

地球温暖化防止と  
サンゴ礁保全に関する国際会議

島嶼地域の持続的発展



大城 肇  
琉球大学

Hajime OSHIRO

University of the Ryukyus

International Conference on Climate Change  
and Coral Reef Conservation  
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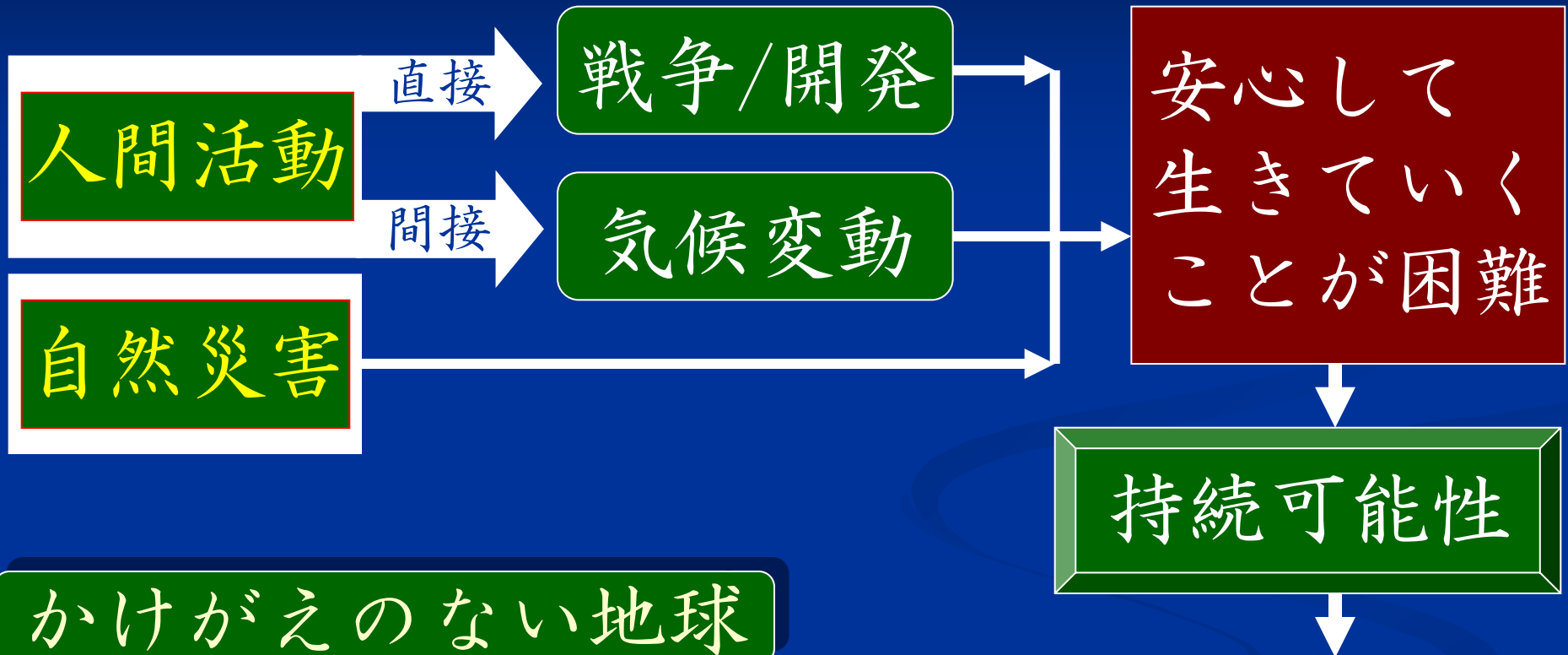
# Sustainable Development of the Island Regions



