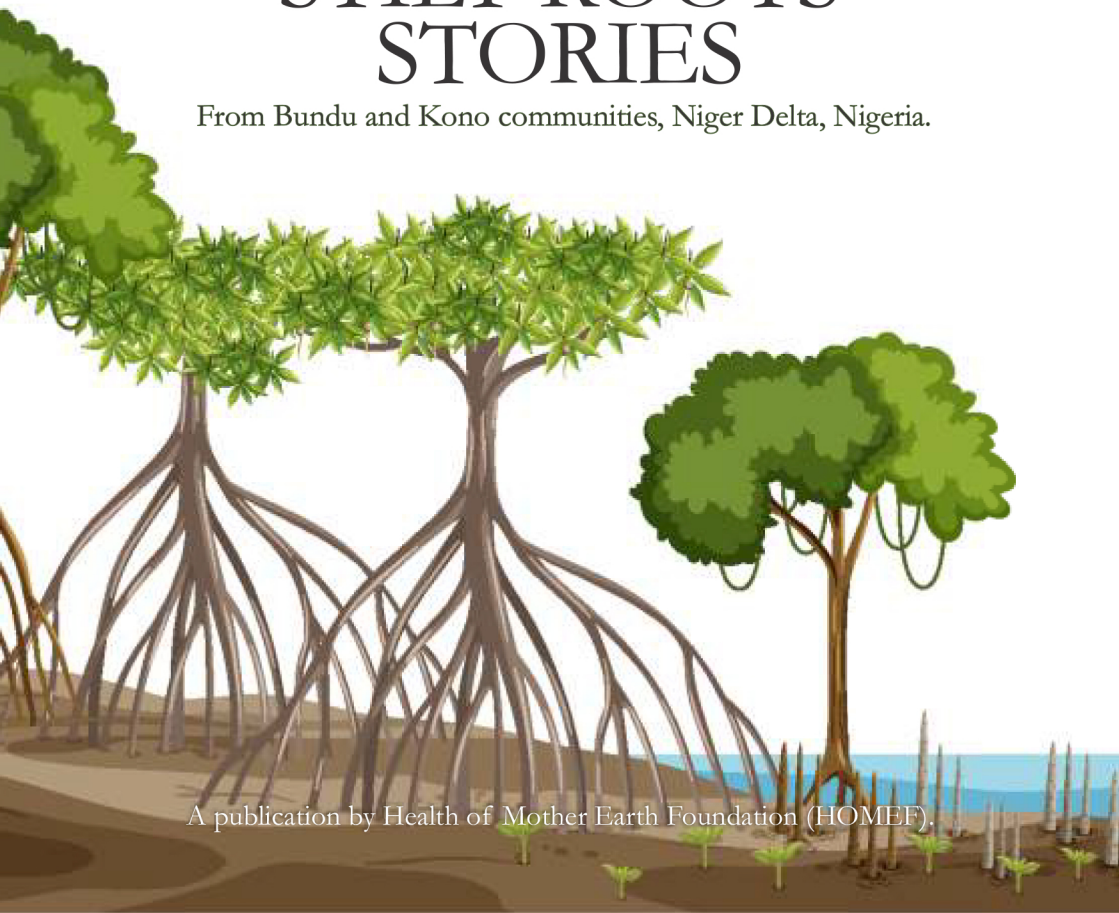
STILT ROOTS STORIES

From Bundu and Kono communities, Niger Delta, Nigeria.



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From Bundu and Kono communities,
Niger Delta, Nigeria

Researched by Centre for Environment, Human Rights and Development (CEHRD) *in collaboration with Health of Mother Earth Foundation (HOMEF)*

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ACKNOWLEDGEMENTS

This report was written by Professor Nenibarini Zabbey of Centre for Environment, Human Rights and Development (CEHRD) as outcome of a participatory research on Shifting the Power Lines carried out in partnership with Health of Mother Earth Foundation (HOMEF). The CEHRD team contributed their expertise on mangrove ecosystems and knowledge of the communities to make the endeavour successful.

Special thanks to all stakeholders who shared their views and provided useful information during the data collection. We particularly acknowledge the Rivers State Ministry of Environment and the FishNet Alliance for their participation and inputs during the community engagements. Our appreciation goes to Bundu (Port Harcourt) and Kono (Ogoni) communities for participating in the study and every other stakeholder that contributed to the work. We are also grateful to the Fisherfolks Association in Bundu and Kono communities for their willingness and zeal to share their daily life's experiences during the data collection process.

We are also grateful to representatives of other civil society organisations and media practitioners who joined us on these journeys. You all made it memorable.

We also acknowledge the ever-resilient team from HOMEF who were always ready to pursue the stories and the songs that we are convinced will help Shift the Power Lines. The concept of Shifting the Powerlines came from a member of the FishNet Alliance who stated at an occasion that when lines (queues) shift, your hope of getting to your point of interest stays alive. With this inspiration we marched and rowed into the creeks of the Niger Delta. While say desperate socio-ecological situations in which the communities are forced to live in, we also saw hope and determination. While we had hoped to hear inspiring stories and

songs steeped in the past, all we heard were stories of struggles for survival. These confirmed our believe that we cannot afford to delay the shifting of the power lines to achieve a much-needed transition that brings justice to the people and the Planet.

Nnimmo Bassey
Director, HOMEF

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He has become a King
Even if he is in the village
He has become a King (3x)

He has become a King
Even if he is in the village
He has become a King (3x)

He has become a King.

(One of the *good catch songs* sung by Bundu fishers).

