Original Research Article

The CoastalEnvironmentalProfiling (CEP)ofBarangayMana,Malita,DavaoOccidental, Philippines: Insights and Implications for Sustainable Management

ABSTRACT

Thestudyfocused on ascertaining comprehensive coastal environmental profile of BarangayMana, Malita, Davao Occidental. Coastal environmental profiling can help policy-makers design appropriate management strategies in the locality. A self-structured survey questionnaire and key informant interview were articulated to know the stratum of the coastal area in terms of socio-political setting, present natural resources, economic sector, existing people's organization and management issues and opportunities. Purposive sampling technique was employed for data gathering following one-shoot sampling technique. Mean, percentage and catch per unit effort (CPUE) formula were used in analyzing the findings of the data. Results revealed that the overall population were 5,679 people, their average age is 31.92 and the productive gender is male. The average of their monthly income is Php7, 550.00 and business and fishing activities were common sources of income. An approximate 6 hectares wetland ecosystem were occupied by mangroves and shrubs grown and 1,500m coastline and 0. 4 hectares of estuaries were abundant with seaweeds, seagrasses, mollusks and crustaceans and by which has contributed to building marine species habitat and livelihood. Economic sector was uplifted by 16.32% of fishermen with their volume caught fishes that goes through fermented processing and fish selling. There were four (4) people's organizations that are engaging with product development and innovation. These People's Organization aims to generate alternative livelihood income, thereby reduce poverty dense in the barangay. They were likewise supplemented with opportunities designed to fish food security and resiliencyandSustainableLivelihoodPrograms(SLP)fromLocalGovernmentUnit(LGU)and

National Government Agencies (NGA's). With the result of the study, it is recommended that Barangay Mana is still in need of various supports from local and national offices in adopting and addressing management issues in both economic and coastal environments.

Keywords:Fisheries;CoastalResourceManagement;naturalresources;Coastalenvironmental profile.

1. INTRODUCTION

The coastal areas, especially in zones adjacent to major rivers and bays, have historically attracted human settlements. It offers opportunities and access to fisheries and commerce and location advantage to rich agricultural lowlands and recreational spots. Coastal municipalities are endowed with rich marine life that can be able to sustain livelihood andsubsistenceofitspopulacefor decades.The economics returns from these coastal resources- dependent activities cannot be underestimated [9,10]. Habitat destruction, illegal fishingpracticesandanopen access regimeareusually the culprits in this problem [1]. The need for the improvement of the management of coastal resourcesmusthaveanintegrativeeffortwiththe local government units, fishing communities and other stakeholders as active participants towards the enhancing the awareness for the group of people who shares coastal resources [3,4]. A majorreasonforthis divergingdevelopmentpath can be found in differing local elite structures, which emerged as a result of different historical experiences [2]. It is envisioned that a well- documented coastal environmental profile can help policy-makers design appropriate coastal resource management strategies in their locality [5,6]. It is hoped that the findings, as the results ofthestudywillbeabletosuggeststartingpoints for the collaborations of the agencies and LGU's on the formulation of a more holistic approach addressing coastal environment and economic issues and opportunities.

2. MATERIALSANDMETHODS

This study was conducted in Barangay Mana which covers with approximate measurement of 744 1781 hectares located northeast of Brgy. Tingolo, Malita, Davao Occidental, west of Brgy. Bito, Malita, Davao Occidental, southwest of Brgy. Ticulon, Malita, Davao Occidental and southeast of Brgy. Lais, Malita, Davao Occidental. The three sitios covered in the study were Talisay, Talucanga and Pagatpat with approximate total land area of 35 hectares using GoogleEarthApplication/website(GoogleEarth,2021). Descriptive research design was used in thesurveysince it willexaminethesocio-political setting, the abundance and availability of natural coastal resources, the economic status and as well as the environmental and economic management issues and opportunities [7,8]. The respondents of the study were taken purposively from the residents residing at the coastal area of Brgy. Mana. The researcher used purposive and one-shoot sampling technique in gathering necessary data. The researcher used a self- structured survey questionnaire and interview of key resource person from field surveys supplemented the secondary data (i.e. maps, reports, Brgy. Recorded data, Community organization and etc.)as the key. Percentage/frequency, mean and Catch per unit effort (CPUE) formula was the statistical tools in analyzing the findings.

3. RESULTSANDDISCUSSION

3.1 Socio-politicalSetting

Therewere5,679overallpopulationoccupiesthe whole area of Barangay Mana, Malita, Davao Occidental.Theproductive age(31-40 yearsold) which has the garnered 19.19% while the lesser number of population ages 61 years old and above that consisted the 6.97% from the ages of overallpopulation. Males were 50.70% and 1336 were females with 49.30 %. Other 27 individuals are completed vocational courses and skills trainings which gathered 1.00% because of job opportunities offered by companies are technical rather than professional and associated with lower income levels. Highschool students have the most numbered individuals which has the percentage of 16.90% with same finding from POPCEN, 2015. There are 301 of them engaged in business in forms of fish dealing, owning a store, online selling, RTW, small eatery, kangkong dealing and computer shop owner which owned 19.97 percent which dominates from other types of livelihood and employment. There are 477 individuals who earns 0-3,000.00 Php in a month and they are mostly laborers, stonepickers,kangkongdealers,otherfishermen andfarmerswithsmallownedlandarea

garnered the percentage of 34.77 percent. Sixty- eight (68) percent were catholic Christians w dominates among other kind of religion withsame findings on POPCEN, 2015. Bisaya/Cebuano were 62.73 percent among all tribal groups. As reported, there are 417 households were members of Water Cooperatives such as Mana Water Supply Cooperative(MAWASCO)havepiped wateras a typeofwatersourcewhichgained64.95percent. There are 430 households have water sealed toilet which garnered 66.98 percent and reported asthehighestone.Heathprogramsandservices include

immunization which served to 74 babies at the present which has a percentage of 3.59 percent, maternal care essentially helped pregnant woman over the years and has benefited by 211 pregnant women at the present whichhasapercentageof10.22percent.In642households, 276 settled in their owned houseandrentedfreelotwhichhasapercentageof
42.99 percent since in the coastal communities, only few legally owns the land area. Among the household,434ofthem owned amotorcycle with a percentage of 64.97 percent for family used and livelihood.Twenty (20) of them owns a fish car for delivering fishes to nearby municipalities which garnered the percentage of 2.99 percent.

