Sustainable Land Management in Atoll Island Countries (2002-2007)

〇Univ. Tokyo, Univ. Ryukyus
Keio Univ, Ibaraki Univ
National Inst. Environmental Studies

Funded by Ministry of the Environment, Japan

環境省地球環境総合研究推進費
（2002-2007年）

B-15 環礁州島からなる島嶼国の持続可能な国土の維持に関する研究

マーシャル諸島共和国，パラオ

〇東京大　理，
平成帝京大・慶應大）
国立環境研・茨城大）

Adaptive measures to changes in geomorphology and water resources on atoll island countries (200802010)

Univ. Tokyo, Keio Univ, Ochanomizu Univ
Ibaraki Univ, Res Inst Human Nature,
〇National Inst. Environmental Studies

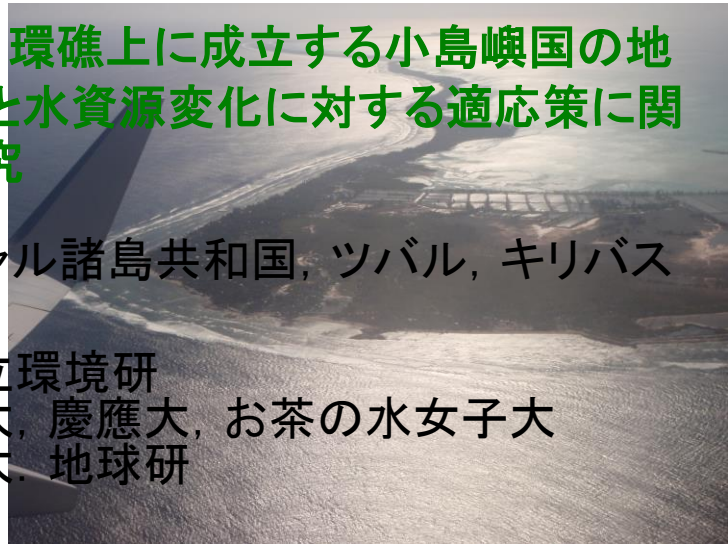
Funded by Ministry of the Environment, Japan

環境省地球環境総合研究推進費
（2008-2010年）

A-0805 **環礁上に成立する小島嶼国の地形変化と水資源変化に対する適応策に関する研究**

マーシャル諸島共和国，ツバル，キリバス

〇国立環境研
東京大，慶應大，お茶の水女子大
茨城大，地球研



Coral reef

Coral gravels

Foram sand

Atoll islands are formed by organisms

SATREPS (JST-JICA)

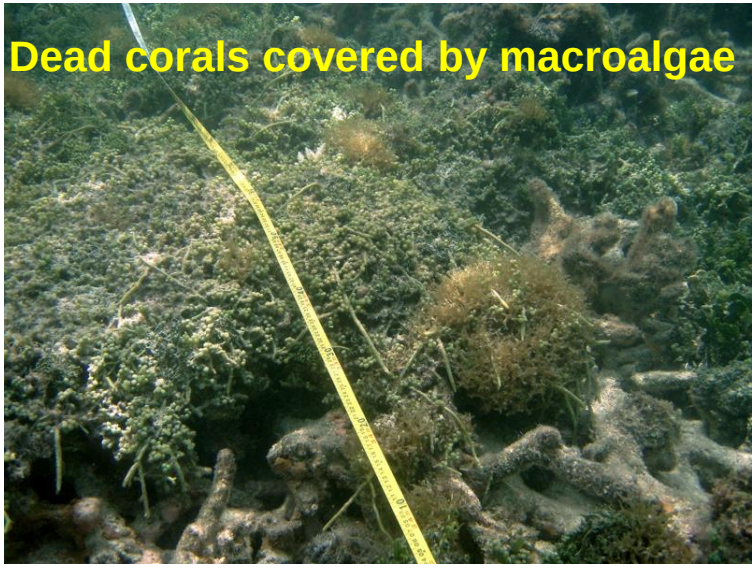
Eco-technological management of Tuvalu against sea-level rise (2009-2013)