The mangrove ecosystem plays critical local and global roles in climate regulation, livelihood support, water purification and shoreline protection in coastal regions of the tropics and subtropics.

The mangroves serve as source of food in many communities, wood for housing and energy, and as reservoir of biodiversity. Primarily, mangroves serve as breeding areas for fishes, and are a major carbon sink. The stilt roots of mangroves provide the needed support and serve as transport link for nutrients and other materials required by the mangrove plants for growth, and thus function as the anchor of the red mangrove in muddy, unstable sediments.

Despite the important roles performed by mangroves, a significant area of the ecosystem is either lost or degraded annually—it is estimated between 340,000 to 980,000 hectares are destroyed

annually. Specifically, within the Niger Delta region which is home of the fourth largest expanse of mangrove in the world, many human activities impact on mangroves. These include oil and plastic pollution, unregulated harvesting, dredging activities and the spread of the invasive nipa palm. Thus, it is pertinent to initiate, develop and adopt appropriate and contextual approaches towards safeguarding the mangrove ecosystem considering the myriad of roles and opportunities it holds for the coastal communities.

This intervention provided a documentary of stories, songs, and fisheries related to the mangrove ecosystem of two mangrove dependent communities. The project was implemented in Bundu waterfront in Port Harcourt City Local Government Area (LGA) and Kono Fishing Port in Khana LGA of Rivers State, Nigeria.

The project involved field reconnaissance, kick-off workshops, onsite and off-site interviews and video documentary of songs and stories about mangrove benefits told by experienced fisher-folks in both communities. It also mined datasets on historic fisheries trajectory of the river systems compared with the present. The songs are of two categories: those sung on good and bad fishing trips. Key outputs of the project are outlined below:

Output 1: Increased awareness of mangrove biodiversity in Kono and Bundu Communities.

Output 2: Identified cultural strategies employed by the communities to preserve mangrove.

Output 3: Identified other beneficial uses of mangrove ecosystem in the region

Output 4: Documented songs relating to mangrove in Bundu and Kono communities

Output 5: Increased understanding of threats to mangrove in the Niger Delta region.

Output 6: Identified knowledge gaps, social and regulatory needs of the mangrove dependent communities.

The following recommendations are made as a framework to facilitate shifting the unsustainable fossil power/energy modes to renewables, to achieve sustainable development in the region.

i. There is need to organise the fisher-folks to form cooperatives so that they could access loans and grants. This would also facilitate access to subsidy or acquiring fishing gears like nets and boats through donations. The fishers can benefit from net donations by the FishNet Alliance.

ii. Security is a huge challenge to the fisher-folks. Government needs to ensure security agencies provide effective protection of the fishing communities especially in Bundu, where the fishers reported subsisting occasional attacks on them by armed cultists and sea pirates. This will improve fishing income and make the communities liveable.

iii. Due to perishability of fish and the long distances between the landing sites (the fishing ports) and the local markets, storage facilities should be provided to minimize post-harvest loss and upscale the income of the fishers.

iv. The Government should subsidize the cost of the fishing implements. Government policy should enable

investment in artisanal fisheries since the subsector produce about 80% of the fish produced nationally.

v. There is urgent need for government to provide basic social amenities (e.g., potable water, sanitation, and health facilities) in Bundu and the Kono Fishing Port and similar fishing communities.

vi. There is also expedient need for sustainable energy (e.g., solar energy) in the fishing ports to limit the exploitation of mangrove wood for energy.

vii. In Kono, the government and other stakeholders should initiate a restoration programme that will replace nipa palm with native mangrove species. For Bundu, there is urgent need to clean the mangrove ecosystem of the massive oiling and plastics and prevent further pollution of the creek. The cleaning of Bundu's mangrove should be a collaborative effort with the government and the community including private and international organizations.

viii. Sustainable alternative livelihood programme for artisanal refiners should be introduced in Bundu community and throughout the Niger Delta. CSOs should channel advocacy towards Bundu community and engage donors to foster alternative livelihoods to discourage artisanal refining in Bundu community.

BACKGROUND OF THE PROJECT

Stilt roots are the anchors of the red mangrove (*Rhizophora* spp.) that dominate mangrove plants of the Niger Delta, the bioregion of Africa's largest expanse of mangroves. They support and sustain the mangrove to provide mankind with numerous ecosystem goods and services.

Mangroves, the coastal forests of the tropics and the sub-tropics, have traditionally provided a variety of plant products, fish and shellfish for local communities for millennia. These include sequestering blue carbon for global climate change mitigation, protection of coastal communities from storms and sea level rise, prevent shoreline erosion, regulate water quality, provide habitat for commercially important fishes and endangered marine species. Mangroves also provide services such as coastal stabilization, and food chain support for near-shore fisheries. In addition, mangroves render cultural services (non-material benefits) such as recreation, spiritual enrichment, and aesthetics. At least, 24 mangrove goods have been identified[1],[2]

Despite these benefits and services, coastal blue carbon ecosystems are some of the most threatened ecosystems on Earth, with an estimated 340,000 to 980,000 hectares being degraded or destroyed each year. It is estimated that up to 67% and at least 35% and 29% of the global coverage of mangroves

1 Ackah-Baidoo, A., 2013. Fishing in troubled waters: oil production, seaweed and community-level grievances in the Western Region of Ghana. Community Development Journal 48, 406–420.

2 Zabbey, N. (2020). Mangrove resources. In: Akpokodje. E. G. and Derefaka, A. *The Niger Delta: An Environmental Perspective*. Onyoma Research Publication, Port Harcourt, Nigeria. Pp 237 – 249.

tidal marshes and seagrass meadows respectively have been lost. When degraded or lost, these ecosystems can become significant sources of carbon dioxide and methane instead of being sinks of these greenhouse gases.

