

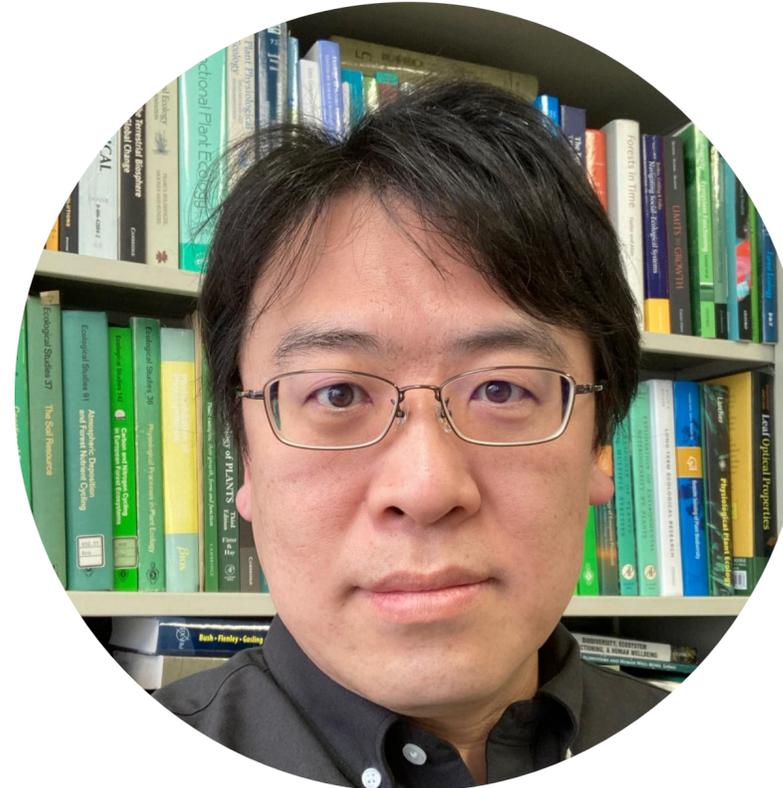
6-10 NOVEMBER #TheEarthTalks
CAPE TOWN, SOUTH AFRICA

GEO WEEK & MINISTERIAL SUMMIT 2023

Flash talks



“APBON” – Biodiversity observation capacity development activity in Asia-Oceania region



Hiroyuki Muraoka
Gifu University / National Inst. Environ. Studies /
MEXT-Japan

6 NOV / 1410h



Asia-Oceania region

- ✓ Complex geographic characteristics
- ✓ Large population (60% of the world)
- ✓ Drastic climate change
- ✓ Natural disasters occur frequently
- ✓ Rapid, diverse socioeconomic development
- ✓ Deteriorating ecosystems

High biodiversity

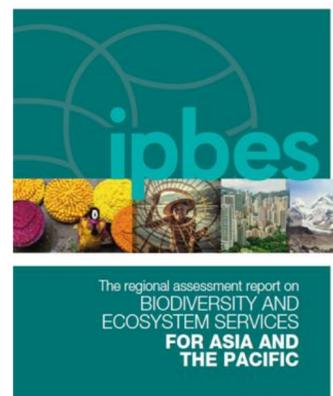
- Terrestrial
- Freshwater
- Coastal and Marine
- But its loss is in progress

Ecosystem function and services

- Environmental regulation
- Provide goods and services (Nature's Contribution to People)

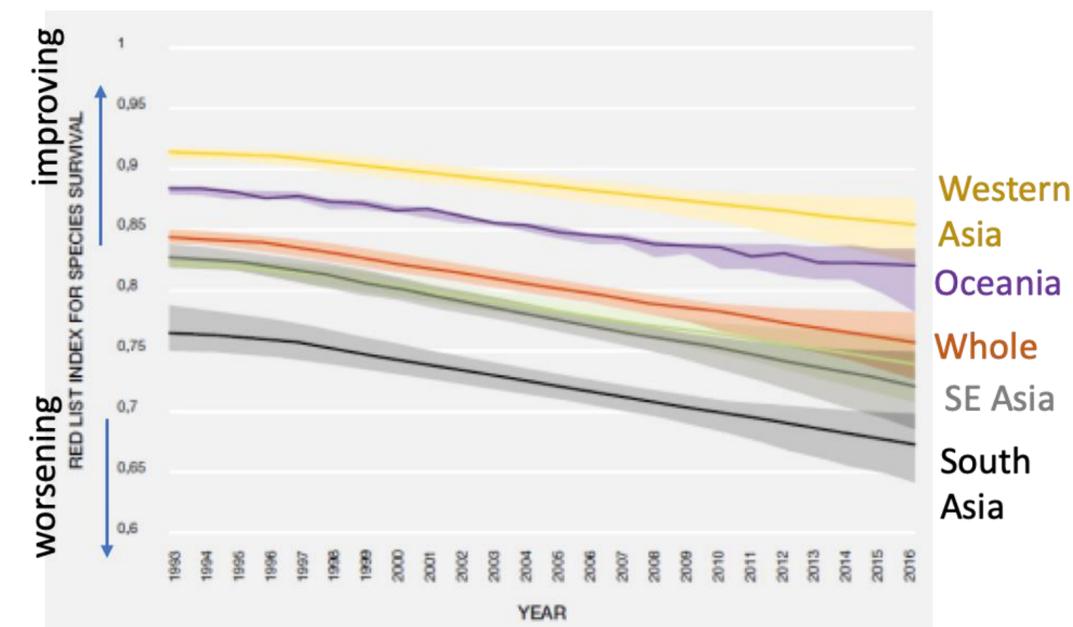
Biodiversity loss is proceeding

Y. Takeuchi (2022)
15th AOGEO Symposium



ipbes

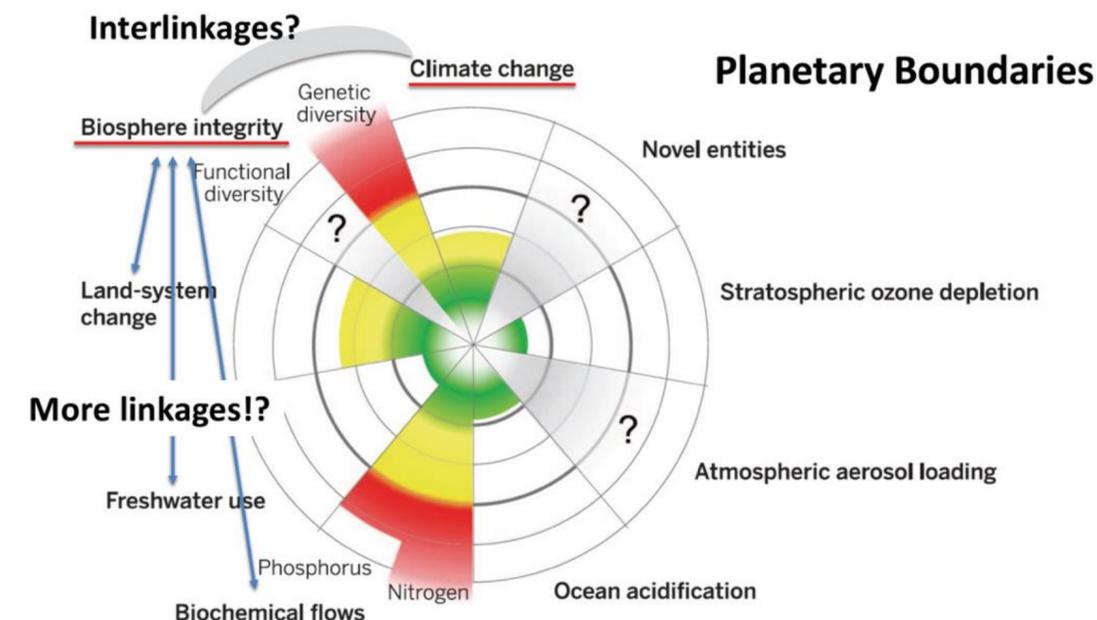
Trends in threatened species status



(IPBES 2018)

