

Regional cooperation for biodiversity observation and capacity development

- Asia-Pacific Biodiversity Observation Network -

Hiroyuki Muraoka

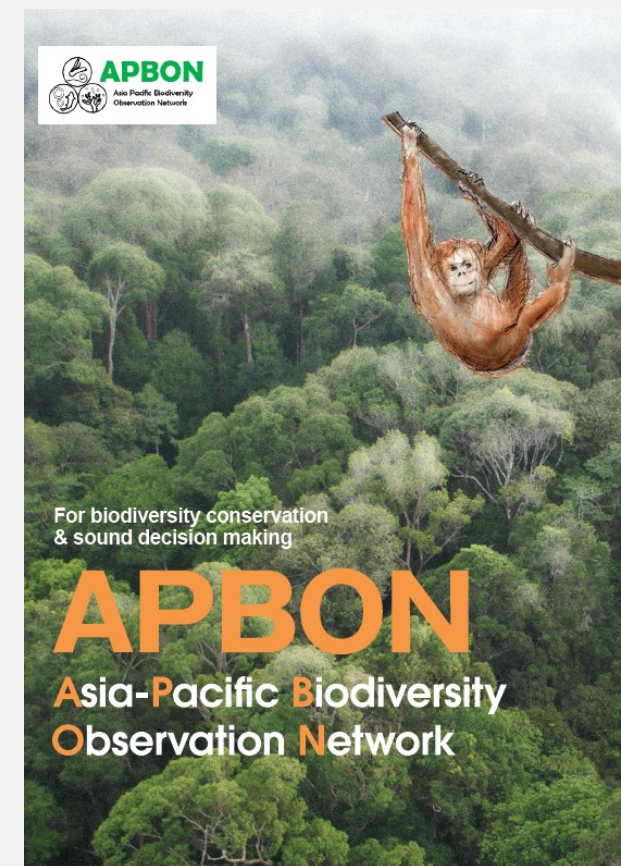
APBON Co-chair

Professor, Gifu University, Japan

Group Leader, National Institute for Environmental Studies

Technical Advisor, MEXT-Japan

*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.*



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

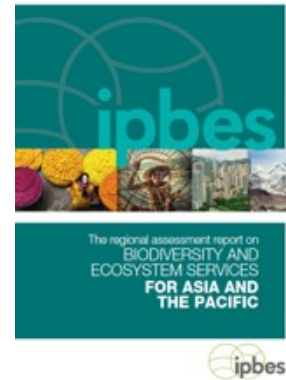
- Terrestrial
- Freshwater
- Coastal and Marine
- But its loss is in progress

Diversity of ecosystems

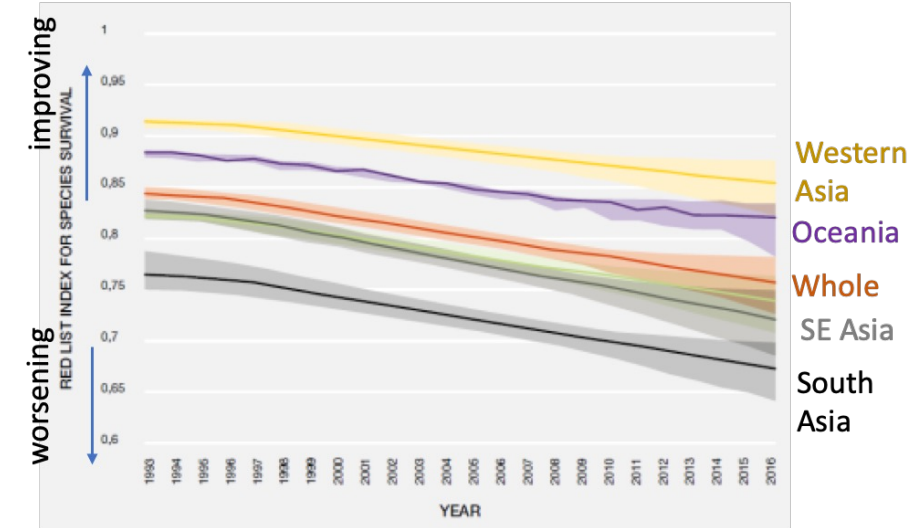
- Environmental regulation
- Provide goods and services (Nature's Contribution to People)