In the Niger Delta region of Nigeria, loss of mangrove ecosystem persists. The surge in unemployment rates, weak economic systems and poor natural resources governance regimes have contributed deeply to the human activities that destroy mangrove resources with attendant consequences on the quality of life of the dependent population. The livelihoods of coastal and indigenous people are inseparably coupled with mangroves, which erode due to mangrove loss or degradation.

It is reported that over 60% of commercial fishes in the Gulf of Guinea breed in the mangroves of the Niger Delta. Thus, degraded mangrove or losses in the Niger Delta affects fish production and the fisheries value-chain in the Gulf of Guinea. However, the Niger Delta mangroves are amongst the least studied and one of the worst degraded mangrove ecosystems globally[3].

Threats to the region's mangroves include over harvesting for fuel wood, oil spill, dredging, reclamation and nipa palm invasion, plastics pollution and fragmenting.

A recent review of crude oil impact on mangrove shows that 27% of the global impact had occurred in the Niger Delta[4].

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3 Zabbey, N., Uyi, H., 2014. Community responses of intertidal soft-bottom macrozoobenthos to oil pollution in a tropical mangrove ecosystem, Niger Delta, Nigeria. Marine Pollution Bulletin 82, 167–174. doi:http://dx.doi.org/10.1016/j.marpolbul.2014.03.002

4 Duke, N.C. (2016). Oil spill impacts on mangroves: Recommendations for operational planning and action based on a global review, Marine Pollution Bulletin, 109 (2), 700–715

Local communities have adopted different approaches to resist mangrove degradation, adapt to the new/emerging order, and innovate new ways to cope with the disappearing ecosystem goods and services. For instance, many communities adopt norms to conserve mangroves.

Other coastal communities, e.g., Kono, designate mangrove conservation area and enact norms to protect the mangrove habitat from unsustainable exploitation. Communities in the delta depend on mangrove fuel as a coping strategy for inadequate energy supply. It is also reported, that communities provide social license and support for operators of artisanal crude oil refining. This is because the 'dirty fuel' is readily available and cost-effective.

Artisanal crude oil refining activities is a major driver for mangrove disappearance, which is driven by the lack of employable jobs in coastal communities. These economic and socio-political dynamics affect the power modes in the community. Thus, the dynamic power mix, affects the capability of community actors to conserve and protect mangroves which serve as efficient carbon sinks.

Therefore, to achieve a shift from dirty to clean modes will involve providing a participatory platform for communities to integrate with other stakeholders to share local and indigenous knowledge to address economic, socio-political power relations that ultimately diminish the mangrove resources, either directly or indirectly. Addressing the issues of mangrove degradation and loss would require multiple stakeholders particularly the communities that are Critically dependent on the mangrove ecosystem for cultural needs, livelihood, energy, and other needs.

This is one of the pathways for mobilizing grassroots movements towards integrating local and indigenous knowledge for protecting and conserving mangroves for climate benefits. To achieve this, galvanizing coastal communities, and creating the awareness

towards mangrove conservation is a fundamental measure towards adopting contextual climate change mitigation and adaptation measures.

A preliminary step to achieving lofty climate actions and shift from dirty to clean modes would be to create participatory platforms for community participation.

This cannot be achieved if local communities are not provided the opportunity to creatively identify the benefits of mangrove resources within their settings and outline approaches for ensuring mangrove ecosystem conservation and restoration. CEHRD, in partnership HOMEF, provided the participatory opportunity for two mangrove communities (Bundu and Kono) in Rivers State whose fishers' told stories about their link with mangroves -the stilt roots stories. The communities outline the historic trajectory of benefits of mangroves, highlight the drivers of mangrove degradation and loss, and how the situation can improve shifting the energy and power modes. Therefore, the aim of the project was to provide baseline data to pressuring government to commit to shifting power modes from fossil fuels to renewable using stilt roots stories and songs.

To achieve this, the following specific objectives were outlined:

- Assess the historic changes in the state of mangrove ecosystems in two selected coastal communities.
- Document stilt root stories, songs and poems preserved in the oral tradition of the mangrove dependent communities.
- Strengthen community ecosystems' knowledge and defence capacities
- Make recommendations for facilitating a shift to fossil-fuel free future.

STUDY AREA

The project focused on two mangrove communities in Rivers State, eastern Niger Delta with varying socio-ecological features.

The Bundu community is a sprawling heterogenous (i.e., not an indigenous community) urban slum located at the South-West fringe of Port Harcourt, the capital of Rivers State (Figure 1). Port Harcourt has more than 40 waterfront settlements[5]. Bundu one of the Port Harcourt waterfront settlements, highly densely populated with more than 200,000 people.

The community lies approximately between latitude N 4° 44'13.93" and N 4° 45'21.34" and longitude E 7° 0'7.88" and E 7° 00'41.87. Bundu waterfront is in the old township axis of Port Harcourt City. The living condition is compact squatter settlement, locally known as "face-me-I-face-you" or single room with roofs touching one another and little or no spacing for ventilation.

The materials used for construction of the houses are mostly wood or zinc on halfway concrete blocks. As an unplanned settlement, a major setback of the buildings/residence is the lack of toilet facilities, as majority of the residents use makeshift hanging toilet constructed atop the Bundu waterfront.

