Biodiversity considerations at the project level

Module 2a

Content of Module 2a

Overview of the ESIA process and introduction to the Mitigation Hierarchy

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- Introduction to the mitigation hierarchy

Screening, scoping and biodiversity baselines

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- Baseline assessment
- Tools, data and guidance

Mitigating and monitoring biodiversity impacts

- Impact mitigation
- Monitoring and verification

EIAs in practice in Mozambique

EIA exercise

2.1 An overview of the ESIA process and introduction to the mitigation hierarchy

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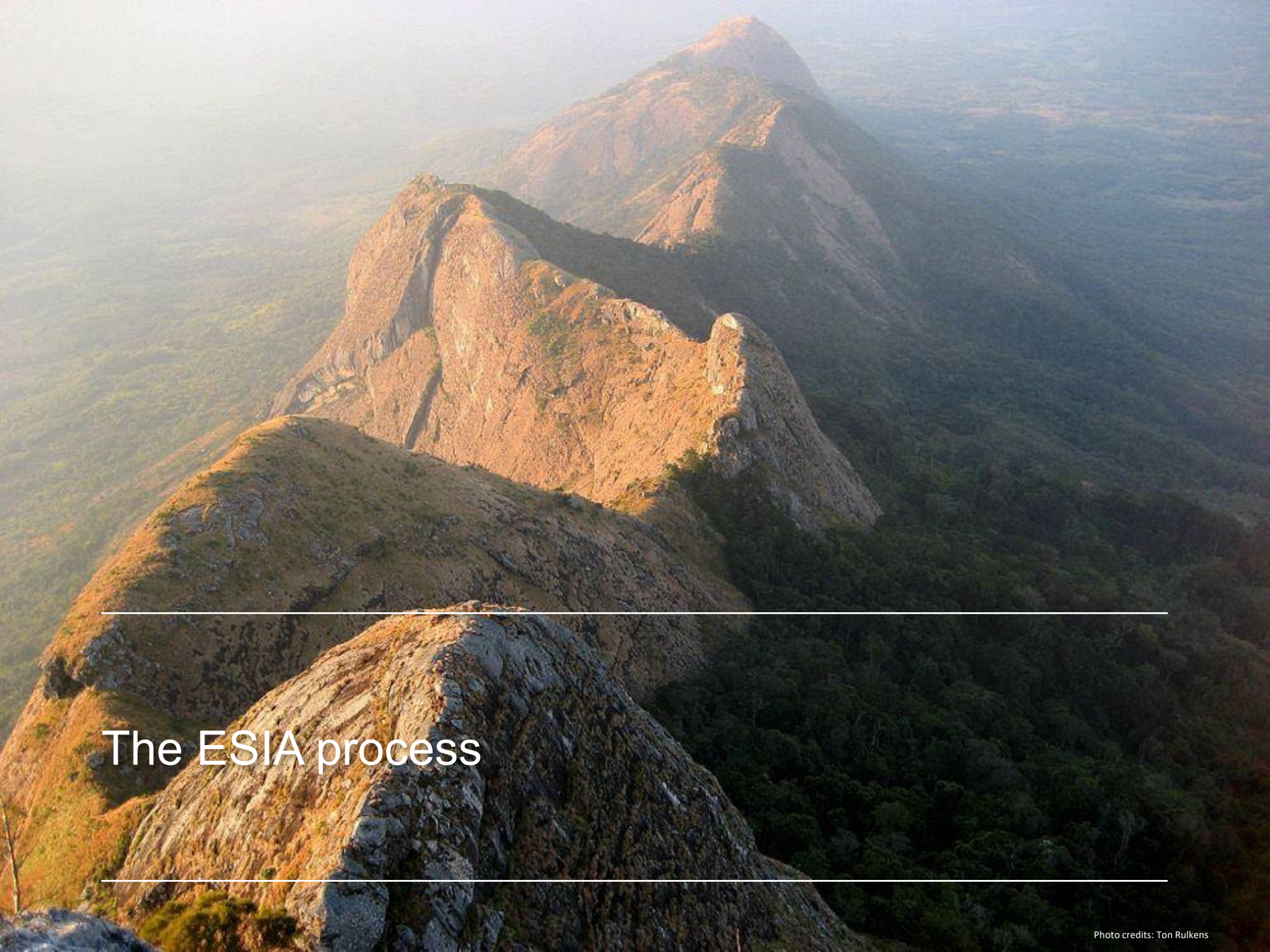
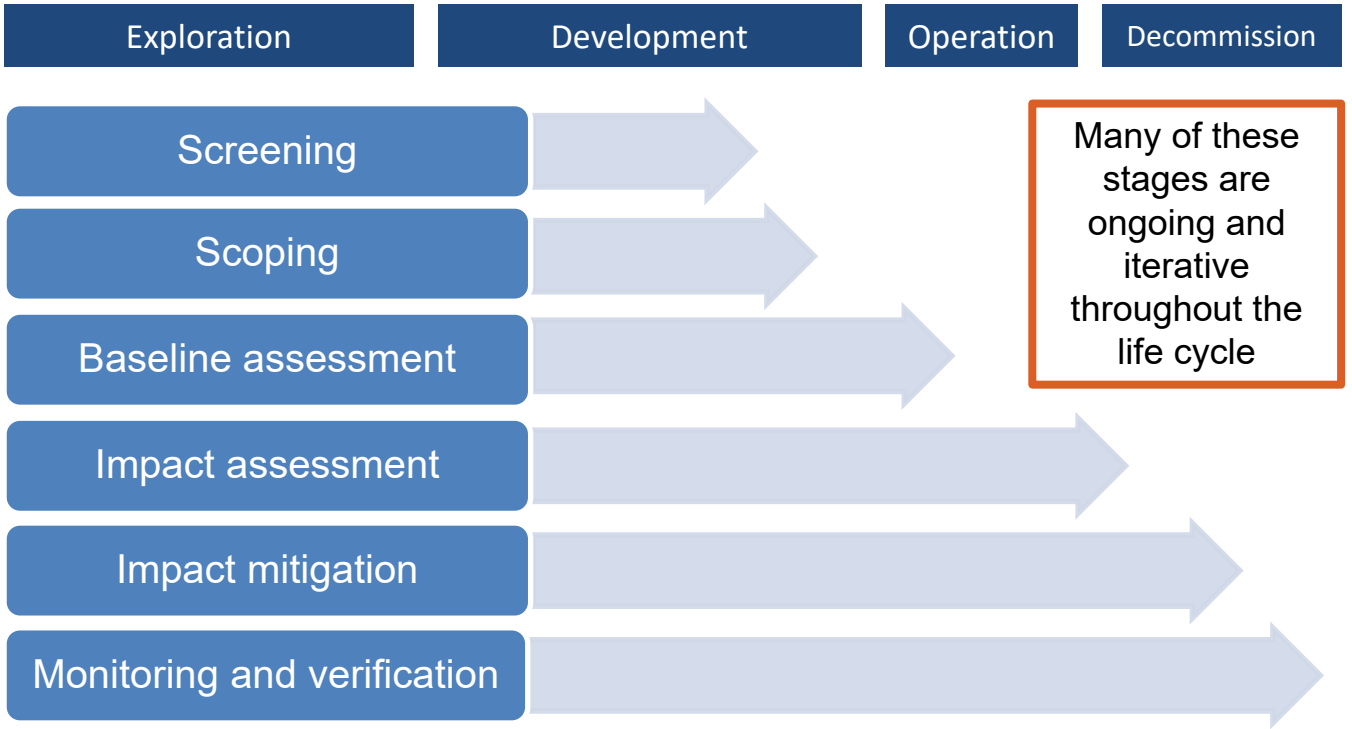


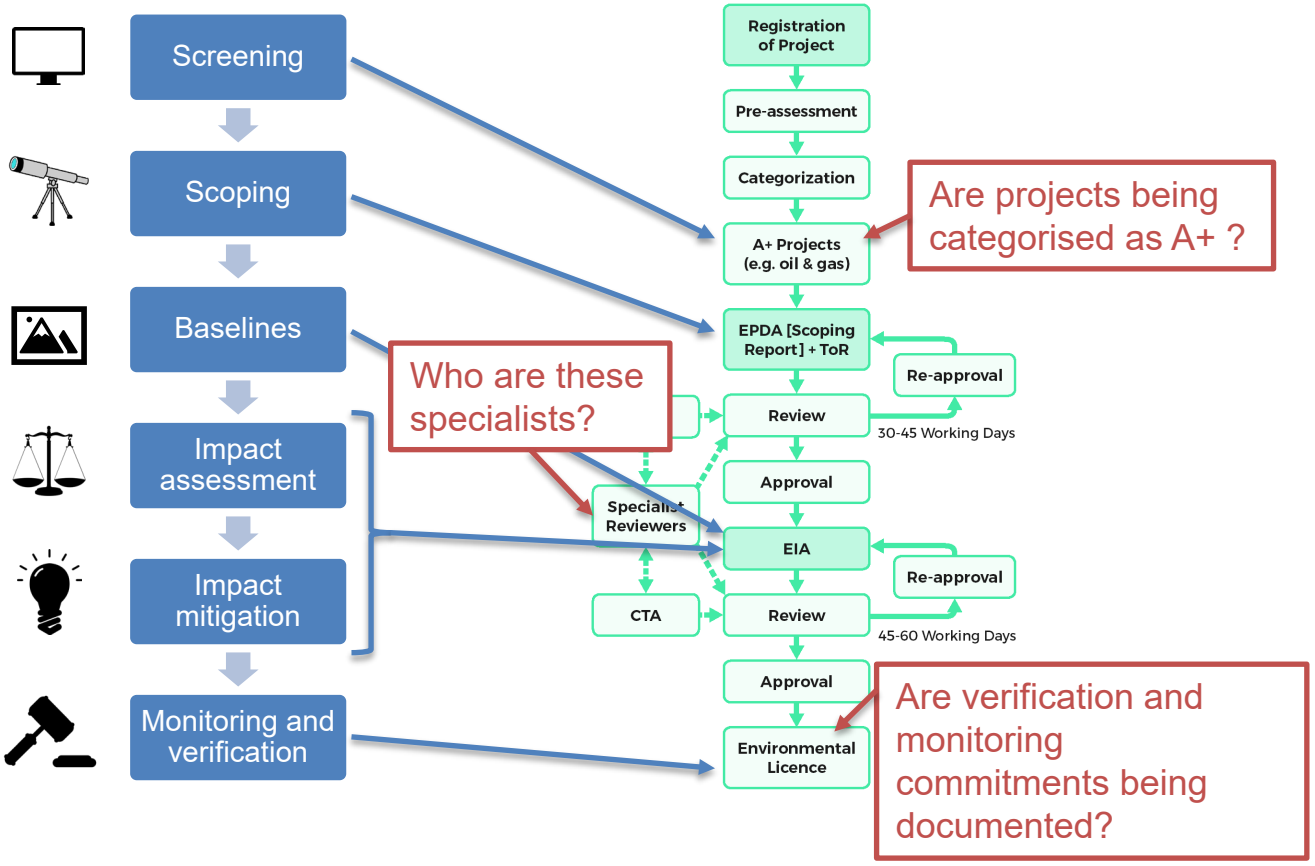
The ESIA process

Photo credits: Ton Rulkens

Biodiversity management throughout the upstream project life cycle



How does this relate to the ESIA process in Mozambique?

