FISHERS AND FISHERIES: ISSUES OF SUSTAINABLE RESOURCE EXPLOITATION. A CASE STUDY OF BONNY AREA IN NIGERIA

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ABSTRACT

Fishers from four river systems, Bonny, New Calabar, Sombreiro and Andoni in Bonny area of Niger Delta were identified. A characteristic of fishers, being a very mobile group was evident from the total of 10 ethnic groups identified, five of which were not indigenous to the area. Age structure ranged from <10 to 74 years. Seven main fisheries exploited were big fish, catfish, shrimp, croaker, sardine and shark. Thirteen different gear types used in the exploitation of the fishery ranged from gill nets of various mesh size, hand and purse seines, and hook and lines; eight were passive and five active. The fisheries resources were exploited within eight fishing grounds in Rivers (Bonny, New Calabar, Sombreiro and Andoni) and in creeks, estuaries and the Atlantic Ocean off these river systems. Estimated CPUE showed highest average from the Ocean fishing grounds with lowest values being obtained from rivers and creeks. Exploitation strategies employing higher number of passive gears, and allowing escape of smaller sizes of fish coupled with highest average CPUE from the Atlantic Ocean fishing grounds where larger sizes were found, are significant for resource sustainability. Encountered exploitation strategies were in compliance with the dictates of responsible fisheries which is being advocated for sustainability of all fisheries resources globally.

Keywords: fishing grounds, child fishers, livelihoods, coastal people, regenerational capacity

INTRODUCTION

Fisheries have been known to play an important role in the livelihoods of coastal people. Fish has traditionally been the main source of animal protein of the diet in many parts of Nigeria especially for low and middle level income groups (Akande, 1993). Nigeria's fish demand is estimated at 1.4 million metric tonnes, whereas domestic fish production from all sectors (industrial, artisanal and culture) is in the neighborhood of 0.4 million metric tons annually (Ajayi *et al.*, 2002). Artisanal fisheries has consistently contributed the highest annually to production over the years with a range of 60 – 80%. The socio-economic environment of the artisanal fishermen is of immense importance as it has bearing on their productivity. This thus calls for a concerted effort on identifying these fishers that produce the bulk of the fish in the country. Sacrosanct to the fishers, also is the fisheries resource that is exploited, as the wellbeing of the resource is of great importance. Under the growing pressures of population growth, coastal developments, improved and sometimes deleterious fishing techniques and the open access nature of the fisheries, these resources have come under threat. This therefore draws attention to issues of management and sustainability of coastal fisheries resources, and this is especially so for the Bonny area in the Niger delta of Nigeria. The Bonny area is very important to the economy of Nigeria due to the huge occurrence of oil and gas activities. It is also an area of a maze of fishing communities and activities (Abohweyere *et al.*, 2004; and Anyanwu *et al.*, 2006), hence the health of the fisheries resources is of immense importance bearing in mind the volume of oil and gas activities coupled with the fishing activities itself. This paper identified the fishers of the Bonny area, and their resource exploitation strategies as issues for fisheries resource sustainability.

STUDY AREA

The study was carried out in communities on four River Systems in the Bonny area between latitude 04° 24'42" and 04° 26'56.5" and longitude 06° 51'27.5" to 07°20'04.6" from October 2004 to July 2005. The communities were Fakpa, Sodieyenkiri, Oruma and Amariari on Bonny River System; Ferupakama on Sombreiro River System; Elem Ifoko on New Calabar River System and Oyorokoto and Oke – Eri on Andoni River System

MATERIALS AND METHODS

Five surveys were carried out in the eight communities throughout the period of the project.

Qualitative information gathering technique of Focal Group Discussion (FGD) (Horemans, 1998) was employed for the questionnaire administration, while ocular and physical inspection coupled with Semi Structure Interviews (SSI) were the methods used for the landings and socio-economic data collection. The questionnaire administration was done only in the first survey while ocular and physical inspection coupled with SSI was done in the remaining 4 surveys. The questionnaire addressed issues concerning fishers, fishing activities, the fishery (canoe, net, engine, target fishery) and the fish (product).

