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Perceptions of local communities on Hann Bay and solutions for sustainable development

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Abstract

Socio-economic surveys conducted among local populations and workers in industrial units made it possible to involve key stakeholders in the decision-making process and to integrate their opinions, expectations, suggestions, and recommendations. The proposed solutions focus primarily on protective and preventive measures, enforcement of regulations, communication and awareness campaigns, acquisition of appropriate equipment, and monitoring–surveillance systems to support the rehabilitation of Hann Bay and ensure its long-term sustainability.

These surveys were carried out in 2022 across eleven sites located in the municipalities of Hann-Bel Air, DalifortFoirail, Thiaroye-sur-Mer, Sicap Mbao, and Mbao. They provided a participatory platform that shed light on both the environmental and socio-economic challenges facing Hann Bay.

The findings revealed that chemical pollution remains present in the bay, which may lead to contamination of fishery resources or push fish populations further offshore. The degradation of ecological conditions could also explain the frequent mortality of juvenile fish, particularly in areas such as Hann Marinas, Hann Pêcheurs, and Cité ISRA (see field observations, July 2022, Serigne Abdoul Aziz Ndaw).

In this perspective, the study goes beyond a simple diagnostic to also propose an integrated set of solutions promoting sustainable development for the area. The target zone is home to nearly 500,000 residents, hundreds of industrial units—most of which lack adequate sanitation systems—as well as a wide range of local stakeholders, including community leaders and municipal council members. The data collection relied on both qualitative and quantitative approaches, using a combination of open-ended and closed-ended questions, the latter requiring respondents to answer with a simple “yes” or “no.”

Keywords: Surveys; Pollution; Sediments; Hann Bay; Senegal

1. Introduction

In Senegal, the issue of pollution in Hann Bay has been at the center of concern, mobilizing the State and various stakeholders for decades. Within the framework of this study on community perception, the aim is to involve the concerned parties in the decision-making process in order to take into account their perceptions, opinions, expectations, and recommendations. The target area of Hann Bay, located south of the Cape Verde Peninsula and east

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of the city of Dakar, extends over approximately 17 km. It is bounded to the north by the Old Rufisque>Road, to the south by Hann Bay, to the west by the military base, and to the east by the village of Petit Mbao. Once a highly frequented site, Hann Bay today receives substantial volumes of wastewater and contains heavily polluted sediments. Indeed, rapid urbanization has brought industrial areas closer to residential zones, thereby intensifying environmental and health pressures.

This study therefore seeks to address two main research questions:

- What are the concerns of the stakeholders involved in the bay?
- What can be our contribution to the rehabilitation of the bay in support of sustainable development?

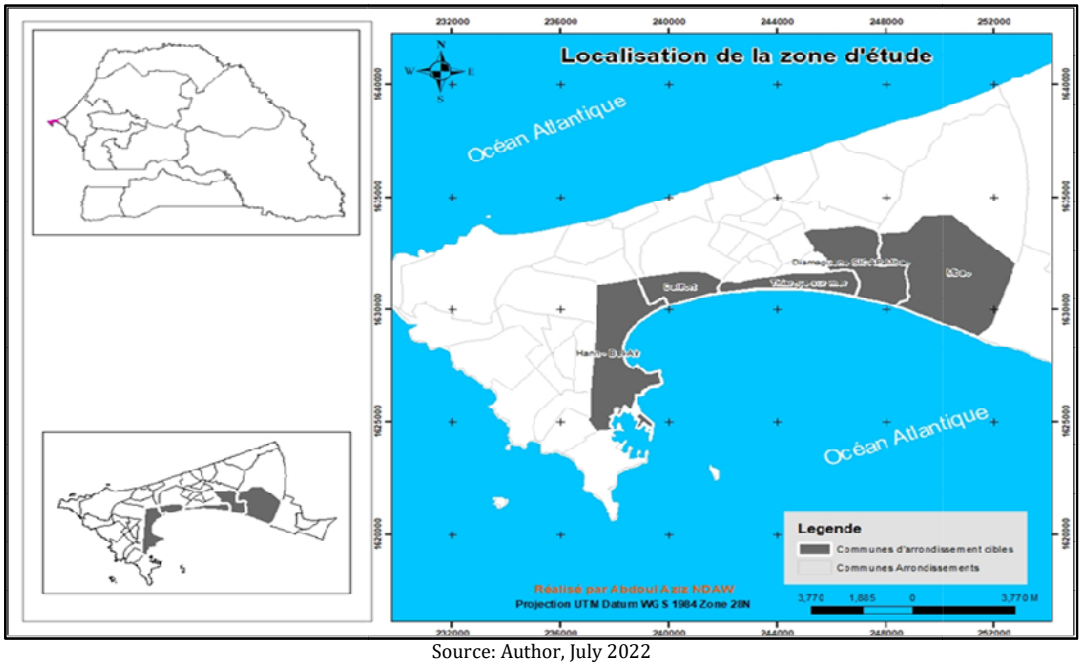
2. Materielsand methods

2.1. Study Area

The Hann-Mbao study area (figure 1) is composed of several municipalities, industrial facilities, households, and various human activities that generate pollution through both direct and clandestine discharges into the bay or into pits. The main district municipalities (Hann-Bel Air, DalifortFoirail, Thiaroye-sur-Mer, Sicap Mbao, and Mbao) most affected by the degradation of the bay have expanded significantly. However, due to the lack of sanitation infrastructure and adequate systems for waste collection and disposal, local residents often dump their solid waste on the beach or directly into the bay. This situation has severe ecological, sanitary, and visual consequences, which in turn negatively impact the sustainable management of Hann Bay.

