THE BARACHOIS PROJECT

Mainstreaming the Contribution of coastal wetlands biodiversity for Sustainable Economic & Livelihood Development at Résidences La Chaux 'Barachois', Mahébourg.

A demonstration project for upgrading 'Barachois' in Mauritius.

HOUSEHOLD SURVEY REPORT

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I INTRODUCTION

Wetland ecosystems are widely recognized as the most diverse and productive ecosystems on Earth and include ponds, marine water areas, marshes, rivers, flood basins with a depth at low tide which do not exceed 6 meters (Convention on Wetlands, 1971). It is also well-known that wetlands provide various ecosystems services that enhance human well-being such as fish, plant resources, clay, fiber, water supply and purification, nutrient retention, climate regulation, flood regulation, coastal protection, recreational opportunities and tourism attraction (Barbier, 1993; Gayatri, 2000; Oglethorpe *et al*., 2000; Millennium Ecosystem Assessment, 2005). The importance of wetland in livelihood is particularly significant in developing countries where local communities are highly dependent on its natural resources. However, it is estimated that more than 50% of the wetlands worldwide have been, damaged, degraded or lost in the past 150 years (O'Connell, 2003) due to anthropogenic impacts which are causing change in water regime and water quality and introduction of Invasive Alien Species .

In this context, Environmental Protection and Conservation Organisation (EPCO) is developing The Barachois Project, since February 15, 2016. The project aims to establish a sustainable and collaborative development model for the restoration, conservation and active management of degraded natural resources, ecological processes and biodiversity of a marine coastal wetland in order to support local livelihood and enhance quality of life. It also aims to promote poverty alleviation, at local level, through the development of improved and diversified livelihood system and income generating activities for community members, including women.

Indeed, the targeted coastal wetland, of approximately 30 ha, includes the barachois and its adjacent mangrove forest. Traditional Barachois aquaculture, dates back to the French occupation period, and consisted of shallow brackish or saltwater lagoons enclosed by semi-permeable rock dykes. Presently, there are 33 recorded private and government owned Barachois along the coasts of Mauritius. Only half of them are actively maintained while others are neglected. These marine coastline wetlands have been over fished and are now being over exploited for other natural resources such as

wood for cooking and collection of bait. All existing infrastructure such as retention walls, fencing, and waterways are no longer functioning and the ecosystem is unable to provide the basic ecosystem services. These wetlands settings are now subject to solid-waste pollution and soil degradation caused by incompatible wastes from demolished buildings and economic development, mainly hotels, along the coastline of the island. Invasive alien species competing with local species are causing water and land ecosystem degradation and considerable damage to the few remaining mangrove plantations. Rodents, termites and other pests also infest the site, which is gradually becoming a health hazard for surrounding community.

Moreover, it is now globally acknowledged that successful management of wetland requires an integrated approach that relies upon effective protection and conservation of biodiversity and the constructive engagement and participation of local communities (Williams, 2002). Community-based conservation is a better alternative compared to central level management and is an effective and sustainable tool solving conflicts and engaging community involvement for wetland resources protection (Trisurat, 2006). It has been acknowledged that the higher the level of community engagement, the higher their compliance to the natural resources conservation (Andrade & Rhodes, 2012). Such management system will ensure that local people have a stake in, and benefit from it either directly, or indirectly through a more productive and healthier environment and the introduction of alternative livelihood opportunities that reduce pressures on coastal resources. Consequently, this community-based project actively encourages the participation of all stakeholders including community members, local fishers and others resources users as well as government agencies and local NGOs.

In this context, a household survey was designed and conducted, in Residences La Chaux. The survey is one of a number of baseline studies that was and will be conducted during the planning and design phase (year 1) of the project. These studies will provide baseline data for monitoring the biophysical and socio-economic impacts of the project on the coastal wetland biodiversity and the adjacent coastal community.

The present survey aims to generate baseline data on the socio-economic and livelihood status of the community, in terms of community profile, household incomes, occupational distribution as well as community skills and education levels. It will assess the resources and capacity of the local community which will enhance the understanding of livelihood circumstances and strategies employed by this community. The study will also evaluate the role that the coastal wetland play in meeting livelihood needs and provide an understanding on how the community use the wetland and its products. Finally, the survey will aim to evaluate residents capacities and willingness to support improved management and conservation regimes as well as the preconditions for sustainable development.

After project implementation (year 3), the same survey will be applied again and compared to the baseline in order to monitor achievement of results and gauge the impact of the planed project interventions on the targeted coastal community.

II OBJECTIVES OF THE STUDY

The primary objectives for the household survey included:

- Understanding the demographics of the community to longitudinally assess changes within households over time.
- Profiling existing livelihood systems in the local community, and link these in relation to the design, analysis and development of the alternative livelihoods.
- Obtaining socio-economic baseline to assess the scale of local community problems and causes.
- Understanding how the targeted community utilise the adjacent wetland.
- Developing community-driven metrics to gauge the progress and success of the project.
- Understanding local vision, priorities, needs, wants and ideas in order to design and implement management activities and evaluate options, suggested locally, for improved wetland management.
- Understanding the skills represented in community and cultivate a list of contact for the future contribution to the project.
- Increasing and establishing stronger connections and interactions with the local community to facilitate future implementation of the project.
- Increasing awareness regarding the project.
- Facilitate local engagement.
- Tracking changes in local people's knowledge, attitude, perception and use of coastal and marine biodiversity.

III STUDY AREA

3.1 Location

Residences La Chaux is located near the coast of the village of Mahebourg, in the south east of Mauritius and in the district of Grand port. The geographical location of Residences La Chaux is GPS position: 20025'03.35''S ; 57042'47.35''E. It is situated near the main coastal road and surrounded by a coastal wetland including the barachois and the adjacent mangrove forests. The wetland is home to the two species of mangroves found in Mauritius, namely *Bruguieragymnorrhiza* and *Rhizophoramucronata*.

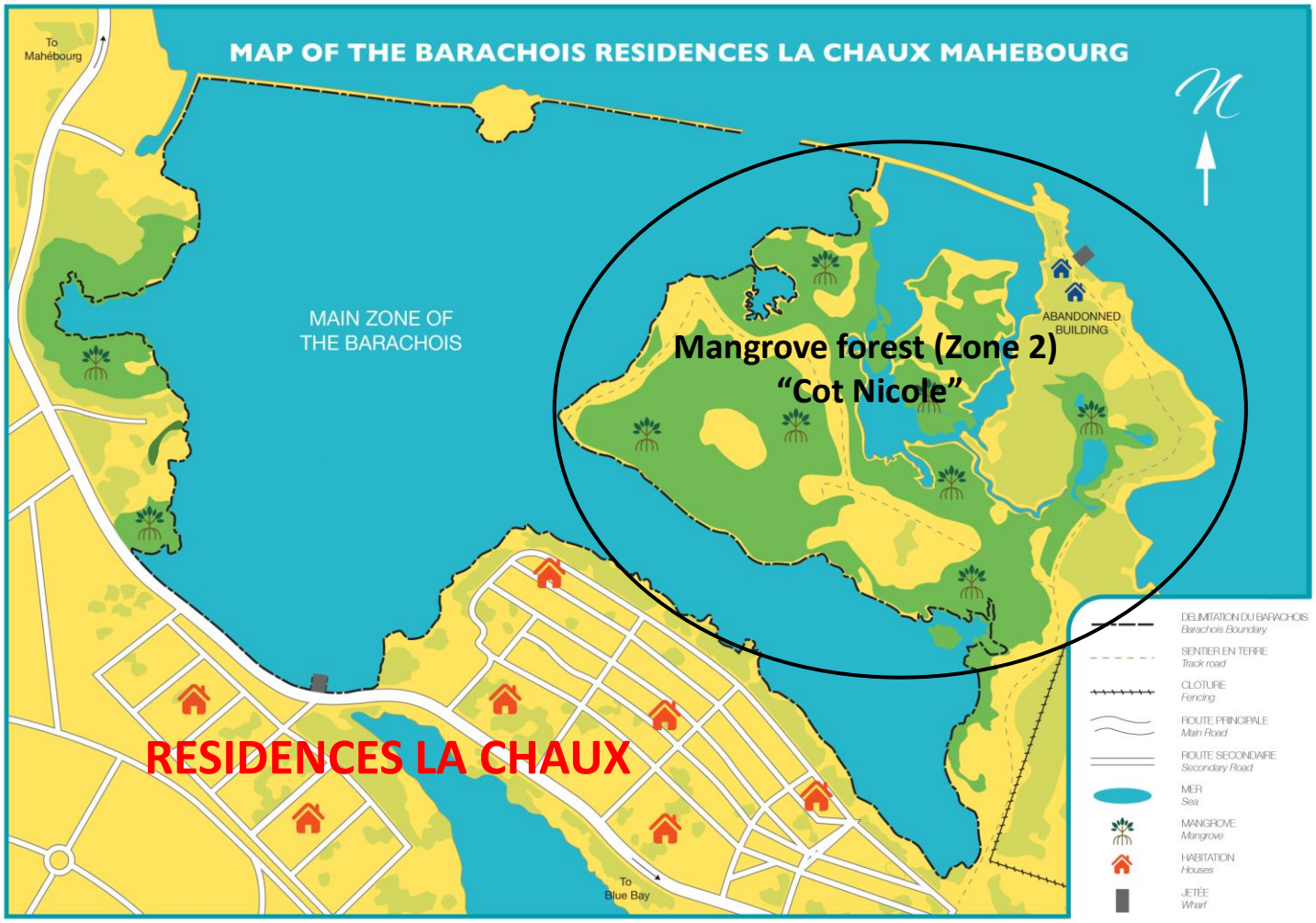


Figure 1: *Map of the study area providing features and boundaries.*

3.2 Internal structure of the community

The chief of the village (president) is a women from Beau Vallon. Residences La Chaux and the community adjacent to it, namely, Beau Vallon are considered by the Government as the same village. There is also a representative of the village (District Councilor) at the Grand Port Savanne District Council (GPDC). Most villagers interact regularly with him and consider him as the president of Residences La Chaux as he is living directly in the community. Only a few residents know the name of the official president.

3.3 Population statistics

A count of the population was undertaken by the community Outreach Facilitator with the help of local residents in April and May 2017. The count was based on a community map divided into 26 quarters to facilitate the count of the population (refer to the map below).

According to the result, there are 356 houses, 551 households totaling 2,140 people in all the community of Residences la Chaux , including 1,533 adults and 607 children.

Figure 2: *Map of the community divided into quarters (1-26).*

3.4 Public infrastructure and facilities

The infrastructure in the community is very limited. There are no health centre, hospital or pharmacy directly in the village. The main hospital is located in Mahebourg, approximately 2 km from the community. While there are no primary and secondary schools in the village, two garden school are inside the village. There is also a Social Welfare Centre including a playground for children. The only facilities for recreational sports include a football stadium and three bocce ball courts. Transport facilities are very restricted within the community. After a count by the Community Outreach Facilitator, only 11 % of total community households have a car. Most residents travel by foot, by bicycle or by getting lifts with private and public transports. Three bus stops are located on the main coastal road crossing the village. There are 12 food stores with basic goods within the community, 3 restaurants, 6 residents selling food in front of their house and many people operating as hawkers. Others facilities include a library, a veterinary centre, two handcraft shops and one place for praying. Finally, all community members have adequate water supply and proper access to electricity.

3.5 Community associations

In total, 6 associations were created by local people. All are registered by the Registry of associations, Ministry of Labour, Industrial Relations, Employment and Training. However, no cooperatives were created in the village.