Those that construct toilet facilities do not dig chambers, but lay pipes from the chambers and connect it to the nearby river where the faeces are discharged[6]

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5 Amnesty International https://www.amnesty.org/en/latest/news/2014/06/nigeria-slum-dwellers-victory-over-government-international-court-triumph-against-impunity/ (ref for PH having over 40 water front communities)

6 Nigeria: Bundu-ama - Rivers waterfront settlement with one toilet nigeria: bundu-ama . https://allafrica.com/stories/202009250673.html

The primary livelihoods of the occupants of Bundu are fishing and petty trading. About 78% of occupants in this settlement live below the minimum monthly wage of thirty thousand naira ($73)[5]. Highest elevation points in Bundu is 5m above sea level with some points as low as 0.3m (Google earth pro). This implies Bundu is prone to flooding when it rain as well as the sea level rise effect of climate change.

Being a transit between upland Port Harcourt and the Bundu Creek which is one of the tributaries of the Bonny Estuary, Bundu is an attractive route for the transport of the products of artisanal crude oil refining from the creeks to the hinterlands of Port Harcourt.

The ancillary oil pollution increases vulnerability of the Bundu settlement. To create additional building space for the increasing population, the tidal flats of the Bundu Creek is continuously reclaimed seaward using excavated blocks of consolidated mangrove peaty sediment (chikoko). Formal wastes management system is lacking in the area. Thus, Bundu occupants deposit domestic at the waterfront bare fringes and mangroves. Consequently, the mangrove roots and floor of the Bundu Creek is visibly clogged by plastic materials.

Kono community lies approximately between latitude N 4° 35'45.78 and N 4° 36'23.52" and longitude E 7° 29'48.49" and E 7° 30'55.41" (Figure 1). Kono waterfront is located on the eastern coast of Ogoniland, Rivers State. The Kono Creek main creek is a bypass of the Imo River bordering the Kono community in Khana Local Government Area.

The creek complex has a network of smaller creeks. The average elevation Kono Creek bank is about 3m over sea level (Google earth pro). This makes Kono, at least section that contiguous to the creek, potentially vulnerable to flooding. The Kono fishing

port (*Muii bom*), the study area (Figure 1), is on the bank of the Kono Creek relatively aloof from the Kono residential area. Housing in the Kono fishing port is made up of thatched mud houses. Like Bundu, there are no modern toilet facilities at the Kono fishing port. Contrary to Bundu, occupants of the Kono fishing port do not erect hanging toilets on the creek waters, instead they use the nearby upland bushes for defecation.

The people of Kono community are predominantly farmers and fishers. The part time fishers operate from their homes in the Kono town while the full-timers camp at *Muii bom* or at the *Nwenua* fishing port, the second but minor fishing port in the Kono Creek catchment. Some of the fishing port campers are migrant fishers. Luxuriant nipa palm (*Nypa fruticans*), an invasive plant that was erroneously introduced to the shores of Nigeria, dominate the Kono Creek intertidal swamps, except a community conserved area of native red mangrove locally called the *Nwenua* swamp [7].

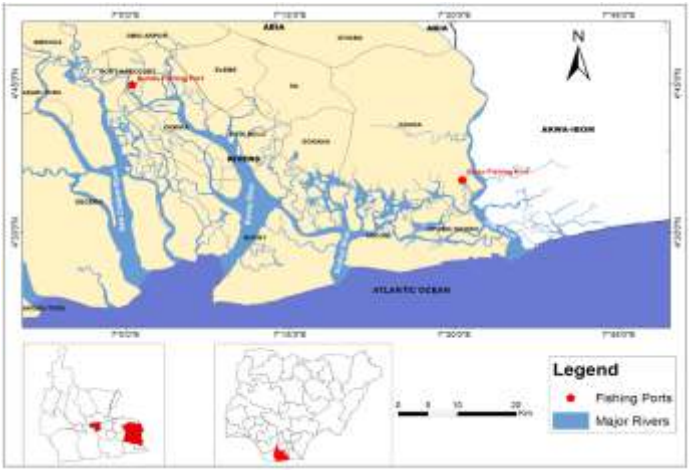

Figure 1: Map Showing Bundu and Kono Communities Fisher folks distance travel during fishing activities.

7 Zabbey, N. and Tanee, F. B. G. (2016). Assessment of asymmetric mangrove restoration trials in Ogoniland, Niger Delta, Nigeria: lessons for future intervention. *Ecological Restoration* 34 (3): 245 – 257. *http://er.uwpress.org*

PROJECT METHODOLOGY

Consultation Visit/Community Entering

CEHRD consulted stakeholders of the Kono and Bundu communities to introduce the Stilt Root project (Figure 2). Two separate pre-data mining consultation visits were undertaken Bundu community. The visits were used to outline the benefits of the project to the community stakeholders and to seek their inputs, cooperation, ownership and support for the project. During the visit at the Kono Fishing Port, the Head committed to providing the needed support, and to sensitise and mobilise the fisherfolks to participate actively in the project. Similarly, the stakeholders at Bundu indicated commitment to provide security for the project personnel and provide the needed support for the achievement of project objectives.

The consultation visits were also used to map project stakeholders with the lead inputs of the community members. Both communities owned and participated in the project activities without hindrances. The activity was measured with the active response to questions of the stakeholders and fisher folks present, their enthusiasm towards achieving the project goal and their support to safeguarding the environment in reducing risk during the project cycle.

Figure 2: Consultation visit at Bundu and Kono communities

Kick-off events

The participatory forum which was held in communities' waterfronts had in attendance the leadership of the communities, the fisherfolks association leaders, periwinkle pickers and fish mongers (traders), representative of the Rivers State Ministry of Environment, community advocates, the media, HOMEF and CEHRD. Eighty-nine and 67 persons attended the kick-off event in Kono and Bundu, respectively.