The target population includes residents from the various neighborhoods, leaders of community associations, businesses, and members of the municipal council. These local stakeholders are expected to provide the necessary data through both qualitative and quantitative surveys.

Finally, in carrying out the quantitative survey, the questions formulated were both open-ended and closed-ended, the latter requiring respondents to answer with a simple “yes” or “no.”



Source: Author, July 2022

Figure 1 Study Area

2.2. Survey Sites

The survey sites were located in the municipalities stretching from Hann to Mbao. All neighborhoods were included in the survey. In total, 160 questionnaires were administered to the local populations.

The neighborhoods visited in Hann were: Hann Yen, Hann Pêcheur, Hann Ferraille, Hann Montagne 5, Hann Montagne 6, Hann Marigot, and Hann Plage.

The neighborhoods visited in Dalifort were: Eaux et Forêt, Forces Armées, Cité Marine, Darou Salam, Cité Mairie, Cité Deggo, Touba Seras, Cité Mor Maty Sarr, and Cité Castors Municipaux.

The neighborhoods visited in Thiaroye were: Thiaroye-Gare, Thiaroye-sur-Mer, and Thiaroye-Kao.

The neighborhoods visited in Mbao were: Petit Mbao (Lébou and Peul), Grand Mbao, Keur Mbaye Fall, and Cité Ndeye Marie.

2.3. Sampling Method

The method used in this study was simple random sampling, which is part of the probabilistic survey methods. A sample is defined as a relatively small group, scientifically selected in such a way as to represent the parent population as faithfully as possible. Instead of examining the entire population, only a portion of it is studied, provided that it is representative, and conclusions are then drawn for the whole population.

As shown in Table 1, a quota of approximately forty questionnaires was administered to residents in each of the following municipalities: Hann-Bel Air, Dalifort, Thiaroye-sur-Mer, Sicap Mbao, and Mbao.

2.4. Sampling of Respondents

Given the demographic weight of each municipality, sampling was conducted, and it was deemed necessary to gather the perspectives of men and women, youth, adults, and the elderly.

Interviews with residents of the study area were carried out on samples designed as reduced models of the overall population. The selection of these samples aimed to achieve the highest possible representativeness.

A reliable scientific study is only as strong as the quality of the tools or instruments used for data collection. For this purpose, a questionnaire was administered by sector.

Table 1 Number of Questionnaires Administered per Sector

	Sector	**Population**
Order	Dénomination	Number of Interviews
Sector 1	Hann Bel Air	40
Sector 2	Dalifort	40
Sector 3	Thiaroye	40
Sector 4	Mbao	40
TOTAL		**160**

Source: Serigne Abdoul Aziz NDAW, July 2022

In addition, semi-structured interviews were conducted using a questionnaire administered to local officials, industrial stakeholders, and administrative services. The questions were formulated in relation to socio-economic activities and environmental policies.

3. Results and discussion

The analysis and interpretation of the survey results are based both on documentary and bibliographic data, and on field observations collected during interviews conducted within the study area. Overall, the findings highlight several key issues concerning Hann Bay, including the most significant environmental problems, the settlement history of the local populations, and the impacts of pollution on economic, tourism, industrial, and commercial sectors.

3.1. Distribution of Respondents by Nationality

The analysis of nationality reveals that 100% of respondents surveyed in Hann Bel-Air, Dalifort, Thiaroye, and Mbao are of Senegalese nationality.

3.2. Distribution of Respondents by Age (%)

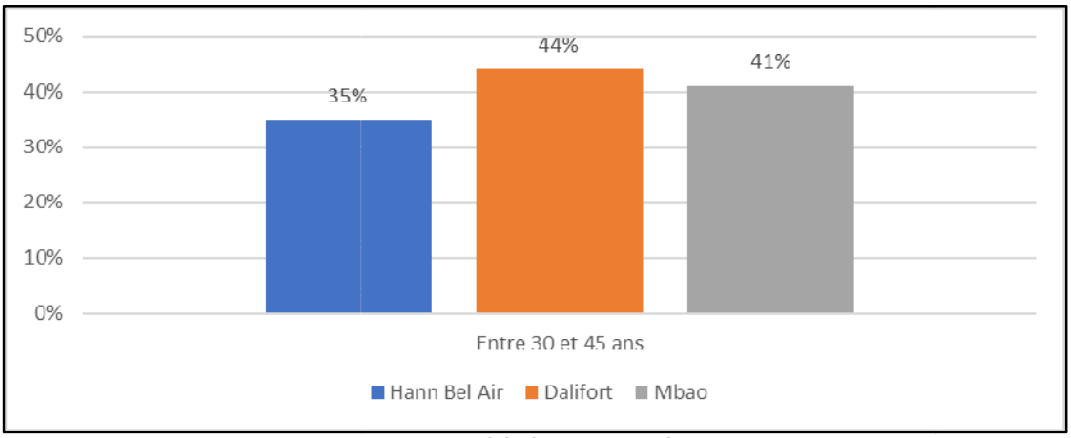
Most individuals surveyed during this study were above 30 years of age, reflecting a relatively mature population. This age profile indicates that respondents are generally aware of the pollution in Hann Bay and its impacts on their livelihoods.

