

# Understanding the Penguin Problem

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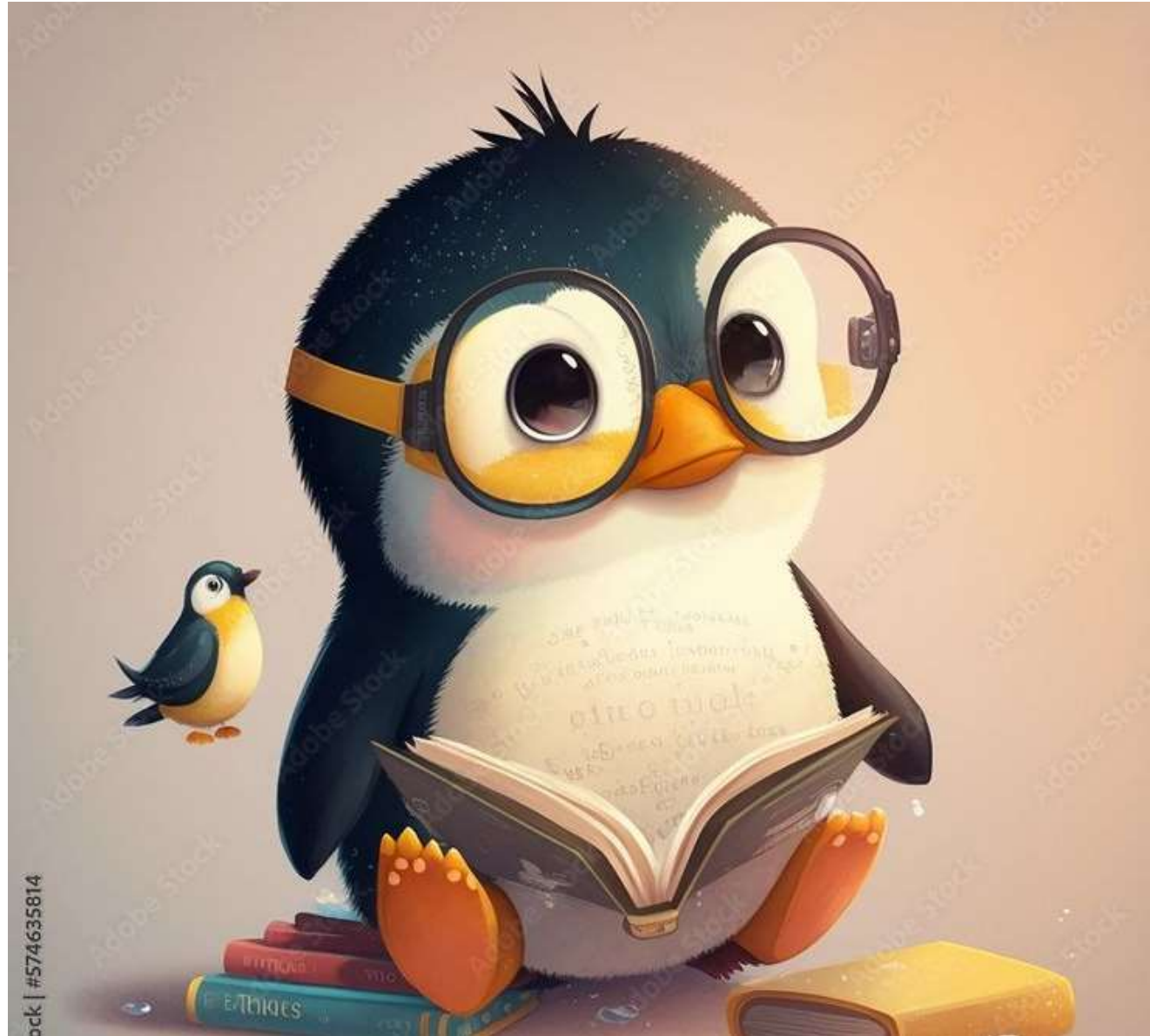
The University of the Witwatersrand

# Structure of Presentation

A group of African penguins is shown in a natural coastal setting. The penguins are standing on a sandy beach, with the ocean and waves visible in the background. The image is slightly faded, serving as a background for the text.

1. Habitat and Distribution
2. Physical and Behavioural Characteristics
3. Breeding and Lifecycle
4. Impact of Climate Change on the African Penguin
5. Understanding the Penguin Problem
6. What happens post projection?
7. Questions

Let's take a closer look at the African Penguin!