Interlinkages of Climate – Biodiversity – Ecosystem functions

H. Yamano (2021)
14th AOGEO Symposium

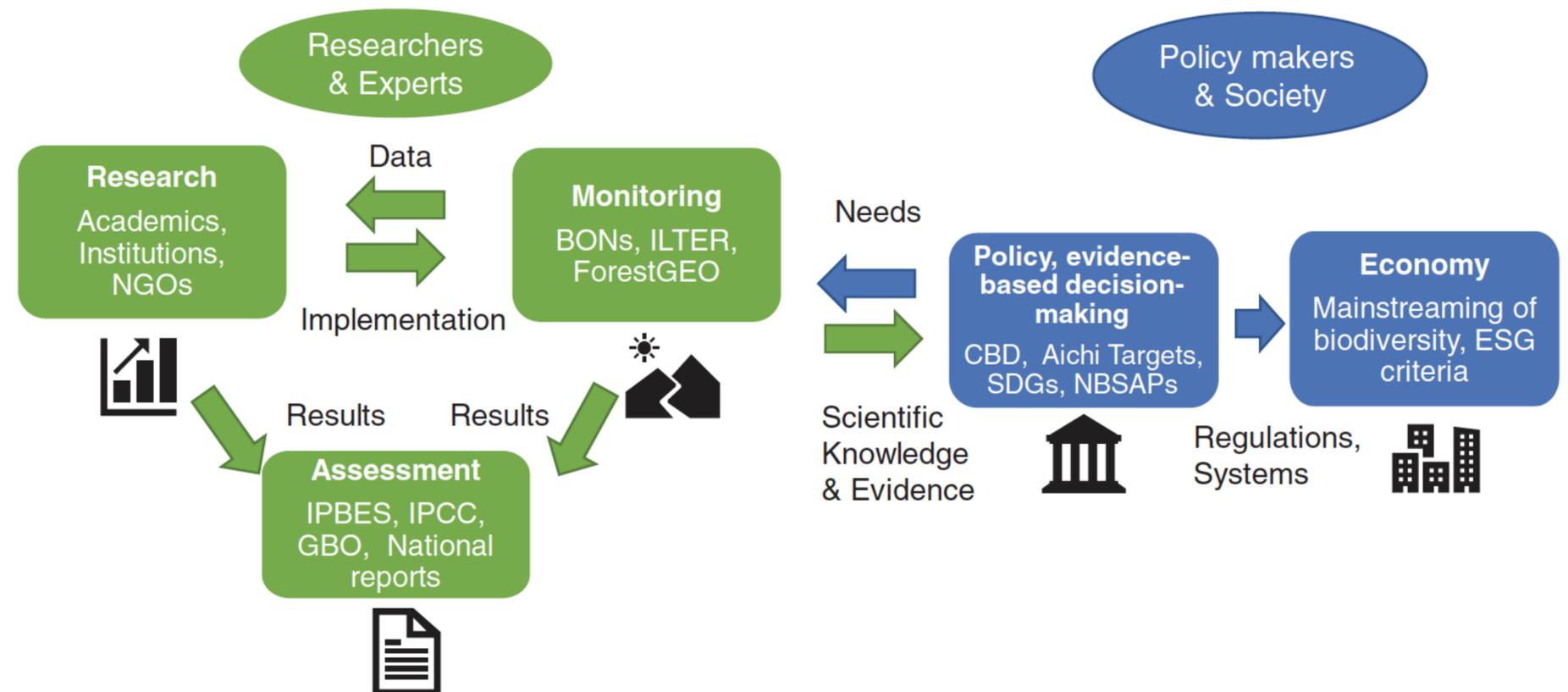
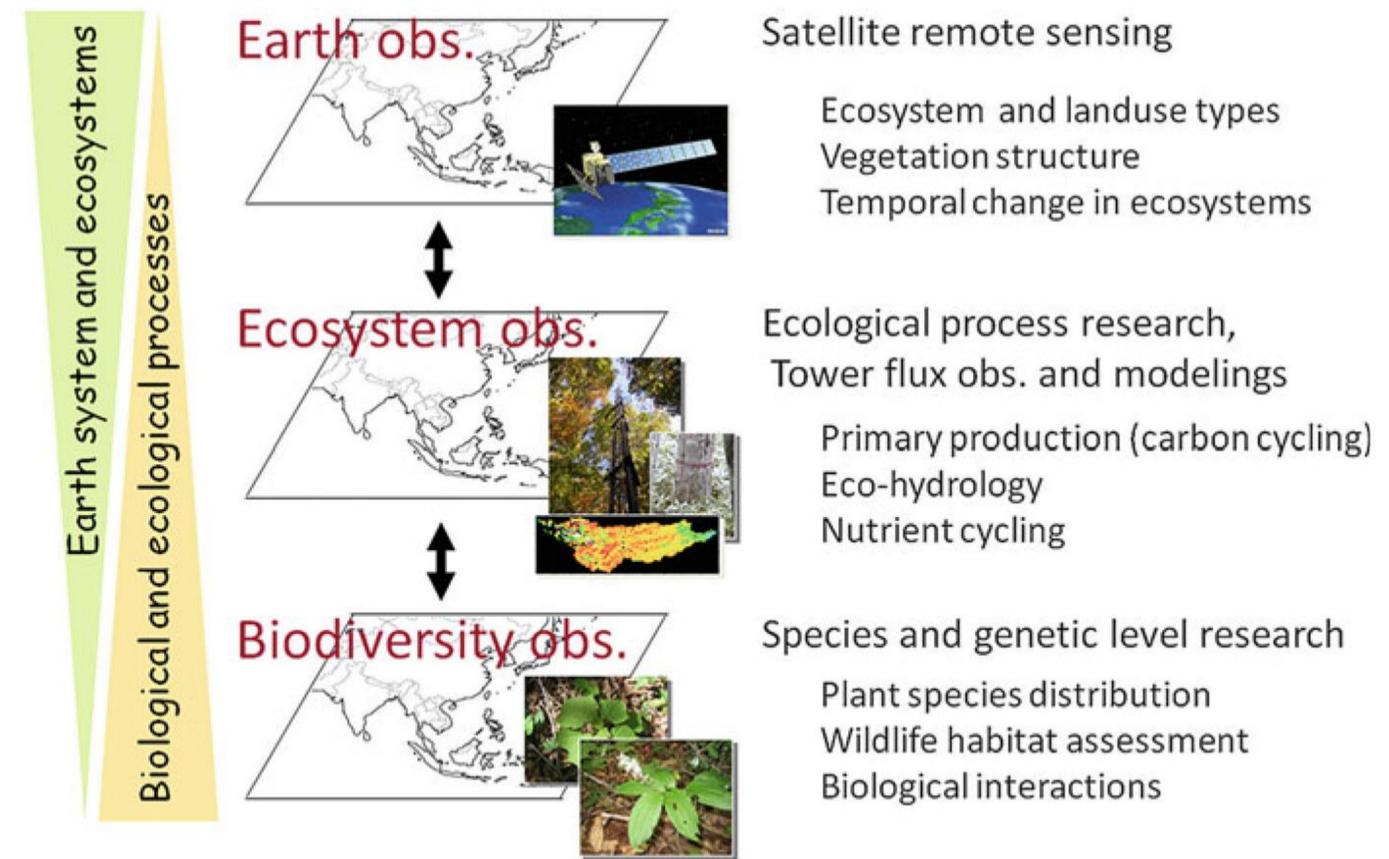


Asia-Pacific Biodiversity Observation Network (APBON) Established in 2009

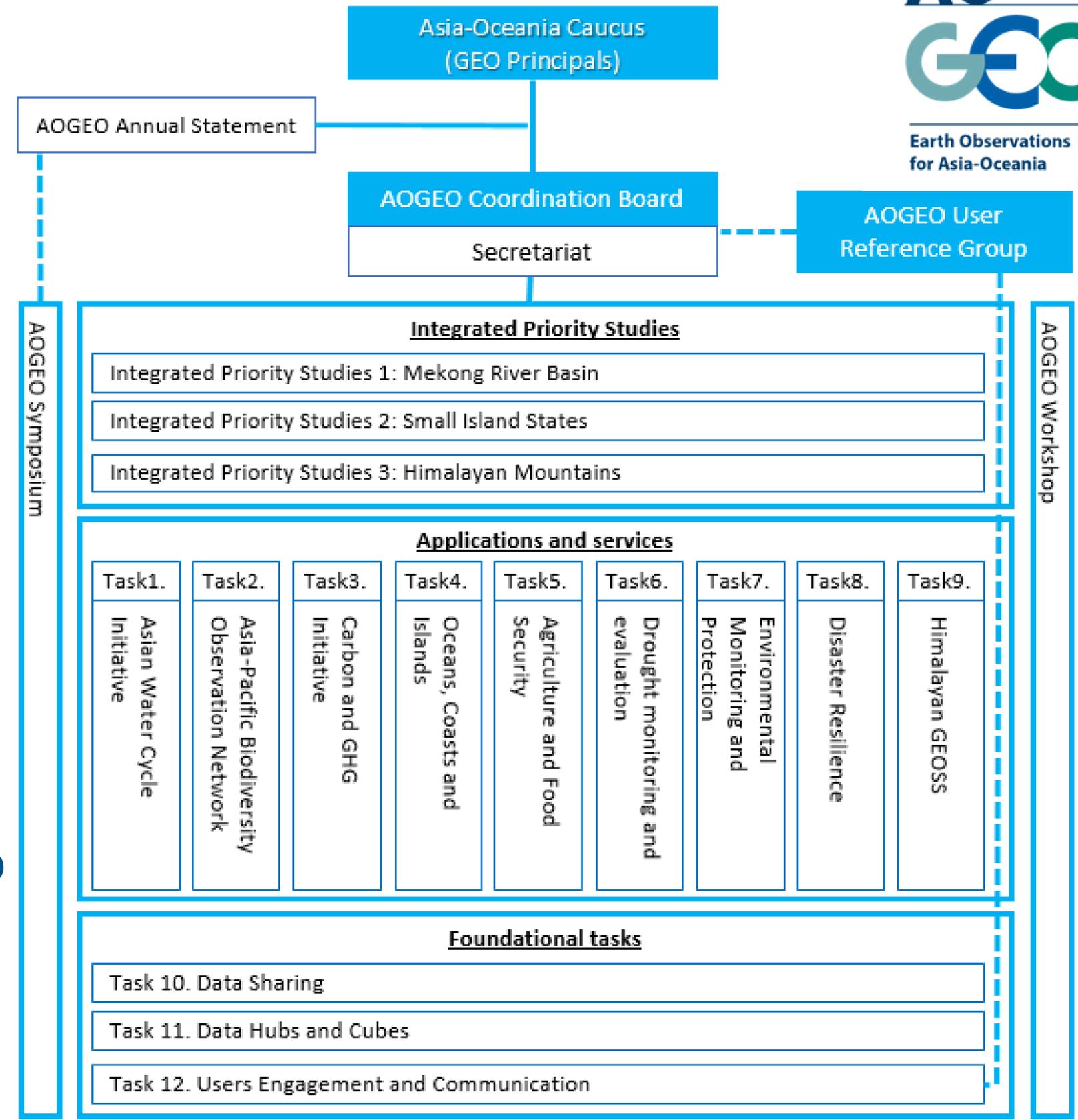
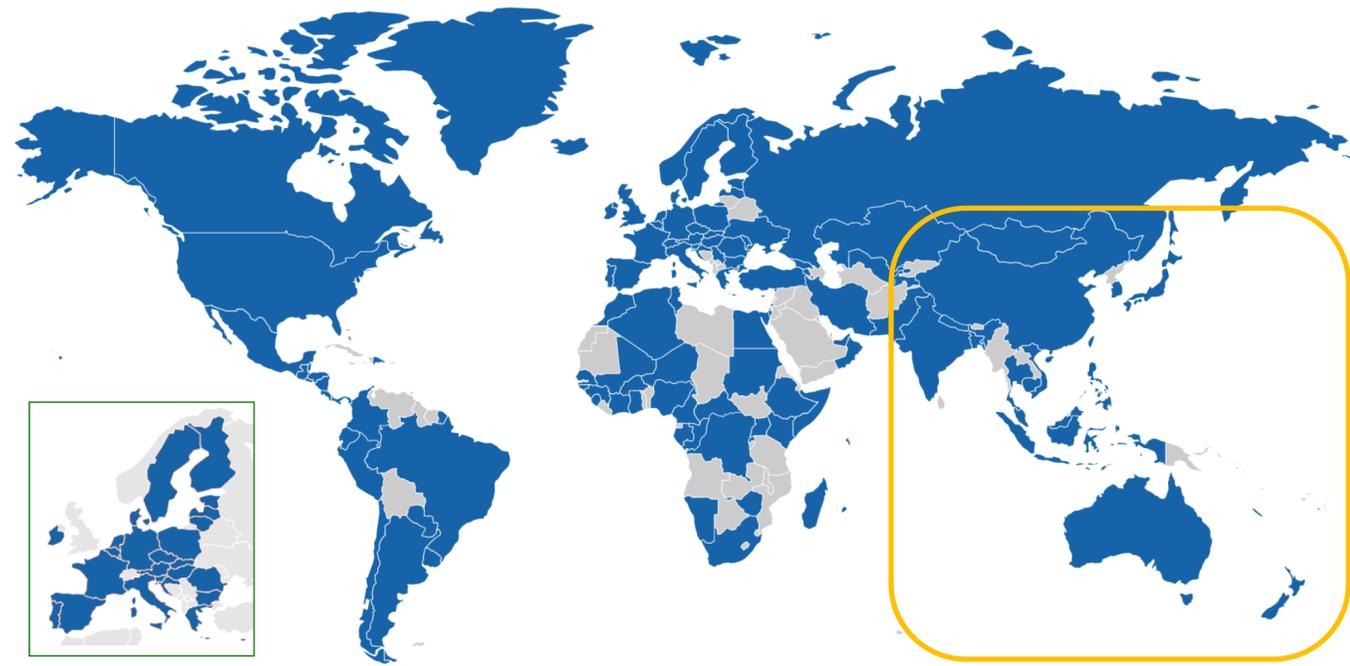


APBON's missions

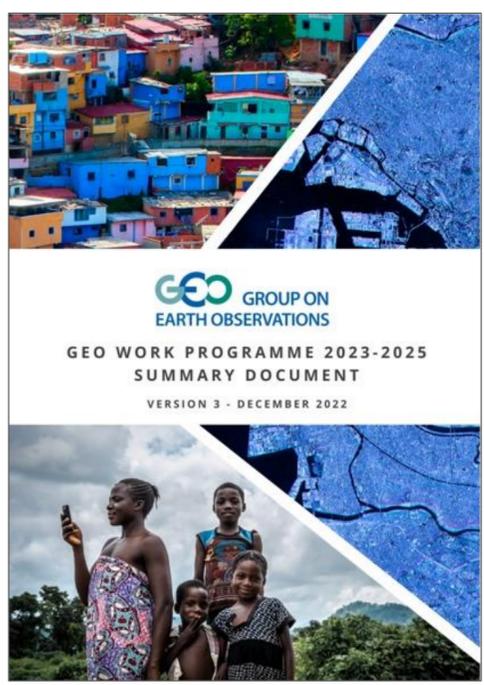
- Promoting interdisciplinary research and problem-solving approaches with filling the observational and knowledge gaps,
- Promoting data sharing and data accessibility through/by networks of the observation networks,
- Delivering our information and knowledge to stakeholders and global platforms



Cooperation with Asia-Oceania Group on Earth Observations



2023-2025 GEO Work Programme



AOGEO engages regional stakeholders, including national agencies and regional intergovernmental organizations, in global GEO activities and coordinate implementation of GEO activities within the Asia-Oceania region.

