



IMBeR

Integrated Marine Biosphere Research

Ocean sustainability under global change
for the benefit of society

GRNの成果と課題 – IMBeR

齊藤宏明

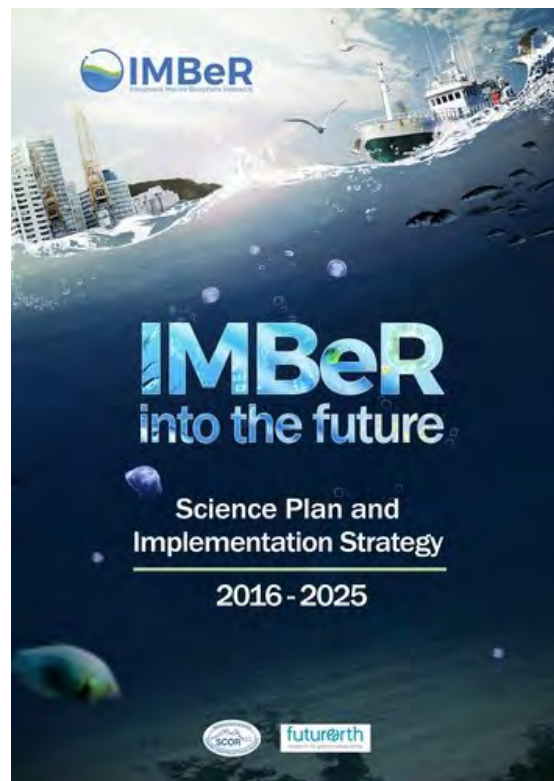


UTokyo



Atmosphere and Ocean Research Institute
The University of Tokyo

SCIENCE

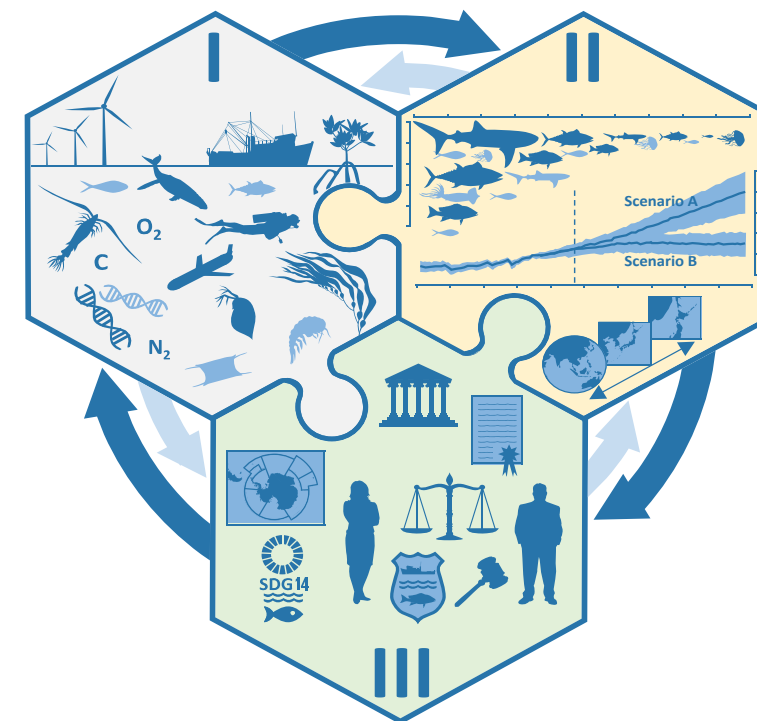


Hofmann, E.E. and the IMBeR Scientific Steering Committee (eds.) (2016): IMBeR 2016-2025: **Science Plan and Implementation Strategy**

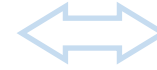
Grand challenge I
Understanding and quantifying the state and variability of marine ecosystems

Grand challenge II
Improving scenarios, predictions and projections of future ocean-human systems at multiple scales

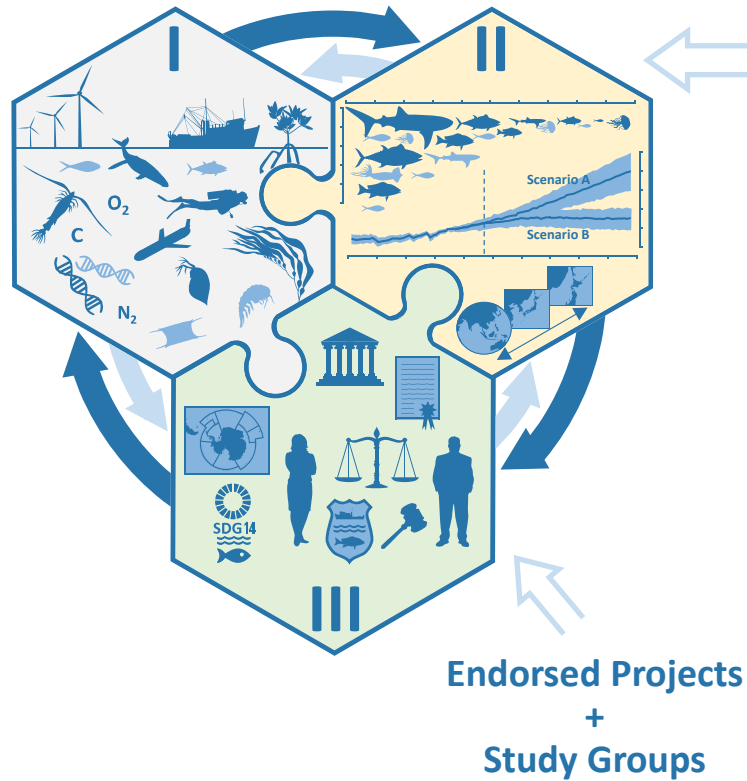
Grand challenge III
Improving and achieving sustainable ocean governance



