenic factors.</p>	<ul style="list-style-type: none"> -Affects food security, livelihoods and job opportunities. -Decrease in food production (maraichage or cash crops) and causes malnutrition. -Reduction of the amount of land available to agriculture. -Higher vulnerability of freshwater supplies. -Internal migration and urbanisation and forced migration from rural areas.³⁴ 	<ul style="list-style-type: none"> 2: Zero Hunger 3: Good Health & Well-Being 11: Sustainable Cities and communities 13: Climate Action



28 See World Economic Forum <https://www.weforum.org/agenda/2021/10/west-and-central-africa-climate-migrants/#:~:text=In%20the%20arid%20Sahelian%20strip,are%20facing%20lower%20crop%20productivity>.

29 See Jonathan Silver, Cheryl McEwan, Laura Petrella & Hamidou Bagueian (2013). Climate change, urban vulnerability and development in Saint-Louis and Bobo-Dioulasso: Learning from across two West African cities.

30 See Maillard, Thomas (2018). Cultiver en ville, cultiver la ville : maîtriser l'urbanisation dans les quartiers agricoles de Saint-Louis (Sénégal).

31 Mamadou Sadio, Edward J. Anthony, Amadou Tahirou Diaw, Philippe Dussouillez, Jules T. Fleury, Alioune Kane, Rafael Almar and Elodie Kestenare. "Shoreline Changes on the Wave-Influenced Senegal River Delta, West Africa: The Roles of Natural Processes and Human Interventions". MDPI Journal. Water 2017.

32 See Cesaraccio et al 2004, Impact des activités humaines sur la dynamique littorale: prélèvements de sables sur le site de Pointe Sarène, Sénégal / Impact of sand extractions on coastal dynamics (Sarène Point beach, Senegal)

33 See Geophysical Research Abstracts (2012) -A methodological approach to assess sensitivity to desertification in two sub-Saharan urban areas: Ouagadougou (Burkina Faso) and Saint Louis (Senegal)

34 See Groundswell West Africa Report. Internal Climate Migration in West African Countries - <https://openknowledge.worldbank.org/handle/10986/36404>



3. Fishery decline and rarity of fish species

Changes in ocean temperatures and acidity have had significant economic effects on fishing productivity.³⁵ According to local regulators, between 2016 and 2017, the catch brought in by Saint-Louis fleets dropped more than 80% and fishing has become considerably more dangerous: After the breach, waters at the (new) mouth of the Senegal river are more turbulent and unpredictable, leading to hundreds of fishermen losing their lives (181 deaths in 2017 alone).³⁶

Causes	Driving factor by type	Consequences - Impact	SDG's affected
<ul style="list-style-type: none"> -Unsustainable fishing practices caused by competition from pirate and large foreign vessels.³⁷ -Climate change has caused the Atlantic Ocean temperature to increase, and has had a negative impact in the upper water column ecosystem. -Climate change and rising ocean temperatures and acidity have led fish to migrate north.³⁸ - Globally, increased human demand for fish and subsidies for fishing fleets have resulted in too many boats chasing too few fish. 	<p>External and internal. Mostly anthropogenic factors.</p>	<ul style="list-style-type: none"> -Decrease in food production (maraichage) and malnutrition of the population. -Some fishermen have migrated to Europe, in dangerous sometimes deadly trips. -Illegal fishing in Mauritania at high risk of being caught, pirogues confiscated or shot death.³⁹ 	<ul style="list-style-type: none"> 2: Zero Hunger 3: Good Health & Well-Being 14: Life Below Water 11: Sustainable Cities and communities 13: Climate Action



4. Poor waste management

Waste management in secondary municipalities in Senegal is rudimentary; existing collection services are irregular and unreliable. While the average waste collection rate in Dakar stands at 84%, the collection rate in regional capitals (such as Saint-Louis) is only 33%, mainly because investments and operation and maintenance have been historically underfunded.⁴⁰ Furthermore, in the entire region of Saint Louis, there is no bio-hazardous waste treatment unit and the only mode of treatment that exists is burning.⁴¹ In general, primary waste collection is carried out using carts and tricycles.

At a national level, the launch of the National Waste

Management Program ("Programme National de Gestion des Déchets") in 2014 and, in 2015, the Integrated and Sustainable Solid Waste Management Strategy ("Stratégie de Gestion Intégrée et Durable des Déchets Solides") showed commitment from the government to find a sustainable solution to address this challenge. In the Exploratory Report for Greening the Economy of Senegal, the government addresses the issue. The report states that its suggested greening policy is to invest in infrastructure for the collection, treatment and recycling of the waste produced. This measure will be accompanied by the dissemination of methods and techniques to reduce waste production.⁴² Indeed, the establishment of the law for the prohibition of the use of single-use

³⁵ See Jonathan Silver, Cheryl McEwan, Laura Petrella & Hamidou Baguian (2013). Climate change, urban vulnerability and development in Saint-Louis and Bobo-Dioulasso: Learning from across two West African cities

³⁶ See GP Investigations, 2018. Overfished: In Senegal, empty nets lead to hunger and violence <https://gpinvestigations.pri.org/overfished-in-senegal-empty-nets-lead-to-hunger-and-violence-e3b5d0c9a686>

³⁷ See UNDP Saint-Louis, Senegal: the challenge of sustainability. <https://www.africa.undp.org/content/rba/en/home/blog/2017/6/8/Saint-Louis-Senegal-the-challenge-of-sustainability.html>

³⁸ See GP Investigations, 2018.

³⁹ Ibid.

⁴⁰ See World Bank, 2021. Senegal Municipal Solid Waste Management Project <https://www.food-security.net/wp-content/uploads/2021/07/Project-Information-Documents-Integrated-Safeguards-Data-Sheet-Senegal-Municipal-Solid-Waste-Management-Project-P161477.pdf>

⁴¹ See Sow, Cheikh Saya (2018). Management of bio-hazardous waste in Saint Louis (Senegal): How to stop environmental disaster. Hygiene Quality Safety. <https://www.scitechnol.com/conference-abstracts-files/2325-9655-C6-035-012.pdf> Environment, Senegal.

⁴² See Rapport Exploratoire Sur L'économie Verte, 2019. https://www.un-page.org/files/public/document_du_rapport_exploratoire_sur_leconomie_verte_updated_green_economy_model_and_green_economy_assessment_report.pdf



plastics in the country in 2020⁴³ is a good first step toward generating awareness in the population, but the law is limited in reach and there has been little to no enforcement, hence continued action is necessary. Despite these measures and past initiatives, according to local consultations, there has been little progress in the waste management space in Saint-Louis, mainly due to a lack of follow-up support to ensure the continuity of actions taken. High centralisation and dependence on the state's transfers, was also cited as constraining factor. Recently, the international community has provided significant funding following state compromise. In March 2020, the government launched the Promotion of Integrated Waste Management and the Economy of Solid Waste (PROMOGED), a

six-year project to promote solid waste management with support from the World Bank, the French Development Agency (AFD), the European Union and the Spanish Agency for International Development Cooperation (AECID). The provisional budget is more than EUR 259.16 million.^{44,45} The funding aims to address a pressing need for further implementation, in particular to i) equip Senegalese cities with high economic and touristic activities which are impacted by poor waste management; ii) address the financing gap for operation and maintenance of solid waste infrastructure, and iii) build the capacity of municipalities to improve overall sector performance and ensure operational and financial sustainability of investments.⁴⁶

Causes	Driving factor by type	Consequences - Impact	SDG's affected
-Rapid urbanization has put significant strains on the capacity of municipalities to efficiently deliver basic urban services and manage scarce resources. rapid increases in waste production far outpace the provision of waste management services. ⁴⁷	Mostly internal and anthropogenic.	-The poor are frequently co-located in neighbourhoods where uncollected or improperly disposed waste is dumped and are exposed to polluted land, air (through open burning) and water. -They are highly vulnerable to health risks and economic uncertainty. ⁴⁸	6: Clean Water & Sanitation 11: Sustainable Cities and communities 15: Life on Land

43 See ELaw https://elaw.org/plastic/SN_PlasticLaws#:~:text=Senegal's%202020%20law%20bans%20production,single%2Duse%20or%20disposable%20plastic.&text=The%20law%20separately%20bans%20plastic,or%20whether%20they%20have%20handles.

44 See World Bank <https://www.worldbank.org/en/news/press-release/2020/03/05/senegal-to-improve-governance-and-solid-waste-management>

45 See GIZ Sector Brief Senegal: Solid Waste Management and Recycling https://www.giz.de/de/downloads/SectorBrief_Senegal_Waste.pdf

46 See World Bank, 2021. <https://www.food-security.net/wp-content/uploads/2021/07/Project-Information-Document-Integrated-Safeguards-Data-Sheet-Senegal-Municipal-Solid-Waste-Management-Project-P161477.pdf>

47 Ibid.

48 Ibid.



5. Other urban challenges

Historically, urban growth, combined with the poor quality of the site (swampy and floodable), has resulted in the splitting of the Saint Louis territory into several sub-areas.⁴⁹ Due to rapid urbanisation the city currently has a great urban concentration of 346.2 inhabitants/km² especially in poorer neighbourhoods inhabited mainly by communities of fishermen and their families.⁵⁰ In thirty years, the population has more than tripled, due to several phenomena that have accelerated population growth: first, a rural exodus in the 1960s

from the River Valley to the city of Saint-Louis. Then, in 1989, the conflict between Mauritania and Senegal led to a massive return of Senegalese expatriates to Mauritania. Finally, the construction of the Diama dam and the Gaston Berger University mobilized a very large workforce. Projections estimate the population at more than 300,000 inhabitants by 2030.⁵¹ As a centre for rural-to-urban migration with poor planning for urban growth, the city has seen informal settlements (particularly in Pikine) and encroachment into fragile and vulnerable flood-prone areas.⁵²

Causes	Driving factor by type	Consequences - Impact	SDG's affected
<ul style="list-style-type: none"> -Unplanned urbanization. -Strong centralization. Lack of funding within the city, and high dependency on transfers from the national government. 	Mostly internal and anthropogenic.	<ul style="list-style-type: none"> -Poorly planned cities are characterised by unmanaged sprawl, and the rapid growth of informal settlements on the edge of cities.⁵³ -Increased cost of service delivery, severe congestion, local air pollution, inefficient energy use, high greenhouse gas (GHG) emissions and other negative spill overs.⁵⁴ 	<ul style="list-style-type: none"> 7: Affordable & Clean Energy 11: Sustainable Cities and communities



49 See Mamadou Daye Sow. Les transformations urbaines dans les villes du sud: l'exemple de Saint-Louis du Sénégal. Géographie. Université Toulouse le Mirail - Toulouse II, 2005. Français. ffhalshs-00007145f

50 See SAMBOU Djiby, FALL Aïdara Chérif A Lamine, DIALLO Mamadou Aguibou, MBAYE Mamadou Lamine. «Résilience socio-écologique des communautés.

51 See Saint-Louis 2030, Nouvelle métropole africaine : Dossier d'analyse. https://www.academia.edu/36706327/Saint-Louis_2030_Nouvelle_m%C3%A9tropole_africaine_Dossier_danalyse.

52 See Jonathan Silver, Cheryl McEwan, Laura Petrella & Hamidou Baguian (2013) Climate change, urban vulnerability and development in Saint-Louis and Bobo-Dioulasso: Learning from across two West African cities.

53 See Cartwright. 2015. 'Better Growth, Better Cities: Rethinking and Redirecting Urbanisation in Africa'. Working Paper. London and Washington, DC: New Climate Economy, Global Commission on the Economy and Climate. Cross reference from FSDA - Financing African Urban Opportunity.

54 See Brahmabhatt, M., Bishop, R., Zhao, X., Lemma, A., Granoff, I., Godfrey, N., and te Velde, D. W. 2016. 'Africa's New Climate Economy: Economic Transformation and Social and Environmental Change. London and Washington, DC: New Climate Economy, Global Commission on the Economy and Climate, in partnership with Overseas Development Institute. Cross reference from FSDA - Financing African Urban Opportunity.

Table 1. List of environmental challenges in the city of Saint-Louis.

	Challenge	Description -Extent of damage	Causes	Driving factor by type	Consequences - Impact	SDG's affected
1	Exposure to climatic hazards: severe coastal erosion, floods.	<ul style="list-style-type: none"> -Climate change is causing sea level rises, heavier rainfall and higher temperatures in Saint-Louis. (fi) -There has been a retreat of the coastline by 0.35 meter per year between 2000 and 2018. IPCC scenarios of sea-level rise of 1.5 meters and 2 meters would lead to flooding on 12% and 15% of the territory. (1) (5) -The villages of Doun Baba Dieye (-700 inhabitants) and Keur Bernard (-250 inhabitants) have already disappeared. (2) 	<ul style="list-style-type: none"> -Climate Change and global warming causing sea level rise. -Opening of the breach of the Langue de Barbarie. -Influence of distant high-energy events (storms) in the North Atlantic is materialised in the wave climate of the West African coast. (6) 	Mostly external. Mainly natural (climate and geophysical forces) exacerbated by anthropogenic factors (opening of the breach).	<ul style="list-style-type: none"> -Affected livelihoods, displacement and increased vulnerability of the population. -Infrastructure loss and damaged. Wave erosion of the residual spit has led to the destruction of villages, tourist facilities and infrastructure. (6) -Increased exposure to floods and inundations. (5) 	<ul style="list-style-type: none"> 13: Climate Action 3: Good Health & Well-Being 5: Gender Equality 10: Reduce Inequalities
2	Land and ecosystem degradation (desertification and saline water intrusion)	<ul style="list-style-type: none"> -The lands of Gandiol once suitable for agriculture, are affected by salinization due to the intrusion of the salted water. -Reduced natural vegetation, with increased human presence and badly designed human protection measures, has exacerbated dune erosion. (ii) -In the and Sahelian strip, temperatures are rising 1.5 times faster than the global average (WEForum). -Desertification and land degradation are among the main causes of low agricultural productivity in Senegal. (FAO) 	<ul style="list-style-type: none"> -Opening of the breach. (2) (6) .Extraction of beach sand. (3) -Soil erosion due to climate characteristics and fluctuations. -Unsustainable land uses. -Overgrazing and inappropriate agricultural practices.(12) opportunities. 	External and Internal. Mostly anthropogenic factors.	<ul style="list-style-type: none"> -Decrease in food production (maraichage or cash crops) and malnutrition of the population. . Reduction of the amount of land available to agriculture. -Higher vulnerability of freshwater supplies. -Less access to clean water and food production. %Affects food security, livelihoods and job - Triaaorc forced mioration from rural areac f 131 	<ul style="list-style-type: none"> Zero Hunger Good Health & Well-Being It Sustainable Cities and communities 13: Climate Action
3	Fishery decline and rarity of Fish species	<ul style="list-style-type: none"> -Changes in ocean temperatures and acidity have significant economic effects on fishing productivity. 01) -Between 2016 and 2017, according to local regulators, the catch brought in by Saint-Louis fleets dropped more than 80%. (10) -After the breach, waters at the (new) mouth of the Senegal river are more turbulent and unpredictable, and hundreds of fishermen have lost their lives (181 deaths in 2017 alone).(10) 	<ul style="list-style-type: none"> -Unsustainable Fishing practices caused by competition From pirate and large Foreign vessels. (8) -Climate change has caused the Atlantic ocean temperature to increase, and has had a negative impact in the upper water column ecosystem. (IPCC) -Climate change and rising ocean temperatures and acidity have led fish to migrate north. (10) 	External and Internal. Mostly anthropogenic.	<ul style="list-style-type: none"> -Decrease in food production (maraichage) and malnutrition of the population. -Some fishermen have migrated to Europe, in dangerous sometimes deathly trips. -Illegal fishing in the Mauritania at high risk of being caught, pirogues confiscated or shot death.(10) 	<ul style="list-style-type: none"> Zero Hunger Good Health & Well-Being 14:Life Below Water 11:Sustainable Cities and communities 13: Climate Action

4	Poor Waste management	<p>-Waste management in secondary municipalities is rudimentary; existing collection services are irregular and unreliable. (15)</p> <p>- While the average waste collection rate in Dakar stands at 84%, the collection rate is 33% in regional capitals (such as St. Louis). (15)</p> <p>-There is no sanitary landfill, open dumping and burning are prevalent in some of SenegaPs municipalities. (15)</p> <p>- Investments and operation and maintenance (0041) are critically underfunded and the funding available to the sector is limited. (15)</p> <p>-There is not a single Bio-Hazardous Waste Treatment unit in the entire legion and the only mode of treatment that exists is burning. (14)</p>	<p>-Rapid urbanization has put significant strains on the capacity of municipalities to efficiently deliver basic. rapid increases in waste production far outpace the provision of waste management services. (15)</p>	Mostly internal and anthropogenic.	<p>-The poor are frequently co-located in neighbourhoods where uncollected or improperly disposed waste is dumped, and are exposed to polluted land, air (through open burning) and water. They are highly vulnerable to health risks and economic uncertainty (15)</p>	<p>6: Clean Water & Sanitation It Sustainable Cities and communities 15: Life on Land</p>
5	Urban challenges: agglomeration, lack of basic infrastructure, deficient urban services, private appropriation of public space, migration	<p>-Great urban concentration of 346,2 inhabitants/km² (1)</p> <p>-Fishing (and processing of fishery products) and tourism are disrupted by the breach, the rise of the swell and the decrease dedicated spaces. (4)</p> <p>-As a centre for rural-to-urban migration with poor planning for urban growth the city has seen informal settlements (particularly in Pikine) and encroachment into Fragile and vulnerable flood-prone areas. (11)</p>	<p>-Unplanned urbanization. -Strong centralization. Lack of Funding within the city, and high dependency on transfers from the national government.</p>	Mostly internal and anthropogenic.	<p>-Poorly planned cities are characterised by unmanaged sprawl, rapid growth of informal settlements on the edge of cities. (17)</p> <p>-Increased cost of service delivery, severe congestion, local air pollution, inefficient energy use, high greenhouse gas (GHG) emissions and other negative spillovers. (18)</p> <p>11: Sustainable Cities and</p>	7: Affordable & Clean Energy communities

(1) See SAMBOU Djiby, FALL Mara Cherif A Lamine, DIALLO Mamadou Aguibou, MBAYE Mamadou Lamine. "Resilience socio-ecologique des communautés vulnérables du delta du Fleuve Sénégal Face au changement climatique", Fondation Croix-Rouge Française, Les papiers de la Fondations, #29, Février 2020, 23p. ISSN 2649-2709.