Participants from... Japan, Thailand, Malaysia, China, Republic of Korea, Indonesia, Nepal, Cambodia, Myanmar, Vietnam, Philippines, USA, ASEAN Centre for Biodiversity, ICIMOD



Conservation

- OECMs/KBAs
- Improved community governance of fisheries in Cambodia
- Mapping “Ecologically and Biologically Significant Areas” in the oceans
- Mapping Ecological Conservation redlines across Asia
- Assessing threat from wildlife trade

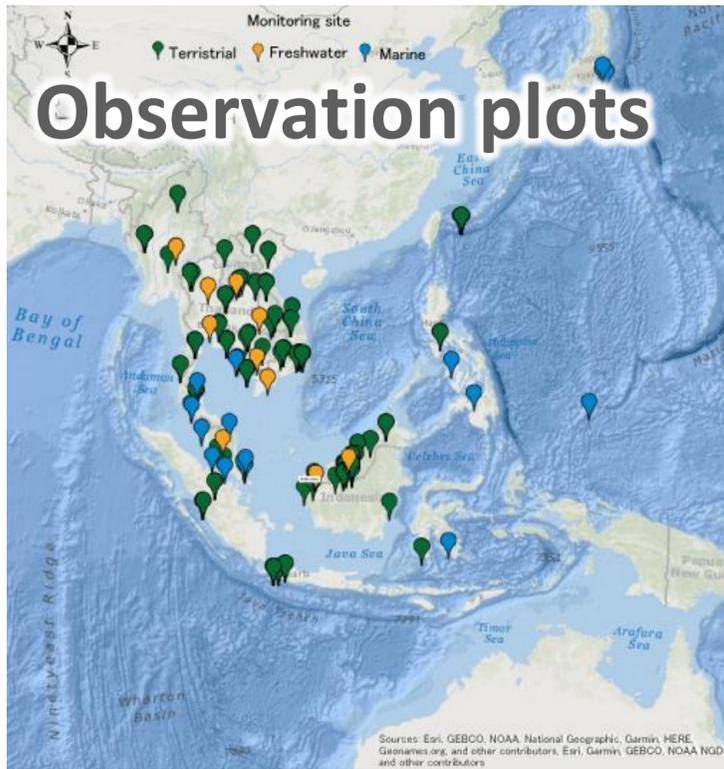
Monitoring biodiversity

- Mapping tropical tree species and changes in forest cover
- Unprecedented algal blooms and fisheries damage in Hokkaido (2021)
- Mapping protected areas in the Hindu Kush Himalaya
- Evaluating the impacts of hydropower dams and climate change on the diversity of fish species in the Mekong
- Assessing threat and priorities regionwide
- Investigating African swine fever infections in wild boars in Malaysia (2022)
- Mapping bats and zoonoses

Mobilizing biodiversity data

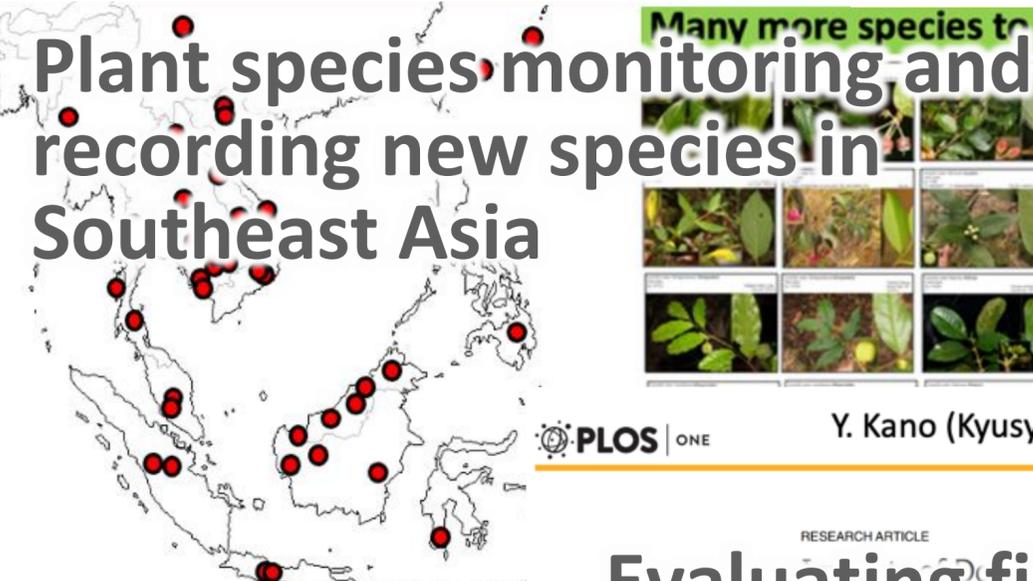
- Descriptions of plant species in Southeast Asia
- Active GBIF BIFA projects
- ffishAsia / floraZia

APBON' collaborative research



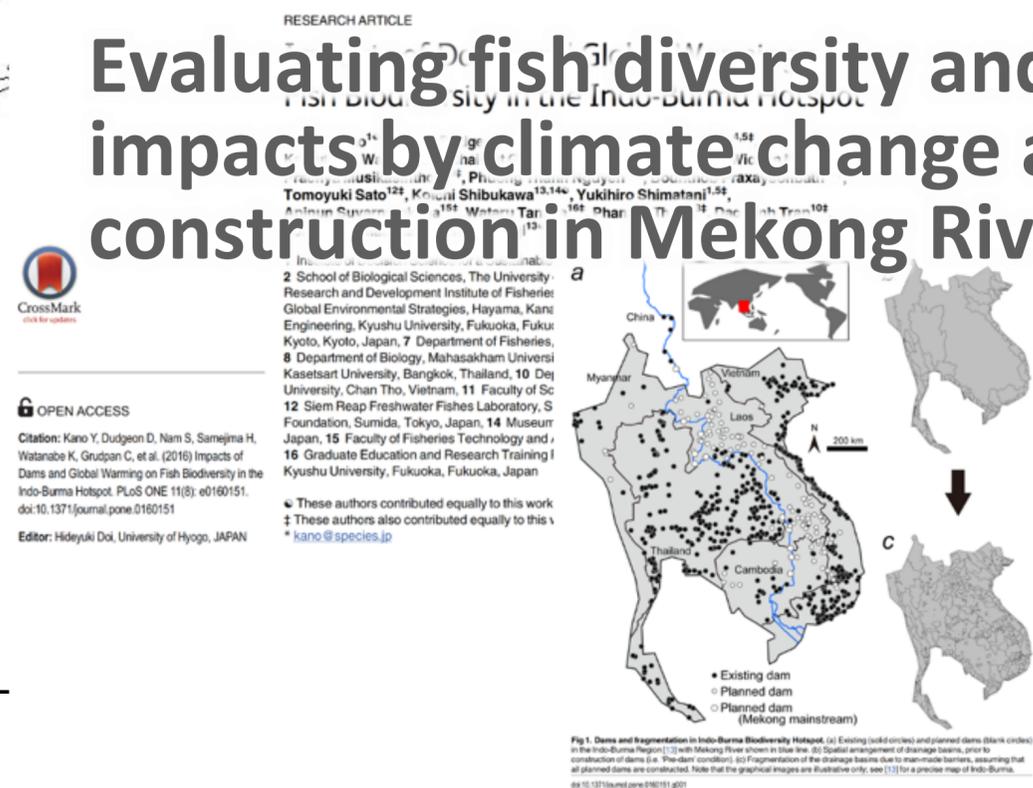
T. Yahara (Kyusyu University, Japan)

**Plant diversity assessment:
154 plots at 56 locations of 10 countries**



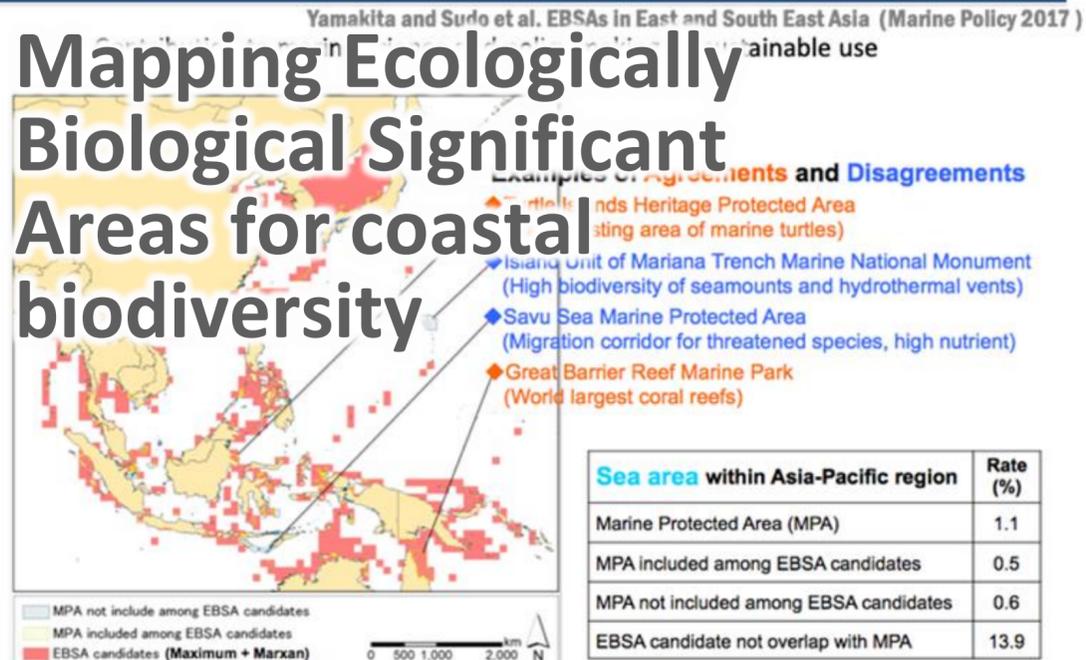
Y. Kano (Kyusyu University, Japan)

Evaluating fish diversity and its impacts by climate change and dam construction in Mekong River



T. Yamakita (JAMSTEC, Japan)

Mapping EBSAs (Ecologically Biologically Significant Areas)



Total area of EBSAs became 14.4% of the study area. Only 45% of MPAs overlapped with EBSA candidates.

