

2026 IM²C
Protecting Wildlife at Scale



National parks, including large **wildlife** reserves, protecting endangered plant and animal species, yet often their size and terrain make continuous monitoring difficult. Reserves such as Etosha National Park in Namibia span thousands of square kilometers and include open savanna, salt pans, waterholes, road networks, and multiple access points. Despite the presence of trained rangers, limited personnel and resources make it challenging to prevent illegal activities such as poaching and unauthorized entry. Technologies, including, but not limited to aerial drones, satellites, fixed monitoring systems, and AI-assisted detection, offer opportunities to support ranger efforts. However, these tools also require coordination, staffing, and thoughtful deployment to be effective. Conservation organizations must decide how to balance human patrols and technology to provide meaningful protection across space and time.

The International Mission for Monitoring Conservation (IMMC) has asked your team to develop a modeling approach to help guide protection strategies for large wildlife reserves and national parks, beginning with Etosha National Park as a case study.

Your Task

The IMMC seeks a modeling-based approach to inform protection planning for Etosha National Park, a large and complex wildlife reserve. Your work should consider how limited human and technological resources can be coordinated to protect wildlife across the park over time, and how “protection” can be defined and measured in a realistic, practical, and quantitative way.

Requirements

1. Conservation priorities and defining protection

Identify and prioritize the major conservation challenges faced by the park, noting that risks may differ by species, habitat, location, or type of threat including both human-driven and natural threats (for example, poaching, habitat disruption such as forest fires, or human–wildlife interaction). Using these priorities, clearly define what it means, in practical terms, for wildlife in the park to be “protected”. Your definition may vary across species or regions and should be quantitatively measurable within your modeling approach.

2. Resource allocation model

Develop a mathematical model to allocate protection resources, including both existing resources and those newly identified by your team, such as personnel, patrols, monitoring technologies, or other interventions, to address your identified conservation priorities. Your modeling approach should account for limited resources, geographic considerations, and uncertainty, and should emphasize strategic deployment rather than complete coverage.

3. Protection over time and staffing need

Use your modeling approach to analyze how well the park is protected over time and to estimate the number of human personnel required to maintain your chosen level of protection. A detailed cost analysis is not required, but consideration of resource use, feasibility, and practicality is expected.

4. Sensitivity and scenario analysis

Investigate how changes in assumptions or available resources affect your strategy. For example, consider how reduced personnel, fewer technological assets, or altered patrol schedules influence protection.

5. Model strengths and limitations

Discuss the strengths and limitations of your approach, including assumptions that may restrict its applicability.

6. Adaptation to other protected areas

Demonstrate how your modeling approach can be adapted for use at two other national parks or wildlife reserves located on different continents. The IMMC asks your team to provide an adaptation plan that addresses the following:

- Which components of your model structure would remain unchanged?
- Which inputs or parameters would need to be modified (for example, terrain and mobility, access points, road networks, threat types, species priorities, or detection capabilities)?
- What types of data would be required to calibrate these modified inputs?
- How you would expect protection metrics and recommended resource deployments to shift under the new conditions?

7. Communication Deliverable: Letter to the IMMC

Write a two-page, non-technical letter to the IMMC clearly communicating your approach, recommendations, and key insights. Your letter should be accessible to decision-makers without technical backgrounds. One of the two pages may contain, if you choose, one visual graphic to help communicate your strategy.

Submission Format

Your PDF submission paper must be typed and in English with at least 12-point font size using page size: A4 with margins at least 1.5cm (OR) page size: Letter with margins at least 0.6in. For detailed information about IM²C submission guidelines and the general expectations for each portion of your solution please review the [Full Submission Guidelines](#).

Your PDF submission should consist of:

- One-page Summary Sheet.
- One-page Table of Contents.
- *Letter to the IMMC* (maximum two pages, nontechnical)
- Complete solution (maximum 20 pages)
- Reference List.
- [AI Use Report](#) (if used).
- The following items do not count toward the 24-page limit: Reference List, Appendices and [AI Use Report](#) (if used).

