Narrowing Data Gaps through AI in EA and Monitoring at Red Sea, KSA

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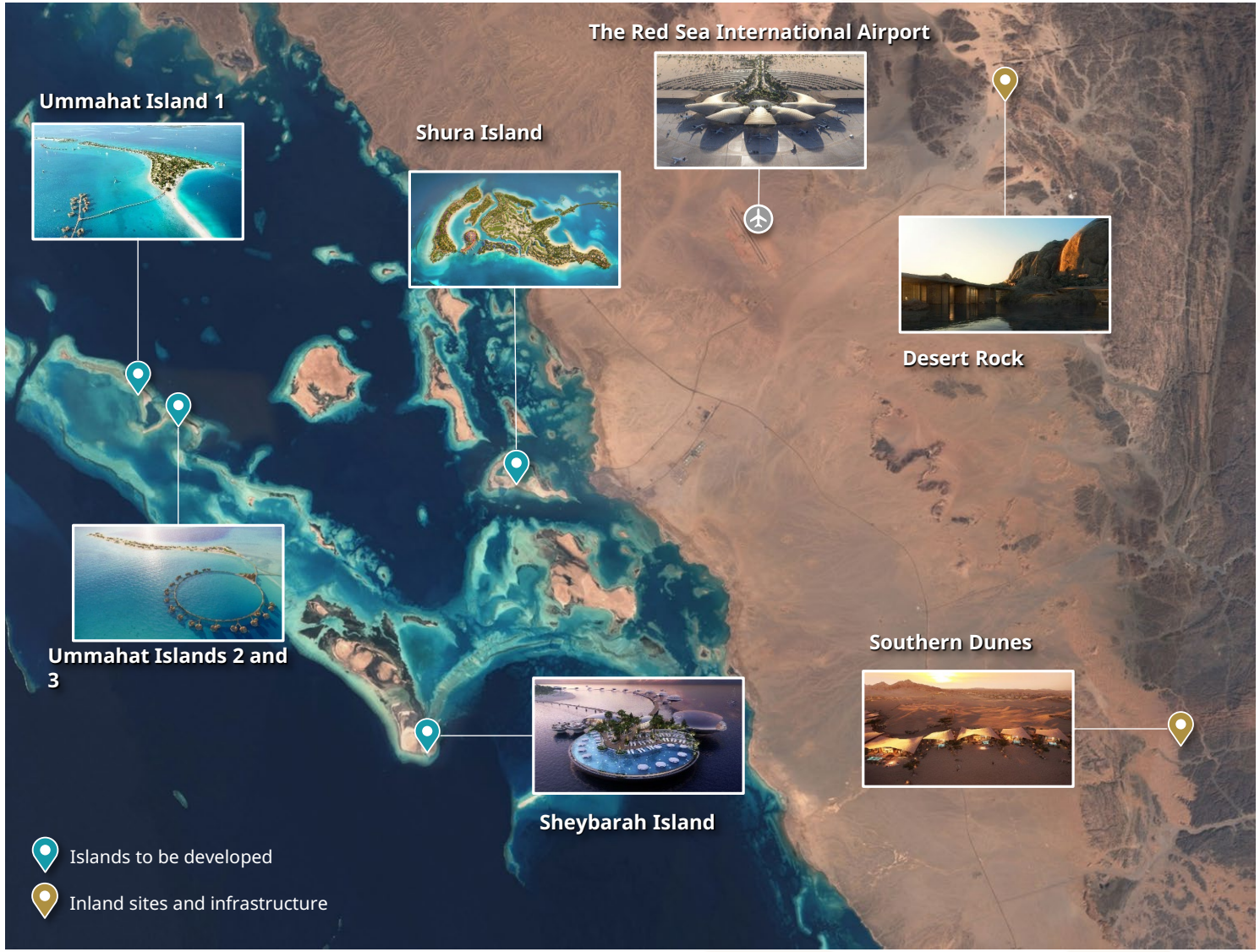
Red Sea Global: A Regenerative Developer

Planning informed by series of environmental studies and the largest marine spatial simulation ever undertaken by a developer

30% net conservation benefit to the surrounding area, with positive impact on local flora and fauna