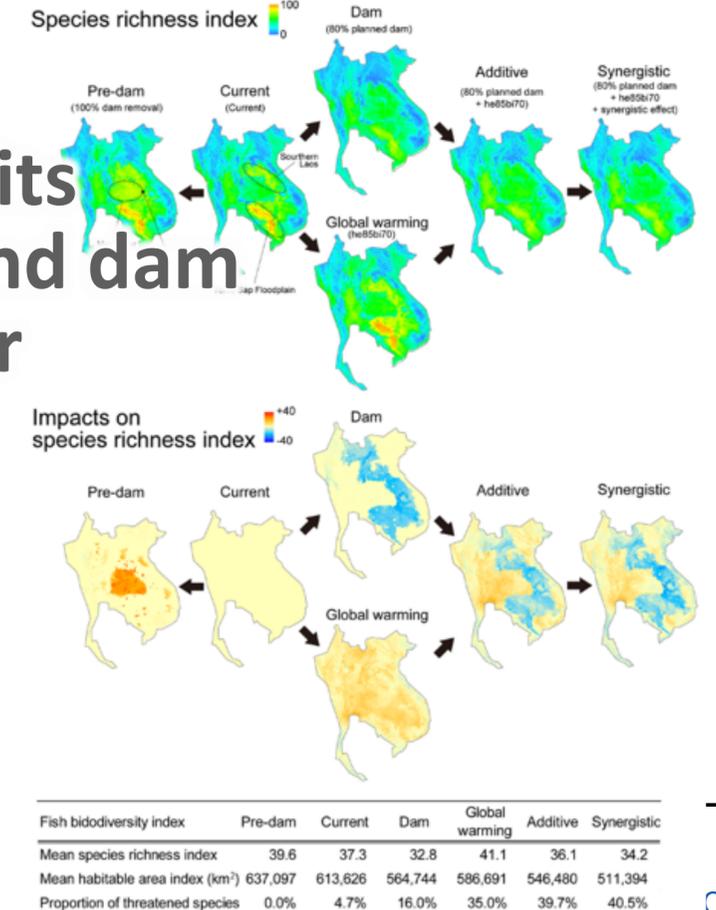


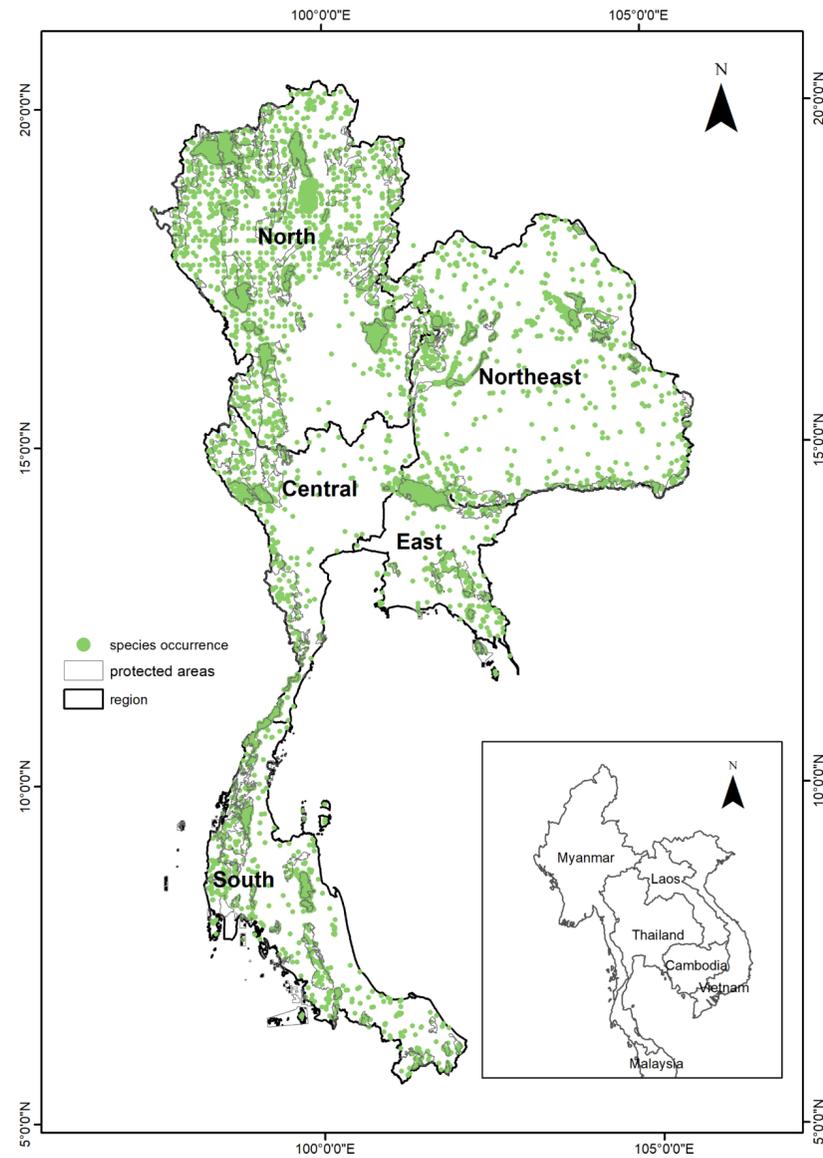
Fig 3. A sequence of changing fish biodiversity under six representative scenarios of dam construction/removal, global warming, and the simple addition or synergy between these two threat factors. Scenario names in parentheses correspond to those in S2 Table.

doi:10.1371/journal.pone.0160151.g003

Observations, integrative analysis, and assessment for biodiversity conservation

Thailand (Prof. Yongyut Trisurat, Kasetsart University)

Biodiversity monitoring



Database

Received: 28 September 2019 | Revised: 24 November 2019 | Accepted: 28 November 2019
DOI: 10.1111/1440-1703.12105



ECOLOGICAL RESEARCH WILEY

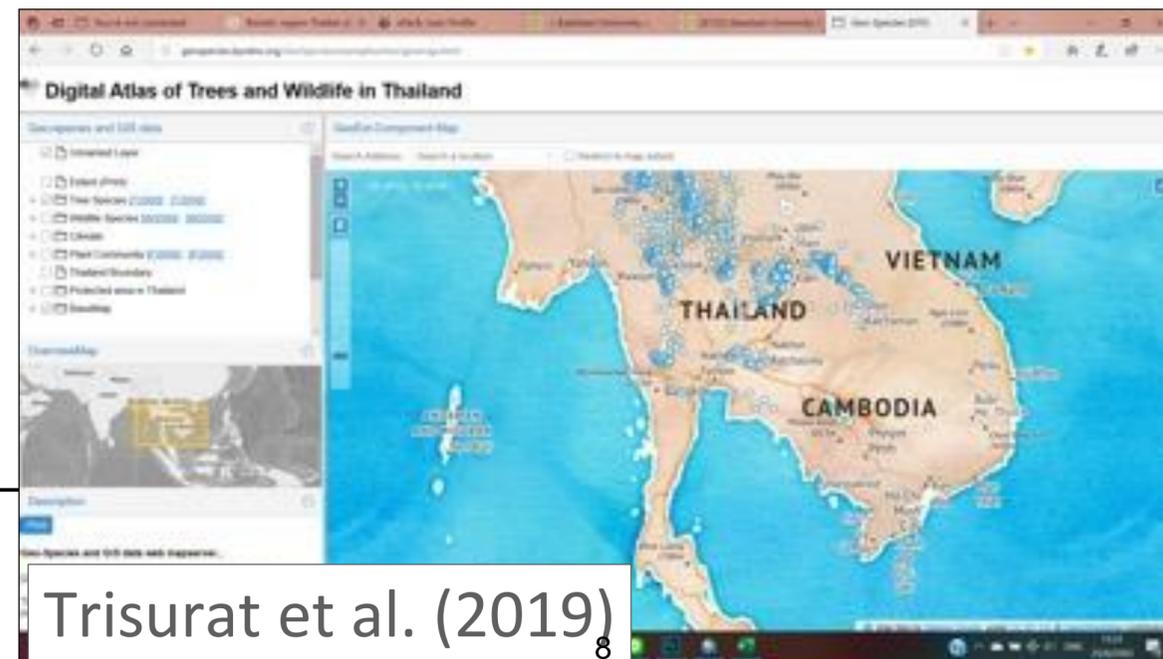
SPECIAL FEATURE

Data rescue—collection of precious and laborious in situ observed data

Systematic forest inventory plots and their contribution to plant distribution and climate change impact studies in Thailand

Yongyut Trisurat¹ | Wichan Eiadthong¹ | Weeraphart Khunrattanasiri¹ | Somyot Saengnin² | Auschada Chitechote² | Sompoch Maneerat²

Digital Atlas of Trees and Wildlife in Thailand



Trisurat et al. (2019)

Climate change impact on species distribution and ecosystem changes

diversity



Article

Climate Change Impacts on Species Composition and Floristic Regions in Thailand

Yongyut Trisurat^{1,*}, Nantida Sutummawong¹, Patrick R. Roehrdanz² and Auschada Chitechote³

- ¹ Faculty of Forestry, Kasetsart University, Bangkok 10900, Thailand; ffromis@ku.ac.th
- ² Moore Center for Science, Conservation International, Arlington, VA 22202, USA; proehrdanz@conservation.org
- ³ Department of National Parks, Wildlife and Plant Conservation, Bangkok 10900, Thailand; auschada1961@gmail.com
- * Correspondence: fforyyt@ku.ac.th

Abstract: Tropical forests are vulnerable to climate change including increased temperatures and changes to rainfall variation. Here, we use Thailand as a case study for assessing the impacts of the shared socio-economic pathway and climate scenarios on changes to the distribution and extent of floristic regions. To address this question, we assigned floristic regions based on a structured cluster analysis of modeled species ranges, and evaluated how those regions respond under scenarios of climate change. A total of 201 plant species with sufficient occurrence data obtained from the systematic forest inventory plots across the country and global datasets were chosen for distribution modeling. Environmental variables, including soils, topography and bioclimatic variables were compiled to model both current and 2050 distributions. Potential floristic regions were classified using a clustering algorithm on the pixel-wise species compositions—resulting in 12 floristic regions representative of both current climate species compositions and projected future species assemblages. Five floristic regions are projected to experience little change in their geographic distribution, while the remainder are projected to be substantially displaced spatially. Additionally, two of the identified floristic regions are not well represented in protected areas—with less than 50% of the current geographic distribution in each region in some form of protected status.

Thailand's CBD Kunming-Montreal GBF 30 x 30

diversity



Article

Can Thailand Protect 30% of Its Land Area for Biodiversity, and Will This Be Enough?

