



Restoration of Resilience of Nature and Society in the Caribbean Netherlands

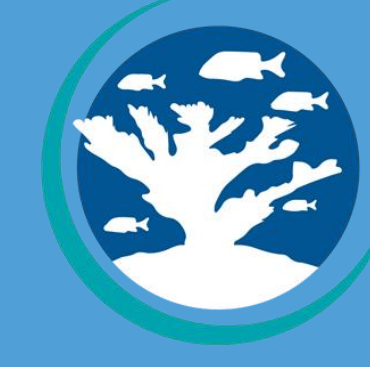
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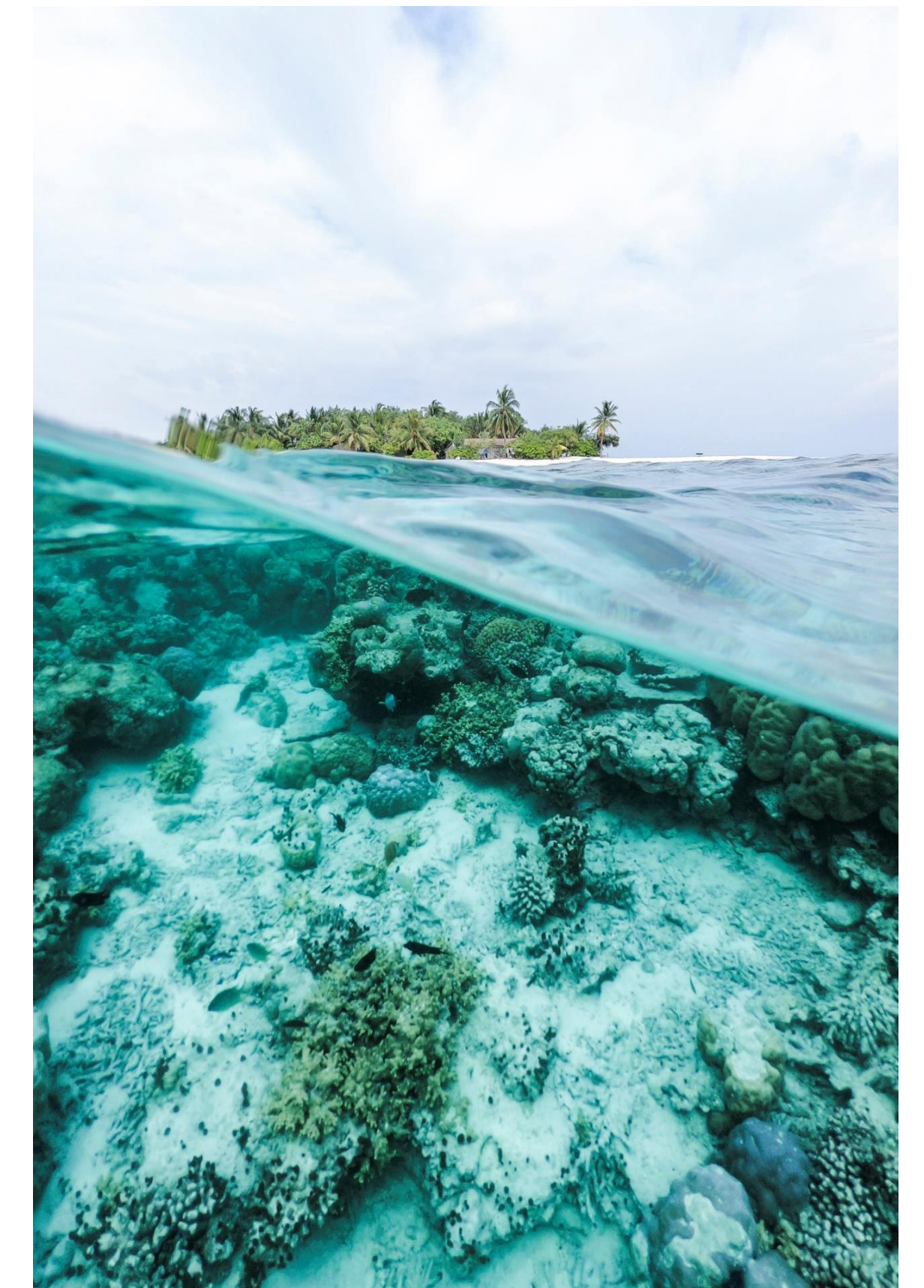
Reef Renewal
Bonaire