# 1. Habitat and Distribution

- Endemic to southern Africa, mainland colonies are found in places like Simons Town and Boulders Beach.
- 27 breeding sites.
- Found in temperate coastal regions (20-45km away from their colonies during breeding season) and nest on land in burrows and under vegetation.
- Habitual behaviour – regulates temperature and avoids predators.
- Relies on the Benguela Current – supports high fish productivity due to upwelling.
- Risks to nesting sites in mainland colonies – urbanisation, coastal development, tourism, rising sea levels and storm surges.

## 2. Physical and Behavioural Characteristics

- Weigh between 2.2-3.5 kg and measure between 60-70 cm in height.
- Black and white plumage – countershading and aiding in camouflaging while swimming and pink patches above the eyes – aids in thermoregulation.
- They are pursuit divers, and their diet mainly consists of sardines and anchovies, as well the Cape Horse Mackerel, squid and crustaceans when food is scarce.
- They usually feed where their prey species aggregate near the upwelling zones.
- They are social animals, often seen in groups both at sea and on land and make use of a variety of vocalisations to communicate.

### 3. Breeding and Lifecycle

- African Penguins are monogamous, and the breeding season varies but peaks between March and May.
- Females lay two eggs in burrows, under vegetation or in guano deposits, with an incubation period of 40 days.
- Chicks are guarded and fed by both parents for 2-3 weeks after which the parents alternate between foraging and guarding the chicks.
- Chicks develop their wing feathers at +/- 60 days old and leave the nest after 60-90 days depending on food availability.
- Juveniles are independent but face high mortality due to predation and food scarcity.
- **Breeding success is largely dependent on local prey abundance.**

### 3. Breeding and Lifecycle

- There are 4 stages in the lifecycle of a penguin:
  1. Egg stage – eggs are vulnerable to predators, extreme temperatures and flooding. Prolonged parental absence can lead to overheating and abandonment.
  2. Chick stage – chicks grow rapidly and rely on their parents for food. Starvation can occur when food availability is low.
  3. Juvenile stage – penguins spend the first 1-2 years away from the colony and return when they are sexually mature.
  4. Adult stage – penguins reach sexual maturity around 4 years of age, while some may start breeding earlier (2-3 years). They have an average lifespan of 15-20 years in the wild.

## 4. Impact of Climate Change on the African Penguin: Food Availability

- Climate change causes changes in sea temperature and currents impacting the availability and timing of prey.
- This leads to spatial and temporal mismatches between the penguins' breeding cycles and food availability.
- These mismatches negatively impact their reproductive success – adaptation to a changing climate is not rapid enough to cope with climatic shifts.
- During breeding season, it is essential for penguins to forage near their colonies to effectively support their young.
- Increasing distances to food sources during breeding season because of the scarcity of food depletes their energy reserves and impacts their ability to feed their offspring.