Over the years Smart Communication Inc. has provided network services among the area and as of June 2021, PLDT and Globe had entered thecommunity.Thepresentinfrastructuresinthe study site were 4 churches,1 high schoolbuilding, 2 basketball open courts, 1 fish fermentedprocessingplantbuildingandconcrete roads along Sitio Pagatpat.

Table1.Socio-PoliticalSettingofthestudyarea

DemographicProfile		**Frequency**	**Percentage**	**Mean**
Population				
	Households	912		
	Individuals	6,866		
Agerange(inyears)				
	0-10	386	14.24%	
	11-20	515	19.00%	
	21-30	401	14.80%	
	31-40	520	19.19%	
	41-50	422	15.57%	
	51-60	277	10.22%	
	61-above	189	6.97%	
	Total	**915**	**100.00%**	**31.92**
Gender				
	Male	1374	50.70%	
	Female	1336	49.30%	
		2710	**100%**	
Educational Attainment				
	Pre-schoolstudent	104	3.84%	
	ElementaryLevel	282	10.41%	
	ElementaryStudent	445	16.42%	
	ElementaryGraduate	274	10.11%	
	HighSchool	255	9.41%	
	HighSchoolStudent	458	16.90%	
	Highschoolgraduate	323	11.92%	
	Collegelevel	171	6.31%	
	Collegestudent	71	2.62%	
	Collegegraduate	160	5.90%	
	Vocational	27	1.00%	
	N/A	140	5.17%	
	TOTAL	**2710**	**100%**	
LaborandEmployment				
	Fisherman	246	16.32%	
	Farmer	40	2.65%	

DemographicProfile		Frequency	Percentage	Mean
	Driver	123	8.16%	
	Gov'tEmployee	107	7.10%	
	Laborer	216	14.33%	
	Businessman/ Manufacturer	301	19.97%	
	Unemployed	135	8.96%	
	Livestock	65	4.31%	
	Poultry	84	5.57%	
	Others(baker,nanny, cooker)	190	12.61%	
	TOTAL	**1507**	**100%**	
Incomerange (in Php)				
	0-3,000	477	34.77%	
	3001-6,000	373	27.19%	
	6001-9,000	156	11.37%	
	9001-12,000	109	7.94%	
	12,001-15,000	56	4.08%	
	15,001-18,000	27	1.97%	
	18,001-21,000	43	3.13%	
	21,001-24,000	43	3.13%	
	24,001-27,000	33	2.41%	
	27,0001-30,000	23	1.68%	
	30,001-33,000	16	1.17%	
	33,001-above	16	1.17%	
	TOTAL	**1372**	**100%**	**7550.9**
Religion				
	Catholic	1847	68.15%	
	Islam	325	11.99%	
	Iglesia	40	1.48%	
	Christians	134	4.94%	
	HisMission	107	3.95%	
	Pentecostal	33	1.22%	
	Alliance	83	3.06%	
	Others: Foursquare**,** Adventist, PBMA,Orthodox	141	5.20%	
	TOTAL	**2710**	**100%**	
Ethnicity				
	Muslim	284	10.48%	
	Tagakaulo	381	14.06%	
	Manobo	217	8.01%	
	B'laan	116	4.28%	
	Bisaya	1700	62.73%	
	Others(Ilonggo, Ilokanano)	12	0.44%	
	TOTAL	**2710**	**100%**	
Heath,SanitationandMedicalCare SourceofWaterofthe households				
	PipedWater	417	64.95%	
	DugWell	218	33.96%	
	WaterfromSpring	7	1.09%	
	TOTAL	**642**	**100%**	
ToiletFacilities				

DemographicProfile		Frequency	Percentage	Mean
	WaterSealed	430	66.98%	
	Unsanitary(OpenPit)	90	14.02%	
	CommunalToilet	108	16.82%	
	Others/PAIL SYSTEM	14	2.18%	
	TOTAL	**642**	**100%**	
Health Programs, Servicesandfacilities				
	Immunization Program	74	3.59%	
	Maternalcare(Pre-Natal, Post- Natal)	211	10.22%	
	Brgy.HealthFacilities (rescuercar,etc)	1053	51.02%	
	OTHERS/Family Planning Methods, FreeMedicine,Free Check-up	726	35.17%	
	TOTAL	**2064**	**100%**	
Tenurestatusofhousing unit and lot				
	OwnedHouseandlot	171	26.64%	
	OwnedHouseand rented lot	152	23.68%	
	Ownedhouseand rentedfreelot	276	42.99%	
	RentedHouse includinglot	15	2.34%	
	Rentedfreehouse and lot	28	4.36%	
	TOTAL	**642**	**100%**	
Transportationmeans and owned by the households				
	Motorcycle	434	64.97%	
	Tricycle	44	6.59%	
	Closecabs	75	11.23%	
	Fishcars	20	2.99%	
	Otherslikebongo, hilux, multicab	95	14.22%	
	TOTAL	**668**	**100%**	

3.2 NaturalResources

3.2.1 Aquaticresourcesandecology

Going through the research area which are the threesitios located incoastalpart, Sitio Pagatpat covers up the land area 16.8 hectares, Sitio Talucanga measured to have 15.9 hectares and SitioTalisaycoversup3hectares(GoogleEarth, 2021) . Coastal wetlands are also measured to totally describe the richness of resources from wetland ecosystems. Coastline measured 1,500 approximatelyandSitioTalucanga'swetland

area measured to be approximately with 3 hectares and Sitio Pagatpat with 3.8 hectares. . Among approximate measurement of overall wetland areas in studysite which is 6.8hectares, there are different mangrove species and other shrubs were found in the assessment done and these were Bakhaw lake *(Rhizophora apiculata)*, Pagatpat *(Sonneratiacaseolaris),* Bakhaw baye *(Rhizophora mucrunata),Nypafruticans*and Kangkong (*Ipomoea Aquatica sp.*) in wetlands ecosystem. Mangroves in the areas are potentially provides habitat and breeding ground formarinespecies,livelihoodforlocalsettlers, house construction, wind breaker and prevent coastal tidal erosion. Seaweeds species found in the assessment were peacock's tail *(Padina pavonica),* Turner *(Sargassum aquifolium)* and *(Sargassumpolycystum*) and it supports livelihood, provides habitat and breeding ground for many marine organisms and decoration decoration.