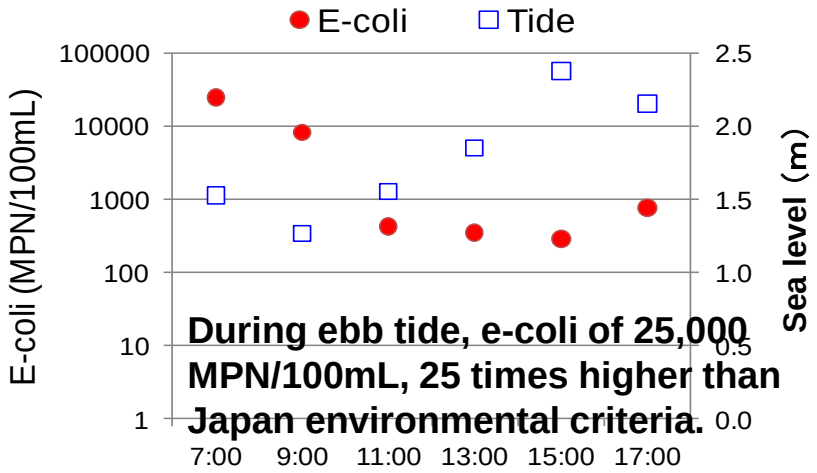
Goal: Regeneration of sandy beach along Fongafale coast

Dept Environment, Fishery Dept, Land Survey, Tuvalu; SOPAC, USP, Fiji
Univ Tokyo, Ibaraki Univ, Ntl Inst Environmetal Studies, Unv Ryukyus, Ntl Inst Land Infrastr Manag, Japan

Production

Ecosystem deterioration





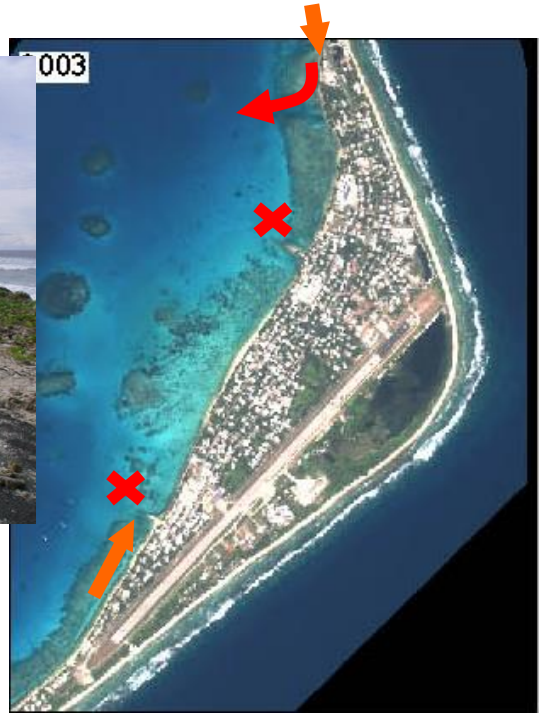
Human waste releases to lagoon..

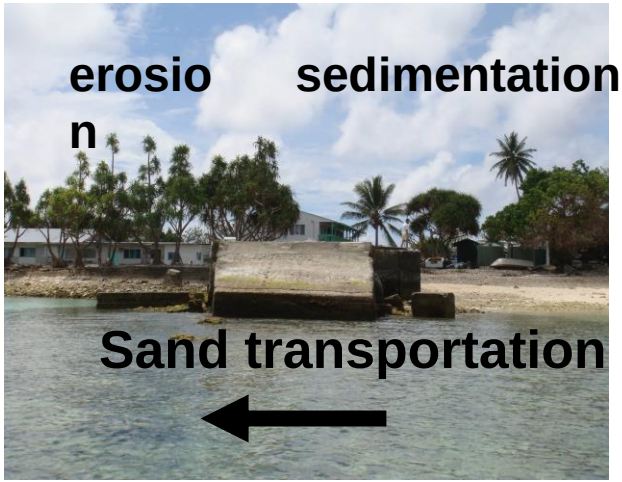
Loss of coral is crucial for Tuvalu as it forms a foundation and natural breakwater.