Name of association	Target
Nu Zenfan Cite	Activities for children
Mahebourg Espoir	Academic support for children
Mouvement Bien-etre de Cite La Chaux	Improving welfare of the community
Ocean women	Outdoor visits for women
Jeunesse Ouvriere Chretienne (JOC)	Recreational activities for youth
Association of elders	Activities for elders

Table 1: *List of associations within the community of Residences La Chaux.*

IV METHODOLOGY

4.1 Questionnaire design

The questionnaire included both closed and open-ended questions which were grouped into different sections based on similarity:

- (1) A series of social and demographic questions about the interviewee residents (gender, age, household size, and household livelihood systems).
- (2) Source of income and income levels.
- (3) Education and skill levels.
- (4) Local perception toward the project and local willingness to participate.
- (5) Local perceptions toward their community and the surrounding environment.
- (6) Local use of natural coastal resources.
- (7) Local wants and opinions regarding the way to manage, conserve and improve ecosystems goods and services of the surrounding wetland and consequently enhance the local livelihood system.

Details of the questions asked are provided in the supplemental data (App. 1).

4.2 Data collection

The survey was conducted over a period of 6 months between June 29 and December 19, 2016. It was carried out on weekdays between 9 am to 4pm. A total of 76 household surveys were completed totaling approximately 14% of the total households of Residences La Chaux.

At the beginning of the interview, household members, selected randomly, were informed that their participation in the survey was completely voluntary, and the answers they provide would remain totally confidential. We requested that they answer each of the questions as accurately and honestly as possible. The interviews were conducted for a duration ranging between half to one and a half hour.

4.3 Data analysis

The questionnaire survey data were gathered into the excel software and analyzed using graphs and tables.

4.4 Limitations

It is important to note that the surveys' results are subject to limitations. The answers to open-ended questions were organized by broad category ‘statements' which have been willingly formulated in order to simplify the analysis of data.

It is also important to notice that some additional details were released in this report based on the information collected from an assessment workshop with community representatives and two community meetings. These consultation strategies were conducted between February and May, 2017.

Figure 3: *Picture illustrating the community outreach facilitator (COF), a local woman, interviewing members of a community household.*

V RESULTS OF THE STUDY

5.1 Demographic

5.1.1 Gender and age

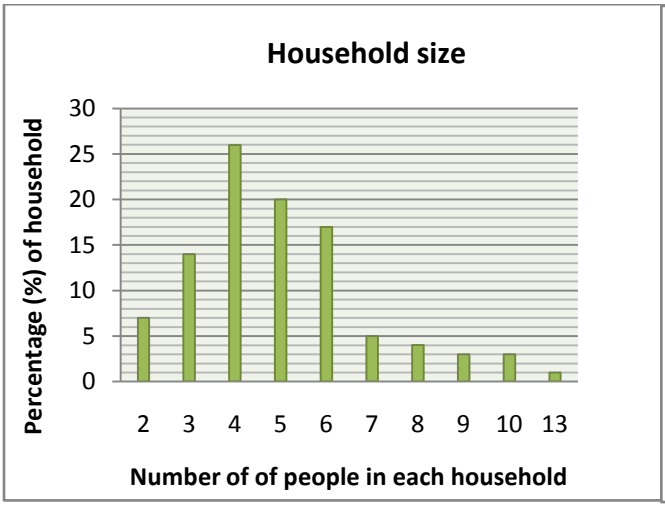
The distribution for the age was calculated among all recorded answers from all household members male and female. The highest frequency recorded were respondents adults between 18 and 34 years old, with these categories representing 28% and 31% of the total answers recorded for male and female respectively.

Age	Male Frequency	Female frequency
10 -	30	34
10 - 17	30	26
18 - 34	52	60
35 - 49	35	39
50 - 65	27	28
65 +	10	7
TOTAL	184	194

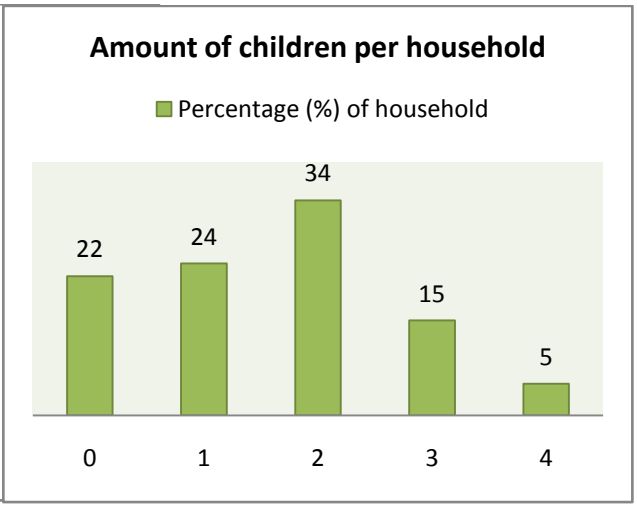
Table 2*: Gender and age distribution.*

5.1.2 Household size

The average household is made of 5 people with a minimum and maximum size of 2 and 13 respectively. The average amount of children of the surveyed households is 1.6. The study emphasized male dominance over the household with 82% and 18% of households managed by men and women respectively.



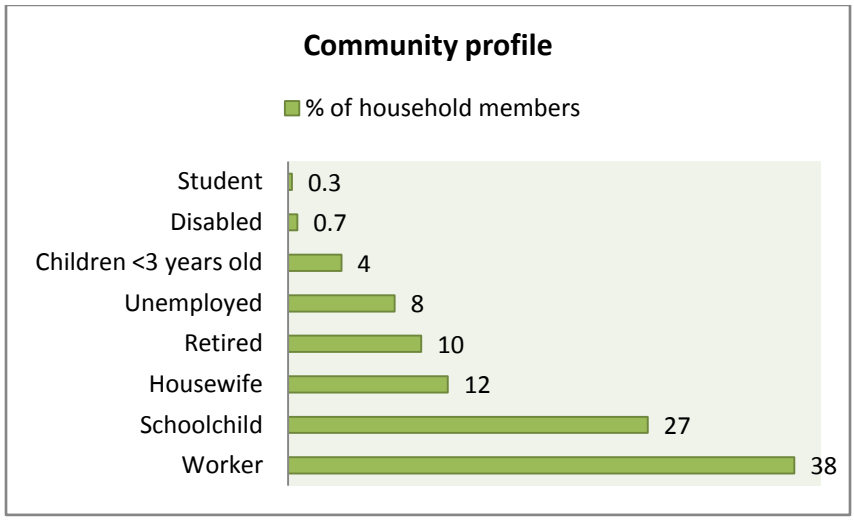
Graph 1: *Community household size.*



Graph 2: *Number of children per household.*

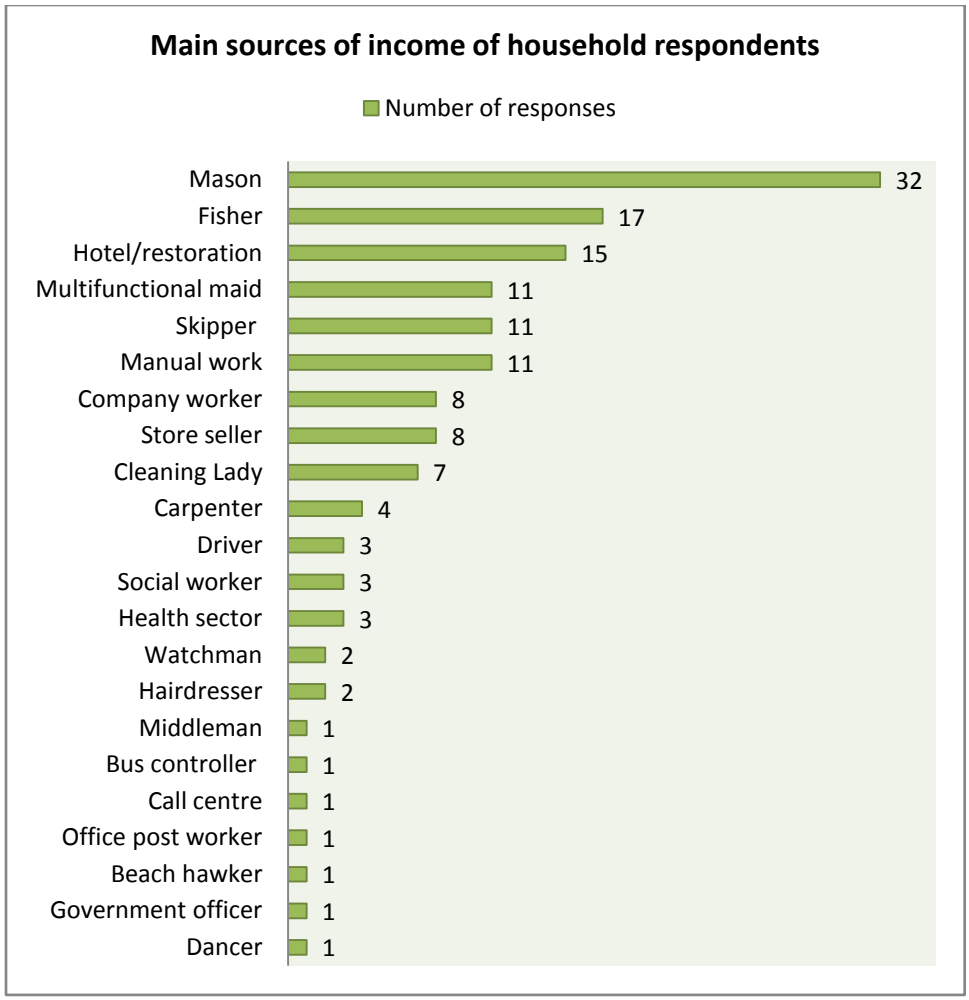
5.2 Occupational distribution

The graph below provides the profile of the community divided into 8 categories in terms of residents status (graph.3). Results demonstrated that 38% of interviewed household members have an income generating activity and consequently are considered as worker while 8% are unemployed. However, it is important to notice that these two percentages are questionable over time, as many local residents have temporary work providing unsecure financial situation. Indeed, some local people expressed that residents "always find a way to get temporary works'.



Graph 3: *Community profile.*

The main characteristic of the local livelihoods is the lack of diversification of primary occupations (graph 4). Among the 144 interviewed household members, the main sources of income include masonry and fishing which contribute to almost 50% of all interviewed household members having a income generating activities. Skipper, hotel/restoration and manual works are also significant in the community with 11% respectively. Such manual works include ploughman, scrap dealer, electrician, factory worker, welder, handcraft and mechanic. Only 1 household member works within a government agency, Ministry of Youth and Sports.

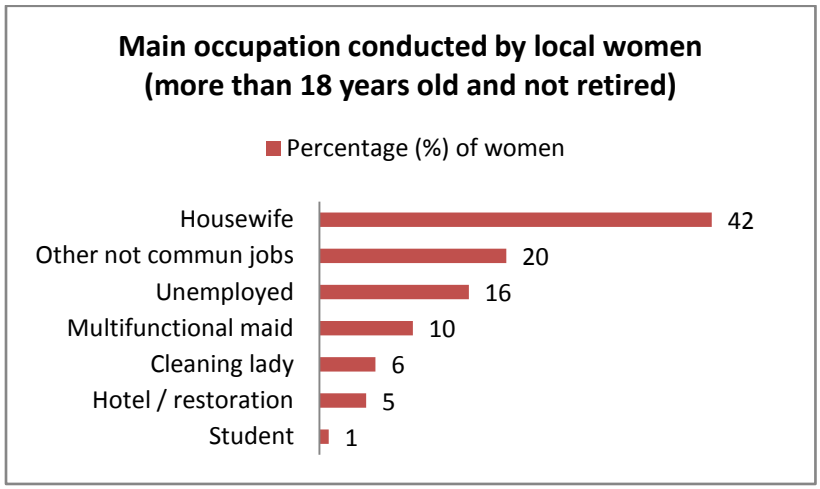


Graph 4: *Community income sources.*

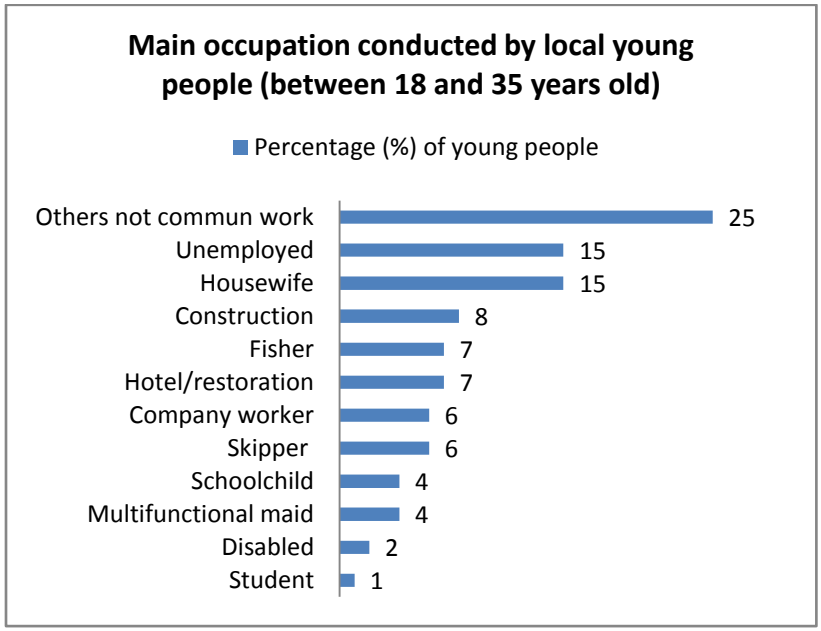
Female occupational distribution is even less diverse (graph. 5). Indeed, 46% are housewife and thus, do not have any income while 10 % are multifunctional maid and 6% are cleaning lady.

