Timeline

Initiation of research
Hypothesize adaptation policies based on preparatory research and communication.

Finalization of research
Finalization of NbS adaptation measures based on validation. Proposal of funding request for the implementation.

2024 | 2025 | 2026 | 2027-

Survey Continuation - Interim Verification
Continuation of survey, development of evaluation models, and interim verification. Conceptual policy proposals.

For social implementation

Our team

coral reef science

PI: Hajime KAYANNE (PhD)
Project researcher, the University of Tokyo
Research Director and Supervisor

coastal engineering

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Assessment of disaster prevention functions of coral reef coasts

Takenori SIHMOZONO (PhD)
Professor, The University of Tokyo
Assessment of disaster prevention functions of coral reef coasts

ocean policy

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Stakeholder participatory problem analysis

community studies

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Researcher, The University of Tokyo
Stakeholder participatory problem analysis

physical geography

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Spatio-Temporal design of ecosystem conservation as NbS

marine environment

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Researcher, National Institute for Environmental Studies (NIES), Japan
Analysis of the use and conservation of marine environments and ecosystems

ecology

Yuki YOSHIDA (PhD)
Researcher, National Institute for Environmental Studies (NIES), Japan
Valuation of marine space and stakeholder surveys

socio-economics

Tatsuhito KONO (PhD)
Professor, Tohoku University
Economic assessment of effect on adaptation measures including NbS

Jun YOSHIDA (PhD)
Associate Professor, Tohoku Gakuin University
Economic model building and analysis

funding planning

Akihiko NONAKA (M.Eng.)
Representative director, Artcivl Inc.
Funding planning for social implementation

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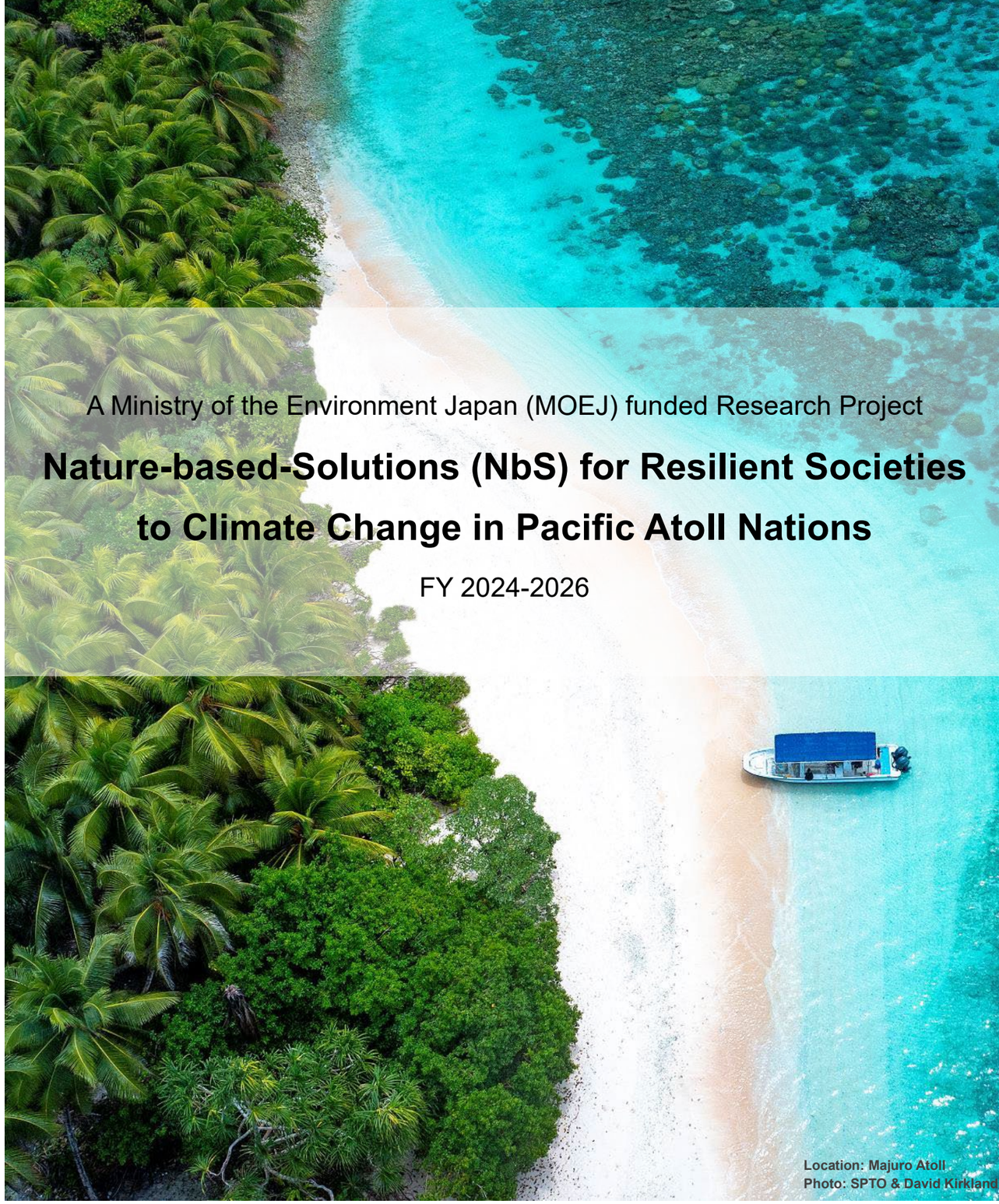
Project Administration: Environmental Restoration and Conservation Agency of Japan (ERCA) URL: https://www.erca.go.jp/erca/english/index.html