Nirunrut Pomoim^{1,2}, Yongyut Trisurat³, Alice C. Hughes^{1,4} and Richard T. Corlett^{1,4,*}

- ¹ Center for Integrative Conservation, Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Menglun 666303, China; nirunrut@xtbg.ac.cn (N.P.); ach_conservation@hotmail.com (A.C.H.)
- ² University of Chinese Academy of Sciences, Beijing 100049, China
- ³ Faculty of Forestry, Kasetsart University, Bangkok 10900, Thailand; fforyyt@ku.ac.th
- ⁴ Center of Conservation Biology, Core Botanical Gardens, Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Mengla 666303, China
- * Correspondence: corlett@xtbg.org.cn

Abstract: The draft post-2020 Global Biodiversity Framework asks CBD parties to conserve at least 30% of the planet by 2030 'through a well-connected and effective system of protected areas ... with the focus on areas particularly important for biodiversity'. We use Thailand as a case study for the ability of a densely populated, hyper diverse, tropical, middle-income country to meet this target at a national level. Existing protected areas (PAs) total 24.3% of Thailand's land area. Adding forest on government land adjacent to existing PAs, plus unprotected areas of Ramsar sites, raises this to 29.5%. To assess the importance for biodiversity, we used modeled distributions of birds and mammals plus, as proxies for other biodiversity components, elevation, bioclimate, forest type, and WWF ecoregion. All modeled species occur in the current PA system but <30% meet representation targets. Expansion of the system increases the proportion of mammals and birds adequately protected and increases the protection for underrepresented bioclimatic zones and forest types. The expanded system remains fragmented and underrepresents key habitats, but opportunities for increasing protection of these are limited. It is also still vulnerable to climate change, although projected impacts are reduced. Additional protection is needed for wetland and coastal habitats, and limestone karsts.

check for updates
Citation: Pomoim, N.; Trisurat, Y.

Application and use

Capacity Development : Biodiversity monitoring and data sharing in the Hindu Kush Himalaya

ICIMOD Nepal

(Dr. Sunita Chaudhary)

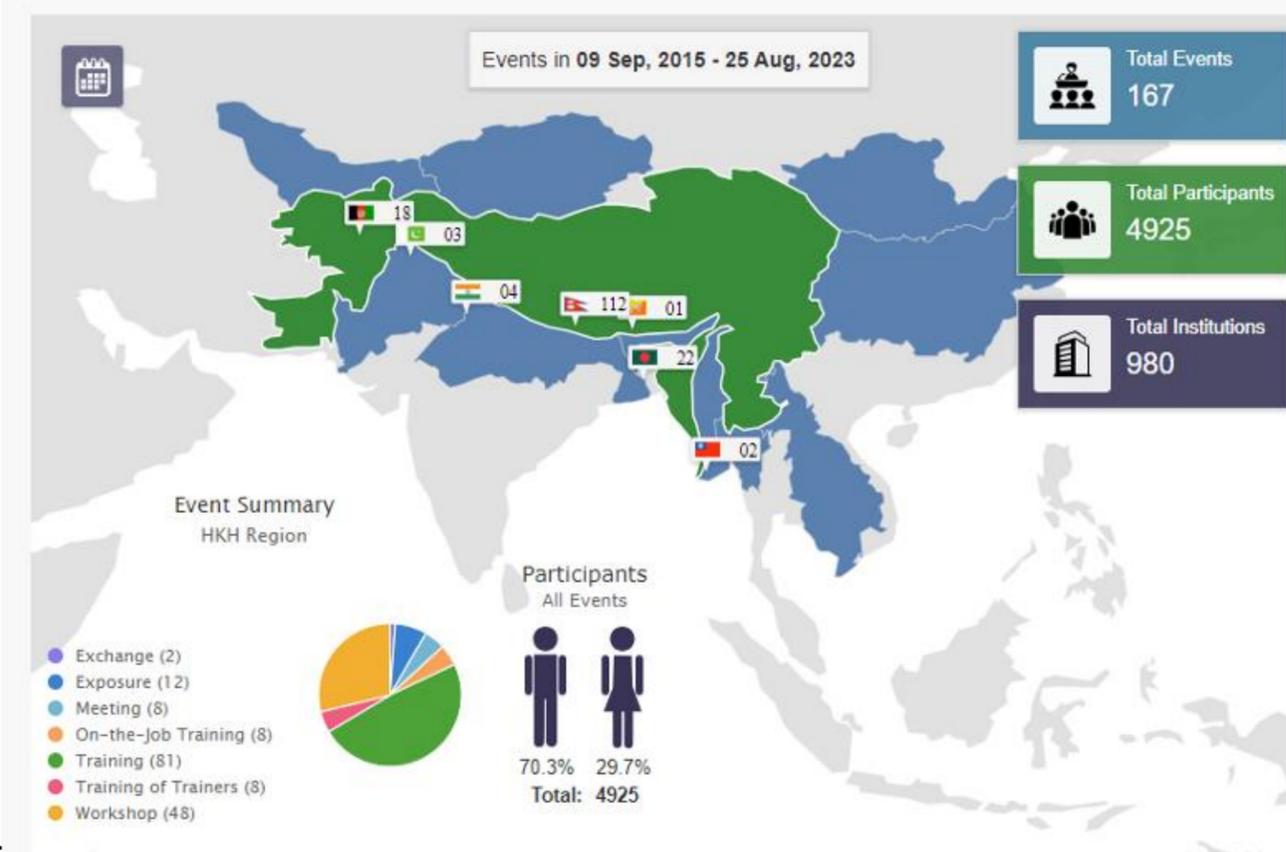
Monitoring and assessment

- Regular climate and discharge monitoring at higher altitude with sites in Langtang and Manang valleys
- Vegetation monitoring including tree coring in Langtang valley of Nepal
- Permafrost monitoring started in far-western Nepal
- Springs inventory and biodiversity assessment
- [Regional Database System](#) with open access policy



Thematic areas:

- Land cover and land use change
- Ecosystem composition & dynamics
- Freshwater resources and hydro-climatic disasters
- Weather and climate



Capacity Development : Engaging research communities for data mobilization



(Dr. Christian Elloran)

Organized Biodiversity Data Mobilization

- KBA e-Learning & Biodiversity Data Mobilisation Workshops
- Workshop on Establishment of National Clearing-House Mechanism Using Bioland Tool

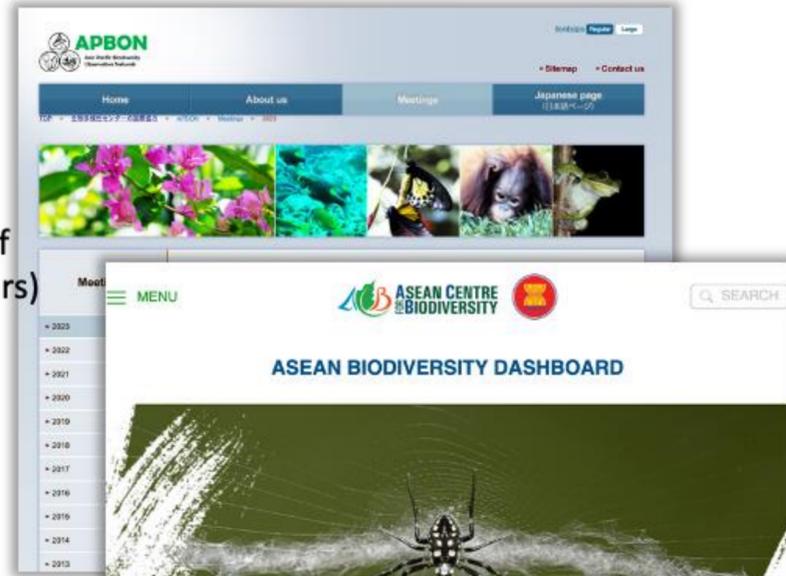
Workshops and Trainings

- Training of Trainers: Multisector Framework for Mainstreaming Biodiversity Workshop
- Philippine Biodiversity Strategy and Action Plan Expert's Consultation Meeting
- Completion of the Internship Program



Data and Knowledge sharing – Database and Publications

APBON knowledge sharing
(Presentation files of workshops / webinars)

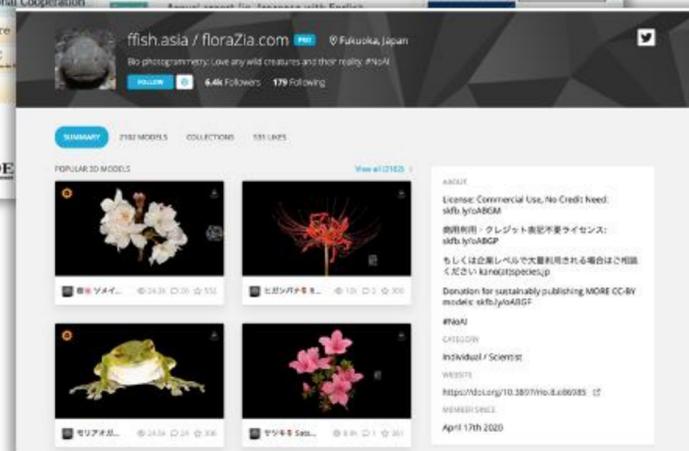


ASEAN Biodiversity Dashboard

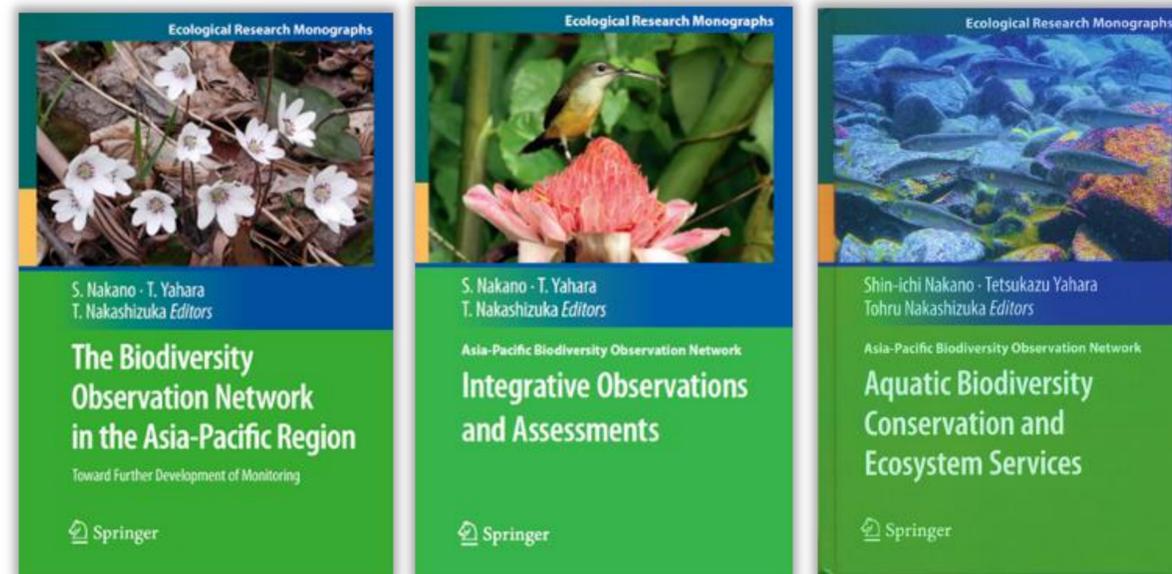
Biodiversity databases
(Biodiversity Center of Japan, MoE)



