ASSESSMENT OF PEOPLES' ENGAGEMENT IN SUSTAINABLE USE ACTIVITIES IN THE COASTAL ZONE OF NAMIBIA

FINAL REPORT

NAMIBIAN COAST CONSERVATION AND MANAGEMENT (NACOMA)

2011

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

1.1 BACKGROUND

NACOMA's Global and Project Development Objective (GDO/PDO) is to strengthen conservation, sustainable use and mainstreaming of biodiversity in coastal and marine ecosystems in Namibia.

NACOMA aims to enhance coastal and marine biodiversity conservation through the mainstreaming of biodiversity conservation and sustainable use into coastal policy, legislative framework, and institutional and technical capacity. The project also supports targeted investments for biodiversity conservation in critical ecosystems on the coast. The Project's four components are:

- Component 1: Policy, Legal, Institutional and Planning Framework for Integrated Coastal Zone Management (ICZM) conducive to Biodiversity Conservation and Sustainable Use

- Component 2: Targeted Capacity Building for ICZM conducive to Biodiversity Conservation and Sustainable Use

- Component 3: Targeted Investments in Critical Ecosystems for Biodiversity Conservation, Sustainable Use and Mainstreaming

- Component 4: Project Management and Performance Monitoring

Three (3) Outcome Indicators (OIs) have been set for the purpose of monitoring the project progress. OI 2 falls under Component 3 of the project and aims to measure the increase the number of people involved in sustainable use activities by year 5 compared to that of the baseline situation through targeted investments. A study conducted in 2005 (van Zyl 2005) established a baseline of 15,774 people involved in sustainable use activities in all four (4) coastal regions, which is expected to increase by 20% by the end of the project. The methodology used to collect such data was further refined in 2007 (Barnes & Alberts 2007), in a study that estimated that 16,140 people were involved in sustainable coastal natural resource use activities. Within this number, 8,264 were involved in tourism activities in all four (4) coastal regions. [Note that as a result of a numerical/typographical error, this number was given as 8,356 by Barnes & Alberts (2007) in their Table 3.2a on Page 14.] The set target for the end of the project was to have a total of 18,542 people engaged in sustainable coastal natural resource use activities, of which 10,082 would be engaged in tourism

activities. Against this background, a repeat study has been conducted at end of project (EOP) in order to evaluate whether the set targets have been achieved and the contribution of NACOMA activities to sustainable use in coastal areas.

1.2 OBJECTIVES AND METHODOLOGY

With respect to people's engagement in sustainable use activities, the NACOMA project initiated this evaluation to assess the current situation against the EOP baseline targets. A quantitative assessment was conducted using the same methodology used by Barnes & Alberts (2007). This was to ensure that the baseline data is comparable with the EOP target. The methodology was used to provide an estimate for the number of people involved in sustainable coastal natural resource use activities as well as the number of people involved in tourism activities. The results of this study will be used for the purpose of reporting on the progress made on Outcome Indicator 2 (OI 2) that reads:

"*Increase in the number of people engaged in sustainable use activities by year 5 compared to baseline*".

1.2.1 LITERATURE REVIEW

A scan was made of the study on sustainable tourism options for the coastal zone of Namibia and refinement of available data on coastal natural resource use practices by Barnes & Alberts (2007). The findings and data in that study serve as a baseline for the quantitative assessment of the NACOMA achievements for the period 2007-2011 on the number of people engaged in natural resource use activities in the coast of Namibia. Various literary sources were also scanned for any data that might assist in determining employment levels in 2011. These included GoB (2006), CBS (2010), WTTC (2006), NTB (2008), among numerous others.

1.2.2 SECONDARY RESEARCH

A desktop survey was conducted for the collection of data on the number of people currently engaged in sustainable coastal natural resource use practices and tourism activities. Of importance was the NTB database of the 2010 tourism enterprise registrations in the coast for the determination of the number of people engaged in the coastal tourism industry. Also of importance was the national accounts economic database of the National Planning Commission.

Where possible, direct information derived from natural resource users was used to estimate employment numbers. In most cases however, indirect estimates were determined. For tourism and several other natural resource uses, the individual enterprise was used as a primary building block to estimate employment. Thus, data on output, value added, and employment could be derived from representative

empirically-derived financial and economic enterprise models developed in the past by the MET Economics Unit (MET 2011, unpublished data). Ratios for employment to aggregate enterprise numbers, or aggregate output derived from such models were applied to determine aggregate employment.

A general paucity of data on employment, enterprise numbers, and economic activity meant that certain assumptions needed to be made. This paucity and the subjectivity involved, highlight the limitations of employment estimation as an impact evaluation tool. Given these limitations estimates are crude, and the key to getting meaningful comparative estimates is consistency. Care was taken to apply ratios and assumptions, consistent with those used by Barnes & Alberts (2007).

1.2.3 Study Area

The project intervention zone employed for the study was that of the Project Document (World Bank, 2005). Thus, it embraced the full length of the coast and extends 12 nautical miles out to sea from the coast, and some 2 to 3 kilometers inland from the coast, except where urban and other sites with coastal links extend further inland. The data collected was relevant to this zone, but the division between coastal and non-coastal activities was conceptual rather than rigidly physical. The key consideration when deciding what activities to include or leave out in this study has been ensuring consistency with the baseline.

The coastal zone does not exist in isolation, and a number of activities take place outside of it that is linked to tourism or natural use activities inside it. Thus, an attempt was made to consider the impact of activities such as offshore marine fishing and inland mining and tourism, where these have links to natural resource use on the coast in relation to planning. Figure 1 shows the four regions on the coast and the broader conceptual inland boundary of the coastal zone as considered for this analysis. Effectively this zone excludes areas which have less than 50 days of coastal fog per year. Figure 2 shows the protected areas in the coastal zone forming what is collectively referred to as the Namib-Skeleton Coast National Park.