Sampling of boat was done and various species in the catch were identified to species level. Total length and weight measurements of samples were taken to the nearest centimeter and gram using measuring board and Salter weighing scale. The number of fish sampled was a factor of the quantity of the catch landed and number of fishers willing to allow sub-samples of different species in their catch to be taken for measurement in each of the communities. Catch per unit effort (CPUE) was estimated based on fishing time and total catch. The craft and gear used for each catch were also measured. Socio-economic information of the crew such as age, number of years spent as fisher and area fished were recorded.

The information extracted from the questionnaire were analyzed using Microsoft excel. This information was analyzed for percentage number of different ethnic groups, fisher's age structure, fishery type, gear type and percentage number of fishers fishing different fishing grounds. The sampled catch of fishers were analyzed for species types, species size ranges, most abundant size, gear type, exploited fishing grounds, percentage number of fishers exploiting different fishing grounds and catch per unit effort for the different fishing grounds.

RESULTS

Fishers

Two hundred and nine questionnaires were administered and 125 fishers were sampled throughout the surveys. Fishers' ethnic groups represented by all questionnaire respondents were 10. These were Akan, Andoni, Igbanis, Fanti, Ibibio, Ijaw, Ilaje, Kalabari, Okrika and Oron. The Andonis constituted the highest with 58%, followed by the Ijaws and Kalabaris (Buguma) with 12% each. The Ilajes were 8% while the Okrikas were 3%. The Ibibios and Fantis were tied at 2% each and the remaining three ethnic groups, Igbani, Oron and Akan 1% each. The Akan and Fanti ethnic groups are non-Nigerians, they are from Ghana. Fig. 1 is a graphical representation of the different ethnic groups. However, the fishers whose catches were sampled were from six main ethnic groups and these were the Andonis, Kalabaris, Ijaws, Okrikas, Orons and the Ilajes. In all the communities, the Andonis dominated in numerical strength. Not many Bonny indigenes (Igbanis) were encountered fishing in these communities except for Amariari. There were also non-Nigerian ethnic groups found among the fishers whose catches were sampled and these were the Fanti and Akan ethnic groups from Ghana.

The respondents' age structure ranged (see Fig. 2) from 19 to 74 years, and these were grouped into 6 classes: 11 – 20, 21 – 30, 31 – 40, 41 – 50, 51 – 60 and >60 years. Class 51 – 60 had the highest representation for all the respondents, having a total of 37. Age class 31 – 40 was second with 30 respondents falling within this group, 41 – 50 had 21 respondents and 21 – 30 had 19. Respondents over 60 were five and were no longer involved in active fishing. Only 1 respondent fell within class 11 – 20. While the respondents' lowest age class was 11 – 20, there was a lower age class for the fishers that their catches were sampled, which is the class under 10. Those under 10 are child fishers (Fig. 3) and were only encountered in Sodieyenkiri, while those under 20 were encountered in 5 communities, namely Sodieyenkiri, Ferupakama, Amariari, Fakpa and Oruma. The highest age group in the fisheries was those between 31 and 40 years and the child fisher's group was the lowest. The overall minimum, maximum and average ages encountered from all the communities were 9, 65 and 39.6 years respectively.

