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ISSN: 2641-3094 DOI: https://dx.doi.org/10.17352/gje

Research Article

Evaluating wetland assets in consumptive and non-consumptive dimensions and utilization potentials in Ibeno, Akwa Ibom state, Nigeria

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Received: 05 July, 2021
Accepted: 22 July, 2021
Published: 23 July, 2021

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Keywords: Wetlands; Consumptive; Non consumptive multi-utilization; Akwa Ibom State

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Abstract

Wetlands possess abundant valuable environmental resources which hold possible opportunities for rapid and sustainable development of the eco-communities. This paper seeks to highlight multifunctional benefits derived from consumptive and non-consumptive wetland resources in Ibeno, Akwa Ibom State with a view to mitigating under-utilization and unsustainable exploitation for effective management in the area. Field reconnaissance survey identified 8 sampled communities which were purposively selected in which 400 copies of structured questionnaires were distributed to generate database for the study. It was hypothesized that tapping into the multi-utilization potentials of consumptive and non-consumptive wetland resources will not contribute to local livelihood and socio-economic development of the region. The chi-square analysis at 0.05 level of significance confirmed 45.23 greater than 2.13. This affirmed the multi-utilization potentials of consumptive and non consumptive wetland resources livelihood opportunities by way of job creation, source of food, source of protein, provision of building materials for constructions, provision of medicinal and pharmaceutical material of plant and animal origin among others. The result showed that the spheres of socio-economic development in Ibeno are not only dependent on crude-oil exploitation but also on the sustainable utilization of other wetland resources in the area. The underutilization is caused by the interplay of natural factors like the swampy nature of the environment, coastal topography lying towards the sea shore with waterlogged and wave action; and anthropogenic forces. Therefore, it was recommended that wetland resources require sustainable exploitation and management for the protection of diverse resources for continuous utilization by all.

Introduction

Wetland is a unique ecosystem perceived by many countries all over the world for utilization. The awareness of the utilization potentials of wetland resources draws researchers from multi-disciplines in humid and sub-humid environment. The knowledge of utilization potentials varies among continents [1]. Diversities of ideas about wetlands influence the definition variations from place to place. According to Olalekan, Abimbola, Saheed and Damilole [2], wetlands are terrestrial or semi-territorial ecosystem, characterized with low drainage quality, slow waters or seldom standing water body filled with soil. They are referred to as boundary ecosystem because of their occurrence in nature at water body interface [3]. Wetlands are wet grounds rather than standing water (Ukpong, 2007). Wetlands are life enhancing systems of the environment which consist of direct and indirect components [2]. Wetlands have diverse functions and values which significantly recognizes the uniqueness of the environment [4]. Wetlands are very important and valuable components of the ecosystem and they serve as habitat for man and animal, source of food, shelter and other ecosystem services. They are known to be the world's most productive ecosystems with multifunctional benefits. The resources of wetlands are both consumptive and non consumptive. Some researchers classify them into direct benefits and indirect benefits. Some of the wetland functions that human benefit from include nutrient cycling, sediment and pollution retention, flood mitigation and ground water recharge which are non-consumptive benefits. Outside these, wetlands are sources of wildlife, fish, wood and several non –timber products that are widely used by neigbouring populations. Most importantly, wetland soils can have great

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agricultural potential when properly used (Olalekan, et al. 2004). Wetlands are unique productive environments with biological supermarkets of extensive food webs and rich biodiversity which support hydrological and chemical cycles [5].

Wetlands form an important primary ecosystem in the world and are often called "in series of life", they provide habitat for thousands of species of both aquatic and terrestrial plants and animals (USEPA, 2001). Although wetlands are best known for being homes to water lilies, turtles, frogs, snakes, alligators and crocodiles, they provide important habitats for water fowls, fish and mammal (USEPA, 2002). These complex biological ecosystems and environs also provide a range of socio-economical, biological, hydrological and recreational benefits that are recognized by the society for multi-dimensional utilities (Abua, 2007).