Overview

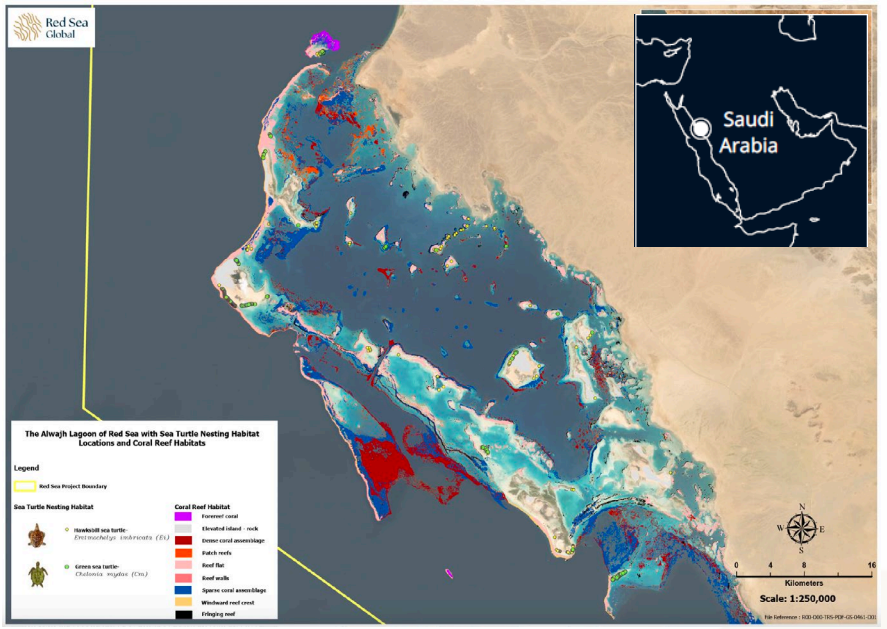
The **Red Sea** is home to some of the world's most diverse marine ecosystems.

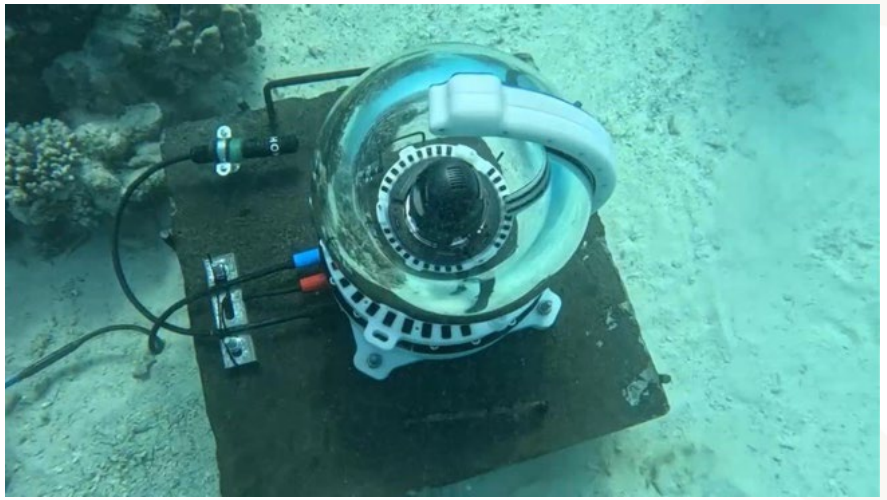
Early **environmental assessments** guide low-impact, eco-sensitive design.

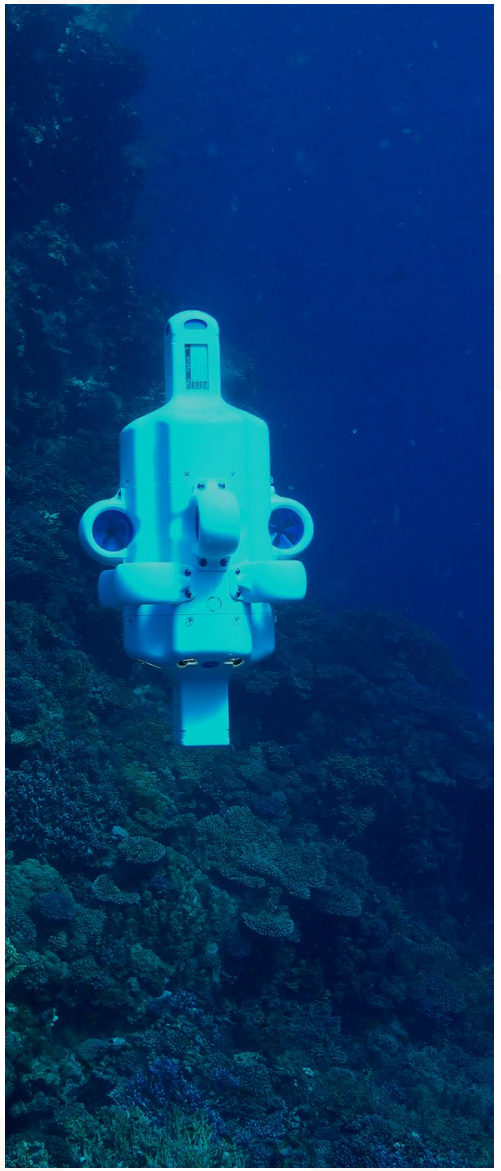
Ensures marine tourism **supports stewardship** and **protects biodiversity**.