In Hann Bel-Air, 46% of respondents were aged between 45 and 60 years, 35% were between 30 and 45 years, and 19% were over 60 years old.

In Dalifort and Thiaroye, 44% of respondents were between 30 and 45 years, while the 18–25 age group and respondents over 50 years each represented 28% of the sample.

In Mbao, 41% of respondents fell within the 30–45 age group. The 18–25 age group accounted for 32%, while those aged 50 and above represented 27% of the sample.

In summary, individuals aged30 to 45 represent the most significant portion of the sample across the area extending from Hann to Mbao (see Graph). Having grown up with the pollution of the bay, their views, concerns, suggestions, and recommendations were given consideration.



Source: Serigne Abdoul Aziz NDAW, July 2022

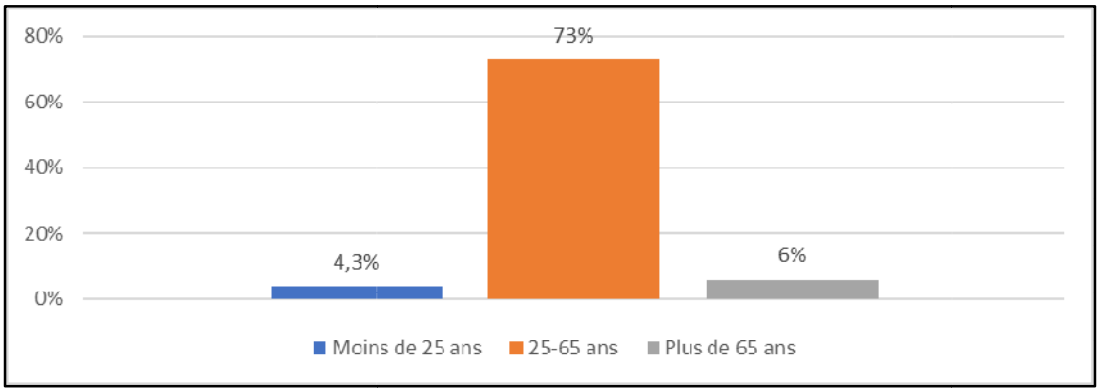
Figure 2 Distribution of Respondents by age (%)

3.3. Distribution of respondents according to the duration of residence (%)

Most respondents are well acquainted with Hann Bay, as they have been residing in the area for several decades, on average around thirty years.

- In Hann Bel-Air:

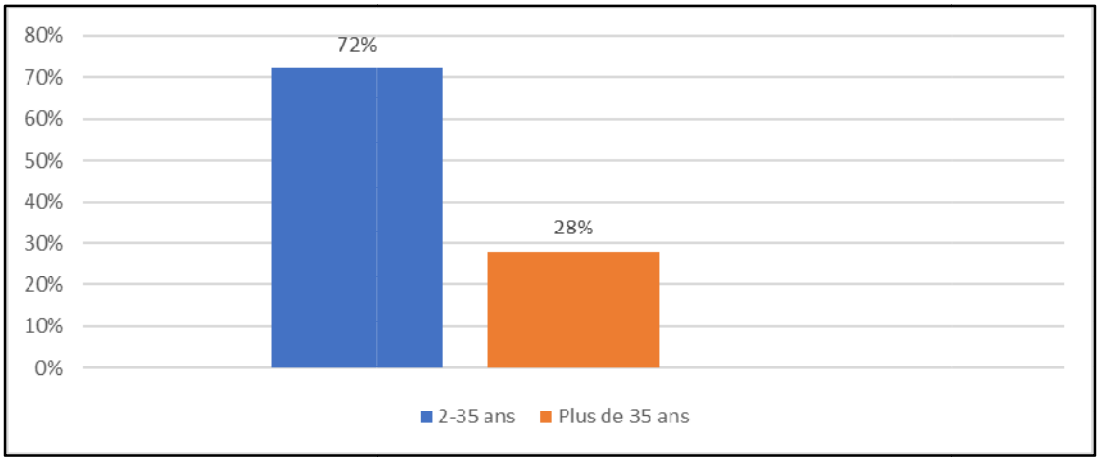
73% of respondents have lived in the area for a period ranging from 25 to 65 years (see Figure 13). This demonstrates that they possess in-depth knowledge of both the evolution of pollution in the bay and the various measures implemented for its management.



Source: Serigne Abdoul Aziz NDAW, July 2022

Figure 3 Distribution of respondents according to the duration of residence (%) in Hann

In Dalifort and Thiaroye, 28% of respondents are natives (see Figure 2). For non-native residents, the number of years of residence ranges from 2 to 35 years. The most recent arrivals are those who settled in the area around 2 years ago.