The World Conservation Union (2002) estimates that wetland ecosystems provide an estimated 33 Trillion US and per year to societies, of which an estimated 26% comes from fresh water ecosystems. Wetland also performs recreational function. They are great ports for fishing, canoeing, hiking, and bird-watching, and they make wonderful outdoor classrooms for people of all ages irrespective of classs. Due to the varied functions performed by wetlands, they are a resource valued by fishermen, hunters, boaters, downstream properly owners, public water supply, flood control authorities, and recreationalists (Heimlich, 1998). Wetland also provides various multiple ecosystem services such as water treatment and purification and serve as buffers zone, provide important resource for humans and animals (verones, fister and hellweg 2013). Its functions also includes recharge of the hydrology of ground water, sediment protection and trapping, flood and erosion control, treatment and recycling of waste water, and provision of breeding and rearing ground for natural habitats, animals and aquaculture resources.

They are also useful for farming especially for cultivation of rice and fish. The peat lands which are a type of wetlands are also good for production of fuels. They are also used for sports and recreational purpose, for amusements, boating festivals, fishing and sailing events [4]. Africa is endowed with abundant wetland resources. About 169 of her coverage for wetlands is shared with estimates of about 5,600,000km^2, which contains wetland soils namely histosols, gleysols, flukisols, and some of the flooded soils. In Nigeria, the resources attributed to the wetlands are highly valuable and they contain fish, reptile, species mammal species, amphibian species, bird's species and different floristic species (Olalekan, et al. 2004). Examples of the wetlands in Nigeria are: Matgadru-kabok floodplains, lake Chad, Komduge, Adiami-Nguru flood plains, Haisdeija and kiriskasama, Yobe, Kainji Lake, Batunya, Nigeria Delta flood plains, Adiami-Nguru flood plains, Cross River Delta and Lagos Coastal flood plains (Zaccheaus 2012).

In Akwa Ibom State, a vast number of species harbours in the wetland. For instance, Avicennia spp, are found on the meander slip-off in the mangrove ecosystem where intense deposition of manne and clastic sediments have build up as a bar extending into channel even up to Kwa Iboe creek [6]. Wetlands offer both consumptive and non-consumptive utilization potentials in the region. The encompassing and the attraction possibilities to wetland resources give a lot of concern on the biodiversity of wetlands and other resources in the area. Wetland resources increase the economy of coastal communities. According to Ukpong (2007), wetlands are commonly known as swamp in Akwa Ibom State and are sources of considerable importance and sustainer of coastal communities with consumptive and non-consumptive resources. The traditional functions by the people like the Stubbs creek wetland covers hunting, fishing, lumbering, wine making, boat building, farming and sources of human labour (Ekanem and Michael 2010).

Although wetlands functions are well known in Ibeno community, underutilization and unsustainable exploitation are prevalent. Expansion in technological development in area of oil exploration and exploitation have with it certain forms of environmental degradation. (Ukpong, 2009, David Allen, 2010). Wetlands are degrading of floral species, through drainage for cultivation, overgrazing and cutting down of trees for building and construction purposes (Otu, 2015).

According to USEPA (2001), hydrologic alteration, pollution, grazing by domestic plants, introduction of non-native plants that compete with natures, removal of vegetation for peat mining and urbanization are common human activities that cause wetlands degradation. Natural threats include erosion, subsidence, sea level rise, drought, hurricanes and storms with remarkable wetland loss and degradation [7].

However, in recent times anthropogenic factors and natural threats have exposed the environment to risk and the resources are vulnerable to series of degradation. The destructive tendencies exhibited is obvious because the people of the area leave a wide variety of wetland resource untapped and concentrate on few which is not protected and can cause more of damage to the resource base. The question is What resources have been perceived to be of great important? What are their uses to local likelihood and socioeconomic development? What practices pose damage to resource utilization, what are the causes of the setbacks? What management strategies can mitigate the problems?

Literature review

Review of wetland resources multifunctional benefits: The study of wetland resources benefits has gain momentum over the years as a result of perception of unique functions across the globe. In addition, wetlands provide a range of goods and services and possess a variety of attributes of value to society [8]. Wetlands are composed of a number of physical, biological and chemical components such as soils, water, plant and animal species and nutrients. Wetlands throughout the tropics provide important goods and services to local communities. They are considered to be important ecosystems, which contribute considerably to the national economy and rural livelihoods [9]. These is increasing evidence that the economic returns from natural or sustainably used wetland habitats exceed those that are degraded or continue largely unabated [10]. In the

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lake Victoria Basin, extensive reclamation and conversion of wetlands has occurred to permit agriculture and the remaining swamps have been degraded by overharvesting [11]. This is partly due to a lack of understanding of their ecological and socioeconomic values, which leads to distorted policy and decision making regarding their use and management [12] de Groot, et al. 2002.