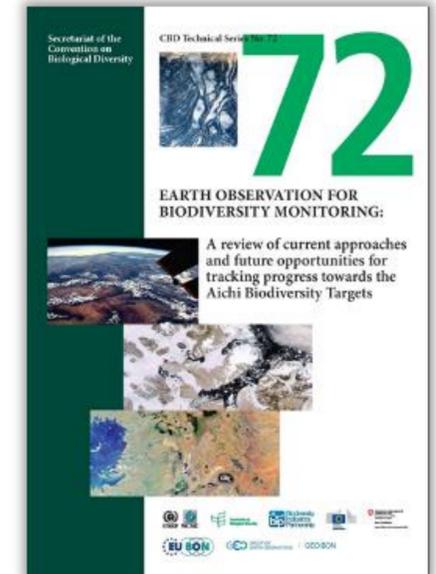
ffish.asia/floraZia
<https://sketchfab.com/ffishAsia-and-floraZia>



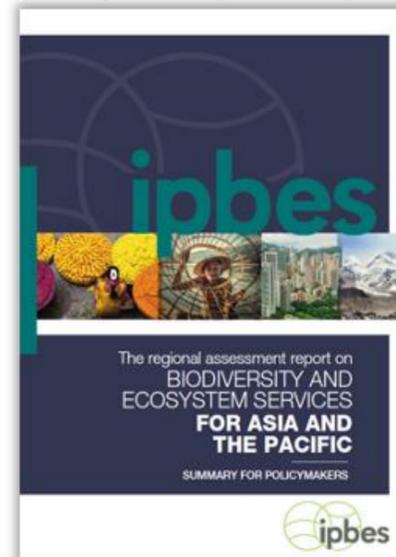
“APBON Books” (Springer, 2012, 2014, 2016)



CBD report



IPBES Regional Assessment Report (2018)



Data paper + Database



APBON Highlights



Workshop summary



Growing needs to develop value chain: Observations, Data processing, and Users to address challenges



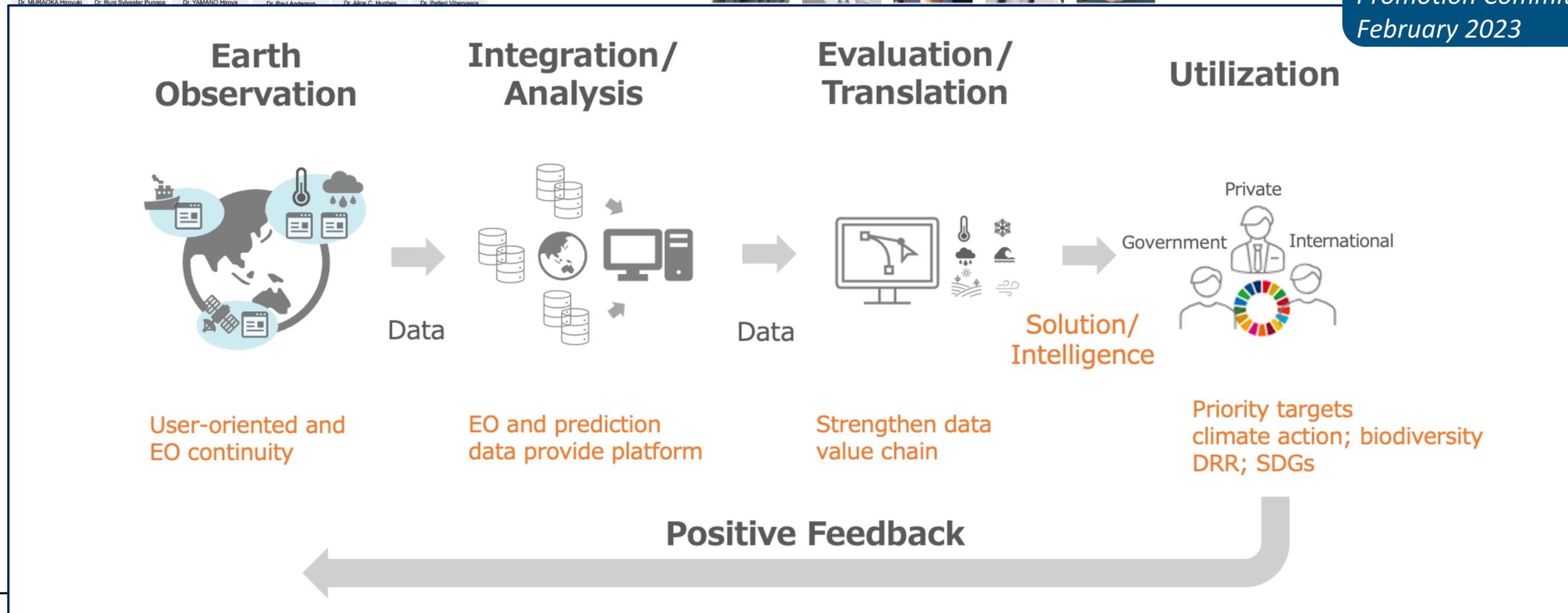
Special Session -- Biodiversity for Addressing Climate Change & Disaster Risk Reduction



Special Session -- Biodiversity and Sustainable Society: How EO contributes to integrating nature into economic activities



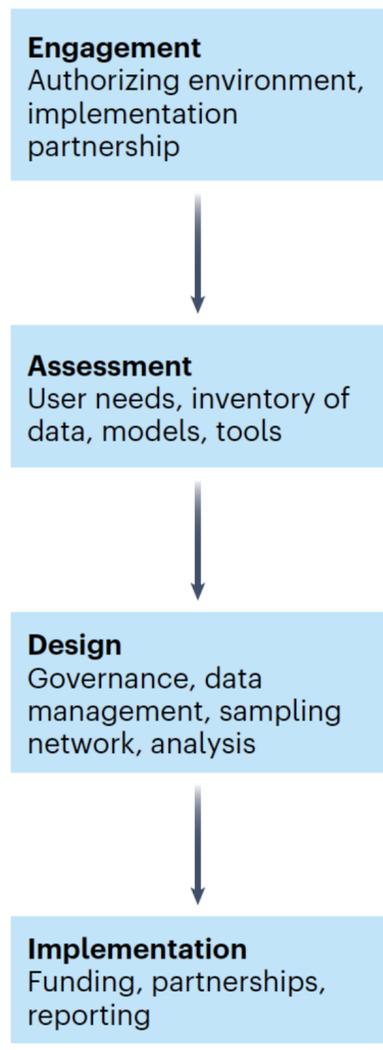
Redrawn from the final report by *The 9th Earth Observation Promotion Committee, Japan, February 2023*



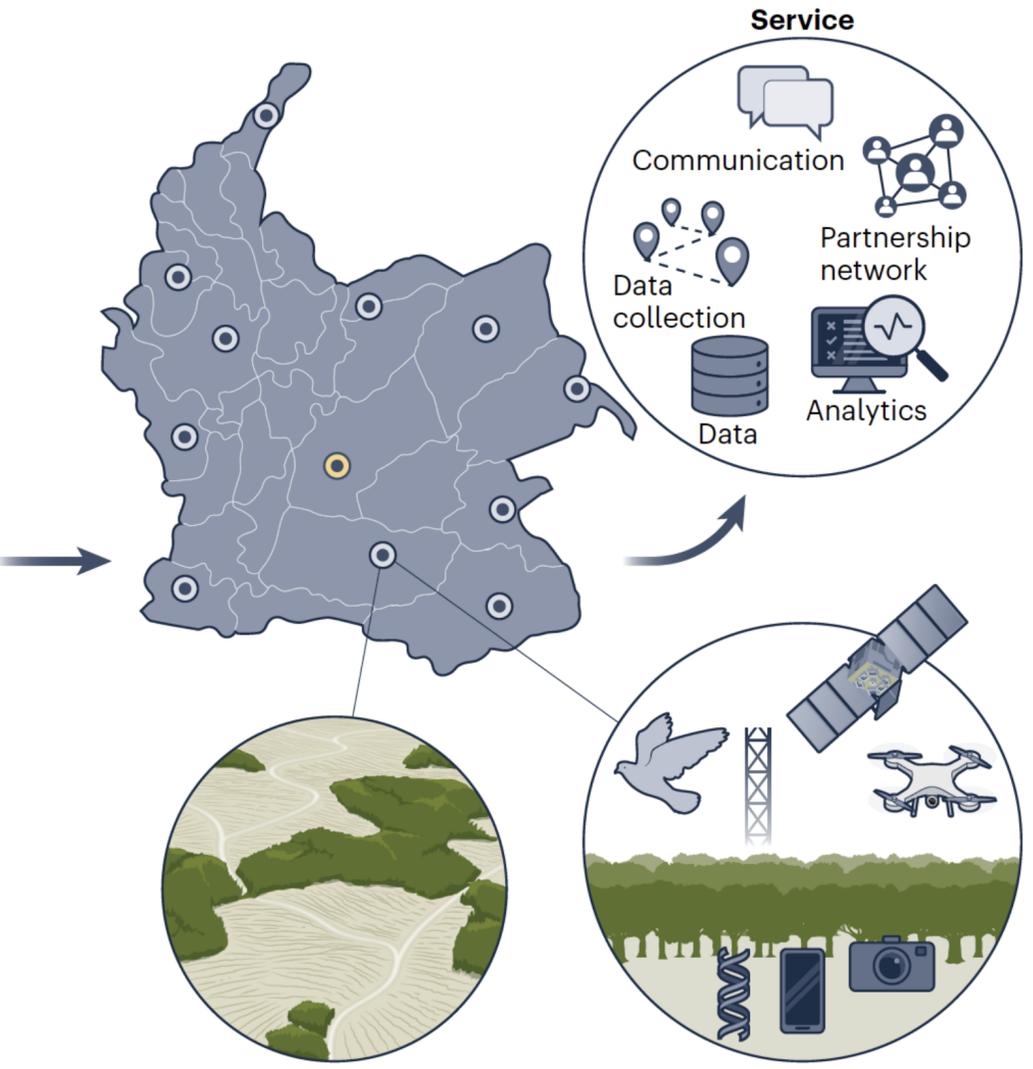
Global Biodiversity Observing System (GBIOS) to fill observational and knowledge gaps