Hajime OSHIRO

President, University of the Ryukyus

# 1 はじめに

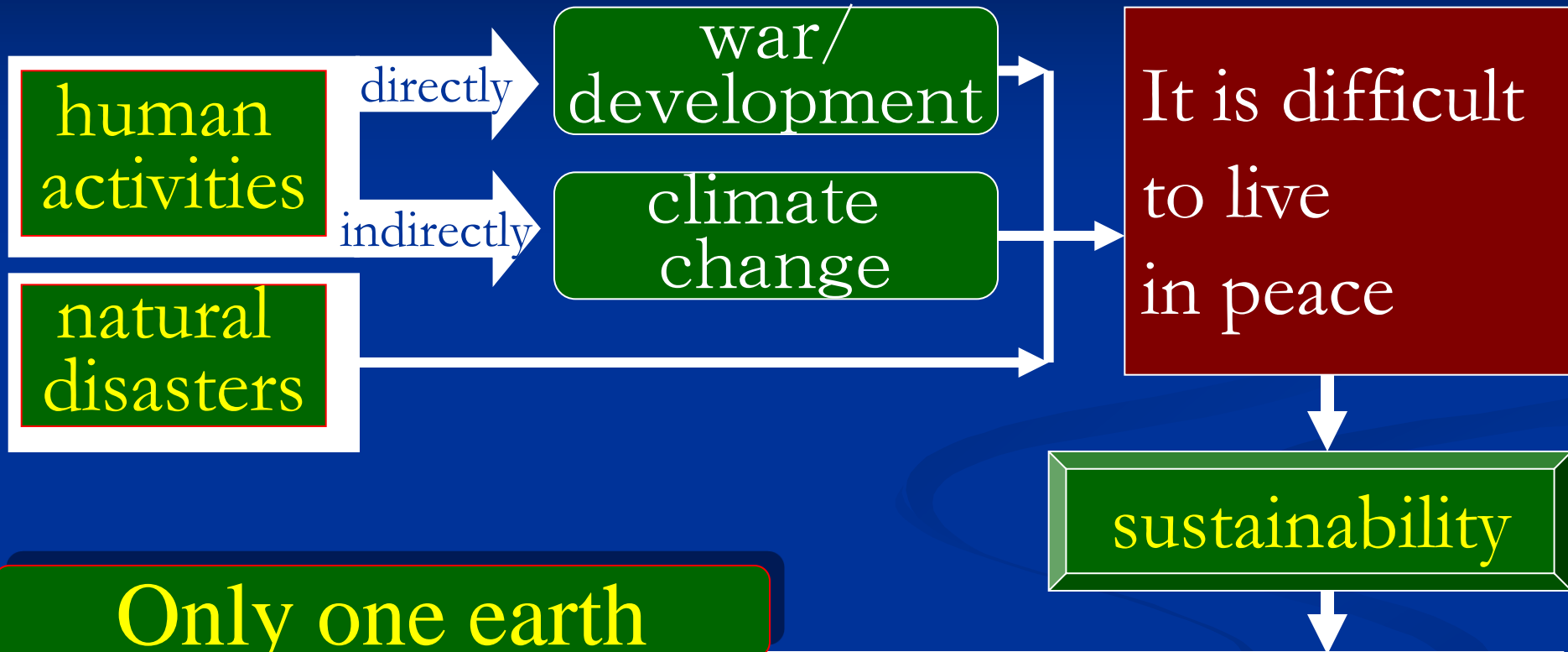


かけがえのない地球



人は、...、現在及び将来の世代のため環境を保護し改善する厳粛な責任を負う  
～国連人間環境会議／人間環境宣言～1972.6

# 1 Introduction



**Only one earth**



We take serious responsibility to conserve and improve environment for present and future generations

~UN Conference on the Human Environment ~ 1972.6

## 2 島嶼の特性

### 島嶼

環海性

狭小性

遠隔性

+

固有の生態系・自然環境

独自の伝統文化・歴史

いやしの空間

-

悪い生産効率 / 高コスト

自然環境や社会経済環境  
が自然災害や外部環境に  
対して脆弱

# 2 Characteristics of Islands

## Islands

oceanic

smallness

remote-  
ness



Peculiar ecosystem and natural environment

Original traditional culture and history

Space of healing



Bad manufacturing efficiency / High cost

Natural environment and a social economic environment are **fragile** compared with the natural disasters and the outside environment.