Ecosystem goods, and services provided by wetland ecosystems are essential for sustaining livelihoods [13]. Wetlands offer provisioning, regulating, cultural, and supporting/services that generate economic value from their direct, indirect, or potential use [14]. Important decisions concerning the management and use of wetlands can best be made only if the functions wetlands perform and how these functions are linked to the provision of goods and services are considered. Unfortunately, relative to other forms of natural resources, few studies have attempted to economically value wetland ecosystem services [15].

Consumptive wetland resource

Food-based resources: Although today, most foods are derived from cultivated plants and domesticated animals, a sustained part of the human diet still comes from wild plants and animals. Wetland is a vital source of edible plants and animal that feature in the diet of the local communities, ranging from game/bush meat, fish and water fowl, to vegetables, insects and fruits. Majority of the people in the wetland use fertile floodplain for growing agricultural crops (Obiero, et al. 2012). The main crops grown are vegetables, tomatoes, maize, millet, sorghum, beans, peas, cassava, sweet potatoes and onions. Certain forms of small-scale subsistence farming and horticulture have been introduced into this ecosystem.

Water resources potentials: Water is one of the most important wetland resources are used for drinking, cooking, washing and irrigation, among the local people. In one part of the wetland, water is freely collected from river and from boreholes dug in coastal communities. In other parts of the wetlands, water is obtained directly from the lake bought from water sellers who transport it using donkeys. The dependence on lake waters for domestic use varies with seasons. During the dry season, a number of households experience water shortage and have to travel distances to the water points [16].

Material resources potentials Wetlands abounds in natural products and a variety of renewable raw materials such as wood, papyrus, reeds, sedges, grass, sand, clay for building and construction. According to M'mayi and katua (2001), in Nyando wetland, over 80% of people live in traditionally huts made of materials gathered from the wetlands, such as clay, sand, wood and papyrus. The wood makes the framework of these huts; the clay is used for the walls while the vegetation, especially papyrus, grasses and water hyacinth provide materials for making mats, baskets, furniture and thatching.

Energy-based products: The wetland also provide energy resources in the form of biomass (fuel wood, dung) and animal-feed (e.g. grass, leaves, litter). Livestock grazing is one of the activities in wetland, people graze animals due to the rich content of wetland flora.

Genetic component resources: wetlands is an important genetic bank where many biotic resources which were once collected in the wild are now obtained from cultivated plants and domesticated animals e.g, wild fruits. Usually, many important crops cannot maintain commercial status without the genetic support of their wild relative.

Medicare and pharmaceuticals potentials: Wetland plants contribute to the maintenance of people's health in many ways by treating various sicknesses and also provide income from herbal medicines sold by traditional healers.

Ornamental resources potentials: Wetlands provide resources which are used for fashion and clothing (notably animal skins and feathers), handicrafts (e.g., wood and stones ceremonies). Wild plants and animals are also collected and traded as pets or for decoration (e.g. ornamental plants) in private households or to supplement the collections of gardens and artistic parks.

Hunting: In a similar manner to fisheries, wetland vegetation provides the ideal conditions to support hunting of both flora species and wild game.

Non consumptive wetland resources potentials

Moran (1994) estimated the current non-consumptive value of protected areas of wetland in Kenya by foreign visitors at some & 450 million per year. This estimate is additional to current financial returns from tourism and makes no allowance for other direct and indirect benefits and potential returns consumptive uses. A valuation study of the coral reefs of the Phi Islands, Thailand (Seenprachawong, 2001) showed the travel expenses, (as an indicatory of the value of a trip) to be B, 21 million baht (U$$205 million) per year. In addition, visitor's willingness to pay to increase biodiversity at Phi was estimated to be 287 Baht (about U$$7) per visit.