transportation

Causeway

Jetties and dredges





sedimentation

Vertical sea wall

Loss of coastal vegetation

Proposed plans for coastal rehabilitation against sea level rise by Foram Sand Project

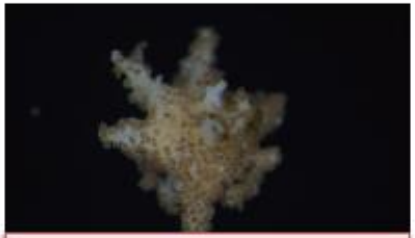
High

Challenge level

Low

Ultimate goal

Regeneration of sandy beach



Foram culture and Habitat generation

Open-cut the causeway

Replanting coastal vegetation

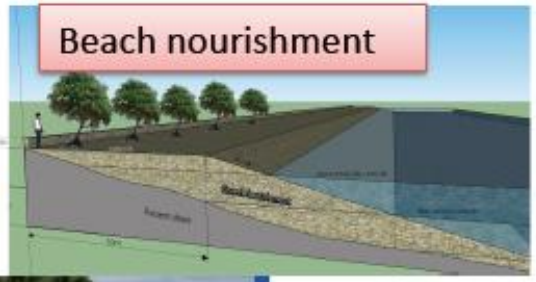
Environment improvement

Ecosytem rehabilitation

Sewage treatment

Waste management

Beach nourishment



Removal of jetties
Backfill dredges

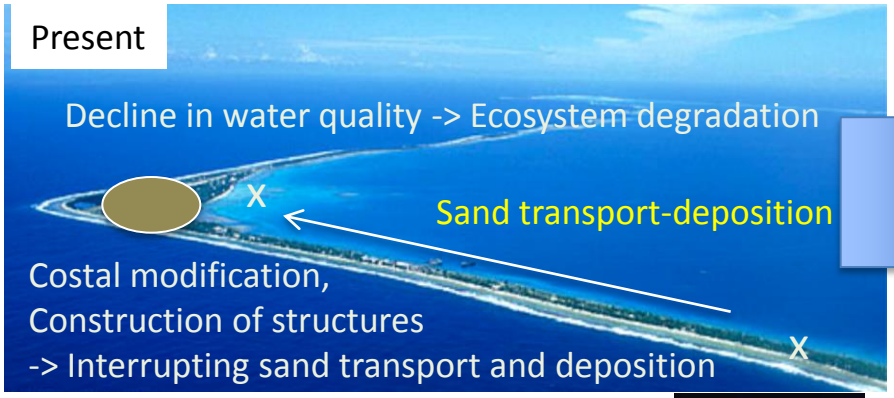
Present status

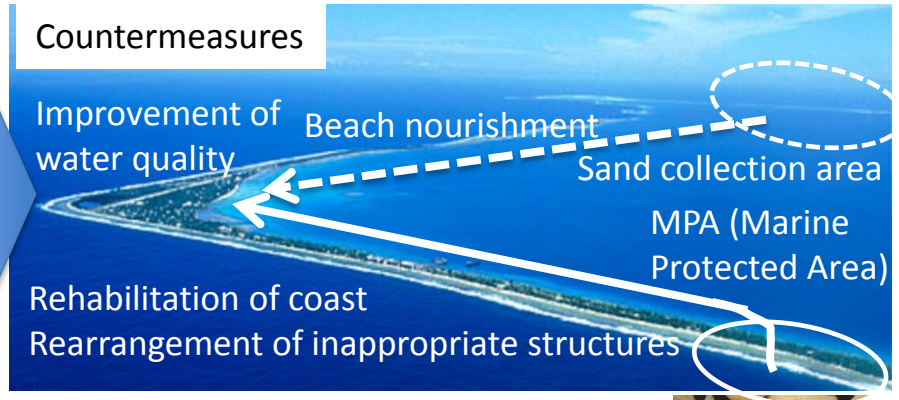
Short-term

Time scale

Long-term

Adaptation to climate change by conservation of coral-reef ecosystem functions





Sand production by foraminifera and coral

Conservation and enhancement of sand production by foraminifera and coral

FORAM SAND PROJECT

Foram Sand Project outputs

-Identifying sand production area (Foram/coral habitats)