3.3 EconomicSectorinBrgy.Mana

3.3.1 Capturefisheries

Fishing is a subsistence livelihood in the profile area and many people start to work in the sea in their younger years. Based on the conducted interviewed on fishermen, seasonal peaks for fishing occur from the month of March to June. The fisher folk observe that most species are gravid during this period and that, because the weather is calm and the water is warm, the fish rise to the water surface. During this period also, fishersaresightedwithintheprovince'sseawater boundary. There are many types of fishing gears they have with them every time they go out fishing. Table 3 below shows the fishing gears inventory of the fisherman in the study area. Table shows that out of 246 fishermen from the three coastal sitios of Brgy. Mana, many fishermanengageinusingmultiplehook andline "palangre"asit earnsthehighestrate of 17.71%, for the reason that it is inexpensive and easy to use techniques in luring fishing and the best methods when it comes to sustainability as the catch can be selective depends on the hook size they are using. Lines are the most abundant gearsassupportedbythevolumeofcatchesand species recorded and this type of fishing gears are also less exploitative (SBPS, 2020). Small fishes can be placed back to the water without being harm through the use of this fishing gearas theyarenotfitfor the hook size.While onthe other side, "taraya" and "kuryente" earns the lowest percentage rating (0.49%) in catching fish it's because nowadays, abundanceof fishes was not the same as time pass by. As population increases in the coastal area, water pollution arises because of improper ways of throwing garbage causing the fishes and fishes habitat nearby shoreline to be destroyed due to contamination. Toxic compounds are commonly found in trash discharged into the oceans, which absorb all of the ocean's oxygen. This causes a significant reduction in the amount of oxygen accessible to animals and other fish, resulting in their death in their natural habitat (Marine Insights, 2019).

3.3.2 Fishingboats

A fishing vessel is a boat or ship that is used to catch fish (Piscary) in a lake, sea, or river.Fishing can be done in saltwater or freshwater. Study shows (Table 1) that the majority of fishermen own their fishing boats (bancas), and most boats are motorized (84.19%). Pump boats or Bangkang de-makina is powered by a small gasoline or diesel engine are widely used by the fishermanbecauseofitsdesignandappearance. They are so important in the fisheries sector for balancing demand and supply that if they were not there, a very simple but equally important activitywouldcometoahalt..Lansaontheother hand earned the lowest rate of 14.71% this is because Brgy. Mana is just a rural community where fisherman can only afford to buy small fishing boats.

3.3.3 Fishcatchcompositionanditsmarket value

Table presented below (Table 1) are the popular types of fishes that are mostly caught by the fishermen in the profile area, with their local names, scientific names and market price. The most common fish caught in the profile area that were identified by the fishermen were; Matambaka(*Selarcrumenophthalmus)* that has a market value of Php 100-140/Kilogram, Nokus (*Loligoduvauceli)* thathas amarketvalueof Php 80-140/Kilogram, Pirit (*Acanthurus dussumieri)* sold in the market for Php 100-130/Kilogram.

Catchperuniteffort(CPUE): CatchperUnit Effort is usually a derived quantity obtained from the independent values of catch and effort. Fishing gears like lift nets, entangling nets, hook and line and the use of “lagtang” are all applicable in undak which is fishing at daylight within a range 4-8 hours and estimated catchrate ranging from 3 kg.- 10kg. per boat trip. Palaran which is fishing all night long within a range of 10-15 hours and estimated catch rate are about 10 Kg.- 25 Kg. per boat trip” .Payao or pamayao which refers to fishing that consumed more than a day as it range 12-60 hours or 1day-3 days fishing. Estimated catch rate are about 15 Kg.-50Kg.per boat trip. Multiple hooks and line “Palangre” and the use of “lagtang” inthe area of Talucanga are usually the favorable fishing gear in line with pamayao.

Inthetablepresentedbelow(Table3),estimated Catch per unit effort (CPUE) of undak are about 0.007kgor7gramsperhourforevery214

fishers in the coastal sitios. Estimated Catch per unit effort (CPUE) in “Palaran” are about 0.010 kg.or 10 grams per hour for every 246 fishers in the profile area. Estimated Catch per unit effort (CPUE) in “payao” is 0.06 kg. or 7 grams for every 220 fishers. It is evident that “Palaran” dominates the estimated Catch per unit effort (CPUE). This is because many fishers go out fishing at night especially “himatayon” wherein volumes of catch of Nokus and Matambaka are caught in long night fishing. In the previousyears,studyshownthatfisheriesproductionwent down by 4.06% in Davao region (PSA. Gov) as there were cases of illegal, unreported and unregulated fishing including overfishing, which has resulted in depletion of fishery resources. Aside from this, fishermen often say that fishes tend to deplete due to the Coal power plant nearby the area located at Brgy. Culaman,Malita, Davao Occidental. The fishermen surveyedhavereportedareductionintheir catchover the years due to damage and destroyed ecosystem brought by the effect of coal power plant that harm and kill fishes. Study shows that coal power plants have detrimental effect on the aquaticandmarineecosystem asresiduesin the flyashcontainacocktailofheavymetalssuchas mercury, cadmium, arsenic, nickel, lead, and etc which contaminates the water ecosystem.

Agriculture Sector: Agriculture sector in the coastal area of Brgy. Mana is divided into three classifications. This includes the farming, livestock and poultry. Faming focuses on crops suchascoconut, banana,cassava andmanga in which 40 individuals are engage earning 21.16% presented in the table below. Livestock includes pig, goat and cow wherein 65 individuals involve earning 34.39% and poultry in which chicken, ducks, and turkey are being raised by about 84 individuals earning the highest percentage of 44.44%.