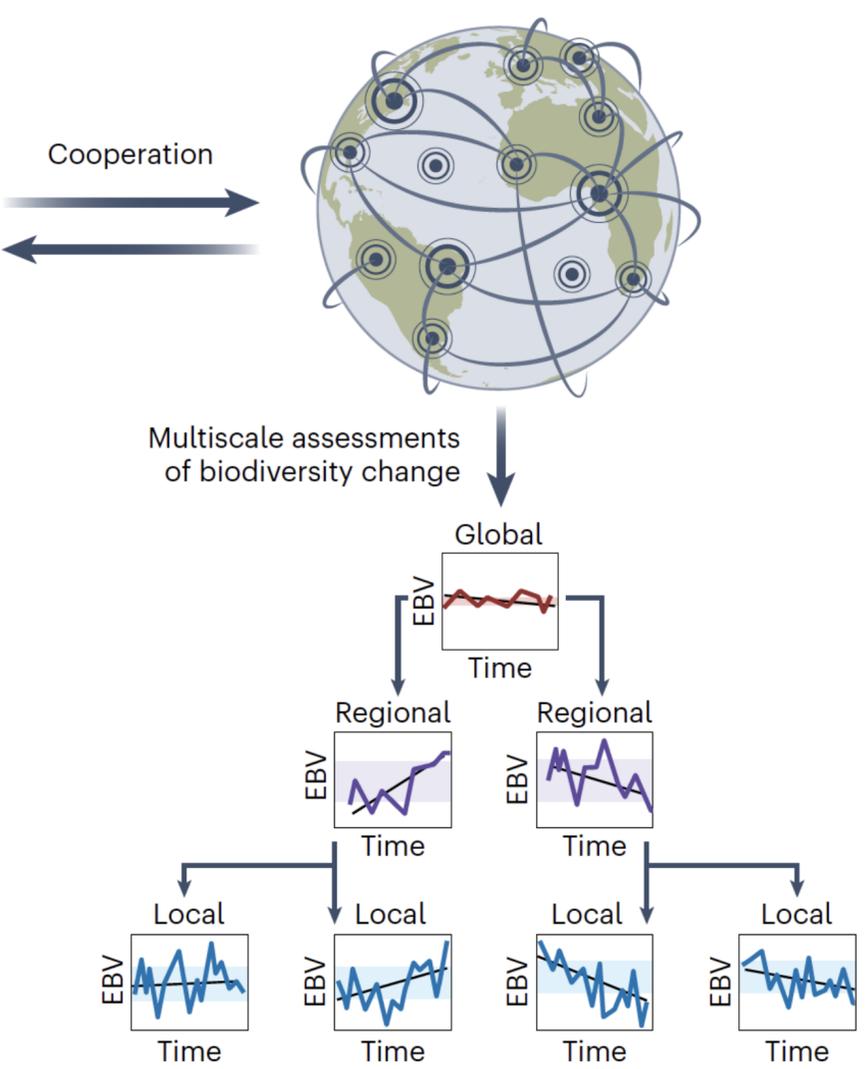
a Building a BON



b National BON



c GBIOS



Comment

<https://doi.org/10.1038/s41559-023-02171-0>

A global biodiversity observing system to unite monitoring and guide action

Andrew Gonzalez, Petteri Vihervaara, Patricia Balvanera, Amanda E. Bates, Elisa Bayraktarov, Peter J. Bellingham, Andreas Bruder, Jillian Campbell, Michael D. Catchen, Jeannine Cavender-Bares, Jonathan Chase, Nicholas Coops, Mark J. Costello, Maria Dornelas, Grégoire Dubois, Emmett J. Duffy, Hilde Eggertmont, Nestor Fernandez, Simon Ferrier, Gary N. Geller, Michael GILL, Dominique Gravel, Carlos A. Guerra, Robert Guralnick, Michael Harfoot, Tim Hirsch, Sean Hoban, Alice C. Hughes, Margaret E. Hunter, Forest Isbell, Walter Jetz, Norbert Juergens, W. Daniel Kissling, Cornelia B. Krug, Yvan Le Bras, Brian Leung, Maria Cecilia Londoño-Murcia, Jean-Michel Lord, Michel Loreau, Amy Luers, Keping Ma, Anna J. MacDonald, Melodie McGeoch, Katie L. Millette, Zoëlt Molnar, Akira S. Mori, Frank E. Muller-Karger, Hiroyuki Muraoka, Laetitia Navarro, Tim Newbold, Aidin Niamir, David Obura, Mary O'Connor, Marc Paganini, Henrique Pereira, Timothée Poisot, Laura J. Pollock, Andy Purvis, Adriana Radulovici, Duccio Rocchini, Michael Schaeppman, Gabriela Schaeppman-Strub, Dirk S. Schmeller, Ute Schmeddel, Fabian D. Schneider, Mangal Man Shakya, Andrew Skidmore, Andrew L. Skowno, Yayoi Takeuchi, Mao-Ning Tuanmu, Eren Turak, Woody Turner, Mark C. Urban, Nicolás Urbina-Cardona, Ruben Valbuena, Basile van Havre & Elaine Wright

[Check for updates](#)

The rate and extent of global biodiversity change is surpassing our ability to measure, monitor and forecast trends. We propose an interconnected worldwide system of observation networks – a global biodiversity observing system (GBIOS) – to coordinate monitoring worldwide and inform action to reach international biodiversity targets.

The Kunming Montreal Global Biodiversity Framework (KM-GBF) provides a vision for living in harmony with nature that will have lasting benefits for humanity. Attaining this vision will require ambitious and rapid action to address the drivers of biodiversity loss and improve conservation action to avoid the great social and economic costs of ecosystem degradation. This will require understanding where, why and how fast biodiversity is changing – something we have limited knowledge of today for much of the planet.

An essential part of the KM-GBF is its monitoring framework (as outlined in COP decision 15/5), which includes a set of indicators that will be used by nations to monitor and report their progress toward the framework's targets and goals. The indicators track actions and policies that implement the framework (such as the establishment of protected areas) and those that reduce the drivers of biodiversity loss (for example, pollution abatement). The indicators rely on monitoring to measure the outcomes for nature and people over time (for example, measures of ecosystem service provisioning) and the risks of losing the benefits that we get from nature. Aggregation of the indicators at the national level can provide insight into progress at regional and global levels.

Disparities among nations in the access and use of biodiversity observations and knowledge means that the global community is not adequately equipped to meet the information requirements of the monitoring framework: to monitor the drivers of biodiversity loss and track species and ecosystem recovery and restoration, as well as assess the risks of losing the many benefits that we get from nature.

To address this gap, we – as members of the Group on Earth Observations Biodiversity Observation Network (GEO BON) and its partner institutions – propose the establishment of a global biodiversity observing system (GBIOS) to initially interlink existing capacities and organizations to monitor how, where and why biodiversity is changing, and to progressively grow to guide the action needed to realize the targets and goals of the KM-GBF.

Biodiversity observations at the science-policy interface

To achieve the goals of the KM-GBF, we have identified four key components to bridge science and policy: (1) biodiversity observations guided by policy needs; (2) observations coordinated to form monitoring programmes designed to rapidly detect change and attribute causes for biodiversity change; (3) observations that inform models to project biodiversity change and the loss of ecological and evolutionary resilience; and (4) frequent assessments derived from monitoring to provide policy options to guide action. Currently, the international biodiversity science-policy interface lacks all four of these components, and so the delivery of policy-relevant knowledge about biodiversity change is slow relative to the timeline set out by the KM-GBF.

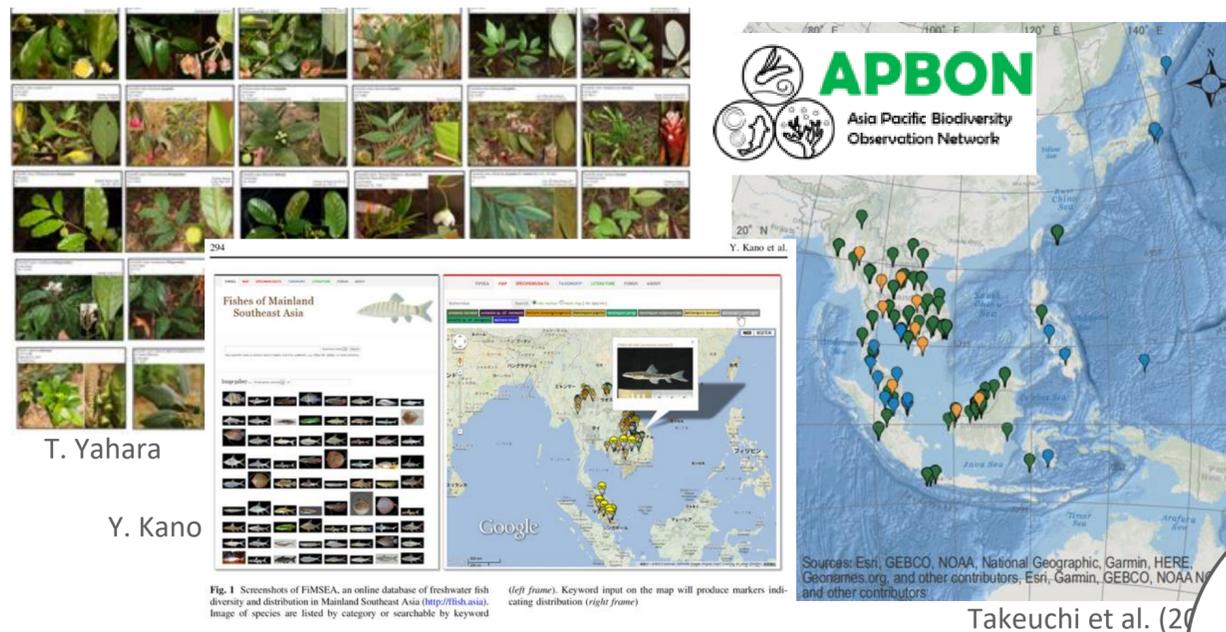
The weather forecasting and climate assessment communities have had all these components that provision scientific knowledge to policy action for several decades. This includes daily weather