According to some residents, the women of Residences La Chaux used to easily find opportunities in textile factories. However, after the closure of many factories, a few decades ago, the local women faced difficulties to find another job due to the lack of skills and qualifications. This information might explain the lack of income sources diversification, the high percentage of housewife and the fact that most women working in the tourism sector (hotel/restoration) are between 18 and 35 years old.

"Others not common jobs" are livelihood activities conducted by less than 2% of women and include handcraft, hairdresser, shop seller, NGOs worker and nurse. The latest provided the highest woman salary.



Graph 5: Diversity of *Local women primary occupation in Residences La Chaux.*



Graph 6: Diversity of youth primary occupation *in Residences La Chaux..*

Moreover, results demonstrated that only 17% of housewife, 10% of workers and 8% of retired people supplement their livelihoods by secondary occupations. The diversity of secondary income generating activities is very limited and includes mainly labor works (carpenter, mason, handcraft, sewing, hairdresser, welder, gardener and rabbit cattle) as well as individual food selling, fishing, driving and multifunctional maid.

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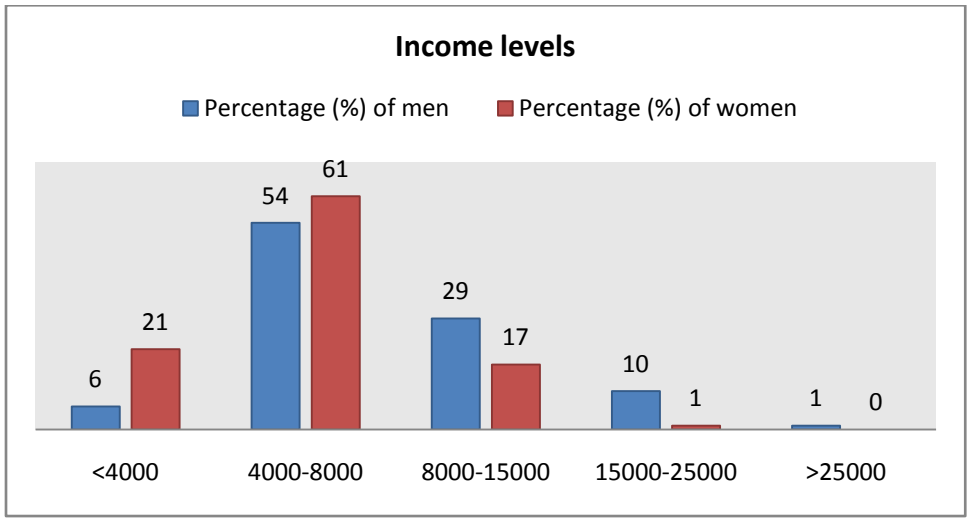
5.3 Monthly average income

Household members' income is a good indicator to assess the actual socio-economic situation of the target community. In this context, household members monthly incomes were assessed into 5 categories, using the Mauritian Rupees (MUR) rate (graph.7)



Graph 7: *Local income levels*

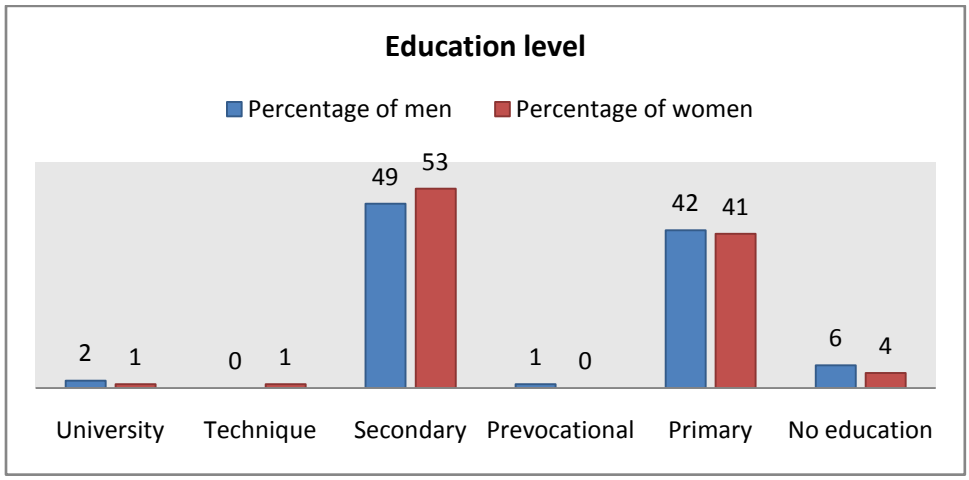
According to the results provided in the graph 7, the community can be categorized as poor as 61% of the women and 54% of the men receive between MUR 4000 and 8000 per month. Moreover, only 1% of interviewed women and 1% of men receive a monthly income exceeding MUR 15000 and 25000 respectively.

It should be noted that some respondents found it difficult to report monthly incomes due to the income fluctuation between winter and summer. For instance, fishers expressed a seasonal variation of their monthly income peaking during the winter season from November until April.

Finally, 83 % of surveyed household members reported income insufficiency regarding monthly expenses.

5.4 Education and skill levels

The educational level of the household members was relatively low, with only 52% of male and 53% female having studied above primary school and 2% above the secondary school level. However, results demonstrated strong similarity between male and female. According to the village council representative, many children study until the end of secondary school, after which many leave due to monetary constraints, the long travel time to the high school and the lack of support from the parents.



Graph 8: *Local education levels*

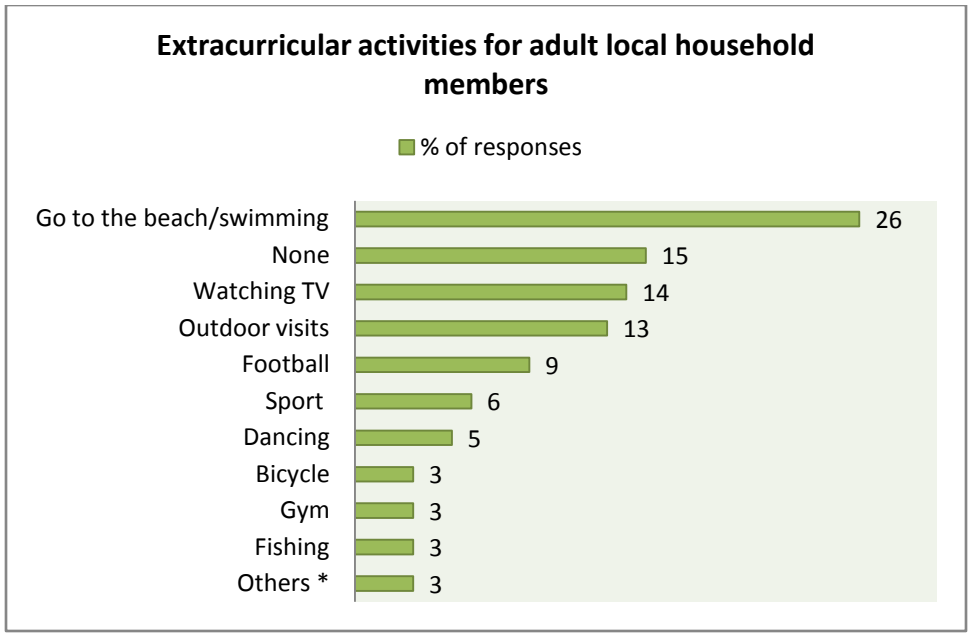
The table 3 emphasized a low range of skills carried by community members which can be linked with the low level of education. However, skills such as painting, drawing, collar creation, sewing, cooking and carried by many respondents, mainly women, are utilized in artisanal trade.

Local skills	Percentage of responses
Decoration	1
Computer scientists	1
Waitress	1
Receptionist	1
Professor	1
Electrician	1
Sailing	2
Customer management / Management	2
Accounting	3
DJ / Musician / singer	8
Gardening	9
Construction	11
Boat license	12
Artist (Painting and handcraft)	31
Experience with children	32
Cooking	53
Sport	59

Table 3: *Local skills in Residences La Chaux.*

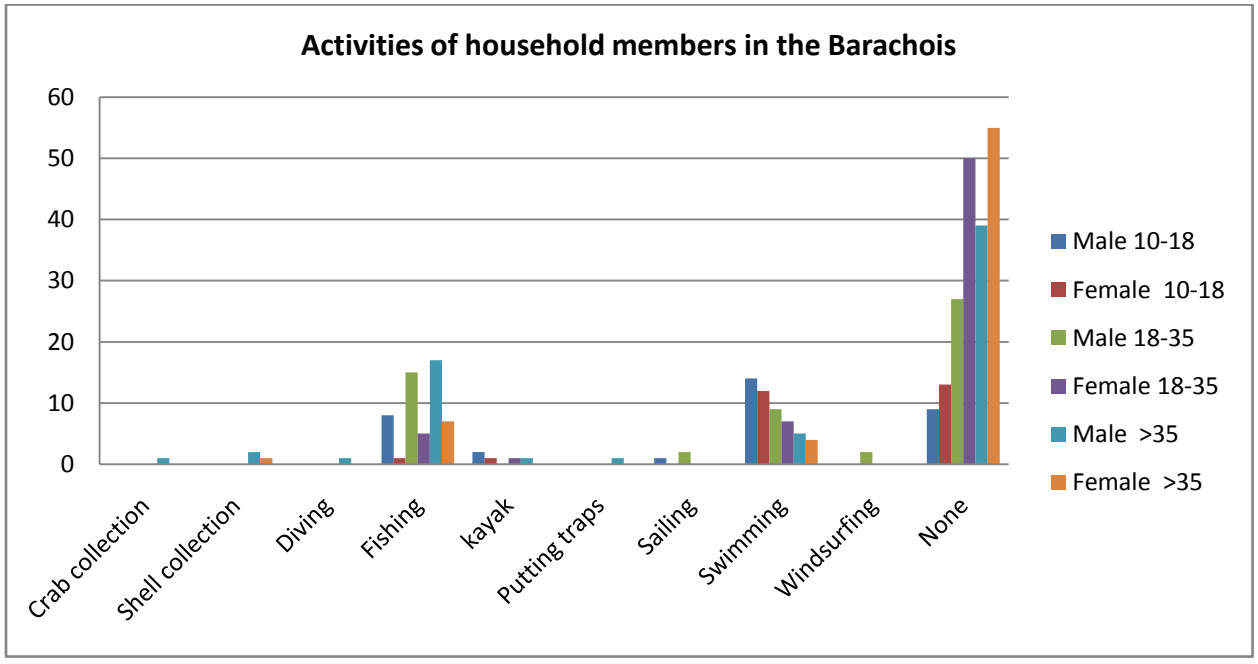
5.5 Extracurricular activities

The extracurricular activities in the community are very limited. The main activities for the youth are football, watching TV, dancing and listening to music. Others activities conducted by youth include kite surfing, zumba, kickboxing, gym, fishing and bocce but are conducted by less than 2% of the interviewed youth. The main activities of local retired people are watching TV and few are doing reading, activity for church, going to the beach and listening to music. The results regarding the extracurricular activities conducted by adult household members (between 18 and 65 years old) are provided in the graph 9 and demonstrated also a low diversity.