The Stilt Roots project, its goal and objectives were clearly communicated all the stakeholders. Feedbacks, expectations and formal support and ownership of the project. The forum was a means of strategic knowledge exchange between wider stakeholders in the community and the project organisers. In particular, the kick-off meeting in the Kono Fishing Port and Bundu provided opportunities for community members to reminiscence the contributions of the mangrove ecosystem to their everyday life. Also, the event availed the communities the opportunity to narrate the benefits of luxuriant mangroves, how the creek functioned before degradation.

The target fisherfolks told stories of bad and bountiful yield, and the challenges they face. Example, the spread and impact of the invasive nipa palm, oil and plastic pollution, the lack of basic amenities (e.g., clinic, public toilets), the high cost of fishing gear and declining catches. They also provided recommendations for improving the situation. Fishers for follow-up were identified at the kick-off meetings based on the insights (e.g., mangrove/fishing songs, poems) they provided at the events (Figure 3).

Finally, the fishNet Alliance was introduced to the participants and launched amidst show of great enthusiasm of the fisherfolks to be admitted to the network for development outcomes.

Figure 3: Kick-off activities with fisher folks in Kono and Bundu Communities, Rivers State, Nigeria

Follow-up of mapped fisher folks:

CEHRD followed up the mapped stakeholders gain and document further insights (i.e., collect more mangrove fishing stories and songs). The songs are of two categories: those sang during bad and good fishing trips. The data mining follow-up in the Kono and Bundu fishing ports gender inclusiveness. In Kono 13 selected fisherfolks (7 fishermen and 6 fisherwomen, including periwinkle pickers) were interviewed, while in Bundu 6 men and 6 women fishers were interviewed (Figure 4).

Documentary stories:

A documentary of the stories, poems, fishing in action and narrative of ecosystem goods and services in the Bundu and Kono communities was scripted, developed and produced. This involved off site in the landing port interviews of the 25 participants, one after the other. Each of the interviewees shared testimonies of the fishing experiences.
This included number of years fished, method of fishing, species caught in the mangrove ecosystem, distance travelled while fishing, number of days and weeks they go for they fish, types of fish caught and gears used during rainy and dry seasons, preferred season for fishing and peculiarity of fish catch during the seasons.

Other data gathered include difficulties faced during fishing (past and present), benefit of their fishing occupation to the communities, and rules and regulations set by the communities to protect the mangrove ecosystem. The documentary also mined data on farming, method of boat construct, type of energy used at home and while fishing and the songs and poems recited during fishing as well as in times of good and bad catch.

Fishing Dramatization

Following the at-the-fishing-port documentary interviews, CEHRD selected 2 fisher folks each from Bundu and Kono communities for onsite filming while fishing. The data mining crew also accompanied two periwinkle (mud whelk) pickers to document the picking process which is usually motivated by age-long songs sung by the picker as she wades through the muddy tidal flats.

KEY OUTPUTS OF THE PROJECT

Output 1: Increased awareness of mangrove biodiversity in Kono and Bundu Communities

The project documented common commercial fish species caught in past years and currently in the Kono and Bundu creeks (Table 1, 2,3,4,5 and 6) and the dwindling state of the fisheries due to mangrove degradation. Common species harvested in both fishing communities include mullets, swimming crabs, shrimps, mudskipper, sleepers, silver catfish, Oyster), periwinkles (mud whelks), snapper and tilapia.

Generally, there is a common seasonal catch trend in both communities. While men dominate fishing with various gear types in the creeks, women predominate periwinkle picking.
All the fisher-folks and periwinkle pickers reported that they catch more fishes in the dry season than during the rainy season. When compared to that in rainy season. In both communities, mangrove woods, particularly the red mangrove, are harvested for energy -for cooking, fish smoking and charcoal production.

Output 2: Identified cultural strategies employed by community to preserve mangrove

Mangrove conservation is imminent to preserving the livelihoods and general well-being of the communities. In Bundu there is no subsisting mangrove conservation area (reserve). However, the interviewees reported that in the past, there were reserved mangrove areas fishing, picking of periwinkle and the cutting down of mangrove woods were not allowed.

These places 'sacred places' where used as burial ground (cementary) where dead babies/children were buried. Dead

adults are taken to their native hometown. As noted above, Bundu is not an indigenous community as Kono. In Kono, there is a large preserved red mangrove swamp called the Nwenua Conservation area (*see description above under study area*). It is the last standing expanse of native mangrove in the Kono Creek.

No one is allowed to cut the mangrove. In addition, in Kono there is a designated day of the Ogoni 5-day in a week known as "Deeson", when no one is allowed to fish (Table 2). *Deeson* is a sacred day set for the worship of the water god. It is believed that defaulters would be punished by the water god. Such culprit would get swollen and die if he or she refused to return the creek good (e.g., fin fish or periwinkle) harvested from the creek.

The major threat to mangrove integrity and health in Bundu and Kono are plastic and oil pollution, and nipa palm spread, respectively.

Output 3: Identified other beneficial uses of mangrove ecosystem

The medicinal use of mangrove plants was reported in both communities. The sap of mangrove twigs, extracted by chewing, heals stomach aches (Table 1 and 2). This is an additional benefit of mangrove in the Niger Delta that is not mentioned in a comprehensive list of published uses of processed and unprocessed parts of mangrove plants in the bioregion[2].

Output 4: Documented Songs relating to Mangrove in Bundu and Kono communities

Songs are powerful communication tool. Through songs, emotions, ideas, information, knowledge and entertainment can be relayed. Songs are a tool for conflict resolution, knowledge sharing and expression of memorable moments. They motivate or energize both the singers and the listeners.