Regulation of atmospheric functions: Wetlands are significant carbon sinks with peat lands and forested wetlands accounting for a greater percentage of the soil carbon pool generation. Conversion of wetlands to agriculture inevitably results in the release of large quantities of carbon-dioxide (CO_2). Wetland plays the role of global climate modifier. The services provided by this function relate to the maintenance of a favourable climate, both at local and international scales, which in turn are important for human health, crop productivity, recreation and even cultural activities (Raburus Onyango and Obiero 2005).

Groundwater recharge and discharge potentials: Wetlands deliver a wide array of hydrological services viz: promoting groundwater recharge, regulating river discharge, excess ground-water movement into the underground aquifer, or underground water movement upward, and stabilizing ground and underground water supplies potential. Water is usually purified during these processes.

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River process regulation functions: By storing water and slowing water movement, wetlands buffer surrounding areas from the worst effects of storms and floods. This service is of value to the poor, who lack the financial or other means to protect themselves against the impact of storms through reinforced buildings or protected food production systems, or to recover from storms quickly (FAO 2001).

Cycling and water quality improvements functions: Sediments and nutrients are deposited in and around wetlands, preventing the siltation of downstream waterways. In addition, high levels of nitrogen and phosphorous from agricultural runoff are removed by wetlands, preventing the eutrophication of streams and rivers and the contamination of groundwater supplies. Mangroves also act as buffers and catch excess sediment that would otherwise flow into the ocean, thereby protecting vital coral reefs and sea grass beds from damaging siltation. Newcome, Provins, Johns, Ghazoul, Burgese and Turner 2005).

Erosion control potentials: Wetland vegetation control erosion by reducing wave and current energy and by binding and stabilizing the soil. The mangrove system in particular has important indirect use value through its environmental function of controlling erosion and sedimentation, which protects agricultural production in relevant regions. In a study of the mangrove wetlands of Bintuni Bay, Irian Jaya, Indonesia, the benefits of erosion control were estimated to be around U$$950 per household [17], based on the value of the local agricultural production that this function provides.

Traditional/Cultural knowledge and traditions: Cultural heritage includes the physical structures and artefacts of the past, traditional water and land – use management practices, and the religious significance of wetlands and their wildlife. While there are few studies of non-use values associated with wetlands, Barbier et al (1996) suggest that donations made through campaign by European and North American environmental grounds to raise funds to support tropical wetlands conservation hint at the magnitudes involved. For example, several years ago the UK's Royal society for the protection of Birds (RSPB) collected £500,000 from a one-off membership mailing campaign to help save the Hadejia-Nguru wetlands of Northern Nigeria in West Africa [18].

Spiritual and historic information: These areas are used baptism either by immersion of by using water from the wetlands, appeasing evil spirits, cleaning, as shrines, and a source of historical lineage among others.

Aesthetic value of wetlands: Wetland ecosystems have an important value as a place where people come for rest, relaxation, refreshment and recreation in natural areas/eco-tourism will most likely continue to increase in the future. Eco-tourism as an important niche market in tourism industry has embrace environmental conservation, maintenance of biodiversity, a satisfying experience for the visitors, nature study and sustainable community development. The wide diversity of vegetation, bird species, fish and other wildlife found within wetlands add to the diversity and beauty of the ecosystem [18].

Scientific and educational information bank: Wetland provides almost unlimited scientific and educational opportunities for nature studies, environmental education and functions as laboratory for scientific research (eg. Ibeno beach excursion and field trip by the Department of Geography and Natural Resources Management, University of Uyo in 2010-2015), enabling successful writing and publications of environmental isues in local and international journal. Government agencies and students from different institutions of learning visit the wetland region to learn more about community based wetland conservation. The wetland zone serve as important areas for monitoring environmental changes such as floods, climate change and other environmental scenario [19-22].

Biodiversity and nursery habitats: Wetland acts as a source of biodiversity by hosting a high diversity of fish species, wildlife and plants. The wetlands play a vital role as habitats in the sustenance of wetland fisheries as it accommodates wetland livelihood activities [19-22].