Biodiversity loss is proceeding

Y. Takeuchi (2022)
15th AOGE Symposium



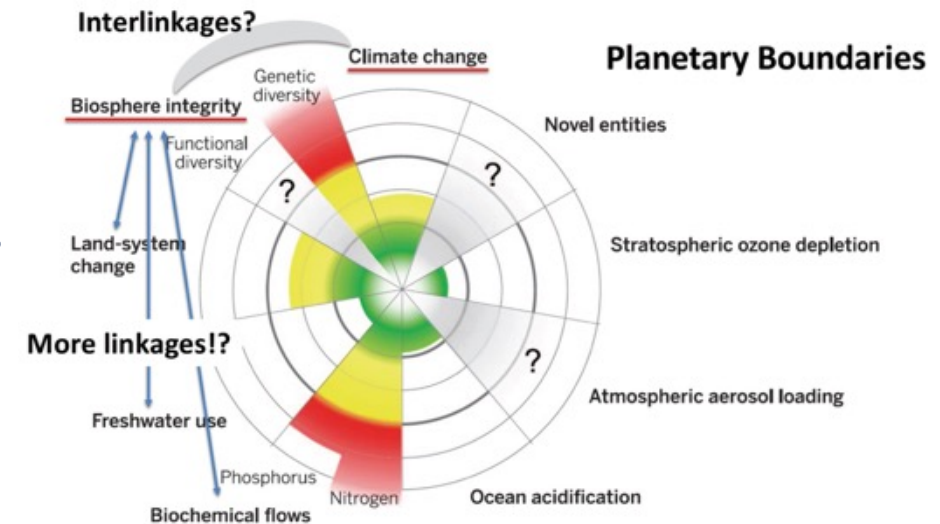
Trends in threatened species status



(IPBES 2018)

Interlinkages of Climate – Biodiversity – Ecosystem functions

H. Yamano (2021)
14th AOGE Symposium



Japan Biodiversity Observation Network

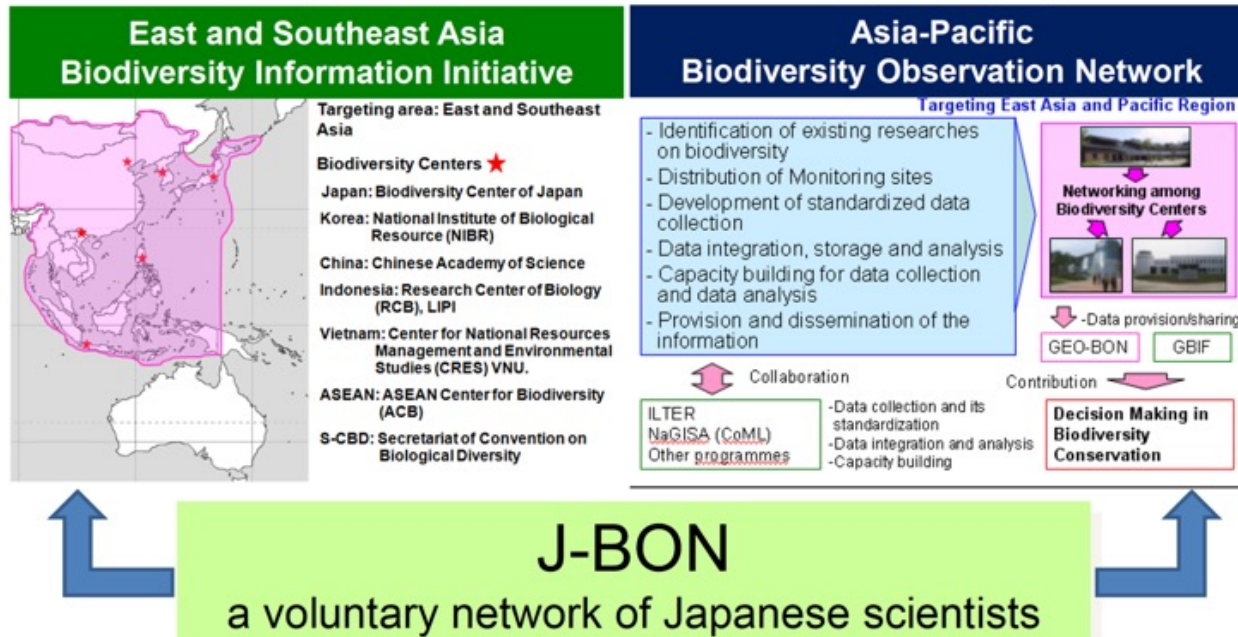
J-BON was established in 2009 as a collaborative network among domestic researchers, supported by the Ministry of the Environment Japan.