-Modeling sand transport and deposition

-Specifying hindrances for sand production-transport-deposition

Production: Decline in water quality
Transport: Causeway, jetty
Deposition: Dredging, coastal vegetation cut-off

-Exploring sand production enhancement

Foram culture

-Exploring suitable monitoring systems

Surveillance camera, satellite data

Proposals

Land management planning →
Production: MPA planning
Improvement of water quality
Transport: Rearrangement of structures
Deposition: Rehabilitation of coast

Sand production technology →
Enhancement of foram/coral production

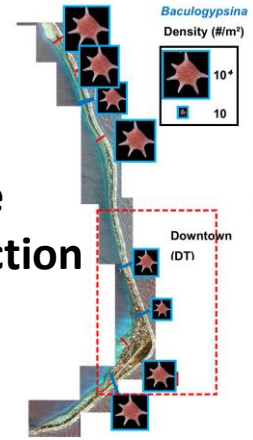
Monitoring system →
Setting surveillance cameras
Satellite data analysis

Implementation options

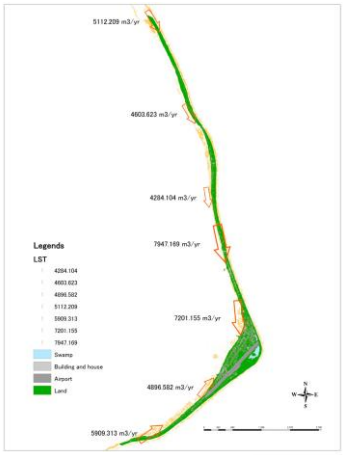
- MPA designation
- Sewage/waste management
- Rearrangement of the causeway and jetties
- Beach nourishment
- Replanting coastal vegetation
- Foram/coral culture
- Habitat generation
- Monitoring and adaptive management