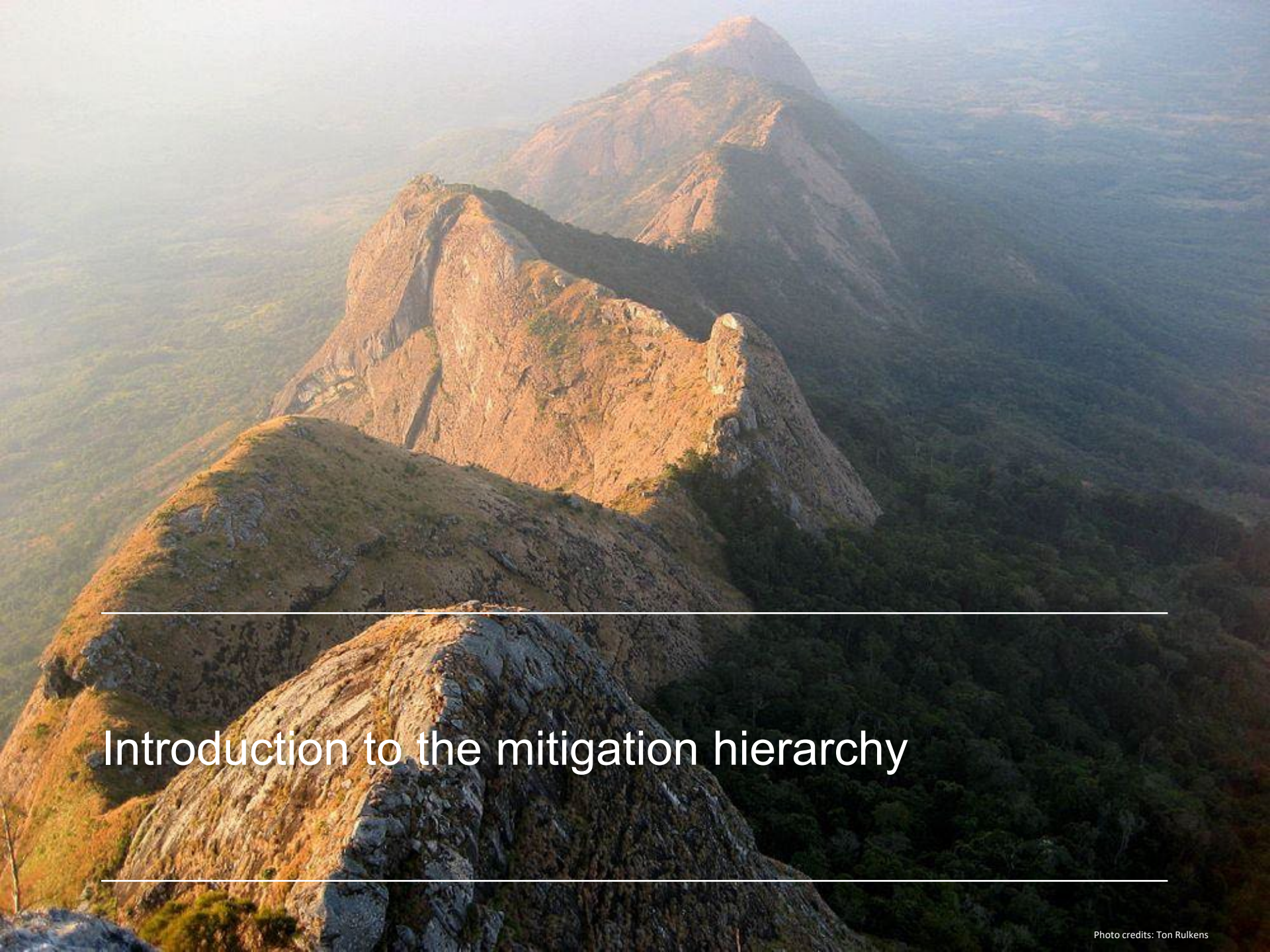


What are Biodiversity Action Plans?

- Biodiversity Action Plans (BAPs) are developed to accompany mitigation programmes as part of project implementation

- BAPS are inspired from National Biodiversity Strategies and Action Plans (NBSAPs) which are required by the CBD for parties to protect and restore their biodiversity an ecosystems

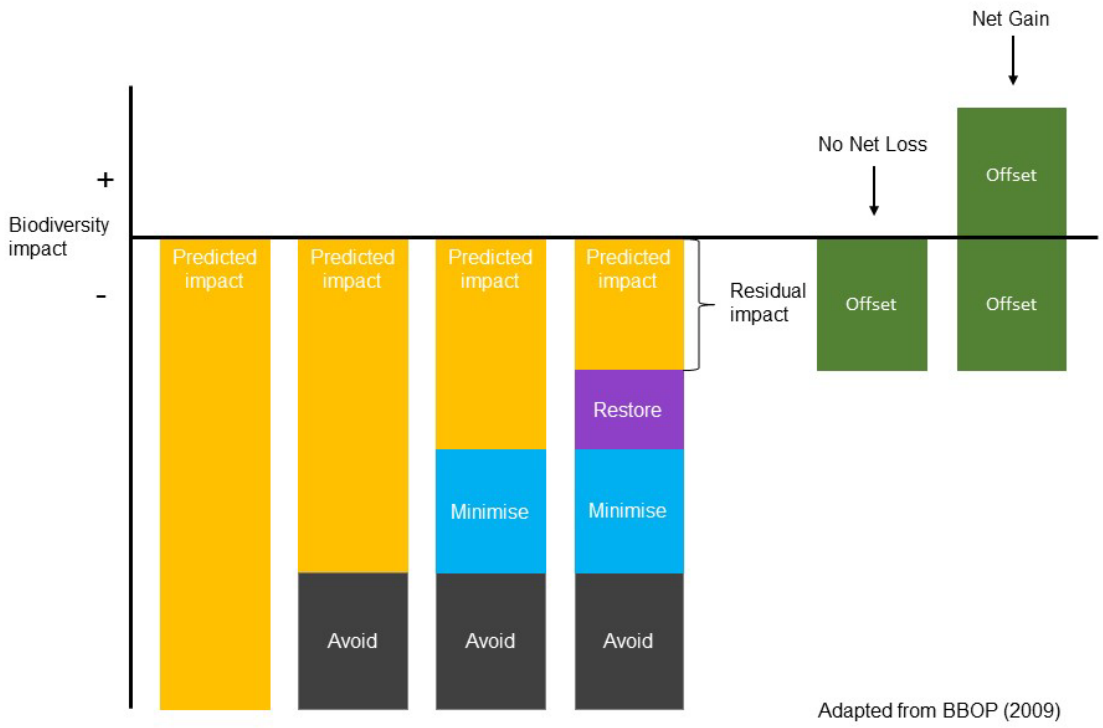
- Principal elements of BAPs typically include:
  - Preparing inventories of biological information for selected species/habitats
  - Assessing the conservation status of species within specified ecosystems
  - Creation of targets for conservation and restoration
  - Forming budgets, timelines and institutional partnerships for implementation



Introduction to the mitigation hierarchy

Photo credits: Ton Rulkens

The mitigation hierarchy

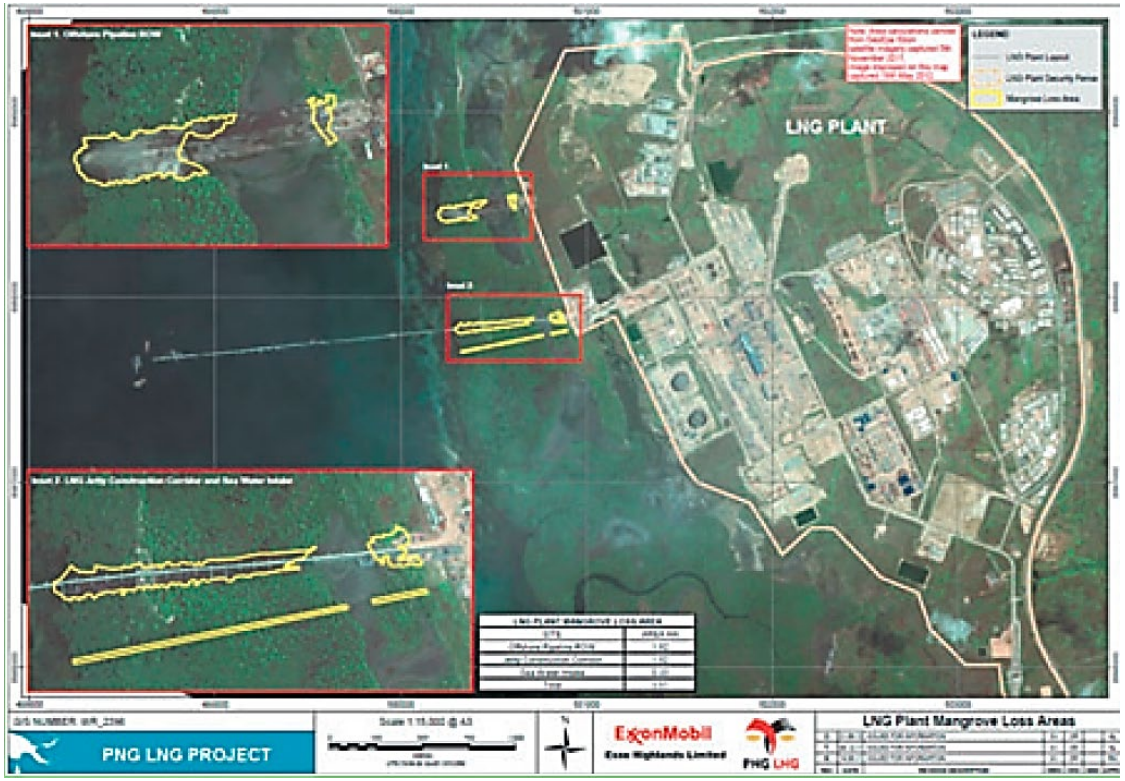


Why do companies adopt the mitigation hierarchy?

No net loss: project-related impacts on biodiversity are balanced by measures taken to avoid, minimize, restore and finally to offset

Net gains: additional conservation outcomes that can be achieved through the development of a biodiversity offset

Case study: ExxonMobil in PNG



Mitigation of physical loss of mangroves

Impact Type	Impact Source	Mitigation Measures	
Physical loss and disturbance of mangrove habitats	Temporary and permanent disturbance and loss of mangrove and species from construction and operational activities	**Avoidance**	• Load Out Facility (jetty) located away from areas of dense and mature growth
		Minimisation	• Minimisation of disturbance during construction in areas outside of the direct construction footprint
		Restoration	• Restore areas temporarily affected by physical impacts. • Approaches to be established through the development of a biodiversity action plan (BAP) and/or reinstatement plan (RP) to define approach to manage reinstatement.