nature ecology & evolution

Gonzalez et al. (2023) Nature Ecology & Evolution

Networking in-situ research networks

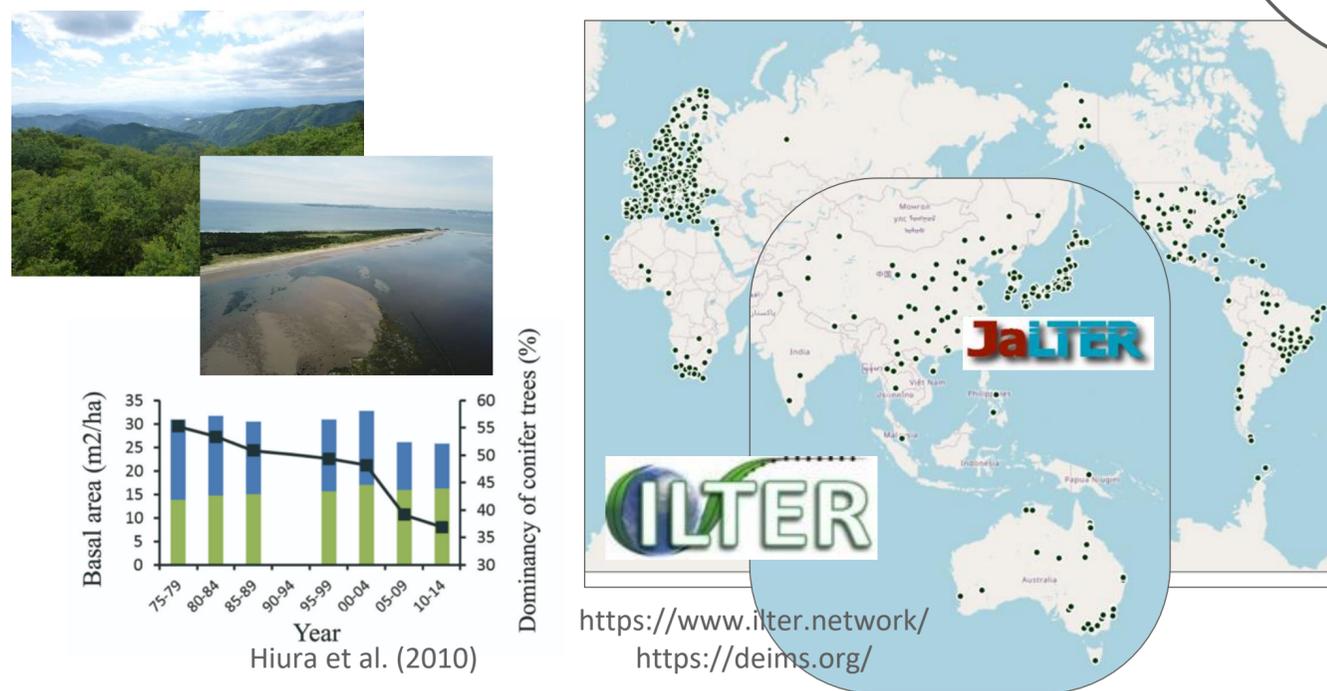
Biodiversity observation network



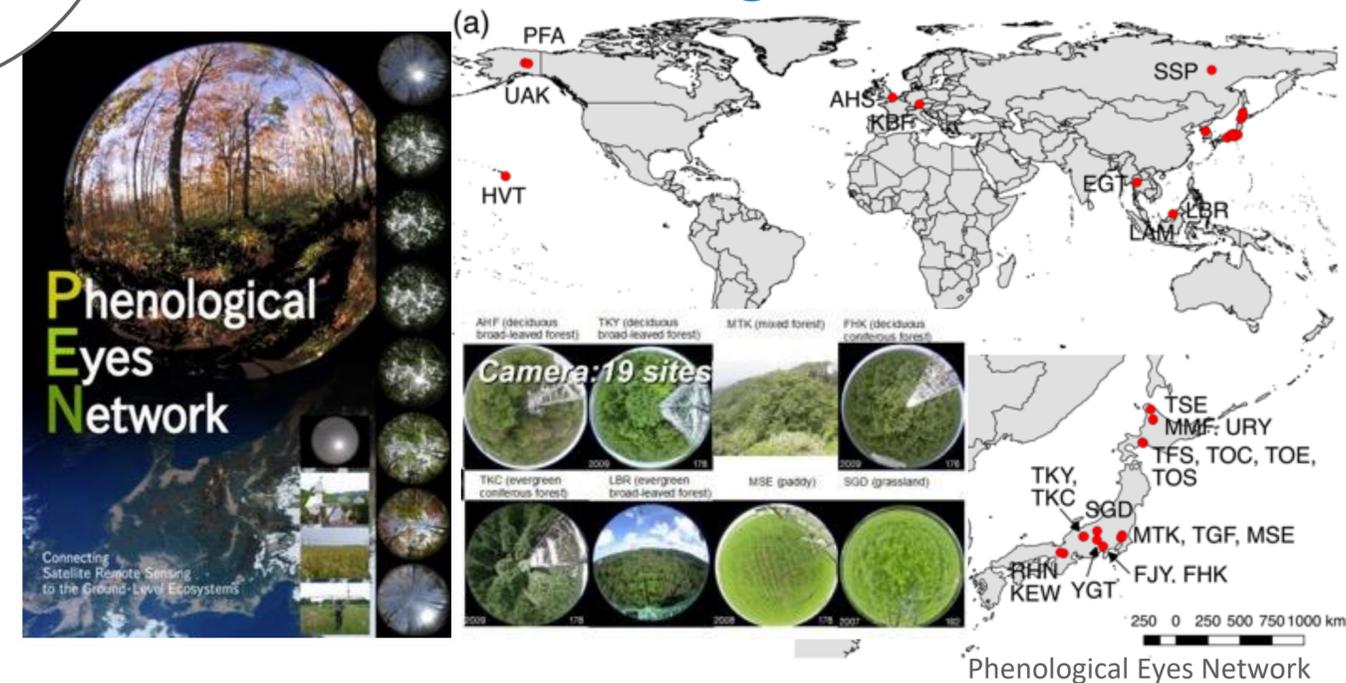
CO₂ flux and GHG research network



Long-term Ecological Research network



In-situ remote sensing observation network



Needs and Challenges to connect observations and society

Broader understanding

Multiple dimensions of “biodiversity and ecosystem data” – genetic, species, ecosystem; no. of threatened species; ecosystem functions; ...

Integrative research

Inter-disciplinary research and understanding on Climate – Biodiversity – Ecosystem functions interdependencies across scales

Cross-scale observations

Filling spatial / thematic observational gaps by connecting *in-situ* and satellite observations, and model simulations

Open science

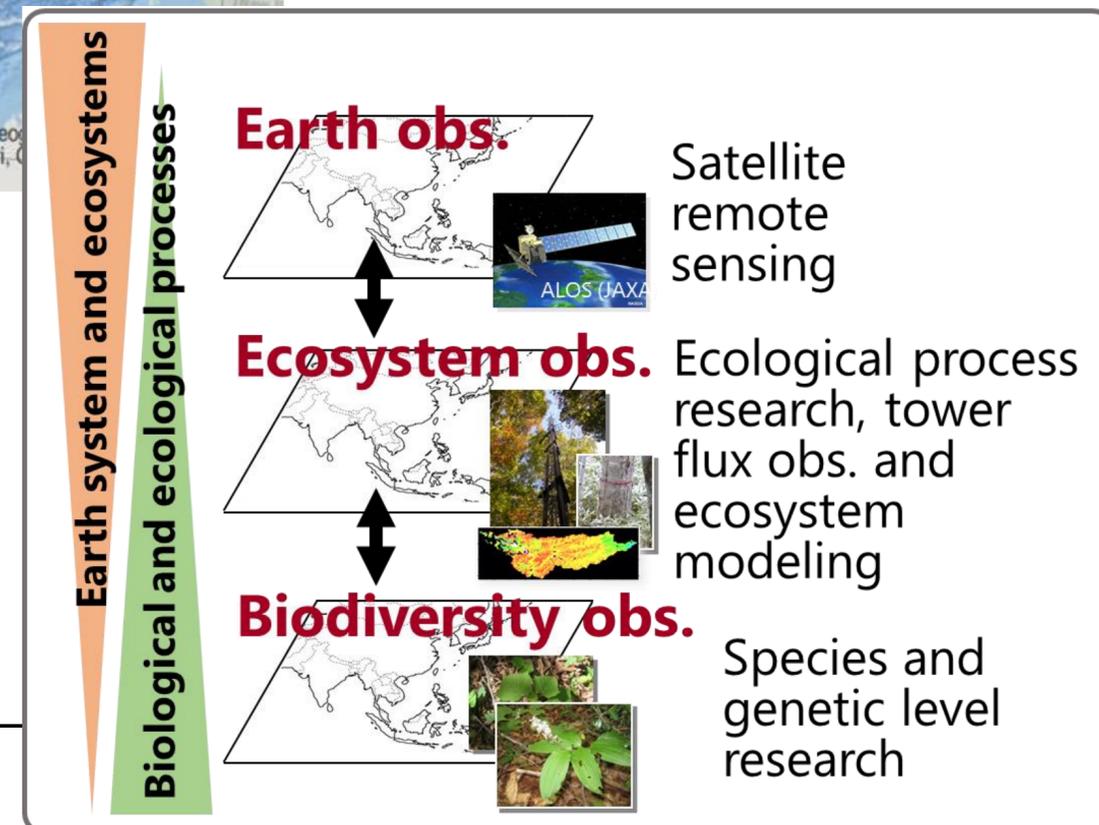
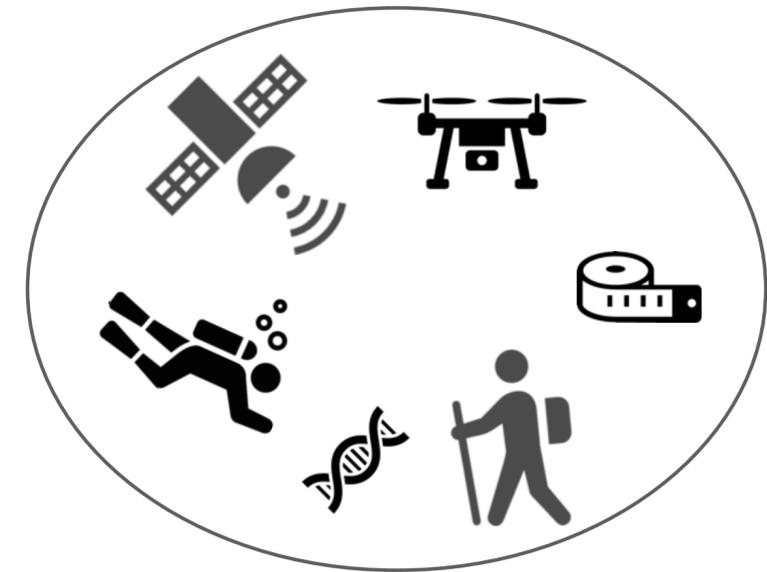
Data / Knowledge generation and sharing through national and regional cooperative capacity development, citizen science

Promoting value chain

Earth observations – analysis – evaluation – intelligence – decision making (*science to action*) by networking networks and stakeholders



Takeuchi et al. (2021)



(Muraoka et al. 2012 in APBON book)

Thank you

For more information of APBON

<http://www.esabii.biodic.go.jp/ap-bon/index.html>



APBON website

<http://www.esabii.biodic.go.jp/ap-bon/index.html>

APBON on-line seminars

<http://www.esabii.biodic.go.jp/ap-bon/meetings/index.html>



AP-MBON website

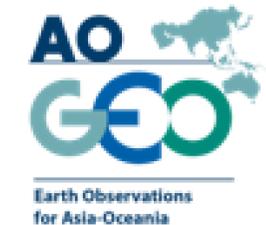
<https://members.geobon.org/pages/ap-mbon.php>

Contact: Hiroyuki Muraoka

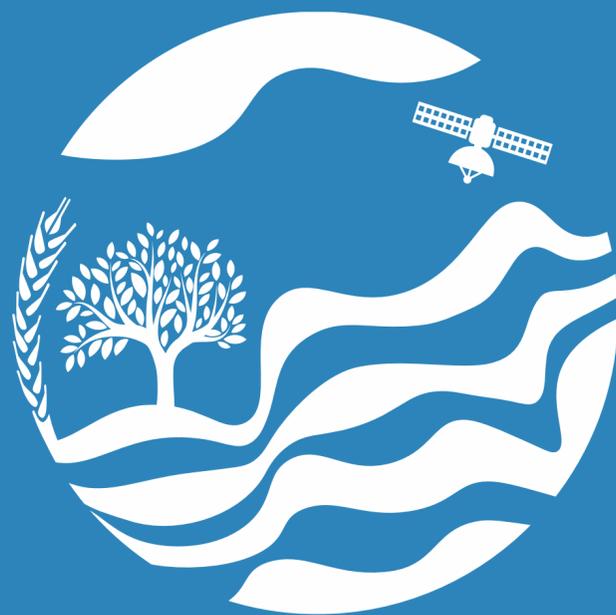
muraoka.hiroyuki.y6@f.gifu-u.ac.jp

APBON is supported by,

- *Biodiversity Center of Japan, Ministry of the Environment Japan;*
- *Ministry of Education, Culture, Sports, Science and Technology (MEXT) Japan;*
- *National Institute for Environmental Studies (NIES);*
... and all other voluntary contributions.



#TheEarthTalks



**GEO
WEEK
2023
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SUMMIT**

6-10 NOVEMBER
CAPE TOWN, SOUTH AFRICA