Adaptation to climate change by conservation of coral-reef ecosystem functions

Land maintenance
-sand production by coral and foram

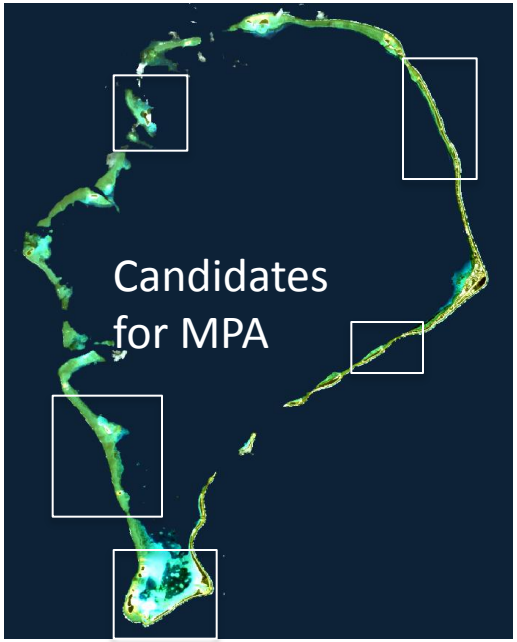


Sand production by foraminifera



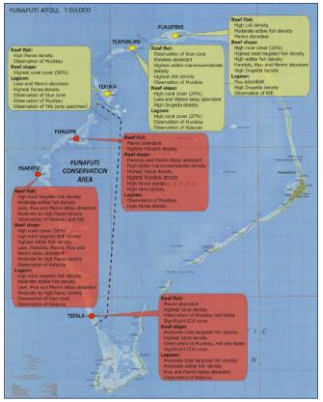
Sand transport

Potential conservation area :
-Sand production area
-Sand source

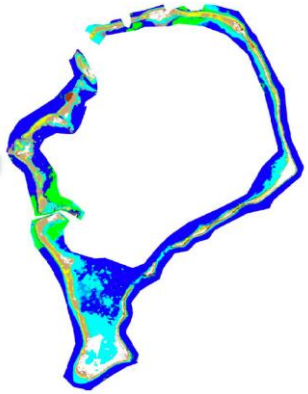


Integration

Biological resource conservation
-biodiversity
-fisheries



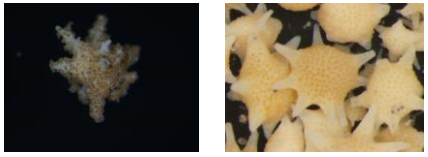
Biodiversity



Satellite data classification

Potential conservation area :