Scientific Steering Committee



International Project Office



Regional Programmes

+ Working Groups



Climate Impacts on
Oceanic Top Predators



Ecosystem Studies of
Sub-arctic and Arctic Seas



Integrating Climate and
Ecosystem Dynamics



Sustained Indian Ocean
Biogeochemistry and
Ecosystem Research



Continental Margins
Working Group¹



Human Dimensions
Working Group



Integrated Ocean
Carbon Research²



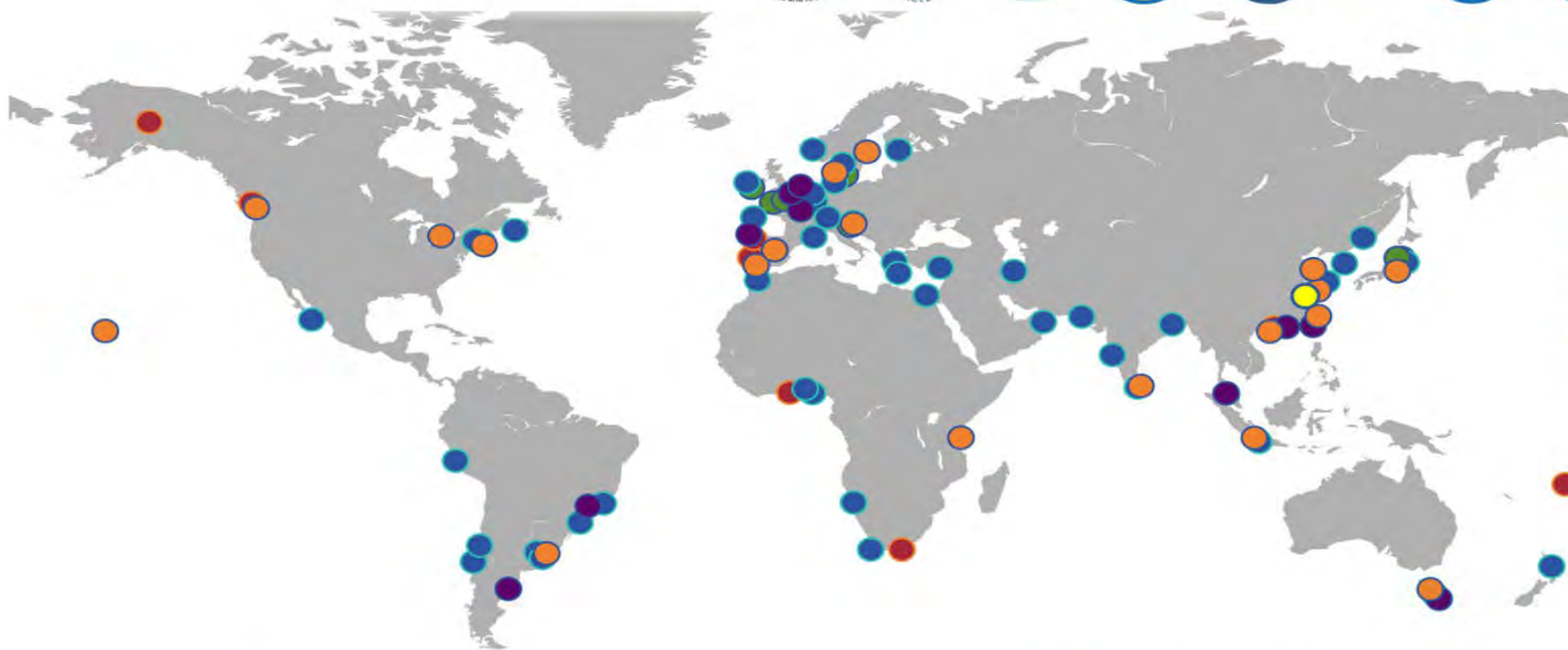
SOLAS-IMBeR Ocean
Acidification³



Submarine Groundwater
Discharge Working Group

 **1100+ Publications (2016-2025)**

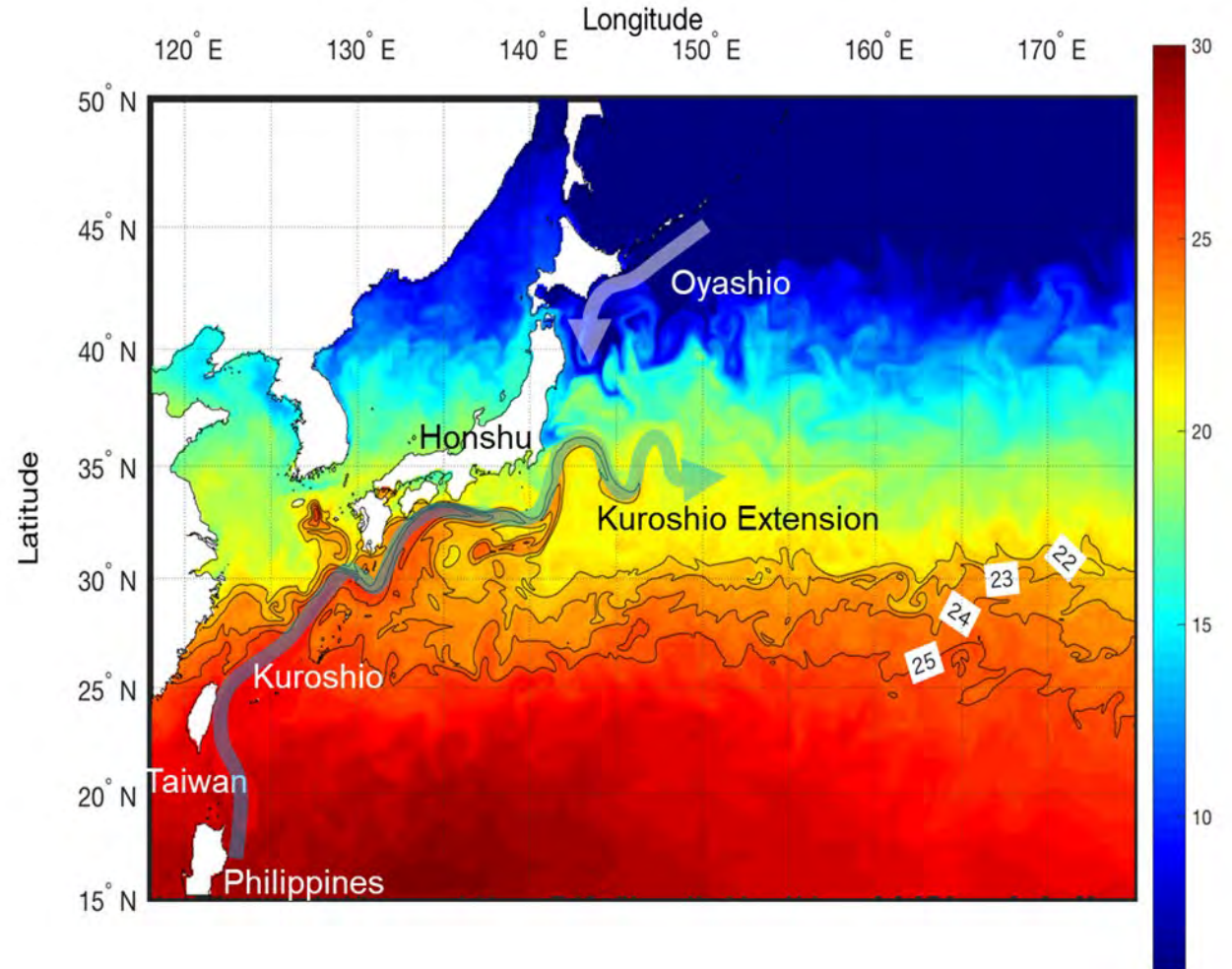
4 Regional Programmes | 5 Working Groups | 6 Endorsed Projects | 4 Study Groups
6000+ Scientists | 48 National Contacts | 1300+ Early Career Researchers from 110+ Countries



-  **Scientific Steering Committee Members**
-  **IMBeR Fellows**
-  **National Contacts**
-  **IMECaN Organising Committee Members**
-  **Endorsed Projects**
-  **IMBeR International Project Office**

黒潮生態系

- 高温高塩で黒い（蒼く暗い）水
- 栄養塩濃度は従来法で検出限界以下
沿岸の植物プランクトンの多い緑がかった青い色とは異なり、植物プランクトンが少なく、昏く青い水。沿岸から黒潮にはいると水が黒っぽく見える。
＝低栄養塩低生産（亜寒帯親潮域に比べ）
- 多くの魚類が産卵場・成育場として利用・日本の採捕漁業漁獲量の58%