# 3 海の生態系と人間行為

沖縄の島々



サンゴ礁域

周りを海に囲まれ、海棲生物の宝庫であるサンゴ礁域を有している

造礁サンゴをはじめ魚類、貝類、海草類、甲殻類など多様な生物種が生息

- ・ 人類にとって共有すべき貴重な財産
- ・ 豊かなサンゴ礁はヒトと海洋生物の共存と繁栄の証

# 3 The sea's ecosystem and Human activities

The Islands  
in Okinawa



Coral reefs

Surrounded by the ocean with rich coral reefs for marine species

Diversity of marine species including hermatypic coral, fish, shellfish, and marine plants

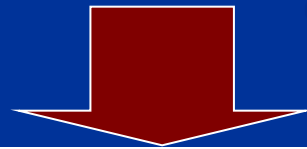
- Valuable assets to share for mankind
- Rich coral reefs are signs of prosperity and coexistence of human being and marine speices



陸上からサンゴ礁へのインパクトは赤土流出によるものが多い（人間活動）

1950年代のパイナップル栽培による農地開発

1972年以降の公共事業、米軍実弾砲撃演習、観光開発等による赤土流出

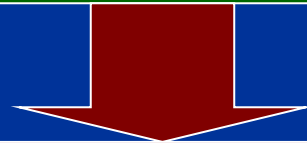


日本復帰後、経済的に公共事業、観光収入、基地収入に依存する（3K経済）が、赤土流出等の環境問題も財政と観光開発と基地に起因

High impact from the land to coral reefs is caused by Red clay outflow (human activities)

Agriculture land development for pineapple cultivation in 1950

Red clay outflow after 1972 by public projects, firing drills in US military bases, tourism development, etc.



After reversion to Japan, Okinawa has been economically dependent on public projects, tourist income, income related to bases (called “3K Economy”); however environmental problems such as red clay outflow have arisen from its economy, tourism development and US bases.

# 4 赤土流出の要因

赤土

自然的要因

- ・ 気候特性
- ・ 土壌特性
- ・ 地形特性

継続的流出

人為的要因

- ・ 開発事業
- ・ 営農活動
- ・ 米軍演習

- ・ サンゴ礁生態系への負荷
- ・ 観光や水産養殖業に悪影響

# 4 Causes of Red Clay Outflow

## Red Clay

### Natural factors

#### Characteristics of

- Climate
- Soil
- Terrain

### Man-caused factors

- Development Projects
- Farming Activities
- US Military Exercises

**Continuous  
Outflow**

- Burden on coral reef ecosystems
- Negative effect on tourism and fisheries / aquaculture industries

# 「沖縄県赤土等流出防止条例」(1994.10)

事業行為に伴って発生する赤土等の流出規制

土地の適正な管理の促進

赤土等の流出による公共用水域の水質の汚濁  
防止 (発生源・流出濁水・最終処理対策)

良好な生活環境の確保

# Okinawa Prefectural Ordinance for Prevention of Red Clay Outflow (1994.10)

Regulations of red clay outflow caused by project/business activities

Promotion of proper land management



Prevention of water pollution by red clay outflow in public water areas (management of sources, outflow pollution, final treatment)



Securement of desirable living environment

# 5 サンゴ礁の役割と経済的価値

## 役割

- ① 生物多様性の維持
- ② 水質の浄化
- ③ 海岸線の維持
- ④ 観光産業、学校教育への場の提供

## 経済 価値

- ◇ 代替法による防波機能の価値評価  
⇒ 832.7億円
- ◇ 仮想評価法による慶良間諸島の  
サンゴ礁保全の価値 ⇔ 3.7億円

出典：藤田陽子・大城肇「島嶼経済システムと  
海域環境保全」『美ら島の自然史』2006.7.

# 5 Functions of coral reefs and economic value

## Functions

- ① Conservation of biodiversity
- ② Water purification
- ③ Preservation of coastal lines
- ④ Providing opportunities for tourism industry and school education

## Economic Values

- ◇ Value assessment of breakwater functions by substitute method  $\Rightarrow$  83.27 Billion yen
- ◇ Value of coral reef conservation in Kerama Islands by contingent valuation method  
 $\Leftrightarrow$  370 Million yen/ year

Reference: Yoko Fujita · Hajime Oshiro "Island Economic Systems and Marine Environment Conservation."