-high biodiversity
High production

Conservation of land and biological resources
Monitoring

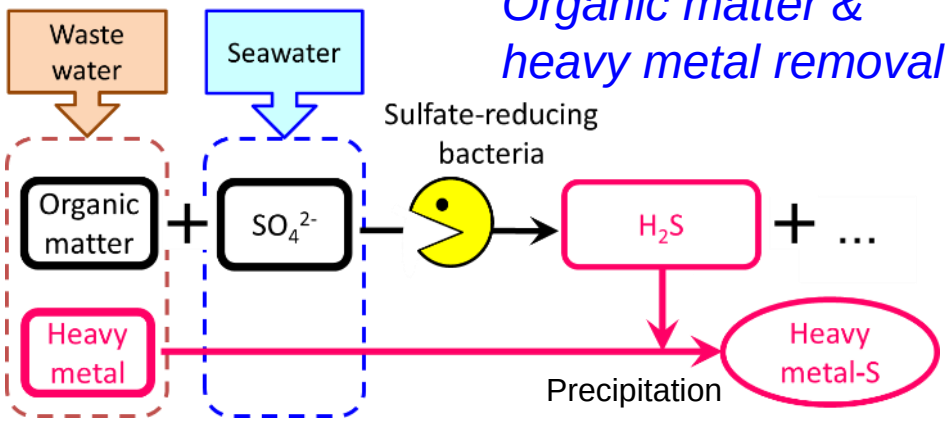


Maintenance of foram culture
Maintenance of aquarium

Next phase of FSP

Coastal water quality management in atolls

Wastewater treatment technology using natural tide system



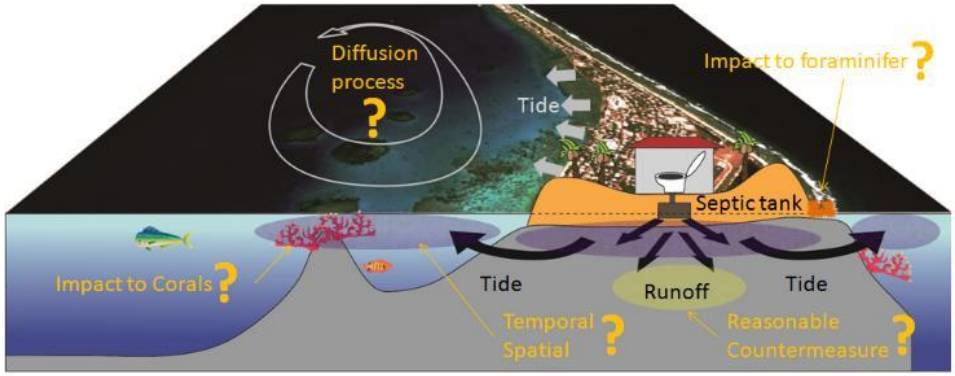
Organic matter & heavy metal removal

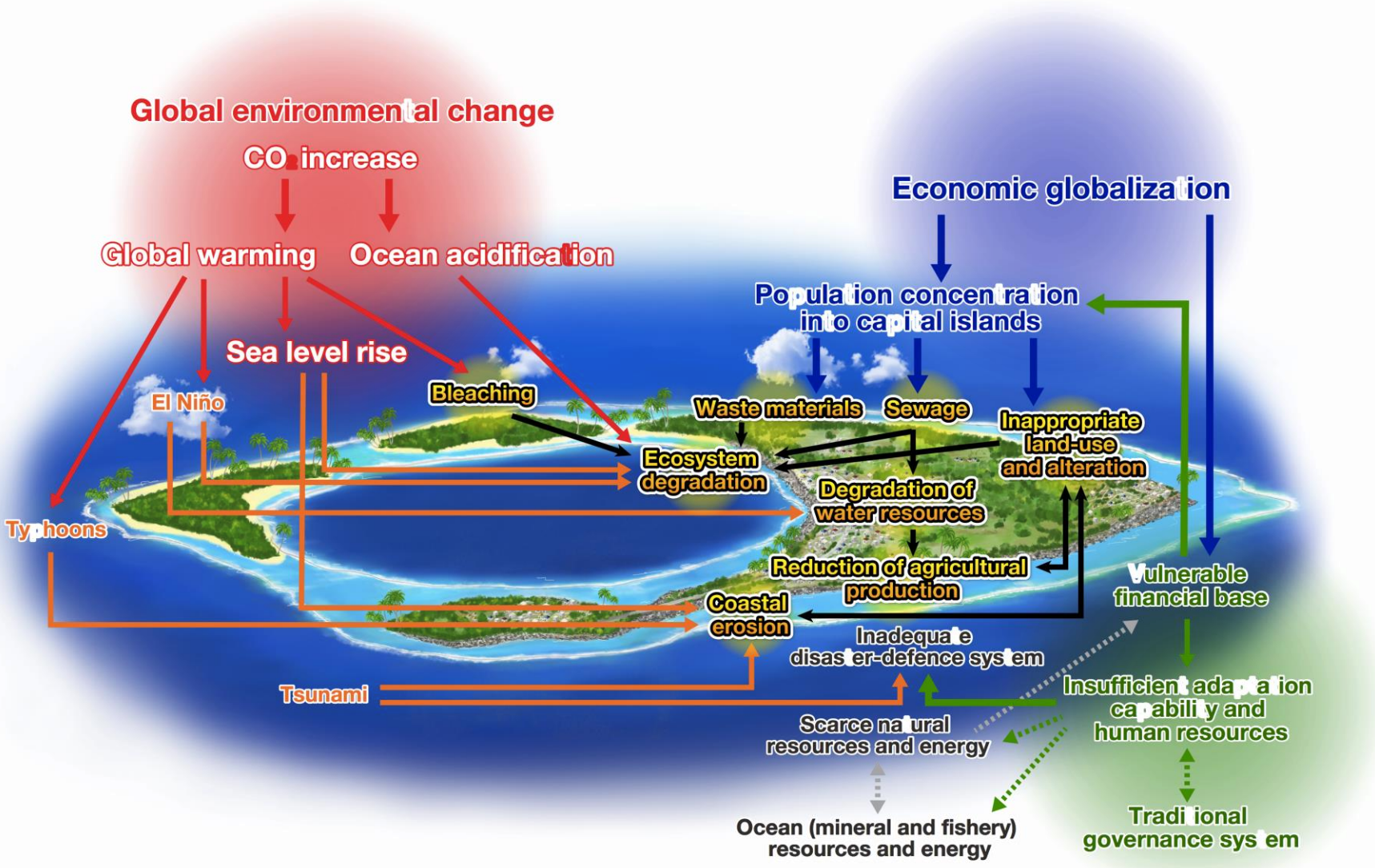
Water quality criteria for the conservation and rehabilitation of coastal ecosystem

Sand-producer (Foraminifera)