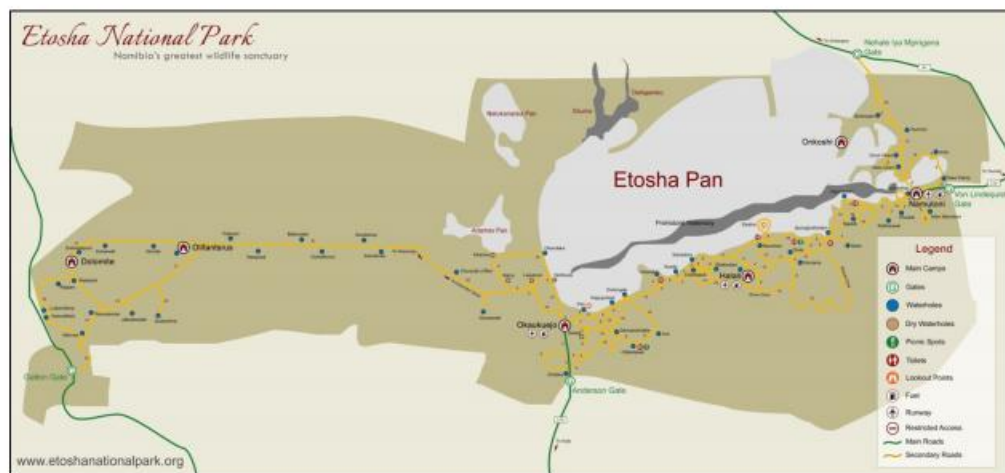
Note on AI/LLM usage: There is no specific required minimum page length for a complete IM²C submission. We permit the careful use of AI such as ChatGPT, although their use is not necessary to create a solution to this problem. Teams that use any generative AI tools must follow the [IM²C AI use policy](#) and include an AI Use Report at the end of the PDF submission. If no AI Use Report is included, the team is affirming that no generative AI or large language model tools were used at any stage of the work. The AI Use Report does not count toward the 24-page limit.

Note on presenting your solution: Teams may find it helpful to include visual or structured elements to support and clearly communicate essential aspects of their modeling approach and proposed solutions. Examples include: a map or table summarizing protection metric(s) across the park over time; an illustration of how resources such as patrols, personnel, or monitoring technologies are allocated; at least one sensitivity or robustness analysis; or a brief comparison identifying which components of the model remain unchanged and which must be modified when adapting the approach to other reserves. Any such elements that teams wish the judges to consider should be included within the main solution document and therefore count toward the 24-page limit.

Etosha National Park Maps

<https://www.etoshanationalpark.org/map>

<https://www.etoshanationalpark.org/media/Etosa-Map-2025.jpg>



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Protecting Wildlife at Scale – Background information for Etosha National Park

The following information is provided to help teams start to understand and explore qualitative and quantitative aspects of Etosha National Park. All values are approximate* and are intended to support modeling, not to constrain assumptions. Teams may refine or add data as long as all additions and sources are clearly justified within their solution. It is expected that teams may encounter more specific data, alternative estimates, or sources that do not fully agree, and that such differences will be thoughtfully incorporated into their modeling choices.

Etosha National Park — Reference Dataset

Category	Approximate Values	Notes
Park Area	22,935 km ²	Etosha is one of the largest wildlife reserves in Africa.
Annual Visitors	~200,000	Typical pre-pandemic order of magnitude estimate.
Length of Roads	3,551 km of roads	Including gravel and dirt routes for access/patrol.

Wildlife (Examples)

Species / Group	Status or Feature	Notes
Mammal Species	114 species	Includes large and small mammals.
Bird Species	More than 400 species	Resident and migratory bird species.
Black Rhinoceros	Endangered	Etosha contains a large black rhino population; poaching is an ongoing issue.
Elephants	Abundant	~2,500 elephants estimated in the broader surrounding ecosystem.
Lions	Present	Part of key predator community.
Leopards, Cheetahs	Present (less common)	Part of key predator community.
Plains Herbivores	Zebras, springbok, oryx, kudu, etc.	Common prey species

Human Resources & Management

Resource Type	Approx. Value	Notes
Park Staff (Ministry)	295 personnel	Ministry of Environment and Tourism staff stationed in Etosha.
Fence Perimeter	~850 km	Park boundary fencing supports management.