Key messages

- The ESIA process is the key legal tool for project-level impact assessment and mitigation
- The mitigation hierarchy is a best practice tool to limit negative impacts that should be considered at all stages of a project
- The mitigation hierarchy follows an order of preference: avoid as far as possible, then minimise remaining impacts, then plan to restore, and as a last resort offset any residual impacts
- The mitigation hierarchy is iterative and should be used throughout the design and implementation of a project

2.2 Screening, scoping and biodiversity baselines

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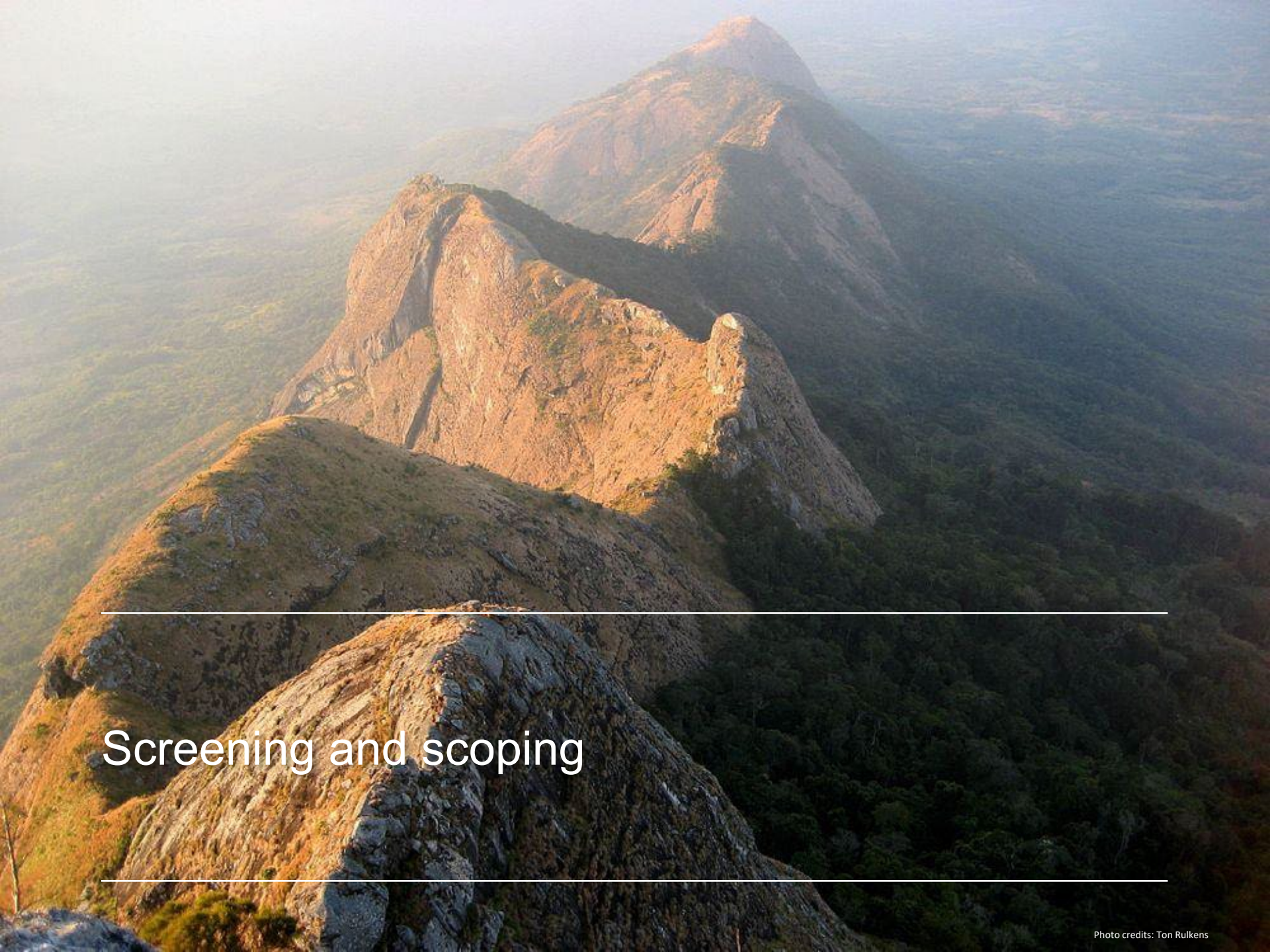
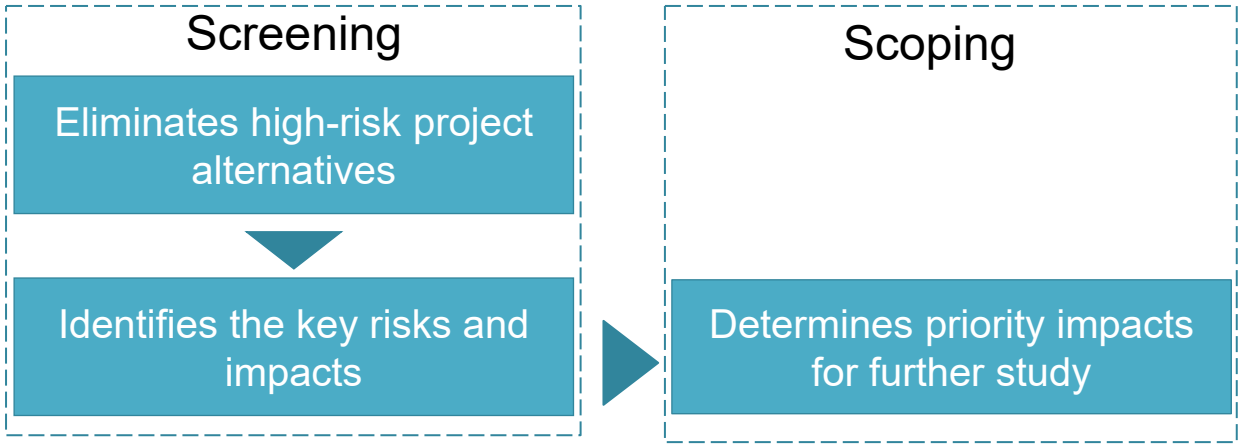


Screening and scoping

Photo credits: Ton Rulkens

Screening and scoping



For regulators
to determine if an ESIA is required and if so, to what level. In Mozambique the screening decision is made on several criteria. Decree 54/2015 provides categories of projects.

For companies
pre-ESIA assessment of the potential impacts from proposed project and its alternatives

Screening and scoping in Mozambique

	Screening	Scoping
Purpose	• Determines level of assessment needed • Eliminates higher-risk alternatives	Establishes ESIA boundaries, including: • Project area • What to include in the ESIA • How to conduct the ESIA
Outcome	Two possible outcomes: • Categorisation of the activity (depending on the assessment needed) • Rejection of the activity	• Environmental parameters to be assessed in the ESIA • Scoping study • ESIA Terms of Reference
Actors involved	• Project proponent • Screening decision authority	• Project proponent • Technical reviewer
Regulatory requirements	Required for all activities with possible impacts on the environment (Decree 54/2015)	Developments in categories A+ and A require scoping, to a different extent. • Categories A+ and A require an Environmental Pre-Viability Study • Category B requires Terms of References for the Simplified Environmental Report

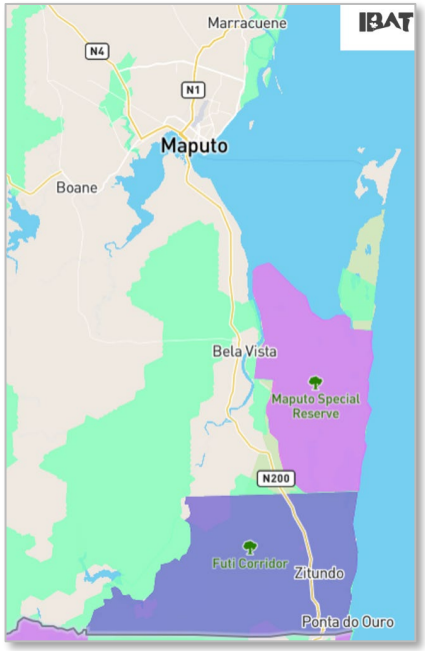
How to screen out high risk options?

Protected areas

Threatened species

Sensitive habitats

Priority ecosystem services



Source: ibat-alliance.org

Critical to early selection of facility locations and routing, and a project's overall biodiversity action planning.

What is the role of spatial data in screening?

Spatial data are available on the key features used in screening:

Protected areas

World Database on Protected Areas (WDPA), and national sources

Threatened species

Species range data from IUCN Red List

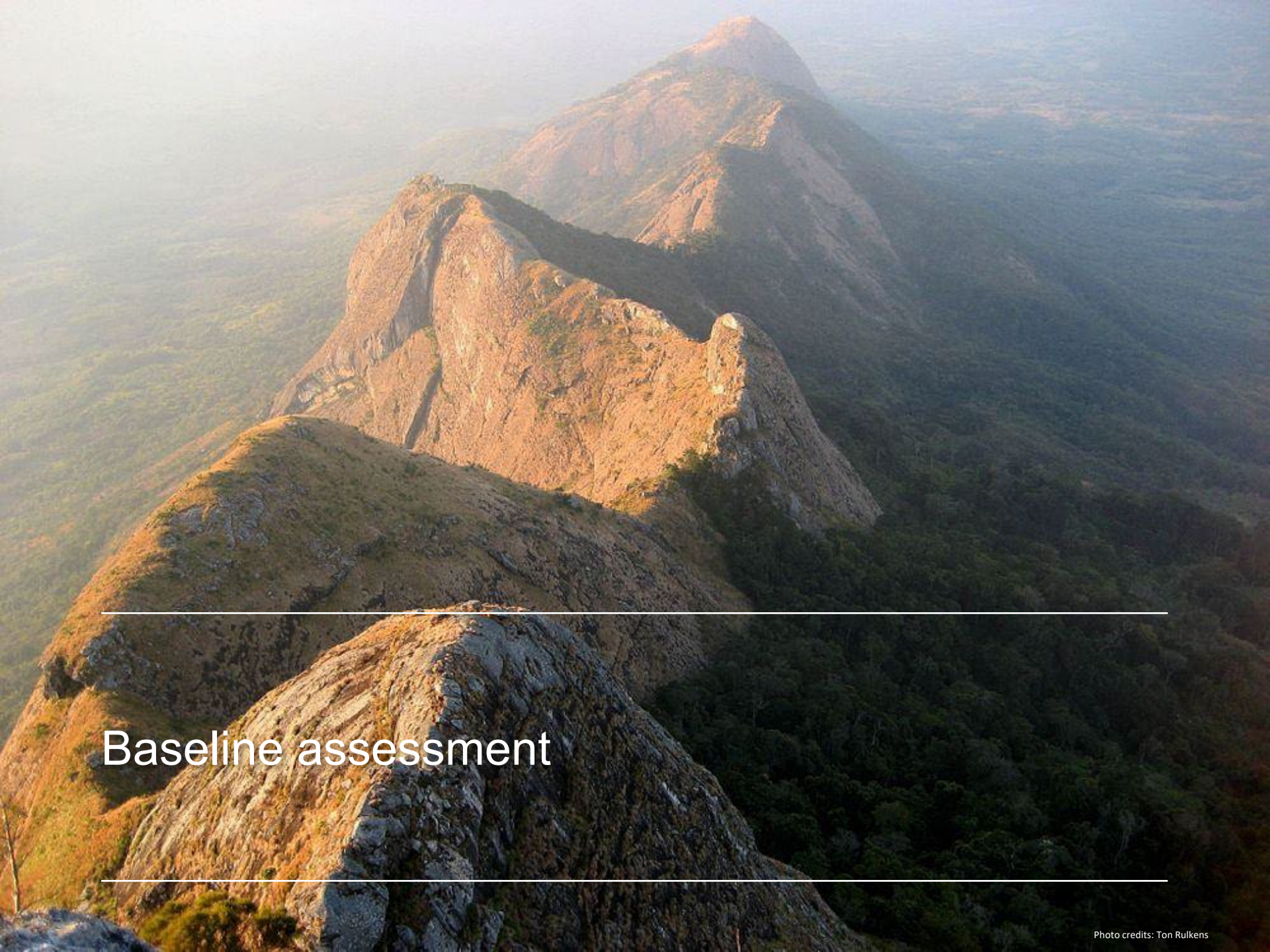
Sensitive habitats

Global or national datasets (e.g. mangrove, coral reef)

Priority ecosystem services

Harder to obtain but could include fishing areas and coastal protection

Data can be further examined through the scoping stage, in consultation with experts



Baseline assessment

Photo credits: Ton Rulkens

What is a baseline assessment?