Fisher folks in Kono and Bundu communities sing different songs to express joy, sadness and special moments. The songs show the relationship between the fisher folks and mangroves as well as their harvest. Through songs, the fisher folks relay bounty harvest and less catches. They also use songs as metaphoric to inform on characteristics needed to qualify for partaking into fishing activities.

(Songs after Good catch)
Paddle gently
I will get pregnant (have enough to eat)"

Song 2:
Soup made with oyster is too sweet
Mother please give me more.

Song 3
Praise, praise, praise
Praise, praise, Let's give God
The God we worship is good
Oh yes! He is good

Song 4
There is nothing God In heaven Cannot do
There is nothing God In heaven Cannot do
There is nothing God In heaven Cannot do
There is nothing God In heaven Cannot do

Song 5
Wherever my father is
He has become a King
Even if he is in the village
He has become a King (3x)

He has become a King

Even if he is in the village
He has become a King (3x)

He has become a King

Song 6
God has done good thing for me
Good more than good
Good more than good oh
Good more than good

Song 7
I don't have man to help
I don't have man to help eh
Don't leave me in sickness
Jesus, I don't have a help

(Song after a bad catch)

Song 2:
Others
Have taken all
Others
Have taken all
I am the only one that did not take
Let everyone take
Yai yai yai ngoroni (slang)

(Song with metaphoric meaning-parable)

Song 3:
What God give me is what I take
What God give me is what I take
I won't do blood money oh

(Song when sailing to the fishing site)
God bless your people (x3)
Please bless us lord
My father bless us lord
Please bless us

(Special song about Oyster)
Soup made with oyster
Is sweet
Mother

Output 5: Increased understanding of threats to mangrove in the Niger Delta region.

Many factors that affect mangrove integrity (structure) and health are reported in literature. However, the Stilt Root project provided a first-hand opportunity to mine contextual data on human activities that impact on mangroves in Kono and Bundu, which is a reflection of the vulnerability of mangroves in the Niger Delta. A classic example is the dominance of nipa palm in the Kono Creek (Figure 5). Nipa palm currently constitute over 80% of mangrove vegetation in the Kono Creek.

This reflects the tremendous rate of spreading of the palm in the Niger Delta, which a recent remote sensing study estimated as 694% in the last 10 years[8].

8 Nwobi, C., Williams, M. and Mitchard, E. T. A. (2020). Rapid mangrove forest loss and nipa palm (nypa fruticans) expansion in the Niger Delta, 2007-2017. Remote Sensing 12(14):2344. doi:10.3390/rs12142344

Figure 4: Lush Nipa palm in the Kono Creeks

The Kono fisherfolks recounted that that ambient temperature of the nipa palm forest is relative cold which preclude them from going inside to fish. This significantly limit the fishing ground. They claimed such very cold ambient temperature will affect fish reproduction and growth.

In Bundu, the major threats to the mangrove and fisheries are oil and plastic pollution. During the reconnaissance and field sampling, oil sheen and scum were sighted on the surface of the creek waters. Many mangrove species, particularly the plants are sensitive to hydrocarbon toxicity -they get killed by oiling. As noted earlier (under the study area), the Bundu Creek is a transit route of the petroleum products of artisanal refining into Port Harcourt. In addition, the Bundu Creek is a major drainage outlet of land-based plastics into the Bonny Estuary. Thus, the creek waters and mangrove roots are clogged by varied plastic materials (Figure 6).

Figure 5: Land-based plastic outlet to the Bundu Creek mangroves

Output 6: Identified knowledge gaps, social and regulatory needs of both mangrove dependent communities.

α. **Knowledge gaps:**
The project provides preliminary insights of the waste stream in the Bundu community. Plastic waste, a major type of waste near and in the Bundu Creek. It is land-based waste generated mostly upland of Bundu (i.e., from the Port Harcourt Township area that abuts Bundu) and transported via runoff following gradient to the low-lying Bundu. The plastics impede or make fishing and transport in the Bundu catchment difficult. The plastic bags clog boat engines and cause accidents. It also clogs fishing gears and reduce fishing yields. As a result, fishing is no longer lucrative and drives involvement of community youths in illegal ventures (e.g., artisanal refining).

β. **Increased knowledge of the needs of storage facilities**

Fish is sold in the study area mainly as processed or smoked fish because of inadequate storage facilities to store fresh fish. At the moment the only storage approach is by salting or with the use of ice blocks. Access to ice blocks is relatively seamless in Bundu due to its location at the coastal fringe of Port Harcourt, the state capital. In Kono, however, access to ice-blocks is a huge challenge given the distance (19 km) between the fishing port and Bori where the fish mongers procure ice blocks.

χ. **Increased need for more reliable energy sources**

Besides storage problems, the study revealed that the fisher folks still resort to the use of firewood and local lamp as energy sources for the drying of fish and lighting, respectively. There are no alternative and reliable energy sources such as electricity and solar energy at the studied locations. The unavailability of sustainable alternative energy sources for the fishers to process and preserve their catch is a major driver to the unchecked harvesting of juvenile mangrove plants for energy and has also encouraged the proliferation of artisanal oil refining which aggravates hydrocarbon pollution in the Bundu Creek.

δ. **Increased need for fishing regulation**

Inadequate government's supervision and effective monitoring of fishing activities have led to the depletion of fish stocks as a result of destruction of aquatic life through pollution and obnoxious fishing practices (e.g., use of toxic chemicals and explosives). Also, the degrading of mangroves continue to shrink the breeding grounds commercially important fish

stocks that breed in the mangrove. The result of this is the reduction in abundance or local extinction of certain species of fish.