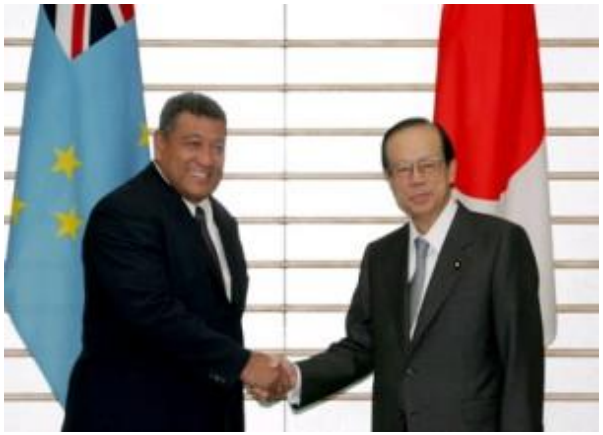
Urgency and importance for the implementation of pollution control measures (Anthropogenic pollution history)

Lagoon water quality prediction model for the estimation of the effectiveness of pollution




Global environmental change
CO2 increase
Global warming
Ocean acidification
Sea level rise
El Niño
Typhoons
Bleaching
Tsunami
Economic globalization
Population concentration into capital islands
Waste materials
Sewage
Inappropriate land-use and alteration
Ecosystem degradation
Degradation of water resources
Reduction of agricultural production
Coastal erosion
Inadequate disaster-defence system
Vulnerable financial base
Insufficient adaptation capability and human resources
Traditional governance system
Scarce natural resources and energy
Ocean (mineral and fishery) resources and energy

December 6, 2007
Prime Minister Yasuo Fukuda - Prime Minister Apisai Ielemia talks



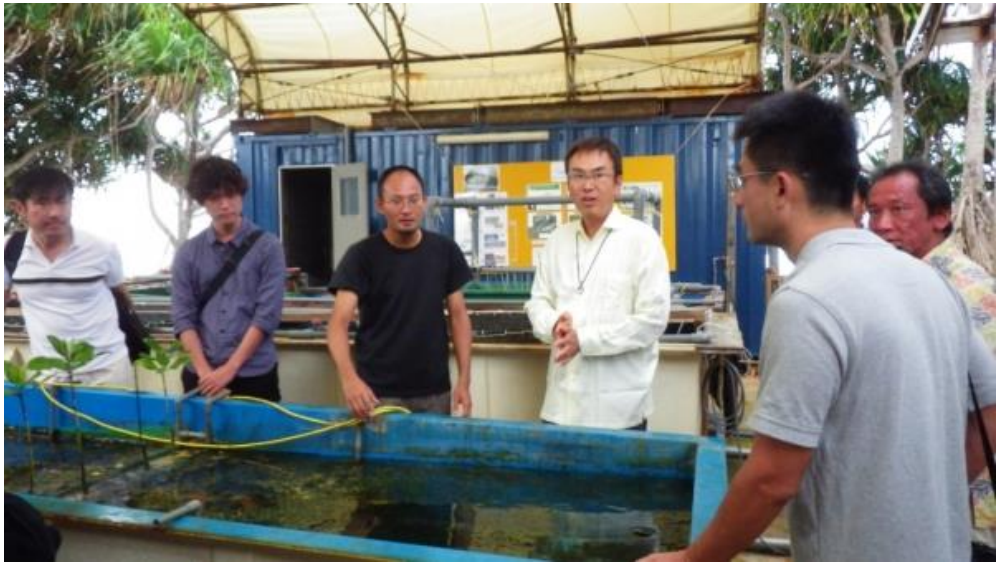
January 4, 2008
Minister of the Environment Ichiro Kamoshita visits Tuvalu

February 2008: Ministry of the Environment investigation team
March 2008: Ministry of Foreign Affairs investigation team

April 12, 2010
Explanation to Prime Minister Apisai Ielemia

2009-2013 SATREPS
Ecological engineering maintenance of Tuvalu in the face of rising sea levels

June 21-23, 2011
Inspection by the President of JICA Sadako Ogata



September 17-19, 2013
Inspection by Minister of the Environment Nobuteru Ishihara