Baseline:

‘A description of **existing conditions** to provide a reference (e.g. pre-project condition of biodiversity) **against which comparisons** can be made (e.g. post-impact condition of biodiversity), allowing the **change to be quantified**.’

- Establishes status of biodiversity before operations
- Informs impact assessment and mitigation
- Informs primary data collection for long term monitoring and measuring performance (metrics)
- More detailed assessment than screening and scoping

How should a baseline be developed?

Biodiversity features identified during scoping

+

Additional biodiversity features within the Area of Influence

Identify the biodiversity baseline study area (area of influence)

→

Identify the scope of the baseline study

→

Review existing information on the biodiversity values

→

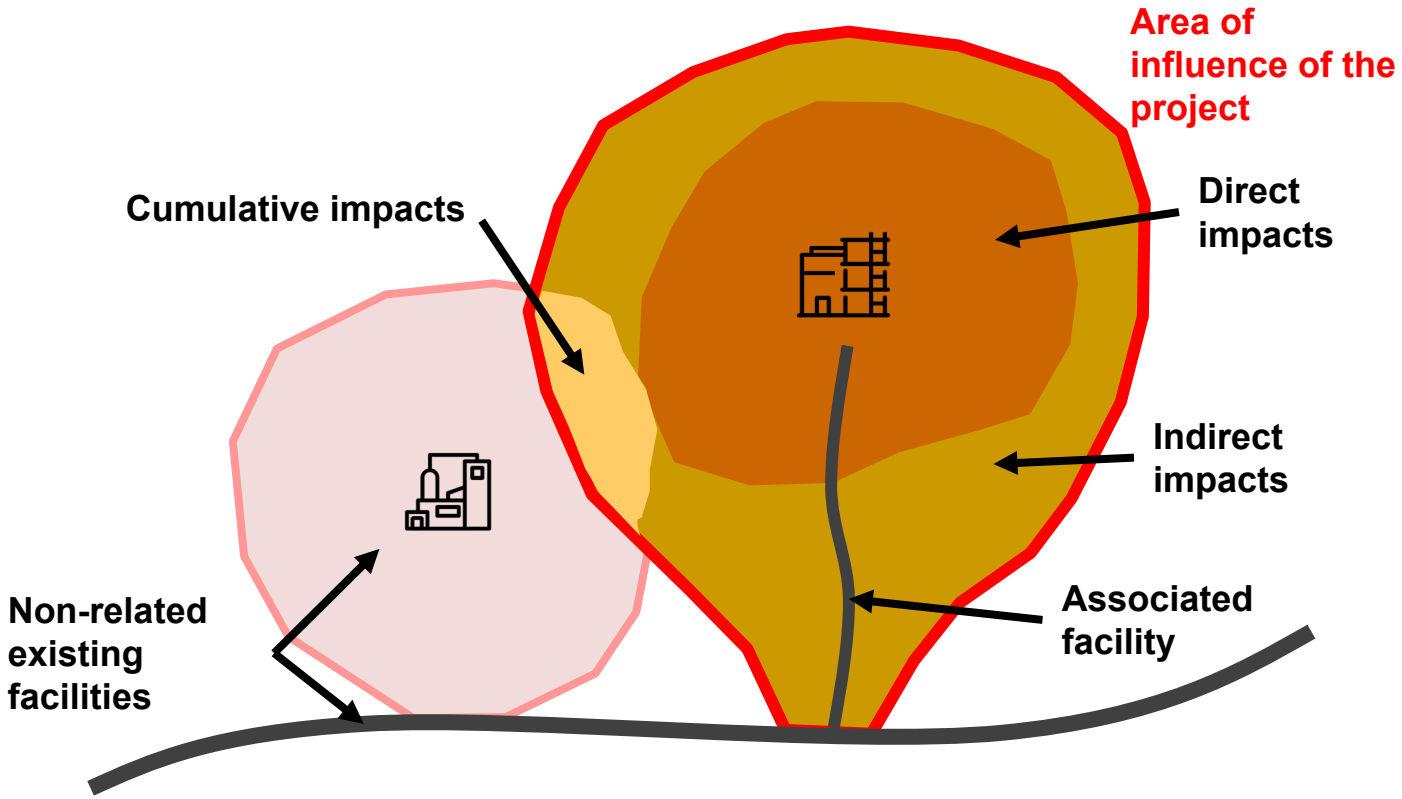
Conduct field-based assessment of biodiversity values (if necessary)

→

Integrate the data into a baseline report

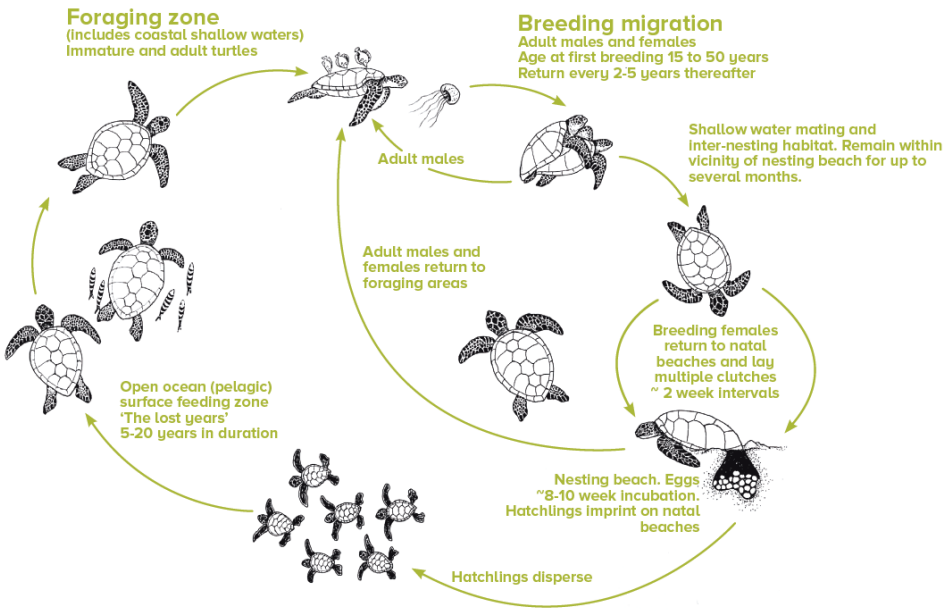
Engage stakeholders and experts

Defining the area of influence



The complexity of baselines

- Many species demonstrate complex life cycles, with different areas and timeframes for foraging, breeding and migrating.



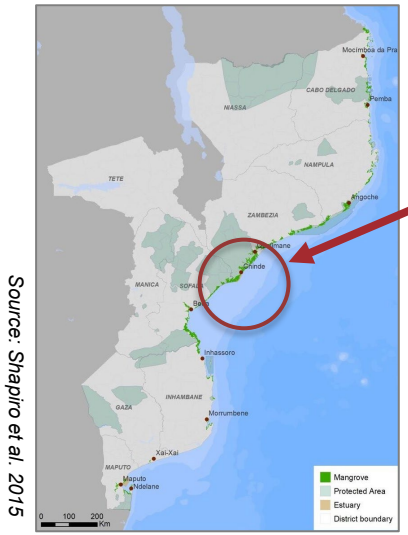
Source: FFI 2017

- Deep-sea baselines are particularly expensive, with the deployment of suitable vessels and remotely operated vehicles (ROVs).

What is the role of spatial data in baseline assessments?

Additional data and new surveys are needed to verify and provide further information on potential biodiversity features. For example:

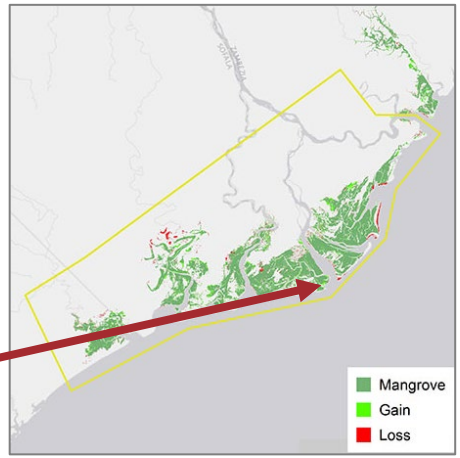
- mangrove extent and condition
- threatened species occurrence indicated by range maps
- seasonal distributions of target species



Source: Shapiro et al. 2015

Scoping using large-scale datasets identifies areas of habitat e.g. mangroves

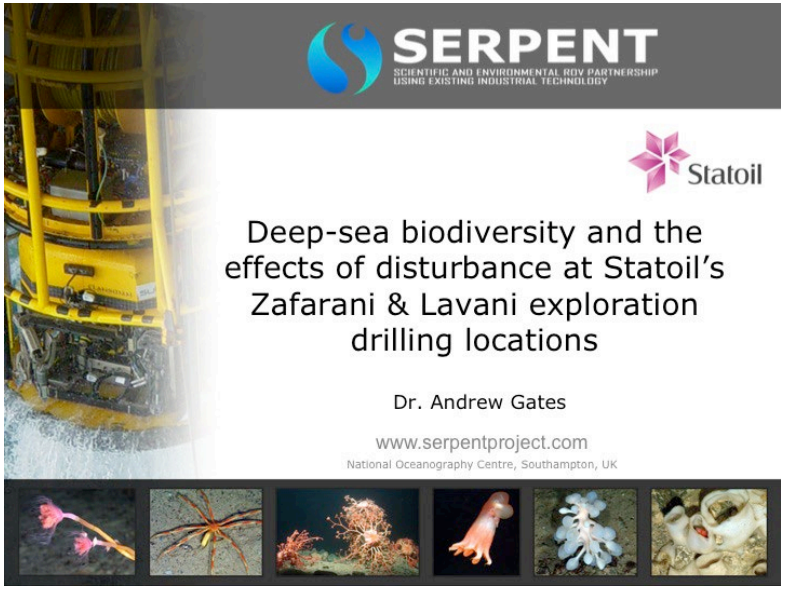
Baseline assessment using surveys provides more detailed data e.g. mangrove condition