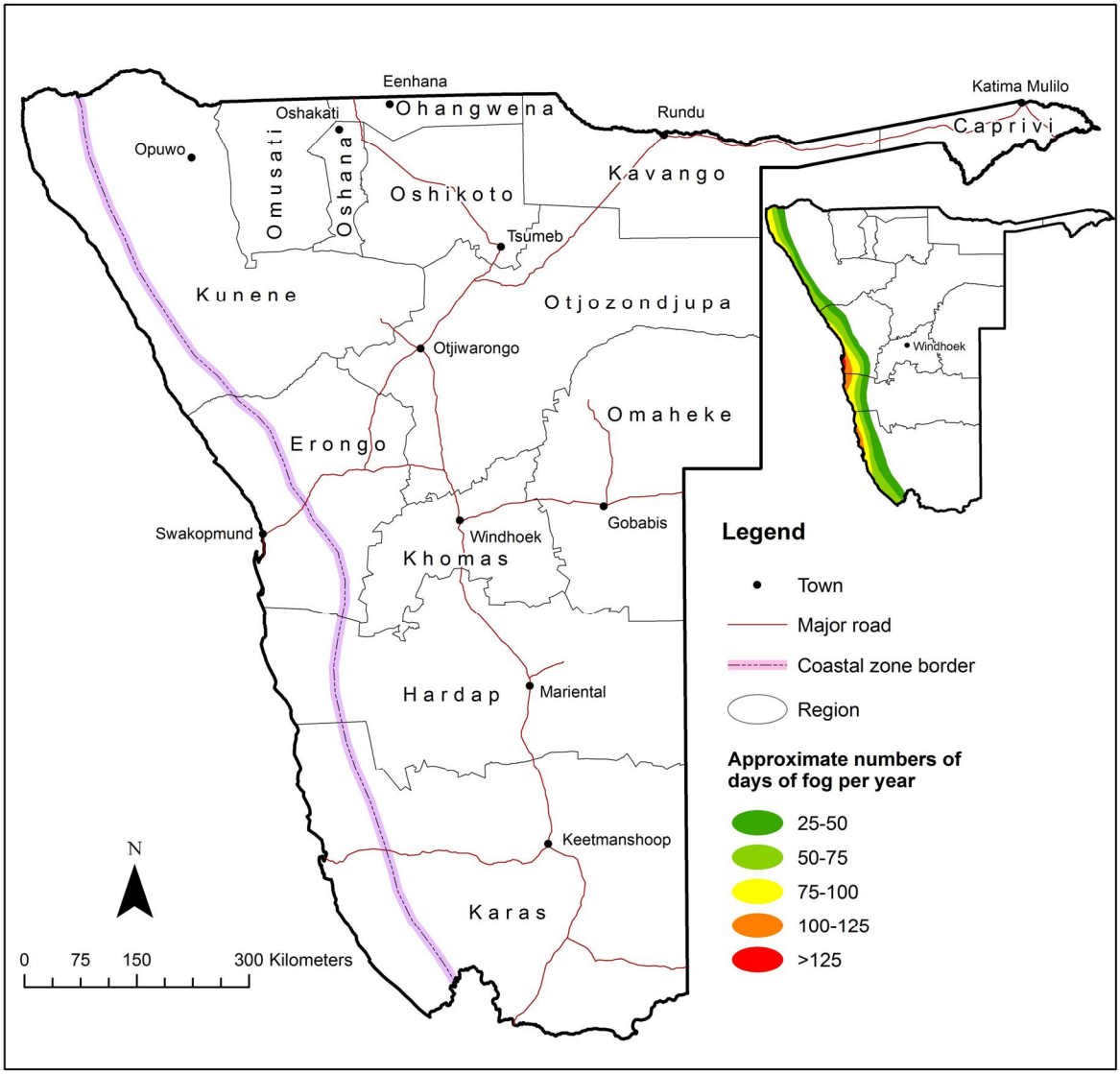

Figure 1: Coastal Regions and Coastal Zone in Namibia

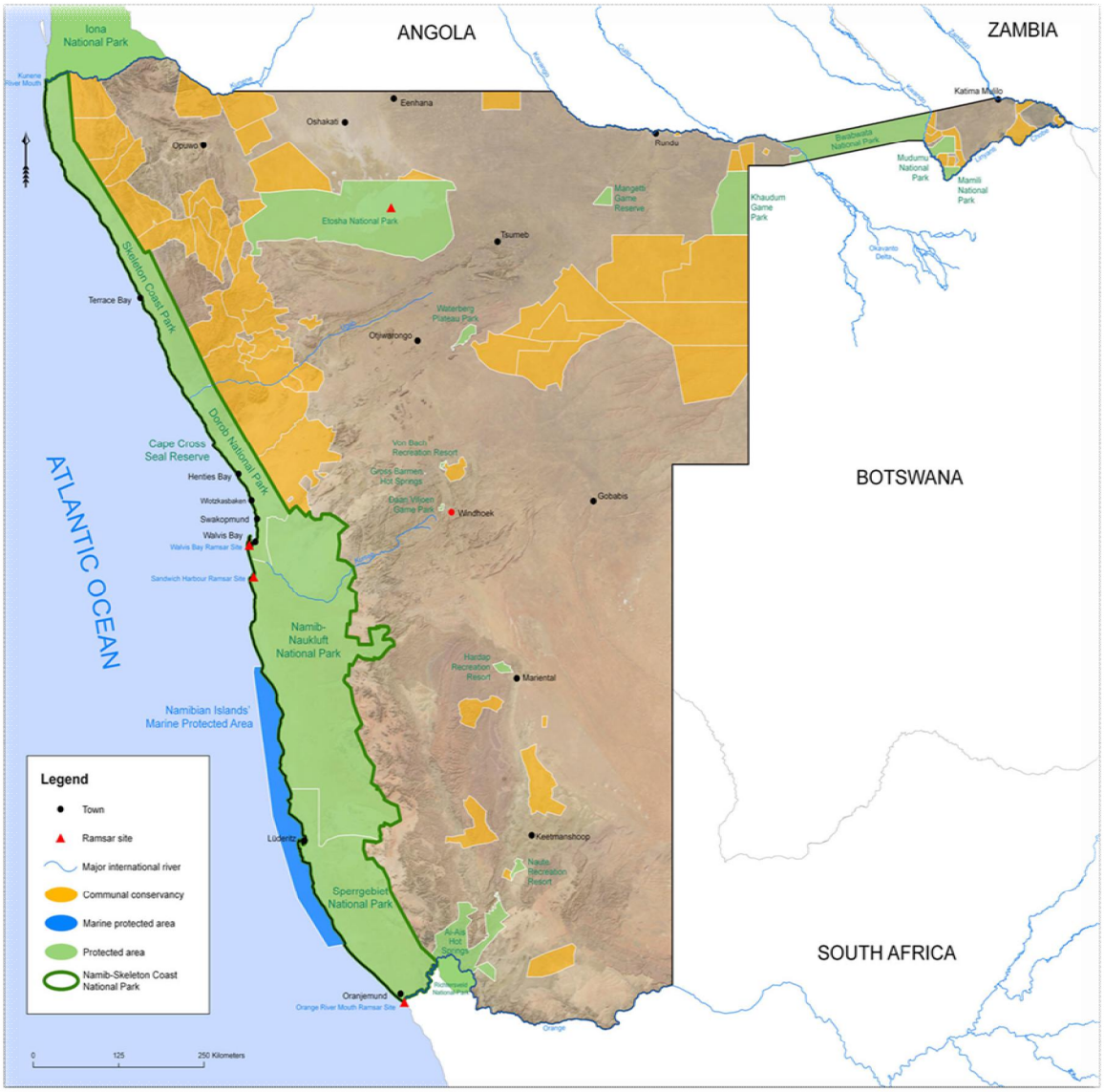

Figure 2: Namib-Skeleton Coast National Park in Namibia

2. END OF PROJECT (EOP) ACHIEVEMENTS

Table 1: Summary of OI2 findings by end of project (EOP) for NACOMA[1]

0I 2 Employment	Estimated baseline 2007	Projected EOP target 2011	Estimated EOP 2011
All tourism and natural resource use	**59,628**	**61,452**	**44,698**
Sustainable activities only	**16,140**	**18,542**	**21,584**

[1] Limited to the coastal zone: excludes uranium mining which falls outside the base line study area

Table 1 summarises the overall findings of this study, and presents the estimated numbers of people employed in tourism and natural resource use activities in the coastal zone study area. In the baseline study of 2007 (Barnes & Alberts, 2007), it was estimated that all employment in coastal zone tourism and natural resource uses amounted to some 60 thousand full time jobs. At the time it was projected that these would rise by some 20% by end of project to some 61 thousand. Not all these activities were considered sustainable at the time and jobs for those activities considered to be sustainable were estimated at 16 thousand, projected to rise by 15% to 19 thousand by end of project.

In the present study it has been estimated that 45 thousand people are employed in all tourism and natural resource uses in the coastal zone. Instead of the projected 20% increase, there has been a decrease of 13% on the baseline. This drop was primarily due to the unforeseen international financial crisis of 2008/2009 which severely affected, diamond mining, by far the largest natural resource use and employer in the coastal zone. It was also influenced by the effect of this crisis on offshore commercial fishing and onboard fish processing, considered in 2007 to be only partially sustainable.

If only tourism and natural resource uses which were and/or are considered sustainable are included in the estimates the picture changes. Here, instead of the projected increase of 15%, an increase of 34% has been estimated. This is due to several reasons discussed in detail below, but primarily due to the increase in estimated coastal tourism employment at end of project, which exceeded the increases projected in 2007. The OI2 end of project (EOP) target has been met, and exceeded, with 226% of the target being reached.

Table 2 shows the detailed findings for the OI2 evaluation summarized above, by specific tourism and natural resource uses. It shows the 2007 baseline estimates, and projections, made at that time, as well as the projected overall growth and annualized growth rates for these. The chapters that follow discuss the findings by individual sector.

The main finding of the detailed analysis in Table 2 reveals that the tourism sector on the coast has performed better that projected in 2007. Analysis of the tourism establishments in the coastal zone in 2011, indicate that annual growth rates of 7.3% to 9.3% have been achieved, significantly more than the 5% growth rates predicted. As the most significant investments of the NACOMA project have been in the development of the coastal protected area network and policy surrounding tourism development, this enhanced tourism growth can largely be attributed to NACOMA.

Estimates of employment in other natural resources uses in the coastal zone were mostly derived from evidence of growth in economic activity. An important use is commercial fishing and onboard processing, which does not strictly take place in the coastal zone, but it feeds the onshore fish processing activity which is in the zone. In this case during the evaluation period there has been a decline in offshore activity but an increase in employment in onshore processing activities. This is seen as a manifestation of fisheries sector policy which encourages onshore processing, and is not attributable to NACOMA.

Generally, employment in the fisheries sector overall has been affected by negative extraneous economic (e.g., exchange rate) and environmental (e.g., water temperature) factors. Fisheries quota setting and resource management might well have helped cause pauperization of the resource stocks, most notably the collapse of the once large pelagic sardine (pilchard) stock. However this is not under the influence of NACOMA.

The largest natural resource employer in the coastal zone is diamond mining which due primarily to the world financial crisis has shown declining levels of production and estimated employment. There have been significant increases in employment associated with the uranium mining boom, but this is located inland from the coastal zone, and was left out of the baseline and present evaluation. No development of natural gas and oil has yet taken place. Although mining activity employment can be sustainable in the short and medium term, it is not so in the long term.

Employment in renewable natural resource use activities such as salt production, mariculture, !Nara, seal, shell and guano harvesting, is relatively unimportant but where data are available, it is estimated that these have experienced modest increases in production and associated employment. The positive influence of NACOMA activities in land use, zoning and conservation education is likely to have been important in the cases of employment in salt production, marine aquaculture, guano harvesting, and possibly seal harvesting. The influence of NACOMA activities on fisheries quota setting has been indirect but likely positive.