The need for **advanced monitoring** techniques is driven by escalating environmental threats (e.g., climate change, human activity).

AI and data-driven tools offer a transformative approach to monitoring and managing these ecosystems.







Why Focus on Coral Reefs and Sea Turtles Habitats?

A detailed list of 106 Valued Environmental Receptors (VERs) was developed during Master ESIA for the Concept Master Plan

RSG implements mitigation hierarchy to manage all environmental risks

For this presentation, we are focusing on two of the most sensitive habitats

Coral Reefs

Critical biodiversity hotspots that support a wide range of marine life.

Threatened by **climate change, pollution**, and **coastal development**

Sea Turtle Habitats

Critically Endangered and Endangered species (Hawksbill Sea turtle and Green Sea turtle) facing habitat loss, disturbance, and rising temperatures.

Key indicators of the **health of marine ecosystems**.

Current Traditional Monitoring and Their Gaps:

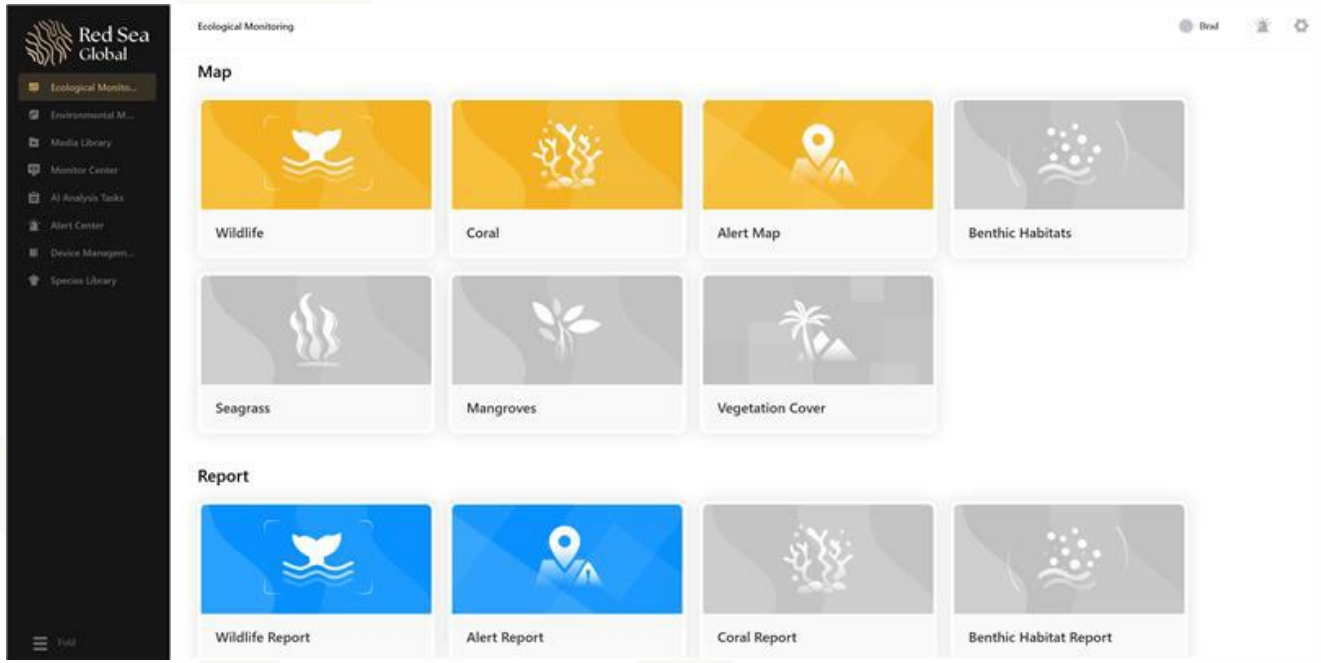
- **Limited scalability** of traditional methods (diver surveys, satellite imaging, etc.).
- **Slow response times** to emerging environmental threats (e.g., coral bleaching, turtle nest disturbance).
- **Human subjectivity** and **low-resolution data** from traditional tools (e.g., diver surveys).
- **Invasive monitoring techniques** that disrupt ecosystems

