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Linking Ecosystem Services to Business Risk: An Oil and Gas Perspective

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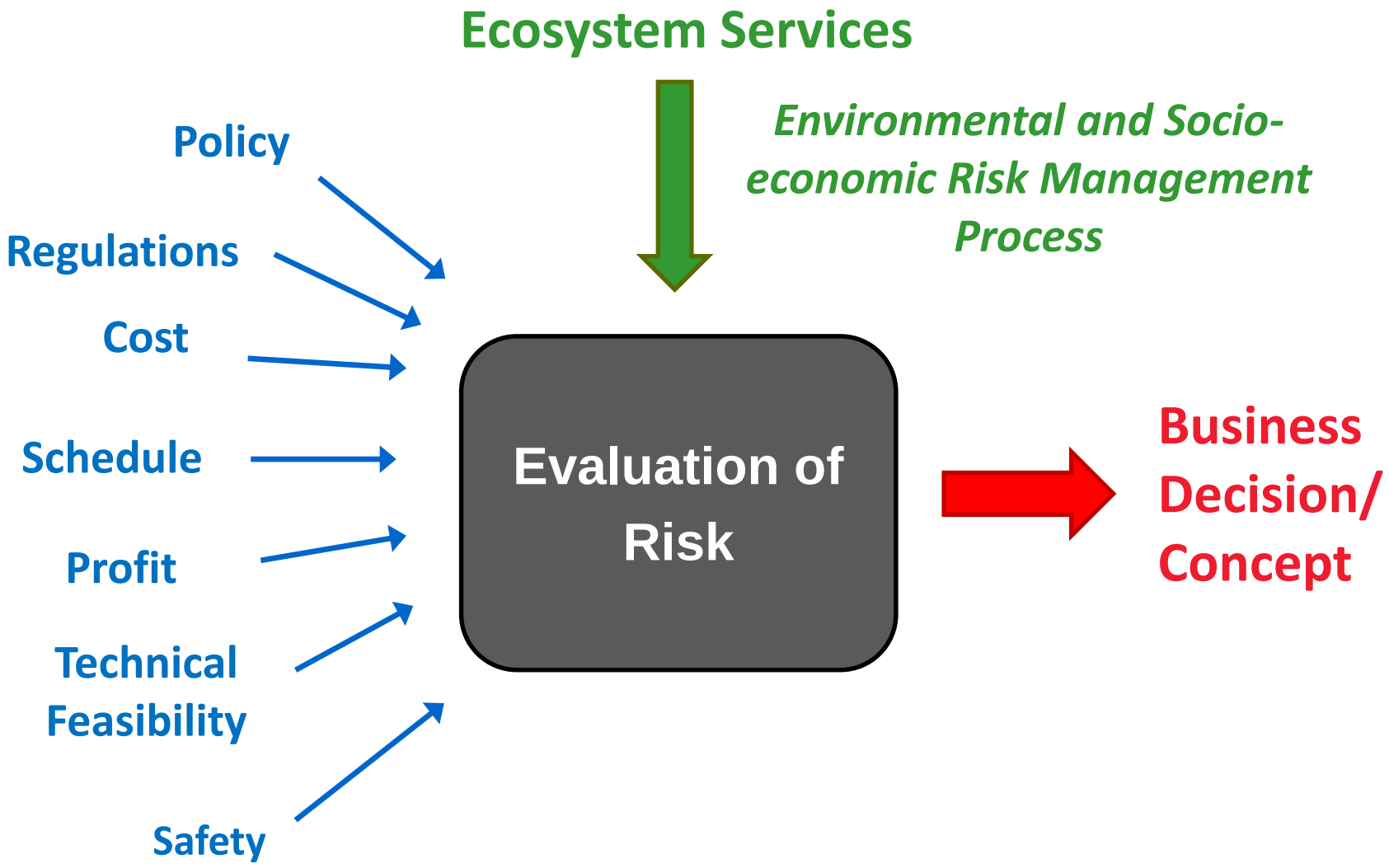
Goals