Table 2: Estimated numbers of people engaged in coastal tourism and coastal natural resource use based on 2007 projections at showing overall and annual growth rates, 2011

Sector employment	Estimated baseline 2007	Projected 2011	Projected growth	Projected growth rate	Estimated 2011	Estimated growth	Estimated growth rate
	Number	Number	% overall	%/annum	Number	% overall	%/annum
Tourism							
Tourism accommodation [1]	3,409	4,160	22%	5.0%	4,506	32%	7.2%
Tour operators [1]	184	224	22%	5.0%	447	143%	9.3%
Tourism related [1]	4,671	5,698	22%	5.0%	6,249	34%	7.5%
Subtotal tourism [1]	**8,264**	**10,082**	**22%**	**5.0%**	**11,202**	**36%**	**7.9%**
Natural resources							
Recreational angling [3]	190	237	25%	5.8%	343	80%	16.5%
Commercial fishing & on-board processing [3]	6,855	8,588	25%	5.8%	4,598	-33%	-8.7%
Crayfish fishing [3]	676	no data	-	-	676	0%	0.0%
Inshore commercial line fishing [2]	230	288	25%	5.8%	259	13%	3.0%
Onshore fish processing [1]	6,592	7,894	20%	4.6%	8,873	35%	9.0%
Artisanal fishing [1]	70	no data	-	-	no data	-	-
Mariculture/aquaculture [1]	150	no data	-	-	225	50%	10.7%

Sector employment	Estimated baseline 2007	Projected 2011	Projected growth	Projected growth rate	Estimated 2011	Estimated growth	Estimated growth rate
	Number	Number	% overall	%/annum	Number	% overall	%/annum
Seal harvesting [3]	18	no data	-	-	19	6%	1.5%
Guano production [2]	6	no data	-	-	no data	-	-
Shell harvesting [1]	no data	no data	-	-	no data	-	-
!Nara harvesting [2]	85	85	0%	0%	93	9%	2.2%
Salt production [1]	228	278	22%	5.2%	260	14%	3.4%
Diamond mining [4]	28,000	34,000	21%	4.8%	18,172	-35%	-1.9%
Natural gas and oil production [4]	None	None	-	-	None	-	-
Subtotal natural resource use	**43,100**	**51,370**	**19%**	**4.5%**	**33,496**	**-22%**	**-6.0%**
Total tourism & natural resource use	**51,364**	**61,452**	**20%**	**4.6%**	**44,698**	**-13%**	**-3.5%**
Total for sustainable activities	**16,140**	**18,542**	**15%**	**3.6%**	**21,584**	**34%**	**7.6%**

[1] Considered sustainable
[2] Considered potentially sustainable
[3] Considered unsustainable in 2007 but potentially sustainable in 2011
[4] Considered unsustainable

3. COASTAL TOURISM USE PRACTICES

3.1 TOURISM INDUSTRY

3.1.1 COASTAL TOURISM SUPPLY

The accommodation sector remains the largest subsector within the coastal tourism economy creating the highest number of jobs. The tour operator sector, along with the tourism related supply sector follow closely in terms of job numbers. Tourism in the coastal zone is most significant in the Erongo region, with around 90% of the total coastal tourism establishment.

On a national level, the hotels and restaurants real value added has recorded a growth of 5.0 per cent in 2009 as compared to a slow growth of 2.7 percent recorded in 2008. The national accounts data (CBS, 2010) shows that the hotels subsector recorded an increase of 9.7 percent in 2009, while restaurant subsector recorded a decline of 18.7 percent in the same period.

The primary approach used in the present evaluation for estimating employment in tourism in the coastal zone was to compare the statistics on registered tourism providers between those from 2007 and those from 2011. For this, unpublished data from the Namibia Tourism Board (NTB, 2007, 2011, Unpublished Data) were used.

Table 3 shows the numbers of NTB registered suppliers to tourism in the coastal zone by category and region in 2010 (NTB, 2011, Unpublished Data). The numbers recorded for 2007 (Barnes & Alberts, 2007) included facilities in the inland part of Erongo and Kunene regions. These have been left out for the comparison as they not in the coastal zone as defined. A total of 819 enterprises were recorded in 2010, for the coastal zone divided into accommodation establishments, tour/activity operators, and tourism related enterprises (car-rental, booking agents, etc.).

Table 4 shows the data derived from NTB (NTB, 2011, Unpublished Data), on room and bed availability and use in the accommodation subsector.

Table 3: Total number of registered tourism suppliers in the four coastal regions , 2010

Region	Town	Accommodation	Activity operators/ facilitators	Tourism Related	Total enterprises
Kunene	-	4	0	0	4
Erongo	Henties Bay	173	16	10	199
	Swakopmund	305	59	46	410
	Walvis Bay	111	54	15	180
Hardap	-	0	0	0	0
Karas	Lüderitz	16	3	7	26
Total		609	132	78	819

Source: NTB, 2011, Unpublished Data

Table 4: Rooms and bed-nights sold by registered tourism establishments per annum in the four coastal zone regions, 2011

Region	Rooms available /annum	Rooms sold /annum	Average room occupancy /annum	Beds available /annum	Beds sold /annum	Average bed occupancy /annum	Average bed-night rate (B)	Average bed-night rate (B&B)	Average bed-night rate (ALL)
Kunene									
Skeleton Coast	8,760	-	-	17520	-	-	-	-	8,844
Kunene total	**8,760**	**-**	**-**	**17520**	**-**	**-**	**-**	**-**	**8,844**
Erongo									
Henties Bay	422,670	88,761	24%	845,340	236,695	28%	224	347	550
Swakopmund	751,170	360,562	48%	1,502,340	480,749	32%	446	309	799
Walvis Bay	280,685	92,626	33%	561,370	151,570	27%	352	345	461
Erongo total	**1,454,525**	**541,948**	**-**	**2,909,050**	**869,014**	**-**	**-**	**-**	**-**
Hardap									
Hardap total	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Karas									
Lüderitz	91,980	45,070	49%	183,960	71,744	39%	177	304	-
Karas total	**91,980**	**45,070**	**-**	**183,960**	**71,744**	**-**	**-**	**-**	**-**

Note: B=Bed, BB= Bed & Breakfast, All = All inclusive
Source: NTB, 2011, Unpublished Data

3.1.2 ECONOMIC VALUE AND EMPLOYMENT

Based on the numbers of tourism suppliers registered for the coastal zone in 2007 and 2011, estimates were made of the direct economic contribution to gross national income (GNI) for both years. The ratios used by Barnes & Alberts (2007) to calculate the value added to GNI were based on typical empirically based tourism enterprise models developed for this purpose. Table 5 below shows these estimates for 2007 (inflated to 2011 prices), and for 2011. Tourism's contribution to the GNI grew from N$1.28 billion in 2007 to N$1.7 billion in 2011. Tourism accommodation and the tourism related enterprises dominate these values. Tourism accommodation income for 2011 is also broken down by region to show the dominance of the central coast (Erongo Region) in the subsector.

Employment numbers for the enterprises generating the income described were derived for 2011 using the same ratios used for the 2007 baseline by Barnes & Alberts (2007). Employment, estimated as full time jobs, or full time job equivalents, were derived from the empirically based tourism enterprise models referred to above. Unskilled labour dominates the numbers as expected, notably in the significant accommodation and tourism related subsectors. The total number of people engaged in coastal tourism in 2011 was 11,202. Of these 70% or 7,884 were occupying unskilled jobs, with 41% of those in the accommodation subsector, and 56% in the tourism related subsector. In the relatively small tour/activity operators subsector approximately half of 447 people engaged were considered unskilled with the remainder in some form of management.

The projections of Barnes & Alberts (2007) for the period of 2007 to 2010, suggested a target increase of 22%, in the total number of coastal tourism suppliers, their generated income, and their associated employment. This is based on an expected annual growth rate in coastal tourism demand of 5%, which in turn was derived from the projections of national tourism satellite accounts (WTTC 2006; NTB 2008). The estimate in this evaluation of current employment numbers for 2011, indicate that actual growth has been higher than predicted. Thus, tourism grew by 36% overall, with an average annual growth rate of 7.9% over the evaluation period. Growth in employment in accommodation and tourism related activities increased by 32% and 34% respectively. The tour/activity operator subsector has increased significantly by 143% during the evaluation period with annual growth rate of 9.3% per annum.

Of particular interest is the question of how coastal zone tourism growth has compared with that for the overall tourism sector in Namibia. Van Wyk et al. (2011) conducted a detailed multi-sectoral analysis of the Namibian macro-economic outlook. Their estimates of growth in value added to the GDP during the evaluation period for the hotels and restaurant services sector provide an indication. The average growth in GDP contribution was 4.6% per annum. This conforms with the growth rate projected for coastal zone tourism by Barnes & Alberts (2007), but is significantly lower than the 7.9% estimated for the coastal tourism above.

3.1.3 CONCLUSION

In the 2007 baseline study, (Barnes and Alberts, 2007) the coastal tourism sector was considered to be sustainable. The most significant achievements of the NACOMA project can be seen in the fact that the protected area status of the coastal zone has been enhanced with the proclamation of Dorob National Park and the Namibian Islands Marine Protected Area (Currie et al. 2009). The whole coastline of Namibia has now been afforded full protected area status referred to collectively as the Namib - Skeleton Coast Park, and linking with the Richtersveld National Park in South Africa and the Iona National Park in Angola.

The completion of a comprehensive Strategic Environmental Assessment for the whole coastal zone (Skov et al. 2010), prepared the ground for policy development and planning, for sustainable management of coastal zone resources. Based on this and other background research (Eco-Africa Environmental Consultants 2004; Cullinan 2007; Barnes & Alberts 2007), a visioning process (NACOMA 2009d) has led to the development of a Green Paper (NACOMA 2009e), and ultimately a Coastal Management Policy or White Paper. The latter awaits endorsement by Cabinet.

Management and development plans for the Dorob National Park, the Skeleton Coast Park, and Namib-Naukluft area of the Namib-Skeleton Coast Park have been developed (NACOMA 2009a, 2009b, 2009c). The plans have provided the frame work for sound tourism development along the whole coastline. Notably the particularly large increases in tour operator activity, have been facilitated through NACOMA planning and extension activities in the central region (NACOMA 2009b, 2010, 2011; Heinze, 2009). Selected small scale investments in tourism, conservation, and community development have been or are being made through NACOMA Matching Grants.

The focus of NACOMA activities on development of the protected area status of the coastal zone, the undertaking of a strategic environmental assessment leading to the development of a coastal management policy white paper, and the development of park management and development plans has created the environment for economically sound tourism development on the coast. This has manifested in confidence in the tourism sector and opportunities for development particularly in the guided tourism sub-sector. The findings of the present study, shown in Table 3, indicate that annual growth rates in tourism of 7.5% to 9.3% have been achieved on the coast, significantly more than the 5% growth rates predicted in 2007. In addition indications are that this was significantly greater than average annual growth in the overall national tourism sector which, based on growth figures for the hotels and accommodation sector, appears to have been around 4.6% per annum.