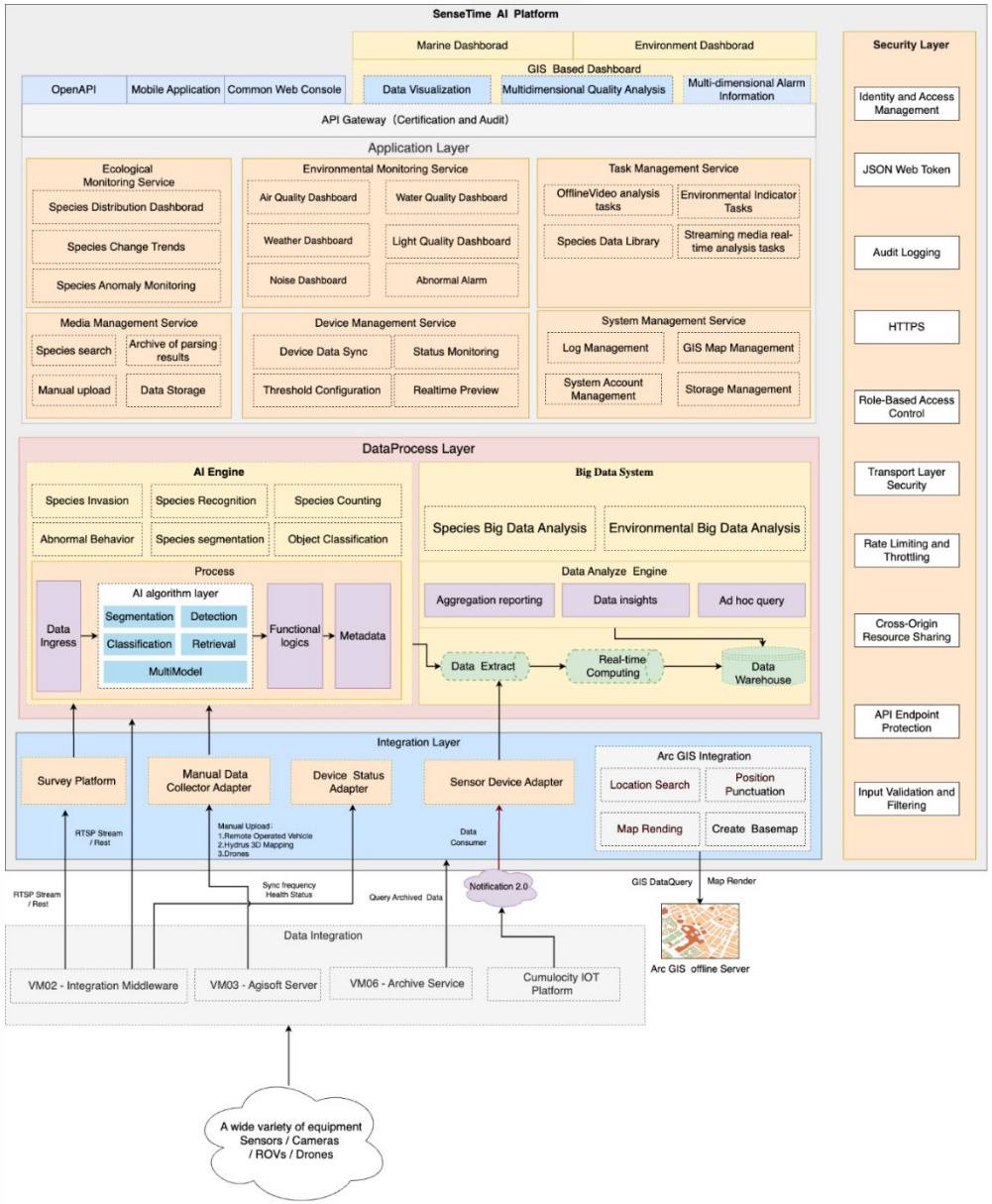
Why Bridging These Gaps Matter:

- The **health of coral reefs** and **sea turtle habitats** is directly linked to the **long-term viability** of marine ecosystems.