なぜ貧栄養である黒潮域の漁業生産が高いのか？

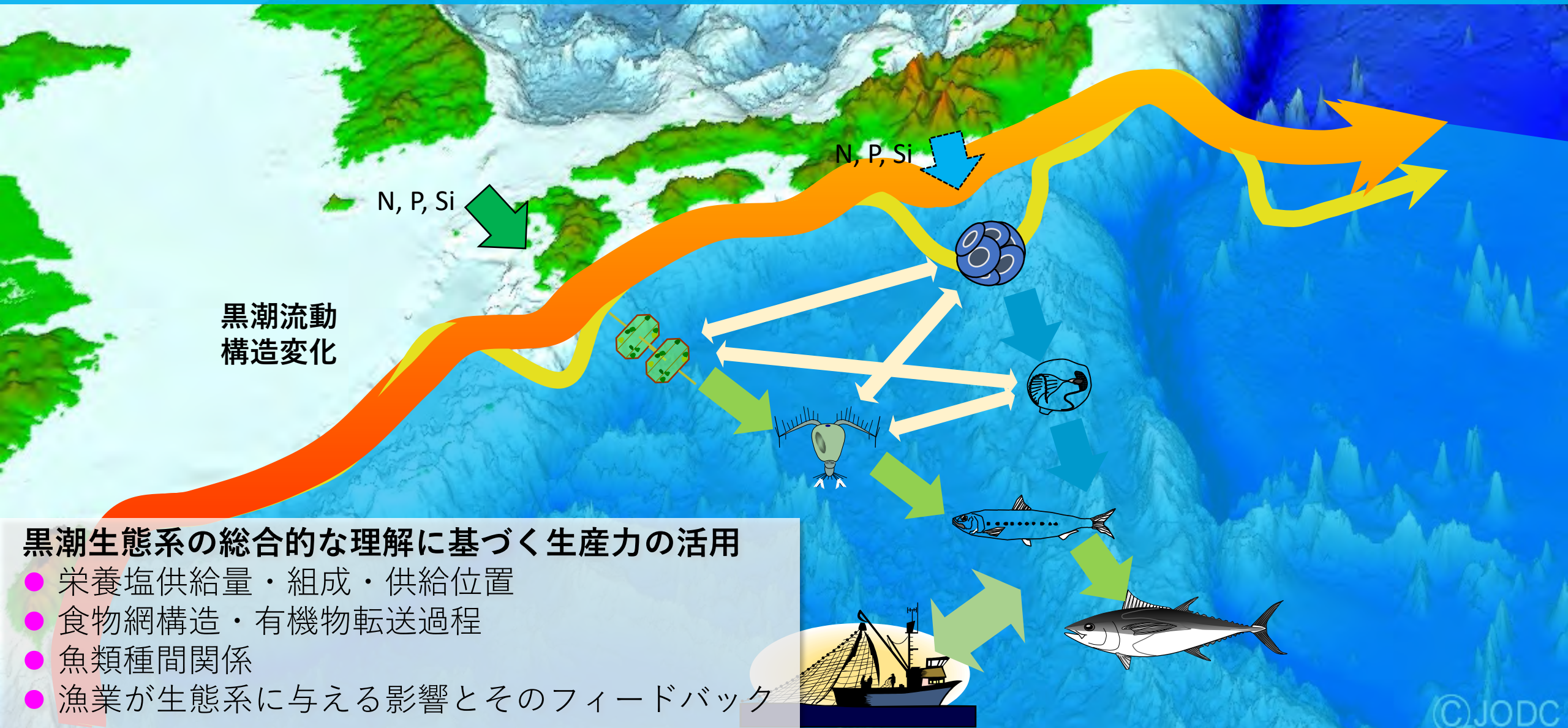
Kuroshio Paradox 黒潮のパラドックス

Saito, 2019

仮説：

1. 亜表層に豊富な栄養塩を、有光層に供給する物理機構
2. 植物プランクトン濃度を低く保つ機構
3. 基礎生産が魚類へ転送される機構

「我が国の魚類生産を支える黒潮生態系の変動機構の解明」

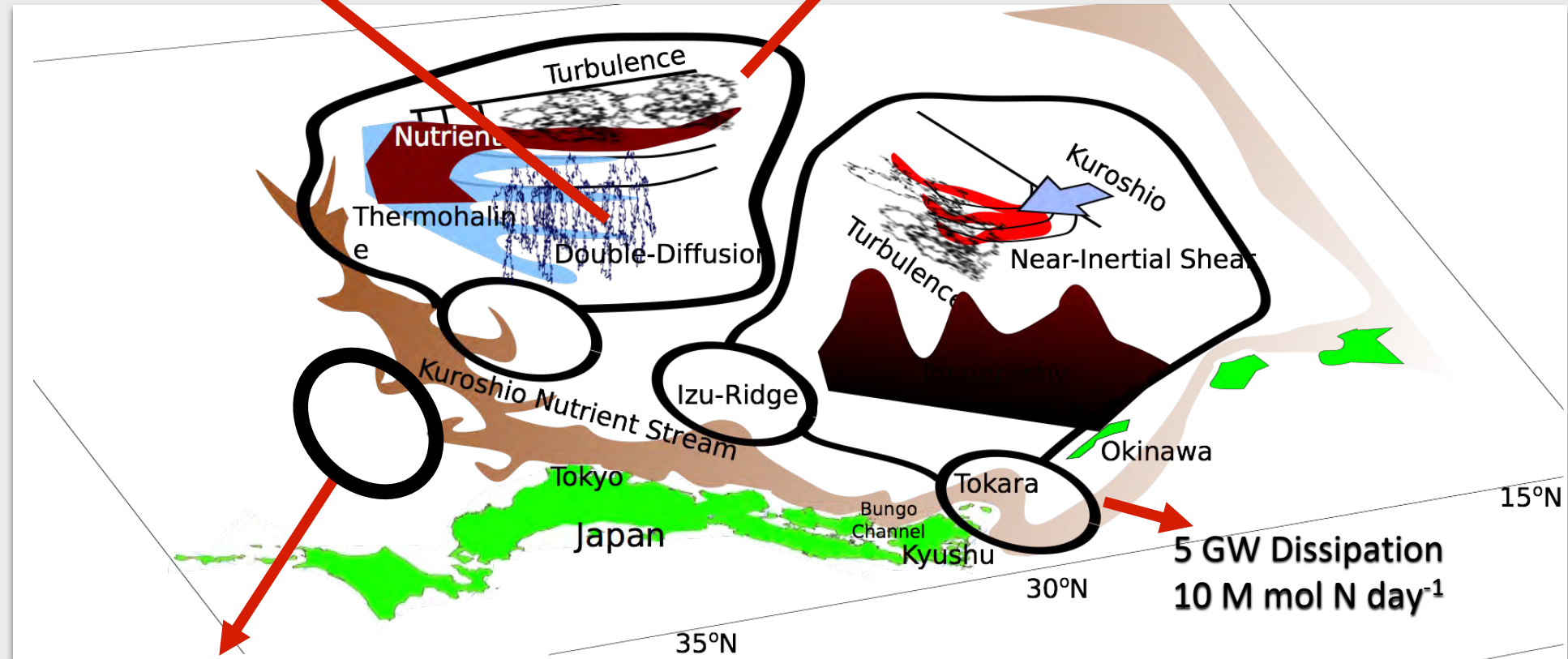


黒潮生態系の総合的な理解に基づく生産力の活用

- 栄養塩供給量・組成・供給位置
- 食物網構造・有機物転送過程
- 魚類種間関係
- 漁業が生態系に与える影響とそのフィードバック

Double diffusion $O(10^{-4}-10^{-3} \text{ m}^2\text{s}^{-1})$
 $O(1-10 \text{ mmole N m}^{-2} \text{ day}^{-1})$ at 100-150m

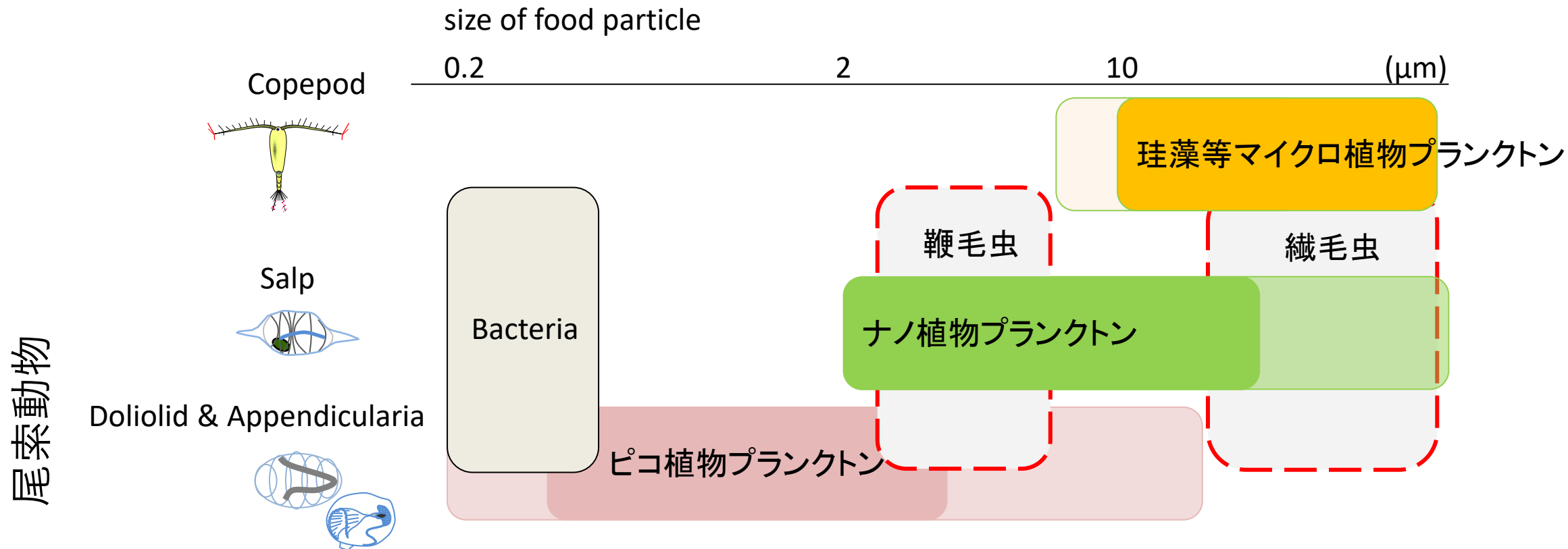
Turbulence dissipation
 $O(1 \text{ mmol N m}^{-2} \text{ day}^{-1})$