- **Explain the Environmental and Socio-economic Risk Management Process.**

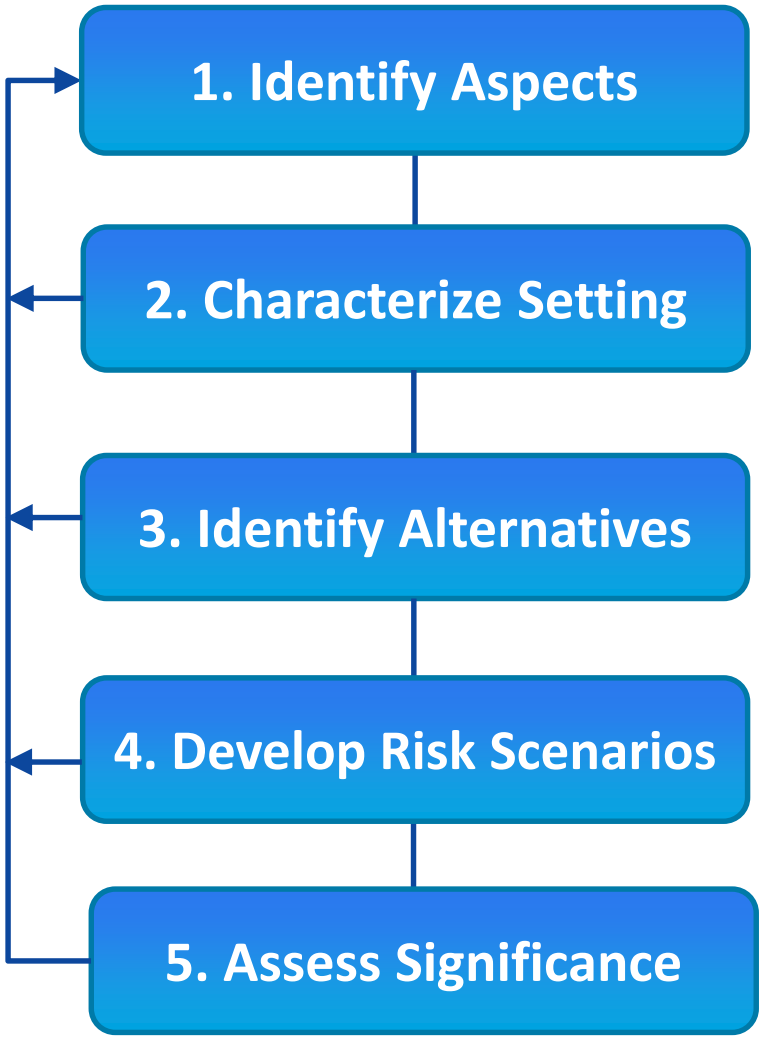
- **Show the linkages to Ecosystem Services using an example.**

Are Ecosystem Services Considered?



How Does the Process Work?

Iterative Process



Aspect: An activity, product or service that can interact with the environment or people (e.g., air emissions, water withdrawal, infrastructure, etc.).

- ***Environmental:*** Flora, fauna, climate, etc.
- ***Public/Socioec:*** Other users, communities, etc.
- ***Regulatory:*** Existing and developing regulations.

Examples: Different technologies, timing, routing or siting options, etc.

Risk Scenario: Links an aspect to a potential consequence through consideration of credible events or conditions.

Risk Significance: Based on an estimation of consequence severity and probability or likelihood.

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Example: Marine Jetty, Papua New Guinea

- Brownfield area located Northwest of Port Moresby.
- Former sisal plantation, pasture land and firing range during World War II.
- Bay area required little to no dredging for shipping access.

Schematic of the Marine Jetty (trestle design) for PNG LNG loading

Setting

Setting:

- Coastline is edged with mangroves.
- Mangroves are a sensitive species and home to a diverse community of life.
- Mangroves stabilize the shoreline.
- Local villages close to LNG plant site.
- Villagers rely on fishing for food supply and business.

Mangroves along the PNG coastline.

LeaLea Fish Market.

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Alternatives and Risk Considerations

Facts:

- Jetty construction requires pile driving.
- Pile driver must be placed on a solid surface.

Typical construction methods:

- **Temporary earthen causeway**:
  - Relatively wide footprint on mangroves and associated habitat (e.g., fish nursing areas).
  - Could enhance potential for localized shoreline destabilization.
  - Temporary obstruction could displace fish and impact fish catch, potentially leading to grievances and compensation claims.
- **Barge and tugs:**
  - Frequent barge positioning disturbs mangroves and seafloor.
  - Could temporarily impact fish habitat and fish catch.

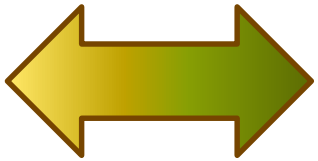
Novel method:

- **Cantilever bridge:** Smaller footprint than causeway or barge.