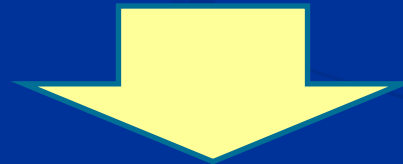


# 〔事例1〕 新素材・スーパーソル

廃ガラスのリサイクル製品

赤土の流出濁水対策機能

サンゴ礁域の環境創造機能



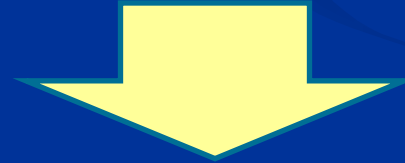
新素材・スーパーソル

# 〔Ex.1〕 New material ・ Super-sol

Recycled products of waste glass

Function for countermeasures against red clay outflow

Functions for environment creation  
in coral reef areas



New Materials ・ Super-sol

# \* スーパーソルによる環境創造

## (株) トリムの廃ガラス再資源化プラント



廃ガラス



プラント



スーパーソル

=

透水性  
保水性  
耐火性

比重・給水率  
の調整



# Case 1: Environmental activities by Super-sol

## Recycling Plant @ TRIM Co., Ltd.



100%  
Waste  
glass



Supersol  
plant



Supersol



Water  
permeability  
retentivity  
Non-  
flammable

Road construction/ Soil improvement/  
Water purification/ Tree plantation/  
Security stone



# \* スーパーソルの活用



沖縄島周辺サンゴ礁域の環境創造研究会

# \* Utilization of Super-sol



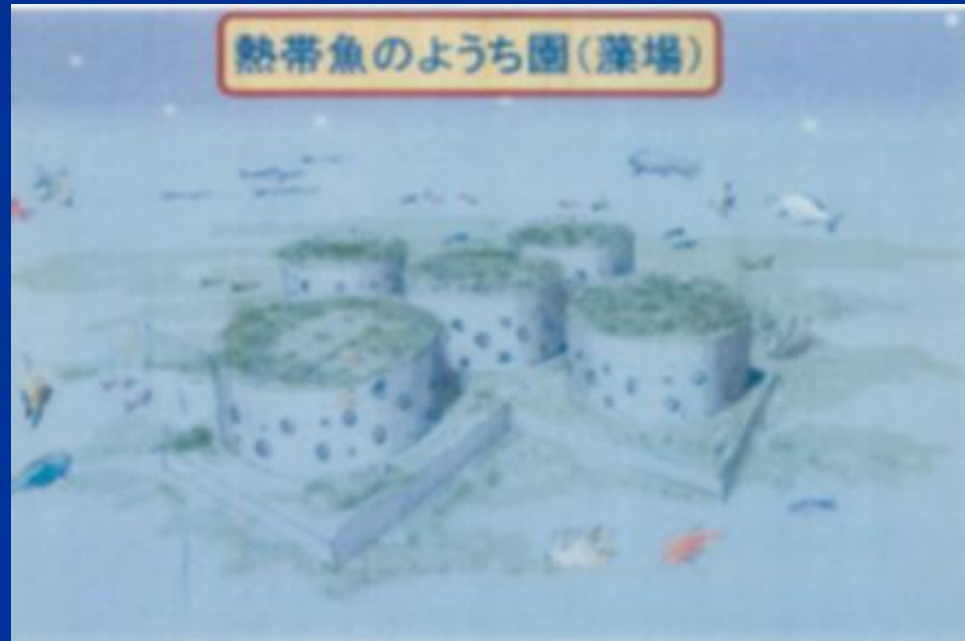
Research Group for Environment Creation in  
Coral Reef Areas surrounding Okinawa Islands

# \* スーパーソルと熱帯魚幼稚園

熱帯魚のようち園(サンゴ)