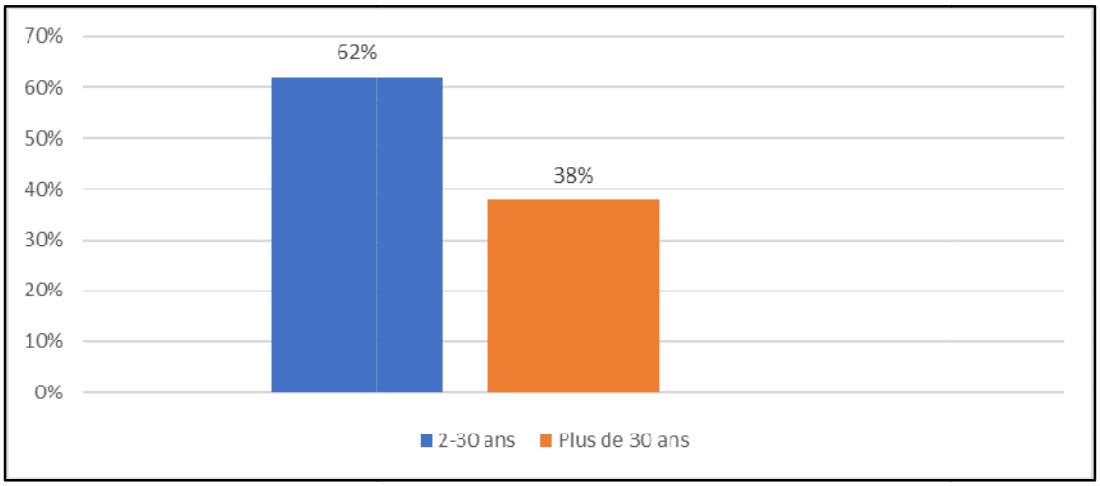


Source : Serigne Abdoul Aziz NDAW, July 2022

Figure 4 Distribution of respondents by duration of residence (%) in Dalifort and Thiaroye

In Mbao, 38% of the respondents are natives of the locality (see Figure). For those who are not originally from the different neighborhoods, the length of residence ranges between 2 and 30 years. The respondents who have most recently settled in the neighborhoods of Mbao have been living there for only 2 years.

Figure 4 illustrates the interactions carried out during the surveys with residents living near SOGAS. These interactions made it possible to consider their opinions, concerns, and suggestions.



Source: Serigne Abdoul Aziz NDAW, July 2022

Figure 5 Distribution of respondents according to length of residence in Mbao (%)



Source: Serigne Abdoul Aziz NDAW, July 2020

Figure 6 Field surveys with residents living near SOGAS

3.4. Major problems related to Hann Bay

- In Hann Bel-Air, Dalifort, Thiaroyeand Mbao

According to the respondents, the main problem is industrial pollution, notably through uncontrolled canals, leading to both water pollution and air pollution, the latter being characterized by the generation of strong foul odors. In addition, for these populations, the Government is considered the primary polluter, particularly through ONAS, which does not sufficiently monitor the discharges channeled through Canal 6, originally designed for rainfall water drainage. Respondents also identified the Port as a major polluter, due to oil spills, wastewater discharged from ships, and household wastewater that is also released into the sea.

Overall, the analysis of respondents' perceptions of the most significant problem associated with Hann Bay shows that 84% believe the main issue is air pollution (odors) and water pollution, while 16% identify soil pollution as the most critical problem (see Figure). The following figure illustrates the distribution of respondents according to their perception of the most important problem linked to Hann Bay.

This situation explains the current state of Hann Bay, which today represents an ecological time bomb for the surrounding populations.

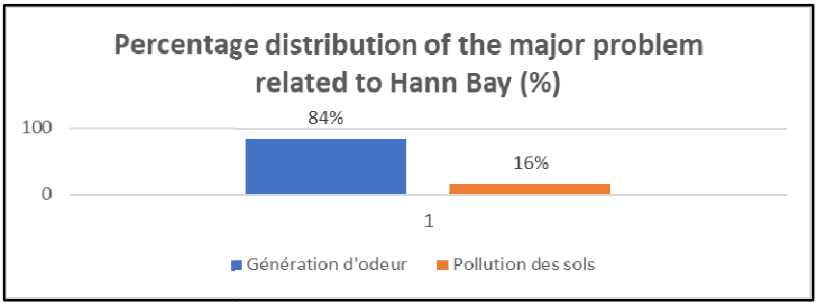


Source: Serigne Abdoul Aziz NDAW, July 2020

Figure 7 Field surveys with residents living near SAR

Figure 7 illustrates the interactions carried out during the field surveys with residents living near SAR. These interactions made it possible to take into account their opinions, concerns, and suggestions.

In summary, according to the respondents, the most important problem affecting Hann Bay is water pollution. This pollution is visible along the entire bay, has adverse effect on public health, and generates nuisance odors.



Source: Serigne Abdoul Aziz NDAW, July 2022

Figure 8 Percentage distribution of the major problem related to Hann Bay (%)

3.5. Analysis of economic activities

3.5.1. Tourism Activities According to Respondents

Tourism activities are virtually non-existent throughout the study area. The severe pollution of Hann Bay has a negative impact on tourism and significantly hinders local initiatives in this sector.