Table2.Naturalresourcespresentinthestudyarea

Particulars	**Estimatedarea**	**Uses**
AquaticResourcesand Ecology		
MangrovesandshrubsinWetlands		
Bakhaw lake *(Rhizophora apiculata)*	1.5ha	These potentially provides habitat and breeding ground for marine species, livelihood for local settlers, houseconstruction,windbreaker andpreventcoastaltidalerosion.
Pagatpat*(SonneratiaCaseolaris)*	2.0ha	
Bakhaw baye *(Rhizophora mucrunata)*	2.0ha	
Nypa fruticans	0.5ha	
Kangkong(*IpomoeaAquaticasp.*)	0.8ha	
Specieofseaweedsandseagrasses found in coastlines and beaches		
peacock’stail*(Padinapavonica),*	600sq	It supports livelihood, provides habitatandbreedinggroundfor many marine organisms and decoration.
Turner*(Sargassumaquifolium)*	780sq	
(Sargassumpolycystum)	120sq	
Estuary		
hipon(*Pandacapigmea*)		Some benefits provided by estuaries and their resources includes food, livelihood, pollutant filtration,nurseryareasand protectionfromstormevents.
Eel(*Anguillifrome*s)	0.4ha	
Crabs(*Brachyurasp.*)		
Mollusks(*Molluscasp.*		
Aquaculture		
Freshwateraquaculture		Theseraisedbytherespondents for displays, stress, business, reliever and decoration.
Pterophyllumscalare		
Carassiussp.		
Cichlasomasp.		
Cyprinuscarpio		
Peociliasp.		
Bettasp.		

Table3.EconomicSectorinBrgy.Mana

Particulars	Frequency	Percentage	Remarks
CaptureFisheries			
Fishing Gears and Methods			
Taraya	6	0.14%	available
Sudsuray	21	1.71%	available
Sigpaw	182	14.78%	available
Pukot	9	0.73%	available
Pang-nokus	196	15.92%	available
Sarangat	156	12.67%	available
Pasol	179	14.54%	available
Palangre	218	17.71%	available
Pana	13	1.06%	available
Panalom	11	0.89%	available
Panulo	0	0	Notavailable
Pingwit	9	0.73%	available
Lagtang	206	16.73%	available
Kuryente	6	0.49%	available
Baling	19	1.54%	available
TOTAL	**1,231**	**100%**	
FishingBoats			
De-mano	40	14.71%	available
De-Makina	229	84.19%	available
Puso	2	0.74%	available
Lansa	1	0.37%	available
TOTAL	**272**	**100%**	
FishCatchComposition anditsMarket Value			
Bolinao	Php100-120/kl		available
Katambak	Php160-180/kl		available
Matambaka	Php100-140/kl		available
Bogaong	NOPRICE		available
Sapsap	Php150-200/kl		available
Tabangko	Php130-160/kl		available
Pirit	Php100-130/kl		available
Karaballas	Php60-90/kl		available
Nokus	Php80-140/kl		available
Salmon-salmon	Php130-160/kl		available
Kubal-kubal	Php100-120/kl		available
Tulingan	Php140-180/kl		available
Timbungan	Php200-250/kl		available
Tanguige	Php250-300/kl		available
Lapis	Php100-120/kl		available
Badlon	Php250-300/kl		available
Balo	Php90-120/kl		available
Diwit	Php60-90/kl		available
Amag	NOPRICE		available
Tabas	Php50-90/kl		available
Hipon	Php120-180/kl		available
Bariles	Php250-300/kl		available
Puyo	Php100-120/kl		available
Burot	Php70-100/kl		available
Bangsi	Php70-100/kl		available
Pandawan	Php130-180/kl		available
Budburon	Php130-180/kl		available

	Bilong-bilong	Php70-90/kl		available
	Lukay-lukay	Php50-80/kl		available
	asohos	Php200-250/kl.		available
	maya-maya	Php200-250/kl		available
	liplipan	Php200-250/kl		available
	Marang	Php200-250/kl		available
	Lipti	Php200-250/kl		available
	Ganting	Php200-250/kl		available
	Sagisi	Php200-250/kl		available
	Rompe-kandado	Php200-250/kl		available
	Talakitok	Php200-250/kl		available
CatchPerUnitEffort (CPUE)				
	Undak	0.007kg./hourforevery 214 fishers		available
	Palaran	0.010kg./hourforevery 246 fishers		available
	Payao	0.006kg./hourforevery 220 fishers		available
AgriculturalSector				
	Farming/cros	40	21.16%	available
	Livestock	65	34.39%	available
	Poultry	84	44.44%	Available
	TOTAL	**67**	**100%**	
ManufacturingandBusiness Sector				
	Sari2store	65	21.45%	Available
	Computershop	8	2.64%	Available
	Kakaninselling	22	7.26%	Available
	Fishselling	57	18.81%	Available
	Kangkong harvesting	14	4.62%	Available
	Bukag2 fish delivery	10	3.30%	Available
	Onlineseller	11	3.63%	Available
	Rtw/ukay2	9	2.97%	Available
	Small carinderia/barbequehan	16	5.28%	Available
	Gulayan	10	3.30%	Available
	Cuconut wine seller/gatherer	8	2.64%	Available
	Stonepicking	49	16.17%	Available
	Spacerental	3	0.99%	Available
	carwash	5	1.65%	Available
	Hollowblock production	2	0.66%	Available
	Lumbertrading	1	0.33%	Available
	Salon	2	0.66%	Available
	Volcanizingshop	3	0.99%	Available
	Motorparts	3	0.99%	Available
	hardware	2	0.66%	Available
	resort	1	0.33%	Available
	Furnitureshop	2	0.66%	Available
	Water refilling station	1	0.33%	Available
	TOTAL	**303**	**100%**	**Available**