→ Basis of APBON



ESABII

AP-BON



Re-building JBON (April 2023~)

To respond to:

1. Growing demands for biodiversity information in society
2. Growing demands for biodiversity information in economy
3. Development of cutting-edge technologies for biodiversity observation & increasing importance of conventional surveys

→ **Network of scientists (academia, national institutes, citizen science), practitioners, private sectors, museums, academic associations, etc.**

188 individual persons
8 organizations (Sep 2023)

Partner Organizations



APBON established in 2009

Mission

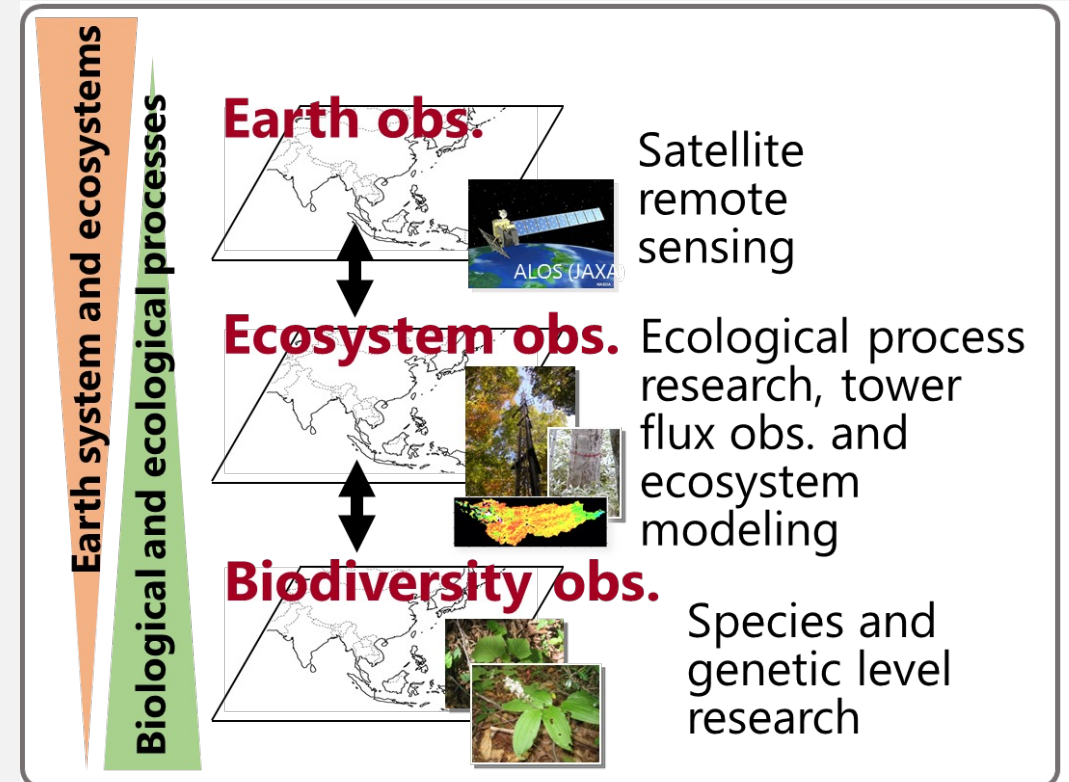
1. Contribution to sound decision making related to biodiversity conservation based on scientific information
2. Facilitation of the utilization of existing biodiversity data
3. Coordination of a regional network