(2) See Le Monde 2013, <https://www.lemonde.fr/planete/article/2013/12/11/pres-de-saint-louis-du-senegal-la-mer-engloutit-les-villages-35291363244.html>

(3) See Cesaraccio et al 2004, Impact des activités humaines sur la dynamique littorale, prélèvements de sables sur le site de Pointe Sarene, Senegal / Impact of sand extractions on coastal dynamics (Sarene Point beach, Senegal) [41 See Djiby Sambou Enseignant chercheur, Université Amadou Mahtar MBOW de Dakar. Changement climatique à Saint-Louis du Sénégal : risques, vulnérabilité et résilience des populations face à la montée des eaux 151 See Paul Durand, Brice Anselme et Yves-François Thomas, L'impact de l'ouverture de la brèche dans la langue de Barbarie à Saint-Louis du Sénégal en 2003: un changement de nature de l'inondation ? Cybergeo : European Journal of Geography [En ligne], Environnement, Nature, Paysage, document 496, mis en ligne le 27 avril 2010.

See Mamadou Sadio, Edward J. Anthony, Amadou Tahirou Diaw, Philippe Dussouillez, Jules T. Fleury, Mount Kane, RaFael Almar and Elodie Kestenare. "Shoreline Changes on the Wave-Influenced Senegal River Delta, West Africa: The Roles of Natural Processes and Human Interventions". MDPI Journal. Water 2017, 9, 357; doi:10.3390/w9050357

[7] See Ndiaye, B., Molenat, J., Ndoye, S., Boivin, P., Cheverry, C. & Gascuel-Odoux, C. (2008). Modélisation du transfert de Peau et des sels dans les casiers rizicoles du Delta du Fleuve Sénégal. Revue des sciences de l'eau 1 Journal of Water Science, 21(3), 325-336. <https://doi.org/10.7202/1018778ar>

[8] See UNDP Saint-Louis, Senegal: the challenge of sustainability. <https://www.africa.undp.org/content/ha/en/home/blog/2017/6/8/Saint-Louis-Senegal-the-challenge-of-sustainability.html>

[9] See Minority Rights Group International. Senegal: the impact of the climate crisis on the fisher community of St. Louis. <https://reliefweb.int/report/senegal/senegal-impact-climate-crisis-fisher-community-st-louis> (10) See GP Investigations, 2018. Overfished: In Senegal, empty nets lead to hunger and violence <https://gpinvestigations.pri.org/overfished-in-senegal-empty-nets-lead-to-hunger-and-violence-e3b5d0c9a686>

(11) See Jonathan Silver, Cheryl McEwan, Laura Petrella & Hamidou Baguian (2013) Climate change, urban vulnerability and development in Saint-Louis and Bobo-Dioulasso: Learning from across two West African cities

(12) See Geophysical Research Abstracts (2012) - A methodological approach to assess sensitivity to desertification in two sub-Saharan urban areas: Ouagadougou (Burkina Faso) and Saint Louis (Senegal)

(13) See Groundswell West Africa Report. Internal Climate Migration in West African Countries - <https://openknowledge.worldbank.org/handle/10986/136404>

(14) See Sow, Cheikh Saga (2018). Management of bio-hazardous waste in Saint Louis (Senegal): How to stop environmental disaster. Hygiene Quality SaFety. <https://www.scitechnol.com/conference-abstracts-Files/2325-9655.C6.035-012.pdf> Environment, Senegal

(15) See World Bank, 2021. Senegal Municipal Solid Waste Management Project <https://www.food-security.net/wp-content/uploads/2021/07/Project-Information-Document-Integrated-Saleguards-Data-Sheet-Senegal-Municipal-Solid-Waste-Management-Project-P161477.pdf>

(16) See Mamadou Daye Sow. Les transformations urbaines dans les villes du sud : Pexemple de Saint-Louis du Sénégal. Géographie. Université Toulouse le Mirail - Toulouse II, 2005. Français. Ffhalshs-00007145F

(17) See Cartwright. 2015. 'Better Growth, Better Cities: Rethinking and Redirecting Urbanisation in Africa'. Working Paper. London and Washington, DC: New Climate Economy, Global Commission on the Economy and Climate. On FSDA - Financing African Urban Opportunity.

(18) See Brahmabhatt, M., Bishop, R., Zhao, X., Lemma, A., Granoff, I., Godfrey, N., and to Velde, D. W. 2016. 'Facilitating New Climate Economy: Economic Transformation and Social and Environmental Change. London and Washington, DC: New Climate Economy, Global Commission on the Economy and Climate, in partnership with Overseas Development Institute. On FSDA - Financing African Urban Opportunity.

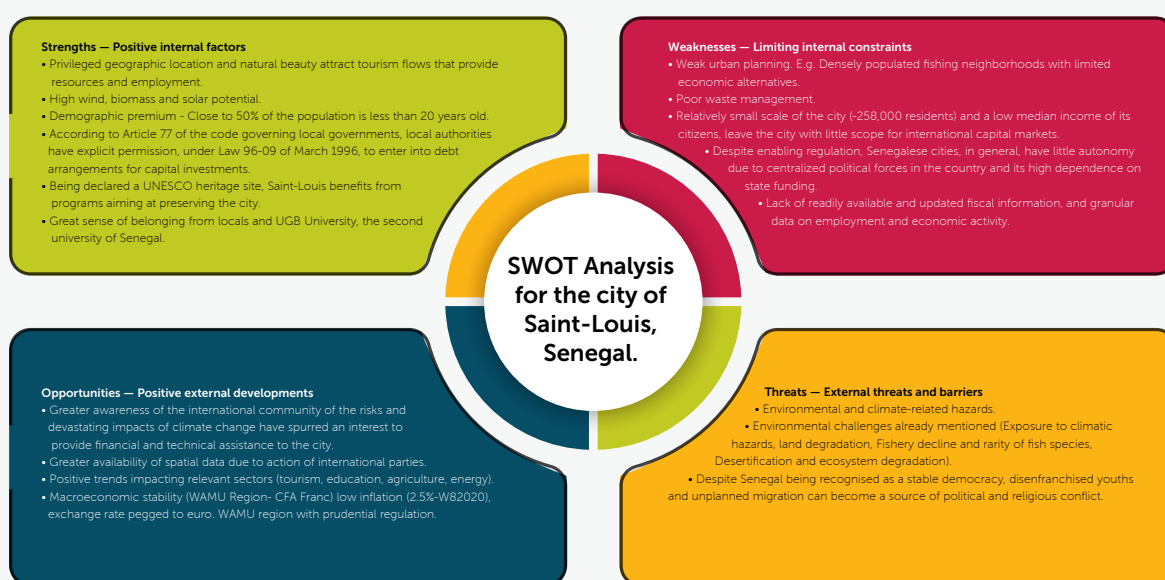


2.2 Enabling environment assessment: SWOT – Risks, barriers & opportunities

Making sense of the intersections between climate change, vulnerability, development and emerging urban governance responses requires a strong understanding of local economic and social contexts, so that the initiatives that are selected

for implementation consider the most effective measures and important sectors.⁵⁵ Therefore an economic and enabling environment assessment of the city is crucial to identify the aspects where the greatest opportunities and disabling constraints lay. This analysis will inform the feasibility study regarding the financial instruments that can be effectively deployed to address the environmental problems of Saint-Louis. (See Box 4)

Box 4. SWOT Analysis for the city of Saint-Louis, Senegal.



Source: Genesis Analytics

Strengths: positive internal factors that enhance its attractiveness

Privileged geographic location and natural beauty attracts tourism flows that provide resources and employment. Listed as a UNESCO World Heritage Site since 2000, the Saint Louis region appeals to history buffs as the city retains important testimonies of its prestigious past. The region hosts key events such as the International Jazz Festival of Saint-Louis, the canoe races (regattas), the Fanal, the Blues du Fleuve in Podor, which attract local and international tourists.⁵⁶



High wind, biomass and solar potential. There is a strong wind energy potential on the coastal fringe between Dakar and Saint-Louis and over a width of 50 kilometres, where the average annual wind speed at 10 m high is on average 4 m/s. Measurements between 30 m and 40 m in height have revealed the existence of speeds of more than 6 m/s. This potential is aimed to be enhanced by recent governmental roadmaps and regulation. In 2019, the government adopted an electricity roadmap for 2035 to increase access to electricity, make the energy mix more

⁵⁵ See J. Silver et al, 2013. Climate change, urban vulnerability and development in Saint-Louis and Bobo-Dioulasso: learning from across two West African cities, Local Environment.

⁵⁶ See Invest in Senegal https://investinsenegal.com/grands_travaux/developpement-touristique/

dynamic and reorganize electricity subsectors (production, transport and commercialization) as well as the governance of the sector. Furthermore, the government adopted a new electricity code through Act No. 2021-31 of July 9, 2021. Its main provisions include raising awareness of regional electricity markets (West African Power Pool - WAPP) with third-party access to the grid, promoting renewables and increasing the energy mix using natural gas, boosting energy efficiency and the development of off-grid rural electrification. The Senegalese National Electricity Company (SENELEC) has signed several power purchase agreements with independent power producers (IPPs) in order to buy power to be injected into the public grid.⁵⁷

A number of significant oil and gas discoveries took place in Senegal between 2014 and 2017. Oil and gas reserves worth more than 1 billion barrels of oil and in excess of 40,000 billion cubic feet of gas have been unlocked off the coast of Mauritania and Senegal. If the country prepares well, these vast natural gas reserves will help guarantee fiscal resources and energy security for years to come.⁵⁸ Regarding the oil explorations and their potential negative impact on the ecosystem, the stakeholders consulted mentioned that multiple assessment studies have been made, by the companies involved (British Petroleum and Kosmos Energy). A portion of the population fears potential negative impacts affecting fisheries.

Demographic dividend - Close to 50% of the population is less than 20 years old. According to 2020 projections from the National Agency for Statistics and Demography, 61% of the population of Saint-Louis is under 25 (51% of the population is under 20), almost evenly distributed by gender (49 % of women). The level of access to education exceeds 80%, confirming the strong potential for the contribution of youth to the development of the city.⁵⁹

According to Article 77 of the code governing local governments, local authorities have explicit permission, under Law 96-09 of March 1996, to enter into debt arrangements for capital investments. The district municipality has legal personality and financial autonomy. The powers of the district municipality, its financial resources and its relations with the city are determined by law.⁶⁰ This is a crucial piece of the puzzle when concerning debt issuances in the capital market, such as Municipal Bonds. Likewise, the enactment of a new Public-Private Partnerships (PPP) Law in 2014, its revision in 2015, as well as the adoption of a decree that establishes a national committee to support PPPs, provides legal ground for PPPs, for example in the solid waste sector.⁶¹

Being declared a UNESCO heritage site, Saint-Louis benefits from programs aiming at preserving the city. The Safeguard and Enhancement Plan (PSMV), the main legal instrument for the protection of the site adopted

57 See DLA Piper. <https://www.dlapiper.com/en/africa/insights/publications/2021/11/africa-energy-futures/africa-energy-futures-senegal/>

58 See Energy Capital & Power.2021. By Miguel Artacho. Senegal Gears up to Become a Major Gas Producing Country in MSGBC Region.

59 See Rapport sur la Population du Senegal 2020. https://investinsenegal.com/wp-content/uploads/2021/03/Rapport-sur-la-Population-du-Sngal-2020_03022021-1.pdf

60 See Loi n° 96-06 du 22 mars 1996 portant Code des Collectivités <https://www.sec.gouv.sn/sites/default/files/loisetdecrets/Loi%20n%C2%B0%2096-06%20du%2022%20mars%201996%20portant%20Code%20des%20Collectivit%C3%A9s%20locales.pdf>

61 See World Bank, 2021. Senegal Municipal Solid Waste Management Project. <https://www.food-security.net/wp-content/uploads/2021/07/Project-Information-Documents-Integrated-Safeguards-Data-Sheet-Senegal-Municipal-Solid-Waste-Management-Project-P161477.pdf>

in 2008 by the government of Senegal, identifies 16 historic monuments legally protected since 1975, 238 buildings of great architectural interest, 486 of medium interest and more half of no particular interest, but many of them contribute to urban coherence.⁶²

Great sense of belonging from the Saint-Louisiennes. The growing importance of the economic role of the heritage of Saint-Louis within the framework of tourism has fuelled a greater affirmation of this heritage among the local population, which attaches more and more importance to its value as an economic resource. Tourism has made it possible to envisage the establishment of a proactive public policy that combines conservation, improvement of heritage, involvement of local communities and generation of income.⁶³

UGB University, the second in the country; influential institution and catalyser of human capital.

Founded in 1990, University Gaston Berger (UGB) is a large coeducational Senegalese higher education institution officially recognized by the Ministère de l'Enseignement supérieur et de la Recherche, Senegal (Ministry of Higher Education and Research of Senegal). In a variety of fields of study, UGB provides courses and programs leading to legally recognized higher education degrees and is the second university of Senegal.⁶⁴



**Weaknesses:
internal barriers**

Saint-Louis is lagging behind in urban planning and management.

In the Region, currently, only 7% of communes have urban planning documents, mainly Urban Master Plans (PDUs). The city of Saint-Louis is faced with:

- Spontaneous expansion of housing, particularly in the neighbourhoods of Pikine;
- Occupation of low-lying flood-prone areas unsuitable for habitat;

- Uncontrolled development of small tourist reception centres and cabins in the Langue de Barbarie;
- Degradation of the Island classified as historical and cultural heritage;
- Dilapidated condition of the bridges (particularly Faidherbe and Masseck NDIAYE);
- Insufficiency and disparities in the distribution of equipment and infrastructure across neighbourhoods;
- Transport difficulties, compounded by the lack of a well-structured public transport system;

Faced with this situation, the Municipal Council decided to draft an Urban Master Plan (PDU), 20-year forecast document making it possible to integrate town planning policy into a general economic and social development policy. It sets the general guidelines and indicates the essential elements of urban development, within the framework of the National Land Use Plan.⁶⁵ However, the relative centralisation of state finances continues to be a constraining factor according to local sources consulted.