3.4 People's Organization and Cooperative

There were three existing People's Organization and one cooperative in costal sitios of Barangay Mana, Davao Occidental which continues to adhere and reach their goals for member's benefits throughout the years. The Mana Water System Cooperative (MAWASCO) is a cooperative in which members are piped water users from same reservoir and water system. It composed of 1,467 member that represented by each household and 417 of them were from the three coastal sitio. The officials of thecooperative actively facilitate seminars like AGRIPINAY that offers income generatingproject to housewives and capital loans amounting100,000.00for30selectedindividuals from its members in coordination with Department of Agriculture (DA). Existing associations are in the study are widely and purely related to fisheries and anchored to the Fisheries and Aquatic Resources Management council (FARMC) who targets actions to reduce povertyandgenerateeconomictransformationto improve their livelihood in the fisheries sector. Pagatpat Fisherman Association (PAFIA) has 24 membersand legallyregistered to Departmentof LaborandEmployment(DOLE)lastJuly3,2020. They receive the Bureau of Internal Revenue issuance of receipt las September 04, 2020. The other association namely Mana Fermented Fish Processing Women Association (MFFPWA) composedby58 womenledbytheir focalperson andit wasregistered inDepartmentof Laborand Employment last August 2, 2019 and have their business permit at same date. There is a new- builtbuildingforthem -theFishProcessingPlant which was turned over by Governor Claude P. Bautista last December 11, 2020 and it is in partnership with other business departments like Department of Trade and Industry (DTI) Davao Occidental and Municipal administrator leagues to MATINLA Farmers Association and MATINLA Fish Processors Association. They productively producedginamos,Vinegar,salted peanut, dayok, dried squid and fish. The DepartmentofTradeandIndustry(DTI) grantfundswiththeamountof300,000.00 as capital loan. The third People's Organization as reported named NagkahiusangMananagatsa Barangay Mana (NAGMABMA). It composed by30membersandledbyRoniloS. Labrador. The association legally registered in Department of Labor and employment last July 26, 2017.(NAGMABMA) SLPA was granted and allocated 380,000 from DSWD, DSLP Office of Region XI to be used in the procurement of stocks to be soldintheSLPstore.Their programs includethe construction of store that sells fisheries supply like fishing gears such as nylon, taga, sensor, tingga, saranggat, sikpaw, liha, paonsaundak, etc. and their reported recent profit for the business is29,394.00. The association is active in seminars such as Fisheries and Aquatic Resources Managemrnt council (FARMC) this agency assists in the preparation of fisheries development plan and recommends enactment MANA fishing Ordinances to Sangguniangbayan, Sangguniang panglungsod, coordinatedin DENR and follows guidelines from Fisheries Administrative Orders (FAO). Above all, the primarygoalsSustainableLivelihoodprogramsis to reduce inclusive growth of poverty (The World Bank, 2018).

3.5 Coastal Environment Issues and Opportunities

Coastal environment of Brgy. Mana shares the sameproblem with therest of DavaoGulf across Mindanao. The suggested management options were intended to ease the conflicts in each problem area and to relieve the pressures impinging on all resources in the coastal area of Brgy. Mana . Aside from the issues besetting the coastal resources of the profile area, thefollowing presents crucial issues on the environment and economy that affect the coastal area of Brgy. Mana.

3.6 Air and Water Pollution SWOT Analysis

The present study conducted regarding management issues, air and water pollution, indicate that absence of a common strategy for coastal and maritime management, shortage of strategic plan for coastal environment conservation, lack of proper systems of coastal pollution will result to environmental degradation andincreasingfrequencyof naturaldisaster. The coastal area of Brgy. Mana is a potentially productive natural ecosystem. However, the growing presence of human communities highlights the increasing need for considerate management of this area in order to yield substantial returns to the people.

Air pollution is caused mainly by the combustion of petroleum products by motor vehicles, combustionofwoods andburningofplasticsthat

are most common activity in the coastal area of Brgy. Mana. Urban air pollution is one of the environmental hazards that World Health Organization assessed as part of its burden-of- disease calculations for the World Health report 2002 (WHO, 2002).

3.7 Improper Sanitation (Lack of Toilet and Source of Water Facilities)SWOT Analysis

Sanitationissues suchaslack of toiletfacilitiesis common in the area mostly in Sitio Pagatpat whereinresidentsoptedtogodirectlytoriverside and seashore to defecate, and lack of water source that the residents are opted to use water from unsanitary spring (Tubod/Balon) for households chores and drinking purposes. Poor maintenance of every individual settler sanitary complexes,culturalpractices,lackofcomprehensivecoastalzoningaresaidtobeone ofthereasonswhytheseissuesarisethatresults in increasing frequency of unhealthy human, animals, and marine environment.

Moreover, the Local Government Unit of the Municipality should return the previous sanitary awareness such as providing each household a toilet bowl for them to have a toilet on their own. However, to some households who are living in an overcrowded place wherein toilet facilities cannot be constructed, a public toilet isapplicable to cater and should be promoted by the Barangay. Increasing public awareness and crowd management were also some ways on helping eradicate improper sanitation in the locality. Given this, reduction of pressure on the marine resources and healthy lifestyle will arise Brgy. Mana.

Table4.ExistingPeople'sOrganizationandcooperativeinthestudyarea

NameofPeople's Organization	**Members**	**ProgramsandActivities**
Mana Water System Cooperative (MAWASCO)	417members	➢ Watersupply ➢ Offers livelihood assistance such as chicken laying eggs ➢ Facilitate agri-pinay project for women ➢ Coordinates with the DTI in conducting cooking lessons that sustain income for women.
Pagatpat Fisherman Association (PAFIA)	24members	➢ FundedbyBFARtoprovidea capital for fisherman.
Mana Fermented Fish Processing Women Association (MFFPWA)	58 women	They productively produced ginamos also known as salted fish paste in Classique and hot and spicy flavor, Vinegar,saltedpeanut,dayok,dried squidandfish.
NagkahiusangMananagatsa BarangayMana (NAGMABMA)	composed by 30 members	Their programs include the construction of store that sells fisheries supply like fishing gearssuch as nylon, taga, sensor, tingga, saranggat, sikpaw, liha, paonsaundak, sapyaw, pulunan, plywood, bulb, timon, tubo, gasoline, kerosene, dry cell battery, pamu, ice box, plasher, epoxy, flashlight, grease, spark plug and other fishing gearsand equipment involve in fishing.