Mesoscale induction
 $\sim O(1 \text{ G mol N day}^{-1})$ in
Kuroshio-Oyashio Mixed
Region in Winter

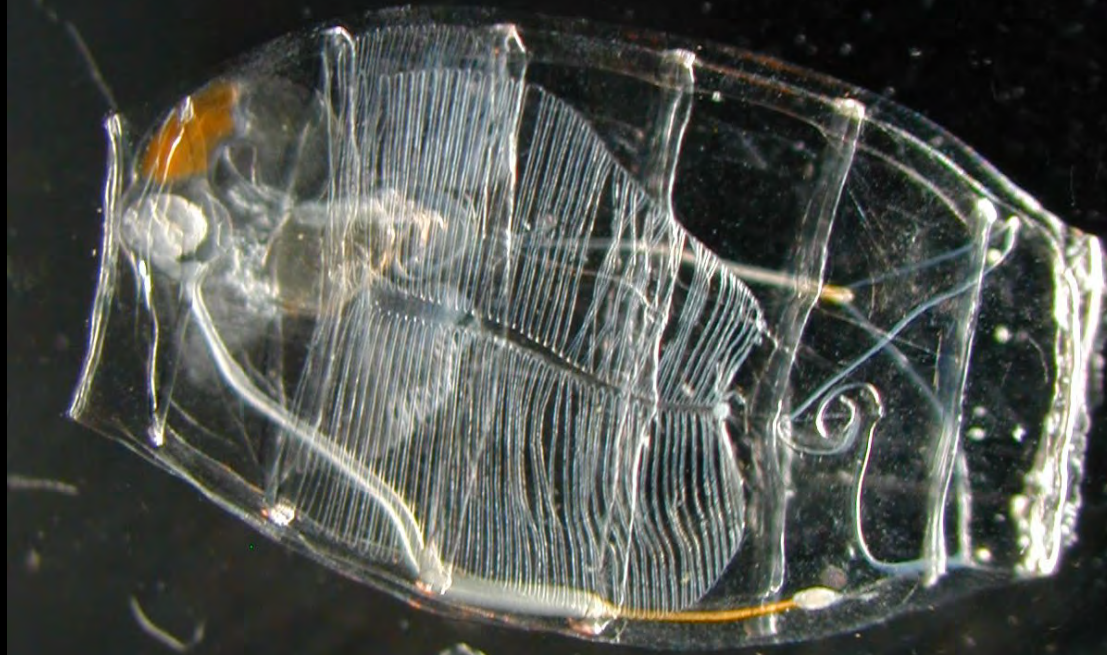
5 GW Dissipation
 $10 \text{ M mol N day}^{-1}$

植物プランクトン→動物プランクトン→稚仔魚



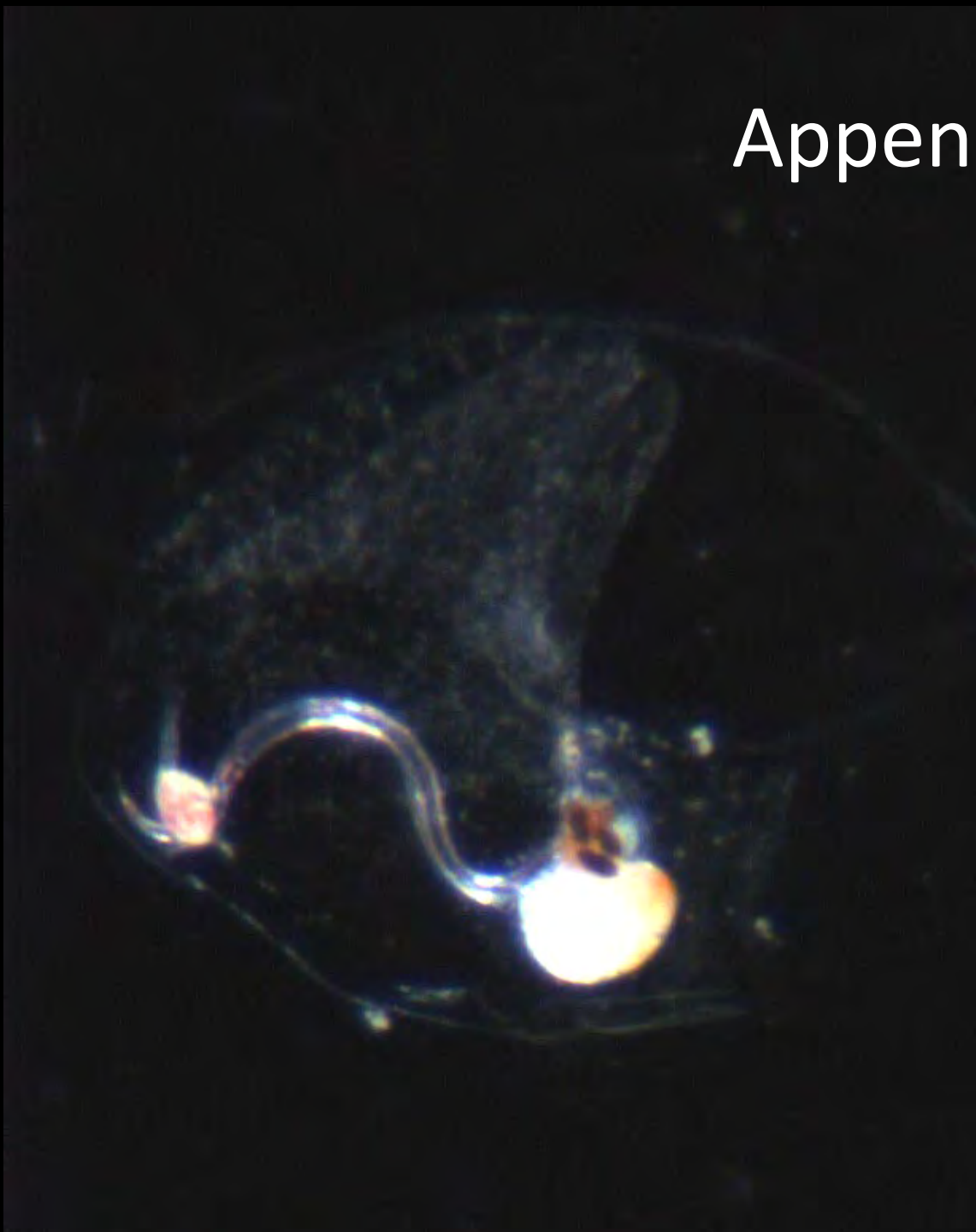
カイアシ類（カラヌス目）はナノ・ピコ植物プランクトンを直接利用できない。
尾索動物(tunicates)はナノ・ピコ植物プランクトンを利用できる
魚類仔稚魚の多くは、尾虫類を直接利用できない