Method of study

Study area: Ibeno is located on latitude 04°32'27'' North of the equator and longitude 008°00·12·· east of the Greenwich meridian. It lies within the tropics and the area is influenced by warm humid air mass from the Atlantic Ocean and slightly continental air mass from the Sahara desert. The two seasons in the region are: rainy and dry seasons influenced by these air masses. There is a longer rainy season than dry because of the coastal location. The area is a wetland region belonging to the mangrove and fresh water swamp forest of Nigeria covering a larger area in Ibeno. The coastal geomorphic zone is a strand coastal area with beach ridge complex geological property and is highly influenced by oceanographic parameters. Ibeno is heavily endowed with petroleum resources that made it the hotspot for oil exploration and exploitation with Exxon Mobil Unlimited as the major oil player. The population of Ibeno is 78,380 people with 44311 males and 34069 females based on 2006 population figure(NPC, 2006). The people engage mainly in fishing, farming and trading Figures 1,2.

Data sets and sources

The data for the research was obtained from field reconnaissance survey complimented with distribution of 400 copies of structured questionnaire to 8 sampled communities in the area. Focused group discussion with stakeholders, farmers, hunters, fishermen, sand miners generated additional data that enabled analysis to be carried out.

Results and discussion

The above data for sex reveals that 50.5% are male while 49.5 are females; for marital status 39.25% are married , 26% are single while 9.5% and 25.25% are divorce and widowed respectively; for age, 22.25% fall between 26-30, 29% between 31-35, 28% between 21-25, 5.75% between 36 and above and 14.75% between 15-20; for educational level, 30.75% have primary education, 29.75% secondary, 21.75% informal and 17.75% tertiary; for occupation, 20% are sand miners, 27.25% are fishermen, 27% are farmers, 8.25% are traders, 7.75% civil servant and students 9.75% Tables 1-3.

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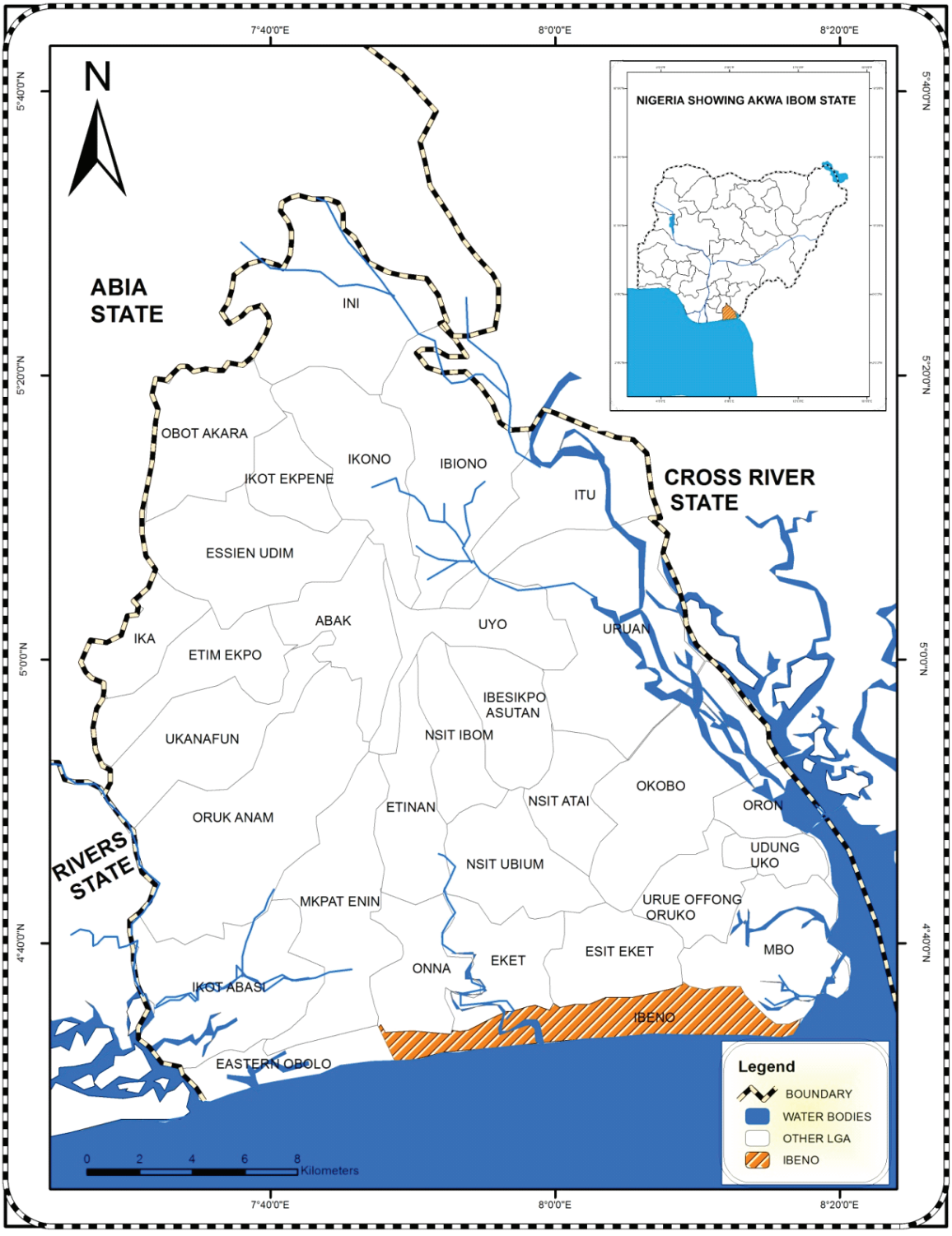