- In Hann Bel-Air

Tourism no longer generates any benefits for the local population, due to the increased pollution of the bay and the insecurity prevailing in certain areas, particularly south of the Hann fishing wharf. This is also where the Dakar Sailing

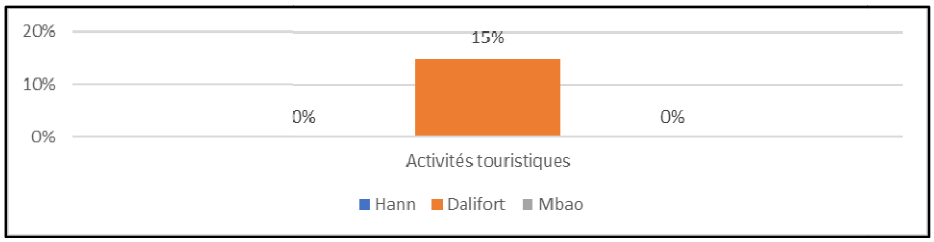
Club (Club des Voiliers de Dakar, CVD) is located. In the past, according to local fishermen, the club used to welcome internationally renowned visitors, including celebrities such as Bonis Pears.

- In Dalifort

For the residents of Dalifort, tourism has been absent for several years. Survey results show that 85% of the population considers tourism activities no longer significant, while only 15% believe they still hold some importance (see Figure).

- In Mbao

According to residents, tourism has been at a standstill for years. They report that tourism activities no longer provide any benefits to the community.



Source: Serigne Abdoul Aziz NDAW, July 2022

Figure 9 Distribution of Tourism Activities (%)

3.5.2. Commercial Activities According to Respondents

Overall, respondents in the study area reported that commerce is the main economic activity, but it remains closely linked to the availability of fishery resources.

- In Hann Bel-Air

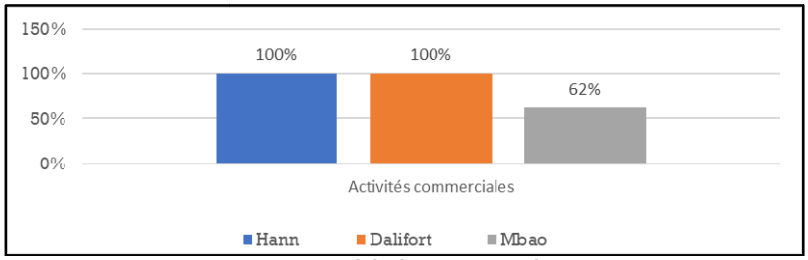
The Hann Fishing Wharf serves as a hub for the embarkation of artisanal canoes arriving from various locations. Economic activities largely depend on the daily catches of fishermen and the availability of marine resources. Small-scale trade is thriving, particularly in food services, including restaurants and street vendors selling juices, peanuts, mangoes, grilled fish, and similar products. All respondents (100% of the sample) identified commerce as the primary activity.

- In Dalifort

Analysis of survey data indicates that all respondents (100% of the sample) identified commerce as the main activity, particularly in connection with the rapid growth of the population.

- In Mbao

Survey results show that most respondents (62% of the sample) consider commerce to be the main activity, linked to the rapid population growth. Conversely, 38% perceive it as less important.



Source: Serigne Abdoul Aziz NDAW, July 2022

Figure 10 Distribution of Commercial Activities (%)

3.5.3. Agricultural Activities According to Respondents

Overall, the analysis of the contribution of agricultural activities in this area shows that they have come to a standstill. This situation is mainly explained by pollution and increasing urbanization.

- In Hann Bel-Air

Agriculture is almost non-existent in this area, which was formerly a fishing and farming village. Today, agricultural land has been overtaken by urban expansion. The only remaining practices are found in Hann Maristes, where market gardening and horticulture continue to exist. These activities contribute to the local economy by generating income for households performing horticulture and market gardening.

- In Dalifort

Survey data indicate that 87% of the population consider agricultural activity unimportant. Conversely, 13% recognize its positive contribution, mainly through market gardening and horticulture.

- In Mbao

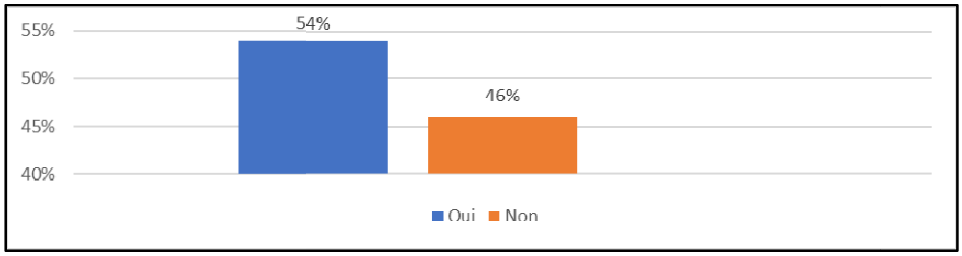
The analysis shows that agricultural activities in this area have been at a standstill for many years. Residents report that agriculture no longer provides any benefits, as all available land is polluted.

3.5.4. Industrial Activities According to Respondents

According to respondents, industrial activities contribute to environmental pollution despite their economic importance. Moreover, industrial activity in the area is not perceived positively in Hann, Dalifort, or Mbao.