ε. **Increased cost of fishing gears**
The fisherfolks complained about the high cost of buying fishing gear. Thus, they find it very challenging to replace worn out gears and crafts needed to carry out fishing operations especially at distant fishing grounds.

ϕ. **Lack of credit facilities**
The fishing communities need to be aware and explore credit facilities, and form cooperative societies in order to be able to access certain loans and grants. Contextually, since such facilities rarely exist, much less in the remote areas, fisherfolk resort to borrowing at high interest rate from friends, relatives and local money lenders and personal savings to be able to maintain or acquire fishing crafts or gears. If the fishers mobilize to form cooperative societies that with effective leadership structures, it would enhance their potential to access financial facilities as well as their marketing powers.

γ. **Absence of basic amenities and extension services**
Both fishing communities lack residential health facility, supply of portable water, good road connection and hygienic restrooms (toilets). The only road connecting Port Harcourt town and Bundu is in very bad state. However, Bundu residents floor most part of the complex of narrow internal roads with periwinkle shells -a sustainable adaptation to make the roads stable and less susceptible to flooding.

Also, all the respondents said they have never benefited from extension services. Absence of extension

services has a negative impact on fishing as there will be no extension guides and innovations in sustainable exploitation of mangrove and fishery resources in the study area. Experience is very important in every enterprise, especially for artisanal fishing. The role of experience in fishing enables heads of household or the experienced fisher to have information on fishing ground, where fish go to breed and spun, water current and tidal regimes, the good time to fish, ability to manoeuvre/handle gears effectively, etc. The Inability to construct/fix nets and local traps noticed in both communities could stem from the fact that skills are not being transferred especially to the younger ones.

η. **Piracy and pilfering of set nets/traps**
The fisher-folks recounted theft of fishing gears by poachers and crafts occasionally when experience pirate attacks.

Output 8: Video documentary of fisher-folks stories

Video documentary is a veritable advocacy tool that captures attention and safeguard memory. The stories and songs about mangrove and fisheries in Bundu and Kono communities documented had been processed in video form. This will serve as advocacy tool, and an essential baseline with which similar future study would reference.

RECOMMENDATION

i. There is need to organise the fisherfolks to form cooperatives so that they could access loans and grants. This would also facilitate access to subsidy or acquiring fishing gears like nets and boats through donations. The fishers can benefit from net donations by the FishNet Alliance.

ii. Security is a huge challenge to the fisherfolks. Government needs to ensure security agencies provide effective protection of the fishing communities especially in Bundu, where the fishers reported subsisting occasional attacks on them by armed cultists and sea pirates. This will improve fishing income and make the communities liveable.

iii. Due to perishability of fish and the long distances between the landing sites (the fishing ports) and the local markets, storage facilities should be provided to minimize post-harvest loss and upscale the income of the fishers.

iv. The Government should subsidize the cost of the fishing implements. Government policy should enable investment in artisanal fisheries since the subsector produce about 80% of the fish produced nationally.

v. There is urgent need for government to provide basic social amenities (e.g., potable water, sanitation and health facilities) in Bundu and the Kono Fishing Port and similar fishing communities.

ꝏı. There is also expedient need for sustainable energy (e.g., solar energy) in the fishing ports to limit the exploitation of mangrove wood for energy.

ꝏıı. In Kono, the government and other stakeholders should initiate a restoration programme that will replace nipa palm with native mangrove species. For Bundu, there is urgent need to clean the mangrove ecosystem of the massive oiling and plastics and prevent further pollution of the creek. The cleaning of Bundu's mangrove should be a collaborative effort with the government and the community including private and international organizations.

ꝏııı. Sustainable alternative livelihood programme for artisanal refiners should be introduced in Bundu community and throughout the Niger Delta. CSOs should channel advocacy towards Bundu community and engage donors to foster alternative livelihoods so as to discourage artisanal refining in Bundu community.

CONCLUDING REMARKS

Many countries and regional alliances have initiated and developed stringent measures toward shifting from fossil fuel energy dependent sources to renewables. The reason for this paradigm shift is not far-fetched. Reliance on fossil fuel or carbon-laden energies and the ancillary effects have degraded the earth, driven climate change and continue to breakdown the resilience capacity biodiversity.

This deepens poverty for the teeming coastal population whose livelihoods depend on ecosystem goods and services such as mangrove dependent populations. A dangerous trend has begun whereby coastal communities can no longer access fishery resources, and other ecosystem services such as shoreline protection, and biological diversity that enrich life standards in the local communities. This Stilt Root Project has provided evidence to the erosion of enormous ecosystem good and services that are no longer accessible in communities.

The time to act is now. Stakeholders particularly relevant government agencies, CSOs, the private sector and local communities need to develop a framework for conserving the mangrove ecosystem. The basics for achieving this would be actionable regulations that outline critical stakeholder roles, particularly for local communities, that will steer mangrove conservation and restoration. A successful framework for ecosystem conservation would include sustained advocacy and sensitization to deepen environmental literacy and stewardship. In addition, policymakers need to put in place strategies and platforms for migrating power/energy modes to renewables for sustainable development. This is expedient for mangrove dependent populations.