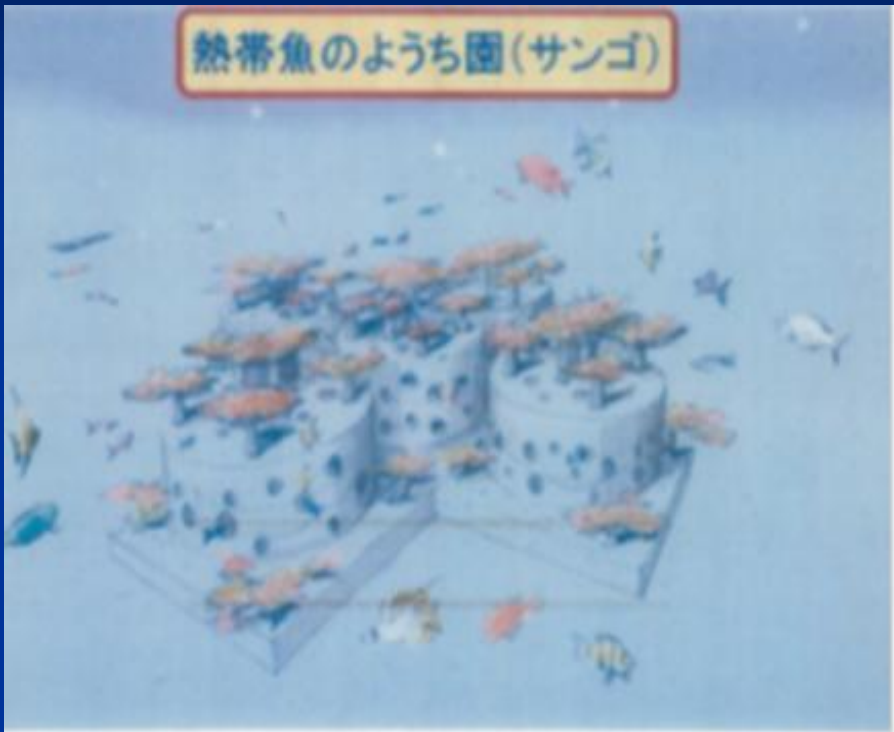
熱帯魚のようち園(藻場)



沖縄島周辺サンゴ礁域の環境創造研究会

# \* Super-sol and Kindergarten for Tropical Fish

熱帯魚のようち園(サンゴ)



Kindergarten for tropical fish (coral reef)

熱帯魚のようち園(藻場)

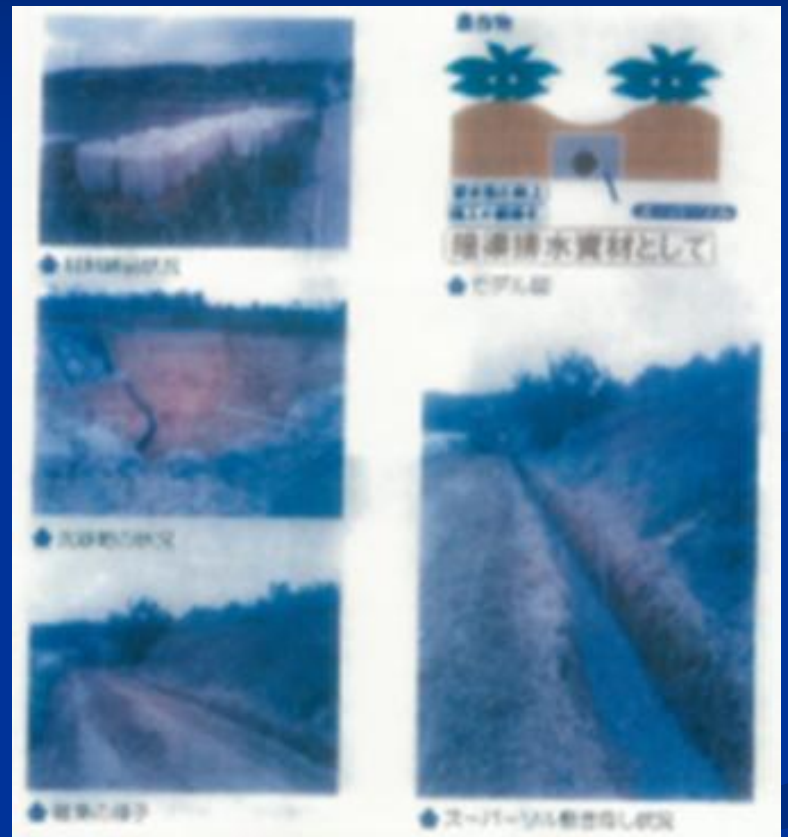
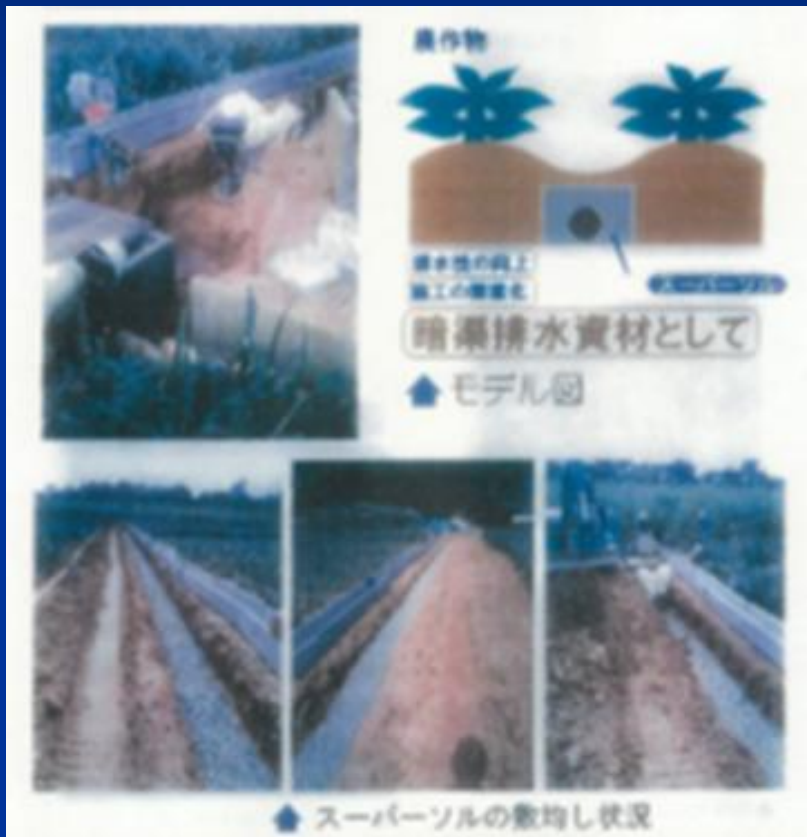