Photo: Handmade Craft of RMI, Copyright: SPTO

A Ministry of the Environment Japan (MOEJ) funded Research Project

Nature-based-Solutions (NbS) for Resilient Societies to Climate Change in Pacific Atoll Nations

FY 2024-2026



Location: Majuro Atoll
Photo: SPTO & David Kirkland

環境省 Ministry of the Environment Government of Japan | ERCA | UTokyo | National Institute for Environmental Studies, Japan | TOHOKU UNIVERSITY | 東北学院大学 TOHOKU GAKUIN UNIVERSITY | Artcivil Inc.

＜A Ministry of the Environment Japan (MOEJ) funded Research Project＞

Nature-based-Solutions for Resilient Societies to Climate Change in Pacific Atoll Nations; FY 2024-2026

Preface

Background and Outline: This three-year project, funded by Japan's Ministry of the Environment from 2024, targets climate-vulnerable coastal areas in Pacific Island Countries. It brings together researchers to explore adaptive strategies for these atoll nations.

Nature-based Solutions (NbS) are actions that protect, restore, and manage ecosystems—land, freshwater, and marine—to enhance resilience, biodiversity, and human well-being in response to climate change.

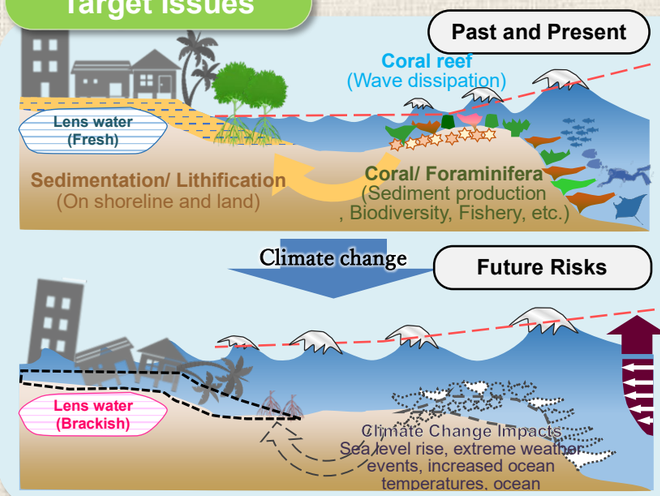
Objective

This project aims to develop and implement Nature-based Solutions (NbS) to strengthen the resilience of small island societies against sea-level rise, flooding, erosion, and other climate impacts. We will:

- Design and evaluate NbS, engineering, and social adaptation measures
- Develop models to assess their economic and ecological benefits
- Formulate adaptation scenarios with local and international partners, including financing mechanisms