Activities

1. Monitoring changes of biodiversity
 - ✓ Biodiversity mapping
 - ✓ Identification of key drivers
 - Land use change, Climate change
2. Networking of the observation networks
 - ✓ Sharing information through the networks
3. Capacity building

Members from the region

Japan, China, Korea, Thailand, Malaysia, Cambodia, Philippines, ASEAN Centre for Biodiversity, Nepal, ICIMOD, U.S.A. (Hawaii), Australia, Indonesia,



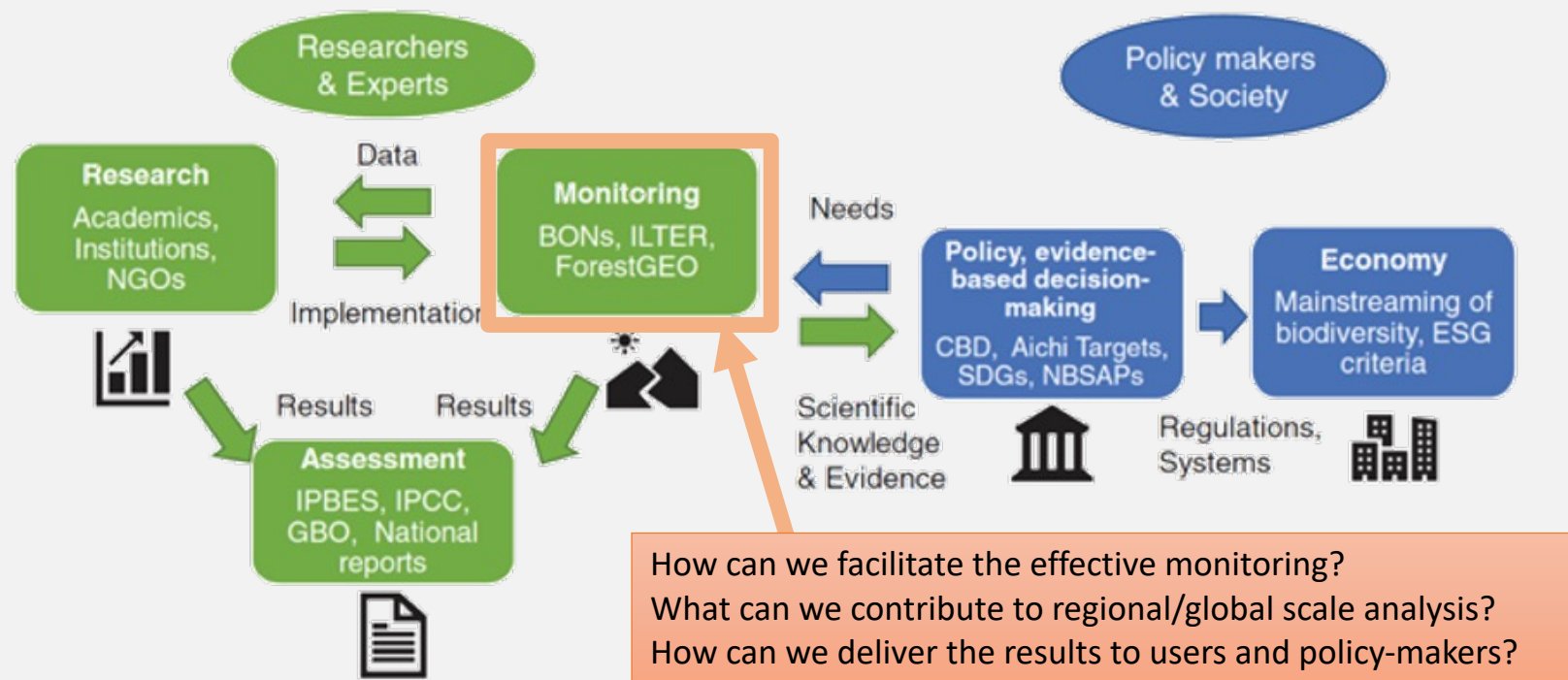
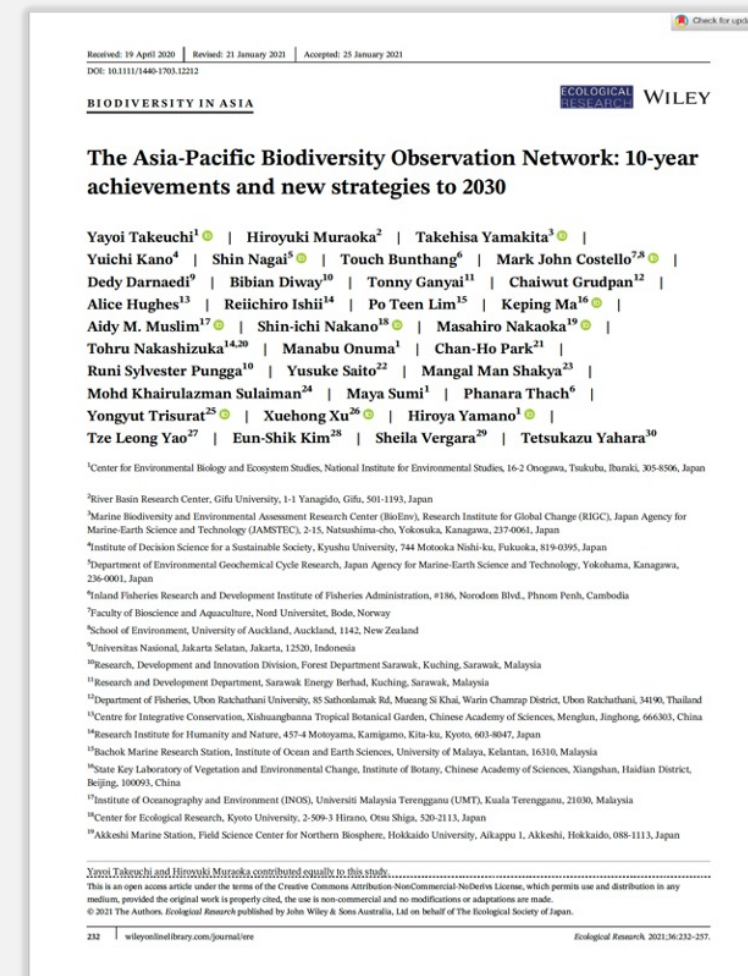
(Muraoka et al. 2012 in APBON book)