Kindergarten for tropical fish (seagrass bed)

Research Group for Environment Creation in Coral Reef Areas surrounding Okinawa Islands



# \* スーパーソルと赤土流出防止



# \* Super-sol and Prevention of Red Clay Outflow



Research Group for Environment Creation in  
Coral Reef Areas surrounding Okinawa Islands

# 〔事例2〕 漂着ごみと油化事業

漂着ゴミのリサイクル油化

海浜環境の美化

沿岸域の生態系保全

運営費の確保

担い手の確保

島の活性化・無人島化阻止

# [Case2] Petrochemical Projects by Utilizing Drifted Garbage

Recycled petrochemicals by  
utilizing drifted garbage

Beautification of seashore environment

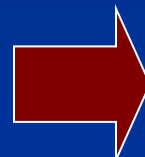
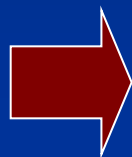
Conservation of biodiversity in coastal areas

Securing  
operating costs

Securing  
human resources

Revitalization of Islands • Prevention  
from making islands uninhabited

# 鳩間島の漂着ごみ資源化用油化装置



漂着ごみ

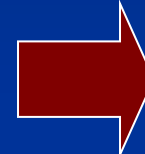
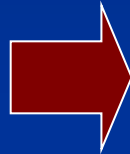
油化装置

スチレン油



- ボイラーや焼却炉の代替燃料  
(灯油やA重油に近い性状)
- ディーゼルエンジンの燃料＝軽油に20%混合
- 有害成分が出にくい可燃性の液体燃料

# Device of making to oil @ Hatoma Isle



Drifted trash

Styrene oil

Equipment of making to oil



- Alternate fuel of boiler and incinerator  
(Properties near kerosene and grade a crude oil)
- Fuel of diesel engine = 20% is mixed with light oil
- Liquid fuel without hazardous component

# 6 島嶼地域の持続可能性について

持続可能性

将来の世代が自らのニーズを充足する能力を損なうことなく、現在のニーズを満たすこと

時間軸の上で共存共栄のためにほどほどに生きること

ヌチ ドゥタカラ (命は宝)