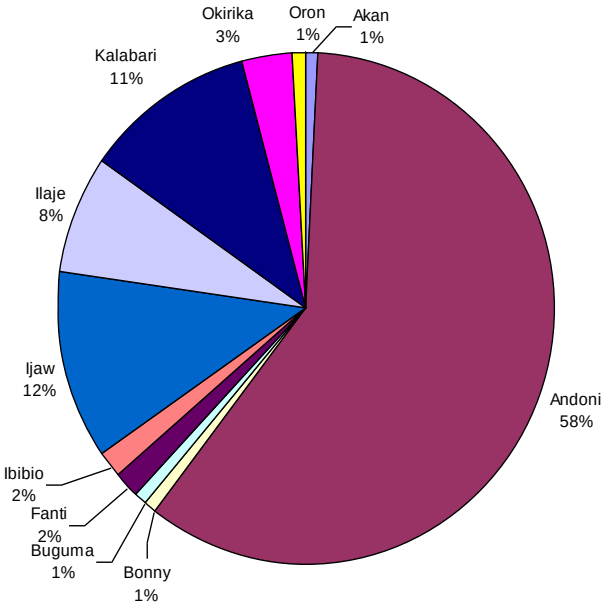

Fig. 1: Percentage ethnicity in the study area

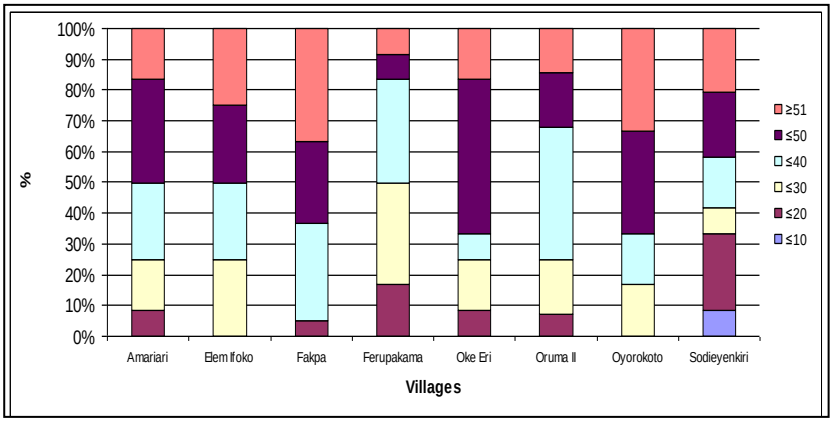

Fig. 2: Age structure from various communities

Fig. 3: Child Fishers being observed by two members of study team extracting catch from net after landing

Respondent's number of years spent as fisher was grouped into 7 categories and these were: 1 – 10; 11 – 20; 21 – 30; 31 – 40; 41 – 50; 51 – 60; and over 60 years. Percentage number of those that had being in fishing for the different categories are presented in table 1. The group of 1 - 10 years had the highest percentage. The respondent with the lowest number of years in fishing found in Ferupakama had been in fishing for 2 years while the highest found in Fakpa had been fishing for 65 years. The duration in fishing of sampled fishers in all the communities also varied between 2 and 60 years. The minimum, maximum and average fishing duration by respondents and as observed during the surveys in all the communities is presented in Table 2.

Fig. 4 shows the average fisher's age and duration in fishing per community, and this indicated that number of years spent as fisher, increased with age. This thus accounted for the very strong positive correlation (r = 0.8883) observed between age and number of years spent as fisher, in all communities (Fig. 5). The average age at which the fishers start fishing in all the communities was 9.90 years.

Fisheries

Respondents exploited seven main types of fisheries and these were big fish (big sizes of *Polydactylus quadrifilis*), bonga, catfish, shrimp, croaker, sardine and shark. These fisheries were distinct for craft size, gear type, operation and seasonality. Thirteen different types of gear were used in the exploitation of the fisheries resources by the fishermen from all the communities and these gears ranged from various gills nets, hand seine and purse seines to hook and lines. The categories of gear types used are presented in table 3. Eight of these gears were passive in their operational method while the remaining five were active. In terms of percentage number the gill net was the highest accounting for 25.19%. This was followed by the croaker net and hook and line that had 15.56% each.

The fishing grounds exploited by the fishers from all the communities were categorized into eight (Fig 6). The percentage number of fishermen fishing these different fishing grounds for all the surveys are presented in Fig. 7.

Rivers and creeks fishing grounds had the highest number of fishers exploiting them and this also corresponded to the high percentage of gear used in these fishing grounds with 56.30% of all the gears being used in the rivers and creek fishing grounds, 9.63% in the estuary while 34.07% were used in the ocean fishing grounds. Most abundant sizes of commercially important species encountered in samples from all the surveys comprised mostly of juvenile. The most abundant sizes for *Sardinella maderensis*, *Ethmalosa fimbriata*, *Ilisha africana*, *Cynoglossus senegalensis* and *Pseudotolithus elongatus* were 10 cm, 15 cm, 13 cm, 37 cm and 32 cm respectively. That of *Liza grandisquamis*, *Pomadasys jubelini*, *Pseudotolithus senegalensis*, *Pseudotolithus typus*, *Polydactylus quadrifilis* were 25 cm, 11 cm, 28 cm, 20 cm and 13 cm respectively. For *Galeoides decadactylus*, *Arius gigas*, *Scomberomorus tritor*, *Gerres melanopterus*, *Cynoglossus browni* and *Pentanemus quinquarius* the sizes were 22 cm, 25

cm, 25 cm, 9 cm, 11 cm, and 12 cm. The species size ranges encountered in different fishing grounds is presented in Table 4. The estimated CPUE (Table 5) showed that the highest average CPUE were obtained from fishing grounds in the ocean where the larger species sizes were found.