62 See El Pais, 2019. https://elpais.com/elpais/2019/05/10/planeta_futuro/1557486057_089852.html

63 See UNESCO. <https://fr.unesco.org/creativity/story/saint-louis-senegal>

64 See Top Universities list. <https://topuniversitieslist.com/universite-gaston-berger/>

65 See Plan Directeur d'Urbanisme PDU – Saint-Louis Horizon 2025 https://pdudakar.sec.gouv.sn/IMG/pdf/rapport_de_presentation_du_pdu_de_saint_louis.pdf



Poor waste management. The volume of waste has increased rapidly compared to the reaction time of the natural cycle and as a result, waste is usually piled up in the streets. Poorly managed waste can be the cause of diseases transmitted from animals to humans. Indeed, the nutritious residues of household waste attract visible or invisible fauna, including certain microorganisms (viruses, fungi, bacteria, etc.), stray animals (dogs, cats, rats, etc.) and other plague vectors. Household waste is the main refuge for various insects, including flies, cockroaches and mosquitoes, which are vectors of diseases such as diarrhoea, bilharzia, cholera, malaria, etc. It should also be noted that there is a possibility of sexually transmitted diseases through the presence of contaminated biomedical waste in the waste bins (needles, syringes, cotton wool, etc.)^{66, 67} (See Section 3.1)

The comparatively small scale of the city (~258,000 inhabitants) and the relatively low median income of its citizens, leave the city with limited scope for tapping the international capital markets. Just over half of its working population is employed in fishing and crafts, with modest income levels.⁶⁸

Lack of readily available and updated fiscal information, and granular data on employment and economic activity. There is little to no public information available regarding the financial capacity of the city, but inferring from the sources of funding

of most of the projects taking place, the city has very little economic capacity. Its projects are mainly funded by state and international donors. The total budget for 2021 was CFA 2,7 billion (~ USD 4,6 million).⁶⁹

Despite enabling regulation Senegalese cities, in general, have little autonomy due to centralized political forces in the country and its high dependence on state funding.⁷⁰ This was evident in 2015, when after multiple years of efforts and involving partnerships with several international organizations, the central government forced the capital city Dakar to abandon the issuance just two days before the planned issue. Government officials cited regulations; others noted the mayor's rivalry with the central government.^{71,72}

High climate change vulnerability of the country. The high vulnerability score and low readiness score of Senegal place the country in the upper-left quadrant of the ND-GAIN Matrix: It has both a great need for investment and innovations to improve readiness and a great urgency for action. Senegal is the 33rd most vulnerable country and the 68th least ready country. Projected change of cereal yields, agriculture capacity and dam capacity are the most concerning factors from the vulnerability perspective. Lack of ease of doing business and low level of education are the most concerning factors from the readiness perspective.⁷³

66 See VivAfrik, 2018. <https://www.vivafrik.com/2018/01/04/gestion-des-dechets-menagers-a-saint-louis-senegal-quelques-pistes-de-reflexion-a14311.html>

67 See El Pais, 2019. https://elpais.com/elpais/2019/04/29/planeta_futuro/1556539886_168742.html

68 See ANSD Service Régional de la Statistique et de la Démographie de Saint-Louis <http://www.ansd.sn/ressources/ses/SES-StLouis-2015.pdf>

69 See https://www.ndarinfo.com/Commune-de-Saint-Louis-Un-budget-de-2-7-milliards-FCFA-pour-l-exercice-2021_a30293.html

70 See Gorelick, Jeremy, 2018. Supporting the future of municipal bonds in sub-Saharan Africa: the centrality of enabling environments and regulatory frameworks. *Environment and Urbanization*. 2018;30(1):103-122.

71 Ibid.

72 See The Economist, 2018. How African cities can pay for their own upkeep. <https://www.economist.com/middle-east-and-africa/2018/04/07/how-african-cities-can-pay-for-their-own-upkeep>

73 See ND-GAIN vulnerability <https://gain.nd.edu/our-work/country-index/>



Opportunities: external possibilities

Greater awareness of the international community of the risks and devastating impacts of climate change have spurred an interest to provide financial and technical assistance to the city. This awareness is at least in part stimulating greater climate funding commitments. In the latest COP26 meeting in Glasgow, developed countries pledged to spend USD 100 billion a year helping developing countries cut their emissions and adapt to climate change. In the face of much larger needs, the pledge is highly insufficient, but the total climate finance has steadily increased over the last decade, reaching USD 632 billion in 2020.⁷⁴ Greening the economy, in fact, represents an enormous opportunity for the country and its cities to capitalize on its good reputation and ensure that flows both financial resources (aid and private sector), as well as technical assistance, keep flowing into the country. It also represents a major opportunity to provide a boost to important sectors such as agriculture and fisheries, forestry, water resource management, energy, and waste management. The country has been very active in taking part in global climate governance, especially at the UN level. Its Nationally Determined Contribution (NDC) plan entails both unconditional and conditional targets (depending on international aid); it aims to achieve carbon reduction targets in stages by 2025 and 2030 mainly by making use of the carbon market and tackling the electricity and power sector.⁷⁵



Box 5. Senegal - Distribution of green investments and green policy objectives by sector

Secteurs	Structure des investissements		Politiques
	EV	EV-Energie	
Agriculture	15%	6.3%	Training farmers in sustainable land management techniques / Combating land desertification / Rehabilitation of degraded land
Foresterie	15%	6.3%	Sustainable forest management - reforestation / Substitution of wood energy by butane gas / Agroforestry
Gestion des ressources en eau	15%	6.3%	Rainwater management (retention basin) / Water reuse / Increased water productivity
Energie	15%	50.0%	Renewable energy production (solar, wind, hydro) / Substitution of wood energy by butane gas / Bioenergy production: biofuel and biogas / Increasing energy efficiency (in industry, construction, transport)
Gestion des déchets	15%	6.3%	Waste collection / Waste recycling
Depenses administratives (contenu en fonctionnement)	25%	25.0%	
Total	100%	100%	

Source: Rapport Exploratoire Sur L'économie Verte, 2019. Translated from original in French.

Positive trends impacting relevant sectors, along with macroeconomic stability provided by the economic union (WAMU Region- CFA Franc), which plays a

crucial role in keeping inflation rates low (2.5%-WB2020) given that the exchange rate is pegged to the euro. The WAMU region also provides extensive

⁷⁴ See Climate Policy Initiative. Global Landscape of Climate Finance 2021 report. <https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021/>

⁷⁵ See Climate Policy Database: <https://climatepolicydatabase.org/policies/nationally-determined-contribution-ndc-17>

prudential regulation. Since the implementation of the PSE (Plan Sénégal Emergent), Senegal has experienced a growth dynamic of more than 6% on average, placing it among the of more than 6% on average, placing it among the fastest-growing economies in sub-Saharan Africa. This is due to the continued dynamism of agriculture, extractive activities and the chemical industries, mining, construction and the ICT sub-sectors, and to the sustained reforms in the business environment.⁷⁶

Greater availability of data, in part due to action and interest from international parties. For instance, the Spatial Analysis of Natural Hazards and Climate Variability Risks Project and the country's first-ever Post-Disaster Needs Assessment (PDNA). Action by international parties such as Deltares with EWB financing. Another example of this, are the measures to monitor the Senegalese coastline against illegal fishing and the development of marine protected areas (MPAs), as well as improved catching techniques, which are helping to mitigate the harmful effects of overfishing.



Threats: external constraints

Environmental challenges and climate-related hazards. The city of Saint-Louis is facing coastal erosion, the advancing sea, flooding and other environmental problems, raising concerns among the

local and international institutions (See Section 3.1).

Despite Senegal being recognised as a stable democracy, disenfranchised youths and unplanned migration can become a source of political and religious conflict. The lack of employment for young people, lack of industrial fabric and infrastructure, can be fuelling ground for disenfranchised youths who end up recurring to violence or joining radicalised religious groups. The demonstrations and riots that rocked Senegal in early March 2021 were not only concentrated in Dakar. They broke out following the Ousmane Sonko affair, the leader of the opposition Senegalese Patriots for Work, Ethics and Fraternity (Pastef) party. Other regions have mobilized to "defend democracy", as in Saint-Louis.⁷⁷



3.1 Mapping potential remedies & resilience-building measures

Having identified the main environmental and urban

challenges for the city of Saint-Louis, and analysed its strengths and weaknesses, this section maps the potential remedies and resilience building measures that can be undertaken to address them. While in section 3.1 the study provides high-level comments regarding the relevance of some of these remedies and resilient building measures for the specific context of the city, it is in section 3.2 where the report



⁷⁶ See Rapport Exploratoire Sur L'economie Verte, 2019. https://www.un-page.org/files/public/document_du_rapport_exploratoire_sur_leconomie_verte_updated_green_economy_model_and_green_economy_assessment_report.pdf

⁷⁷ See RFI, 2021. Au Sénégal, la jeunesse de Saint-Louis est sans horizon. <https://www.rfi.fr/fr/podcasts/afrique-%C3%A9conomie/20210323-au-s%C3%A9n%C3%A9gal-la-jeunesse-de-saint-louis-est-sans-horizon>



3. The remedies and financial instruments to execute them

offers a detailed analysis in regard to which of these measures are most suitable and the way they could potentially be funded.



Remedial solutions to address exposure to climatic hazards

Climatic hazards span a variety of events to be addressed with differentiated tools depending on the context and the nature of the hazard. Here, we highlight two distinct groups, themselves umbrella terms containing an assortment of specific solutions. These are: i) Nature-based Solutions (NbS), and ii) The Disaster Risk Finance (DRF) toolkit. While the first group comprises natural solutions to address environmental risks, the second is group is more concerned with specific financial mechanisms that ensure the financial resources are in place, so that territories can face disasters in a timely and effective manner.



Nature-based solutions (NbS)

Nature-based solutions (NbS) are increasingly being considered as an option to reduce societies' vulnerability to natural hazards, creating co-benefits while protecting ecosystem services in the context of changing climate patterns with more frequent and extreme weather events.⁷⁸ NbS are actions that involve the protection, restoration or management of ecosystems, or the creation of novel ecosystems in and around cities; a distinct feature of NbS, is that they seek to provide benefits both for human well-being and biodiversity.⁷⁹ Common examples in the context of cities and municipalities are urban parks to provide natural cooling (e.g., Athens, Greece; Medellin, Colombia; Addis Ababa, Ethiopia; Kuala Lumpur, Malaysia⁸⁰), or coral and mangrove restoration initiatives to decrease vulnerability to waves and tsunamis.⁸¹ A recent report by the EIB⁸², provides a useful categorisation of NbS, detailing

the eligible sectors for the Natural Capital Financing Facility (NCFF)⁸³ and provides some examples within each category:

- Pro-biodiversity and adaptation businesses: Sustainable forestry, Regenerative agriculture, Sustainable aquaculture, Ecotourism.
- Payment for ecosystem services: Protecting and enhancing forestry, Biodiversity protection, Pollution reduction, Carbon dioxide mitigation.
- Green Infrastructure: Green roofs, Green walls, Ecosystem-based rainwater collection / water re-use systems, Natural flood protection, Erosion control.
- Biodiversity offsets and compensation: Compensation pools (on-site), Compensation pools (off-site).



78 See Marchal, Roxane, Guillaume Piton, Elena Lopez-Gunn, Pedro Zorrilla-Miras, Peter van der Keur, Kieran W.J. Dartée, Polona Pengal, John H. Matthews, Jean-Marc Tacnet, Nina Graveline, Monica A. Altamirano, John Joyce, Florentina Nanu, Ioana Groza, Karina Peña, Blaz Cokan, Sophia Burke, and David Moncoulon. 2019. "The (Re)Insurance Industry's Roles in the Integration of Nature-Based Solutions for Prevention in Disaster Risk Reduction—Insights from a European Survey" *Sustainability* 11, no. 22: 6212.

79 See Nature-based Solutions Initiative. University of Oxford. <https://www.naturebasedsolutionsinitiative.org/what-are-nature-based-solutions/>.

80 See Farshid Aram, Ester Higuera Garcia, Ebrahim Solgi, Soran Mansournia. Urban green space cooling effect in cities, *Heliyon*, Volume 5, Issue 4, 2019, <https://doi.org/10.1016/j.heliyon.2019.e01339>.

81 See Kunkel, Hallberg and M. Oppenheimer (2006), Coral reefs reduce tsunami impact in model simulations, *Geophys. Res. Lett.*, 33, L23612,

82 See EIB. Investing in Nature: Financing conservation and nature-based solutions. Appendix 1. <https://www.eib.org/attachments/pj/ncff-invest-nature-report-en.pdf>

83 The European Investment Bank's Natural Capital Financing Facility (NCFF) The NCFF is a dedicated programme to support pioneering conservation and nature-based solutions projects.

Box 6. NbS initiatives in African coastal cities

In a paper for the South African Institute of International Affairs (SAIIA), Sumetee Gajjar provides examples of NbS initiatives that have been applied in coastal cities:⁸⁴

- Dar es Salaam in Tanzania - The Msimbazi Opportunity Plan (MOP) was conceived and designed by a team of stakeholders, including government officials, scientists, planners, the private sector, nongovernmental organisations (NGOs) and civil society members in 2018. Its activities span from upstream reforestation; making room for the water by widening the river channel and dredging (through civil engineering techniques); improving land use planning and solid waste management, and restoring wetlands and mangroves in the lower basin.
- eThekweni in South Africa - eThekweni began planning city-wide climate-related efforts in 2004 through its Municipal Climate Protection Programme (MCP). It then planned a range of Ecosystem-based Adaptation (EbA) strategies, such as acquiring land and water bodies for preservation and entering into agreements with the owners of vacant plots or degraded land.
- Mahé and Praslin islands in Seychelles - The Ecosystem-based Adaptation through South-South Cooperation (EbA South, 2013– 2019) project is a global initiative funded by the Global Environment Facility (GEF) through its Special Climate Change Fund. Its overall goal is to build the climate resilience of vulnerable local communities through demonstrative interventions in mangrove ecosystems. It restored a 300ha degraded landscape at Anse Royale in southern Mahé by replanting mangroves, removing invasive species and desilting channels to increase the water-storage capacity of wetlands.