Figure 1: Akwa Ibom state showing study area (IBENO).

The table above shows that 95% of one respondents perceived the availability of wetland resources in Ibeno, while 5% accounted for non-perception.

Consumptive wetland resources in Ibeno L.G.A Tables 4-7.

Testing the hypothesis

H0: Tapping into multi-utilization potentials of consumptive and non-consumptive resources of wetlands will not contribute to livelihood and socio-economic development of Ibeno.

H1: Tapping into multi-utilization potentials of consumptive and non-consumptive resources of wetlands will contribute to livelihood and socio-economic development of Ibeno.

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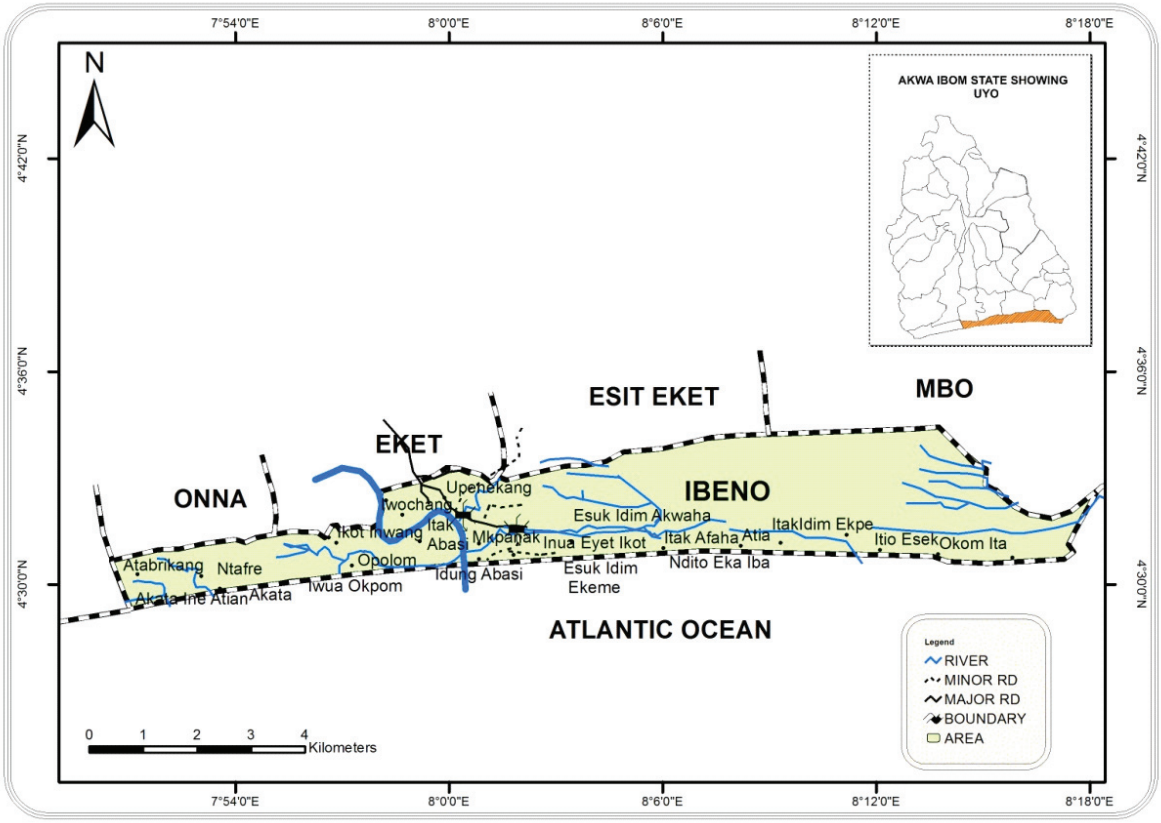

Figure 2: IBENO Local government area showing study area.