Significance & Relevance

- Multiple stressors (e.g., pollution, eutrophication, sedimentation, coastal development, overfishing, coral disease, ocean warming, and ocean acidification) are threatening the health and survival of coral reef ecosystems globally
- Healthy coral reefs are more resistant to adverse effects of multiple-stressors
- Guidance is needed to apply reef resilience to support coral reefs and the benefits reefs provide (ecosystem services).*
- A resilience-based approach monitors the stress tolerance of coral reef ecosystems, promotes recovery and facilitate adaptation by integrating all aspects of the coupled social-ecological system*

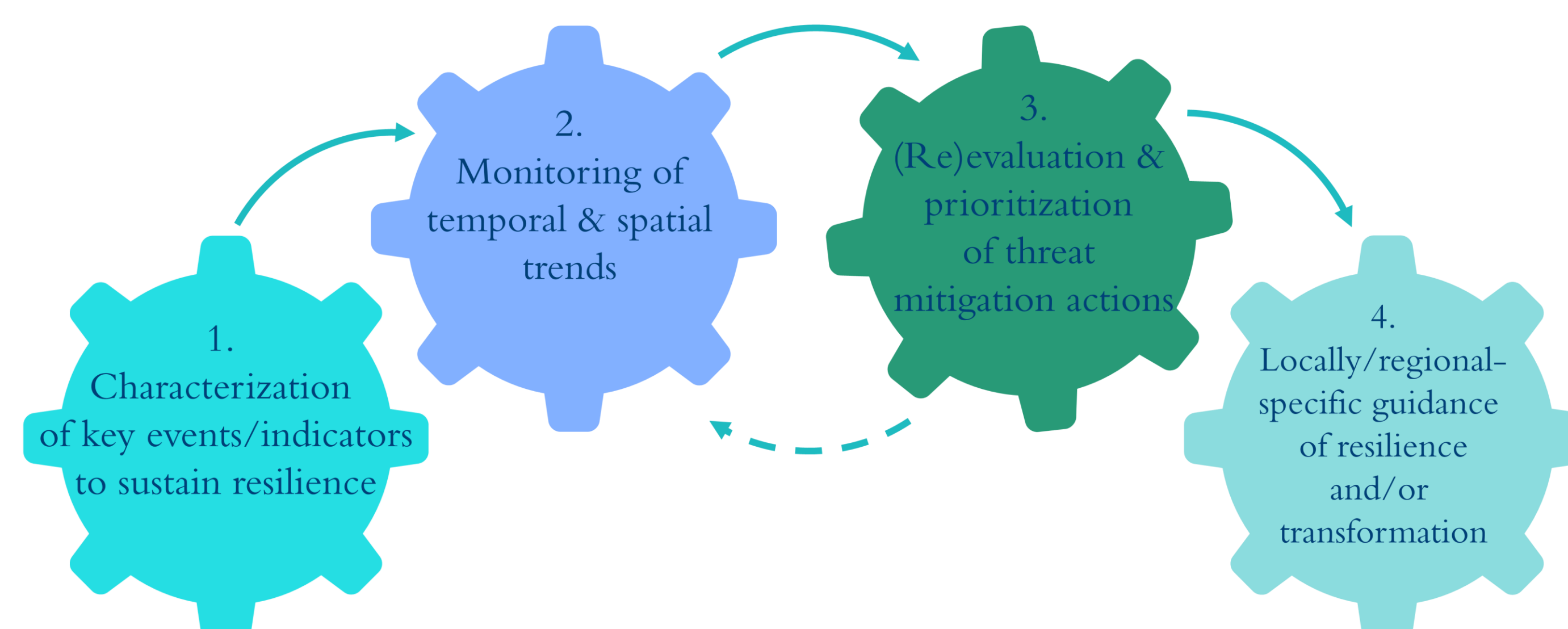
Solution for the Caribbean Netherlands

- As part of the policy supporting research from the Ministry of Agriculture, Nature and Food Quality the present project started in 2021 on Bonaire, Saba, and St. Eustatius for 4 years with a total budget of 1.8m€
- Together with local stakeholders we want to improve the resilience of coral reef communities around the islands and contribute to a resilient economy



Project goals:

Developing a resilience-based monitoring and management approach in the Caribbean NL



Monitoring approach

Coral reef images

Underwater drones will collect images down to 100m depth and provide more knowledge and data on the mesophotic reef environment

Artificial intelligence

Deep learning and AI will help to identify massive amounts of photographs from the reef to estimate coral diversity, cover and health status

Metabolomics

Metabolomics is used to detect specific indicators of health and stress of the coral reef system. Metabolite profiling of hazardous chemical micropollutants will be conducted