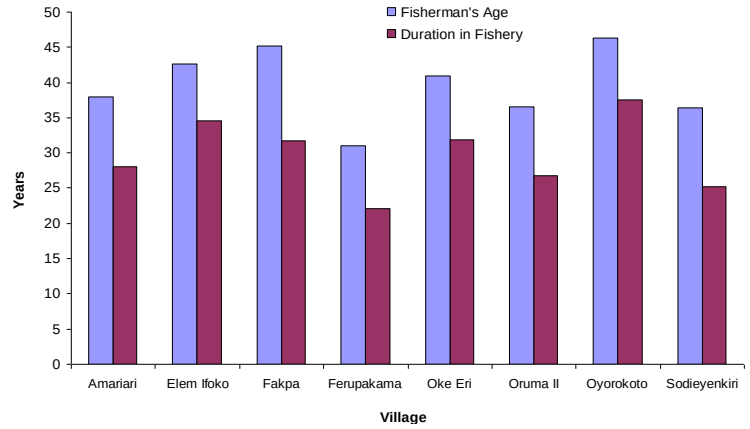

Fig. 4: Average Fisher's Age & No. of Years Spent as a Fisher

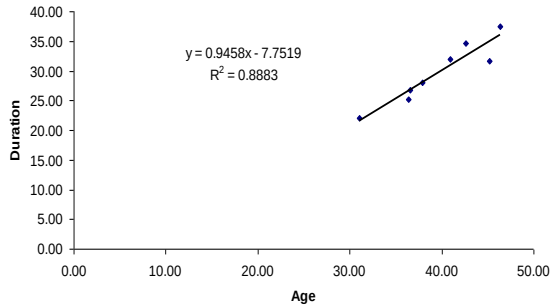

Fig 5: Correlation between No. of Years Spent as a Fisher and Age of Fisher

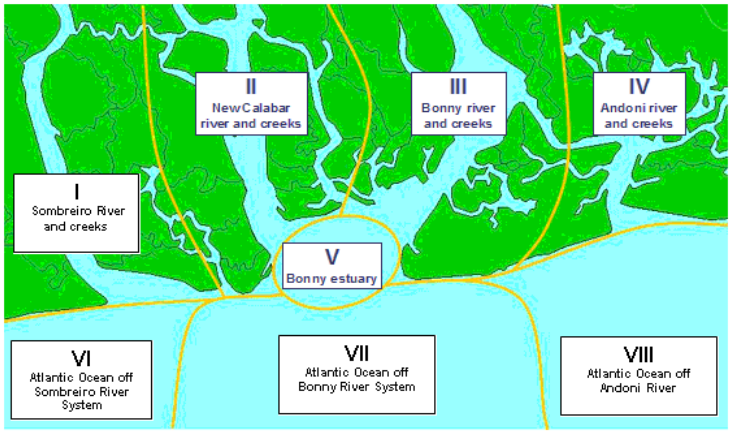

Fig. 6: Regionalization of the study area

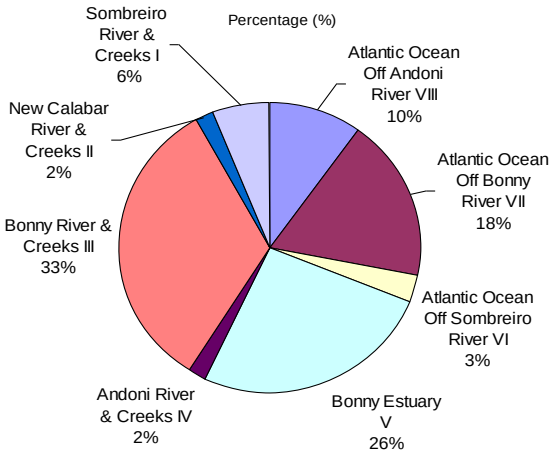

Fig 7: Percentage number of fishers exploiting different fishing grounds

Table 1: Percentage number of fishers with different number of years in spent as fishers