Table 1: Socio-economic characteristics of respondents.

S/N	Characteristics	Frequency	Percentage (%)
1.	**Sex**		
	Male	202	50.5
	Female	198	49.5
	Total	400	100
2.	**Marital status**		
	Married	157	39.25
	Single	104	26
	Divorce	38	9.5
	Widowed	101	25.25
	Total	400	100
3.	**Age**		
	15-20	59	14.75
	21-25	112	28
	26-30	89	22.25
	31-35	117	29.25
	36 and above	23	5.75
	Total	**400**	**100**
4.	**Educational level**		
	Informal	87	21.75
	Primary	123	30.75
	Secondary	119	29.75
	Tertiary	71	17.75
	Total	**400**	**100**
5.	**Occupation**		
	Civil servant	31	7.75
	Farmers	108	27
	Sand miners	80	20
	Fishermen	109	27.25
	Traders	39	9.75
	Students	**33**	**8.25**
	Total	**400**	**100**

Source: Field survey, 2015

Table 2: Sampled communities in Ibeno.

Sampled Communities in Ibeno	No. of Questionnaires Distributed
• Ukpenekang	50
• Mkapanak	50
• Ntafre	50
• Iwochang	50
• Opolum	50
• Itak Afaha	50
• Itak Idim Ekpe	50
• Usu-idim	50
Totals	400

Table 3: Perception of availability of wetland resources in Ibeno.

Responses	Frequency	Percentage
Yes	380	95%
No	20	5%
Total	400	100

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Table 4: Floratic resource in Ibeno communities.

S/N	Botanical name	Common name	Functions
1.	Laringa gaboness	Bush mango	Edible fruit with vitamin content.
2.	Dacroyeds xedulis	Native pear	Used to treat skin disease
3.	Pentaclethra macrophy sia	Oil bean tree	Edible fruit eaten as fruit, oil and fat content.
4.	Colanitida	Kola	Stimulant
5.	Chrysosphyllum albium	Star apple	Edible with vitamin content, for arts craft
6.	Raphia hookie	Raffia tree	Wine
7.	Rothmania hispidia	Black dye	Body colouring
8.	Raphia vinifera	Raphia palm	Roofing and map weaving
9.	Eremospatha macrospath	Rattan cane	Chair
10.	Carica papya	Pawpaw	Fruit consumed malaria relief
11.	Cumbopogum spp.	Lemon grass	Tea and also malaria relief
12.	Psidum Jujara	Cruava	Cures malaria
13.	Gnetum Africanum	Affang	Consumed as vegetable plant, for cooking
14.	Elaeis guimensis	Oil palm	Cooking oil mat making peam wine
15.	Nypa frutican	Nypa palm	Roof makings, mat weaving, beverage and wine
16.	Colacasia essulenta	Cocoyam	Wise, delicacy for Ibeno people
17.	Telfaria occidentails	Fluted pumpkin	Vegetable, purgative and blood tonic
18.	Veronia amygadalina	Bitter leaf	Cures stomach ache, for cooking
19.	Talinum triangulare	Water leaf	Treat internal heat measces
20.	Solanum incanum	Garden egg	Treats leprosy
21.	Dennettia tripetala	Pepper fruit	Eaten and used as spicy on food
22.	Cucumis melo	Melon	Treat fungal disease gonorrgea
23.	Cucumis statirvs	Cucumber	Mild purgative and divretic fruit
24.	Lasianthera Africanim	Editan	Treats indigestion and internal heat
25.	Abelmoschus esculentus	Okra	Treats catarrh, fever,
26.	Cocos nuciferia	Coconut	Edible ripe fruits, cures malaria used as sweet fresh drink

Table 5: Faunatic species.

