



Ministry of Environment and Tourism  
Republic of Namibia

A brief summary of  
**BACKGROUND REPORT & SPECIES  
MANAGEMENT PLAN**

**Nile crocodile**  
*Crocodylus niloticus*

**January 2012**  
By Patrick Aust

**Contents**

**Background Report**

1. **Biological Information.....2**
2. **Conservation Significance.....5**
3. **Economic Significance.....6**
4. **Sustainable use, stakeholders etc.....9**

**Management Plan**

1. **Vision.....11**
2. **Ecological Objectives and Actions.....11**
3. **Economic Objectives and Actions.....14**
4. **Social Objectives and Actions.....15**
5. **Regional Objectives and Actions.....17**
6. **Finance and Capacity.....18**
7. **Risks and Assumptions.....19**

## 1. Biological Information

Class:	SAUROPSIDA
Order:	CROCODILIAN
Family:	Crocodylidae
Sub-family:	Crocodylinae
Genus:	Crocodylus
Species:	Niloticus

Crocodylians first appeared about 200 million years ago. There are three families and approximately 23 species of crocodilians. Only one, the Nile crocodile, occurs in Namibia.

### ***Distribution & Abundance***

Nile crocodiles occur virtually throughout tropical Africa wherever suitable habitat exists. In Namibia populations occur in the major river systems in the North of the country, including the Kunene, Kavango, Kwando, Chobe and Zambezi Rivers. The crocodiles of the Caprivi region have been relatively well surveyed. A combination of boat and aerial surveys estimate approximately 529 adult female crocodiles and 417 adult male crocodiles for this region (Box 1). West of Caprivi information on the status of crocodiles is relatively lacking. Together the upper Okavango and the Kunene River probably support a similar sized population to Caprivi.





### ***Ecology and Natural History***

Their preferred habitat consists of warm, murky water, deep pools and open sand banks. Crocodiles are apex predators preying on a wide variety of both aquatic and terrestrial prey species. Diet varies with age: small crocodiles eat mainly insects whilst adults feed mainly on fish. Large adult crocodiles prey on mammals at the water's edge, including humans.

Both sexes become sexually mature between 1.8m and 3m long and between 8-30 years old, depending on food intake and temperature. Crocodiles mate in the winter months and lay an average of 45 eggs in summer. Eggs are laid in a hole dug in a sand bank and incubation takes about 3 months. Mortalities at this early stage in life are very high.

Crocodilians play an important role in maintaining the structure and function of freshwater ecosystems. This includes selective predation on fish species and recycling of nutrients.

### Box 1

Summary of boat surveys 2004 to 2010 (sample counts). Figures show density of crocodiles per kilometre of river surveyed.

Year	no. of surveys	distance (km)	Kwando	Zambezi	Chobe
<b>2004</b>	4	81	1.06	0.44	na
<b>2006/7</b>	20	525	0.9	0.47	2.84
<b>2010</b>	4	98.5	1.19	0.26	na

Summary of Aerial Surveys 2004 – 2010 (total counts).

Year	Okavango	Kwando	Mamili	Linyanti/Chobe	Zambezi
<b>2004</b>	17	40	37	58	55
<b>2007</b>	35	40	48	60	59
<b>2009</b>	33	14	31	25	48
<b>2010</b>	na	52	36	98	19

Population estimates for the Caprivi region based on aerial and boat surveys.

Crocs >2m	2004	2007	2009	2010
<b>Okavango</b>	102	210	198	Na
<b>Kwando</b>	297	297	104	387
<b>Mamili</b>	275	357	231	268
<b>Linyanti/Chobe</b>	348	360	150	587
<b>Zambezi</b>	330	354	288	114
<b>Total</b>	1352	1577	970	1356

Crocs total	2004	2007	2009	2010
<b>Okavango</b>	547	1127	1062	Na
<b>Kwando</b>	1511	1511	529	1964
<b>Mamili</b>	1293	1678	1083	1258
<b>Linyanti/Chobe</b>	556	575	240	940
<b>Zambezi</b>	142	152	124	49
<b>Total</b>	4049	5043	3038	4211



## 2. Conservation Significance

Habitat loss or alteration is probably the most significant long term threat facing Nile crocodiles. Freshwater scarcity in Africa means crocodile habitat is increasingly threatened. Illegal persecution driven by reprisals and the defence of livestock and equipment may also be significant. Other threats include nylon fishing nets, dam building and excessive disturbance. Perceptions of major stakeholders and the effective management of shared water resources are critical long term conservation issues.

Despite this, most Nile crocodile populations are relatively healthy. In 2005 CITES down listed the Namibian population from Appendix I to II. The IUCN list the Nile crocodile as Lower Risk, Least Concern. In Namibia approximately 10% of available crocodile habitat falls within or on the borders of Protected Areas.