Advanced Monitoring Approach – RSG Environmental AI Platform

RSG Environmental AI platform is a cutting-edge environmental monitoring and management system designed to **safeguard biodiversity**, **support sustainability**, and **enhance eco-tourism** in one of the world's most pristine marine ecosystems.

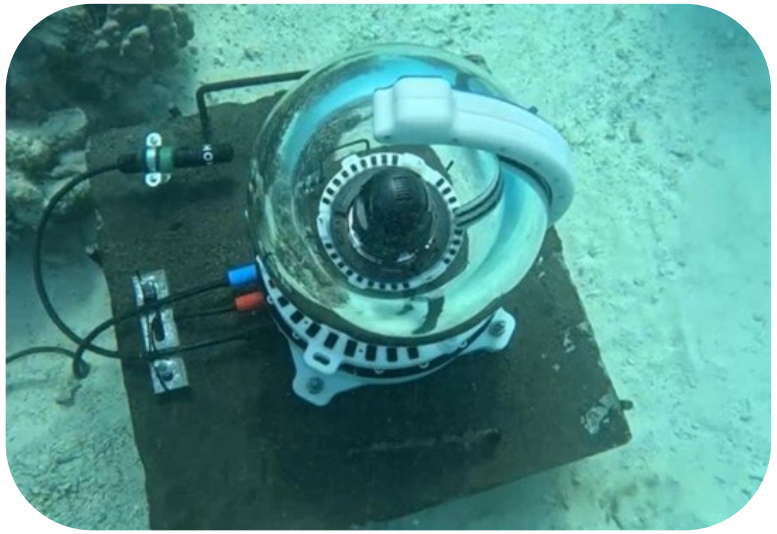




RSG's AI-Enhanced Monitoring Solutions – **Coral Reefs**

Autonomous Underwater Vehicles

Use AI imaging and navigation to assess coral health, map reefs, and detect stressors like bleaching or invasive species



Underwater Camera Networks

Fixed cameras in key reef zones stream continuous imagery for AI-driven analysis of bleaching, biodiversity, and growth trends.

Smart Water Buoys

Equipped with environmental sensors and real-time data transmission to monitor oceanographic conditions (e.g., temperature, salinity, turbidity) that influence coral health.

RSG's AI-Enhanced Monitoring Solutions – **Sea Turtle's Habitats**

Red Sea Global

Unmanned Aerial Vehicles

- High-resolution drones scan nesting beaches for turtle activity.
- AI models detect nests, habitat changes, and disturbances from aerial imagery.

Acoustic Monitoring Network

- Underwater hydrophones monitor vocalizations and movements in foraging areas.
- Machine learning identifies behavioral patterns and activity hotspots.

Smart Water Buoys

- Real-time ocean data collection (e.g., temperature, currents, salinity).
- Integrated with AI platform to correlate habitat conditions with turtle behavior and nesting success.

Anticipated Future Developments

As RSG nears **full deployment** of its AI-powered environmental monitoring program, **several transformative developments** are expected:

AI Platform Completion

- Seamless integration of aerial, acoustic, underwater, and buoy data sources
- Accelerated analytics for real-time insights and rapid decision-making

5G Infrastructure Rollout

- High-speed, low-latency communication
- Immediate transfer of field data to centralized servers
- Supports high-resolution imagery, video streams, and sensor data in real time

Advanced Habitat Monitoring Tools

- **Corals**: AUVs, AI health classifiers, smart buoys, and 3D reef models
- **Turtles**: UAV patrols, AI image recognition, acoustic mapping, and smart water buoys
- Scalable, continuous, non-invasive observation of critical ecosystems

Key Takeaways

- RSG will continue to **enhance and scale** its AI-enabled environmental monitoring program
- Integration of AI tools **improves** ecological accuracy and response time
- Non-invasive technologies **minimize human impact** on sensitive marine zones
- Real-time data streams **enable adaptive, proactive** environmental management

Conclusion

- Continue **scaling AI applications** to new habitats and species
- Prioritize **data standardization** across monitoring tools
- Foster **cross-sector partnerships** for innovation and biodiversity protection
- Build capacity for **AI literacy and environmental data interpretation** within RSG teams and other stakeholders

Let’s continue the conversation!

Message me your questions or comments in the IAIA25 app.

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