Table 5: Estimated direct annual contribution of tourism to the gross national income (GNI), and the associated numbers of full time jobs, unskilled, semi skilled, and management, 2007 and 2011

Category and year of estimate	Region	Direct GNI	Number of full time jobs			
		N$ @ 2011 prices	Unskilled	Semi skilled	Management	All jobs
Tourism Accommodation						
2007	All regions	536,000,000	2,449	480	480	3,409
2011	Kunene	70,673,600	323	63	63	449
2011	Erongo	605,897,200	2,768	543	543	3,854
2011	Hardap	0	0	0	0	-
2011	Karas	31,937,500	146	29	29	203
2011	All regions	708,508,300	3,237	634	634	4,506
Tour operators						
2007	All regions	21,440,000	92	0	92	184
2011	All regions	52,100,600	224	0	224	447
Tourism related						
2007	All regions	723,600,000	3,306	622	743	4,671
2011	All regions	968,047,700	4,423	832	994	6,249
Total tourism						
2007	All regions	1,281,040,000	5,847	1,102	1,315	8,264
2011	All regions	1,728,656,600	7,884	1,467	1,852	11,202

4. RENEWABLE NATURAL RESOURCE USE PRACTICES

4.1 RECREATIONAL SHORE FISHING

4.1.1 OVERVIEW

The recreational shore fishery is as shown by Barnes & Alberts (2007) fairly important in the coastal zone and involves shore-based beach and rock angling, as well as limited inshore boat angling using ski-boats. It is a consumptive resource use with implications for resource use sustainability, but it is also a component of the tourism industry described above. There is thus overlap in the values given here with those for tourism.

Angling is mostly self-driven, although over this evaluation period there appears to have been an increase in guided angling services, in line with policy recommendations made by Barnes & Alberts (2007). The primary period for angling is from November to March, when species such as west coast steenbras (*Lithognathus aureti*), kob (kabeljou) (mostly *Argyrosomus inodorus*), galjoen (*Dichistius capensis*), and blacktail (dassie) (*Diplodus sargus*) among others, can be caught. Sharks, including the spotted gulley shark (*Triakis megalopterus*), and the large copper shark (*Carcharhinus brachyurus*) are also targeted by anglers. Boat anglers target the pelagic snoek (*Thyrsites atun*), as well as demersal kob and west coast steenbras. Some recreational capture of rock lobster takes place from the shore.

Conservation measures place certain restrictions on coastal anglers. Catch and size limits are imposed. Anglers are limited to keeping ten fish of any one species in total of any one or more of kob, steenbras, blacktail, or galjoen, provided that on any one day no more than eight galjoen are caught and retained. There are also restrictions on the fish that can be retained between minimum and maximum size limits. Catch and release is practiced by shark anglers and for bony fish, usually after catch limits have been reached. The maximum number of rock lobster that any one person may catch per day is also restricted. Angling and the catching of rock lobster both require a permit, purchased monthly or yearly from the Ministry of Fisheries and Marine Resources (MFMR), but there are no restrictions on the number of permits issued.

Coastal angling is allowed in the following areas: From the Orange river to Pomona Island, from Grosse Bucht to the northern limits of Luderitz, from Sandwich Harbour to Pelican Point, from Walvis Bay to the Ugab river mouth, and at Terrace Bay and Torra Bay on the Skeleton Coast.

Several tour operators offer half day or day trips along the coast with an experienced guide, as well as trips of several days. The most popular sites are found along the 200km stretch of coast between the Swakop and Ugab river mouths. Selected sites associated with campsites are favoured. Elsewhere there are also localized sites around Walvis Bay, Torra Bay, Terrace Bay, and Lüderitz.

4.1.2 ECONOMIC VALUE AND EMPLOYMENT

Barnes & Alberts (2007) described the results of a number of economic studies that have been done on the recreational shore fishery. Unfortunately no such studies have been carried out during this evaluation period. The only source of data on change in values for angling, has been catch data for kob and west coast steenbras that presented by MFMR (2007) for the period 2006 and 2007. These show very significant growth (40% to 55%). These increases most likely reflected a short term recovery of stocks, and cannot be realistically projected over the evaluation period. It was assumed that growth in recreational angling has grown at a rate of 16.5% over the period.

Barnes & Alberts (2007) estimated that the base line number of jobs associated with recreational angling was 190. It was projected that this would grow overall by 25%, at an average annual rate of 5.8%, to reach 237 by 2011.

The estimated growth for the evaluation period (16.5% per annum results in an overall growth of 80% so that some 343 jobs would be associated with recreational angling in 2011 (Table 2**,** above). Given the lack of data available, and the need for rough estimation, little can be deduced from these findings. It does however suggest that, as with general coastal zone tourism, there has been growth in excess of that projected in 2007.

Based on the results of exhaustive stock assessments available in 2007 (Kirchner 1988; Holtzhauzen & Kirchner 2001), Barnes & Alberts (2007) classified the recreational fishery as unsustainable. The little evidence to hand does not categorically prove this classification correct. Along with the new tighter catch restrictions for angling, evidence that commercial line fishing has become more concentrated on the pelagic snoek resource, and evidence that stock recovery can occur in the short term, tend to suggest better sustainability.

4.1.3 CONCLUSION

Few data make it impossible to say much about employment associated with the recreational fishery over the evaluation period, other than that it appears to have increased faster than projected in 2007 by Barnes & Alberts (2007). The activities of the NACOMA project which created a more favourable investment environment for coastal tourism may have played a role. Fishery resource management has been the responsibility of MFMR. NACOMA has not had any direct influence on biological

resource management, but in overall sector coordination, and raising general awareness about conservation issues, it may have played a role in ensuring better resource management.

4.2 INSHORE COMMERCIAL LINE FISHING

4.2.1 OVERVIEW

The inshore commercial line fishery operates from around 12 licensed vessels in the inshore area. In the past it has employed hand lines to target bottom dwelling kob (kabeljou) (mostly *Argyrosomus inodorus*) and west coast steenbras (*Lithognathus aureti*), competing with the recreational fishery for these species, and also the pelagic snoek (*Thyrsites atun*). There is no TAC for this fishery and the only restriction is on the number of licensed boats.

The fishery has undergone something of a transformation, with reduction in the catches of kob and steenbras in the five years leading up to 2007 and most fishing effort focusing on snoek (MFMR 2007). There has also been conversion of the traditional wooden line boats, using ice for preserving catch, to freezer line boats. Most effort is focused closer to Walvis Bay and the fresh/frozen snoek product has allowed for higher profitability.

4.2.2 ECONOMIC VALUE AND EMPLOYMENT

Barnes & Alberts (2007) estimated that the commercial line fishery generated some N$11 million in direct value added to the national income in 2007. It provided an estimated 230 full time employment opportunities. Based on the past changes in numbers of licensed boats it was projected that this would increase by 25% overall, and at an average annual rate of 5.8%, to 288 in 2011.

Few data on catches, effort and employment are currently available, but our approximate estimates suggest that the employment has not grown to the extent projected, and has only grown by some 13% overall, at a rate of 3% per annum to 259 jobs in 2011. Inshore line fishing was classified as sustainable in 2007. The greater focus on snoek, and reduction in competition with the recreational fishery, suggest that this fishery has become more sustainable.

4.2.3 CONCLUSION

Few data make it impossible to say much about employment associated with the inshore commercial line fishery over the evaluation period. It appears however to have increased slower than projected in 2007. There are indication that it has become

more sustainable, but it not clear how much this has been influenced by the implementation of the NACOMA project.

4.3 COMMERCIAL OFFSHORE FISHING

4.3.1 OVERVIEW

The substantial commercial fishery carried out offshore does not qualify directly as a coastal zone activity as defined for the base line study of 2007. This also applies to the onboard processing activity which frequently accompanies it. However, offshore fishing is the natural resource use that directly supplies the onshore fish processing industry, which is included as a coastal zone natural resource use activity. It has thus been included here for that reason.

The cold south Atlantic waters off the coast of Namibia are characterized by nutrient rich upwellings, and contain some of the richest fishing grounds in the world. There is potential for sustainable yields of up to 1.5 million metric tons per year.

The main species found off Namibia are pilchards (sardines) (*Sardinops ocellatus*), anchovy, hake (*Merluccius capensis, M. paradoxus*), and horse mackerel (*Trachurus trachurus*). There also are smaller but significant quantities of sole (*Austroglossus microlepis*), squid (Alloposidae), deep-sea crab (*Chaceon maritae*), rock lobster, (*Jasus lalandii*) and tuna (mostly *Thunus alalunga*). However, at the time of independence, fish stocks had fallen to dangerously low levels due to the lack of protection and conservation, and the overexploitation of these resources. Post independence saw the introduction of sound fisheries management, including major reductions in fishing quotas and an aggressive fisheries enforcement campaign. This appears to have halted and to some extent reversed declines in stocks. Namibia is a signatory to the Convention on Conservation and Management of Fisheries Resources in the South-East Atlantic (SEAFO). The country is also part of the Benguela Current Large Marine Ecosystem (BCLME) program, which is designed to help the Governments of Namibia, Angola, and South Africa manage their shared marine resources in an integrated and sustainable way.

Species such as hake and the less economically valuable horse mackerel have shown some recovery despite a series of environmentally adverse natural events. However, the once vast pilchard resource, which forms the basis of the food chain and which consequently influences many other marine resources, has not recovered. The reasons for this are unclear but likely include both continued overfishing and adverse environmental conditions. The fisheries sector since independence has thus not grown to the extent expected. It has tended to fluctuate at low levels and shown only moderate, sporadic growth. Despite this, commercial fishing and fish processing is one of the significant sectors of the Namibian economy in terms of employment, export earnings, and contribution to GDP.