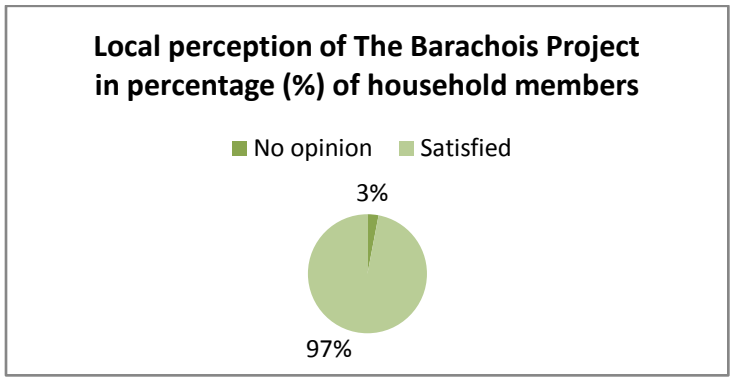
Graph 9: *Diversity of recreational activities conducted by household members between 18 and 64 years old.*

The most conducted activities within the barachois area include fishing and swimming with 17% (mainly men) and 16% of surveyed households respectively. This activities are mainly recreational and do not generate any incomes. Finally, 61% of interviewed household members do not have any activity in the barachois.



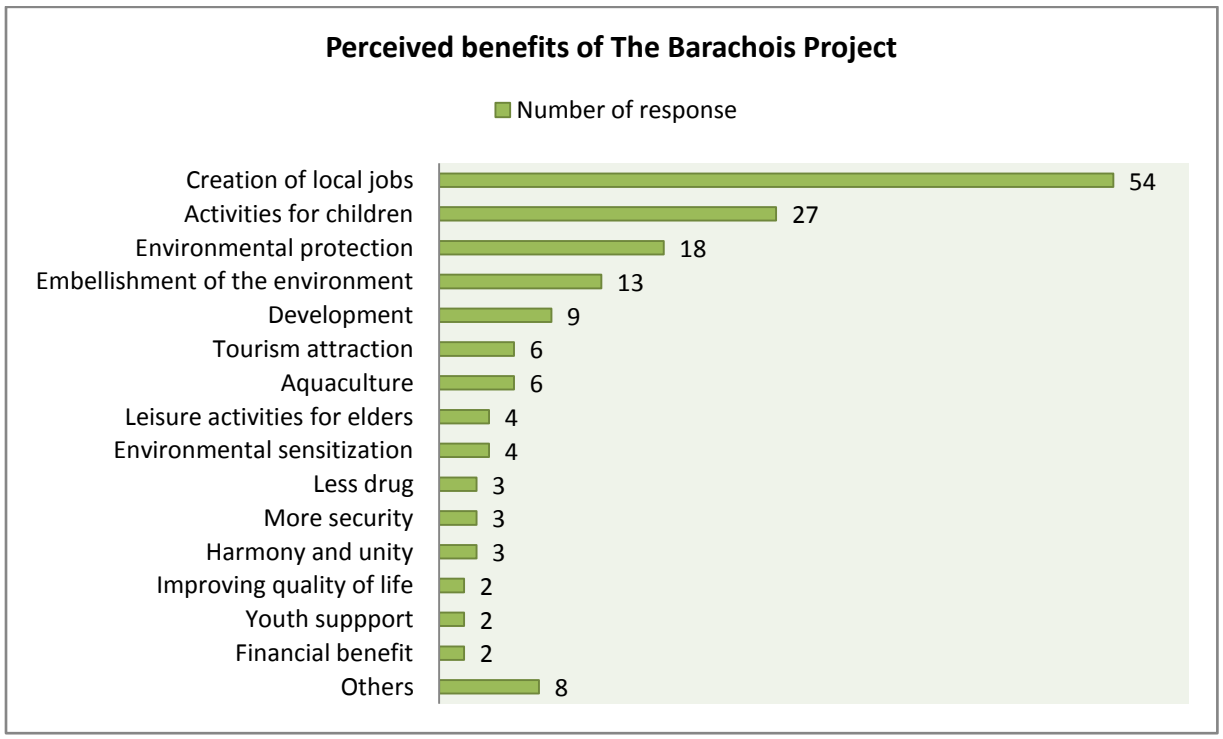
Graph 10: *Type of recreational activities undertaken by local residents within the barachois area.*

5.6 Local perception towards The Barachois Project



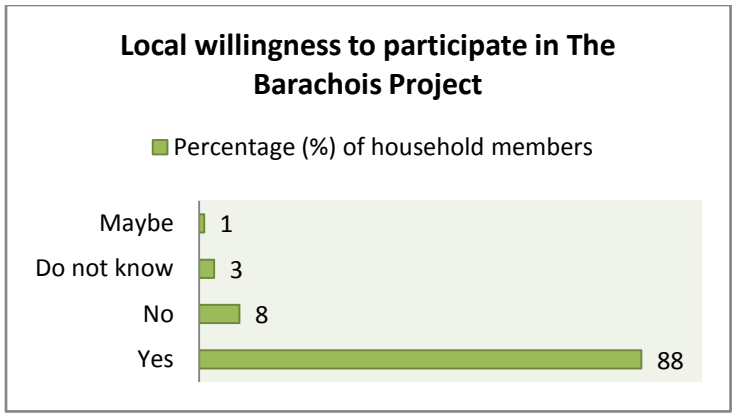
The survey's results clearly show positive local perception towards the project as 97 % of household surveyed stated their satisfaction (Fig.3).

Figure 4*: Local perception towards the project.*



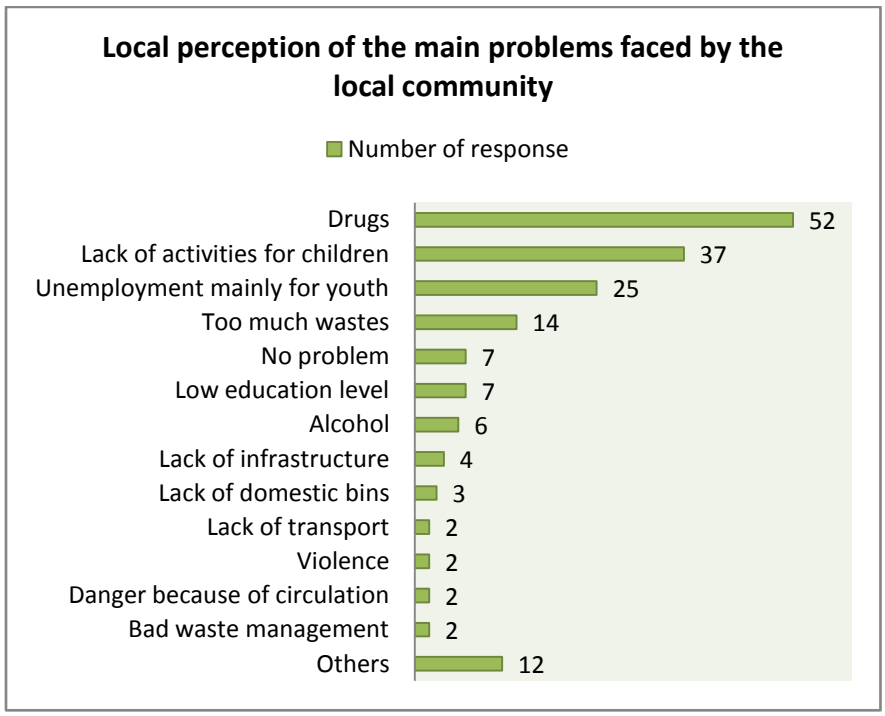
Graph 11*: Perceived benefits of The Barachois Project.*

The main benefit perceived by the surveyed household are the creation of job for local people (54%) as well as the creation of activities for children and the protection of the environment. The results showed a clear local understanding of the project objectives. Most surveyed households perceived one or many benefits being some of the project targeted objectives. This goes along the fact that 88 % of the interviewed household members would be willing to participate.



Graph 12*: Local willingness to participate in the project.*

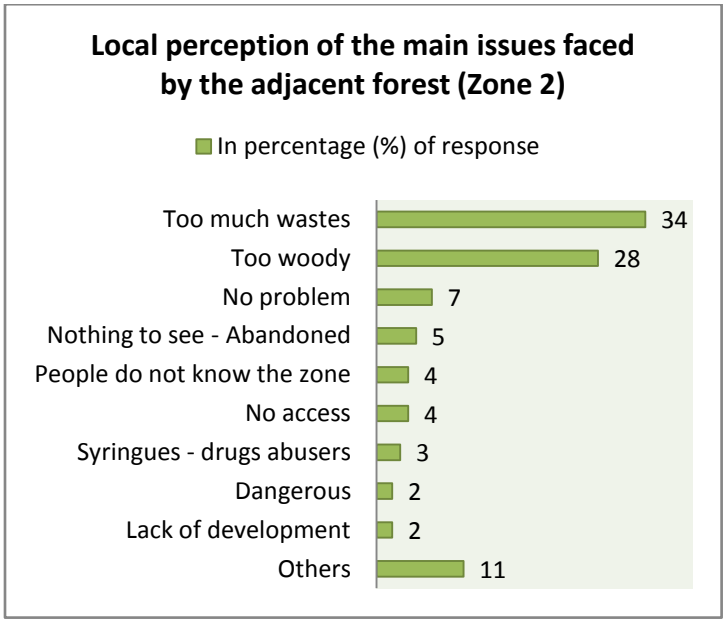
5.7 Local perception of community issues



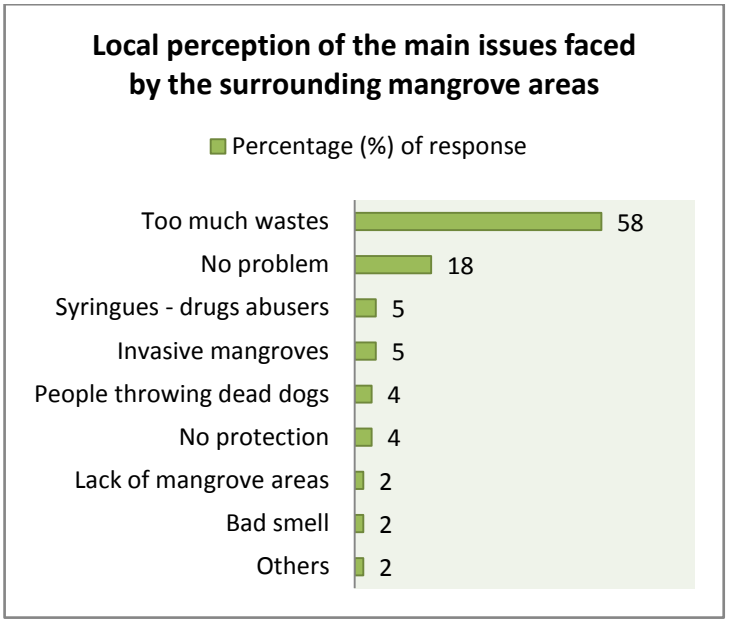
Graph 13: Perceived problems faced by the local community.

The four main issues perceived by interviewed households members include the significant dealing and consumption of drugs within the community, the lack of extracurricular activities for children, the significant youth unemployment rate and the bad management of wastes. Considering the fact that those statements have been mentioned with high percentage, these problems are significant and undeniable within the community. Others * issues included but are not limited to: bad reputation of the community which reduce opportunities for local employment; illegal fishing; stray dogs; youth adrift; early pregnancy and; poverty.