全てのいのちの受け継ぎ

いのちに立脚した島嶼学の確立

# 6 On the sustainability in the island regions

sustainability

Paths of progress which meet the needs and aspirations of the present generation without compromising the ability of future generation to meet their needs

To live moderately on the time axis for live-and-let-live

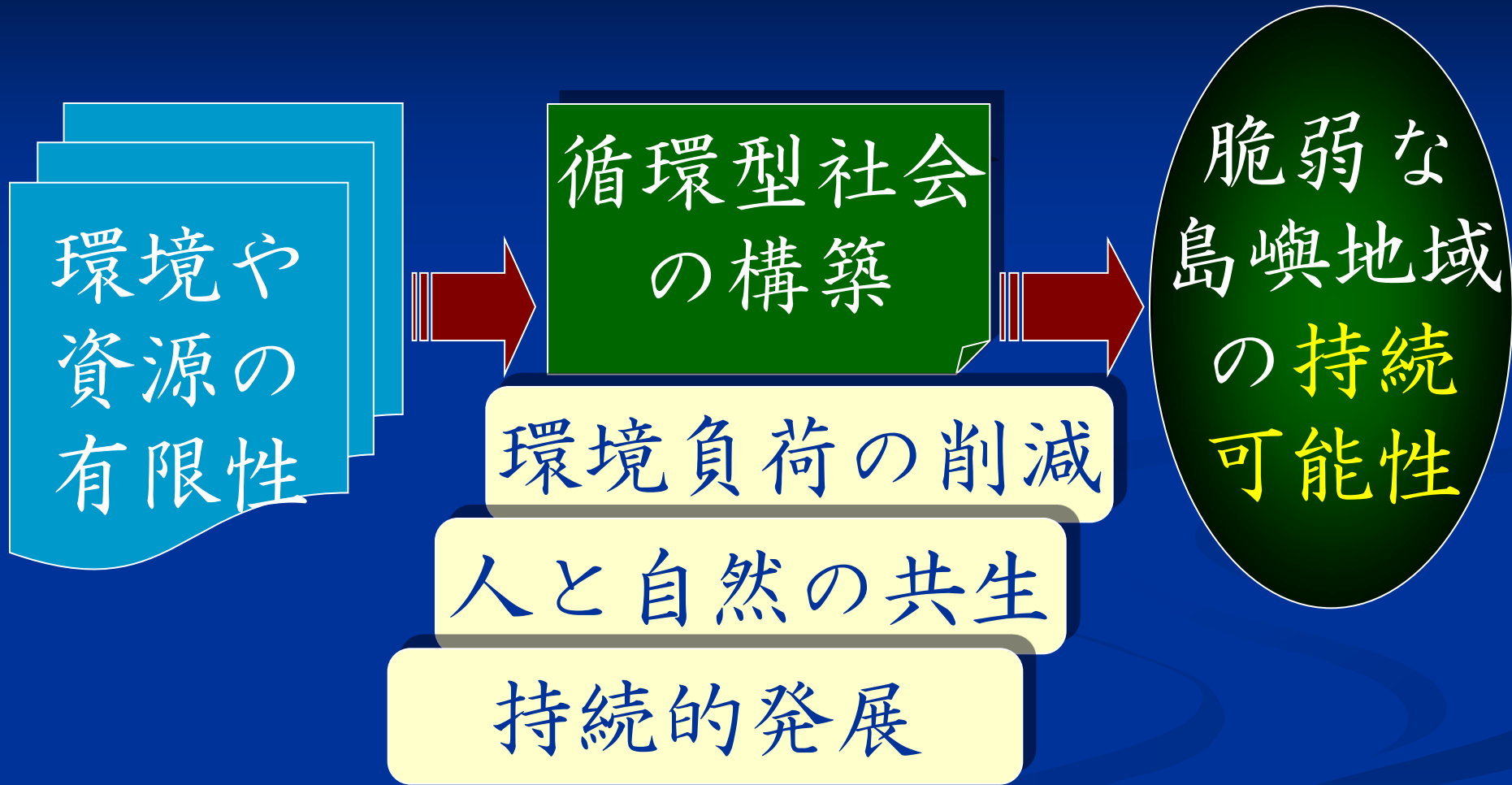
The life of future generations is a treasure