4.3.2 ECONOMIC VALUES AND EMPLOYMENT

In 2009, fishing contributed almost 3.6% of GDP, while on-shore processing of fish products contributed another 1.4%. The Namibian Government has actively pursued value-addition policies aimed at increasing on-shore processing of fish products. Furthermore, the fishing industry has been a source of considerable employment in Namibia. In accordance with government policy there has also been an increase in the proportion of Namibians employed in fishing crews.

Barnes & Alberts (2007) estimated that, in 2007, some N$1.5 billion was contributed directly to the national income, and some 6,855 people were employed, in offshore commercial fishing and onboard processing. The most recent empirical data on catches, output and employment are for 2008 (Sherbourne 2010). To derive indications what should have transpired in the evaluation period we have used two approaches.

On one hand we have used growth in the gazetted total allowable catches (TACs) as proxies for fishing activities and thus employment. On the other we have used predictions of the likely contribution to the GDP by the fisheries sector, made as part of a detailed analysis of the macro-economic outlook for Namibia (van Wyk et al. 2011). These data and predictions are based on past trends, expected changes in national and global economic conditions, exchange rates, demand for the sector's products, the fuel price, and the state of resource stocks as reflected in data on TACs and/or catches. The employment in the subsector was assumed to be proportional to the catches estimated.

Table 6 below, shows the possible catch data, calculated using the approaches described above. It shows those for the three most important species involved in the offshore commercial fishery during the evaluation period. The changes between years vary significantly from -26% to +15%.

Barnes & Alberts (2007) predicted that the estimated 6,855 people employed in the subsector in 2007 would grow 25% overall by 2011, or at an average annual rate of 5.8% over the period. The data in Table 6 below, suggests that that this growth did not happen. As shown in Table 2**,** estimated employment declined over the period by some 33%, to some 4,598 jobs, and thus decreased at an average annual rate of 8.7%.

The decline in offshore fisheries production can be largely attributed to the global economic downturn and high fuel prices as well as changes in environmental conditions affecting stocks. The policy of MFMR which actively promotes onshore processing is another factor that likely caused the decline. There has been a marked shift over the period with a greater proportion of the offshore catch being processed onshore.

Table 6: Changes in possible TAC and catch for the most important species in the commercial offshore fishery sector between 2007 and 2011 (tonnes)

Category	Year					Average 2007-2011
	2007	2008	2009	2010	2011	
Hake	130,000	130,000	130,000	140,000	140,000	134,000
% change		0.0%	0.0%	7.7%	0.0%	1.9%
Horse Mackerel	360,000	230,000	230,000	247,000	310,000	275,400
% change		-36.1%	0.0%	7.4%	25.5%	-0.8%
Pilchard	15,000	15,000	17,000	25,000	25,000	19,400
% change		0.0%	13.3%	47.1%	0.0%	15.1%
Total	505,000	375,000	377,000	412,000	475,000	428,800
% change		-25.7%	0.5%	9.3%	15.3%	-0.2%
Estimated production	425,000	314,075	269,790	277,345	285,110	314,264
% change		-26.1%	-14.1%	2.8%	2.8%	-8.7%

The recorded decline is not attributable to NACOMA activities which have not as yet had direct influence on the biological management of resources, and fisheries management, both of which are directed by MFMR. Offshore commercial fishing was classified in 2007 by Barnes & Alberts (2007) as unsustainable. In 2011 we would consider it to potentially sustainable.

4.3.3 CONCLUSION

The offshore fisheries sector did not exhibit increases in employment as project in 2007. Instead there has been a decline. The changes were due to factors outside the control of the NACOMA project.

4.4 COMMERCIAL ONSHORE FISH PROCESSING

4.4.1 OVERVIEW

A proportion of the offshore fish catch is landed and processed onshore in factories in Walvis Bay and Lüderitz. Fisheries policy (MFMR 1991) has been to promote onshore fish processing as it provides more employment and in particular employment for Namibians. This component of the manufacturing sector makes use

of the scarce coastal water resources and in as much as it impacts on the coastal environment is classified as a coastal natural recourse use activity.

No empirical data for years later than 2008, beyond those provided by Sherbourne (2010) were available for this evaluation. The approach to estimation of change in economic productivity and employment in onshore fish processing was similar to that for offshore fishing. Here we used data from the detailed analysis of the macro-economic outlook for Namibia (van Wyk et al. 2011) as well as some information from Sherbourne (2010) and MFMR (2007). Van Wyk et al. (2011) analysed the manufacturing sector, including fish processing. They made predictions based on a variety of considerations including past trends, expected changes in national and global economic conditions, exchange rates, and demand for the sector's products. The employment in the subsector was assumed to be proportional to the economic contributions estimated.

4.4.2 ECONOMIC VALUES AND EMPLOYMENT

Changes in onshore fish processing output and value added appear to have followed the pattern of the offshore fishery in that this activity was affected negatively by the 2008 global economic downturn. However it has not declined overall, but has exhibited growth over the evaluation period. Thus growth ranged from 2.1% in 2008 to 10.5% in 2011, with an average growth rate of 9%

Barnes & Alberts (2007) estimated that, in onshore fish processing in 2007, the direct contribution to the national economy was N$593 million, and the number of people employed was 6,592. They predicted that employment would grow in the evaluation period to 7,894, overall by 20% and at an average annual rate of some 4.6%. The data in this study indicate that it is more likely to have grown to some 8,873, an overall growth of some 35%, and at an average annual growth rate of 9%.

Growth in employment thus appears to have grown significantly faster than projected. This can be attributed largely to MFMR policy aimed at maximizing the proportion of catches undergoing onshore processing. NACOMA activities would have had little to do with the higher than expected growth rate, but there are indications that the better coordination between sectors promoted by NACOMA and the conservation message it has broadcasted, have made this sector more sustainable. Promotion of cleaner production mechanisms by the MET (Hetherington & Copeland 2006), which has been indirectly supported by NACOMA, appears to have improved the efficiency of water use in the sector. Fish processing onshore was classified as sustainable in 2007, but it has likely become more so as a result of MFMR policies as well as the conservation promotion activities of NACOMA.

4.4.3 CONCLUSION

Employment in the onshore fish processing natural resource activity in the coastal zone has grown at about twice the rate projected in 2007. While this growth is not attributable to the NACOMA project, the activities of NACOMA have likely had a impact in ensuring that this activity has become more sustainable.

4.5 ARTISANAL FISHING

4.5.1 OVERVIEW

Artisanal fishing refers to small scale commercial or subsistence fishing practices. In the coastal zone of Namibia this involves mainly shore angling with rod and line as practiced by recreational anglers. It is a very small sub-sector relative to recreational angling and its influence on the overall fish stocks is relatively small. It is likely to have increased along with general population growth on the coast. However, no data was found by Barnes & Alberts (2007) regarding possible trends, and nor has any such data has been found in the present study.

4.5.3 CONCLUSIONS

It has not been possible to determine if the baseline estimate of 70 full time job equivalents has changed over the evaluation period. Given the smallness of the sector relative to the size of the resource, artisanal fishing can be considered to be sustainable. It is unregulated, but NACOMA project monitor activities, such as spatial planning, that are likely to have indirectly influenced the recreational fishery, may have positively affected this subsector.

4.6 CRAYFISH (ROCK LOBSTER) FISHING

4.6.1 OVERVIEW

Crayfish (rock lobster) are the basis of a small inshore fishery in the southern coastal zone around and south of Lüderitz. Post independence annual TACs have been fairly stable in the vicinity of some 400 tonnes, with some 185 tonnes being allocated to fully commercial operations, and some 215 tonnes being allocated to smaller-scale limited commercial operations. Hoopnets are used inshore and in deeper water traps are used. Fishing is restricted to a specific season. Catches and stocks were much higher in the pre-independence period, but the ensuing collapse of stocks is considered to be partly due to environmental causes and not only to over-harvesting. The current annual catch is commonly below the TAC. Disturbance from

diamond mining activities and overharvesting do not appear to explain this fully and it may also be for reasons of access (Pulfrich & Penney 1999; Boyer & Hampton 2001; Ramasar 2005).

There exists a conflict between the marine diamond mining activities that take place on the southern coast and the crayfish industry. Siltation and destruction of the benthic environment, due to mining, reduce the area suitable to crayfish (Pulfrich & Penney 1999). However, to some extent the mobility of the crayfish resource enables the stock to avoid the damage which affects more sedentary organisms. In 2007, Barnes & Alberts (2007) considered the fishery to be unsustainable. In the present study it is classified as potentially sustainable. Quota setting is outside the influence of NACOMA. However, it is likely that NACOMA's efforts in promoting sectoral coordination, general conservation education, and park management and development planning, have had a role in putting the fishery on a more sustainable footing.

No data were found in 2007 to enable projection of the growth for this fishery sector. Similarly, for this evaluation, there were no data accessible to indicate whether any growth has taken place since 2007. Given the history of the fishery and especially that since independence, we consider it likely that there has been no overall growth in the crayfish fishery. Thus the 676 jobs estimated for the baseline in 2007, are expected to be the same in 2011.

4.6.3 CONCLUSIONS

It has not been possible to determine if the base line estimate of 676 full time job equivalents has changed over the evaluation period. It is assumed to have been stable. NACOMA project activities have likely had a positive influence on the fishery making it potentially sustainable.