Another related initiative around the African coast is the West African Coastal Management Programme (WACA), a joint initiative by the World Bank in partnership with the West African Economic and Monetary Union (WAEMU), The Abidjan Convention, The Dakar-based Center for Ecological Monitoring (CSE), and the International Union for Conservation of Nature (IUCN), running along 11 coastal countries, including Senegal. The program has developed in partnership with the West African people who live on the coast and depend on it for their livelihoods, nutrition, food security, and prosperity. It supports countries' efforts to improve the management of their shared coastal resources and reduce the natural and man-made risks affecting coastal communities.⁸⁵



Despite their palpable environmental and societal benefits, the perception that NbS are a long-term, hard-to-quantify, therefore high-risk investment, is restraining the deployment of capital at the scale that is needed. NbS initiatives vary in size, and they can be funded by either public funding (state, municipalities); commercial funding (public development banks such as KfW, CDC and private financial institutions such as local banks or equity funds); concessional funding (public institutions such as EU programmes, EIB, private institutions like philanthropies, and NGOs); or blended finance, i.e., vehicles that combine the last two.⁸⁶ Currently, however, only the more risk-tolerant investors, including some development finance institutions

⁸⁴ See Gajjar, Sumetee. (2020). Nature-based solutions to climate change in coastal cities. https://www.researchgate.net/publication/343892466_Nature-based_solutions_to_climate_change_in_coastal_cities

⁸⁵ See World Bank, 2018. <https://www.worldbank.org/en/news/press-release/2018/04/09/world-bank-board-approves-west-africa-coastal-areas-waca-resilience-investment-project>

⁸⁶ See EIB. Investing in Nature: Financing conservation and nature-based solutions. <https://www.eib.org/attachments/pj/ncff-invest-nature-report-en.pdf>

and philanthropists, are more likely to invest in longer-term outcome-focused activities in frontier regions of emerging markets compared to more risk-averse mainstream actors such as institutional investors.⁸⁷

To address some of the aforementioned challenges, a growing body of research and practice is being developed in the field of natural capital accounting. This is important, because assigning a value to ecosystems services and developing the analytic tools to account for negative and positive externalities that are frequently overlooked, will contribute to strengthening the business case for NbS, therefore crowding in private investors who are still to make the leap. Such is the case of the Sustainable Asset Valuation (SAVi) tool developed by the Institute for Sustainable Development, and their economic valuation of the contribution of the Saloum Delta in Senegal to sustainable development, focussing on wetlands and mangroves.⁸⁸ The Natural Capital Project led by Stanford University and their InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) open-source model, also strives to provide a tool to map and value the goods and services from nature that sustain and fulfil human life.⁸⁹

In the context of the city of Saint-Louis, Senegal there seems to be great potential around NbS, in particular in the category of pro-biodiversity and adaptation businesses (sustainable forestry, regenerative agriculture, sustainable aquaculture, and ecotourism). A financial instrument that can be deployed to execute some of these alternatives, is Social Impact Bonds (SIBs), also known as Development Impact Bonds (DIBs). Rather than “bonds” in the financial sense of the word, these instruments constitute a contracting framework to pay for pre-arranged results. They can be an appropriate tool for financing interventions with measurable outcomes and identifiable target groups. When these outcomes are exclusively environmental project, these pay-for success mechanisms are called Environmental Impact Bond (EIB). (See section 4)



The Disaster Risk Finance (DRF) toolkit

The DRF toolkit provides practical guidance on how to choose a particular disaster risk finance instrument for different circumstances. The toolkit considers instruments for i) risk reduction, such as loans, micro-credit, bonds, grants, subsidies & tax breaks, and impact bonds; ii) risk retention, such as reserve funds, contingent loans; and lastly, iii) risk transfer, such as micro-insurance, agricultural insurance, risk pooling, catastrophe bonds.⁹⁰ Box 7 summarises a proposed taxonomy of DRF solutions provided by GIZ. It specifies which tools are most appropriate by which type of risk holder and the main purpose of the funds.



⁸⁷ See Chatam House, 2021. Building Investor Confidence in Nature-based Solutions. By Henry Throp, Ana Yang and Suzannah Sherman.

⁸⁸ See Sustainable Asset Valuation (SAVi) of Senegal's Saloum Delta <https://www.iisd.org/system/files/2020-08/savi-saloum-delta-senegal.pdf>

⁸⁹ See Natural Capital Project <https://naturalcapitalproject.stanford.edu/software/invest>

⁹⁰ See Disaster Risk Finance - A Toolkit. 2019. GIZ ACRI+ Commissioned Report. Authored by: Conor Meenan, Risk Management Solutions (RMS); John Ward, Pengwern Associates; and Robert Muir-Wood, Risk Management Solutions (RMS).

Box 7. Taxonomy of DRF solutions

Instruments	Risk Holder				Purpose		
	What is the capacity and need of the risk holder? Individual Community Municipality Sovereign				What will the funds be spent on? Live & Physical Operational Livelihood Assets		
Risk Reduction							
Loan	x	x	x	x	x		x
Microcredit	x	x			x		x
Bonds			x	x			x
Grants, Subsidies, & Tax breaks	x	x	x	x	x		x
Crediting	x	x	x	x	x		x
Impact Bonds	x	x	x	x	x	x	x
Risk Retention							
Budget Contingency			x	x		x	
Reserve Funds	x	x	x	x	x	x	x
Contingent Loans				x		x	
Risk Transfer							
Microinsurance	x	x			x		
Agriculture Insurance	x	x			x		x
Takaful & Mutual	x	x	x	x	x	x	x
Insurance							
Insurance & Reinsurance	x	x	x	x	x	x	x
Catastrophe Bonds			x	x	x	x	x
Risk Pools			x	x		x	x

Source: Disaster Risk Finance - A Toolkit. 2019. GIZ ACRI+ Commissioned Report. Authored by: Conor Meenan, Risk Management Solutions (RMS); John Ward, Pengwern Associates; and Robert Muir-Wood, Risk Management Solutions (RMS). <https://www.indexinsuranceforum.org/resilience-document/disaster-risk-finance-toolkit> Alternative toolkit in [Climate Insurance.org](https://climate-insurance.org/wp-content/uploads/2021/05/Climate-and-Disaster-Risk-Financing-Instruments.pdf). <https://climate-insurance.org/wp-content/uploads/2021/05/Climate-and-Disaster-Risk-Financing-Instruments.pdf>

Concerning the DRF toolkit there is a concern regarding the scale needed and the level of governance for the particular case of Saint-Louis. In most cases, these tools might require greater scale as they work better in aggregation to attain risk diversification (i.e., mitigate covariant risks). Therefore, they work better when implemented at the macro/national or even regional level. In fact, the Senegalese government has been quite proactive in their DRF strategy and it is already implementing some of these instruments. In 2021 the government signed an agreement with African Risk Capacity (ARC) from the AfDB to protect 160,000 people in the country from the effects of drought through parametric insurance.⁹¹ SIBs could also be potentially applied in the context of DRF, as indicated in the box above, but doing so may be challenging due to difficulties in quantifying outcomes related to risk reduction and doubts over who should bear the risk of a disaster striking during the lifetime of the bond.⁹²



Remedial solutions to address land and ecosystem degradation

Recent research shows that the marginal rate of return to

investment in restoration of degraded lands in Senegal is greater than 4, suggesting high returns to taking action against land degradation (land users would receive more than USD 4 for every USD they invest) and highlighting that there is great potential for

⁹¹ See Reliefweb <https://reliefweb.int/report/senegal/new-insurance-policy-will-protect-160000-people-senegal-drought>

⁹² See Disaster Risk Finance - A Toolkit. 2019. GIZ ACRI+ Commissioned Report. Authored by: Conor Meenan, Risk Management Solutions (RMS); John Ward, Pengwern Associates; and Robert Muir-Wood, Risk Management Solutions (RMS).

successfully addressing the issue through increased awareness that ensures community involvement.⁹³ The authors argue that this can be done, for example, by expanding the number of agents promoting Integrated Soil Fertility Management (ISFM) practices, Community-Based Forest Management (CBFM) and strengthening public-private partnerships to increase the adoption of sustainable land management (SLM) practices.⁹⁴ Indeed, these suggestions are all contained in the broad arena of Climate-Smart Agriculture (CSA).



Climate-Smart Agriculture (CSA)

CSA is an approach that helps guide actions to transform agri-food systems towards green and climate-resilient practices. It aims to tackle three main objectives: i) sustainably increasing agricultural productivity and incomes; ii) adapting and building resilience to climate change; and iii) reducing and/or removing greenhouse gas emissions, where possible.⁹⁵ As is often the case when dealing with areas related to climate change, CSA is a developing field, and there are lots of interlinkages among fields of research and practice. With that in mind, the CSA guide, a web portal specialised in CSA, divides the field across a range of practices: i) Soil Management, ii) Crop production, iii) Water Management, iv) Livestock management, v) Forestry and Agroforestry, vi) Capture fisheries and aquaculture, and vii) Energy Management.⁹⁶

To enhance the reach of CSA worldwide, the FAO proposes 5 action points: Expanding evidence, supporting enabling frameworks, strengthening national and local institutions, enhancing funding and financing options, and implementing practises at the field level. In 2021, it made available a report containing a range of case studies from all over the world around these 5 action points.⁹⁷ Examples include the project for enhancing CSA learning by understanding indigenous knowledge and

perceptions of climate change in Senegal. The first pathway is the mainstreaming and adoption of the Farmer Field Schools (FFS) approach⁹⁸ and climate change adaptation practices into the Senegalese national agricultural extension agency (Agence Nationale de Conseil Agricole et Rural). The second pathway is the establishment of a resilience fund within the national fund for agro-sylvo-pastoral development (Fonds National de Développement AgroSylvo-Pastoral) to finance community development plans.



Besides the traditional barriers to lending for agriculture (poor enabling environments, lack of capacity to manage risk exposure, high transaction costs), the integration of climate finance into the agriculture space faces additional barriers. These include i) difficulty in demonstrating short-term “quick wins”; ii) limited capacity to adequately assess what is

93 Sow S., Nkonya E., Meyer S., Kato E. (2016) Cost, Drivers and Action Against Land Degradation in Senegal. In: Nkonya E., Mirzabaev A., von Braun J. (eds) Economics of Land Degradation and Improvement – A Global Assessment for Sustainable Development. Springer, Cham. https://doi.org/10.1007/978-3-319-19168-3_19

94 Ibid.

95 See FAO Climate-Smart Agriculture. <https://www.fao.org/climate-smart-agriculture/en/>

96 See CSA Guide is a web portal presenting the climate-smart agriculture (CSA) approach to food security and sustainable development. <https://csa.guide/>

97 Climate-smart agriculture case studies 2021 <https://www.fao.org/3/cb53559en/cb53559en.pdf>

98 The FFS approach is a community-based learning-by-doing approach whereby local agricultural practices are compared to practices suggested by science and research.

needed to finance adaptation and mitigation; iii) the fragmentation of climate finance sources; iv) broken links between financiers and farmers; and v) lack of capacity and readiness at the country level.^{99,100} Even as climate-aware agricultural practices and climate finance have both increased, in developing economies such as Senegal, it is still the case that financial services (e.g., lending -short-term for working capital loans and longer-term for investment capital loans-; equity capital; leasing; mobilization of savings and deposits; and financial intermediation, such as mobile financial services, transfers, payments, and insurance) for the most part continue to reach greater scale/corporate actors, while smallholders and SMSE's in most cases continue to be left behind. To address some of these barriers, the World Bank proposes innovative ways to attract additional capital to agriculture and CSA:¹⁰¹

- **Public-Private Partnerships (PPPs)** tend to have a multiplier effect by leveraging diverse types of expertise, skills, resources (technical and financial), and networks. Partners in

PPPs may be public donors, international and non-governmental organizations (NGOs); foundations; research institutions; UN organizations; development financial institutions; private companies; and impact or institutional investors.

- **Well-designed layered capital structures** (such as securitization structures) can leverage additional capital while meeting the different expectations of each potential investor. These can also diversify risk and investment returns, and add flexibility to the terms (maturity) and uses of the capital. (See Box 8)
- **Bundling financial instruments with technical assistance** can be an effective way to utilize climate finance. Furthermore, bundling several instruments may prove critical to providing more comprehensive solutions to financiers and private actors while also increasing the efficacy and efficiency of the resources allocated to each intervention.

Box 8. Examples of layered capital structures

Private investors	Notes	Senior Notes	
DFIs, IFIs	Senior Shares	Subordinated loans	Subordinated notes
DFIs, IFIs	Mezzanine Shares	Senior Shares	
Public Donors	Junior Shares	Junior Shares	
Source of capital	Structure No.1	Structure No.2	

Source: World Bank, Discussion Paper. Making Climate Finance Work in Agriculture. Page 17. Development Financial Institutions (DFIs). International Financial Institutions (IFIs)

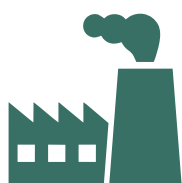
Concerning the context of the city of Saint-Louis, Senegal, although some CSA practices are highly relevant for the country and neighbouring region, we have found that the city's land resources available for agriculture and or forestry are limited. However, projects around aquaculture farming could offer alternative livelihoods for the fishermen community. Concerning the innovative ways to attract capital exposed, it is important to keep in mind that un-necessarily complex structures increase transaction costs, which can become prohibitive.

99 See World Bank, Discussion Paper. Making Climate Finance Work in Agriculture. <https://documents1.worldbank.org/curated/en/986961467721999165/pdf/ACS19080-REVISED-OUO-9-Making-Climate-Finance-Work-in-Agriculture-Final-Version.pdf>

100 See also CPI and IFAD, 2020 https://www.ifad.org/documents/38714170/42157470/climate-finance-gap_smallscale_agr.pdf/34b2e25b-7572-b31d-6d0c-d5ea5ea8f96f

101 See World Bank, Discussion Paper. Making Climate Finance Work in Agriculture. Page 17. <https://documents1.worldbank.org/curated/en/986961467721999165/pdf/ACS19080-REVISED-OUO-9-Making-Climate-Finance-Work-in-Agriculture-Final-Version.pdf>

The more participants and the more layers, the higher the costs, and therefore the higher the minimum-scale threshold for a particular financial instrument to be feasible.



Carbon Markets

Carbon markets aim to turn emission reductions and removals into tradeable assets, and can be a powerful tool to tackle land and ecosystem degradation. Globally there are two types of carbon markets: the regulatory compliance, and the voluntary markets. The compliance market is used by companies and governments that by law have to account for their greenhouse gas (Ghg) emissions. It is regulated by mandatory national, regional or international carbon reduction regimes.¹⁰² On the other hand, voluntary markets function outside of compliance markets

and enable companies and individuals to purchase carbon offsets on a voluntary basis with no intended use for compliance purposes.¹⁰³ Crucially, voluntary carbon markets would facilitate the mobilization of capital to emerging and frontier market economies, where there is great potential for nature-based emissions-reduction projects.¹⁰⁴ The Taskforce on Scaling Voluntary Carbon Markets (TSVCM), estimates that demand for carbon credits could increase by a factor of 15 or more by 2030 and by a factor of up to 100 by 2050. Overall, the market for carbon credits could be worth upward of \$50 billion in 2030.¹⁰⁵

Box 9. Examples of Clean Development Mechanisms (CDM)* Projects:

- Methane Avoidance: Energy and fertiliser enterprise from dumped cattle waste in Pakistan.
- Biogas: Methane capture & combustion from poultry manure treatment at Lusakert Plant, Armenia.
- Biomass Production: Electricity generation from mustard crop residues in India.
- Reforestation Programme: Planting trees for timber, firewood and fodder production on degraded land in Bagepalli, India.
- Afforestation of Grassland: Establishment and management of forest plantations in Tanzania.

* The carbon credits from CDM projects are called Certified Emission Reductions (CER). For information on individual projects see <http://cdm.unfccc.int/Projects/projsearch.html>

Source: FAO. Carbon Markets – Which Types Exist and How They Work.

However, in the context of the city of Saint-Louis Senegal, we initially observe two main limitations for the adoption of a financial instrument that is immersed in this market: The lack of abundant forestry resources, and the overall challenges facing these markets globally. First, territories containing healthy and abundant forests are more of a fertile ground for carbon markets. Secondly, for carbon markets to reach their full potential, the market still needs to grow large, more transparent, verifiable, and more environmentally robust. Today's market, though, is still fragmented and complex.¹⁰⁶ However, project developers in the growing carbon market space in Senegal can be valuable partners by incorporating alternative sources of funding, effectively channelling additional funds, notably private capital, to environmentally friendly initiatives.

¹⁰² See FAO. Carbon Markets – Which Types Exist And How They Work. <https://www.fao.org/3/i1632e/i1632e02.pdf>

¹⁰³ See Carbon Offset Guide. <https://www.offsetguide.org/understanding-carbon-offsets/carbon-offset-programs/mandatory-voluntary-offset-markets/>

¹⁰⁴ See see Christopher Blaufelder, Joshua Katz, Cindy Levy, Dickon Pinner, and Jop Weterings, "How the voluntary carbon market can help address climate change," December 2020.

¹⁰⁵ McKinsey, 2021. A blueprint for scaling voluntary carbon markets to meet the climate challenge. <https://www.mckinsey.com/business-functions/sustainability/our-insights/a-blueprint-for-scaling-voluntary-carbon-markets-to-meet-the-climate-challenge>

¹⁰⁶ Ibid.



Remedial solutions to address fishery decline and rarity of fish species

A global authority in the matter, the WWO, has argued that the best solution to the problem of declining fisheries is to rebuild overexploited stocks and ecosystems through relieving fishing pressure, improving gear selectivity and fishing exploitation patterns, protecting habitat and making wise and generous use of protected areas and no-take zones.¹⁰⁷ This seems to belong to the domain of public policy: establishing and expanding protected marine reserves; improving long-term sustainable marine governance; compliance and enforcement by employing new technologies (satellites, drones, etc); coordinating on global policy and multinational enforcement schemes¹⁰⁸, funding research, increasing awareness through better education, amongst others.