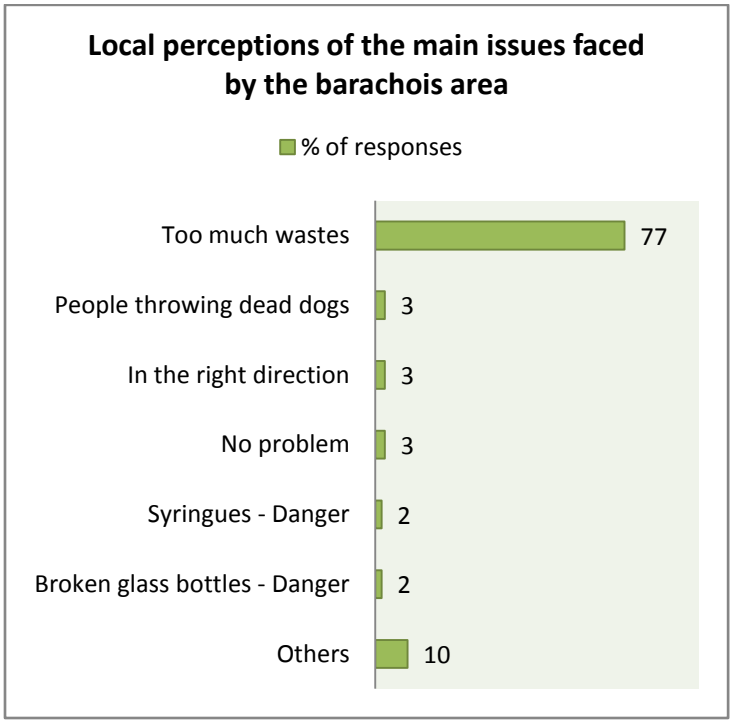
5.7 Local perception of the main issues faced by their surrounding environment.



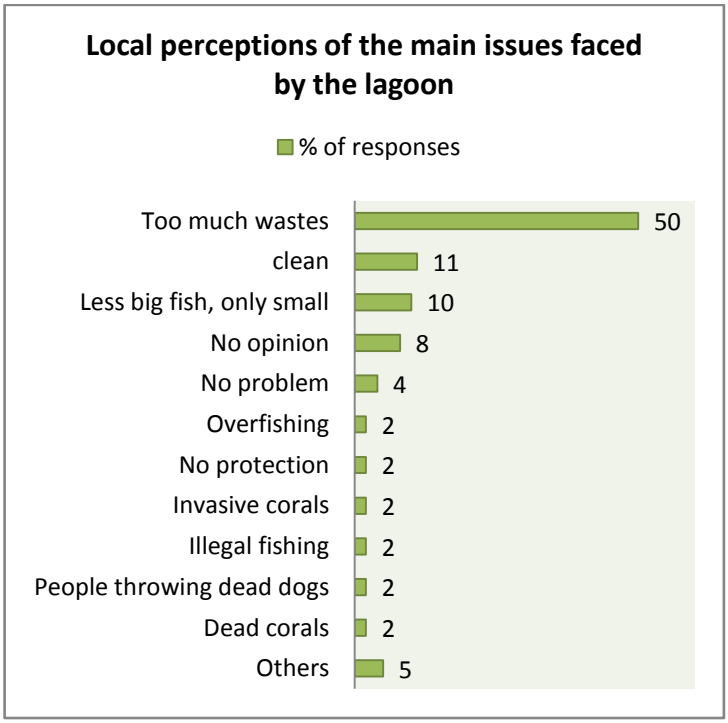
Graph 14: Perceived issues in mangrove forest.



Graph 15: Perceived issues in the mangrove areas

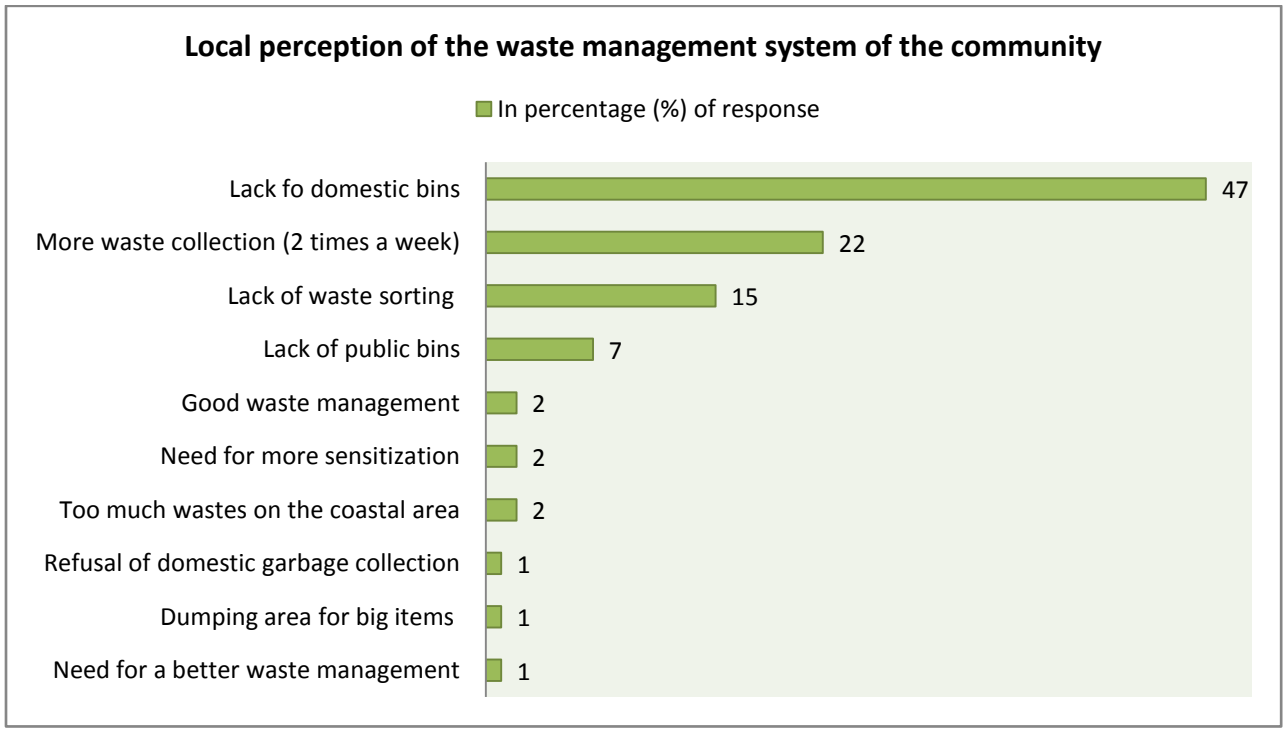


Graph 16: Perceived issues in the barachois area.



Graph 17: Perceived issues in the lagoon.

The results clearly emphasized that there is considerable local concern regarding issues of wastes and pollution in the environment. The statements highlighting the presence of broken glass bottles, syringes and dead dogs were significant and clearly defined hazardous type of wastes that should be taken into consideration. Moreover, a lack of management and protection of the environment are clearly emphasized in the revelations stating that mangrove forests is currently woody and full of wastes.



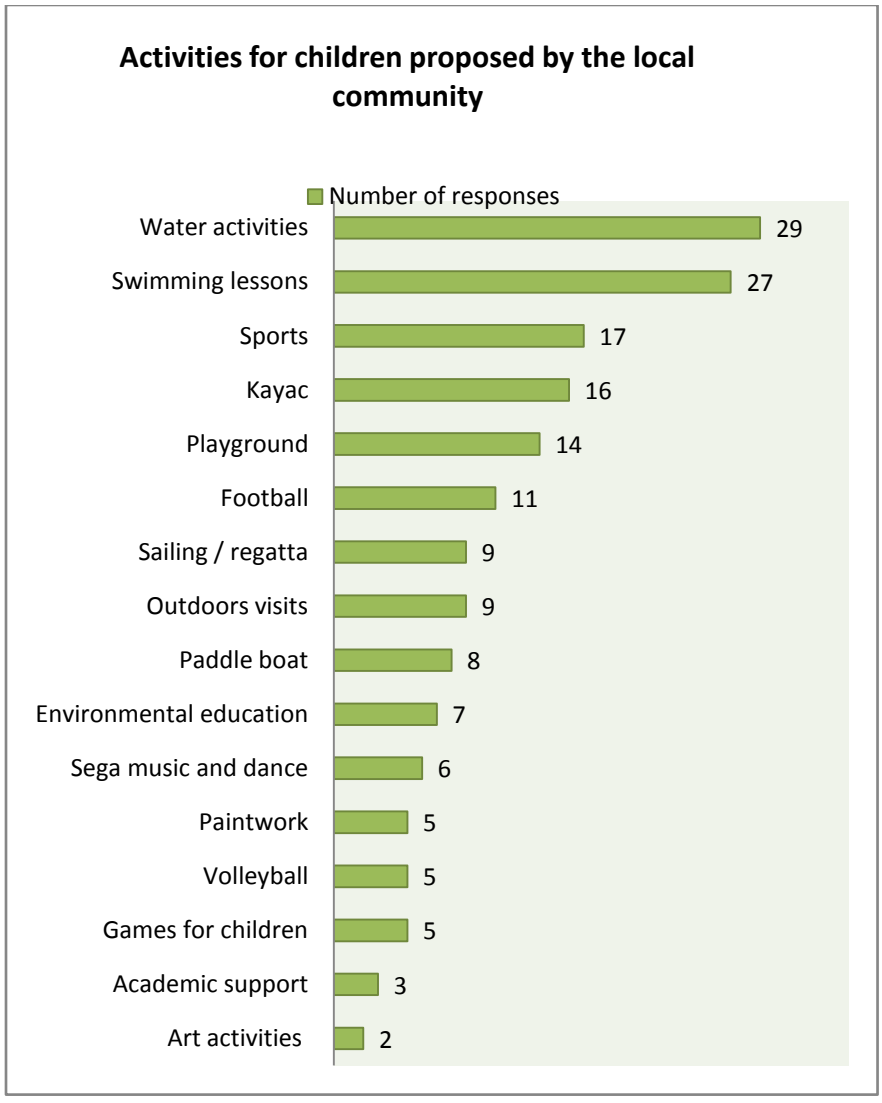
Graph 18*:* *Local perception towards the community waste management system.*

Regarding the waste management system of the community (graph.17), 47% of surveyed households reported a lack of domestic bins. Many additional similar comments included that the local residents never received domestic bins from the Grand Port District Council (GPDC), while most of the surrounding villages did. Moreover, frequency of wastes collection were reduced to once a week compared to two times a week, in the past. Finally, there are no recycling bins for waste sorting and public bins are lacking in the village which demonstrated a poor waste management system in the community.

5.8 Suggested ideas for enhancing livelihood and wellbeing of local people.

Considered the various perceived problems faced by the community and surrounding environment, the following questions targeted local vision and ideas towards solutions in order to enhance local wellbeing and livelihood of the community and seek for a better environment.