S/No	YEARS AS FISHERS	PERCENTAGE
1	1 – 10	26.08
2	11 – 20	24.35
3	21 – 30	16.52
4	31 – 40	21.74
5	41 – 50	8.70
6	51 – 60	1.74
7	> 60	0.87

Table 2: Number of years in spent as fishers in different communities

	Questionnaire's Respondents			Survey's Observation		
Community	**Minimum**	**Maximum**	**Average**	**Minimum**	**Maximum**	**Average**
Amariari	6	55	27.3	9	50	28.00
Elem Ifoko	7	60	20.3	18	58	34.58
Fakpa	4	65	28.5	11	51	31.67
Ferupakama	2	40	19.3	7	41	22.08
Oke Eri	8	46	32.3	11	60	31.91
Oruma	8	50	22.8	6	50	26.79
Oyorokoto	2.5	50	23.5	20	50	37.50
Sodieyenkiri	9	52	29.8	4	53	25.15
Overall Average			**25.47**			**29.71**

Table 3: Gear types with mesh sizes used in the Bonny Area fisheries resources exploitation

S/No.	Gear Type	Mesh Sizes (mm)	Operational Method	No	%
1	Gill Net	20, 30, 75	Passive	34	25.19
2	Sardine Net	25	Passive	7	5.19
3*	Gleaning	-	Active	1	0.74
4	Trap	-	Passive	2	1.48
5	Purse Seine	10, 20, 25	Active	7	5.19
6	Cast Net	25	Active	2	1.48
7	Drift Net	95	Passive	2	1.48
8	Hook and Line	3,4,5,7,8,9,10,11,12,13,14,17 hook size	Passive	21	15.56
9*	Croaker Net	75, 95	Passive	21	15.56
10*	Bonga Net	25, 30, 65	Passive	10	7.41
11	Beach Seine	25, 30	Active	8	5.93
12	Stow Net	5,10,14,25,30,50,55,130	Passive	19	14.07
13	Clap Net	10	Active	1	0.74
			Total	**135**	

* Sardine, Croaker and Bonga Nets are all gill nets; however they differ in construction and mesh sizes.

Table 4: Species Size Ranges in Different Fishing Ground

Species	Fishing Ground							
	Atlantic Ocean (Off Andoni)	Atlantic Ocean (Off Bonny)	New Calabar River & Creeks	Atlantic Ocean (Off Sombreiro)	Bonny Estuary	Bonny River & Creeks	Sombreiro River & Creeks	Andoni River & Creeks
Arius gigas	22 – 29	17 – 64	-	14 – 43	21 – 46	-	15 – 42	-
Pseudotolithus elongates	15 – 54	18 – 53	17 - 33	-	9 – 53	10 – 34	16 – 32	12 – 28
Pseudotolithus typus	25 – 31	26 – 48	-	-	20 – 35	12 – 33	19 – 27	-
Pseudotolithus senegalensis	-	30 – 47	-	16 – 33	18 – 32	-	16 – 40	-
Polydactylus quadrifilis	40 – 44	40 – 107	29 - 47	-	12 – 76	10 – 30	31 – 70	17 - 36
Pomadasys jubelini	14 – 39	12 – 43	16 - 27	-	8 – 57	10 – 21	12 – 34	13 – 25
Ethmalosa fimbriata	16 – 28	15 – 45	-	-	8 – 27	11 – 17	20 – 30	-
Sardinella maderensis	9 – 25	22 – 28	5 – 13	-	3 – 26	6 – 24	-	7 – 11
Caranx hippos	23 – 35	15 – 26	-	-	6 – 32	9 - 9	19 – 19	8 – 14
Galeoides decadactylus	13 – 27	21 – 30	11 - 20	-	9 – 28	13 – 13	30 – 32	10 – 22
Cynoglossus senegalensis	9 – 37	23 – 34	-	-	11 – 31	24 – 24	-	12 – 20
Chloroscombrus chrysurus	13 – 20	5 – 25	5 – 22	-	14 – 20	9 – 17	-	-
Sphyraena guachancho	-	-	-	-	65 – 71	76 – 76	-	-
Carcharhinus plumbeus	34 – 40	48 – 83	-	-	-	-	-	-
Trachinotus teraia	15 – 16	15 – 26	-	-	-	-	20 – 20	-
Trichiurus lepturus	59 – 72	23 – 94	27 - 75	-	9 – 53	23 – 86	53 – 63	18 – 41
Liza grandisquamis	11 – 20	-	11 - 22	-	5 – 26	12 – 19	-	-
Scomberomorus tritor	-	24 – 51	17 - 26	-	15 – 37	14 – 15	-	-
Drepane africana	-	16 – 21	11 - 11	-	7 – 18	7 – 15	-	7 – 15