Nevertheless, there is a promising scope for action led by private and development actors and municipalities such as Saint-Louis, for stimulating the production of fish through aquaculture and fish farms, of which sustainable practices are considered under both NbS and CSA (addressed above). Significant social impact can be achieved in this space by securing alternative livelihoods and food security for the communities of fishers in the city. So far, instruments targeting this space have been limited to providing funding through lending facilities. As a recent example, ADM Capital Group, IDH, and Alune Aqua are developing a blended finance solution, the Asia Aquaculture Facility (AAF), that uses a revenue-based financing model (loans granted based on regular repayments of a percentage of gross profits) for farmers to engage in sustainable intensive aquaculture and support mangrove conservation. The vehicle will be piloted in Indonesia with a focus on shrimp aquaculture and potentially expand to India, Vietnam and the Philippines.¹⁰⁹ The last section of this report explores additional ideas where Social Impact Bonds (SIBs) or results-based mechanisms could be designed to address some of the challenges facing the industry for example by expanding entrepreneurial capacity through accelerators and incubators, or by providing training for expanding the level of certification in sustainable practices.



Remedial solutions to address poor waste management

Territories with better waste management performance tend to have in place a set of economic instruments to drive and support improvements. Some economies have incentivised investment in this space through tax-incentives, concessional loans to finance recycling investments, or to recycling companies, focusing on SMEs, for investments in facilities and technology development.¹¹⁰ The following are specific economic measures that have been put in place in a variety of European countries at a national and municipal level to promote improved waste management:¹¹¹



¹⁰⁷ See WWO. https://wwf.panda.org/discover/knowledge_hub/endangered_species/cetaceans/threats/fishstocks/

¹⁰⁸ See The Economist Video, 2020. \$1bn to save the ocean.

¹⁰⁹ See <https://thefishsite.com/articles/a-novel-funding-method-for-sustainable-aquaculture-intensification-shrimp-farming-indonesia>

¹¹⁰ See OECD. Waste Management and the Circular Economy in Selected OECD Countries: Evidence from Environmental Performance Reviews. <https://www.oecd-ilibrary.org/sites/1f4e61ee-en/index.html?itemId=/content/component/1f4e61ee-en>

¹¹¹ See Bio Intelligent Service, 2012. Use Of Economic Instruments and Waste Management Performance. https://ieep.eu/uploads/articles/attachments/871e7128-1bfd-4d45-b590-973e37ecc5a7/Waste_economic_instruments_-_Final_report_-_10_April_2012.pdf?v=63664509768

1. **Charges for waste disposal and treatment.** This includes landfill taxes and fees (and restrictions/bans to provide context for the charges), and incineration taxes and fees (and restrictions/bans to provide context for the charges);
2. **Pay-as-you-throw (PAYT) schemes.** Although these vary and are not always comparable, examples include: Fixed annual fees per household; fees for the purchase of mandatory refuse bags; fees per emptying of a bin; and, fees per kg.
3. **Producer responsibility schemes for specific waste streams,** notably packaging (schemes that oblige packaging producers to financially support, to varying degrees, the implementation of recycling schemes for packaging waste), WEEE (Waste of electric and electronic equipment, where each producer is responsible for financing a portion of a pre-specified target based on its market share in each of the EEE it sells), ELV (end of life vehicle, specify that ELV must be taken back at no cost to the final owner of the vehicle) and batteries (schemes charge fees to producers based on the number of batteries placed on the market, either per kg, per

battery or according to market share).

Concerning the specific context of Senegal, the solid waste recycling sector is made up of informal businesses and small and medium-sized enterprises (SMEs) with substantial development potential and business opportunities. Such businesses are in the process of establishing partnerships to extend their operations, improve their plant and equipment and strengthen their capacities through financing and the sharing of expertise. Initiatives such as creating a recyclables exchange, developing a network of standardised waste collection points and introducing authorised paid systems for specific streams (rubble, tyres, green waste, bulky waste, old vehicles, WEEE, etc.) all remain a priority for the government and offer interesting investment opportunities, while also contributing to the development of a circular economy that creates wealth and jobs. Establishing and operating training centres to increase the employability of young people and women requires mobilising significant financial and human resources with potentially attractive returns.¹¹²



Waste Management Initiatives

As is expressed in the Report for the Greening Economy in Senegal (see above), initiatives to improve waste management in Senegal are being addressed

by policy makers and multilateral organisations. The launch of the Project for the Promotion of Integrated Waste Management and the Economy of Solid Waste (PROMOGED) in Senegal, and studies to evaluate alternative taxation at the municipal level, are promising avenues to enhance the enabling environment in the waste management space. Concerning alternative financing instruments that can bring additional resources, multiple countries have designed and prepared municipal solid waste projects applying results-based financing (RBF) approach, such as the one behind Social Impact Bonds (SIBs). Lessons from these projects were shared in a joint report by the World Bank and the Global Partnership for Output-Based Aid (GPOBA): *Results-based financing for municipal solid waste*.¹¹³

¹¹² See GIZ. Sector Brief Senegal: Solid Waste Management and Recycling. https://www.giz.de/de/downloads/SectorBrief_Senegal_Waste.pdf

¹¹³ See World Bank. 2014. Results-Based Financing for Municipal Solid Waste. Urban development series; knowledge papers no. 20. Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/20792> License: CC BY 3.0 IGO.

Remedial solutions to address other urban challenges



Green Urban Initiatives

Cities play a powerful role in driving investment that can shape the transition to a greener economy

and more equitable society.¹¹⁴ Green urban initiatives span from supporting city greening and appropriate water management (NbS such as urban parks or rainfall collection); to low-carbon transport (green mobility incentives, large infrastructure projects such as railways and electric public transport); green, energy-efficient and resilient infrastructure (climate-smart building techniques); appropriate waste management (see earlier section); enhancing early warning systems and communications strategies to increase resilience to climate shocks, and the list can go on.¹¹⁵ Given the great scope of remedial measures that are being developed globally to address urban challenges, this study prioritised the needs that are most pressing in the city of Saint-Louis.

Considering Saint-Louis' relatively small size and low median income, the green city progression scheme (See Box 10) suggests the basic-to-eco green initiatives to be prioritised are clean water supply; wastewater treatment, waste management (addressed above separately), urban agriculture, and clean energy. To design the most efficient strategies, cities can receive support through a variety of mechanisms, such as finance academies, research, capacity development and knowledge sharing, project preparation support, investor engagement, and technical assistance.¹¹⁶

In terms of how these fields of action can be funded,

there is a range of sustainable finance options for green and resilient building projects designed to provide broad environmental and economic benefits. These include, but are not limited to:

- Green loans from traditional actors such as development and commercial banks, climate finance funds (such as the Climate Investment Funds (CIFs), Green Climate Fund (GCF), Adaptation Fund (AF), Global Environment Facility (GEF), the C40 Cities Finance Facility, etc).
- Grants from international donors, development banks and international developmental finance.
- Accessing the capital markets through the issuance of municipal bonds, which can also be Green, Social, Sustainable or Blue bonds – Ordinary bond issuance paired with certified use of proceeds toward green, social, sustainable or blue projects respectively.
- Structuring securitised structures based on a stream of financial flows mostly applicable for macro projects in transport and infrastructure.

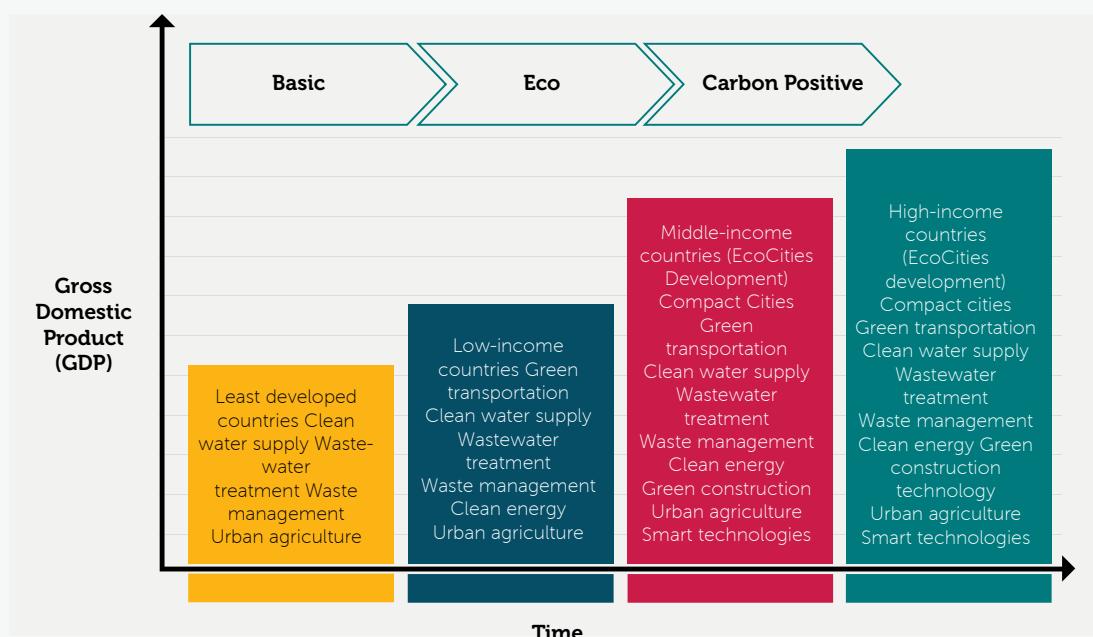
In order to explore the relevance of each of these alternatives for the context of Saint-Louis, there needs to be greater clarity on the scale and main revenue sources, as well as the city expenses. Essentially, the more revenue sources a city has relative to its functioning costs, the higher its perceived repayment capacity, and the greater its access to debt, including loans and capital markets funding. Furthermore, since interest rates and risk aversion are on the rise globally, the creditworthiness and enabling environment of municipalities seeking funding will be heavily scrutinised in the near future.



114 See 40 Cities. <https://www.c40.org/what-we-do/influencing-the-global-agenda/financing-the-green-transition/>

115 See FSD Africa, for a comprehensive and relevant report on Greening African cities. The report develops 6 innovative mechanisms City as Mobiliser (Philippines City Disaster Insurance Pool, Cooling as a Service); City as Partner (Pay As You Save for Clean Transport (PAYS), Nagpur Water Supply Public-Private Partnership (PPP)); City as Leader (Breathe Better Bond (BBB), Kenyan Country Climate Funds). Financing Africa's Urban Opportunity - The 'Why, What and How' Of Financing Africa's Green Cities. <https://www.fsdafrica.org/wp-content/uploads/2021/09/FinancingAfricaUrbanOpportunity-FINAL-REPORT.pdf>

116 Ibid.

Box 10. The Green City progression¹¹⁷

Source: Asian Development Banks. Green City Development Toolkit. Scheme adapted from Steinberg and Lindfield 2012.

Having considered a wide range of potential remedies to the most pressing challenges for the city of Saint-Louis, we devote the next section to list and rank the specific financial instruments that can be put in place to implement the most relevant amongst these.



3.2 Ranking the most suitable financial instruments for the context of Saint-Louis

Most of the remedies explored above are umbrella terms, themselves comprising a variety of specific solutions to be financed through an extensive range of financing alternatives. We hereby aim to match some of the potential solutions discussed with the most appropriate financial instruments that would make it possible to execute them. The guiding question is: What are the financial instruments that could feasibly be deployed in Saint-Louis to fund and make some of such initiatives possible? We first list as many instruments as we believe could potentially be relevant for the context, then rank such alternatives based on three criteria: feasibility, impact and additionality.

In the context of this report, “financial instruments”

are understood as monetary contracts between parties, which can be created, traded, modified and/or settled. Here, financial instruments also entail instruments that grant ownership interest in an entity or a contractual right to receive or deliver (currency; debt; equity; derivatives), but also results-based contracts, insurance products, as well as financial facilities (such as reserve funds, or lending vehicles). Notably, for the purpose of this work, Blended Finance (BF) and Public-Private Partnerships (PPPs) are considered to be ways of funding more than financial instruments *per se*. This is to say that many of the instruments listed can in fact be financed by blending concessional and non-concessional debt or equity capital (BF), or can be funded by combining public and private sources through PPPs. Since there is a potential for the financial instrument that is ultimately selected, to be funded by either BF or PPPs, they are not hereby considered separate instruments.

¹¹⁷ See Asian Development Banks. Green City Development Toolkit. <https://www.adb.org/sites/default/files/institutional-document/173693/green-city-dev-toolkit.pdf>

It is useful to note that the terms of reference for this project were intentionally broad by design to allow for a wide variety of instruments to be evaluated. The main premises to take into consideration when selecting the financial instrument were the following:

- Improve living conditions for the population in the city of Saint-Louis Senegal, addressing at least one of the environmental challenges identified.
- Key attributes: Feasibility, (+ Impact, Additionality).
- No specific role is required from the municipality or other governmental entities (they can be a direct actor or not).
- Implementing agency will depend on the instrument.

As a final output, the study will provide a report

containing the rationale and suggested work plan for structuring such an instrument at a later stage. (See section 4)



Listing

A total of eighteen financial instruments were mapped so long as they could be deployed to enact some of the remedies explored above: Disaster Risk Finance; Nature-based Solutions (Sustainable aquaculture, Ecotourism, green roofs); Climate-Smart Agriculture (Capture fisheries and aquaculture, Energy Management); Carbon Markets (Biodiversity protection); Waste Management Initiatives and Green Urban Initiatives. The instruments comprise typical funding tools (funds, bonds, securitization structures, etc), results-based finance mechanisms, and insurance. The following table summarises our proposed taxonomy and the instruments that were initially considered.¹¹⁸

Table 2. Initial list and taxonomy of financial instruments mapped

Taxonomy	Description	Instruments considered
Funding / Investment	Instruments or facilities that themselves, or the services they provide, will constitute a financial liability for the entity receiving funding, or an investment /financial asset from the perspective of the funder. This comprises debt and equity.	<ul style="list-style-type: none"> • Labelled bonds: Green, Social and Sustainable Bonds / Sustainability-Linked Bonds (SLB Bonds) / Blue Bonds • Securitization structures (e.g., Solar ABS) • Disaster Allocation Fund / Reserve Funds • Climate Fund or National Financing Vehicles (NFVs) • Green Banks • GROVE - Forestry Smart Ledger (FSL)* • Loans4SME* • Breathe Better Bond* • Greenfi - Climate-Smart Lending Platform*
Results-based financing and/or payment mechanisms	Programs, instruments or interventions that provide rewards to individuals or institutions after agreed-upon results are achieved and verified. It holds out the promise of tackling spending inefficiencies and making more effective use of resources.	<ul style="list-style-type: none"> • Impact Bonds (IB) • Adaptation Benefit Mechanism (ABM) • Sale of Carbon Credits • Green Street Africa (Energy as a service)* • Cooling as a service (CAAS)*
Other financial & insurance products	Other instruments related to insurance and other products.	<ul style="list-style-type: none"> • Insurance-Linked Securities (ILS) / Catastrophe Bonds (Cat-bonds) • Micro Insurance • Index Insurance • Risk pools

Options marked with an asterisk (*) are ideas that were identified in the Climate Finance Lab database. These include structures that are already fully developed in some regions or that might be in the piloting stage and were considered to be potentially relevant for the case of Saint-Louis.

¹¹⁸ As part of the deliverable of this project, a full dataset describing key characteristics of each of these instruments was provided to the commissioners of the study.