Source: Shapiro et al. 2018

Baseline studies in a marine environment

- Nearshore: shallow-water coral reefs less expensive, but subject to sea conditions
- Deep-sea: very expensive unless there is a drillship on site



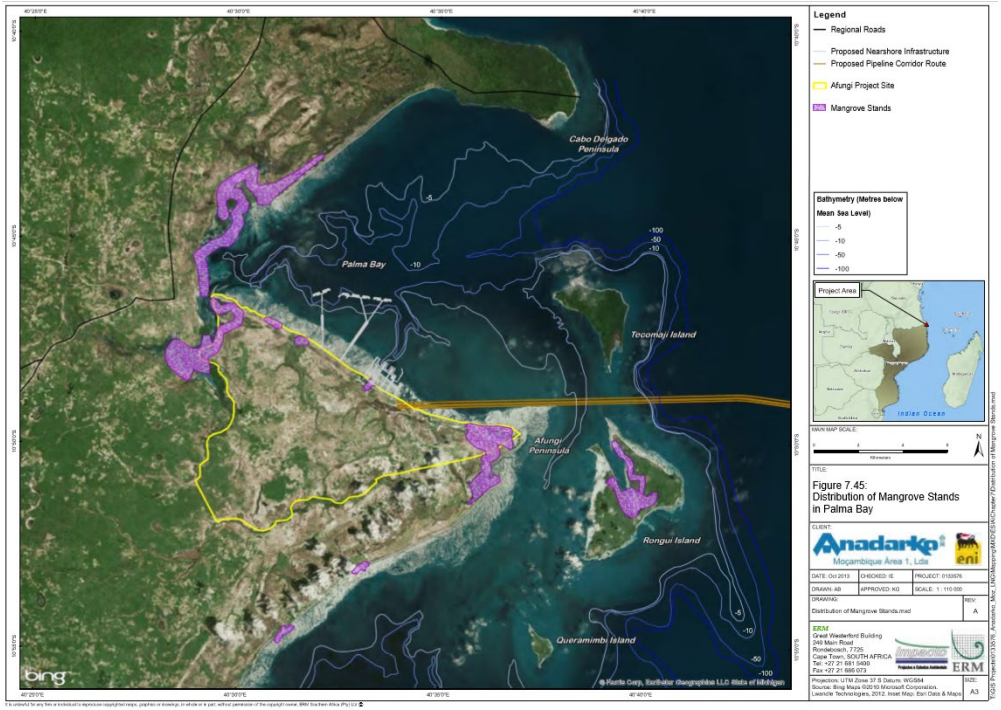
Case-study: Mozambique LNG

Environmental baseline parameters identified in the ESIA:

OFFSHORE	NEAR SHORE	ONSHORE
• Plankton • Benthos • Reef structures • Fish • Wales and dolphins	• Supratidal sand beach and intertidal sand/mudflats • Mangroves • Seagrass • Coral reefs • Fish • Turtles • Whales and dolphins • Seabirds	• Surface waters • Vegetation (Afungi project) • Herpetofauna • Avifauna • mammals

Case-study: Mozambique LNG

Mapping mangrove habitats:

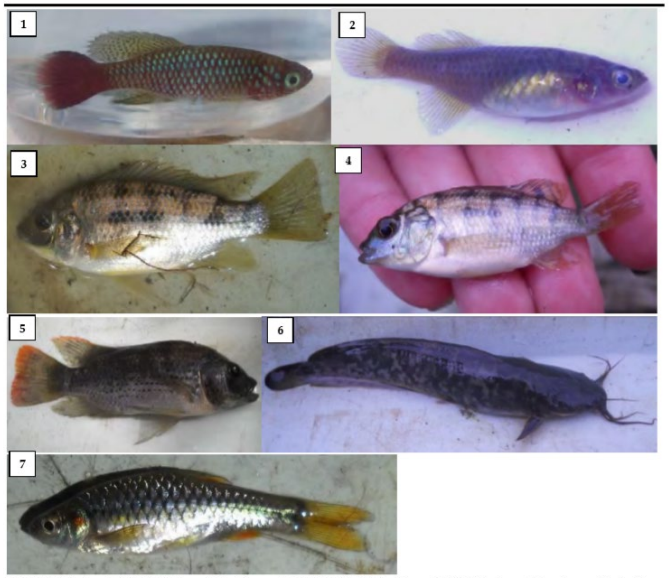


Case-study: Mozambique LNG

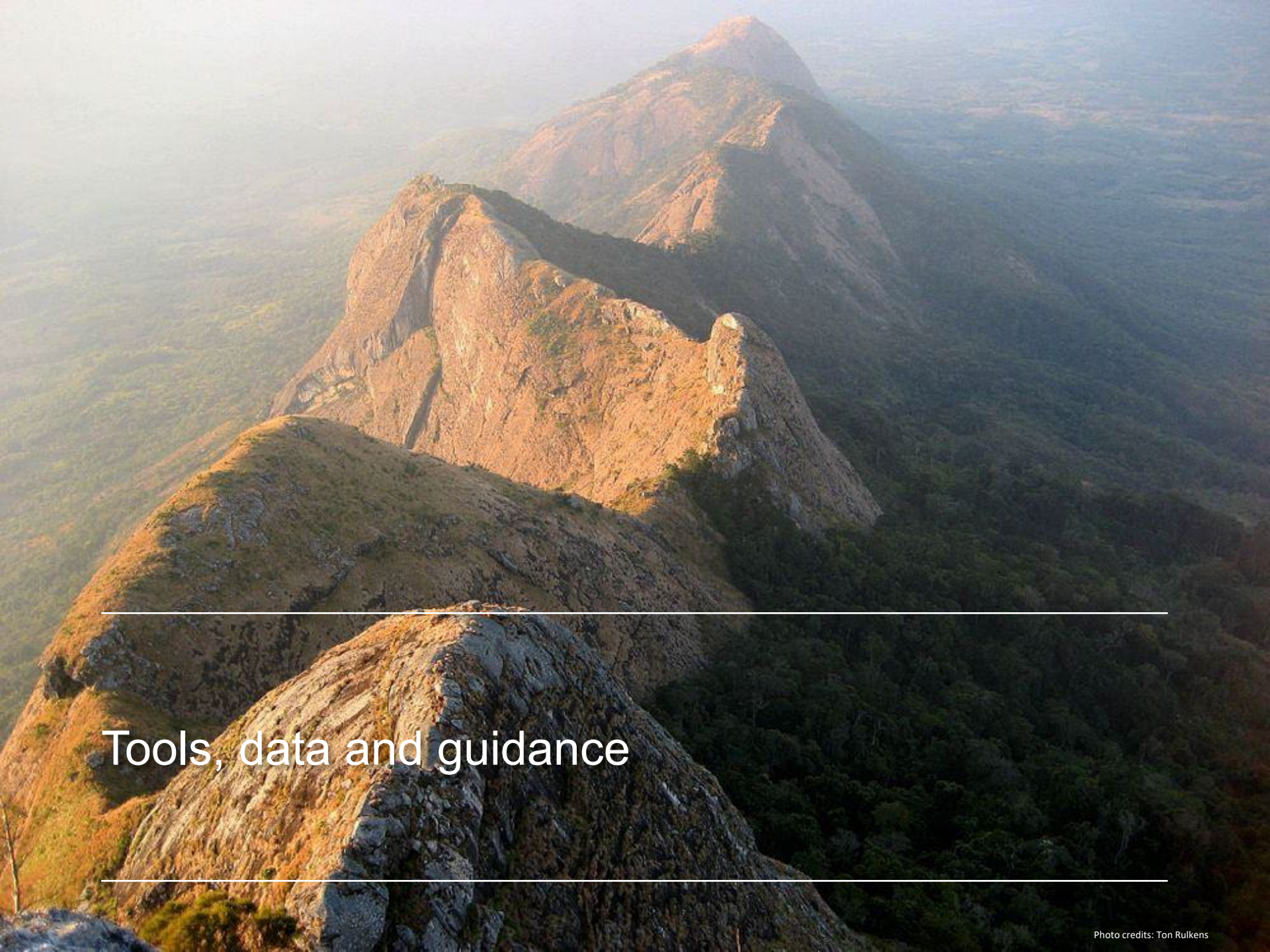
Fish surveys:

- No historical data available
- Rovuma River is the closest river to the survey area but it does not flow into any of the aquatic systems sampled.
- Majority of species in the region are considered of Least Concern (LC) or Data Deficient (DD) according to the IUCN Red List
- *Barbus choloensis* considered vulnerable (VU), and *Oreochromis mossambicus*, categorised as Near Threatened (NT)

Indigenous Fish Sampled during the High Flow and Low Flow Periods



1: Killifish (male) (*Nothobranchius hengstleri*); 2: Killifish (female) (*Nothobranchius hengstleri*); 3: Black tilapia (*Oreochromis placidus*); 4: Black tilapia (juvenile) (*Oreochromis placidus*); 5: Mozambique tilapia (*Oreochromis mossambicus*); 6: Sharptooth catfish (*Clarius gariepinus*); 7: Redspot barb (*Barbus kerstenii*).



Tools, data and guidance

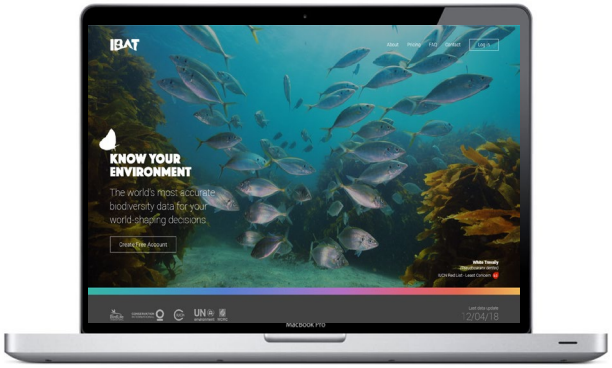
Photo credits: Ton Rulkens

Guidance documents

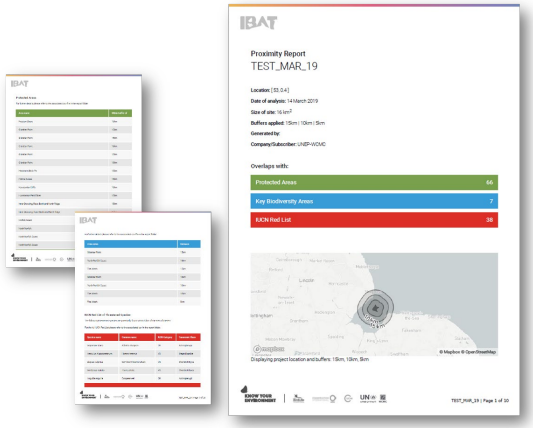
- CSBI (2015) Good Practices for the Collection of Baseline Data
- EBI (2006) Integrating biodiversity in ESIA processes
- FFI (2017) Good Practice Guidance for Oil and Gas Operations in Marine Environments
- IPIECA (2011) BES Checklist
- IPIECA (2016) BES Fundamentals
- IPIECA (2020) Environmental management in the upstream oil and gas industry
- IFC PS6 & Guidance Note 6 (2019) – Biodiversity Conservation and Sustainable Management of Living Natural Resources
- WRI (2013) Weaving ecosystem services into impact assessment
- WRI (2012) Corporate Ecosystem Services Review