APBON Work Plan update toward 2030

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

Takeuchi & Muraoka et al. (2021)
Ecological Research



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

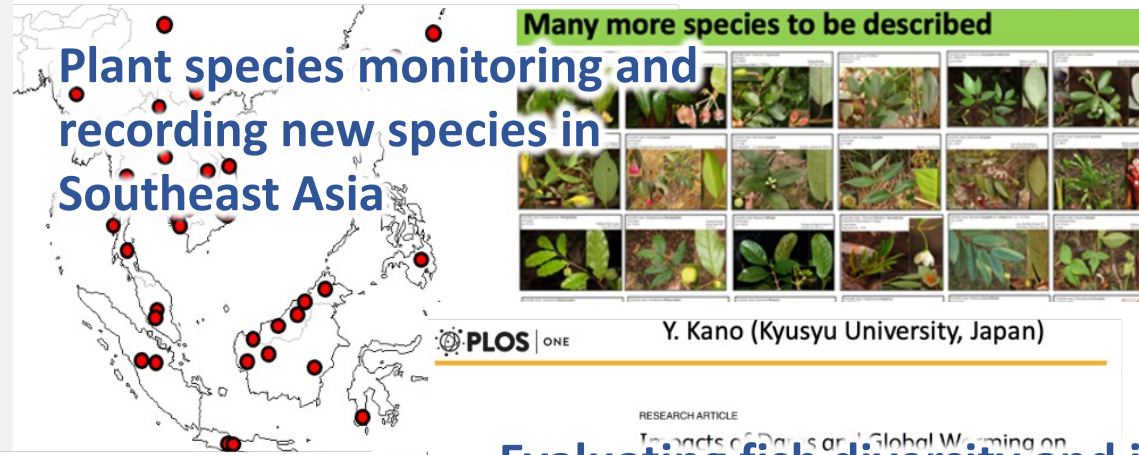
- Descriptions of plant species in Southeast Asia
- Active GBIF BIFA projects
- ffishAsia / floraZia