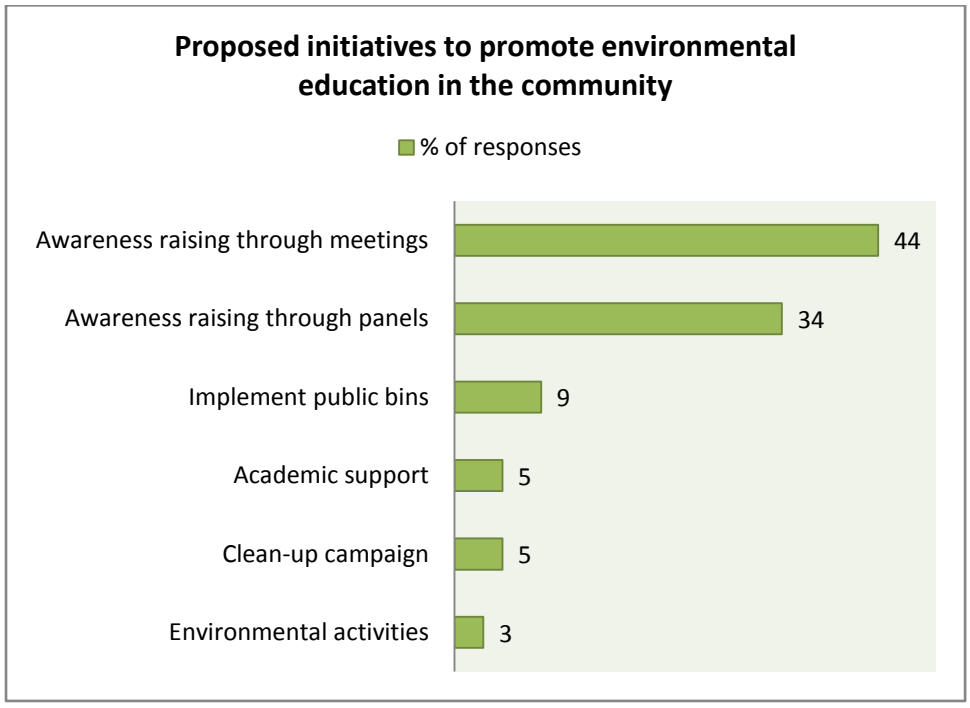
The first questions asked was to identify the type of activities that "you would like the project implement for your children". Many activities were suggested by household members, particularly recreational sports related to the sea. Swimming lessons were perceived as critical by the respondents, who stated "we are on a island and our children do not know how to swim!".



Graph 19: *Local vision regarding the type of activities that could be implemented for local children.*

The second questions targeted local vision and ideas regarding solutions to enhance environmental education in the community. Firstly, it is important to note that most respondents did not have a clear idea of the meaning of environmental education. Indeed, it has been acknowledged that the community has never benefited from some form of environmental education from external institutions such as environmental NGOs and governmental agencies. However, respondents would welcome environmental education program to enhance their ability to understand their surrounding wetland, particularly for the youth and children.

Almost half of the responses stated the need to implement meetings with local people, locally named as "causeries". Information and interpretative panels were also suggested as adequate communication tools to increase local awareness on coastal biodiversity. Community-based clean-up events and environmental activities were also emphasized by many community members. Such activities included outdoor visits and classroom lessons to understand the Mauritian biodiversity, history and culture as well as snorkeling trips.

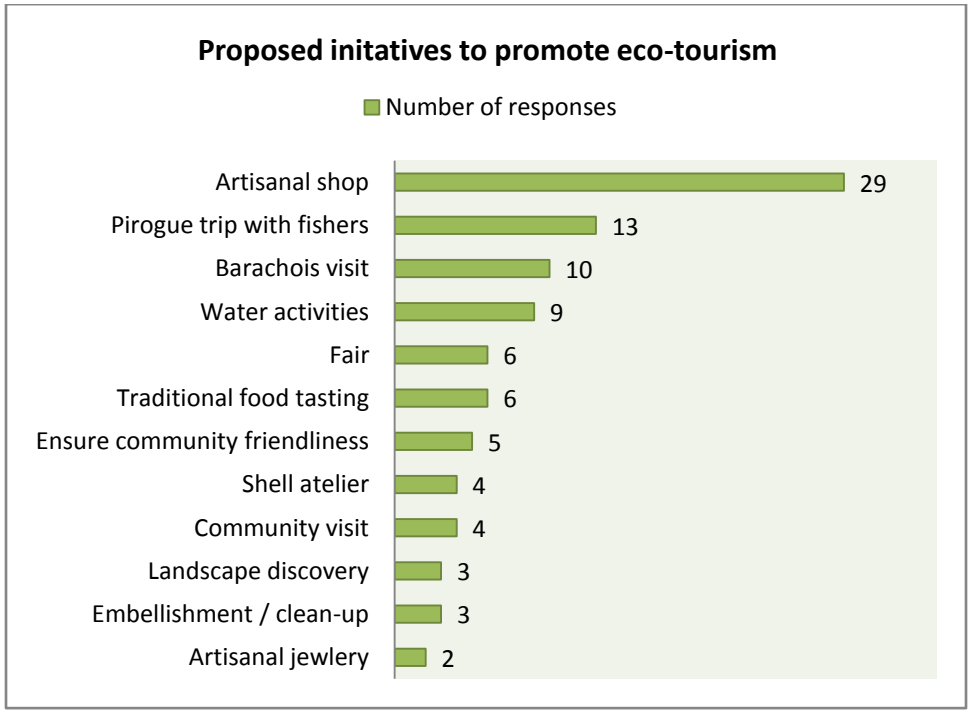


Graph 20: *Local vision regarding the initiatives that can be implemented to increase awareness and understanding of local residents towards the*

Considered the small traditional fishing community and the adjacent coastal wetland of the study area, many options promoting natural, cultural and historical ecotourism could be undertaken in order to develop income generating activities in the community. However, It was critical to increase awareness and understanding of local opinions, wants and needs regarding such initiatives and to ensure their willingness to enhance tourism attraction in their village before planning and designing any activities.

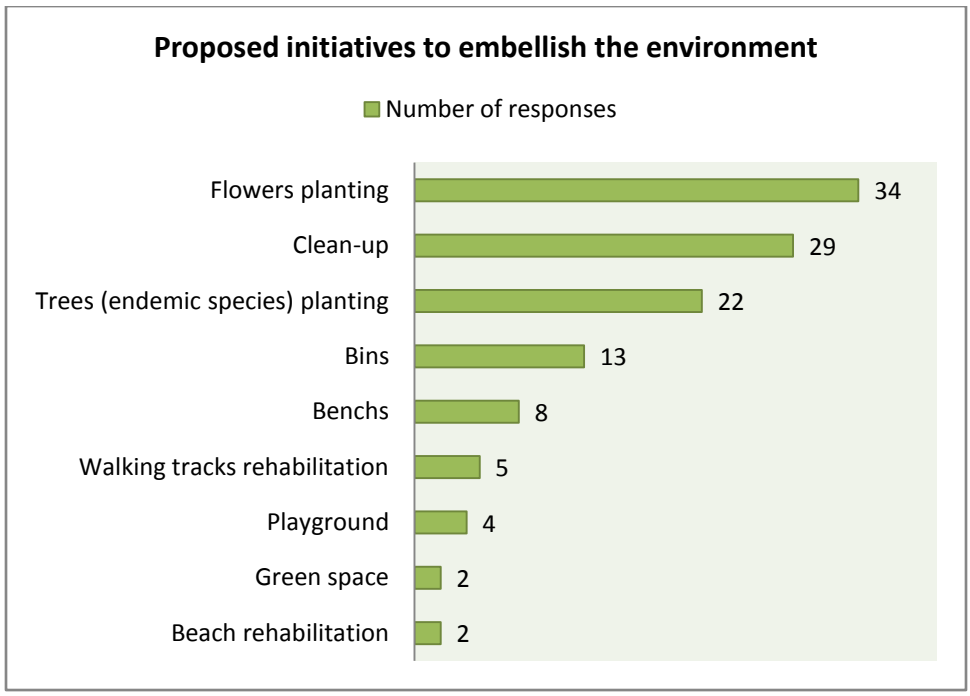
In this context, the third question was targeting local vision and ideas regarding tourism attraction. Results demonstrated that local respondents mentioned a diversity of potential initiatives attracting tourists in their surrounding environment which highlighted local willingness to promote tourism attraction in their community and adjacent wetland, based on their cultural, historical and natural values.

Such initiatives included the creation of artisanal shops and organization of fairs for selling community products involving community members willing to participate was suggested in 35% of responses. The visit of the barachois for discovering the landscape and learn about its historical use and pirogue tours in the lagoon were suggested in 10 and 13 % of responses respectively.



Graph 21: *Local vision regarding the initiatives that can be conducted to promote eco-tourism in the community.*

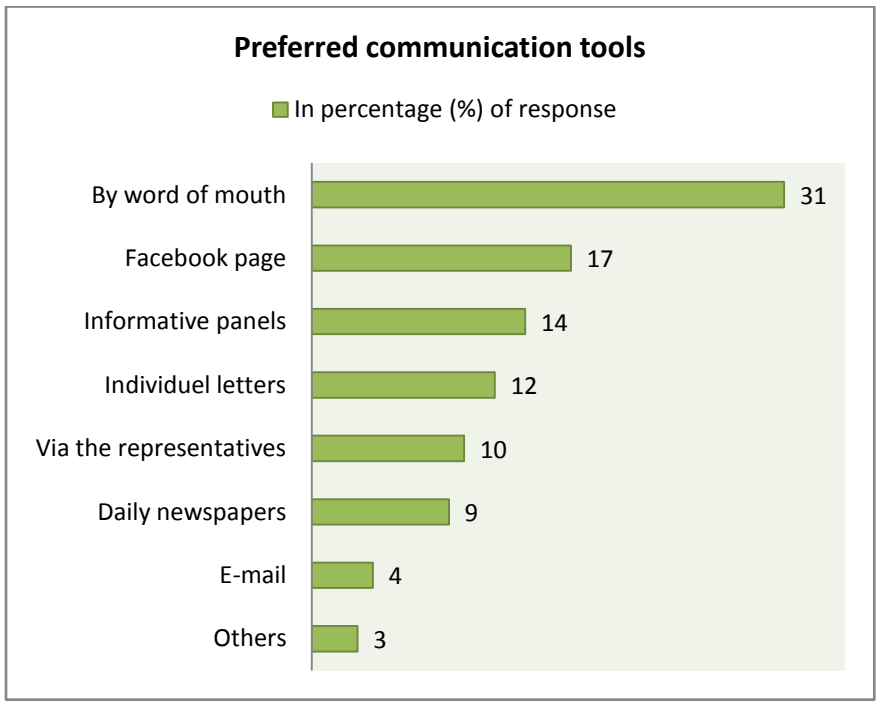
The last question targeting local vision regarding management activities was linked to the way to conserve and manage the environment in order to ensure a more appealing and healthier environment for the local community. The recommendation that was sugested in more than half of responses (57%) was the plantation of flowers and trees "typical of the region'. Other initiatives included conducting clean-up (29%) and set up waste disposal facilities (13%) as well as implemeting recreational facilities and rehabilitating walking tracks to increase their willingness to visit the zone.



Graph 22: *Local vision regarding the initiatives that can be conducted to embellish the natural environment.*

5.9 Communication tools

Although essential, the tasks of gathering local people through focus group interviews for consultation and disseminating information for awareness raising are always difficult when the project targets an entire community. During the planning and design phase of the project, an effective information dissemination system is critical within the context of a collaborative approach where the local people are involved in the design and planning of management activities and are part of the decision-making processes. Consequently adequate communication tools need to be identified for effective information dissemination among the community. According to the results, the dissemination of information is seen as effective by word of mouth as well as through the facebook page and information panels, which are already in place.