Table 5: Catch per unit effort (CPUE) for fishing grounds

Fishing Ground	CPUE (Kg)		
	Min	**Max**	**Average**
Andoni Ocean VIII	0.3	36	9.5
Andoni River & Creeks IV	1.7	4.0	2.9
Bonny Estuary V	0.1	46.7	8.7
Bonny Ocean VII	1.6	120.8	16.4
Bonny River & Creeks III	0.1	25.5	7.4
New Calabar River & Creeks II	0.7	11.3	5.1
Sombreiro Ocean VI	1.2	8.5	4.8
Sombreiro River & Creeks I	0.3	3.3	1.7

DISCUSSION

The distinct characteristic of fishers being a very mobile group was evident from this study. Of all the ten (10) ethnic groups identified from the questionnaire administered and the six groups encountered during the surveys, five ethnic groups (Akan, Fanti, Ibibio, Ilaje and Oron) were not indigenous to the area, out of which two originated as far as Ghana. One salient issue that was also brought to the limelight was that development should not be such that would lure indigenes from their primary occupation especially when such occupation has bearing on food production and self-sufficiency. Bonny ethnic group (Igbanis) in whose area the study was conducted was one of the least in terms of numerical strength among the fishers being less than 1% from the administered questionnaires, whereas the Andoni ethnic group had as high as 59%. Most of the Bonny indigenes prefer working in the oil and gas establishments in their environment even when it involves menial irregular job rather than fishing as they perceived the money made from these jobs is more, though its irregular nature could mean being out of job sometimes.

Fishing among most coastal communities is a generational occupation that is passed down from one generation to another as was attested to by the wide age range of the Bonny area fishers (<10 – 74 years) and the high positive correlation (r = 0.8883) between age and duration in fishing. The age group 31 – 40 being the highest encountered in the fisheries showed that the fishers of Bonny area were in their productivity prime since this age group was 10 years younger than age 50, age at which productivity begins to decline (Bagi, 1982; Battese and Coelli, 1995; Okoruwa and Ogundele, 2006). The significance of this to the fisheries resources being exploited is enormous as it means that most of the resource exploiters are in their productive prime and this could translate to high extraction from the resource. In light of this, the sustainability of the resources could be in a precarious state; however assessment of the fishing gear employed in the exploitation of the resource showed that the operational method of most gear used was passive, thus giving room for the escape of some of the fish such that resource sustainability was not jeopardized. These exploitation strategies allowing for the resource sustainability is in compliance with the dictates of responsible fisheries which are being advocated for the sustainability of all fisheries resources globally. Significant also to issue of sustainability and management of fisheries resource was the area exploited, sizes exploited and the CPUE. The rivers and creeks fishing grounds were the most exploited in the Bonny area as was established by this study. It was also revealed that from the fishers' landings smaller sizes of the exploited fish species were landed from the rivers and creeks fishing ground (Table 4), while larger sizes were found in the ocean fishing grounds. These two facts, most exploited area and small size of fish species landed from same area connotes negative sign for the resource sustainability. However upon examination of the CPUE, the highest average were obtained from fishing grounds in the oceans where the larger species sizes were found, the resource health therefore was not jeopardized. The importance of this to the resource sustainability is that most of the catches would have had the opportunity to reproduce thereby maintaining the regenerational ability of the resource.

CONCLUSION

Fishers in the Bonny area have an heterogeneous population characteristic, however

with a couple of ethnic groups being dominant in numerical strength. Developmental process that does not carry along the peoples' primary occupation has lured the Bonny indigenes from fishing thus accounting for the dominance of other ethnic groups among the fishers. Taking cognizance of the artisanal fisheries contribution to the national fish production, concerted effort should be made to enhance its continual contribution by creation of environment that encourages the fishers staying in fisheries. Despite the fact that the highest percentage of the fishers were in their productive prime, their exploitation strategies do not hamper the fisheries resources regenerational capacity thus ensuring the resource sustainability.

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