### 3. Economic Significance

#### *Farming and Ranching*



The trade in crocodiles focuses on the utilization of skins for the manufacture of luxury leather goods. More recently the industry has begun to develop markets for other products including the meat. Crocodile farming involves the captive breeding and rearing of crocodiles whilst ranching relies on harvesting wild populations to some degree. Most Nile crocodile ranching involves the collection of wild eggs. Ranching is preferable to closed cycle farming because it retains dependence on wild populations and therefore has far greater potential for conservation and sustainable development. Crocodile farming and ranching operations are intensive production systems requiring high levels of financial investment and skilled labour.



### ***Sport hunting***

Large crocodiles are valuable sport hunting animals with a trophy value of about N\$50 000 each. Crocodile populations can support high densities and recruitment rates and therefore sport hunting can be a low impact and lucrative component of crocodile sustainable utilisation programs.



### ***Non consumptive use***

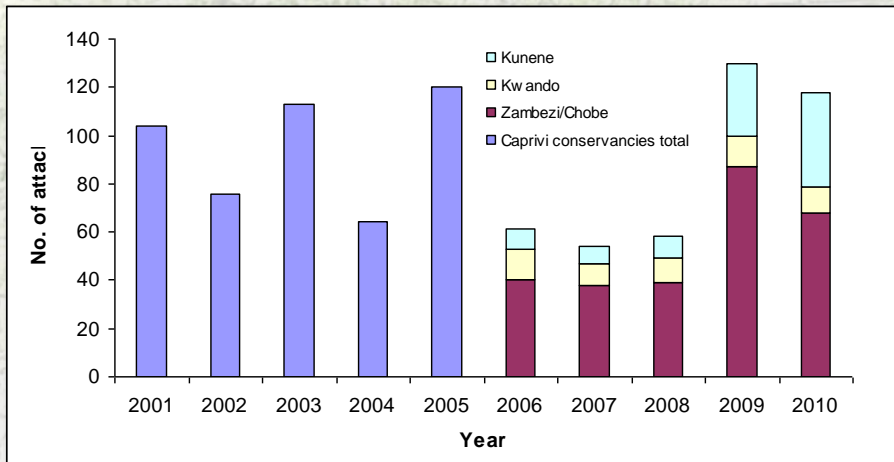
Nile crocodiles are large charismatic predators and as such they are popular with tourists. Crocodile farms are popular attractions and many tour operators are now offering specialist activities like cage diving. In Namibia there is significant room for expansion and diversification in this sector.

### ***Crocodiles as Problem Animals***

Crocodiles are notoriously good at moving in and out of densely populated areas undetected. In Namibia crocodiles attack and kill both people and livestock every year. They also destroy a

significant amount of fishing equipment. The overall impact crocodiles have on rural riverside livelihoods is significant.

Mitigation measures include the construction of crocodile proof harbours, provision of alternative water supplies, compensation and lethal control. Information dissemination through education and awareness campaigns is the key long term solution to conflict.



*Number of attacks per year and, from 2006 onwards, per region (Event Book data 2001-2010).*



#### **4. Sustainable use with multiple stakeholders and transboundary issues**



Crocodiles exhibit many desirable traits for sustainable utilisation. They have a high reproductive capacity and growth rates that are strongly density dependent both in terms of survival and fecundity.

The key to sustainability is having species and population specific management plans and tightly controlled use together with local institutions with rights over management and mechanisms to enforce those rights. Sustainable use can provide the necessary economic incentives to encourage people to maintain crocodilians and their natural habitats.

Over 90% of Namibia's crocodile habitat is shared with neighbouring countries. Apart from Angola all of these countries have existing

crocodile management plans. Furthermore, land tenure is highly variable in neighbouring countries and includes several National Parks, towns, villages and intensive agricultural areas. This fact makes it essential for Namibia to include transboundary issues as a cornerstone to long term sustainable crocodile management.





# ***Management Plan***

## **1. Vision**

**To conserve and manage the national crocodile population at biologically viable levels consistent with the demands imposed and opportunities offered by the larger socio-economic setting in which crocodiles occur in Namibia**

## **2. Ecological Objectives**

**To maintain the biological and ecological integrity of the national population of Nile crocodiles in Namibia**

### **Actions**

#### **a) Ongoing monitoring of the population**

- Multi-species aerial surveys, total count of adults (interval 2-5 years max)
- Spotlight boat surveys, sample counts for demographics (interval 2-5 years max)
- Crocodile monitoring as a management activity for conservancies (Event Book).
- MET to monitor crocs and maintain records of attacks on humans and

livestock, trophy hunting, PAC and exports (CITES)

- In time, the above data to be incorporated into area specific population models

### **b) Zone all crocodile habitat for management purposes**

Zones are based on protected area category, crocodile population densities, levels of conflict and synergy with other forms of natural resource management. Three zones have been identified:

#### **1. *Crocodile Conservation Zones***

Fully protected areas where both banks of the river or the greater landscape lie within the boundaries of the Protected Area. Use will be limited to non- consumptive tourism.