4.7 MARINE AQUACULTURE

4.7.1 OVERVIEW

Commercial marine aquaculture involves intensive production of certain marine organisms and is practiced in sheltered sites on the coast. It has been dominated by oyster production in Walvis Bay, Swakopmund and Lüderitz. Both the Pacific oyster (*Crassostrea gigas*) and the European oyster (*Ostrea edulis*) are grown. One company in the Lüderitz bay grows seaweed (*Gracilaria gracilis*), to complement and stabilize harvesting of natural production in the bay. The results have shown that the growth rate for this species is very high. The species is cultured in open water in the lagoon area. The resulting product is predominantly used as a cosmetic ingredient as well as a source of food for humans and abalone. The main product generated is agar.

One abalone (*Haliotis midae*) farm was developed in Lüderitz. Crayfish (rock lobster) (*Jasus lalandii*) and black mussel (*Mytilus galloprovincialis*) culture has also developed on two farms during the evaluation period.

The marine aquaculture industry is seen as having significant growth potential and ambitious expansion plans for it have been conceived (MFMR 2001, 2004; Klingelhoeffer & Forbes 2004). However, rapid growth has been set back recently as a result of poor economic environment and adverse environmental events, which have caused in particular, hydrogen sulphide irruption and biotoxin contamination.

The detailed data accessible on production, output, and value added in the industry was found to be incomplete and available for 2008 and 2010 only. The approach we adopted to measuring growth necessitated simply tracking the growth in the number of production units. The base line study (Barnes & Alberts 2007) estimated that in 2007 there were six marine aquaculture farms in production. By 2010, according the MFMR records, this had grown to nine (J.J. Titus 2011, personal communication).

4.7.2 ECONOMIC VALUES AND EMPLOYMENT

The 2007 baseline study by Barnes & Alberts (2007) estimated the direct contribution of marine aquaculture production to the economy of N$9.2 million. This was associated with an estimated 150 full time employment opportunity equivalents. Due to a lack of clarity and data on growth trends at the time they were not able to meaningfully project expected growth to 2011.

By 2011, based on the recorded growth in the number of production units, the number of employed would have grown to 225 full time job equivalents, after an overall increase in production of 50%, and annual growth of 10.7%. Given the ambitious targets set initially for the industry by policy makers, this is likely to be somewhat low. Economic conditions and environmental factors have tended to constrain growth. Nevertheless, despite constraint growth has been significant. The investment climate for producers has been improved with better zoning and site identification securing stronger property rights for production, and support from MFMR in monitoring environmental conditions likely to affect growth. The Activities of NACOMA in coordination of sectoral activities, as well as physical and spatial planning in relation to protected area and other coastal developments, has no doubt played a role in the expansion of the industry.

4.7.3 CONCLUSION

The marine aquaculture industry is estimated to have grown at 10.7% per annum during the evaluation period. The estimated number of people employed in full time job equivalents was 150 in 2007, and this grew to an estimated 225 in 2011, and overall increase of 50%. The industry is considered to be sustainable, with potential

for significant further growth, but economic and environmental factors have tempered this growth. NACOMA activities in terms of sectoral coordination and spatial planning have assisted in improving the investment environment for this activity.

4.8 OTHER BIOLOGICAL RESOURCES

4.8.1 OVERVIEW, ECONOMIC VALUES AND EMPLOYMENT

Seaweed – Seaweed (*Gracilaria gracilis*) is harvested as beach cast in Luderitz bay, alongside that cultured there in the marine aquaculture industry. It was not included in the estimation for the marine aquaculture industry, or considered in the base line of Barnes & Alberts (2007). Production varies considerably with environmental conditions. It is estimated that, on average, 225 employment opportunities associated with the activity. No data are available to suggest that this average number has changed in the evaluation period.

!Nara harvesting – The Topnaar people, living in the Kuiseb valley inland from Walvis Bay, have historically been fishermen, goat-herders, and !Nara (*Acanthosicyos horridus*) harvesters. Old records contain accounts of the Topnaar offering beef, goat meat, milk, water, and !Nara fruits to European trade ships in exchange for general merchandise, clothes, weapons, and alcohol. The main occupations of the Topnaar are goat husbandry, and harvesting and cultivation of !Nara, which grows in the Kuiseb riverbed and delta. Harvesting is mostly undertaken by men, but women occasionally assist in the harvest when necessary. The Kuiseb riverbed and delta contains the largest population of !Nara plants, and the Topnaar people have been particularly dependent on the !Nara plant for their livelihoods (van den Eynden et al. 1992; Henschel et al. 2004). Although this dependency has diminished over the last few decades, it is still vital to their survival. In 2007 Barnes & Alberts (2007) found evidence that the resource was being depleted through overuse and as a result of flooding change in the riverbed. They recommended investment in a community-based natural resource management CBNRM initiative to ensure that !Nara use becomes sustainable.

In the baseline study Barnes & Alberts (2007) estimated that !Nara use in the coastal zone generated some N$88,400 in direct value added per annum to the national income. The number of full time job equivalents involved was estimated at 85 in 2007. Without data to hand they were unable to estimate projections for growth. In the present study we have found that no CBNRM initiatives have been initiated, and that use of the resource continues as in 2007. The population of the area has increased during the evaluation period, and we used a rural population growth rate of 2.2% per annum (Mendelsohn et al. 2002) to project likely growth in !Nara use and employment. Employment in this activity is thus estimated to have risen from 85 in 2007 to 93 in 2011. NACOMA has had little influence on the change involved here.

Seal-harvesting - Protection and the sustainable use of natural resources is part of Namibia's constitution. The country regularly conducts one of the highest seal (*Arctocephalus pusillus*) harvests in the world. This is done in the interests of sustainable use and to reduce competition with the commercial fishery. The seal culling is a controversial issue and is opposed by animal rights groups. While a government-initiated study estimated that the seal population consumes more fish than the entire fishing industry, animal protection society, Seal Alert South Africa, estimated that losses to commercial fisheries are less than 0.3%. The collapse of the once vast pilchard stocks and the fact that periodic die offs of seals occur, suggest that the seal harvest might be sustainable and might have merit. Seals, most notably those in the colony at Cape Cross are also used as an important object of coastal tourism, and culling should not jeopardize this.

Harvesting is done from July to November at two places, Cape Cross and Atlas Bay, and in the past at Wolf Bay. These two colonies together account for 75% of the cape fur seal population of the country. Cape Cross is a tourism resort and the largest cape fur colony in Namibia. In season, the resort is closed and sealed off during the culling in the early morning hours, journalists are not allowed to enter. Namibia's SPCA has been permitted to observe the culling from 2010 onwards. Namibia's Ministry of Fisheries announced a three-year rolling quota for the seal harvest, although different quotas per year are sometimes reported. The latest quota of 85,000 pups and 7,000 bulls, announced was in 2009, valid until 2011. The quotas are usually not filled by the concession holders.

For lack of data, Barnes & Alberts (2007) could not estimate the economic contribution of seal harvesting, but estimated the baseline employment in 2007 at 18 full time job equivalents. The seal quota has fluctuated but remained around the same levels during the evaluation period. We estimate that the 2011 employment number is some 19 full time job equivalents. The overall increase at 6% for the period is negligible.

In the baseline study, seal harvesting was classified as unsustainable, due primarily to perceived incompatibility between seal culling and seal tourism. A lot depends on how the two activities are managed and in the present study we consider it unsustainable but potentially sustainable. NACOMA has invested directly in improvements to the infrastructure for and management of seal tourism at Cape Cross. This and NACOMA's overall activities supporting tourism and sound planning of natural resource use, suggest that the project has had an important role in making seal management potentially sustainable.

Guano production - After independence, guano scraping continued at Ichaboe Island, where it is still considered to be marginally economically viable. Ichaboe Island was last scraped during 2007 and can currently produce approximately 500 metric tons of guano annually. This quantity of guano will decrease as the number of guano-producing seabirds, especially Cape Gannets (*Morus capensis*), the main

guano-producing species, continues to decrease. If guano harvesting is not sufficiently controlled, this has a severe impact as it removes too much of the substrate required for African Penguins (*Spheniscus demersus*) to burrow in. Hardly any penguins are able to burrow on any of the Namibian islands any more. Nesting on the surface, where eggs may be predated by Kelp Gulls (*Larus vetula*) and where chicks are prone to heat exhaustion has had a negative effect on breeding success. Removing too much substrate for guano harvesting also compromises gannet breeding, because gannets construct their nests by scraping surrounding guano into a mound.

Man-made structures near Walvis Bay and Cape Cross provide additional share of Namibia's guano harvest. In total Namibian coastal zone was estimated to generate N$3.4 million in direct value added to the national income. The number of full time job equivalents was estimated at six. Lack of reliable data made it impossible in 2007, to predict changes. In 2011 it remains impossible. Sea bird decline, most likely due primarily the collapse of the pilchard resource, but also possible due to excessive guano scraping and disturbance, make this activity unsustainable, particularly on the islands. NACOMA has been instrumental in securing protection for the islands, as part of the Namibian Islands Marine Protected Area, and this might well help halt these declines. NACOMA has also been involved in bird number monitoring on the coastal islands and has assisted in finding ways to improve sea bird conservation. These roles, and shifting the focus of guano production to man-made structures, may contribute to making the activity potentially sustainable.

Shell harvesting – A small informal shell harvesting activity, located mainly around Swakopmund, involved the collecting of sea shells from beaches for sale, partly unprocessed and partly as craft products. No data were found in 2007 or in 2011 to enable estimation of the value, employment, or sustainability involved. The small scale and nature of the activity suggests that it is sustainable. NACOMA activities in protected area development and planning have likely set the stage for ensuring this sustainability.