3.8 Improper Waste Disposal SWOT Analysis

Improper waste disposal is the disposal of waste in a way that has negative sequences for the environment. It also has far-reaching socioeconomic repercussions that governments should take into account today. Substitution of organic plates, etc for plastic items, provision of health centers near coastal zones, increasing public awareness, crowd management and encouraging litter free zone along the coast are all required for the waste management agenda. Brgy.Manacouncilcandevelopasetofactivities to limit the amount of waste that needs to be disposed of. They have the potential to encourage source reduction. Reuse andrecycling as realistic waste management solutions that reduce waste and promote more resilient, diversified, and sustainable communities' economies that are self-sufficient and long-term. In other words, people shouldnow see waste management not only as a social responsibility but also as a business opportunity. The government is unable to manage waste on its own. The goal of the public awareness campaign should be to mobilize widespread supportforeffectivewastemanagement.Given the said opportunities and implementation oftheBLGU,goodsoilandclimate,tourism potential, reduce pressure on marine resources,highlevelorganizationalfacility,and coastal protection structure will be developed.

3.9 FishScarcitySWOTAnalysis

Degradation and destruction of coastal and marine habitats, changes in marine community composition and trophic interactions, and the employment of harmful fishing methods or gear types are all factors that contribute to the loss of marine biodiversity.

Untreated waste water discharge, inefficient in implementing legal framework, lack of comprehensive coastal zoning, population crowded are said to be the reason of the depletion of fishes in the Barangaythatresults to disappearance of marine resource, increasing frequency of food scarcity, threatening of natural sites by over commercialization, damages of importantmarinespeciesandhabitatdestruction. Brgy.Council of Mana and the Local Government Unit of the Municipality of Malita should manage and govern for a resilient social-ecologicalsystem,preventingthefisheryfromfailing to deliver benefits by nurturing and preserving ecological, social, economic, and institutional attributes that allow it to endure, renew, and reorganize. The challenge is to build andstrengthencoastalnations'andcommunities' social-ecologicalresilience tothemanyeffects of fisheries resource scarcity, increase of coastal revenue, increasing coastal guards, possibility of endangered species culture, crowd management as well to break the destructive cycle of "fish wars."Giventhisopportunities,marineresources and food availability will gradually have developed.

3.10 EconomicIssuesandOpportunities

The coastal area of Brgy. Mana is endowed with diverse fisheries, agricultural and natural resourcesandhasthepotentialtoproducemore. But diverse fisheries, agricultural and natural resources cannot sustain the growth and developmentoftheeconomyasitisconstantly hampered by product seasonality, vulnerability to natural calamities, and product inelasticity to income and price change.

3.11 UnemploymentSWOTAnalysis

Thecostof unemployment tothe individualis not hard to imagine. When a person loses their job, there is often an immediate impact on that person's standard of living. In Barangay Mana, there were individuals who happen to be lack of education, lack of creativity, bias/pabor2 system because of low profile are said to be some of the reason why unemployment occurs and because of this poverty arises and some families were suffering financial problems due to no income. The Local Government unit, in response to the growing unemployment affecting economy of the residents, continues to reach up poor families as vulnerablepopulationwhoaregreatlyaffectedby the catastrophe through supporting Sustainable LivelihoodPrograms(SLP)distributedtodifferent sitio in forms of small scale business such as sari-saristoreandsellingfishing gears,tools and equipment. Housewives in Brgy. Mana, particularly those who are residing along coastal areas thatare not a beneficiaryof 4'Ps and other Government Funding program, were provided technical support and livelihood trainings sponsored by the Province of Davao Occidental. Themaingoalofthesponsored Sustainable Livelihood Programs is to eradicate poverty, give opportunity to the unemployed individuals, and to help them sustain their essential

needs.

3.12 PandemicCovid-19CrisisSWOT Analysis

The onset of Ciovid-19 pandemic brought the country's economy into recession breaking almost three decades of uninterrupted growth. High risk of pandemic occurrence in Brgy. Mana and throughout the nation are said to be the result of inefficiency in implementing legal frameworks, lack of awareness, underdeveloped health emergency discipline, lack of relief materials and human resources and the spreading misinformation rumor that set an alarming issues not just on economic but on mentalandphysicalaspect as well thatresults to negative impact on a daily life, works, on economic status and increase poverty.LowpricesofCropsandFishes SWOT Analysis

Low prices of crops such as the coconuts, manga, and cardava in the market were the problem face by the farmers in the Barangay. Meanwhile, low prices of fish caught were also the problem of the fishermen in the locality. This happens because of the fishermen and farmers lack of knowledge on the industry, in economic diversity and the poor organizations supporting farmers and fishermen in the study area. Increasing frequency of poverty, unhealthy competition and increasing number of unemployment were the threats given by the disadvantageoflowpricesofcropsandfishes [9-25].

Table5.Analysisofcoastalenvironmentandeconomicissues,problems andopportunities

Particulars	Strengths	Weaknesses
CoastalEnvironment Issues		
➢ **AirandWater Pollution**	▪ Aestheticsofbeach environment. ▪ Strong coastal protectionstructures. Opportunities ▪ Possibility to research about the coastalenvironment. ▪ Increasingpublic awareness	▪ Absence of a common strategyforcoastaland maritimemanagement. ▪ lack of proper systems of coastalpollutiontreatment. Threats ▪ Environmentaldegradation ▪ Increasingfrequencyof natural disaster.
➢ **Improper Sanitation**	Strengths ▪ Reduceofpressure on the marine resources and healthy lifestyle. Opportunities ▪ Crowdmanagement ▪ Increasingpublic awareness ▪ BLGU should develop back-up strategic plan like placingpublictoilets and water refilling stationintheBrgy.	Weaknesses ▪ Poormaintenanceofevery local settler's sanitary complexes. ▪ Lackofcomprehensive coastal zoning. ▪ Culturalpractices Threats ▪ Increasing frequency of unhealthyhuman,animals, and marine environment. ▪ Environmentaldegradation
➢ **Improperwaste disposal**	Strengths ▪ Tourismpotential ▪ Goodsoiland climate. ▪ Coastalprotection	Weaknesses ▪ Inefficiencyinimplementing legal frameworks. ▪ Crowdedpopulation ▪ Lackof education