See references folder for more guidance documents

Tools and data platforms



Integrated Biodiversity Assessment Tool
www.ibat-alliance.org



- ✓ Confirm boundaries and biodiversity values
- ✓ Validate species absence/ presence
- ✓ Critical habitat screening

Tools and data platforms

Name	Description	URL
BirdLife Data Zone	Data on bird species and IBAs with country profiles and case studies	http://datazone.birdlife.org/home
GBIF (Global Biodiversity Information Facility)	Compiled species-level data with global coverage	https://www.gbif.org/
IBAT (Integrated Biodiversity Assessment Tool)	Database compiling information about global biodiversity in an online decision support tool	https://ibat-alliance.org/
InVEST (Integrated Valuation of Ecosystem Services and Trade-offs)	Open-source software models to map and value ecosystem services and assess trade-offs	https://naturalcapitalproject.stanford.edu/invest/
IUCN Red List	Online information on global conservation status of species	https://www.iucnredlist.org/
Ocean+	Platform providing access to marine and coastal biodiversity datasets	https://www.oceanplus.org/
Protected Planet	Web-tool providing access to the World Database on Protected Areas	https://protectedplanet.net/
UN Biodiversity Lab and the Environmental Situation Room	Online platform giving access to global data layers	https://www.unbiodiversitylab.org/ https://environmentlive.unep.org/media/html/situation/situation_room.html
Biodiversity Network of Mozambique	Research-grade primary biodiversity data from leading national universities, research centres, and conservation areas.	https://maps.openscidata.org/index.php/view/map/?repository=bionomo&project=Bionomo

Key messages

- Screening should take place prior to the selection of the preferred project option to eliminate alternatives with the greatest potential impacts
- Scoping determines the priority issues to be considered in the ESIA, and good scoping saves time, money and effort
- Baseline assessments characterise the existing conditions to establish the biodiversity and ecosystem service status before operations begin
- Baseline assessments inform impact assessment and management planning, monitoring and adaptive management over the life of the project

2.3 Mitigating and monitoring biodiversity impacts

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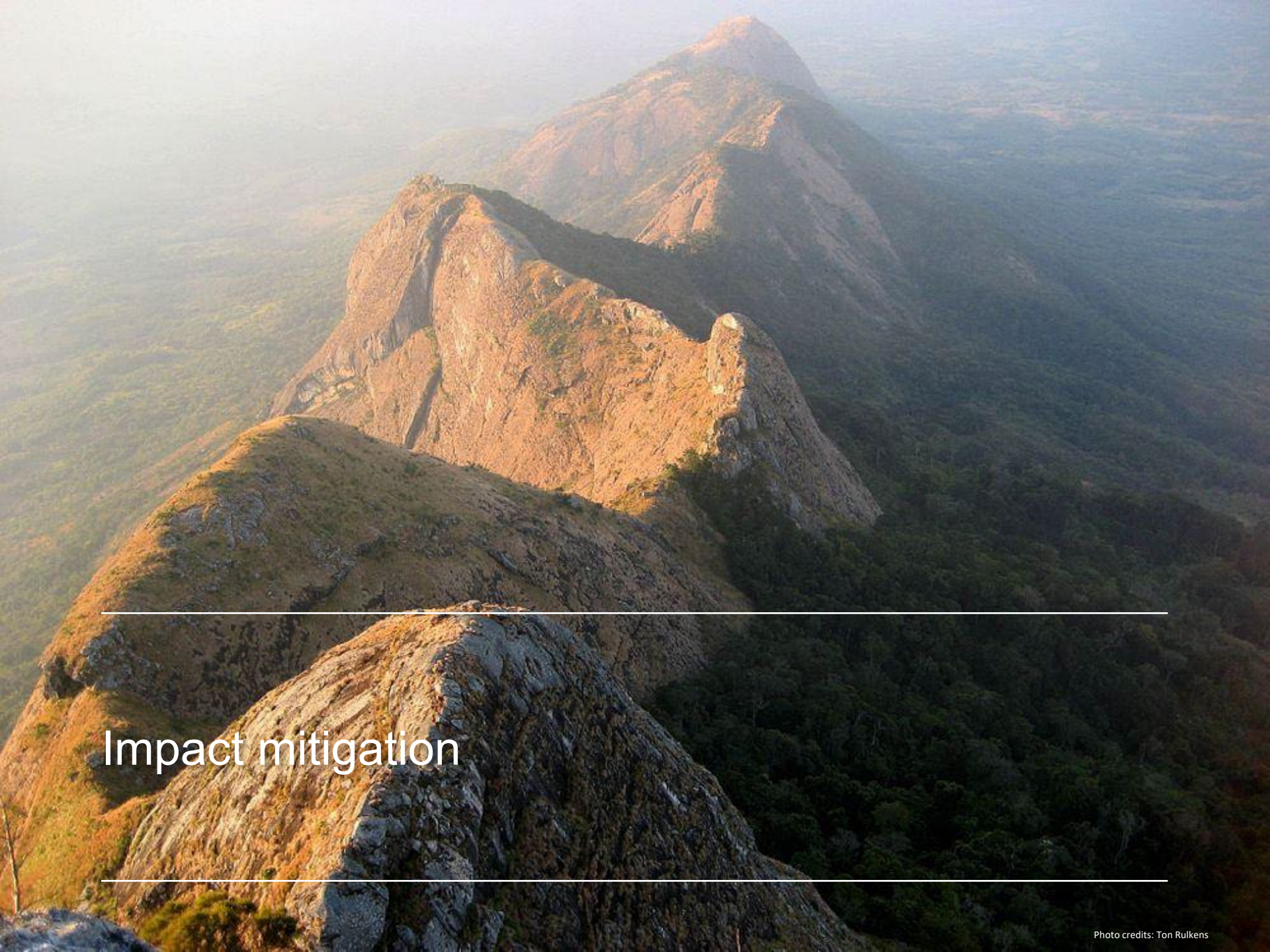
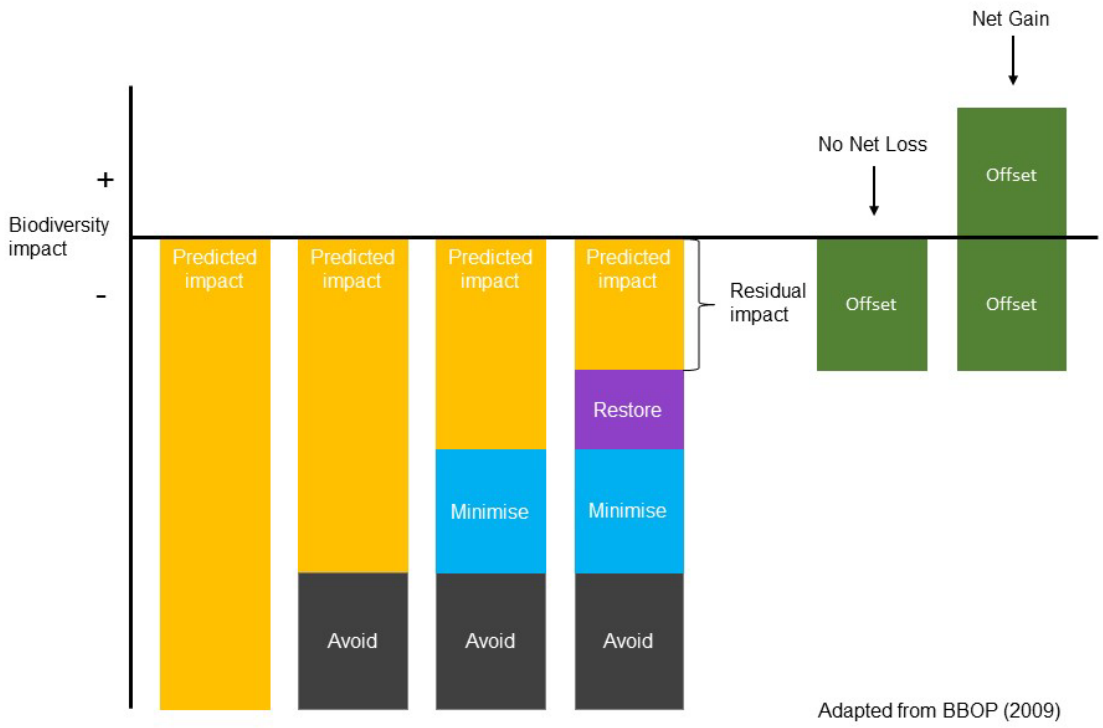


Impact mitigation

Photo credits: Ton Rulkens

The mitigation hierarchy



Avoid

Site selection

- Relocate a project site to avoid an area of high biodiversity
- Re-routing pipelines

Project design

- Directional drilling
- Siting of drilling pads

Scheduling

- Avoid breeding seasons
- Schedule seismic outside of migration seasons
- Prohibit night transportation

Minimise

Physical controls

- Installing culverts
- Using bird flight diverters on transmission lines

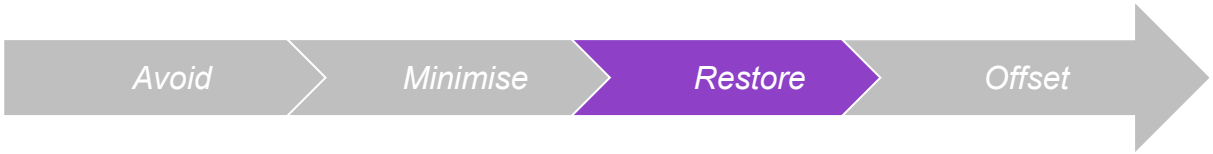
Operational controls

- Managing staff behaviour
- Managing access to areas

Abatement controls

- Implement waste management
- Invasive species management

Restore



Revegetation

- Retaining topsoil and its original seedbank
- Invasive species control measures

Habitat enhancement

- Building artificial nests
- Spreading grass cuttings from undisturbed habitat

Considerations

Might:

- not be possible for certain features
- have lower certainty of success
- be scientifically uncertain
- financially uncertain
- require expert consultation
- require long-term intervention
- require significant monitoring effort