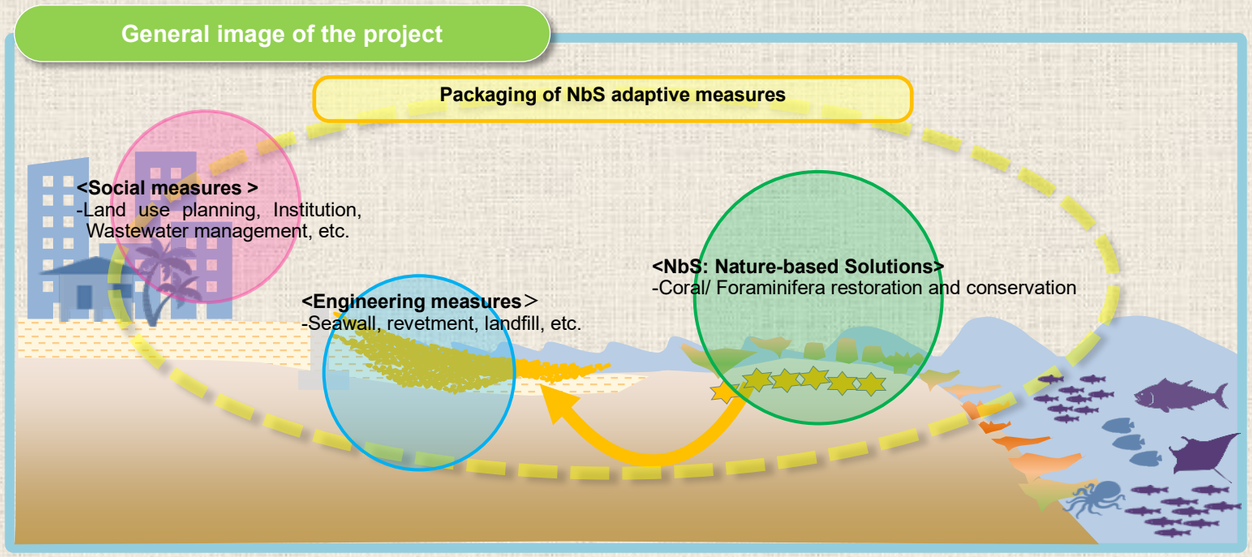
Collaboration with island governments and communities is central to achieving these goals.

Target Issues



Climate change—through sea-level rise and extreme weather—threatens coastal ecosystems and increases risks to island communities. Beyond engineering solutions, there is a growing need for adaptive measures that integrate and sustain coastal ecosystem functions.

General image of the project



Sub-themes

Preparation

Stakeholder participatory problem analysis and development of action packages: [Makino, Sena] Solution packages and their implementation methods relevant to local context should be developed and evaluated by the parties concerned on their own initiative.

Restoration of coastal ecosystem [Kayanne]
Evaluation of coral reef function as coastal protection and sediment supply for coastal resilience.
Propose ecosystem restoration measures and improvement of coastal environment through wastewater and garbage management.

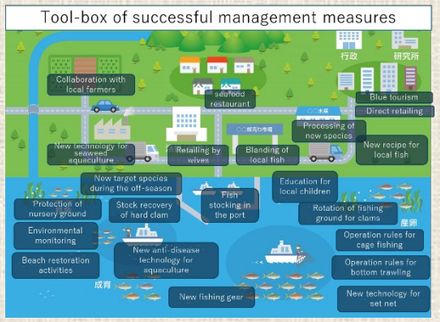
Engineering countermeasures for coastal protection [Tajima, Shimozono]
Assessing the impact of climate change and the effectiveness of coastal protection measures on the coastal zone. Planning and proposal of engineering measures for coastal protection considering NbS.

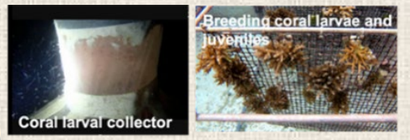
Spatio-Temporal design for NbS [Yamano, Abe, Y Yoshida]
Research of restoration and conservation of the coastal ecosystem as NbS adaptive measure.
Proposal the priority areas for conservation based on land bioresources management and cost.

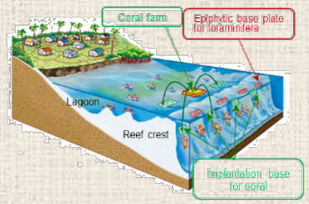
Economic assessment of effect on adaptation measures including NbS [Kono]
Study and development of an integrated economic and ecosystem assessment model for NbS projects.
Economic assessment of project ideas using the developed model.

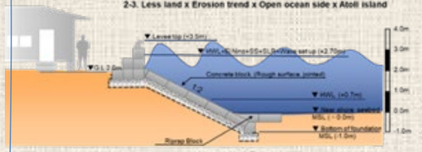
Funding planning for social implementation [Nonaka]
Financial planning for implementation of the project ideas.
Support for funding proposal for the implementation.