S/N	Botanical name	Common name	Functions
1.	Protomoschoerus porous	Bush pig	Meat consumed
2.	Cricetomyagambianus	Giant rat	Meat consumed
3.	Ciclhiid	Tilapia	Fish, oil produced meat consumed
4.	Claras	Mudfish	Fish oil, meat consumed
5.	Phasiquidae	Bush fowl	Meat consumed
6.	Throynomys	Cane rat	Meat concumed
7.	Achaechantina marginata	Giant snail	Meat consumed and shell for production of vim
8.	Itefilx pormaria	Small snail	Same
9.		Periwinkle	For food and meat, source of protein and shell used for building construction and vim
10	Crustacean spp.	Cray fish, lobster, prawn	Soup condiment

Table 6: Consumptive and non-consumptive wetland resource multifunctional benefits.

S/N	Wetland resources	Benefits derived	Frequency	Percentage
1.	**Consumptive**	**Fish**		
	• Food based resources	Production, wild game, fruits and grains	70	17.5%
	• Water resources	Consumption, grazing lands	50	12.5%
	• Energy resources	Water for domestic, industrial	40	10%
	• Biochemical resources	and agricultural use	10	3.25
	• Genetic component resources	Logs production, fuel wood, organic matter, peat, leaves, fodder and litter	10	3.25
	• Medicare resources	Extraction of bio-fuels Genes for resistance to pathogens and ornamentals	30	3.25
	• Material resources	Herbal drugs and pharmaceuticals Resources raw materials for industries	40	7.5%
			230	
2.	**Non consumptive**			
	• Spiritual resources	Use of nature for religious/	10	3.25%
	• Recreational resources	spiritual purpose Tourism, sports and beach	30	7.5%
	• Educational	functions. For scientific research and	20	5%
	• cultural and artistic	information education. Use of nature as motive in books, film, paining, folklore, national symbols, advert etc.	10	3.25%
	• Supporting	Soil formation and good agric soils, organic matter	10	3.25%
	• Regulation	accumulation, nutrient cycling, and processing of nutrients,	10	3.25%
	• Building construction/ industrial resources	habitat. Climate regulation, water purification, erosion control Sand mining for construction, building, oil drilling and income generation	60	15%
	Total		400	100

Table 7: Utilization level of consumptive and non-consumptive wetland resources.

	Consumptive resources	Non consumptive	Total
High	98	79	177
Medium	90	58	148
Low	43	32	75
Total	231	169	400

Chisquare test is used to test where $\chi^2 = (O-E)^2/E$

$\chi^2 = 45.23$

Table value = 2.13

since the table value of 2.13 < 45.23, therefore the null hypothesis is rejected and the hypothesis one is accepted. this means that tapping into the multi-utilization potentials of consumptive and non-consumptive resources of wetlands will contribute to livelihood and socioeconomic development of Ibeno.

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Conclusion and recommendations

The multi-utilization potentials of consumptive and non-consumptive wetland resources in Ibeno have been examined. From the findings, both natural and anthropogenic factors viz: swampy nature of the environment 30%, coastal topography 33.25%, water logged 19.25%, wave action, 17%, and anthropogenic 52%, non- perception of wetland multifunctional benefits 38% and institutional challenge 10%, interact to cause under-utilization. Also, deforestation, overgrazing, bush burning, sand-mining, coastal erosion and over exploitation of some resources enhance degradation of wetland. The challenge of inventory to account for endangered species, poor coordination, under-utilization, low planning, government unconcerned attitude and lack of environmental monitoring mechanism are technical problems to wetland sustainablity. Therefore, environmental monitoring team should be set up, impact assessment carried out; more attention should be paid to wetland multifunctional enlightenment programmes. Wetland vitality and conservation should be ensured while integrated management approach be applied with good network provision to enhance sustainable exploitation and management for diverse resources protection and utilization for present and future generations.

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Citation: Abraham CM, Ebong MS, Udoh JC, I William NO (2021) Evaluating wetland assets in consumptive and non-consumptive dimensions and utilization potentials in Ibeno, Akwa Ibom state, Nigeria. Glob J Ecol 6(1): 065-072. DOI: https://dx.doi.org/10.17352/gje.0000146