Offset

Restoration offsets

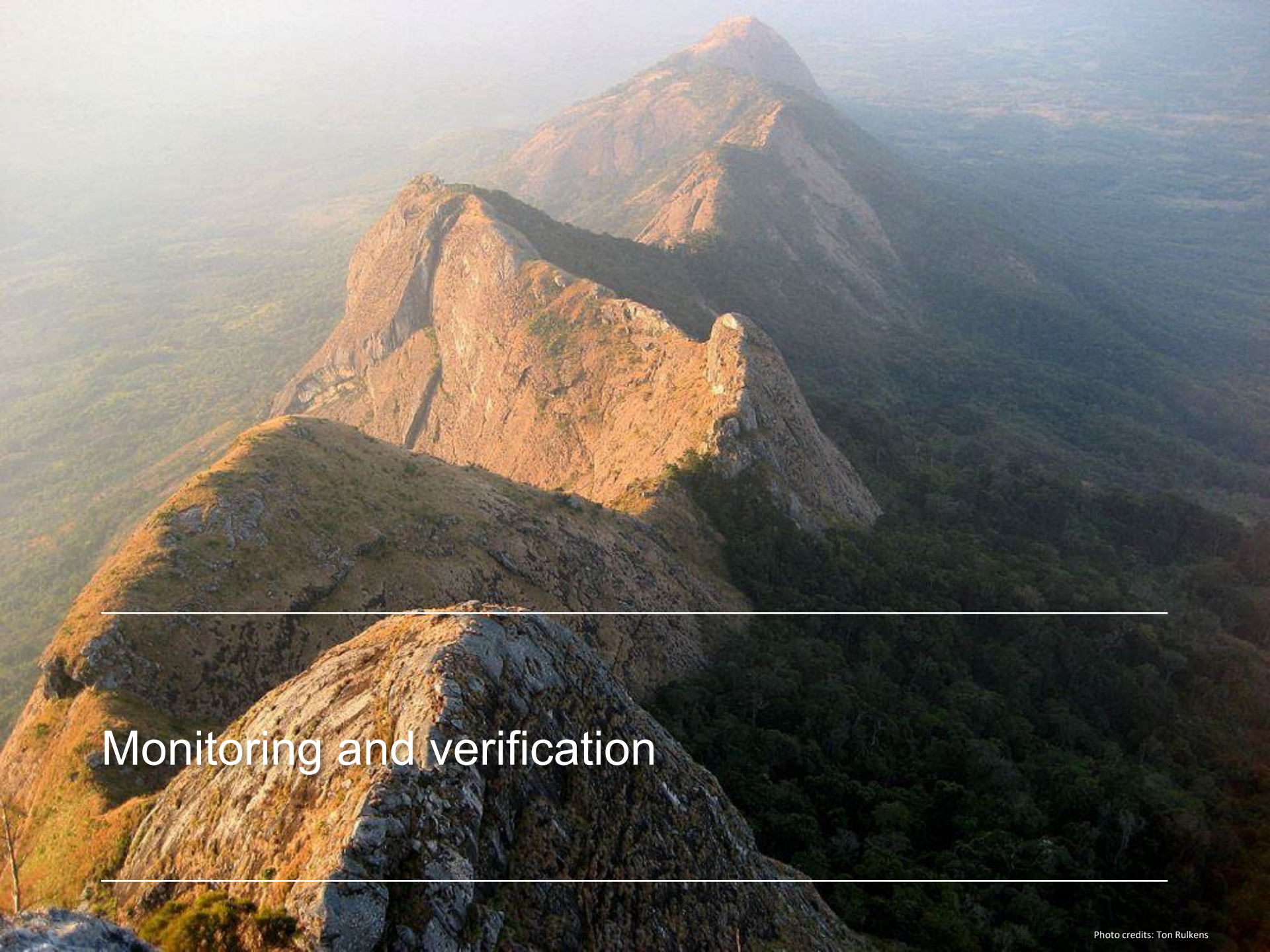
- Reintroduction of priority species in degraded habitat
- Building artificial reefs as nursing grounds

Protection offsets

- Developing alternative livelihoods for communities to prevent ongoing degradation of threatened forests

Considerations

- Possibility/ feasibility needs to be assessed
- Is the offset equivalent to the previous habitat?
- Outcomes need to be specified (and ideally quantified)
- Appropriate stakeholder consultation
- Will it last at least as long as the project impact?



Monitoring and verification

Photo credits: Ton Rulkens

What do we mean by monitoring and verification?

Monitoring	• Standardized measurement and observation of the environment
Indicators	• Data which provides evidence of a company's performance in addressing sustainability issues
Verification	• The process of establishing the truth, accuracy, or validity of something
Reporting	• Disclosing relevant information and data to internal and external stakeholders

What is the role of spatial data in monitoring?

Spatial monitoring data can verify the effectiveness of impact mitigation across landscapes and at specific sites:

- **Landscape level:** Remote sensing data can monitor broad-scale changes over large areas

- **Site-level:** High resolution data can establish whether specific objectives of impact mitigation strategies are being met

Criteria for site-level biodiversity indicators

S	**Specific** e.g. percentage of coral reef area bleached/bleaching
M	**Measurable** e.g. number of sites in biodiversity sensitive area with a Biodiversity Action Plan
A	**Achievable** e.g. number of annual monitoring survey campaigns carried out
R	**Relevant** e.g. number of globally threatened species in project footprint
T	**Timely** e.g. amount of sensitive areas cleared during project phases

Case study: Mozambique LNG monitoring

Project's ESHIA included commitment to undertake additional biodiversity studies to inform the Biodiversity Action Plan (BAP) :

- Avian surveys
- Large carnivore and terrestrial megafauna monitoring
- Alien invasive species surveys
- Aquatic ecology surveys, including water quality, fish, macroinvertebrates
- Bush meat surveys
- Surveys of coral communities within the bay

	Mozambique LNG ***ESHIA Executive Summary and Update*** **Document No**. MZ-000-AM1-HS-RPT-00002 **Rev.** 1 **Rev Date**: 14-MAY-2020	

Biodiversity	
Biodiversity Strategy	Sets out the goals, objectives and focus for the Project's biodiversity effort, and provides context to the BAP.
Biodiversity Action Plan – Preliminary Framework	Sets out the key biodiversity related mitigation measures and actions that will be undertaken as part of the Project's biodiversity effort. Also sets out roles and responsibilities related to the biodiversity management measures, as well as the schedule and KPI's etc. The Biodiversity Action Plan will also incorporate the Ecological Constraints Mapping, Biodiversity Stakeholder Engagement Plan and the Marine Mammal Observation Procedure.

Case study: Mozambique LNG monitoring

Environment	Impact	Monitoring
Air Quality and GHG Emissions	Impacts from GHG	Monitoring for leaks and fugitive emissions
Surface Water	Impacts of water pollution	Monitoring of physical, biological and chemical parameters for wetlands, to begin prior to construction
Marine ecology	Impacts of physical disturbance	ROV surveys to be performed before and after drilling activities to monitor impacts on the seabed, on a well by well basis
	Impact of turbidity	Monitoring turbidity levels in the Zone of Moderate Impact
Vegetation	Impact of invasive plant species	Monitoring for potential spread of invasive species (in situ control and eradication measures will be implemented if spread identified)
Herpetofauna	Impacts of water pollution	Monitoring of physical, biological and chemical parameters for wetlands, to begin prior to construction
Mammals	Impacts of habitat fragmentation	Monitoring open trenches for stranded animals.

Why is verification important?

Provides **credibility and transparency** to the whole biodiversity management, monitoring and reporting process.

Usually done **independently** by a third party:

- Regulators
- Reputable expert(s)
- Stakeholder panels
- Science-based conservation NGOs
- Universities
- Scientific institutions

How do regulators monitor?

Decree 54/2015: regular inspections on project sites to monitor implementation of environmental management plans

- Responsibility of AQUA, autonomous entity within MITADER
- Annual inspections for projects under categories A+ and A

Environmental audits: additional monitoring and verification exercise, carried out by independent specialists/consultants, usually after construction/during operation of the project.

Environmental License: renewal required every 5 years, with an update of the environmental management plan (including for biodiversity impact mitigation in the case of projects under category A+)

Key messages

- The Mitigation Hierarchy is an effective tool to guide environmental impact avoidance and minimisation, restoration and offsetting
- A risk based approach that considers severity and likelihood of impact can inform future mitigation actions
- Monitoring should support active management by the company, so that results are fed back into mitigation actions
- Monitoring supports accountability and transparency, helps to ensure success of mitigation measures, and informs adaptive management
- Monitoring is also carried out by regulators, in addition to the renewal of the environmental license and potential environmental audits

2.5 EIA Exercise

ESIA Mapping Exercise

Context:

An oil and gas company is planning activities in a new exploration block within an inhabited coastal area.

However, the area has considerable terrestrial and marine biodiversity and thriving socio-economic sectors, with high population densities along the coastline.

Aims:

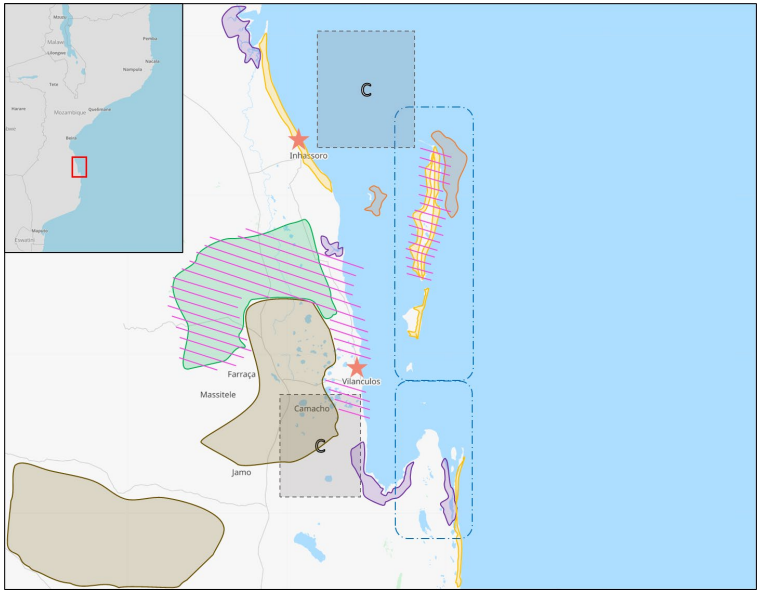
- Exercise A: Concession block selection, screening, scoping and baseline assessment

- Exercise B: Impact assessment, mitigation and monitoring

Background

Any oil and gas concession will require:

- A production platform;
- A pipeline;
- A processing plant;
- Access roads;
- A product pipeline to reach their market.



There are two concession block options.

However, the area has considerable terrestrial and marine biodiversity and thriving socio-economic sectors (e.g. tourism, fisheries), with high population densities along the coastline.

Environmental and socio-economic features

Habitats

Coral reefs situated near the coast

Mangroves present along the coastal area

Shrubland used for grazing livestock by local communities

Socio-economic features

Marine and coastal protected areas

A Key Biodiversity Area

Important areas for tourism, a source of income for locals

Cities and existing port location

Exercise A: Concession block selection, screening, scoping and baseline assessment

Aims:

- Understand the context of operations to eliminate potential locations to avoid impacts
- Determine the priority biodiversity and ecosystem service features for further study
- Identify the Area of Influence and specific surveys that will assist in establishing the existing biodiversity and ecosystem service status

Part 1: Screening

1.1 Screening by the oil and gas company

The results of the screening operations from the oil and gas company have come in. They have identified two potential locations for drilling platforms within the proposed concession blocks and three potential locations for onshore processing plants.

The following additional environmental and socio-economic features have been identified within the landscape/seascape.