- In Hann / Dalifort / Mbao

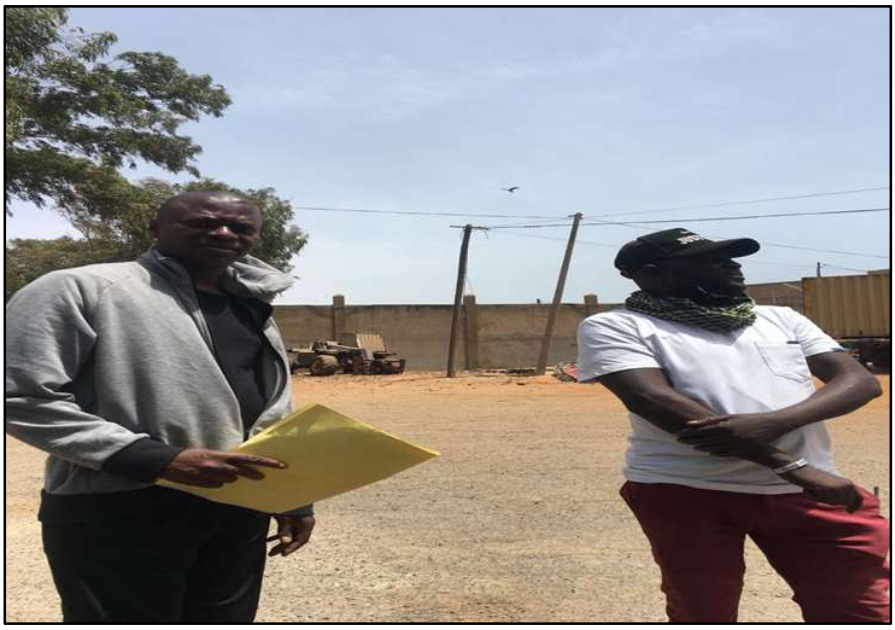
Due to its proximity to the Dakar Autonomous Port, the municipality of Hann Bel-Air hosts around one hundred industries. These industries employ local workers, particularly those who did not pursue fishing as an occupation. However, their contribution is not widely perceived in a favorable light. The analysis of industrial activities indicates that most respondents (54% of the sample) consider industrial activity to be important. Conversely, 46% believe it is not (see Figure 8).



Source: Serigne Abdoul Aziz NDAW, July 2022

Figure 11 Perception of the Importance of Industrial Activities Among the Population of Hann, Dalifort, and Mbao (%)

Figure 11 illustrates discussions sessions conducted during field surveys with workers at Mèches Linda (industry). These interactions made it possible to get their opinions, concerns, and suggestions. It was noted that not all industries have implemented pre-treatment systems for wastewater. Many rely on the Government to provide both financial and technical support to ensure better management of their discharges.



Source: Serigne Abdoul Aziz NDAW, July 2020

Figure12 Surveys with Meches Linda Workers

3.5.5. Transportation Activities According to Respondents

- In Hann / Dalifort / Thiaroye-Mbao

Most respondents reported that transportation is an important activity, particularly due to rapid population growth. On average, 82% of the sample considered transportation significant, while 18% believed it is not.

3.5.6. Handicraft Activities According to Respondents

Figure 12 shows a handicraft shop in Isra, near Canal 6. According to local artisans, there has been a decline in activities because tourism has slowed down.

- In Hann Bel-Air

Carpenters generate income by manufacturing and repairing fishing canoes within the municipality. Conversely, vendors of handicrafts have ceased their activities due to COVID-19 restrictions and national tourism policies.

- In Dalifort and Thiaroye

Most respondents (72% of the sample) stated that handicrafts remain an important activity. However, 28% believed it is currently declining.

- In Mbao

The analysis of handicraft activities in this area reveals that they are virtually non-existent. Residents acknowledged that handicrafts are considered important but reported that they bring no real benefits anymore, mainly due to the absence of tourists.



Source : Serigne Abdoul Aziz NDAW, August 8, 2021

Figure 13 Artisanal shop in ISRA (close to Canal 6)

3.5.7. Fishing Activities According to Respondents

Overall, fishing remains a vital activity in this area and constitutes the primary economic sector, playing a crucial role in combating youth unemployment.

- In Hann Bel-Air

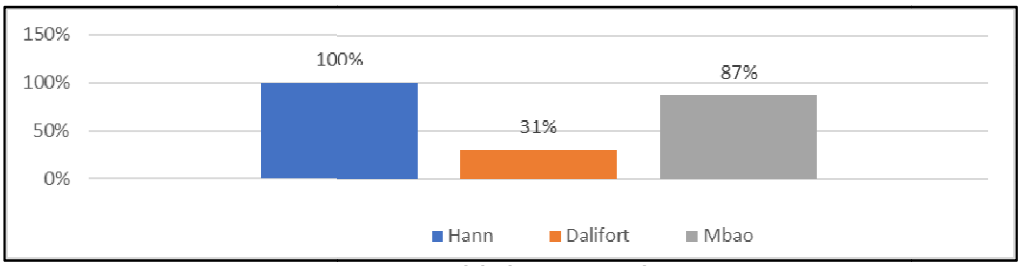
Fishing is the main activity for residents. However, landings at the fishing wharf are reported to be less productive due to marine pollution and climate change, according to fishermen. Local fishmongers complain about poor management of the wharf. Furthermore, activities at the Dakar Autonomous Port significantly contribute to the pollution of Hann Bay. Fishmongers, nevertheless, take advantage of the port's proximity to export certain highly valued fish species abroad. Residents of Hann also noted that the port employs only a small number of local youths. However, port authorities have recently engaged with the community to undertake joint initiatives for protecting the bay.

- In Dalifort and Thiaroye

Most respondents (69% of the sample) reported that fishing is practically non-existent. In contrast, 31% believed it is still functioning but at a reduced level (see Figure).