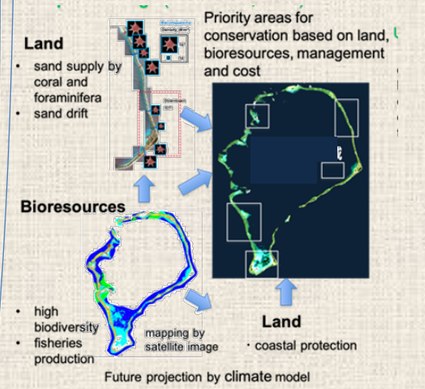
Implementation



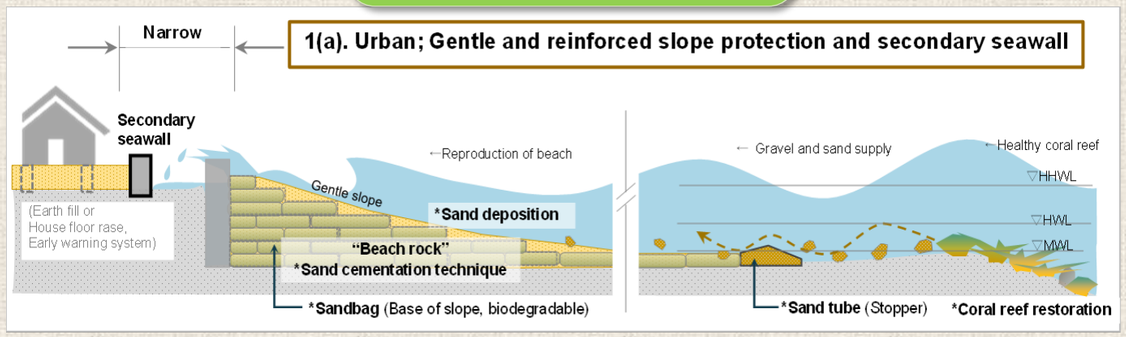




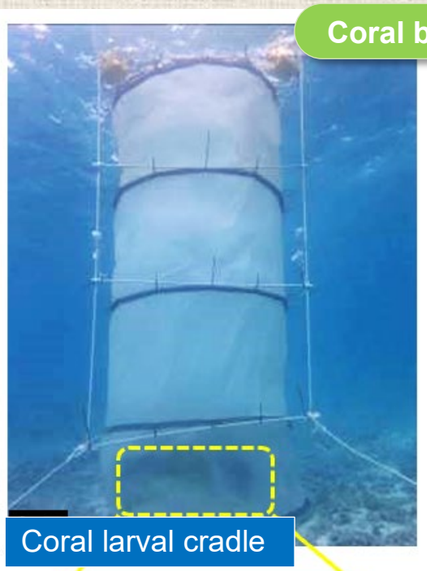




NbS Engineering measures

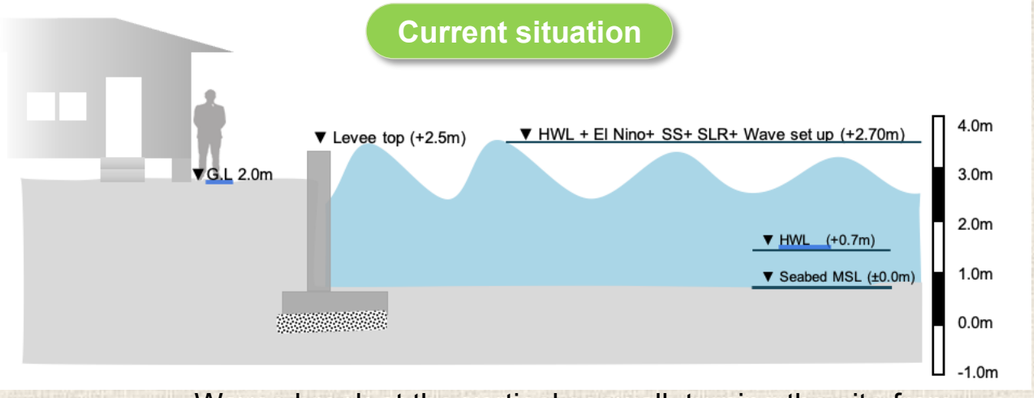


Coral breeding technology



The coral larval cradle in which corals are bred can be installed in the excavated pits. Coral larvae will be dispersed to the coral reefs, and juvenile corals will be raised and outplanted on the seawalls.

Current situation



Waves break at the vertical seawall, turning the site from sedimentation to erosion, causing the beach loss

Utilizing high production of foraminifera for beach nourishment