## 4. Impact of Climate Change on the African Penguin: Heat Stress

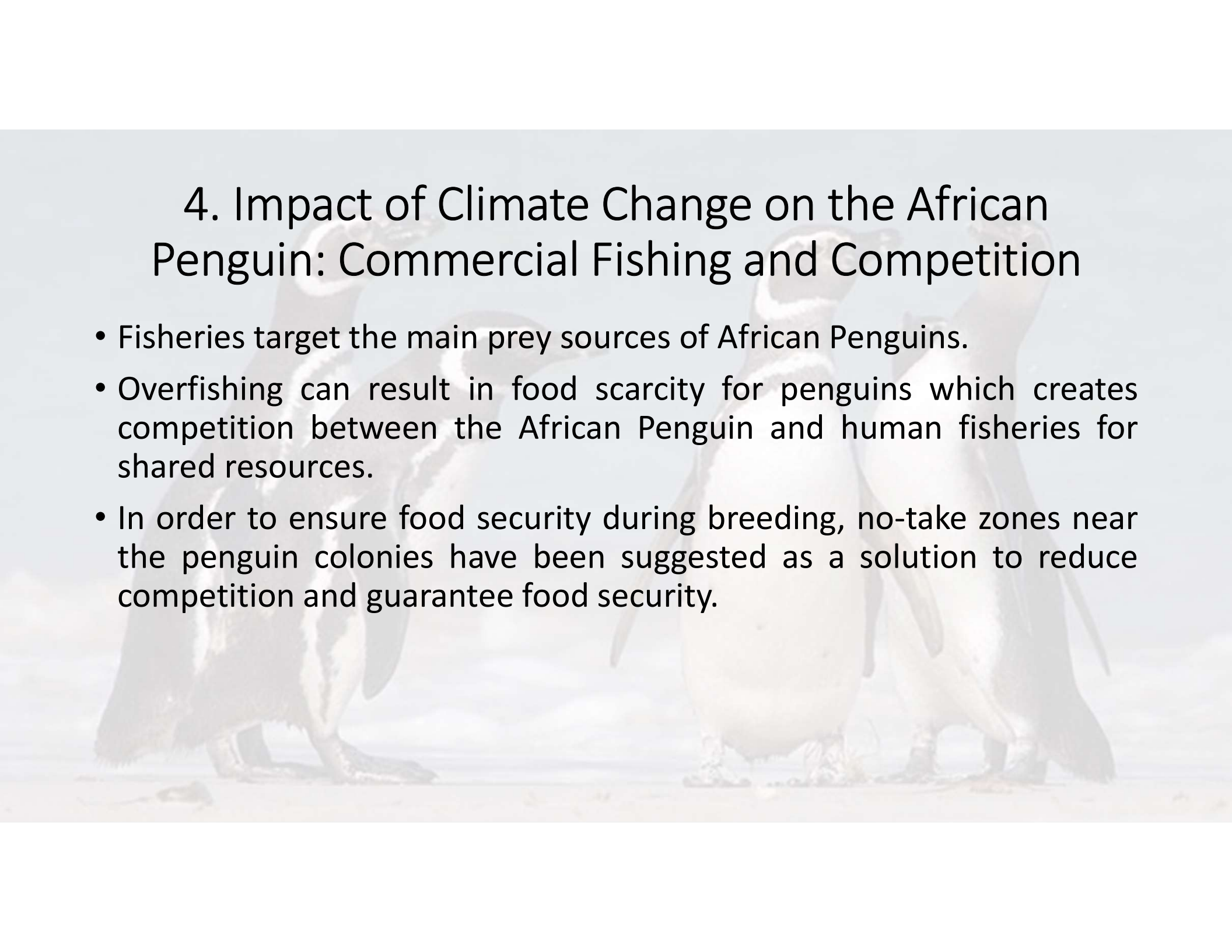
- Although African Penguins are biologically and behaviourally adapted to temperate climates, extreme heat events place strain on their thermoregulatory abilities which can result in heat stress.
- This reduces their survival and reproductive rates.
- Eggs and chicks are more vulnerable to heat waves as these stages in the cycle of a penguin's life is extremely sensitive.
- Heat stress can limit the foraging abilities of adult penguins and compromises breeding success.
- Prolonged exposure to heat can lead to chick and egg abandonment when penguins are not able to balance thermoregulation and other activities.

## 4. Impact of Climate Change on the African Penguin: Habitat Degradation

- An increase in the frequency and intensity of Extreme Weather Events (EWEs – e.g., tropical cyclones and flooding ) has resulted in the destruction of nesting sites.
- Nesting sites support optimal environmental conditions for breeding and when habitat destruction occurs, penguins may need to relocate to subtropical habitats which are less optimal.
- Relocation = Reduction in breeding success due to predators, poor nesting material or unsuitable temperatures.
- Vegetation loss around colonies due to changes in rainfall patterns and anthropogenic activities reduces the availability of shaded nesting sites and exposes penguins to heat stress during breeding seasons.

## 4. Impact of Climate Change on the African Penguin: Commercial Fishing and Competition

- Fisheries target the main prey sources of African Penguins.
- Overfishing can result in food scarcity for penguins which creates competition between the African Penguin and human fisheries for shared resources.
- In order to ensure food security during breeding, no-take zones near the penguin colonies have been suggested as a solution to reduce competition and guarantee food security.



Research shows that the African Penguin is sensitive to changes in climate...



## 5. Understanding the Penguin Problem

- Within the context of unprecedented climate change, modelling a projection of the year at which the African Penguin species will likely face a significant threat to its survival, potentially leading to its extinction will assist conservation efforts.
- Climate change poses a major threat to the survival of the African penguin population, as it may adversely impact the species' access to food, potentially disrupting the African penguin's breeding patterns, while also exposing African penguins to dangerous levels of heat stress, and habitat degradation.
- Therefore, such projections inform the urgency of conservation efforts and places the threat of extinction within a time frame.

## 6. What happens post projection?

- The protection of foraging grounds through the creation of marine protected areas needs to be prioritised.
- Regulating commercial fishing and ensuring that regulation is locally enforced can reduce the competition for prey species.
- Environmental monitoring and modelling should be used to monitor the impact of climate change on prey abundance and distribution so that conservation strategies can be adapted accordingly.
- The creation of artificial nests that optimise environmental conditions for the longevity and reproductive success of penguins will enhance habitat resilience against climate induced change.

# References

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Thank you for  
your time and  
we welcome  
any questions  
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