- In Mbao

Most respondents (87% of the sample) stated that fishing is non-existent, attributing this to water pollution and coastal erosion. Conversely, 13% considered it to be in decline but still present at a reduced scale.



Source: Serigne Abdoul Aziz NDAW, July 2022

Figure 14 Distribution of Fishing Activities (%)

3.5.8. Real Estate Activities According to Respondents

- In Hann Bel-Air

Real estate opportunities are particularly attractive due to the proximity to the Plateau. However, this situation mainly benefits landlords, while residents struggle to afford housing. Rental cost average amounts to50,000 CFA francs for a single room and 120,000 CFA francs for an apartment. The importance of the real estate sector in this area is confirmed by all respondents (100%).

- In Dalifort and Thiaroye

Most respondents indicated that real estate is becoming increasingly significant as a result of rapid population growth. This perception is shared by 72% of respondents in Dalifort and Thiaroye and by 67% in Mbao, reflecting a growing trend in these localities.

3.6. Recapitulation of stakeholders' concerns

The concerns presented in Table 2 are drawn from the various meetings held with local populations. Similarities were observed across the different areas, highlighting common issues and recurring needs expressed by the stakeholders.

Table 2 Specific Concerns of the Population by Sector

Populations/ Sector	**Specific Concerns of the Populations**
Hann Bel-Air	Severe scarcity of fish resources Low profitability of fishing activities High fuel consumption of motorized canoes Decline in recreational activities (reduced attendance at the Dakar sailing club, private swimming zone, etc.)
Dalifort	Rising unemployment rates and growing insecurity Increasing pollution from wastewater discharges and solid, liquid, and industrial waste
Thiaroye	Rising unemployment rate and growing insecurity Increasing pollution from wastewater discharges and solid, liquid, and industrial waste
Mbao	High unemployment rates Severe pollution due to large volumes of liquid and solid waste Air, noise, and water pollution issues Growing insecurity in the area Concerns over insufficient access to safe potable water Displacement of fishermen to other areas and soaring migration rates Public health issues leading to multiple diseases (lung cancer, respiratory problems, bronchitis, tuberculosis, diarrhea, etc.) Coastal erosion and sea encroachment Deficient sewage and drainage systems in Mbao Need for stronger involvement of local communities (e.g., basic training programs) Demand for guarantees regarding monitoring of the wastewater treatment plant (WWTP) and effective treatment of effluents

Source: Serigne Abdoul Aziz NDAW, July 2022

Table 3 Similarities in stakeholders' concerns

Populations	Similarities in stakeholders concerns
Hann Bel-Air Dalifort-Thiaroye Mbao	Worsening pollution throughout the area Youth Unemployment Scarcity of fish resources Visible algal pollution on the beach (Canal 6, fishing pier) and dumping of various solid wastes along the bay and the beach Sewage pipes discharging directly into the bay Discharges from municipalities and industries; strong odors reported in some open canals (e.g., Canal 6, Wallogui — opened at night by ONAS, SOGAS) Illegal connections also observed in the area through canals Widespread unsanitary conditions, with solid waste openly dumped on the beach and along the bay (cases of ISRA, fishing pier, Wallogui, Thiaroye-sur-Mer, Petit Mbao, Mbao) Solid waste carried offshore eventually returning to the bay with the tides

Source: Serigne Abdoul Aziz NDAW, July 2022

In summary, the surveys conducted among residents revealed that, in the ISRA housing estate, a project worth more than CFA francs 250 million, funded with private resources, was launched in 2021 by one of the residents. The project consisted of pumping wastewater from households into the ONAS network. This initiative was later extended to include other residents to reduce pollution originating from this marina community.

Despite these efforts, untreated wastewater mixed with hydrocarbons from the port (see photo in the annex) continues to flow through the ISRA canals into the bay without undergoing any physical, organic, or chemical treatment. This situation has become a major source of ecological imbalance. The level of pollution is so high that, during sampling on the beach in this area of the bay, noticeable differences were observed in the coloration of rocks as well as in the condition of fish.

3.7. Proposed solutions for the rehabilitation of the bay

The following solutions, suggested by various stakeholders, reflect the opinions, concerns, and recommendations gathered regarding Hann Bay.

3.7.1. General Solutions

- Provide the necessary financial resources for the effective implementation of the depollution project and ensure compliance with the project timeline.
- R aise awareness among industries, local populations (youth, women), ONAS, relevant ministries and organizations, as well as other stakeholders, regarding environmental regulations, environmental management, hygiene, health, and waterborne diseases.
- Monitor and control the quality of domestic and industrial wastewater, as well as bay sediments, through regular sampling and analysis; prohibit and supervise swimming on polluted beaches.
- Secure new donors to guarantee full financing of the project.
- Carry out pest control operations (disinfection, rat control, reptile elimination) at least twice a year across the entire bay area.
- Establish special protection standards for Hann Bay through a State decree.
- Enhance the bay's value for tourism by improving the landscape and developing discovery circuits.
- Conduct periodic sampling and analysis of marine species to prevent potential environmental contamination.
- Undertake, where possible, hydraulic or mechanical dredging operations to remove sediments and aspirate waste using motor pumps and suction equipment, followed by sand replenishment.
- Clean contaminated sediments, treat outfalls, and ensure proper waste management within Hann Bay.