Ranking

The initial pool of eighteen instruments was ranked assigning a score spanning from 1 to 4 according to the following criteria and weights:

- **Feasibility / Actionability for the context of Saint-Louis (60%):** Would the deployment of the tool be feasible/actionable for the particular context of the city of Saint-Louis? Is the existing regulation supporting the deployment of the tool? Would the minimum scale threshold stand? Are there actors who can execute the different stages and markets that support the instrument? The answers to all these questions ultimately give a sense of the probability of success of the deployment of the chosen instrument.
- **Impact (20%):** Can the deployment of this tool contribute to making the city more clean, inclusive & resilient? Will it improve living conditions for the population in the city or region of Saint-Louis Senegal?
- **Additionality (20%):** Would the deployment of this tool bring additional funds (preferable additional funding from the private sector)? Would it have a sizeable effect, when compared to the baseline?



The selected instrument: Impact Bonds

After a process of ranking based on desktop analysis, two rounds of stakeholder consultations and a validation workshop with experts in multiple domains, Impact Bonds were identified as the best-placed tool to be deployed. Social Impact Bonds (SIBs), Development Impact Bonds (DIBs), or Environmental Impact Bonds (EIBs) (hereafter, altogether "Impact Bonds") are a form of outcomes-based commissioning where the contract is funded not by the government or the service provider, but by third-party investors who provide up-front capital to organisations that deliver the services.¹¹⁹

Rather than "bonds" in the financial sense of the word, Impact Bonds constitute a contracting framework to pay for pre-arranged results. In that sense, strictly speaking, they are result-based financing mechanisms, i.e., financial instruments that apply the "pay for success" approach. Although the literature on their success is mixed, they have shown to be an appropriate tool for financing interventions with measurable outcomes and identifiable target groups.¹²⁰ All the following terms refer essentially to the same type of instrument (herein, "Impact Bonds") with minor differences:

- **Social Impact Bonds (SIBs):** Where the outcomes to evaluate and pay for are social and governmental entities (such as the municipality) are directly involved as an outcome payer.
- **Development Impact Bonds (DIBs):** Where the outcomes to evaluate and pay for are social and the outcome payer is not a governmental entity, but a third party, such as donors or development institutions.¹²¹
- **Environmental Impact Bond (EIB):** Where the outcomes to evaluate and pay for are exclusively environmental.¹²²



For each of these criteria, a score of "1" was given if the answer to the question is "most probably not", and "4" if the answer is "yes, to a high degree". The score was assigned as an informed assessment based on extensive desktop analysis and through validation

119 See. Golab. Impact Bonds. <https://golab.bsg.ox.ac.uk/the-basics/impact-bonds/>

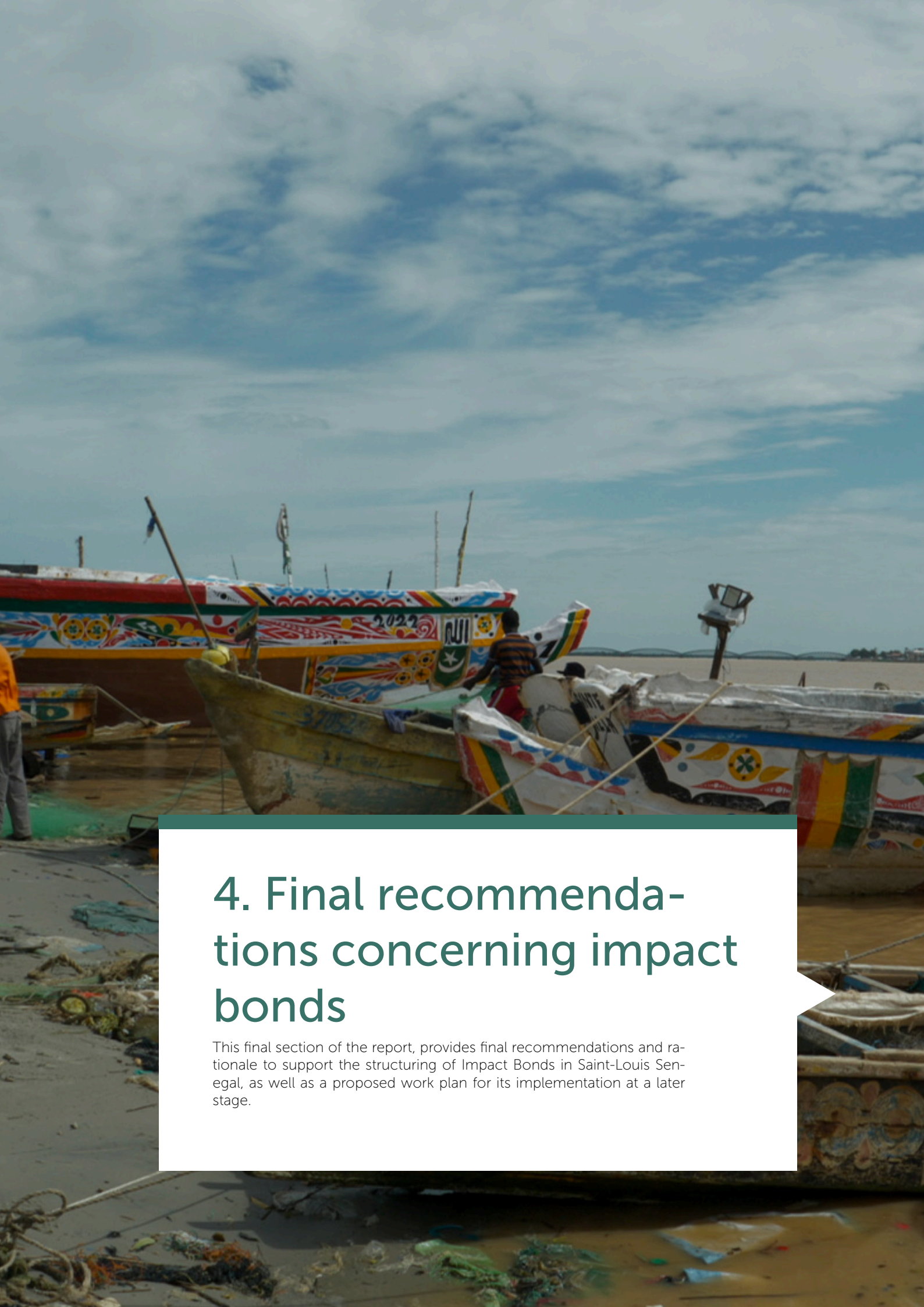
120 See OECD, 2015. Social Impact Bonds: Promises & Pitfalls. <https://www.oecd.org/cfe/leed/SIBsExpertSeminar-SummaryReport-FINAL.pdf>

121 See Brookings, 2019. From Colombia to Cameroon: The gradual growth of impact bonds in developing countries. <https://www.brookings.edu/blog/education-plus-development/2019/11/21/from-colombia-to-cameroon-the-gradual-growth-of-impact-bonds-in-developing-countries/>

122 See EFC, 220. Environmental Impact Bonds: Where are they now? <https://efc.web.unc.edu/2020/07/02/environmental-impact-bonds-where-are-they-now/>

Table 3. Database for selected financial instruments and ranking

#	Financial Instrument	Taxonomy	Feasibility	Impact	Additionality	Rank	Comment
1	Impact Bonds	Results-based financing	3.0	3.0	4.0	3.2	Suitable to enhance social outcomes (employment/ entrepreneurship) in aquaculture, tourism; as well as waste management or environmental results.
2	Labelled bonds: Green, Social and Sustainable Bonds / Sustainability-Linked Bonds (SLB Bonds) / Blue Bonds	Funding / Investment	2.0	3.0	4.0	2.6	Suitable at sovereign level. High potential to replicate cases such as the Seychelles Blue bond in partnership with the World Bank.
3	Cimate Fund or National Financing Vehicles (NFVs)	Funding / Investment	1.0	3.0	4.0	2.0	More suitable at sovereign, multi-country or macro level (see green finance platform).
4	Green Banks	Funding / Investment	1.0	3.0	4.0	2.0	More suitable at sovereign, multi-National, DFI, or macro level.
5	Green Street Africa (energy as a service) *Climate Finance Lab	Results-based financing	1.5	3.0	2.0	1.9	Suitable for scalable Renewable Energy. High levels of initial investment required.
6	Disaster Allocation Fund / Reserve Funds for Disaster Protection	Funding / Investment	1.0	3.0	3.0	1.8	More suitable at sovereign, multi-country or macro level.
7	Insurance Linked Securities (ILS) /Catastrophe Bonds	Other financial & insurance products	1.0	3.0	3.0	1.8	More suitable at sovereign, multi-National, DFI, or macro level.
8	Adaptation Benefit Mechanism (ABM)	Results-based financing	2.0	1.0	2.0	1.8	Potentially suitable for waste management or training fishermen. Not enough track record.
9	GROVE: Forestry Smart Ledger (FSL) *Climate Finance Lab	Funding / Investment	1.0	3.0	2.0	1.6	Suitable for territory with abundant resources for forestry.
10	Greenfi Climate-Smart Lending Platform *Climate Finance Lab	Funding / Investment	1.0	2.0	3.0	1.6	More suitable at sovereign, multi-National, DFI, or macro level and CSA/agricultural activity not as strong in the city of Saint-Louis.
11	Cooling as a service (CAAS) *Climate Finance Lab	Results-based financing	1.0	3.0	2.0	1.6	Suitable for agriculture in the Region or at the national level.
12	Micro Insurance	Other financial & insurance	2.0	1.0	1.0	1.6	More suitable at a commercial level.
13	Sale of Carbon Credits	Results-based financing	1.0	2.0	2.0	1.4	Suitable for territory with abundant resources for forestry. Potential partnerships for additional sources of revenue.
14	Loans4SME *Climate Finance Lab	Funding / Investment	1.0	2.0	2.0	1.4	Suitable for RE, requires enough scale: abundant energy projects on the SMEs space.
15	Securitization structures (e.g. Solar ABS)	Funding / Investment	1.0	2.0	2.0	1.4	More suitable at corporate, DFI, or national level. High minimum scale required.
16	Index Insurance	Other financial & insurance products	1.0	1.0	2.0	1.2	More suitable at sovereign, multi-country or macro level. Most suitable for agriculture, not a priority in the city.
17	Risk pools	Other financial & insurance products	1.0	1.0	2.0	1.2	More suitable at sovereign, multi-National, DFI, or macro level
18	Breathe Better Bond *Climate Finance Lab	Funding / Investment	1.0	1.0	1.0	1.0	Air pollution not the most pressing problem in Saint Louis.



4. Final recommendations concerning impact bonds

This final section of the report, provides final recommendations and rationale to support the structuring of Impact Bonds in Saint-Louis Senegal, as well as a proposed work plan for its implementation at a later stage.

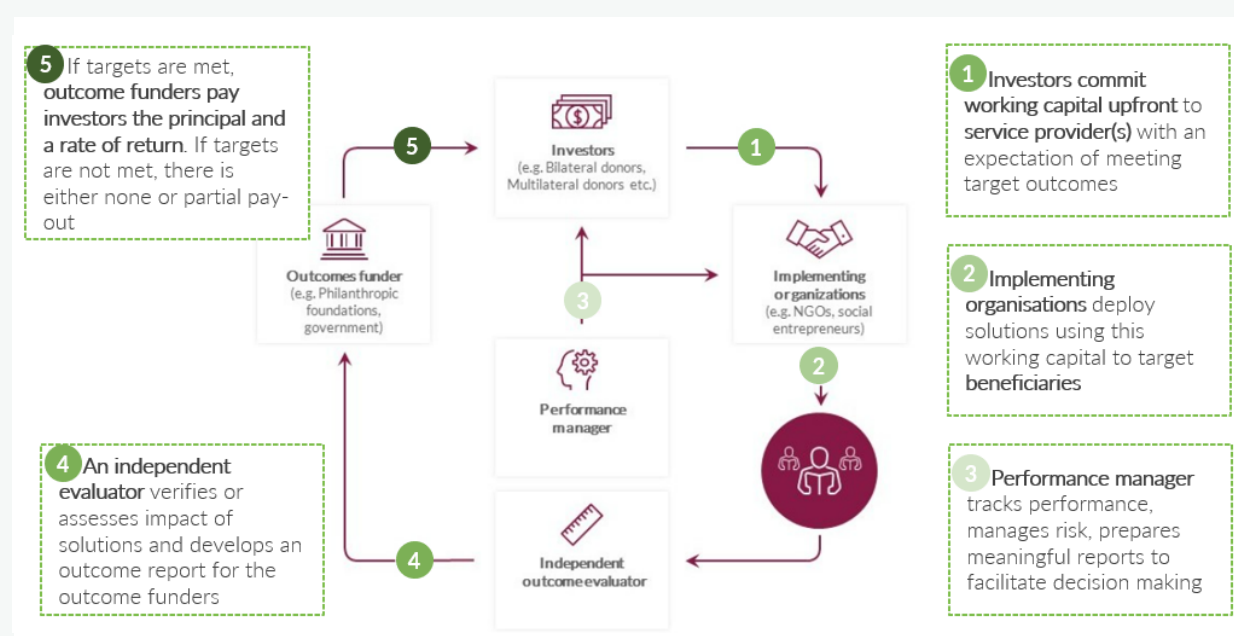


4.1 Impact Bonds' detailed structure and examples

Impact Bonds can be structured in many different ways. In general, however, they comprise the following structure and agents involved: 1. Investors commit working capital upfront to service provider(s) with an expectation of meeting target outcomes; 2. Implementing organisations deploy solutions using this working capital to target beneficiaries (or the

environmental project chosen in the case of EIB); 3. A performance manager tracks performance, manages risk, prepares meaningful reports to facilitate decision making; 4. An independent evaluator verifies or assesses impact of solutions and develops an outcome report for the outcome funders; and lastly, 5. If targets are met, outcome funders pay investors the principal and a rate of return. If targets are not met, there is either none or partial pay-out.¹²³ (See Box 11)

Box 11. Structure of Social Impact Bonds



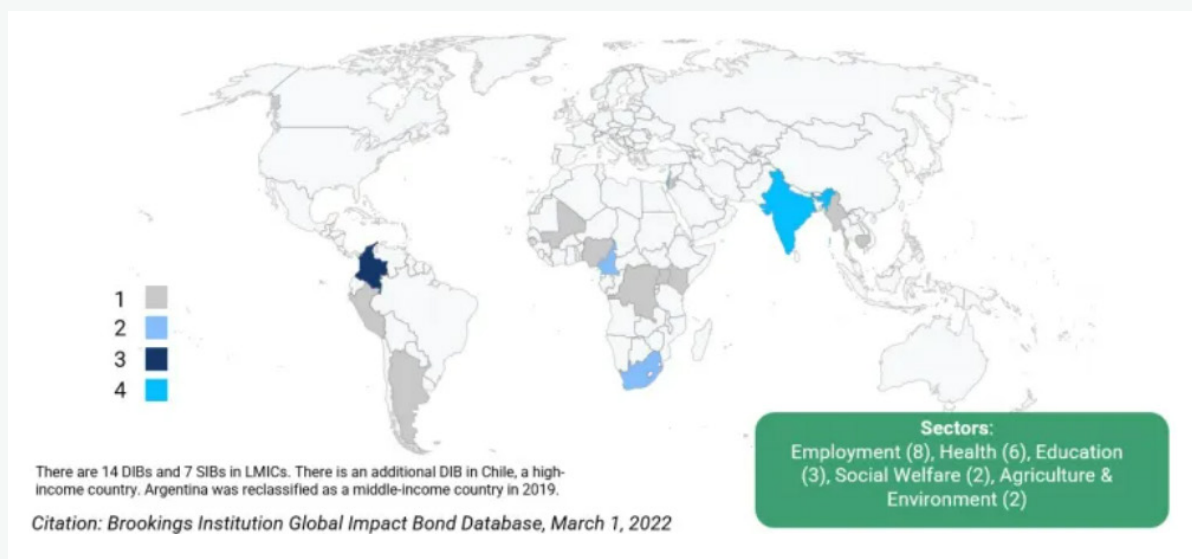
Source: Dalberg, 2019.

According to Brookings database,¹²⁴ there are currently 225 Impact bonds worldwide (210 SIB, 15 DIB) across 37 countries. Of these, 21 have been implemented in developing economies in multiple areas: employment (8), health (6), education (3), social welfare (2), agriculture and environment (2). Notably, foundations and philanthropists are the most common type of organization providing upfront capital (investing) in these deals; others include non-profits, investment funds, and commercial banks. Concerning the service providers, NGOs/non-profits are by far the most common, but in some cases the implementing organisation have been for-profit organizations and foundations. Bilateral and multilateral organizations have engaged in multiple ways: providing technical assistance, as outcome payers, and at times providing guarantee for investors to limit their potential losses.