5. MINERAL RESOURCE USE PRACTICES

5.1 DIAMOND PRODUCTION

5.1.1 OVERVIEW

The Namdeb Diamond Corporation (Pty) Limited is owned in equal shares by the Government of the Republic of Namibia and De Beers Centenary AG. Nearly all diamond production in Namibia is controlled by this company and it takes place south of Lüderitz along the shore line and increasingly at sea mostly within the defined coastal zone. Namdeb maintains an in-house environmental care programme. The diamond mining company SAMICOR has been awarded concessions in several offshore mining areas. These mining concessions expire in 2019. Processing of diamonds through cutting and polishing takes place away from the coast at Okahandja, just North of Windhoek.

Diamond mining is a major national industry. Over the last decade it has contributed approximately 8% of GDP and 40% of foreign exchange earnings. In recent years diamond mining in Namibia has accounted for about 7% of the world's rough diamond production by value. The prominent role diamonds play in the economy, makes the national wellbeing relatively vulnerable to the effects of reduced diamond demand.

For reasons related to confidentiality it has not been possible to gain access to detailed financial records on diamond mining. However, the national accounts contain broad estimates of the economic contribution and periodically figures on overall employment can be obtained. Economic contribution and employment in the industry are profoundly affected by the demand for diamonds, which in turn is affected by changes in global economic conditions. They are also influenced by factors such as changing exchange rates and fuel prices.

Van Wyk et al. (2011) conducted a detailed analysis of the outlook for diamonds in their research on Namibia's macro-economic outlook. Using this and limited data from Sherbourne (2010), it was possible to estimate the changes to diamond production and economic contribution during the evaluation period. By linking economic values with known employment figures it was possible to determine estimates of notional changes in employment.

5.1.2 ECONOMIC VALUES

Table 7 below, shows the estimates of changes in diamond production, the direct contribution of this in terms of value added to the national income, and the changes in employment between 2007 and 2011. While actual employment numbers do not follow the notional estimates exactly, the latter do provide a useful picture of overall change. In summary the global economic downturn of 2008 had a profound effect on the diamond industry. A dramatic drop in production and economic contribution amounting to more than 50% resulted during 2008 and 2009. Estimates suggest that there has been a marked recovery during 2010.

On its official website, Namdeb provided some insight to these changes. It noted that 2010 was an extraordinary year for Namdeb, considering that the global economy was in recovery mode, following the global economic crisis of 2009. Namdeb enjoyed strong price growth in 2010 and with reference to the 2010 operating performance the following was highlighted:

1. Carats sold increased by 12% whilst carats produced increased by 58% driven by consumer demand following strong recovery in the diamond markets.

2. Diamond sales revenue was 49% higher than in 2009, as a result of the recovery in the rough diamond prices along with higher volumes sold.

3. Profit before tax was N$1,516 million compared to a loss of N$555 million in 2009. This was primarily due to the increase in revenue along with a decrease in the cost of sales which was due to the focus on making the cost savings achieved during 2009 a permanent feature of the Namdeb operating culture.

After 2010 the industry was predicted to experience small negative growth amounting to some 13%.

Table 7: Changes in production (carats) value added to the national income and national employment estimated for coastal diamond mining, 2007-2011

Category	Year					Average 2007-2011
	2007	2008	2009	2010	2011	
Carats produced	2,178	2,132	929	1,472	1,330	
Carats (% change)		-2.1%	-56.4%	58.4%	-9.6%	-2.4%
VAD (% change)		-0.6%	-49.7%	58.4%	-13.4%	-1.3%
Average (% change)		-1.4%	-53.1%	58.4%	-11.5%	-1.9%
Employment	28,000	27,620	12,964	20,538	18,172	

Barnes & Alberts (2007) estimated the economic contribution of coastal zone diamond mining in 2007 to be N$2.3 billion. Associated with this was employment

amounting to some 28,000 full time jobs. They predicted that by 2011, the industry would have grown by 21% overall, at an average of 4.8% per annum, resulting in some 34,000 jobs. This evaluation indicates that, instead, the production and associated employment has declined between 2007 and 2011 by 35% to some 18,172 jobs. Average annual change has been negative at -1.9 per annum.

In as much as diamonds are an exhaustible natural resource, diamond production must be considered unsustainable. Economic output and employment changes cannot in any way be linked to the activities of the NACOMA project. However, the key role NACOMA has had in the establishment of the activities in development of the Sperrgebiet National Park and the Namibian Islands Marine Protected Area will have had a marked influence on the effectiveness of the environmental care programme associated with Namdeb diamond mining activities. Similarly, the impact of the sectoral coordination and environmental education activities of NACOMA in the southern coastal zone will have been positive for long term environmental sustainability in the zone.

5.1.3 CONCLUSION

Due to unusual global economic conditions severely affecting the diamond mining industry, employment in this activity has declined. The activities of NACOMA are not linked to these changes. However, they have had a notable effect in setting the scene for development of new employment, associated with the mining activities, such as that in tourism development, and marine aquaculture.

5.2 SALT PRODUCTION

5.2.1 OVERVIEW

The salt field operation at Walvis Bay comprises two companies, Salt & Chemicals (Pty) Ltd and Walvis Bay Salt Refiners (Pty) Ltd. The company produces the raw salt while Walvis Bay Salt Refiners further processes and markets the salt.

Both S&C and WBSR are Namibian registered companies and are wholly owned subsidiaries of Walvis Bay Salt Holdings (Pty) Ltd, which in turn is a wholly owned subsidiary of Chlor-Alkali Holdings (Pty) Ltd. The salt field operation at Walvis Bay was established in 1964 and is one of the largest solar evaporation facilities in Africa, processing 24 million tonnes of sea water to produce in excess of 650 000 tons of high-quality salt per annum.

The bulk of the salt produced by Walvis Bay Salt Refiners is exported to markets in Southern and West Africa, where it is used mainly by the chlorine alkali industry for

the production of chlorine and caustic soda, by the agricultural sector as a feed supplement, as well as a feedstock for refined table salt for human consumption.

The firm, The Salt Company, operates a series of evaporation ponds 10km north of Swakopmund. Seawater is let into these ponds and allowed to settle for evaporation. Harvesting in the meter-deep pans takes place mechanically with a tractor-drawn scraper, which hauls the salt to the processing plant. Each evaporation pond yields around 12,000 tonnes of salt and harvesting takes place throughout the year. At the processing plant, the salt is crushed and washed with concentrated seawater. Passing through a centrifugal, the water is spun out after which the various crystal sizes are determined in a rotary grid.

The Namibian Small Miners Assistance Centre established the Cape Cross Salt Mining Company. Operations began in 2001.The mining is relatively simple and includes the excavation of shallow solar evaporation pans in which the salt crystallizes, ready for "harvesting" and further processing. Presently the company is able to produce about 40 000 tonnes of unrefined salt per year.

The company intends to fully exploit the potential of its mineral holding to satisfy the ever-increasing demand by Central and West African nations, and thus intends to increase production to levels between 500 000 and 800 000 tonnes per annum shall construct and erect a refining and bagging plant will investigate and implement infrastructural development by obtaining fresh water and electrical power on site investigate the feasibility of the construction of an offshore loading platform to load bulk carriers, thereby avoiding high land transport costs.

Data has been accessible to enable estimates of out in salt production and employment in both 2007 and 2011.

5.2.2 ECONOMIC VALUES

In the baseline study, Barnes & Alberts (2007) estimated that salt production in 2007 generated some N$6 million in direct value added to the national income and provided employment amounting to 228 full time job equivalents. These included an estimated 176 unskilled jobs, 43 semi-skilled jobs, and nine management jobs.

They predicted that employment would grow from 228 in 2007, by 22% overall at an average annual growth rate of 5.2%, to some 278 in 2011. Based on the data available we estimate that job numbers have in fact grown to only some 260, by 14% overall at average growth rate of 3.4% per annum. Growth in employment has been lower than expected. The reasons are likely to relate to economic conditions and cannot be linked to any activities of the NACOMA project. Salt production is considered sustainable.

5.2.3 CONCLUSION

Growth in employment in the salt production industry has fallen below that anticipated in 2007, most likely primarily as a result of adverse economic conditions during the evaluation period. NACOMA implementation is not linked to this outcome, but the spatial planning undertaken by NACOMA would likely have improved the investment climate for the activity and made it more environmentally sound.

5.3 OTHER MINING INDUSTRIES

Several mining industries have not been included in the base line and this evaluation because they either fall outside the coastal zone as defined and/or have not started.

Zinc - The Anglo American's Scorpion Zinc mine was established at Rosh Pinah inland from Lüderitz in in the Karas region in 2003. This mine falls out of the coastal zone as defined in the baseline study of Barnes & Alberts (2007).

Uranium - The Anglo American's Scorpion Zinc mine was established at Rosh Pinah The Rössing Uranium Limited near Arandis in Erongo Region is also extending its operational life. Rössing Uranium Limited is a major player in the Namibian mining industry. Their large open-pit uranium mine started in 1976 is engaged in a major re-evaluation to sustain the life of the mine to the year 2021 and maybe beyond. This mine was also excluded from the study of Barnes & Alberts (2007) as being outside the coastal zone.

Since 2007 there has been an explosion in uranium prospecting and mining inland from the coastal zone in the vicinity of the Rössing mine. Australia's Paladin Resources opened the Langer Heinrich Uranium mine in 2006. Other new uranium mining sites include those at Valencia and Trekkopje, also close to the Rössing mine in the Erongo Region. In several other nearby sites, prospecting activities are in progress.