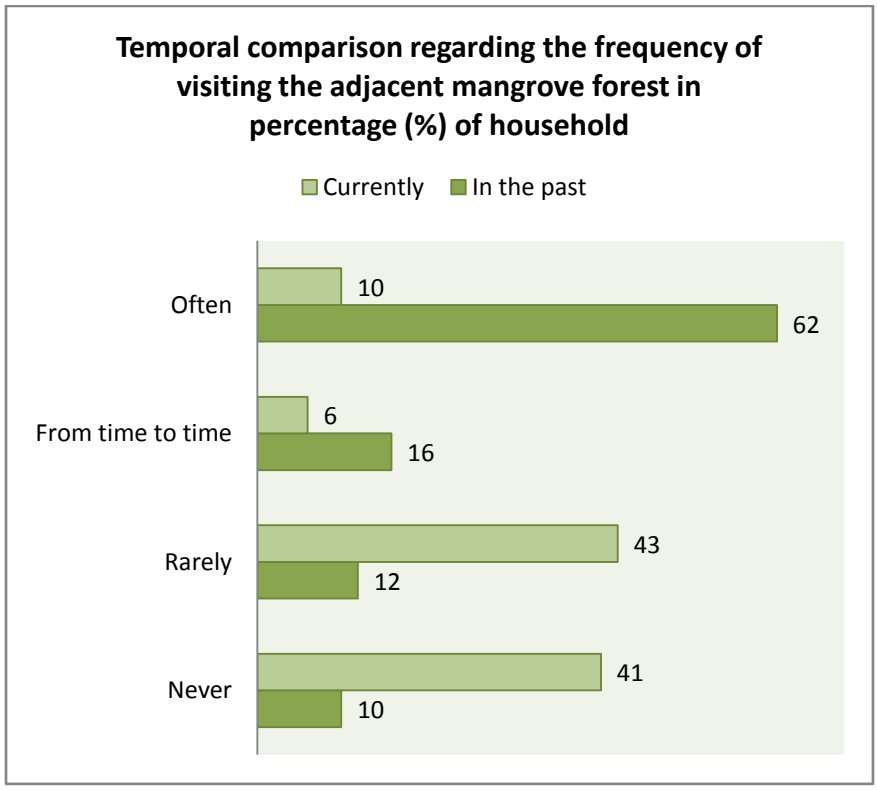


Graph 23: *Preferred communication tools.*

5.10 Regarding the adjacent mangrove forest (Zone 2).

The mangrove forest has a surface of approximately 6 hectares and includes mangroves areas, beaches, five delimited mangrove ponds, walking tracks, and existing buildings. The zone, which is government property, has been abandoned since more than 40 years and is currently a dumping ground with no management activities. As the area is adjacent to the community of Residences La Chaux, it was important to understand how the local community uses and values the forest. Moreover, understanding local vision regarding potential options for future forest utilization and management is also critical to ensure residents satisfaction and willingness to participate.

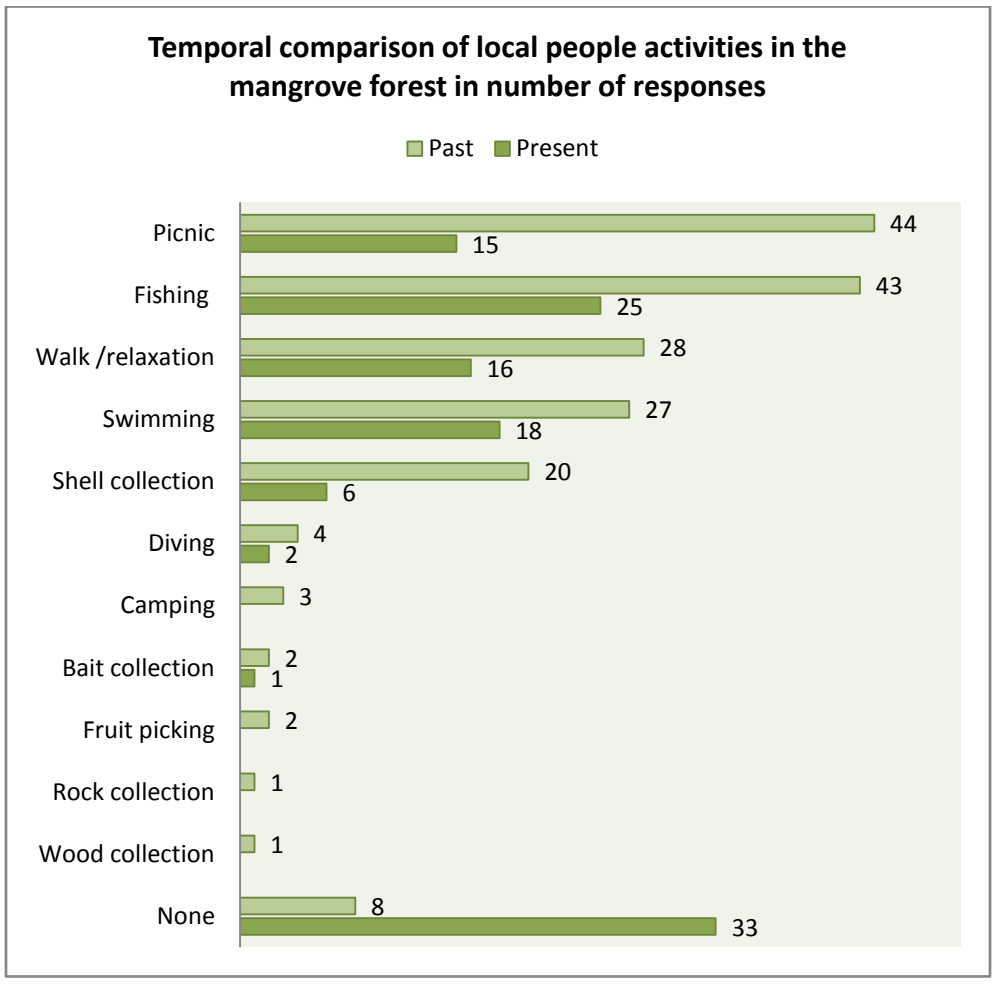
The results demonstrated that the frequency of visiting the forest by local household members has reduced drastically over time. Indeed, 62% of respondents used to go often in the past while only 10% visit the mangrove at present. Moreover, approximately 40 % of household members do not go anymore to the forest while living a few hundred meters from it.



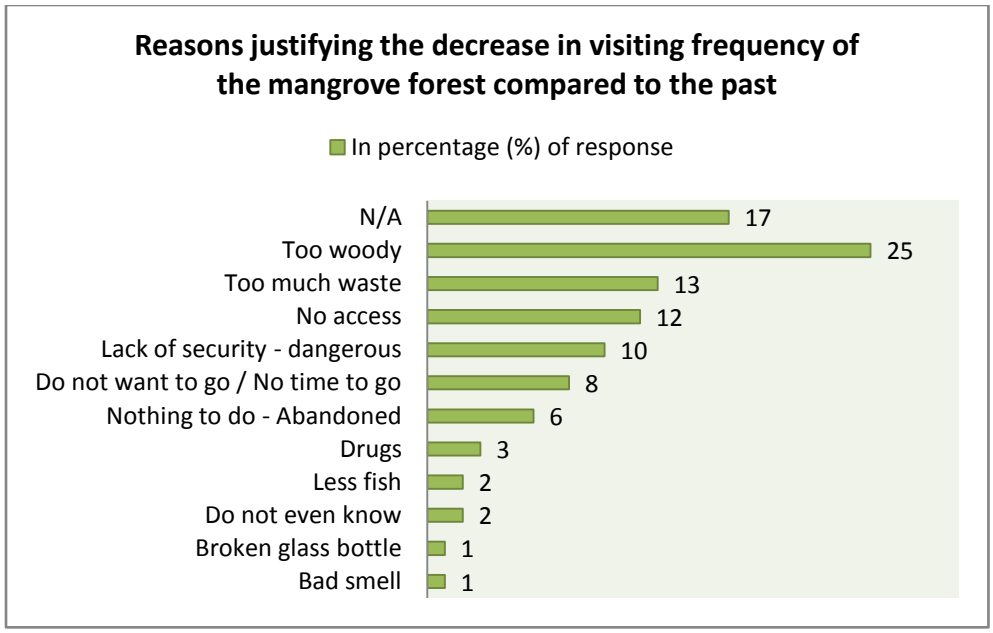
Graph 24: *Local frequency of visiting the adjacent mangrove forest.*

The following questions aim to provide an understanding of how the community uses and values the forest and gather local ideas of the options for improved management of the forest.

The diversity of activities conducted by household members, in the forest, also decreased drastically over time. Indeed, the local people used to be involved in many recreational activities including fishing, shells fruits and wood collection, swimming, diving, picnicking and camping. The number of responses regarding this activities are reduced when talking about the present. It is also important to notice that harvesting crab harvest using torch is an activity currently conducted in the mangrove areas, mainly by youth. However, crab harvesting was not mentioned by respondents, owing to the knowledge that it is illegal.

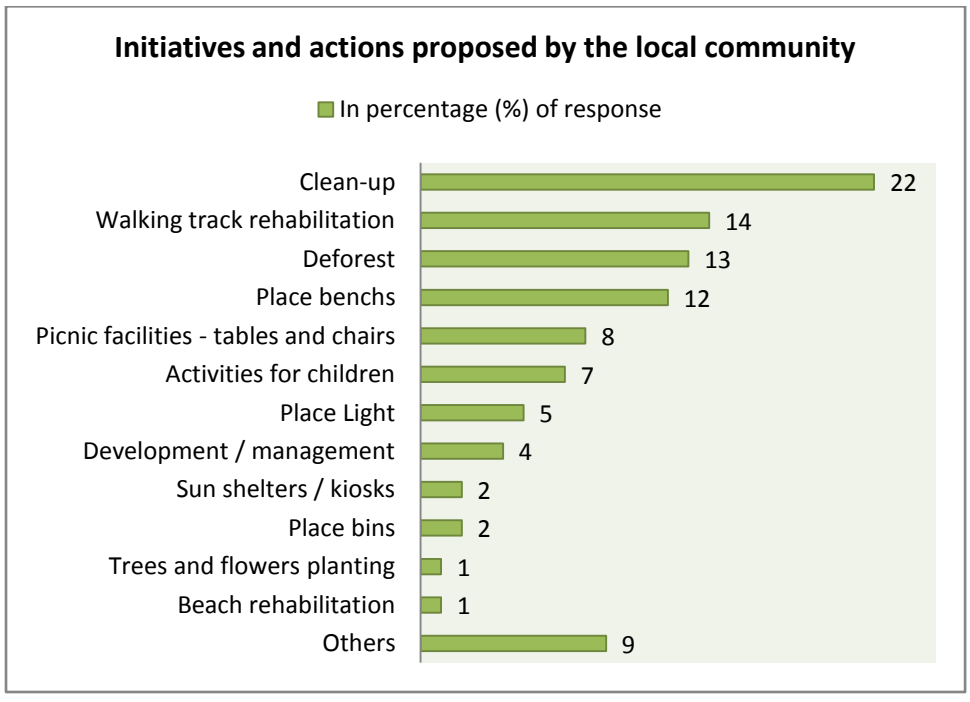


Graph 25: *Local uses of the mangrove forest (Zone 2) over time.*



Graph 26: *Reasons justifying the decrease in visiting frequency compared to the past.*

The decrease in frequency of visits and activities in the forests is due to a range of reasons as reported in the graph below. As a consequence, various ideas were suggested by household members to cope with these constraints.



Graph 27: *Suggested initiatives for wetland restoration.*

Others * suggested initiatives, included but are not limited to: building renovation; access for disabled people; aquaculture in mangrove ponds; creation of a visitor centre; artisanal shops; playground and; actions for increased security and compliance.

VI FINDINGS AND DISCUSSION

The key findings from the household survey are as follow:

- Residences La Chaux can be considered as a poor coastal fishing community as the household income levels are generally low and insufficient to cover day-to-day expenses.
- The main problems faced by the local community remain the lack of employment and activities for youth. This could be linked with the significant drugs issues in the village.
- Indeed, extracurricular activities are very limited in the community, particularly for the youth with the main ones being football, watching TV, dancing and listening to music. Moreover, a high percentage of adult household members do not have any recreational activities. Only a very small proportion of people does activities requiring equipments and costs which reveals the monetary constraints.
- The predominant household livelihood system for men is primarily based on coastal traditional fishing and manual works related to construction. Moreover, half of local women are either housewife, cleaning lady or multifunctional maid.
- The low diversity of the community livelihood system can be justified by the low education level due to monetary constraints.
- It is also emphasized that only a ignorable percentage of households supplement their livelihoods by grazing cattle (mainly rabbit, chicken and duck), producing crop and raising small livestock although a small number of households have home gardens. This can be explained by the lack of space as they usually have small landholdings and the fact that poultry are relatively inexpensive to keep in small areas.
- The study also revealed surprisingly that there are no practices in agriculture, aquaculture and forestry adopted by local community members as well as others innovative use of local biodiversity in the adjacent wetland or surrounding environment. This can be explained by the lack of opportunities from the relevant agencies and local NGOs, the lack of land and the difficulty to obtain required permits.