Table 1: Fish and fisheries characteristics of Kono, Rivers State, Nigeria

Gear Types			Types of Specie		Season Catch		Fishing Distance	
Gear Types	**Dry**	**Wet**	**Dominant/Common**	**Declining**	**Dry**	**Wet**	**Before**	**Now**
Nets (Different Nets for different fishes), Hooks (ranges from 1 - 10) and Traps (Nkata, Kpo)	Nets, Traps and Hooks	Nets, Traps and Hooks	Fish: Mullet, Catfish, Mudskipper, Tilapia, Bonga (*Kaa-baree*). Crayfish, Crabs, Oyster, Periwinkle, Shrimps and Prawns (*Gbeneka oro*)	Fish: Red snapper, Three bones,	More quantity and species catch like Mullet, Catfish; Periwinkle, Crabs	Less quantity catches	Within Kono Creek	As far as Andoni and Akwa Ibom

Table 2: Gender and cultural attributes of mangrove fisheries in Kono

Gender Variation		Days Travel		Cultural Affiliation	Methods of Fishing
Men	**Women**	**Finfish trips**	**Periwinkle Picking**	**Rules**	
Mainly Fin fishes	Mainly shellfishes (e.g., Periwinkle and Oyster)	2 days - 2 Months	Daily except Sundays and *Deeson*.	Deeson (the day forbidden for fishing and other Mangrove activities). Kono Community has subsisting mangrove conservation site; Disallow artisanal crude refining in the catchment	Cast net, hook setting, dragging/towing net, fish fencing (Cover Bush and Cover Creek)

Table 3: Energy mode in Kono, Rivers State, Nigeria

For Cooking	For Fishing	Preserving of Fishes	Challenges
In the Past: Mangrove woods, Present: Wood and rarely kerosine stove	Past: Mangrove woods used as energy source, Present: Supplement with torch	Dry fishes with red mangrove wood	Abundance of nipa palm, and the use of dynamite by inexperienced fisher folks, Increasing number of fishers due to unemployment, mangrove woods harvesting, sand dredging

Table 4: Fish and fisheries characteristics of Bundu, Rivers State, Nigeria

Gear Types			Types of Species		Season Catch		Fishing Distance	
Gear Types	**Dry**	**Wet**	**Dominant/Common**	**Declining**	**Dry**	**Wet**	**Before**	**Now**
Net (Cast net, floating net, sink net, mullet net, baracuda net, grouper net, herring net) hooks, Traps.	Nets, Traps and Hooks	Nets, Traps and Hooks	Fish: Mullet (*Mugil Cephalus*), Silver catfish – *Chysichyithes nigrodigitatus*), mudskipper (*Periophthalmus papilio*), Tilapias, Bonga fish (*Ethmalosa fimbriata*), Sardines. Crayfish, Crabs, Oyster (*Crassostrea gasar*), Periwinkles – (e.g., *Tympanotonus fuscatus* and *Pachymelania fusca*), dogwhelk (*Thais coronata*), bloody cockle (*Senilia senilis*),	Fish: Sting Ray Baracuda, crocker (e.g., *Pseudotolithus elongatus*), flat Fish, herring, Angelfish, Sole fish, Snapper	Tilapia, Mullet, Grouper, Barracuda. Other species (More Quantity)	Angelfish, Soul fish, Flatfish or Ngiga (Red Snapper). Other species (Less quantity)	Not more than 2km from Bundu Creek, Isaka Water	More than 2km as far as Kalabari, Bonny, New Calabar River; Akwa Ibom State

Table 5: Gender and cultural attributes of mangrove fisheries in Bundu

Gender Variation		Days Travel		Cultural Affiliation	Methods of Fishing
Men	**Women**	**Fisher folks**	**Periwinkle Pickers**	**Rules**	
Finfishes	Mainly Shellfishes	2 days - 2 Months	Daily except Sundays.	Past: Used to have conserved mangroves. Present: No longer available	Cast net, Hooks, Floating net, Bamboo trap, Cover Bush and Cover Creek

Table 6: Energy mode in Bundu, Rivers State, Nigeria

For Cooking	Light For Fishing	Preservation of Fishes	Challenges
Past: Mangrove woods Present: Woods supplemented with stove and gas cookers	Past: Bush lantern (*Atamkpuka*). Present: Torch	Drying mangrove woods	Oil Spill, Illegal Refining (Bunkery), Plastic, Cutting of Ngala (Mangrove woods)

HOMEF is the ecological think tank and an advocacy organisation promoting environmental/climate justice and food sovereignty in Nigeria and Africa.

HOMEF examines the roots of exploitation of resources, peoples and nations. We nurture movements for the recovery of memory, dignity and harmonious living with Mother Earth. In HOMEF, we believe in the Rights of Mother Earth, the need to equip communities to push back oppression, and the need for justice for the environment, our food systems and natural cycles at every level of policy engagement.

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The mangrove ecosystem plays critical local and global roles in climate regulation, livelihood support, water purification and shoreline protection in coastal regions of the tropics and subtropics. The mangroves serve as source of food in many communities, wood for housing and energy, and as reservoir of biodiversity. Primarily, mangroves serve as breeding areas for fishes, and are a major carbon sink.

The stilt roots of mangroves provide the needed support and serve as transport link for nutrients and other materials required by the mangrove plants for growth, and thus function as the anchor of the red mangrove in muddy, unstable sediments. Despite the important roles performed by mangroves, a significant area of the ecosystem is either lost or degraded annually—it is estimated between 340,000 to 980,000 hectares are destroyed annually. Specifically, within the Niger Delta region which is home of the fourth largest expanse of mangrove in the world, many human activities impact on mangroves.

These include oil and plastic pollution, unregulated harvesting, dredging activities and the spread of the invasive nipa palm. Thus, it is pertinent to initiate, develop and adopt appropriate and contextual approaches towards safeguarding the mangrove ecosystem considering the myriad of roles and opportunities it holds for the coastal communities.

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