¹²³ See Dalberg, 2019. Dalberg, 2019. How Development Impact Bonds work, and when to use them. <https://dalberg.com/our-ideas/how-development-impact-bonds-work-and-when-use-them/>

¹²⁴ See Brookings, Social and development impact bonds by the numbers. March 2022 snapshot. <https://www.brookings.edu/research/social-and-development-impact-bonds-by-the-numbers/>

Box 12. Impact bonds in developing countries^{125, 126}



Selected examples

Name, country & contract year	Sector	Social Challenge	Beneficiaries	Upfront commitment (USD million)	Service Provider	Investor	Outcome Funder
Education Bond. SIB (South Africa, 2018)	Education	Improving Children's ability to learn who do not have access to ECD centers	2,000	0.65	Western Cape Foundation for Community Work	The Standard Bank Tutuwa Community Foundation. Future Growth Asset Managers. LGR Venture Philanthropy	Department of Social Development. ApexH1 Charitable Trust
The Inclusive Youth Employment Pay for Performance Platform, SIB (South Africa, 2018)	Employment	Improving employment opportunities for excluded South African Youth	600 (Year 1) 5,400 (Year 2)	2.42 (Year 1) 6.21 (Year 2-4)	Harambee Academy Others in Years 2-4: Explore Data Science Academy. WeThinkCode	Brimstone Legacy Fund. Old-mutual. Nedbank, The Hollard Insurance Company Limited. The Standard Bank, Tutuwa Community Foundation, Clientele Limited, Oppenheimer Generations Foundation Limited	Yellowwoods. Allan Gray Otis Foundation Endowment Gauteng Provincial Government. The Jobs Fund, First Rand Empowerment Foundation
Cali Employability. SIB (Colombia, 2019)	Employment	Employment for vulnerable population	856	0.86	Fundacion Carvajal. Fundacion Akarallce. Kuepa. Fundacion Oolomba Incluyente	Fundacion Corona, Fundacion Bolivar Davivienda, MSD Fundacion Plan, Fundacion WWB, Corporacion Mundial de la Mujer Colombia	Cali Mayor's Office. SECO through the IDB-LAB
Graduation Model, DIB (Kenya and Uganda, 2017)	Social Welfare	Impact in poverty reduction	18,000	3.5	Village Enterprise	Nine impact investors, including Delta Fund. Lairdir Foundation. Silicon Valley Social Venture Fund. Bridges Impact Foundation, and several individual investors	USAIDS DIV. FCDO, Anonymous Donor

Source: Brookings, 2022, 2019

125 See Brookings, Social and development impact bonds by the numbers. March 2022 snapshot. <https://www.brookings.edu/research/social-and-development-impact-bonds-by-the-numbers/>

126 See Brookings, 2019. From Colombia to Cameroon: The gradual growth of impact bonds in developing economies. <https://www.brookings.edu/blog/education-plus-development/2019/11/21/from-colombia-to-cameroon-the-gradual-growth-of-impact-bonds-in-developing-countries/>



4.2 Rationale for a structuring programme

Based on the ranking presented in Section 3 of this report,

Impact Bonds were identified as the most appropriate financial instrument to deploy in the city of Saint-Louis, and they can be used to fund and implement several of the remedial initiatives mapped as this report will come to explain.

Impact Bonds ranked highest in FEASIBILITY, crucially because they are flexible in terms of scale. Most of the instruments ranked above have large minimum scale thresholds (USD 10 million and over). In most cases, this is due to either high structuring costs, the time and effort it can take for investors to conduct due diligence, aggregation required for revenue streams to be significant, or risk diversification concerns. Impact Bonds, on the other hand, are highly flexible. Depending on each case, they can be structured from deal sizes below USD 1 million, up to several million for large scale projects. They can also be structured in stages, with piloting stages involving lesser amounts. Furthermore, Impact Bond investors, tend to be patient or flexible investors who care deeply about the social or environmental result, as well as the financial return. Their investment tickets are usually moderate in size and, typically, they do not involve funds from clients, hence they do not hold fiduciary duty over those resources. Foundations and philanthropies are the most common type of investors.

They are aimed at achieving measurable IMPACT, and in doing so, when structured properly, they have a high potential to improve the living conditions of the population in the city; they can aim to make the



city more inclusive, clean and/or resilient. The area of focus will depend on the sector and outcome that is ultimately designed.

Furthermore, given that these instruments are intended to bring together different resources from private and public investors, they were assigned the highest score in the criteria of ADDITIONALITY. Notably, as some examples detailed below will show, multiple cases of Impact Bonds in developing economies have been successful in crowding-in

funds from the private sector. This is critical because while international climate finance flows -for both mitigation and adaptation-, have been steadily increasing, the needs for such funding are far greater posing an imperative challenge for emerging market economies to capture as much of these flows as possible. For reference, conservative estimates indicate that ~USD 4.35 trillion per year is needed to limit global warming to 1.5 degrees.¹²⁷ Although total climate finance has increased

over the last decade, reaching USD 632 billion in 2020, this is still a small fraction (~14%) of estimated needs.¹²⁸

Implementing this financial tool in the city of Saint Louis, Senegal, would provide additional advantages beyond the ones discussed above. Crucially, Impact Bonds bring together fruitful partnerships and create spaces for collaboration and synergies. As mentioned in the enabling environment section before, the city has received great attention from international organisations that can be potentially valuable partners. Furthermore, a local government that is open and willing to invest in the city's future provides a great opportunity to bring efforts together and enact a solution with positive multiplier effects, given its possibility to be replicated in different sectors.

¹²⁷ See Climate Policy Initiative. Global Landscape of Climate Finance 2021 report. <https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021/>. Other estimates can be found in [Net Zero Financing Roadmaps](#) by UNFCCC Race to Zero campaign.

¹²⁸ Ibid.

The following are additional advantages that are commonly cited when discussing Impact Bonds:

- **They facilitate alignment of incentives** that can lead to a well-functioning service.
- **The existence of objective evaluation mechanisms** can provide an effective way to deliver social or environmental services due to their focus on monitoring and measuring outcomes.
- Impact Bonds can be structured with a **great deal of flexibility**. Not only in terms of scale, but also in the definition of who bears the risk. Sometimes the investors bear all of the risks, but this can also be shared among implementing agents and outcome payers.
- From the perspective of public entities, when they are involved, Impact Bonds can be seen as **a way for local governments to test out solutions** without fully paying for them.¹²⁹

Some of the potential risks include the fact that they can be a complex system involving multiple parties, which entails a great deal of contracts and therefore potentially greater costs relative to traditional government services. Other potential challenges are the ones that typically arise in the implementation:

- **Timescale and measurement.** Although there is a lot of flexibility around duration, some results are best achieved in longer timescales entailing potentially greater costs and less investor interest. Concerning measurement, given that returns are tied to results achieved, the longer the investment period, the higher the risk of compromising the attribution effect of the Impact Bond.¹³⁰
- **Continuity and coordination.** Ensuring sustainability and continuity of the service delivery is crucial. Coordination

between different stakeholders in complex environments where benefits are clear for everyone is essential, as many practicalities can slow down the functioning of the mechanism.¹³¹ This is particularly relevant for the city of Saint-Louis, as multiple stakeholders consulted mentioned that in the past, capacity and governance constraints have affected the continuity of certain initiatives.

To mitigate such risks, it is crucial to consider the following success factors from the beginning.

Impact Bonds tend to work best when the service to be provided is **well defined** from inception and is delivered by a **trustworthy implementing agency** (the service provider). **The definition of outcomes** should be clear and well-defined in advance, and there should be coherence between the outcomes and the **target group definition**, and the defined **timeframe** of the project. Lastly, it is crucial to have an **objective and pragmatic evaluation framework** of project outcomes.



4.3 Potential applications in Saint-Louis Senegal

One of the key characteristics of Impact Bonds is that they can be a **powerful tool to implement across a wide variety of sectors and solutions**. When asked about the potential role of the private sector and the sectors where the city has greater potential to crowd in further investment, the most common responses were related to providing solutions around waste management, aquaculture and tourism. Furthermore, as highlighted in Section 2, the country and the city can benefit from a population dividend if provided with appropriate opportunities to thrive. 61% of the population of Saint-Louis is under 25 years and the level of access to education exceeds 80%, confirming the strong potential for the contribution of youth to the development of the city.¹³² In the following table we provide initial ideas that locate the youth and women at the centre.

¹²⁹ See InsideOut Impact Bonds in Africa, by Joonji Mdyogolo <http://insideoutpaper.org/impact-bonds-in-africa-2/>

¹³⁰ See OECD, 2015. Social Impact Bonds: Promises & Pitfalls. <https://www.oecd.org/cfe/leed/SIBsExpertSeminar-SummaryReport-FINAL.pdf>

¹³¹ Ibid.

¹³² See Rapport sur la Population du Senegal 2020. https://investinsenegal.com/wp-content/uploads/2021/03/Rapport-sur-la-Population-du-Sngal-2020_03022021-1.pdf

Table 4. Potential applications of Impact Bonds in Saint-Louis

Sector	Waste Management	Sustainable tourism	Aquaculture	Environment
Challenges	Improve waste management practices and results, or help youth create their own companies in this space.	Provide alternative sources of livelihoods, increase education and training, increase employment, and/or help youth create their own companies.	Provide alternative livelihood, ensure food security and meet the population's demand for protein, increase employment, and/or help youth create their own companies.	Environmental challenges
Potential applications	<ul style="list-style-type: none"> Waste Management services that are verified (Results-Based Financing for Municipal Solid Waste) Entrepreneurship 	<ul style="list-style-type: none"> Education Employability Entrepreneurship 	<ul style="list-style-type: none"> Employability Entrepreneurship 	These are still considered a developing field. First developments around green infrastructure. ¹³³
Potential Investors	Depending on the solutions targeted, some investors would be more suitable and interested than others. In general, these can be <ul style="list-style-type: none"> International foundations, philanthropies Senegalese foundations, philanthropies and large banks and companies NGOs, non-profit Private individuals 			
Outcome Funders	Depending on the solutions targeted, some investors would be more suitable and interested than others. In general, these can be <ul style="list-style-type: none"> Municipality, or other governmental entities Philanthropies Multilaterals and bilateral aid: USAID, FCDO, Norfund, etc NGOs, non-for-profit or even private individual donors 			
Potential performance managers	With experience in developing markets: <ul style="list-style-type: none"> Instiglio (manager in the graduation model in Kenya and Uganda) Social Finance Others with experience in developed markets: <ul style="list-style-type: none"> Good Finance 			
Potential Partners (different potential roles)	These entities are mapped exclusively for illustration purposes. No formal conversation or agreement has been held with any of them. <ul style="list-style-type: none"> Aquaculture: L'Agence Nationale de l'Aquaculture, Innovation Environnement Developpement Afrique (IED Afrique); Fish4ACP. Tourism: Ecole Nationale de formation Hôtelière et touristique (ENFHT), ICD-Afrique Waste management: World Bank, Autre Terre, Caritas, Recuplast. Environment: Allcot (Project Developer Natural Capital Space) Entrepreneurship: L'Agence de Développement et d'Encadrement des Petites et Moyennes Entreprises (ADEPME) Providing guarantee: Fonds de Garantie des Investissements Prioritaires (FONGIP); The Sovereign Fund for Strategic Investments (FONSIS). Environmental Impact Bonds: Quantified Ventures (they have developed some in municipalities across the United States, Washington DC, Atlanta, Baltimore, etc) 			

Note: Impact Bonds work best when targeting one of the potential applications. The table intends to provide ideas to be refined when implementation is launched.

133 See EFC, 2020. Environmental Impact Bonds: Where are they now? <https://efc.web.unc.edu/2020/07/02/environmental-impact-bonds-where-are-they-now/>

The definition of the target sector should be one of the initial phases of implementation. Important question to depart from are: Where lies the greatest untapped potential in the city? What is the particular problem that needs to be tackled in that space? Is this problem susceptible to be addressed by interventions that have measurable outcomes and identifiable target groups? In a final stakeholder consultation validation workshop, participants ranked waste management initiatives as the most plausible avenue to consider, followed by eco-tourism and aquaculture. Further analysis is required to define avenues for implementation.

Convening with the local authorities is crucial, in order to identify potential areas for synergy. The definition of the sector can also come from a particular workstream that the local government want to fund and incentivise, or any other major local partner such as the World Bank, of the ADF.



4.3 Work plan to turn recommendations into actions

Multiple advisors in the space, have made available toolkits

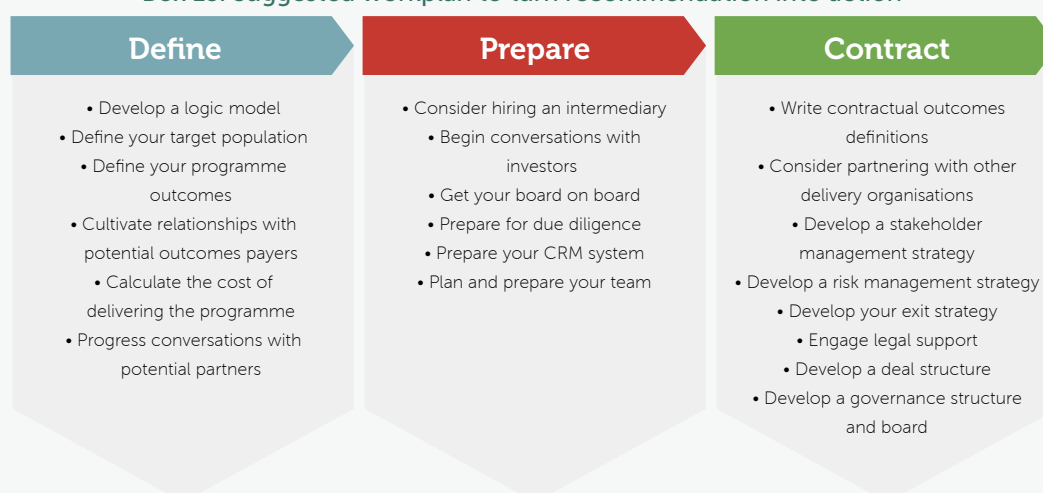
for implementation. In particular, Goodfinance in collaboration with UK Department for Digital, Culture, Media and Sport, Think Forward and Bank of America compiled a comprehensive toolkit providing Stage-by-stage tips, tools and resources for successfully developing an Impact Bond.

The toolkit suggests a 3-stage process that can take anything from six months to two or three years to set the Impact Bond up and running, and it should be led by a team with the following skills:

- Traditional fundraising skills including networking and prospect research
- Legal understanding of organisational structures
- Financial awareness (for example an understanding of debt, equity and return)
- Excel modelling
- Knowledge of and contacts within the Impact Bond 'landscape'

Additional stages, not detailed here, include the phase of delivering (the actual life of the bond) and learning and monitoring a process that should run across all stages.

Box 13. Suggested workplan to turn recommendation into action¹³⁴



Source: Work plan from the SIB providers Toolkit, Good Finance

* A logic model – sometimes called a 'theory of change' – lays out the key project inputs, outputs and outcomes. Its purpose is to clarify the work being done and the aims and benefits of that work.