- There is clear local concern regarding the ineffective waste management system in the community, with no private bins delivered to residents, no wastes sorting, a low frequency of wastes collection and inadequate amount of public bins in the community.
- The ineffective waste management system as well as a lack of community awareness regarding the impacts on pollution on the environment can explain the high amount of wastes in the barachois, mangrove areas and adjacent forest. The areas are utilized as dumping ground for the surrounding communities.
- The results revealed that the management and conservation of the adjacent coastal wetland is absent since many years. The woody forests revealed the introduction of Invasive Alien Species (IAS) and the terms abandoned employed by local residents means that the wetland is no subject to any monitoring and conservation actions by the relevant authorities.
- The survey highlighted the fact that local people do not rely on wetland resources for their subsidence, basic needs and for income generating activities. Only few people supplement their livelihood by harvesting crabs, collecting bait and fishing. Indeed, all fishers depend only on lagoon and outside lagoon fishing. However, these activities should be bear in mind for project planning and implementation.
- It could be noted that considering the past fishing and recreational activities of the local people in the coastal wetland, there used to be a cultural relationship between the wetland and the people which is decreasing since years due to the lack of conservation and management. If community lose access to the wetland, although no significant socio-economic impacts will occur on the community, they might be resistant to any attempt to cut themselves from the wetland. This situation occurred in the past. The fishers were also concerned that their fishing boats (pirogue) were going to be removed from the barachois. This revealed a need to work in close collaboration with the local people to prevent potential conflict and ensure project effectiveness and sustainability.
- Although local fishers are working directly in the natural environment and have great knowledge regarding the sea and the marine resources, others livelihood

are not connected to the natural resources which revealed a lack of awareness and understanding regarding the biodiversity and the benefits of the adjacent wetland.

- Environmental education has never been conducted in Residences La Chaux which demonstrated a lack of information, communication and relationship with NGOs and governmental agencies.
- The local people expressed a positive perception towards the project and the high percentage of respondents willing to participate shows that local people can understand and be aware of the potential benefits of restoring the adjacent coastal wetland, particularly regarding the creation of job and the creation of recreational facilities.
- Many visions and ideas were gathered from interviewed household members regarding the potential options for improved management of the forests in a way to increase the ability of the local population to benefit from, and contribute to biodiversity conservation. The ideas were refined to make them more concise by combining similarities. This ideas, which fulfilled the aspirations of the local people, will be integrated in the management activities.
- For instance, tourism is perceived as a welcome economic activity across the village sample as it is expected to bring considerable development. Indeed the restoration of the wetland biodiversity with is adjacent to a traditional fishing community could facilitate publicity and attraction for ecotourism development.
- Moreover, basic tourist facilities would be needed, such as walking tracks, interpretation panels, kiosks and benches inside the area to view wildlife and natural scenery, as suggested by the households members. Moreover, the requirement of sufficient tourist guides would provide direct employment opportunities to local youth.
- However, based on the wetland surface (30 ha) and its limited visitation number taking into account the carrying capacity, it is unlikely that this potential could be developed to a level sufficient to contribute significantly to livelihoods improvement in the community.

- Although secondary occupation are very limited in the community and include mainly manual and artisanal works, the artisanal skills of the community can be use to promote community culture and livelihood by creating a shop which could be part of the visitor centre where community members can sell their products based on sharing benefits as suggested by many respondents. Indeed, respondents found difficult to sell artisanal products to tourists due to the lack of permits, facilities, investment and time.
- Moreover, the opportunity to experience traditional fishing on a pirogue accompanied with local fishers was also suggested by respondents. It is important to notice that both initiatives has yet never been undertaken in Mauritius which leads to believe to a good potential due to the lack of market competition. As a result, the introduction of ecotourism in order to diversifying the economic opportunities of the local livelihood system.
- Finally, although local people are working in the tourism sector through hotel and restoration, there is a lack of knowledge and skills about what market, infrastructural and services related factors will allow for successful tourism. As a result training will have to be conducted to ensure effectiveness and sustainability of the planed initiatives.

VIII CONCLUSION

To conclude, this study was critical to examine the socio-economic conditions of the coastal fishing community which could be considered as poor due to the low income levels and livelihoods diversity.

Moreover, results of the study allowed to understand that Residences la Chaux is facing a range of problems which restrict its development. Such problems include; the low education levels due to monetary constraints; the lack of recreational activities and employment for the youth leading to significant drug issue in the area; the lack of effective waste management system impacting significantly the surrounding environment; the lack of land, the difficulty permitting process and the lack of support and information to develop new livelihood opportunities in agriculture, aquaculture and forestry by community members; the lack of adequate infrastructure and; the lack of support from and interaction with governmental agencies and local NGOs.

This local community is adjacent to a coastal wetland, including the barachois and the adjacent mangrove forests, which is not subject to any management and conservation initiatives since more than 40 years. The restoration and conservation of the wetland is seen as a promising solution for enhancing livelihoods and wellbeing of the community by improving its functionality and productivity.

Indeed, based on the local needs, wants, vision and ideas, this study was also important to identify the interventions that could be implemented in order to increase community satisfaction and consequently participation in the project management activities through the introduction of wetland restoration, environmental education and activities and eco-tourism initiatives.

Indeed, the study clearly highlighted that considerable potential exists for eco-tourism based on natural, cultural and historical values as suggested by community households members. Such initiative will provide opportunity to expand economic base and can bring to the community new employment opportunities through the provision of services

such as entertainment, traditional food tasting, traditional fishing excursions, barachois visits, visitor centre, community shop with hand-made products, as suggested by local respondents. This community-based eco-tourism is clearly welcomed and seen as an opportunity to involve local people in tourism development and share in the benefits. The active participation and cooperation of all members of the community will be however critical to achieve sustainable tourism development within the context of sustainability and this surveys was the first consultation process.

The study also permits to understand that the local community do not rely on the wetland products for subsidence, basics needs and income generating activities which will facilitate project development.

Finally, collaborative wetland management practices promoting community engagement and empowerment in conservation in order to make them realize greater benefits from the wetland will likely make them more inclined to feel ownership, power and benefits sharing and become better managers and guardians as well as creates and builds trust between local community and governmental agencies. This management strategy, which will be conducted in a holistic manner, is expected to result in regaining ecological integrity, improved biodiversity conservation as well as local livelihoods and wellbeing enhancement. The underlying theory is that social and ecological systems are linked and the social transformation behind it is expected to be key to reach sustainable wetland management so that human well-being is strengthened in the long run.

If successful, the project will demonstrate how the collaborative restoration and conservation of a coastal wetland adjacent to a local fishing community can be linked to improved local livelihood and poverty alleviation through development and enhancement of ecosystems goods and services. It will also enhance the capacities of government agencies to promote and implement integrated coastal zone management project to develop and restore others wetlands in strong conjunction with local stakeholders, particularly the local communities.

VIII RECOMMENDATION

In reference to the findings and discussion of this study and the fore going conclusion, the following recommendations can be made:

1. Build capacity for environmental conservation and management at local level and develop an integrated community-based coastal wetland management plan to enhance resources conservation and protection integrating environmental and economic considerations and taking into account the visions and aspirations of the community, within the context of sustainability.
2. Develop an Invasive Alien Species (IASs) removal and control program with the local community.
3. Identify endemic and native flora species to plant in the mangrove forest. The increase in native plant coverage in the wetland is expected to increase biodiversity directly.
4. Undertake detailed nature-based as well as historical and cultural ecotourism initiatives planning in a collaborative approach through community consultation and workshops and by integrating the local ideas gathered in this report.
5. Enhance communication tools to increase interaction between the Barachois staff and the local community.
6. Develop training programs. As it is expected that selected community members will become wetland managers, part of the patrol teams or staff responsible for giving environmental education themselves, it is critical that training should be conducted by technical experts via relevant governmental agencies or local NGOs.
7. Enhance the waste management strategy of the community, in conjunction with the relevant governmental agencies.
8. Develop integrated livelihood improvement program focusing on sustainable aquaculture production through the introduction of innovative methods including crab culture in Strawberry guava cages and the enhancement of availability of fish feed with the local fishers.

9. Implement continuously recreational activities for local children in collaboration with the existing local associations in order to increase local satisfaction towards the project and make the local residents involved.
10. Develop a continued environmental education program with local people including women. However, considering the fact that education levels among the community of primary school and secondary school levels, the education program needs to take into account the levels of education and skills to clearly present the approach of wetland managements including conserving biodiversity, ecologies and hydrology as well as provide a clear understanding of wetland benefits.
11. Develop and conduct a community outreach through meetings and community based activities in order to raise local understanding of the importance of the coastal wetland for improving their local livelihood and quality of life.
12. Disseminate results of the baseline surveys to relevant governmental agencies and increase communication and interaction between government and community.
13. Ensure networking as well as exchange of information and lessons learnt with all stakeholders. including government agencies.
14. Turn the targeted wetland into a protected area under a collaborative management system.
15. Finally, the historical information of the coastal wetland expressed by community members and supplemented by expertise will be interesting in explaining the limited use of the wetland by the adjacent community and the absence of conservative and protective initiatives by relevant authorities.

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Appendix 1: Household questionnaire.

#	NAME AND SURNAME	ADDRESS	PHONE NUMBER (ADULTS: >18)	E-MAIL (ADULTS: >18)	FAMILY ORGANIZATION Householder Husband/Wife Son/Daughter Father/Mother Son in law/Daughter in law Brother/Sister Grand-father/Grand-mother Grand-son/Grand-daughter Other	EDUCATION LEVEL Elementary school Primary school Secondary school Tertiary School University/College	AGE
1							
2							
3							
4							
5							
6							
7							
8							

#	PRINCIPAL OCCUPATION Unemployed Student Retired Occupation?	PLACE OF WORK (CITY)	SECONDARY OCCUPATION	MONTHLY SALARY None <4000 4000<>8000 8000<>15000 15000<>25000 >25000	COMPETENCES PERSONNELLES Gardener Artist Painter Boat license Necklaces/Bracelet Sport DJ/Animator Experience with children Cooking Accounting Management Other ...	EXTRACURRICULAR ACTIVITIES/SPORTS Adults (Activities /Location) Children (Extracurricularactivities / Location)	ACTIVITIES IN THE BARACHOIS (B)Type of activities (N) Type of activities	PERCEPTION TOWARDS THE PROJECT Positive Negative None	WILLINGNESS TO PARTICIPATE YES NO DO NOT KNOW
1									
2									
3									
4									
5									
6									
7									
8									

1) Is your monthly salary sufficient to cover your daily expenses ? Yes/No

2) What are the main problems encountered by your community ?

3) What are the main environmental problems in your region ?

LAGOON?

BARACHOIS?

COT NICOLE (Mangrove Forest Zone 2)?

MANGROVES?

4)Do you think that the waste management in your community is efficient ? (recycle of waste, number of trash bins present, frequency of waste collection) If not, explain why.

5) In context of the environment and the social, what advantage do you expect the project will bring to your community ? (Justify)

Activities with children ? What types ?

Sensitization and environmental education? How ?

Attract tourists to your community? How ?

Embellishment of your environment? How ?

Promote your culture? How ?

Others ?

6) What do you think will be the benefits that the project will deliver to your community ?

7) How would you like to be informed regarding project updates ? (Circle the right answer)

Letter to physical address

Newspaper

E-mail

Facebook page

Word to mouth

Information panels in the community

Information via the representatives of the community

EPCO

Regarding the adjacent Mangrove forest (Zone 2) Locally known as "Cot Nicole"

#	Did you previously go to "Cot Nicole" area? Often Sometimes Rarely Never (Please specify)	Activities?	Do you currently go to "Cot Nicole" area? Often Sometimes Rarely Never (Please specify)	Activities?	Reasons for infrequency of visit?	What can be done to encourage you to go to the zone?
1						
2						
3						
4						
5						
6						
7						
8						