Inheritance of all lives

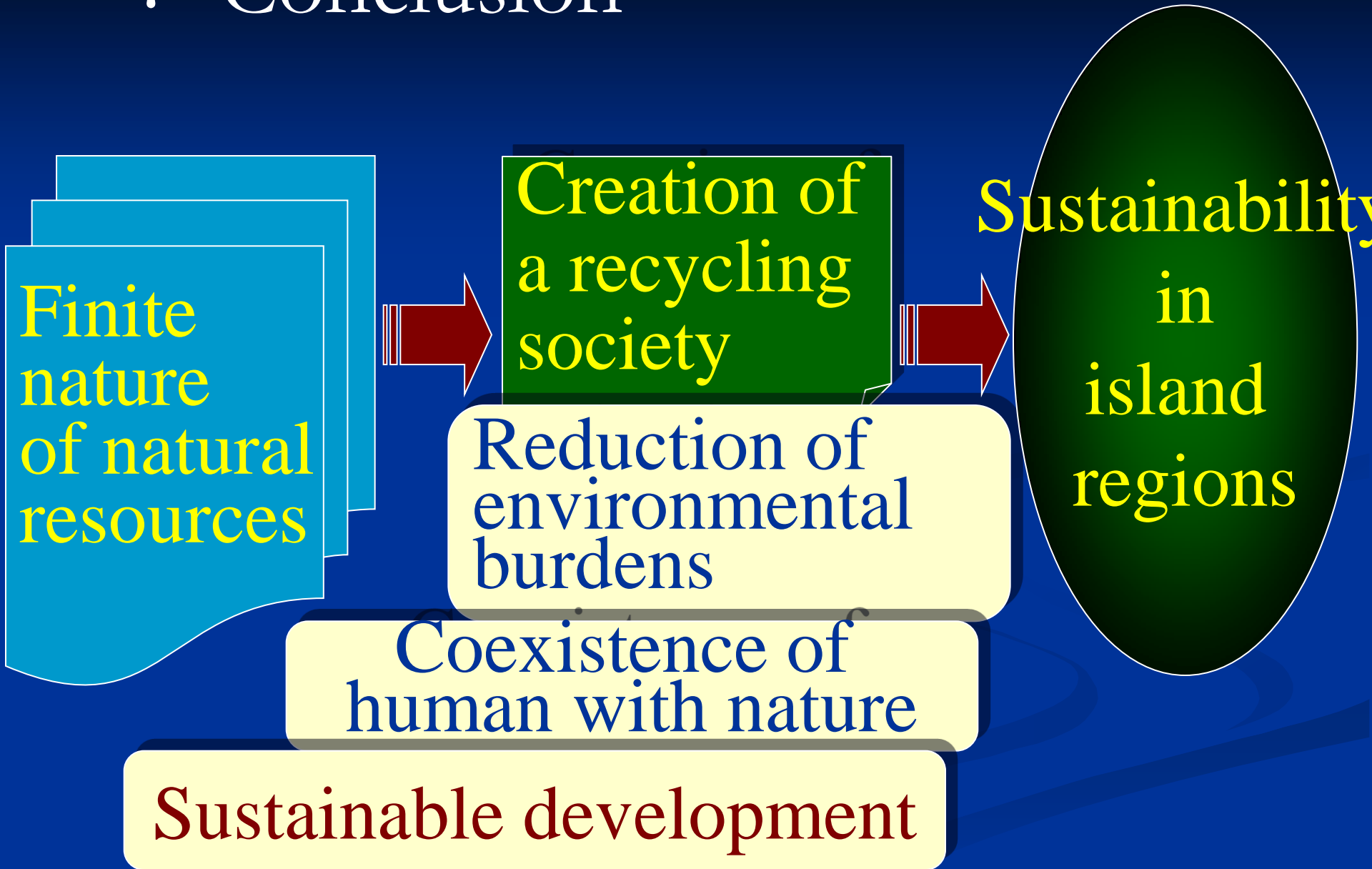
Island studies based on all lives



# \* 結論



# \* Conclusion





知の創造  
と  
知の津梁  
をめざす  
琉球大学





University of the  
Ryukyus  
aiming for  
Creation of Wisdom  
and  
Global Academic  
Network





Thanks a lot!