Linkages to Ecosystem Services

Risk Considerations

- Disturbance to mangrove habitat
- Disturbance to seafloor
- Disturbance or displacement of fish
- Impacts on fishing
- Grievances and compensation claims
- Potential localized shoreline destabilization



Ecosystem Services

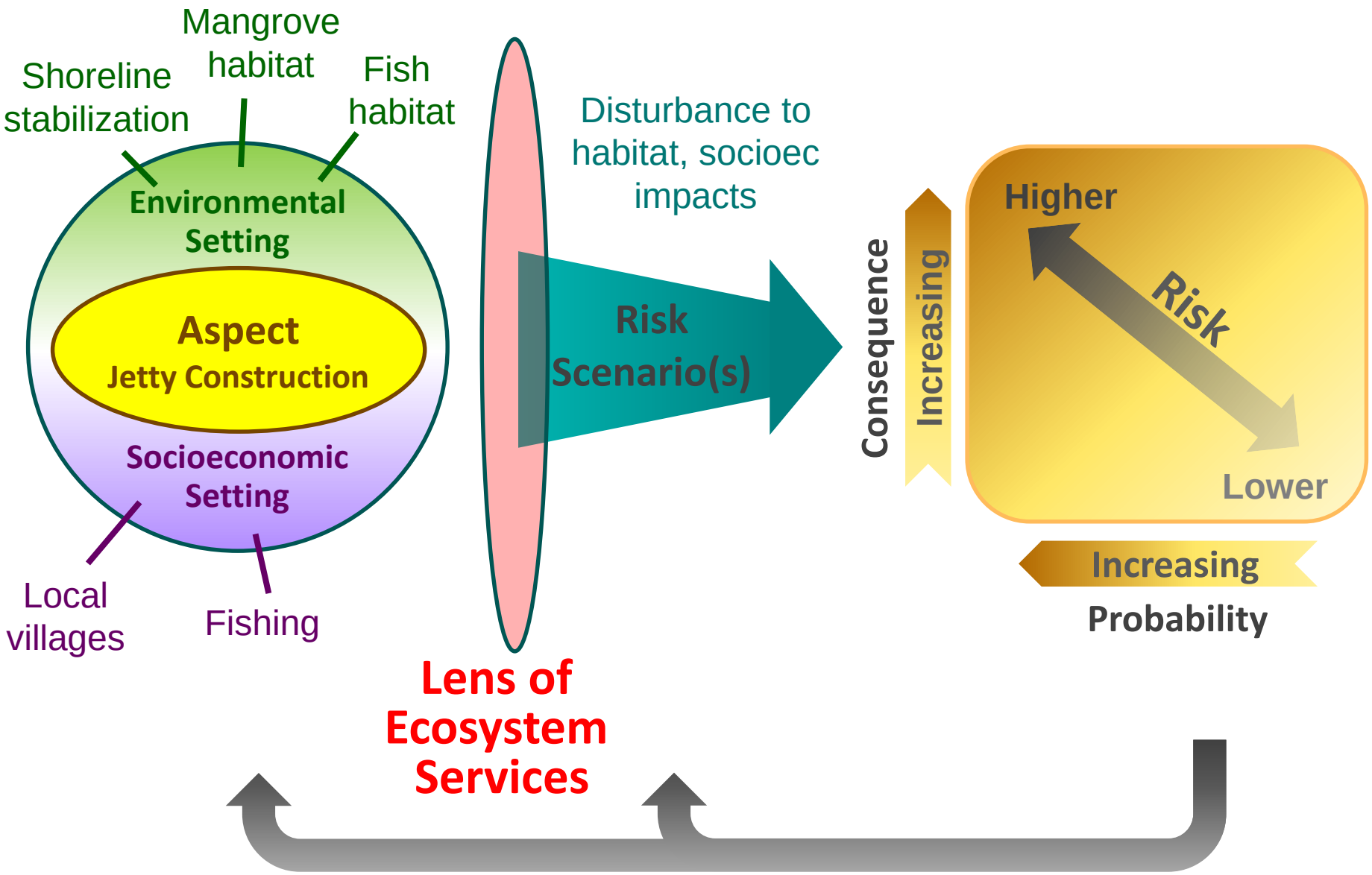
Provisioning:
Food

Cultural:
Historic Value
Aesthetics / Existence

Supporting:
Habitat
Nutrient Cycling

Regulating:
Erosion Control
Storm Protection
Waste Regulation
Nutrient Regulation

Lens of Ecosystem Services



Cantilever Bridge

- Novel design
- Self-propelling
- Reduced environmental footprint

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Summary

- **Environmental and socio-economic risk management is part of our day-to-day business.**
- **It is a rigorous process that takes place throughout a project's lifecycle and is applied at all (small and large) scales.**
- **Ecosystem services are an integral part of this process.**
- **Through this linkage, ecosystem services play an important role in business decisions.**