The expanding uranium mining industry has grown to contribute very significantly to the Namibian economy and it generates significant associated employment. The result has been very positive for the economies in the coastal zone notably in Swakopmund and Walvis Bay. Since the base line study the uranium industry has started to engage in some natural resource activities in the coastal zone. Water use is an example with desalination plant development.

Oil and gas - The exploration for natural gas resources offshore in the extreme south has been rewarded in that natural gas was discovered in 1974. The Kudu Field off the mouth of the Orange River is believed to contain reserves of over 1.3 TCF. The Kudu gas field development is led by Tullow Oil Plc. Tullow Oil owns 70% of the

Kudu gas reserves, Japanese firm Itochu Corporation owns 20% and the Namibian Government owns the remaining 10%. The government is understandably keen to see the commercial development of the Kudu gas fields. However exploitation has yet to be initiated.

6. IMPACT OF NACOMA

The finding of this report indicate that in terms of the OI2 indicator ("increase in the number of people engaged in sustainable use activities by year 5 compared to baseline") The impact of the NACOMA project has been positive.

The projected target in terms of the employment in sustainable use activities (in tourism and natural resource use), set in 2007, amounted to a 15% increase by 2011. This evaluation finds that employment in sustainable use activities has increased by 34%. The OI2 end of project (EOP) target has been met, and exceeded, with 226% of the target being reached. The finding is particularly noteworthy given that the evaluation period coincided with a serious unforeseen downturn in global and national economic conditions. If employment in all, sustainable and unsustainable, coastal tourism and natural resource activities is considered, this evaluation found that employment had decreased by 13% and had not met the target for a 20% increase.

In particular the positive finding applies in the coastal tourism sector. The estimated increase in employment in coastal tourism between 2007 and 2011 is 64% higher than the target increase. Tourism activity and employment increased on the coast at an estimated rate of 7.9% per annum, where estimates of growth for the whole tourism sector were in the region of 5% per annum. Several natural resource uses that were considered unsustainable during the baseline study are now considered sustainable or potentially sustainable.

NACOMA achievements have focused on facilitating establishment of new protected areas, consolidation of the entire coastline as a protected area, spatial and development planning for these parks and sustainable use, selected targeted interventions in tourism and conservation, coordination and harmonisation of sectors involved in land and resource use, development of an environmentally sound policy framework for the coast, and environmental education and advocacy.

It is considered that these interventions have had a significant role in ensuring the positive employment growth in sustainable uses on the coast. Direct investments in matching grants and training have had a small impact on employment. By far the most significant contribution of NACOMA has been in creating a more secure investment environment for tourism activities and other sustainable natural uses. The NACOMA interventions in environmental advocacy have also certainly had a significant role in broadening the range of natural resource uses which are on a sustainable path.

Current and future developments near to and inside the coastal zone include mining developments in uranium and petrochemicals, as well as linked water purification, and industrial developments (such as the Gecko initiative) promise to be significant. It is important that the investments and activities of NACOMA be sustained into the future to avoid reversal of its achievements.

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GLOSSARY

Asset value of a natural resource - The value of the natural resource as a capital asset, measured as the present value of the expected future stream of resource rent to be generated by that resource.

Backward linkage - The link between an enterprise or activity in the economy and another enterprise in the broader economy which is induced to supply factors or resources to that enterprise or activity, as a result of the presence of the enterprise or activity.

Biodiversity – The diversity of biological resources, in terms of ecosystems, species and/or genetics. An object of conservation as it is held to reflect various values, such as existence and option value, ecosystem health and ecosystem resilience.

Commercial tourism - All activities involving enterprises which provide services directly to tourists within the tourism sector.

Community - A group of rural or urban residents, that have formed a legal entity, which has a defined membership, defined boundaries, and an elected body which represents the interests of the membership; or a group of Namibian citizens that have defined themselves as a community and by virtue of being formerly disadvantaged are being considered as beneficiaries under this policy.

Concession - The rights, whether full or restricted or shared or exclusive to conduct tourism activities and/or to commercially use state-owned plant and/or animal resources (collectively referred to as wildlife resources) on business principles in proclaimed protected areas and any other state land for a specified period of time.

Concession agreement - means an agreement between the government and a concession holder that outlines each party's rights and obligations arising out of the granting of the concession

Concessionaire or concession holder - Any individual, collective of individuals, community, conservancy, or incorporated or unincorporated entity, that has been granted a concession by the government.

Contribution to national income – The annual contribution made directly to the national income by a specific enterprise activity or sector

Demersal – Refers to marine biological resources or species occurring in the bottom or benthic layer of the ocean water.

Direct contribution to national income – The annual contribution made to the national income by a specific enterprise activity or sector, *excluding* any indirect or induced effects through backward or forward linkages or multiplier effects.

Discounting – The process of finding the present worth of future amounts of money, or determining the opportunity costs of future amounts of money. This adjusts for the time value of money, and is generally obtained using a discount factor.

Discount rate – The interest rate used to determine the present worth of future amounts of money by 'discounting'.

Economic analysis – In this report, analysis of the amount by which a production unit changes the 'national income'. Costs and benefits are measured in terms of their opportunity costs to the national

economy. Involves some 'shadow pricing' adjustments to the transaction values which measure private costs and benefits in 'financial analysis'.

Epipelagic – Refers to marine biological resources or species which occur in the upper layers of the ocean.

Financial analysis – In this report, analysis of the private transactions in a 'production unit', to measure the costs and benefits, return on investment and profit accruing to the investor.

Forward linkage - The links between an enterprise or activity in the economy and another enterprise in the broader economy which is induced to make use of, process, or market products from that enterprise or activity, as a result of the presence of the enterprise or activity.

Gross domestic product (GDP) – The measure of income earned by factors of production, owned by nationals or foreigners, within the geographic borders of the nation.

Gross national income (GNI) - The measure of the income earned, whether domestically or abroad, by factors of production owned by nationals (see 'national income').
Income multiplier

Gross output or output – In this study, the total annual value of goods and/or services produced by an enterprise or activity. The economic term for 'turnover'.

Joint venture – In this report, an enterprise in which the landholder (government or local community), enter into an operational agreement with a private sector operator. The private sector partner invests in and manages the venture, providing capital and specific operational and marketing skills, in return for rentals, royalties and dividends, depending on the structure of the agreement.

Marine aquaculture – The production of marine biological resources, where the production process in controlled or manipulated at least in some way by the producer. It is also termed mariculture.

Market price – The value of cost or benefit as experienced by a production unit or enterprise, and reflected in an actual financial transaction. It is applied in financial analysis to determine the profit, and/or the financial return on investment.

Multilpier – In this report, the proportional increase in 'national income' that occurs from each unit increase in new spending from some autonomous source such as private or government investment, or the outside world (through exports). Expressed as a factor and usually calculated using the 'SAM'.

National accounts – the compilation of accounts to derive estimates of the 'national income'.

National income – the total earnings of labour and property employed in the production of goods and services in a nation during some accounting period, usually a year. Commonly measured by the gross domestic product (GDP), the gross national product (GNP), and the 'gross national income' (GNI). Measured either as the value of all expenditure on final goods and services, the value of all payments to factors of production, or the value of all value added by producing units.

Natural resources – Natural animal or plant species and natural tourism attributes, which can be used to derive a commercial value.

Natural resource accounts (NRA) – A set of accounts, separate from but supporting the national accounts, which seeks to measure the asset stocks and flows of natural resources which are not owned or man-made. Such natural assets (fish, forests) are excluded from the conventional national asset accounts.

Net income or profit – A financial measure of the amount remaining in a production unit or enterprise after all costs have been subtracted from all revenues. Measured in 'market prices'.

Net national income (NNI) – The gross national income adjusted for depreciation of capital assets.

Open access resource – A resource in which access to its use is unrestricted. Commonly results in utilisation of the resource in excess of its most productive and/or profitable use level, reducing total output and dissipating use profits.

Pelagic – Refers to marine biological resources or species which occur, above the bottom or benthic layer, in the middle or upper layers of the ocean.

Production unit or enterprise – An entity which invests capital to derive a return through production of goods or services.

Protected areas - Areas proclaimed as national parks, game parks, recreational areas or similar areas in terms of Ordinance 4 of 1975 (as amended) and Ordinance 20 of 1973, and managed by the MET. Here, the definition also includes marine protected areas managed by the MFMR.

Semi-skilled worker – A worker with some basic vocational skills for which they are able to take responsibility, or a worker employed in a job for which basic vocational skills are necessary

Skilled-worker – A worker with vocational skills enabling him/her to undertake work requiring specialist skills, or to take on lower and middle management responsibilities.

Sustainable development - Barrow, a well respected environmentalist offered a convincing argument that sustainable development lies at the convergence of the three global systems of economics, society and biological resources (Barrow, 1995:67ff).

Sustainable tourism development - Perhaps the best definition of sustainability is that offered in the Brundtland Report (World Commission on Environment and Development, 1987). It states: [Sustainability] is meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable use - The use of a renewable natural resource in a way, and at a rate, that allows for the regeneration of the same resource.

Tourism satellite accounts (TSA) – A set of accounts, separate from but drawn from and supporting, the national accounts, which describe the economic characteristics of the tourism industry. Tourism is a demand-based industry and is not delineated among the production-based industries of the conventional national accounts.

Tourist – In line with the WTO definition, any person who spends more than 24 hours away from their normal place of abode.

Unskilled worker – A worker with no specific vocational skills, or a worker employed in a job where no specific vocational skills are necessary.

Value added – The amount of economic value generated by the activity carried on within a production unit or enterprise. Measured as the returns to, or income earned by, the internal factors of production in the production unit or enterprise (capital, labour and entrepreneurship). All value added in the economy amounts to its 'national income'.