Artisanal fishing

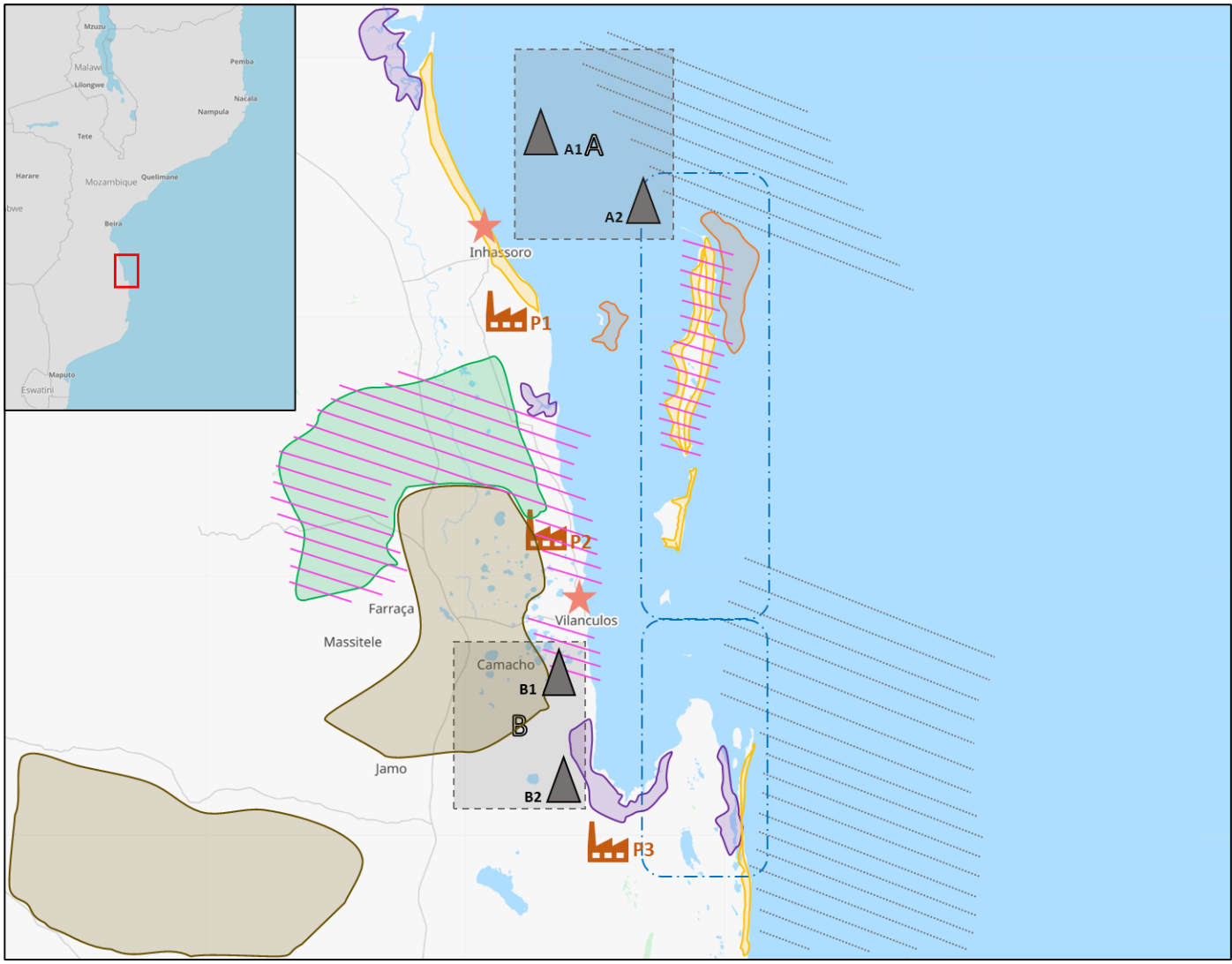
Beaches

Potential drilling platforms

Potential processing plants

Legend

- Coral reef
- Mangrove forest
- Sand beach
- Shrubland
- Key Biodiversity Area
- Tourism
- Artisanal fishing
- Cities and ports
- Marine & coastal protected areas
- A — Concession block
- A1 — Potential drilling platform
- P1 — Potential processing plant



Part 1: Screening

1. Which drilling platform and processing plant locations might be screened out by the oil and gas company? Why?

2. Considering the sensitivities of different sites and the potential implications of operating in them, explain your reasons below. Use the table to cross out unsuitable options and tick the suitable option(s).

Part 1: Screening

	Biodiversity and ecosystem services considerations		Is this a potential option? ✓/✗
	Sensitivities	**Implications**	
	e.g. the site may impact nearby human settlements	*e.g. delays in operations due to stakeholder discontent over local disruption*	
Platform			
A1			
Processing plant			

Part 2: Scoping and baseline assessment

2.1 Scoping by the oil and gas company

Screening was used to eliminate certain sites for drilling platforms and processing plants. Scoping will now identify the priority biodiversity components and ecosystem services to study for potential sites identified during screening.

For the site(s) that you have chosen in Part 1:

- List the biodiversity components and ecosystem services identified in the screening exercise.
- Note reasons for their importance
- Identify what data are required to assess the selected biodiversity components or ecosystem services, including in terms of their geographic scope and seasonality.

Part 2: Scoping and baseline assessment

Biodiversity component or ecosystem service	**Reasons for importance**	**Type of data needed**
e.g. local subsistence fishery (provisioning services)	*e.g. fish is the only source of protein in this area*	*e.g. quantitative baseline fish population data covering the whole bay with at least two repeats per year to capture seasonality*

Exercise B: Impact assessment, mitigation and monitoring

Aims:

- Understand the potential impacts as a consequence of going ahead with the project
- Develop approaches to mitigate biodiversity and ecosystem services impacts
- Develop indicators to monitor the status of biodiversity and ecosystem services at the project site

Mitigation of impacts on biodiversity and ecosystem services

The baseline assessment has provided further information:

- Hawksbill turtles use parts of the undeveloped beaches as nesting sites. These sea turtles are listed as Critically Endangered on the IUCN Red List of Threatened Species.
- There is a whale migratory route offshore.
- Some of the mangroves remain undisturbed, but other parts are experiencing pollutant/sediment load on the coast from nearby human activities, which are severely degrading the mangroves.

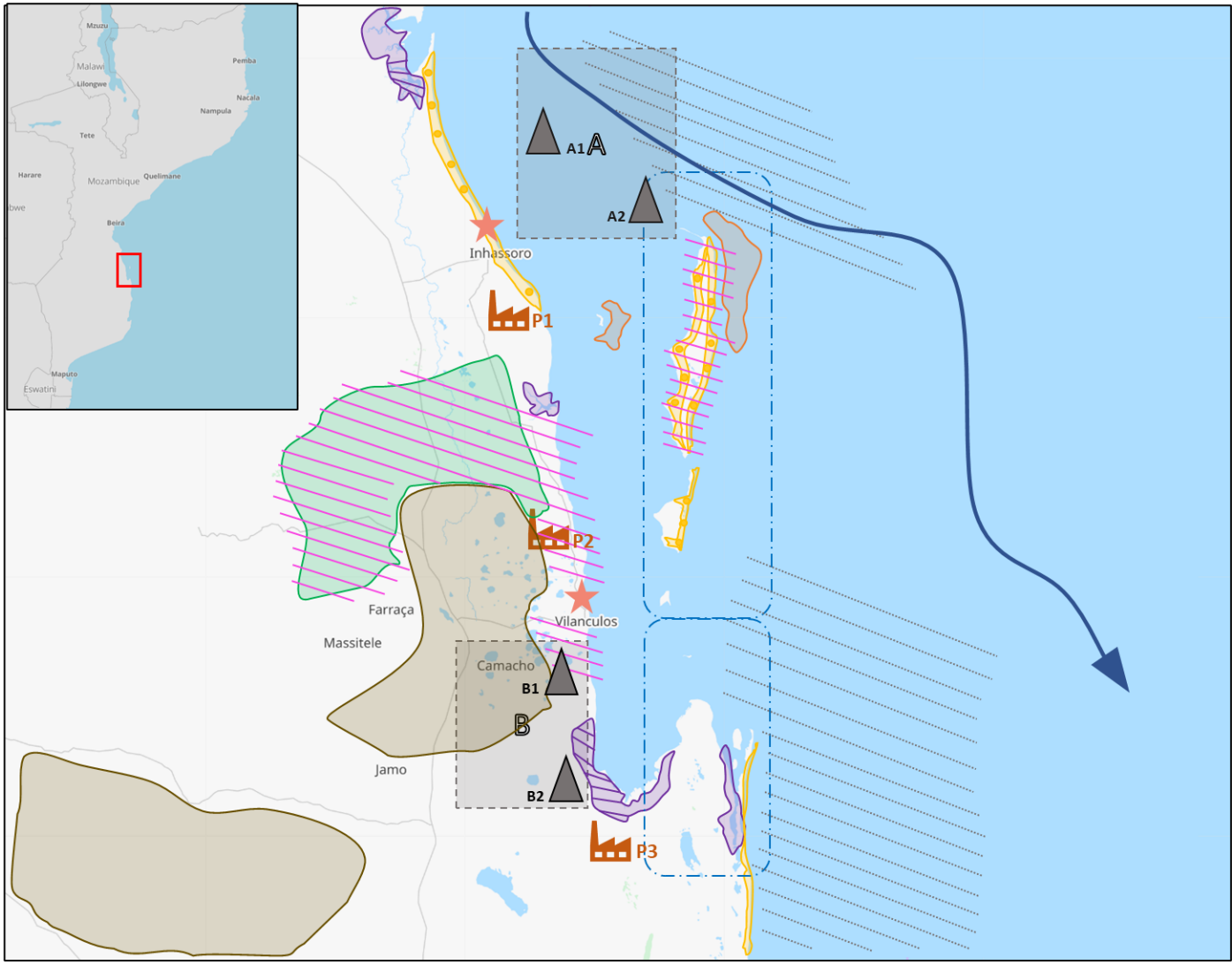
Turtle nesting sites

Whale migratory route

Degraded mangroves

Legend

- Coral reef
- Mangrove forest
- Degraded mangroves
- Sand beach
- Turtle nesting site
- Shrubland
- Key Biodiversity Area
- Whale migratory route
- Tourism
- Artisanal fishing
- Cities and ports
- Marine & coastal protected areas
- A — Concession block
- A1 — Potential drilling platform
- P1 — Potential processing platforms



Mitigation of impacts on biodiversity and ecosystem services

Based on your chosen platform and processing plant locations and the biodiversity components prioritized during Exercise A:

1. Identify potential project impacts. In addition to the drilling platform and processing plant themselves, also consider the pipeline from the platform to the plant and access roads.

2. For each of the identified impacts, outline what example mitigation measures could be applied.

3. Think about which indicators might be useful to monitor the success of the mitigation measures.

Mitigation of impacts on biodiversity and ecosystem services

Biodiversity component or ecosystem service	**Description of key impacts**	**Potential mitigation options**	**Indicators for monitoring**
e.g. local subsistence fishery (provisioning services)	*e.g.* ***Impacts*** *– Restricted access to fisheries and/or wild foods for local people,*	*(consider solutions that avoid, minimise, restore and offset impacts and dependencies)*	*(Consider: Specific, Measurable, Achievable, Relevant, and Timely (SMART) criteria)*

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Thank you