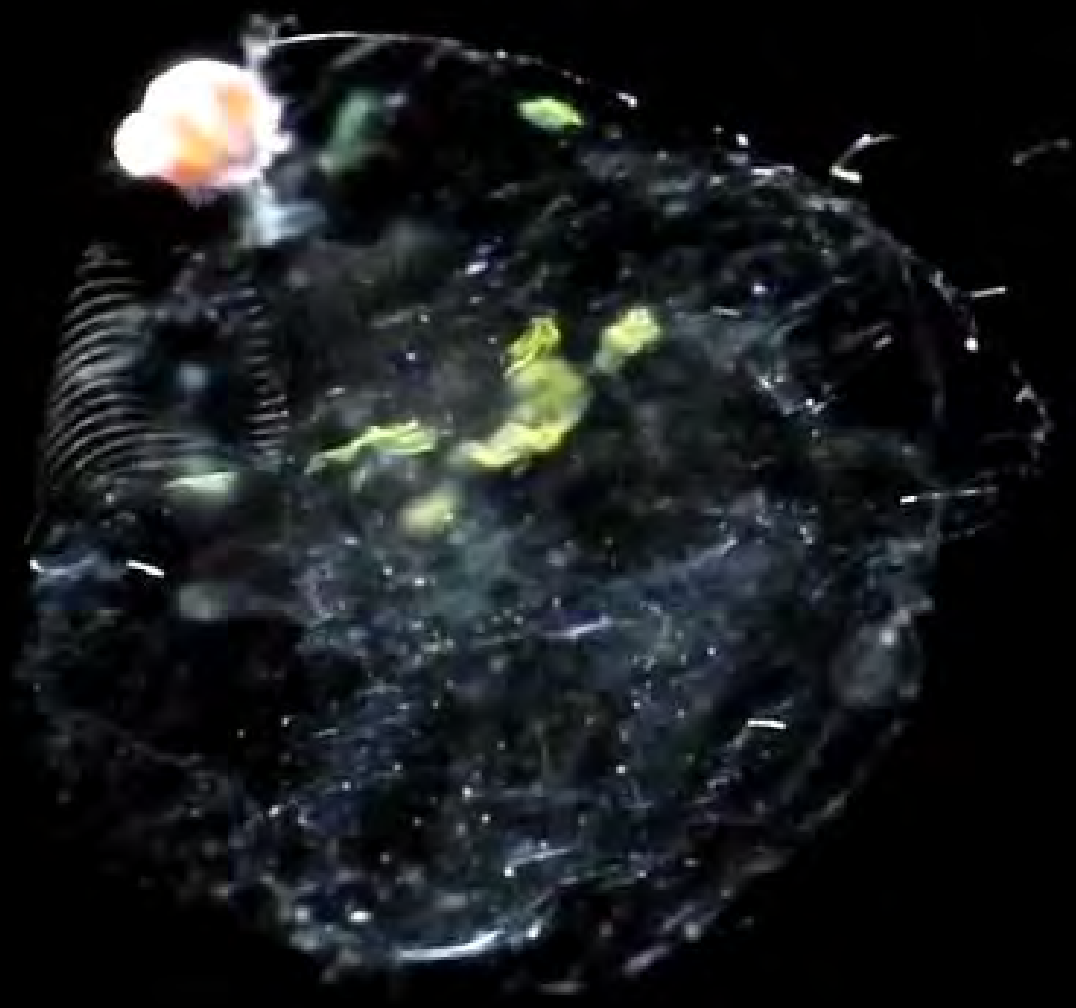
Tunicate: gelatinous mucus feeder



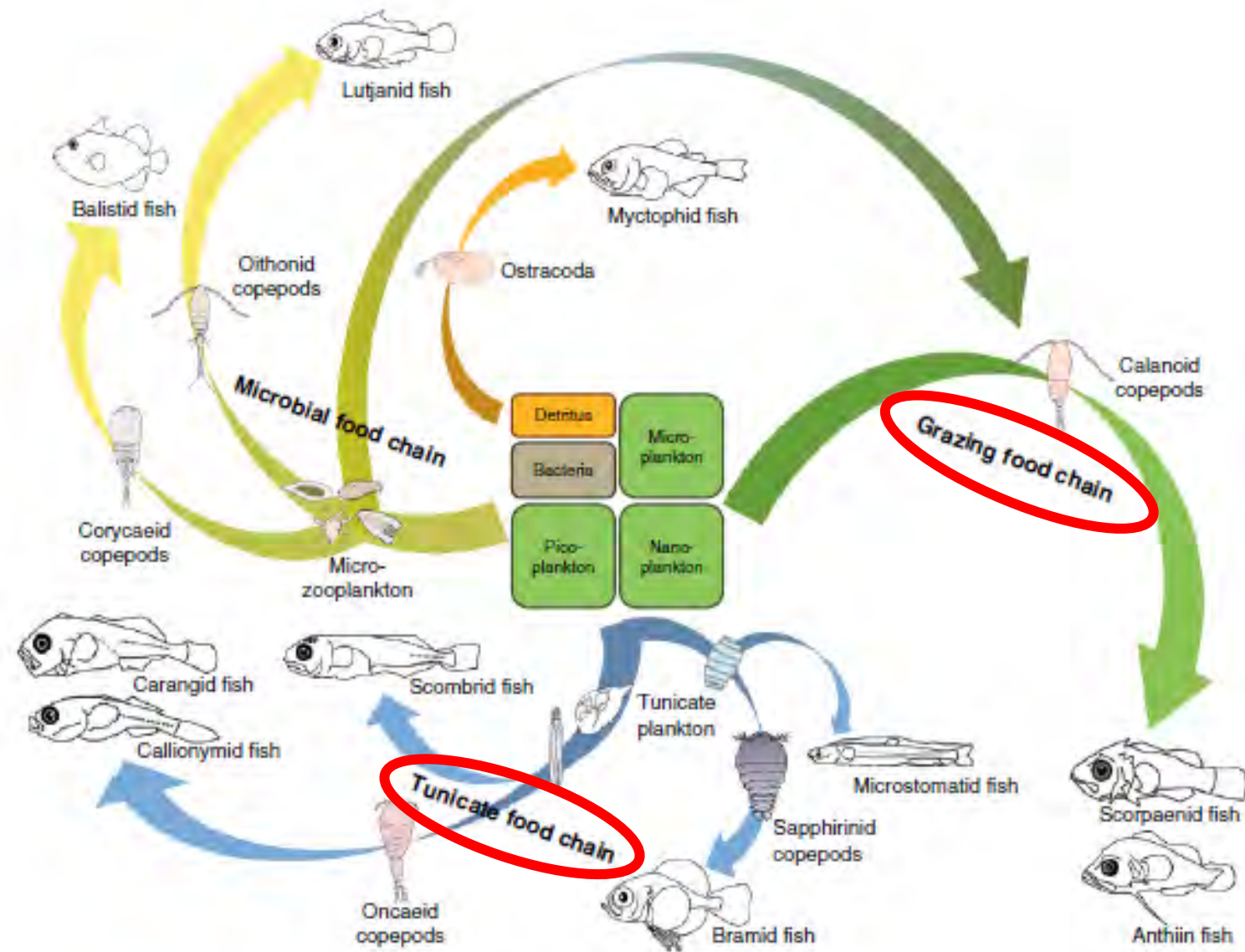
Doliolid

Appendicularian

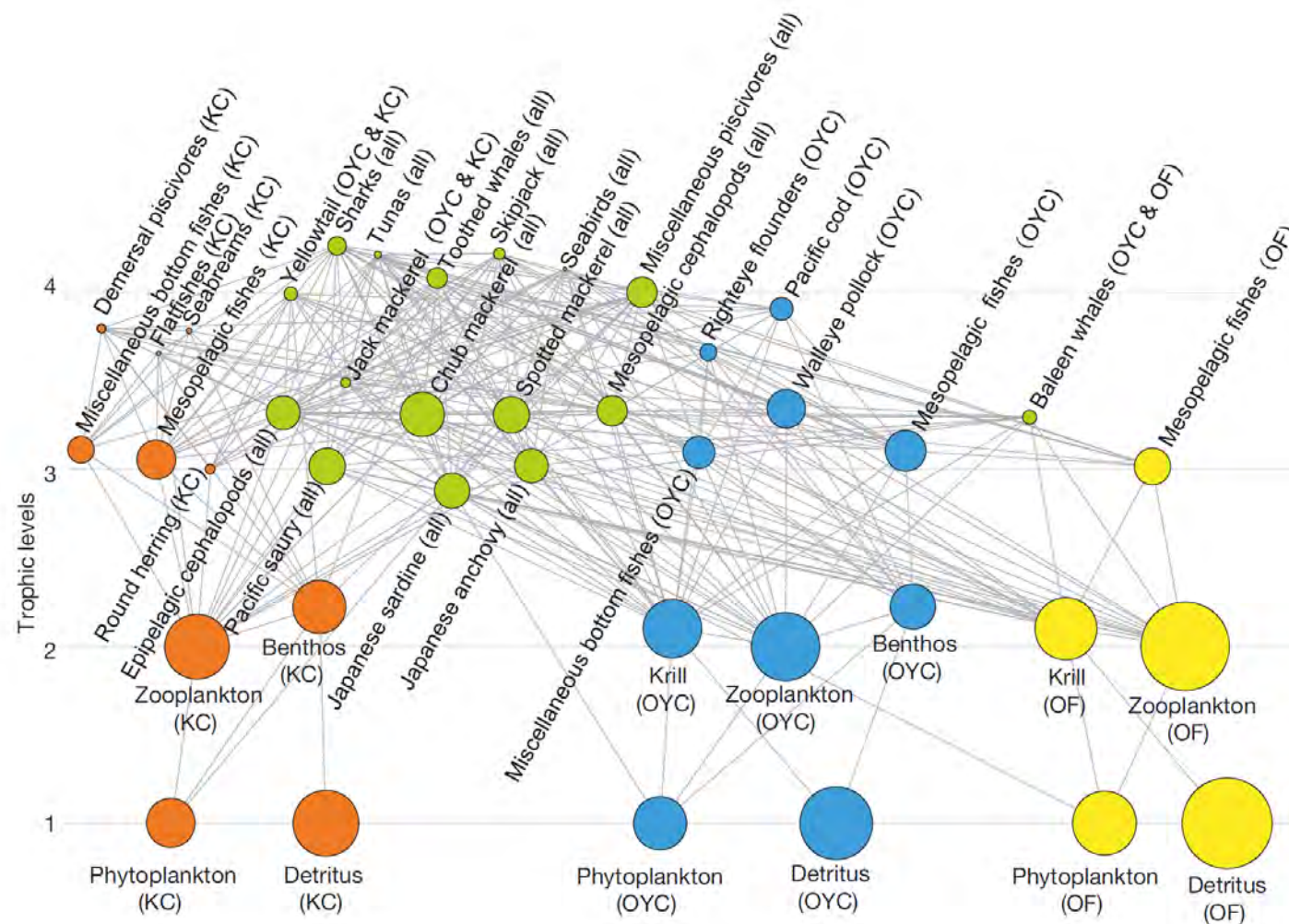
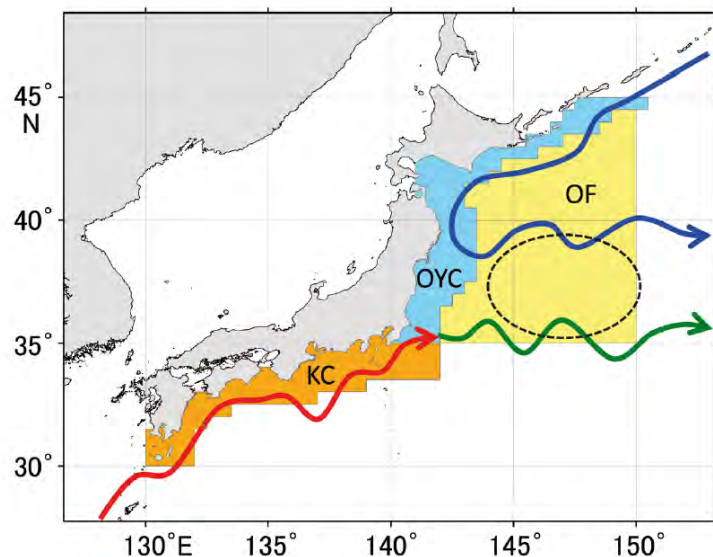




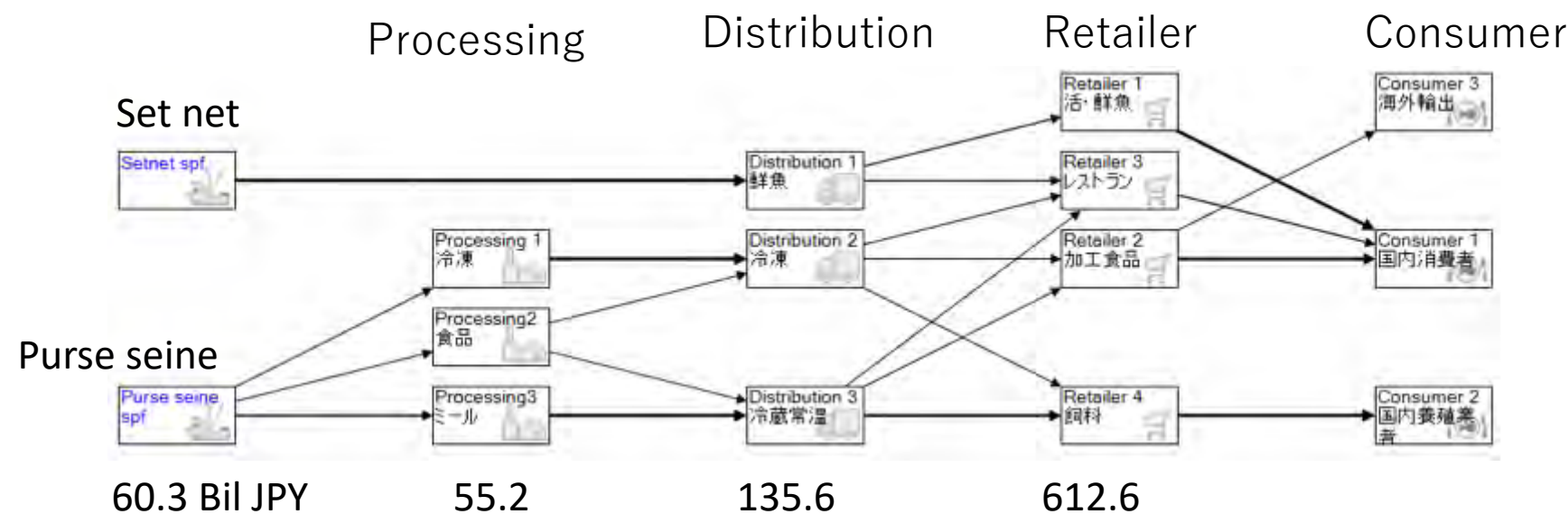
Multiple
food chains
support fish
production



黒潮域の生産が、他海域の漁業生産につながる



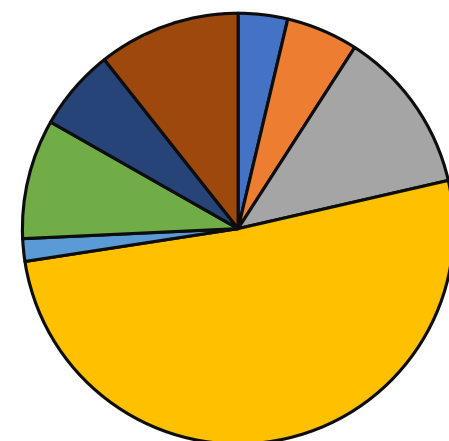
小型浮魚類による経済的価値



	Fisheries prod. (Bil. JPY)	Processing/Distri- bution/retailer
Set net	18.9	205.8
Purse	414	657.9
Total	60.3	863.8

91% of fisheries prod. 940.0 Bil JPY

累積生産金額8638億円の内訳



- マアジ 定置網
- マアジ まき網
- サバ類 定置網
- サバ類 まき網
- マイワシ 定置網
- マイワシ まき網
- カタクチ 定置網
- カタクチ まき網



CREPSUM

持続的な東南アジア海洋生態系利用のための研究教育プロジェクト
Science and educational networking for sustainable use of
marine ecosystem services in the Southeast Asia



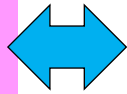
JSPS

Core-to-core program

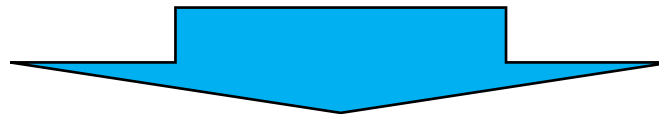
CREPSUM



Future Earth & other Int.
Projects



Sci. knowledge for sustainable use of marine ecosystem services
Int. Education core for marine ecosystem studies in SEAsia