	structure. ▪ High level organizational facility.	▪ Poormanagementsystem and implementation.
	Opportunities ▪ Substitution of organicplates,etc for plastic items ▪ Provision of health centersnearcoastal zones. ▪ Crowdmanagement ▪ Encouraginglitter freezonealongthe coast.	Threats ▪ Lossofaestheticvalues ▪ Environmentaldegradation ▪ Damagestomarine inhabitants ▪ Increasingfrequencyof natural disaster.
➢ **FishScarcity**		
	Strengths ▪ The presence of waterresourcesnear coastal zone ▪ Marineresources availability ▪ Foodfacilities	Weaknesses ▪ Untreatedwastewater discharge ▪ Inefficientinimplementing legal framework. ▪ Lackofcomprehensive coastal zoning ▪ Crowdedpopulation
	Opportunities ▪ Increaseofcoastal revenue ▪ Increasingcoastal guards ▪ Possibility of endangeredspecies culture ▪ Crowdmanagement	Threats ▪ Disappearanceofmarine resources ▪ Increasingfrequencyoffood scarcity ▪ Naturalsitesmaythreatenby over commercialization. ▪ Damagesofimportantmarine species and habitat destruction.
EconomicIssues		
➢ **Unemployment**	Strengths ▪ Eradicatepoverty ▪ Sustainessential needs ▪ moreopportunity	Weaknesses ▪ Lackof education ▪ Lackof creativity ▪ bias/pabor2system
	Opportunities ▪ BLGU should invite private/publicsector on conducting Sustainable LivelihoodPrograms.	Threats ▪ Poverty ▪ Noincome
➢ **Pandemic Covid-19crisis**	Xtrengths ▪ Covid-19pandemic quick and effective cooperation of departmental joint prevention and control ▪ The medical and health system is graduallyimproving Workopportunities	Weaknesses ▪ Inefficiencyinimplementing legal frameworks. ▪ Lackof awareness ▪ Healthemergencydisciplineis underdeveloped ▪ Lackofreliefmaterialsand human resources. ▪ Rumorsspreading misinformation.

	both online and physical are graduallysafeand convenient Opportunities ▪ Promotesvirtual works and opportunities ▪ Furtherimprovement and inspection on the health emergency system	Threats ▪ Negativeimpactonadailylife, works. ▪ Negativeimpactonthe economic status ▪ Poverty
➢ **Lowpricesof crops, fishes**	**Strengths** ▪ Opportunities for the residentstoearnincome to sustain daily living. ▪ Reducepressureon economic sector ▪ Foodfacilities Opportunities ▪ Crowdmanagement BLGU should implement strategic plan on marketing	**Weaknesses** ▪ Lackofknowledgeonthe industry ▪ Lackofeconomicdiversity ▪ Pooroforganizationsof producers **Threats** ▪ Increasingfrequencyof poverty ▪ Unhealthycompetition ▪ Increasingnumberof unemployment

4. CONCLUSION

In socio-political setting; Out of the purposely taken 639 households, there were majority numbers of male's age between 31-40 years old and mostly were secondary students as their highest education attainment. Most of the respondents were born Catholic and Bisaya as their language. The sources of income of the respondentsweresmall-scalemanufacturingand business earning Php 1.00-Php 3,000.00 monthly. Majority also of the household settle in their own house but of free rented lot, owned motorcycles and used Globe Telecommunication asmeansofcommunicationandpracticesproper sanitation as there was high rating for sanitized sources of water and toilet facilities and majority of the household benefited in health programs and facilities offered by the Barangay Local Government unit.There were also present of infrastructures in the coastal Brgy. of Mana such as churches, schools, Fish processing building and Gasoline station.

In Natural Resources; there were identified aquatic resources and ecology in the study Area that composes of Mangrove species and other shrubs such Bakhawlake *(Rhizophoraapiculata)*, Pagatpat *(Sonneratiacaseolaris), Bakhaw baye (Rhizophora mucrunata)* and *Nypafrutican*.Alongbeacheswereseaweedsidentifiedaspeacock's tail (*Padina pavonica*), turner (*Sargassum aquifolium*) and *Sargassum polycystum*. The results of economic sector inthe study area lead to a conclusion that Small- scalebusiness andmanufacturingdominatesthe coastal area of Brgy.Mana. In people's Organization, there are three existing People's Organization and one cooperative in costal sitios of Barangay Mana. These are, Mana Water System Cooperative (MAWASCO), Mana Fermented Fish Processing Women Association (MFFPWA), NagkahiusangMananagatsa Barangay Mana (NAGMABMA). In managing coastal environment issues, problem and opportunities, the major strength found in the Brgy. Mana are the esthetics of beach environment, the good climate, its tourism potential and the marine resources availability that aid and help reduce coastal environmentand economic problems.

REFERENCES

1. White A, Green S. et al. Coastal Environmental Profile of Northwestern Bohol, Philippines.Blue-Green A dvisors Ltd 34 Publications and Tetra Tech Inc. Coastal Resource Management Project, Cebu City, Philippines. 2000;113.
2. Kuruda K, Otsuka K. and Shimomura Y. Environmental awareness about coastal area and behaviors of regional fish-eating, Oceans 2016-Shanghai. 2016;1-5. DOI:101109/OCEANSAP.2016.7485543
3. Horigue, Vera, Porfirio M. Aliño, andRobert L. Pressey. "Evaluating management performance of marine protected area networks in the Philippines. Ocean&coastalmanagement. 2014;95:11-25.
4. Rimmer,MichaelA.,etal.Areviewand SWOT analysis of aquaculture development in Indonesia.Reviews in Aquaculture.2013;5.4:255-279.
5. Muzakir,Muzakir,SuparmanSuparman. "StrategyofdevelopingTominiBayfor economicgrowthofcoastalcommunityin CentralSulawesi.JEJAK:JurnalEkonomi danKebijakan.2016;9.1:96-110.