#### **2. *Crocodile Utilization Zones***

Areas close to or on the periphery of protected areas where wildlife management is a recognized form of land use. Sustainable harvest of eggs, problem animal control and sport hunting will be permitted.

#### **3. *Intensive management zones***

Areas situated away from the influence of Protected Areas where wildlife is not considered a major land use type. Manage the population for smaller size classes of crocodile (ie <2m).





### Proposed Crocodile Management Zones

- Conservation Zone
- Utilisation Zone
- Intensive Management Zone

### c) Ecological research to refine management systems

- Genetic portfolios
- Recruitment
- Breeding habitat suitability
- Movement patterns
- Locality or ecosystem specific diets
- Population abundance including survey methodology
- Status and trends in prey base

### 3. Economic Objectives

**To enable the full economic potential of crocodiles to be realized according to the provisions for sustainable use in Namibia's Constitution**

#### Actions

**a) The development of crocodile ranching program based on wild egg harvests**

A crocodile ranching program will be developed in accordance with local resources, abilities and stakeholders.

**b) Restrict sport hunting to 25 specimens and modify according to trends**

- Trophy hunting should be restricted to animals greater than 3.2 m
- Aerial survey data and trophy hunting feedback information used as primary information in setting quotas.
- A quota of 4% of large animals may be set.

**c) Encourage the development of crocodile centric non-consumptive tourism**

- Local stakeholders made aware of value of crocodiles as tourist attractions
- Tourist operators encouraged and assisted to develop crocodile specific activities



- NGOs should be encouraged to support specialist crocodile tourism

**d) Encourage Research & Development to maximize value**

- Market research on the role of Namibia's economic capacity and brand name *vis a vis* crocs
- Developing platform to link crocodile conservation with regional development
- Explore new products and markets

**4. Social Objective**

**To promote multi-stakeholder management of crocodiles in those places where they interact with people in order to reduce conflict**

**Actions**

**a) Develop a problem animal control protocol to facilitate rapid response**

- Verify attack and identify problem animal
- In case of livestock attacks problem animal should be harvested as trophy animal
- Animals responsible for human fatalities should be destroyed by trapping or shooting

- No action required for destruction of fishing equipment
- MET should oversee crocodile PAC initially but local stakeholders should be incorporated over time

**b) Encourage education and awareness on crocodiles and human crocodile conflict**

- Government and NGOs should provide information to local communities
- Easy-to-interpret signs warning of the dangers of crocodiles should be advertised around riverside towns and in community centers.
- A series of workshops and training exercises should be conducted to provide baseline information to regional stakeholders

**c) Continue to pursue loss-offsetting schemes**

Loss-offsetting should work in conjunction with zoning and ensure proportionate response and compensation value linked to sustainable utilisation. Compensation should be directly balanced with the overall benefits. The Human Wildlife Self Reliance Scheme (HWSRS) provides an ideal framework on which to build.

**d) Research**

- Socio-economic review of HCC to determine total cost and identify worst affected areas.



- Identify measures suitable for immediate deployment in the worst affected areas
- Ecology and behavior of crocodiles in human dominated landscapes (e.g. upper Okavango River)

**e) Other actions**

Crocodile proof harbors and alternative water sources should be encouraged where possible.

## **5. Regional Objectives**

**To ensure optimal management of Nile crocodiles at the greater landscape level**

**Actions**

**a) Encourage a transboundary agenda**

- Maintaining liaison between stakeholders on either side of the international border;
- Maintaining linkages between crocodile populations;
- Ensuring compatible forms of land use on either side of the international boundary;
- Co-operating on law enforcement directed at illegal persecution;
- Collaborating on air and boat surveys
- Setting hunting quotas and monitoring the sustainability of hunting

- Problem animal control
- Sustainable harvesting of crocodile eggs and/or crocodiles

**b) Collaboration with relevant authorities**

- Identify those stakeholder initiatives which have similar or relevant management actions. (eg dept. fisheries)
- Establish a platform for collaboration and synchronize management effort where possible

## **6. Finance and Capacity**

Population size determines the opening stock. There are no data for the Kunene and upper Okavango and therefore the following value estimates will be confined to the Caprivi region:

Stock	Females	Males	Eggs per year
<b>Total numbers</b>	<b>529</b>	<b>417</b>	<b>17986</b>
Value (NAD\$)	1058000	1251000	693600

The implementation costs of the management plan will vary according to the type and level of management actions undertaken. The full benefits of a formal crocodile management program will take at least ten years to realise.



Preliminary calculations suggest management costs of approximately N\$500 000 and benefits between N\$1 and 1.5 million Namibian dollars per year.

## **7. Risks and assumptions**

Although several key assumptions have been made, there is little risk that the proposed management interventions could have an adverse effect on the status of wild crocodile populations in Namibia provided the entire exercise is based on adaptive management with sound monitoring systems in place.