¹³⁴ See GoodFinance https://socialimpactbondtoolkit.goodfinance.org.uk/sites/default/files/block_image/SIB%20Providers%20Toolkit%20-%20Downloadable%20PDF%20-%20Development_0.pdf

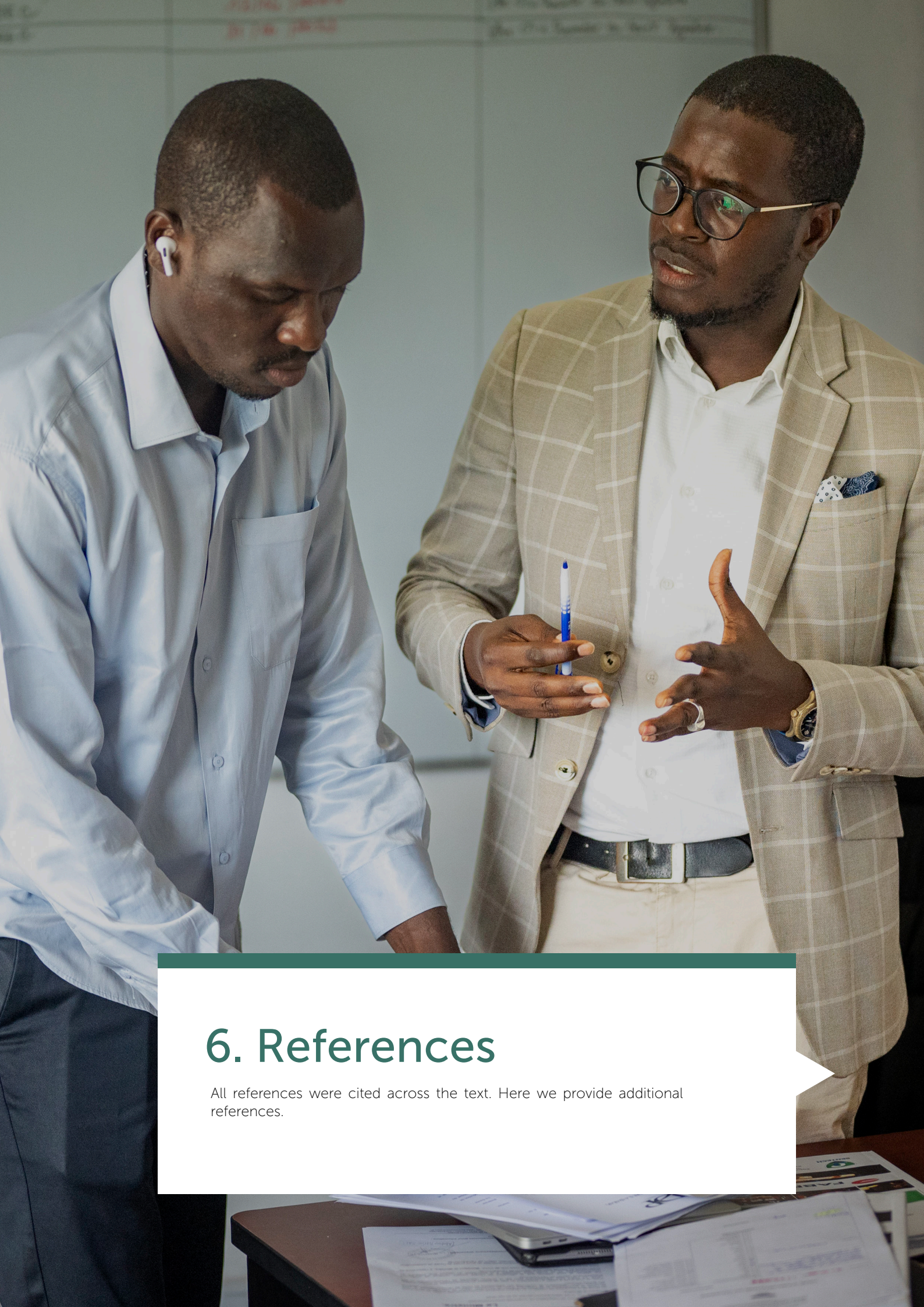


5. Conclusion

Saint-Louis Senegal, a city of great beauty and potential, has the opportunity to capture a greater portion of the international climate finance flows available globally, through the deployment of Impact Bonds. This Report provided an in-depth analysis explaining why this tool was chosen for the particular context of the city. Its flexibility in regards to scale and sector, its capacity to generate positive impact by fostering valuable partnerships, its great potential to be scalable and replicated once the first case is implemented, and its capacity to crowd in private capital, are some of the reasons that explain the choice.

Going forward, convening with the local authorities is crucial, in order to identify potential areas for synergy. The definition of the sector can also come from a particular workstream that the local government want to fund and incentivise, or any other major local partner such as the World Bank, of the ADF.





6. References

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7. Annexes

The following is the initial list of stakeholders consulted. We are deeply grateful for their contributions.

1. Stakeholders consulted

1. M. Aziz HALIDOU – Head of Regional Debt Capital Market Development at UMOA-Titres.
2. Mme. Elsa Dansokho - Commercial Diplomacy Officer at British Embassy.
3. M. Sanou DAKONO - Chef de bureau Division des Évaluations d'Impact sur l'Environnement (DEEC).
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6. Mme. Marie NDAW - Directeur technique Agence de Développement Municipal.
7. M. Bouna Manel Diop - Responsable du volet environnement et changement climatique de la SAED.
8. M. Luc MALOU - responsable de la gestion de zones côtières du West Africa Coastal Areas Management Program (WACA).
9. Monsieur Moussa GUEYE - Chef de la Division des Évaluations d'Impact sur l'Environnement de la Region de Saint Louis (DEEC).
10. M. Ousmane fall SARR and M. Ousseïni Inoussa - ALLCOT Sénégal.
11. M. Malick SECK - Consultant for the FCDO Manufacturing Africa programme Renewable and consultant on several renewable energy programmes.
12. M. Mouhammad FALL – IFC Infrastructure & Telecoms Media and Technology Investments.
13. M. Cheikh MBOUP and Aminata Cheikh MBAYE - Private Sector investment, Structuring & Corporate Finance at CGF Bourse.
14. Isabelle Celine Kane – World Bank Team Leader SERRP -Saint Louis Emergency Recovery and Resilience Project
15. Farouk Banna - Sector Leader for Sustainable Development at The World Bank



2. Issuing labelled bonds

another promising financial instrument to be deployed ideally at the national level.

Issuing Green, Social, Sustainable

or Blue Bonds, is no different than issuing regular bonds, but, with an additional step: issuers certify the use of funds or their achievement of sustainable goals through assurance companies who issue Second Party Opinions (SPO). Issuer do this by taking into account international guiding principles. 97% of sustainable bonds globally were aligned with ICMA principles in 2020¹³⁵, but other frameworks include the Climate Bond Initiative, and the EU Green Bonds Standard (EU GBS).

While the city does not have the resources at scale to issue these types of bonds on its own, we believe there is an opportunity for issuing at sovereign level, or targeting a common market such as the WAEMU market, to help overcome the scale constraint. The proceeds can then be targeted to specific environmental projects in the region of Saint Louis. Alternatively, it is worth to evaluate the possibilities for a private transaction by contacting the World Bank/IFC, or AfDB, or other multilaterals who can be potentially interested in underwriting and structuring a targeted transaction.

- **Green, Social and Sustainable Bonds:** Ordinary Debt Capital Market (DCM) issuance with certification on the sustainable use of proceeds. Green bonds, allocate funding to environmentally beneficial projects and were first issued globally on 2007. Social

Bonds allocate funding to socially beneficial projects and were issued first in 2010, and Sustainable allocate funding to either socially or environmentally beneficial projects and were issued first in 2012.

- **Sustainability-Linked Bonds (SLB Bonds):** DCM issuance whose structural characteristics vary depending on the issuer's sustainable target's achievement. The first SLB was issued in September 2019 by Enel a multinational energy group. Netcare, in partnership with Standard Bank, launched Africa's first sustainability-linked bond in South Africa and Lesotho in March 2021, a 3-year issuance totalling USD 67 million.¹³⁶ Rand Water, a South African state-owned company, followed in July 2021 with an issuance of approximately USD 110 million.¹³⁷ Last February 2022, Chile became the first sovereign to issue this kind of bonds, with a USD 2 billion issuance maturing in 2042, with a bid-to-cover (demand to offer ratio) of 4.1 times, hence providing evidence of the great appetite for these instruments in the market.¹³⁸ In fact, a recent paper by academics at the University of Zurich, argues that SLBs offer a 'free lunch' for some issuers, as their financial savings are higher than the potential penalty, and they have a call option to reduce this penalty.¹³⁹ **As investors have become increasingly aware of the importance of working with managers to reduce emissions as an avenue for decarbonisation as opposed to exclusion, these tools provide an ideal opportunity to do so.**

135 The International Capital Markets Association is a self-regulatory organization and business association for capital market participants. <https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/The-Green-Bond-and-ESG-Chartbook>, February 2021

136 See ESI-Africa, 2019. <https://www.esi-africa.com/industry-sectors/business-and-markets/africas-first-sustainability-linked-bond-now-available/>

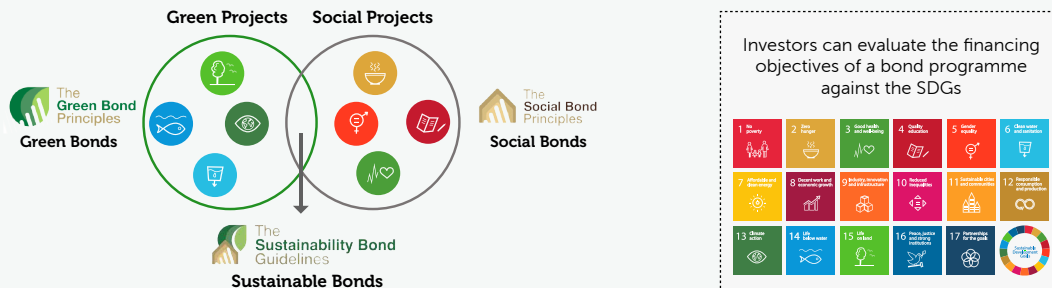
137 See <https://www.engineeringnews.co.za/article/rand-water-reports-successful-r17bn-bonds-auction-2021-07-01>

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139 See Kölbel, Julian and Lambillon, Adrien-Paul, Who Pays for Sustainability? An Analysis of Sustainability-Linked Bonds (January 12, 2022). Available at SSRN: <https://ssrn.com/abstract=4007629> or <http://dx.doi.org/10.2139/ssrn.4007629>

Box 14. Green, Social, and Sustainable Bonds (GSS)

Ordinary bonds whose funds are intended to finance green or social projects, or both. Same structure of an ordinary bond (plain vanilla) and same pricing mechanism.



The International Capital Market Association (ICMA) is the most widely referenced entity providing voluntary compliant guidelines for the issuance of GSS bonds.

ICMA Principles - Green 2018; Social 2020; Sustainable 2018;

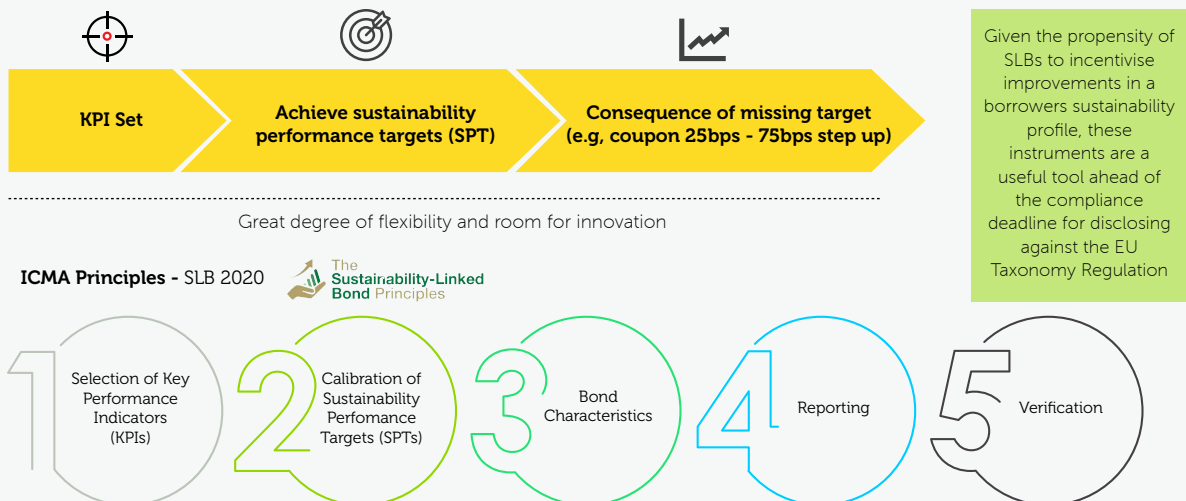


Source: Genesis Analytics. ICMA Principles.

Box 15. Sustainability-Linked Bonds (SLB)

Proceeds may be used for general purposes, rather than for specific projects.

Structural characteristics vary depending on whether the issuer accomplishes a predefined sustainable objective. Shift focus from "allocate and report" to "achieve and report".



Source: Genesis Analytics. ICMA Principles.

- **Blue Bonds:** Blue bonds are emerging as a new asset class that helps to solve water-related challenges, create sustainable ocean business opportunities, and signal responsible ocean stewardship. When an issuer issues a blue bond, it specifically commits to investing the proceeds on business solutions for oceanic health, freshwater and/or to improve access to water and sanitation. Until there is a widely accepted set of blue bond principles, issuers are encouraged to use ICMA's social and green bond principles, adapted to a blue use of proceeds. Moreover, the UN Global Compact Sustainable Ocean Principles can serve as a guide for responsible practices.¹⁴⁰ Blue bonds were first issued globally in 2018 by the Republic of Seychelles (USD 15 million). In this case, the World Bank assisted in developing the blue bond and reaching out to the three investors: Calvert Impact Capital, Nuveen, and U.S. Headquartered Prudential Financial, Inc.¹⁴¹

The following table summarises relevant examples in Africa, as well as some advantages and challenges:

Relevant Examples in Africa	Advantages	Risks / Challenges
<p>-Sovereigns: Nigeria Green Bond (USD 30 million) in 2017; (Egypt Green bond (USD 750 million) in 2020; Seychelles Blue Bond 2018 (USD 15 million)</p> <p>-Municipalities: City of Johannesburg (USD 138 million) in 2014, followed by Capetown in 2017 (USD 74 million)</p> <p>-Private sector: Standard Bank of South Africa Green Bond (USD 200 million); Netcare of South Africa issued SLB (USD 67 million); Emergence Plaza, the owner of Cosmos Yopougon shopping centre in Côte d'Ivoire (USD 18.1 million)</p>	<p>-Direct financing exclusively to projects with positive climate, environmental, and sustainability outcomes across a myriad of sectors, including energy, transportation, construction, agriculture, and water.</p> <p>-Exponential growth of this new market. The demand for green bonds gained significant momentum</p>	<p>- African private and public sectors have lagged behind other emerging markets: Size and depth of capital markets, creditworthiness harder to prove with fewer entities being rated by international rating agencies, and political economy concerns (high level of centralisation and state-dependency)¹⁴²</p>

Africa's sustainable bond space still lags compared to the rest of the world, it represents close to 0.4% of international green bond issuance.¹⁴³ Size and depth of some capital markets, creditworthiness harder to assess with fewer entities being rated by international rating agencies, and political economy concerns (i.e., high level of centralisation and state-dependency) in many African countries, are commonly cited as reasons that explain the lag. Within Africa, the distribution of the funds raised by green bond issuance has been overwhelmingly concentrated in South Africa, followed by Morocco, Nigeria and Kenya.

In the context of Saint-Louis, we think that the fact that it is a UNESCO heritage might help build the case for a private placement of a relatively small size. However, it is important to convene with governmental authorities and assess the city and country's finances and speak to potential underwriters to evaluate the existence of sufficient appetite for this instrument to be deployed. Furthermore, as was mentioned above, since interest rates and risk aversion are on the rise globally, the creditworthiness and enabling environment of municipalities seeking funding will be heavily scrutinised in the future.

¹⁴⁰ See BidInvest <https://www.idbinvest.org/en/blog/development-impact/five-things-know-about-blue-bonds>

¹⁴¹ See World Bank, 2018. <https://www.worldbank.org/en/news/press-release/2018/10/29/seychelles-launches-worlds-first-sovereign-blue-bond>

¹⁴² See Gorelick, Jeremy, 2018. Supporting the future of municipal bonds in sub-Saharan Africa: the centrality of enabling environments and regulatory frameworks. Environment and Urbanization. 2018;30(1):103-122.

¹⁴³ See Capital Monitor <https://capitalmonitor.ai/sector/consumer/why-cote-divoires-first-green-bond-is-so-important/>

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