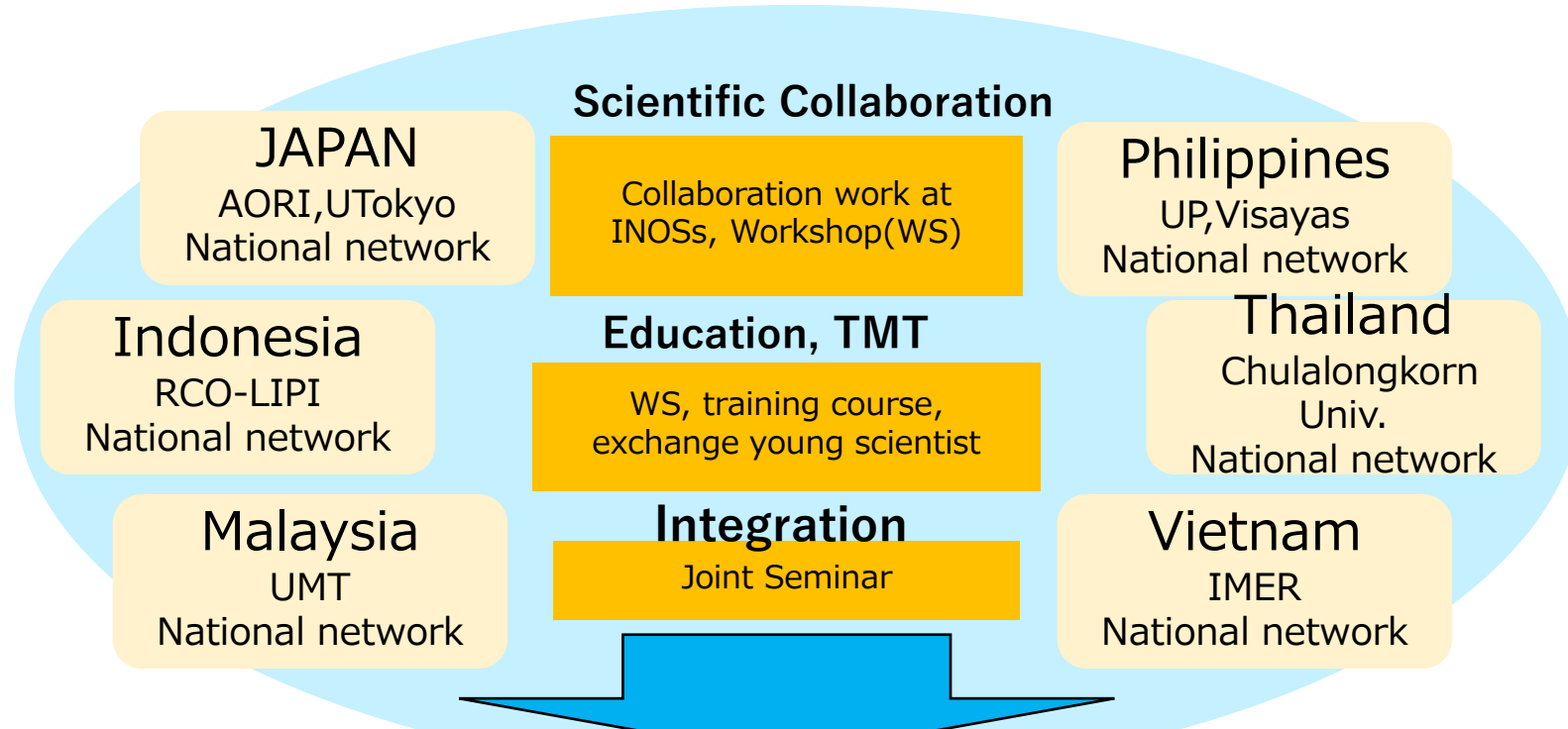
UN SDGs

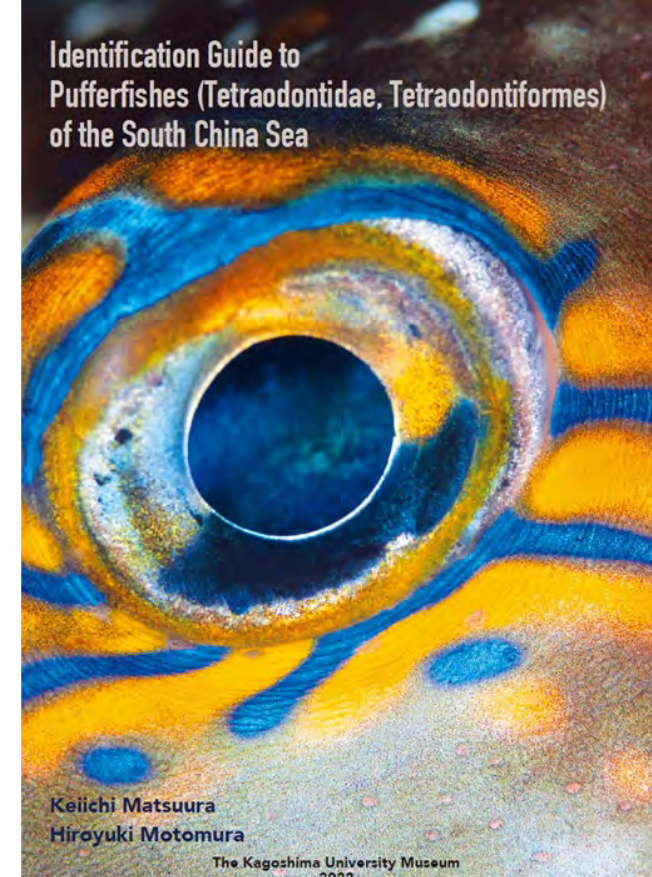
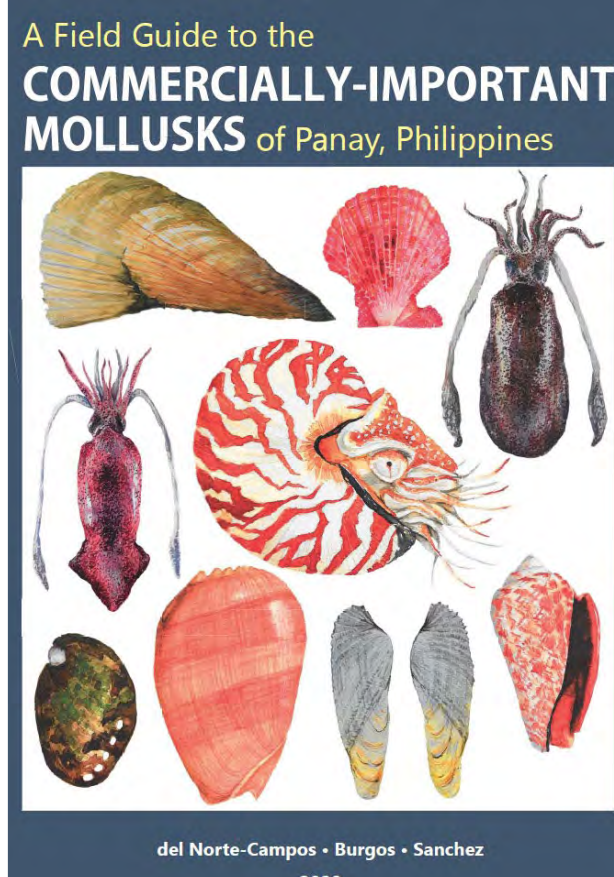
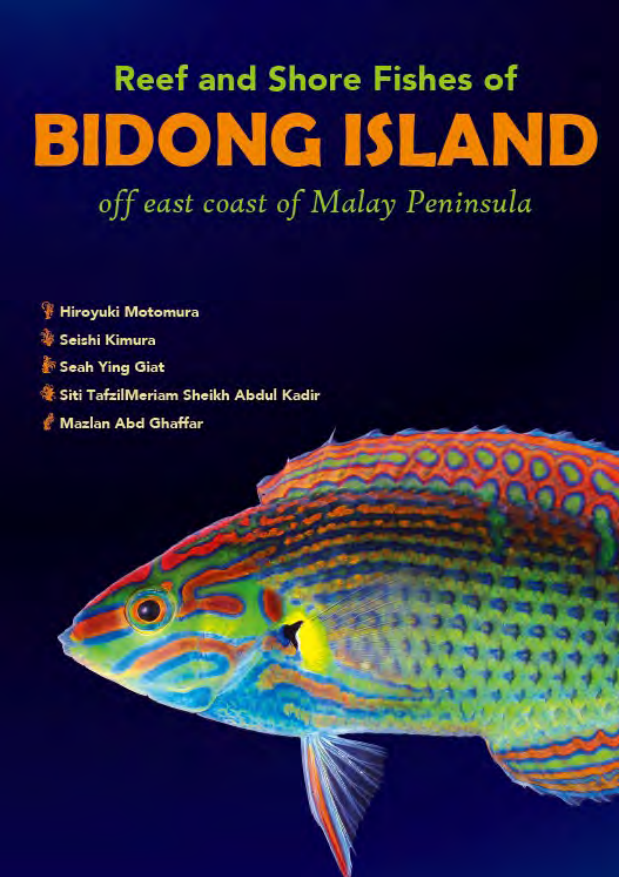
IPBES