3.7.2. Rigoros enforcement of regulations

- Enforce housing construction standards during the implementation of wastewater evacuation networks in the Hann–Mbao area.

- Prohibit any subdivision or construction projects on sanitation networks.
- Identify irregular land occupations in the area and carry out awareness campaigns for residents as well as local and national authorities on the risks of disasters.
- Put an end to the overexploitation of fishery resources by foreign pelagic trawlers.
- Strictly enforce regulations on the storage and transport of hazardous products, as well as on hygiene standards.
- Conduct unannounced inspections in the Hann Bay area to ensure compliance with laws (Environmental Code, discharge standards).
- Properly equip the services responsible for monitoring pollution levels, enabling national institutions to exercise effective control over pollutants discharged into the sea and rigorously enforce regulations.
- Establish long-term monitoring systems to assess the effects of industrial accidents on populations.
- Carry out annual inspections of all classified establishments, as well as systematic checks of discharges from households.
- Conduct annual inspections of all classified establishments, as well as systematic monitoring of discharges from households.

3.7.3. Specific solutions

Classified Establishments

The financing mechanisms developed under the Hann Bay depollution project did not produce the expected results. The process proved excessively complex, and the budget allocated to industrial operators remained insufficient (Source: Steering Committee Report, 2014).

To ensure the long-term preservation of Hann Bay, we propose a simple, rapid, and effective financing mechanism, including a pilot phase aimed at encouraging approximately ten Senegalese companies to implement industrial pollution control equipment. This approach would rely on a new mechanism specifically dedicated to the pre-treatment efforts of industrial facilities.

The subsidy rate should be highly incentivizing and could be granted to beneficiary companies in exchange for a reasonable contribution from the industrial partner. The timeline for implementing both the subsidy and the equipment should be as short as possible.

- Identify industrial connections to stormwater networks or direct discharges into the sea.
- Exempt companies from taxes on the importation of depollution equipment or clean technologies and provide them with adequate information.
- Establish simple, rapid, and accessible mechanisms for financial and technical assistance.
- Install effective individual pretreatment systems capable of eliminating residual toxic substances or specific pollutants.
- Allocate a dedicated budget to co-finance collective pretreatment stations.
- Promote continuous improvement of industrial processes and technologies.
- Ensure that pretreated industrial effluents meet environmental standards are connected to the ONAS network.
- Conduct periodic environmental audits and/or eco-balance assessments.
- Carry out regular sampling and internal analyses and strictly regulate the use of hazardous substances.
- Develop systems for the recovery and recycling of solid and liquid waste.
- Support industrial operators in Hann Bay with subsidies aimed at environmental upgrading.

Classified Establishments – Port Autonome de Dakar (PAD)

- Implement the agreement signed between the National Sanitation Office of Senegal (ONAS) and the Autonomous Port of Dakar (PAD).
- Carry out the restructuring plan for the sewerage network and the Canal V watershed.
- All solutions proposed for classified establishments are equally applicable to industrial operators within the port area.

Partners

- Identify new financial partners such as the China Development Bank, the Dutch Cooperation, and the European Union.
- Strengthen the equipment of the mobile laboratory used by the DEEC for monitoring industrial wastewater discharges.
- Ensure the dredging of Canals V and VI at least twice a year to restore proper flow.
- Close the ONAS canal at Montagne 6 and eliminate open-air canals such as Sogas, Montagne 6, and industrial canals in Petit Mbao.
- Reinforce the protection dike in the Marinas area, which is currently subsiding.
- Construct an interceptor linked to a wastewater treatment plant, a marine outfall, and networks to connect both industrial units and households to the interceptor. Source: Alassane Dieng (ONAS), March 2022

Population

- Conduct and coordinate regular cleaning campaigns and sanitation days throughout the Hann Bay–Mbao area, involving associations and NGOs.
- Organize and ensure proper storage of household waste.
- Carry out community-led reforestation initiatives.
- Connect households in the municipalities of Hann, Thiaroye, and Mbao to a functional collective sanitation system.

4. Conclusion

The various results obtained from field surveys with stakeholders and from the review of documentation have provided valuable insights and enabled us to achieve our initial objectives, following a thorough grassroots-level approach underpinned by a clearly defined methodology.

These results made it possible to identify the main concerns of the populations from Hann to Mbao: increasing pollution due to wastewater and solid waste discharge, the spread of various diseases, fish scarcity, a decline in recreational activities, unemployment, and rising insecurity.

Furthermore, proposals for improving the quality of living conditions and ensuring the sustainable development of Hann Bay have been outlined above, including an effective monitoring and communication system. These solutions are categorized as general, regulatory, and specific measures.

This scientific work provides an answer to the central questions

- What are the concerns of the stakeholders involved with Hann Bay?
- What is our contribution to the solutions for rehabilitating the bay in support of sustainable development?

Furthermore, Hann Bay deserves protection standards established by a State decree, such as designation as a marine protected area, where waters would be safeguarded across the municipalities from Hann to Mbao.

Similarly, delays observed in the implementation of depollution infrastructure by the State have contributed to exacerbating the existing pollution.

This issue remains highly relevant, as it reignites the debate on Hann Bay's pollution.ann. The critical question remains: How can Hann Bay, once restored, regain its status as one of the most beautiful and ecologically vibrant bays in the world?

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

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