6. Hassig, Tyler.Evaluating the effectiveness of community managed marine protected areas (MPAS) on Guimaras Island, Philippines. Diss. College of Charleston; 2016.
7. Coastal Resources Center and Fisheries Opportunities Assessment; 2006. Kingston and Miami: Coastal Resources Center at the University of Rhode Island and Florida International University. 2006.
8. Cheong SM. The Korean fishing communities in the transition: Limitationsof community-based resource management.EnvironmentandPlanning A.2005;37(7):1277-1290
9. Crespo C,J, Fengler W, Kharas, H, et al. Will the Sustainable Development Goalsbe fulfilled? Assessing present and future global poverty. Palgrave Commun. 2018;4:29. Available: https://doi.org/10.1057/s41599-018-0083-y
10. Philippine Statistic Authority; 2018. Contributionoftourismto the economy is 12.2 percent in 2017. Available:Https://psa.gov.ph/tourism-satellite-accounts-press-releases.Accessed 9 March 2019
11. 7. National Economic and Development Authority(NEDAXI), Manufacturing Sector Numbers In Signal Recovery – NEDA; 2020.
12. World Health Organization. Global Health Risks. Mortalityand burden of the diseases attribute to selected major risks. World Health Organization Geneva; 2009.
13. Panigrahi, Jitendra K, Pratap K. Mohanty. Effectiveness of the Indian coastal regulation zones provisions for coastal zonemanagementandits evaluationusing SWOT analysis.Ocean & coastal management. 2012;65:34-50.
14. Bersaldo, M.J.I., Llameg, M.B., Avenido, P.M., Pacyao, J.P.R., and Marquez, J.M.D. Population Dynamics of Mangrove Clam Pegophysemaphilippiana (Reeve, 1850) in Davao Region, Southeartern Mindanao, Philippines. 2024. HAYATI Journal of Biosciences, 31 (5), 964-979. https://doi.org/10.4308/hjb.31.5.964-979.
15. Lopez, A.J.M., Llameg, M.B., Pacyao, J.P.R., and Lubat Jr., G.P. Utilizing Alternative Carbon Sources for Biofloc System for Growth and Survival of Pacific Whiteleg Shrimp (Litopenaeusvannamei). 2024. Sustainable Agroecosystems – Principles and Practices. IntechOpen. https://doe.org/10.5772/intechopen.1005537.
16. Llameg, M.B., Pacyao, J.P.R., Avenido, P.M., Dalogdog, J.M., Firman, E.A.P., and Morastil, D.R. Production and Yield of Milkfish reared in Pond using Probiotics. 2022. SPAMAST Research Journal. Vo. 10, Issue 1.
17. Llameg, M.B., Pacyao, J.P.R., Avenido, P.M., Lubat Jr., G.F., Dalogdog, J.M., Firman, E.A.P., and Morastil, D.R. Promoting Food Resiliency through PalaisdaansaPamayanan Project. 2022. SPAMAST Research Journal. Vo. 10, Issue 1.
18. Bersaldo, M.J.I., Macusi, E., Garley, L., Pacyao, J.P.R., and Avenido, P.M. Biomass Estimates using Species Specific Allometry in Reforested Mangrove Areas of Malita, Davao Occidental Province, Philippines.2023. Social Science Research Network.
19. Pacyao, J.P.R., Marquez, E. Species Composition and Abundance of Seashells in the intertidal zone of Tubalan Cove, Municipality of Malita, Davao Occidental Province, Philippines. 2022. International Journal of Biology Sciences. Vol. 4, Issue 1-A (2022). P-ISSN: 2664-9926/E-ISSN: 2664-9934.
20. Pacyao, J.P.R., Llameg, M.B., and Jondonero, J.C.O. Mangrove-epiphytic Plants in Selected Mangrove Rehabilitation Areas of Davao Occidental, The Philippines. 2022. Asian Journal of Fisheries and Aquatic Research, 17 (1), 35-42. http://doi.org/10.9734/ajfar/2022/v17i130396.
21. Pacyao, J.P.R., and Barail, S.T. Anthropogenic Activities inside the Mangrove Conservation and Rehabilitation Area: a Case of Davao Occidental, Philippines. 2020. International Journal of Fisheries and Aquatic Studies. Vo. 8, Issue 5 (2020). E-ISSN: 2347-5129.
22. Pacyao, J.P.R., and Llameg, M.B. Success Indicators of the Philippine National Aquasilviculture Program (PNAP) - Mangrove Rehabilitation Project in Davao del Sur, Southern Philippines. (2018). Open Science Journal 3 (1).
23. Pacyao, J.P.R., and Gencianeo, V.M.P.F. Management Strategies employed under PNAP Mangrove Rehabilitation Project in Davao del Sur, Philippines. 2018. International Journal of Current Research, 10, (7), 71091 – 71094.
24. Pacyao, J.P.R., and Macadog, H.O. Secondary Productivity of the Philippine National Aquasilviculture Program (PNAP): Mangrove Rehabilitation Area in Brgy. Bagumbayan, Malalag, Davao del Sur, Philippines. International. 2018. International Journal of Fisheries and Aquatic Research. Vo. 3, Issue 3. ISSN: 2456-7248.
25. Generalao, I. Fuentes, A., Llameg, M.B., Elemino, M., Avenido, P.M., Lubat Jr., G.F., Pacyao, J.P.R., and Patagoc, R. Community Based Mangrove Resource Management and Aquasilviculture: A Coastal Conservation and Livelihood Project in Davao del Sur. 2014.

4th Biennal Convention of the Philippines Association of Extension Program Implementors, Inc. (PAEPI) at Mindanao University of Science and Technology (MUST), Claro M. Recto, Cagayan de Oro, Philippines. Pp. 27-29.

26. Pacyao, J.P.R., and Llameg, M.B. Enhancing Mangrove Resilience: Assessing Rhizophora sp. Survival in Davao Occidental's Conservation and Rehabilitation Zones, Philippines. 2024. Asian Journal of Fisheries and Aquatic Research, 26 (8), 8-13. https://doi.org/10.9734/ajfar/2024/v26i8790.