IOC/WESTPAC

Policy makers

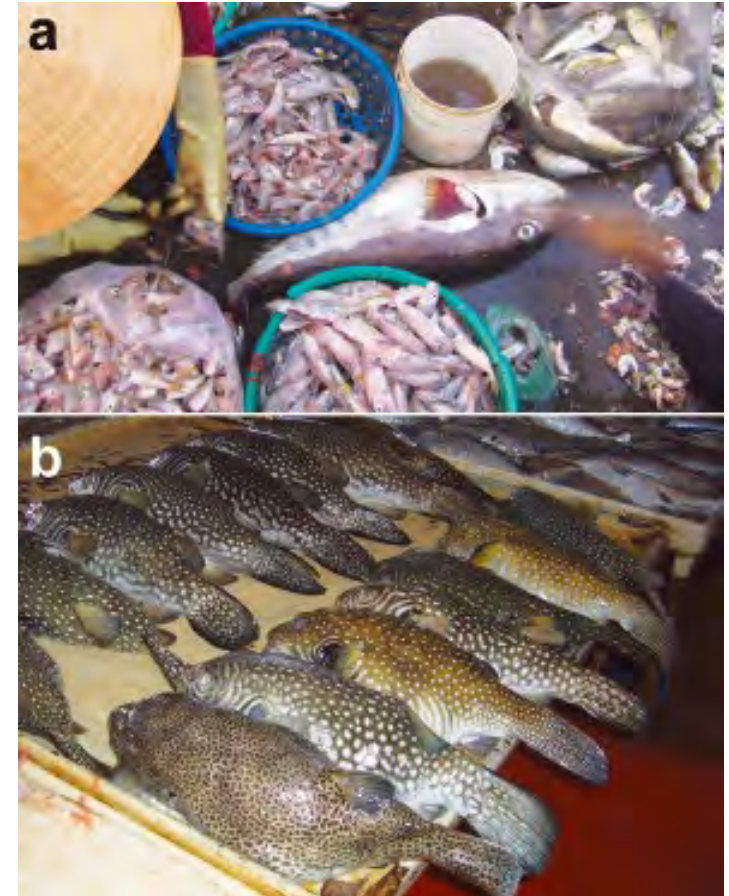
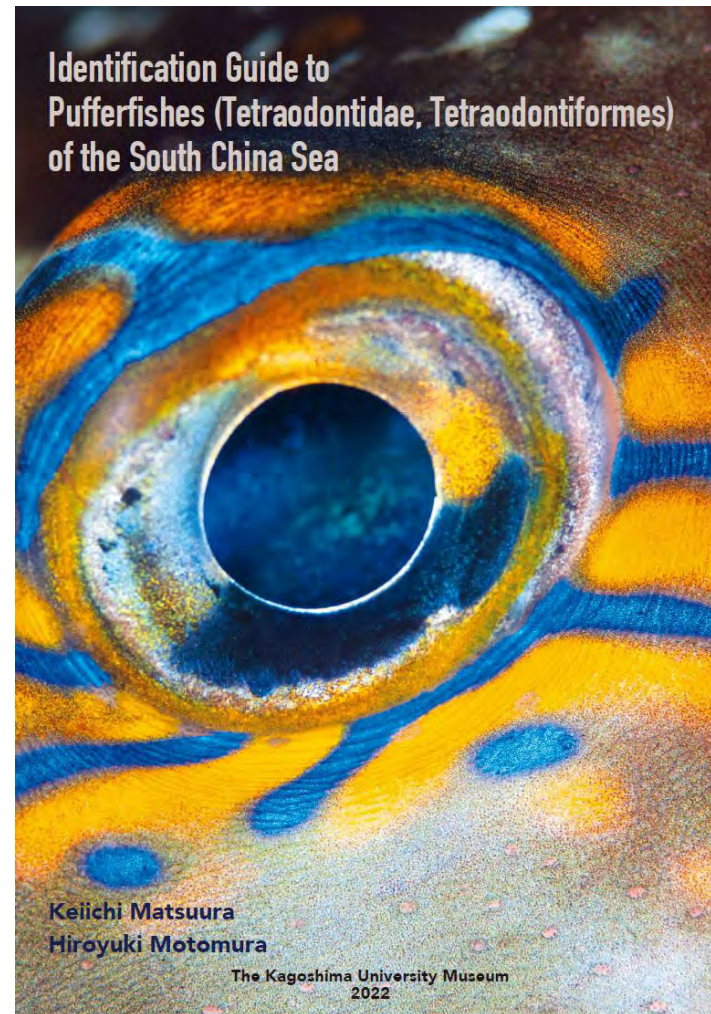
Public, NGO



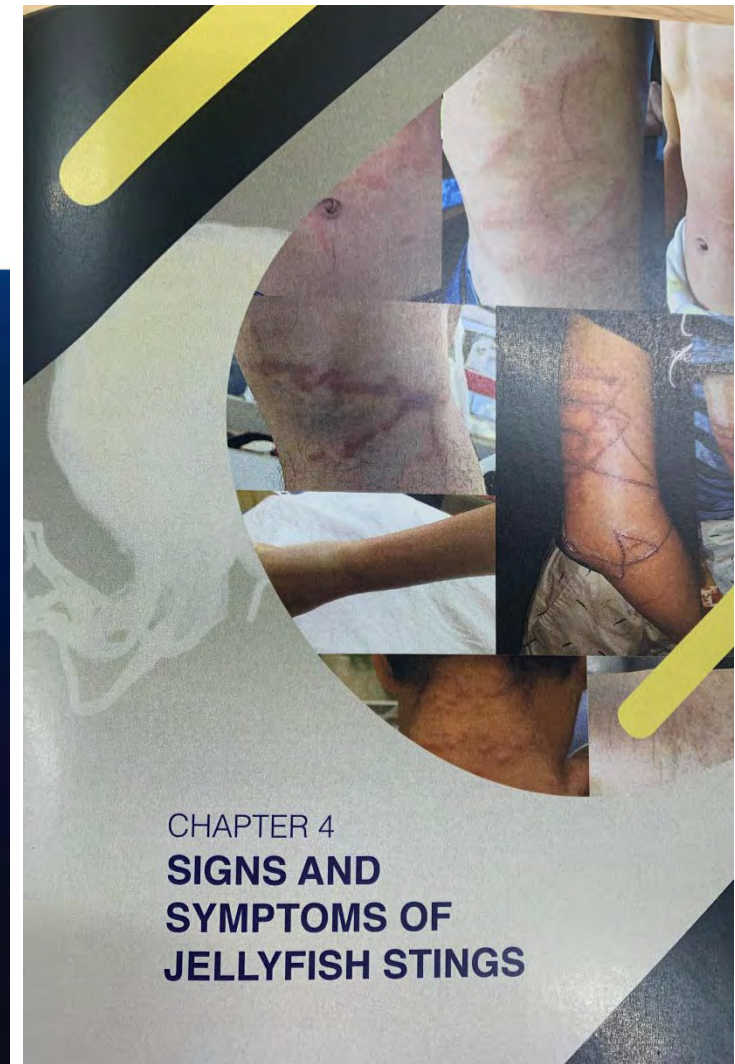


Field Guides/Identification Guide

Scientific Contribution to Social Issues



Scientific Contribution to Social Issues



UN SDGs

The Sustainable Development Goals (SDGs) are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.



適切なタイミングで最善の科学知見の提供

異なる言語・価値観を持つ科学者およびステークホルダー間のコミュニケーション

scientists in different discipline

scientists and decision makers

stakeholders in different sectors