Remote sensing

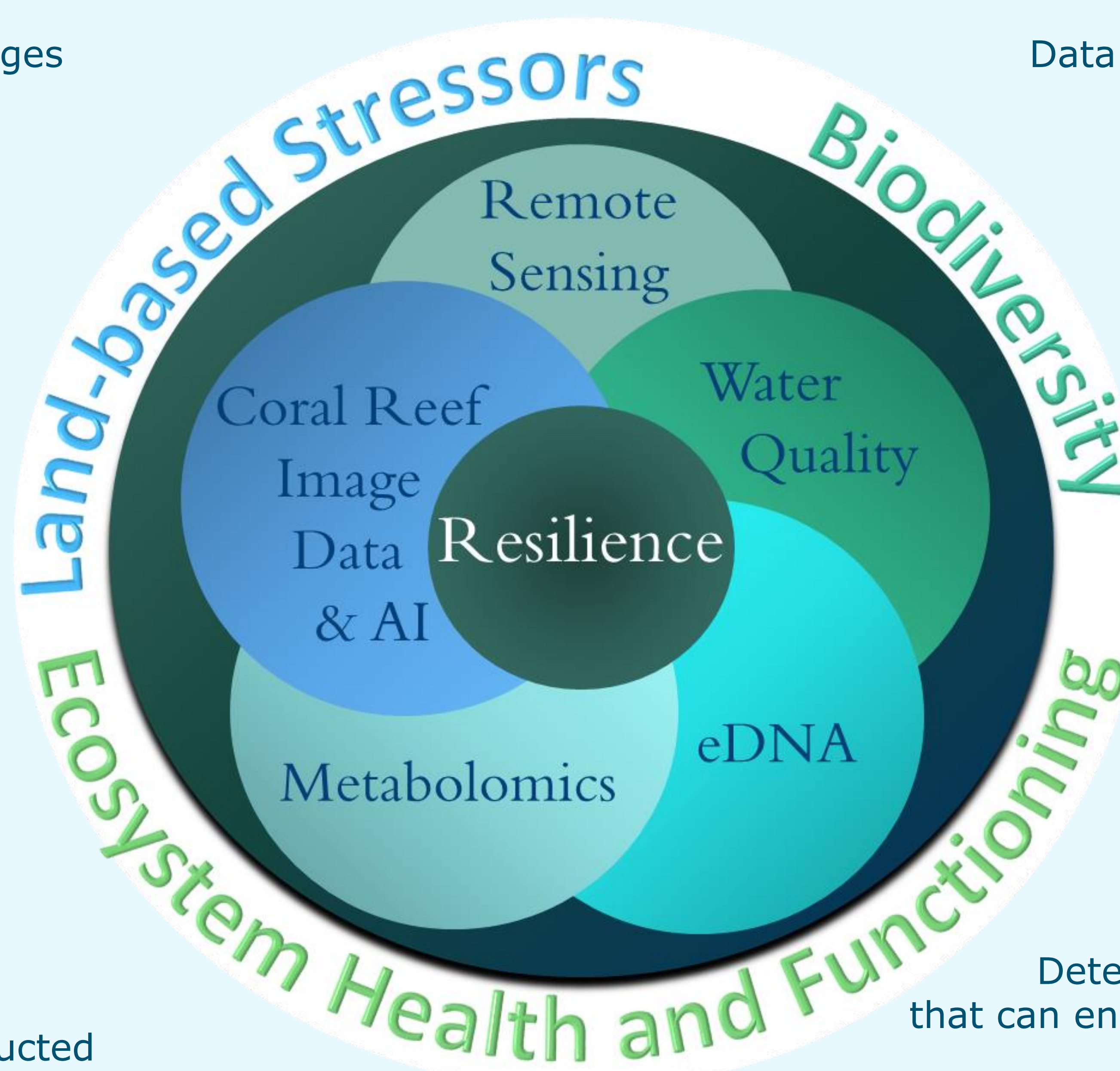
Data from satellites and drones (air and sea) will be used to build Digital Elevation and bathymetric models that include vegetation cover and runoff

Water quality

Intensive water quality monitoring with new sensors and large scale spatial and temporal sampling will increase the knowledge base

Environmental DNA

eDNA techniques are used to detect migratory species and total biodiversity. Detecting the functional group diversity that can enhance coral recovery and resilience



References

*McLeod, E. et al. (2019). The future of resilience-based management in coral reef ecosystems. Journal of environmental management, 233, 291-301.



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