APBON' collaborative research

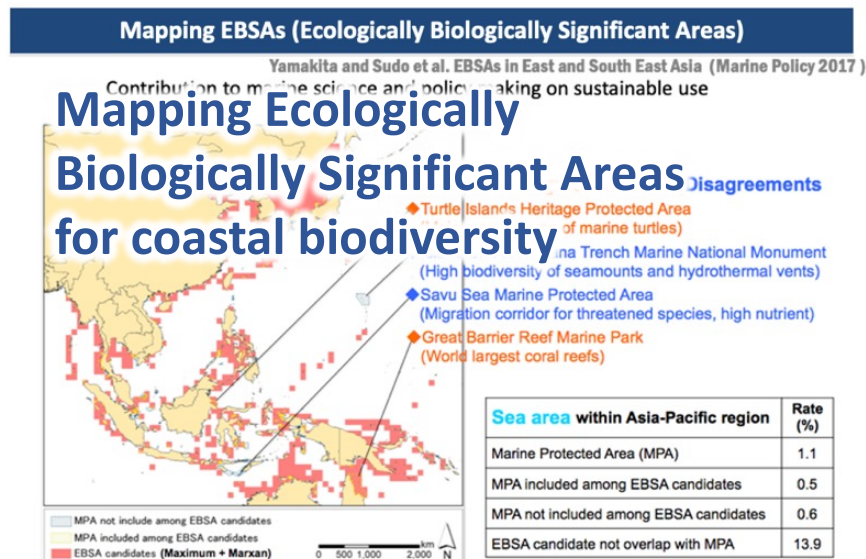


T. Yahara (Kyusyu University, Japan)

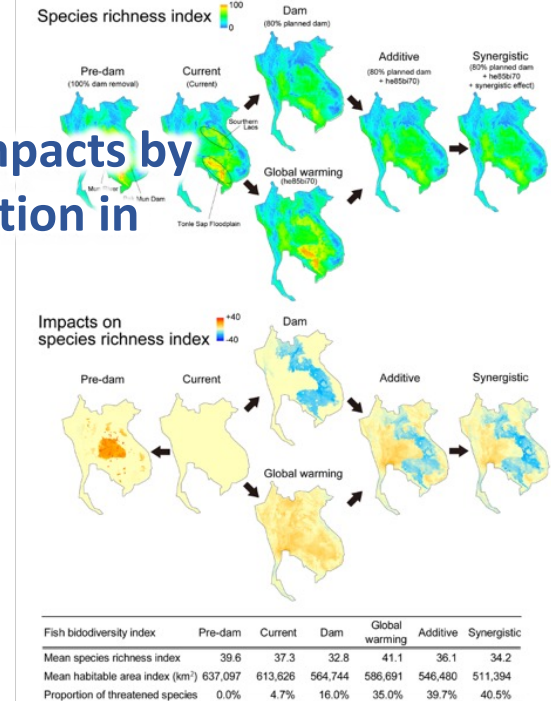
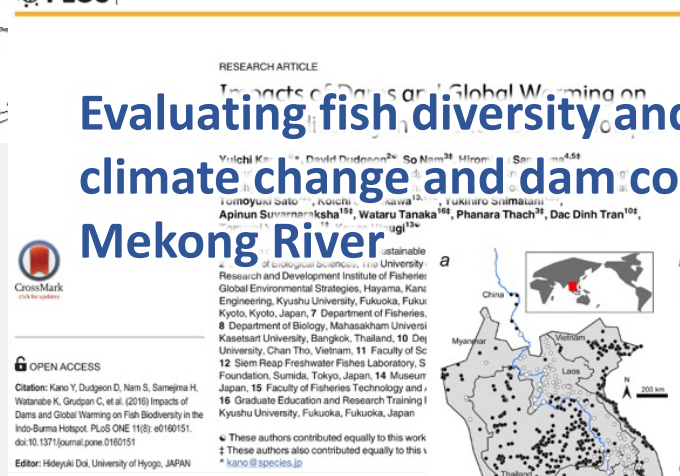
**Plant diversity assessment:
154 plots at 56 locations of 10 countries**



T. Yamakita (JAMSTEC, Japan)

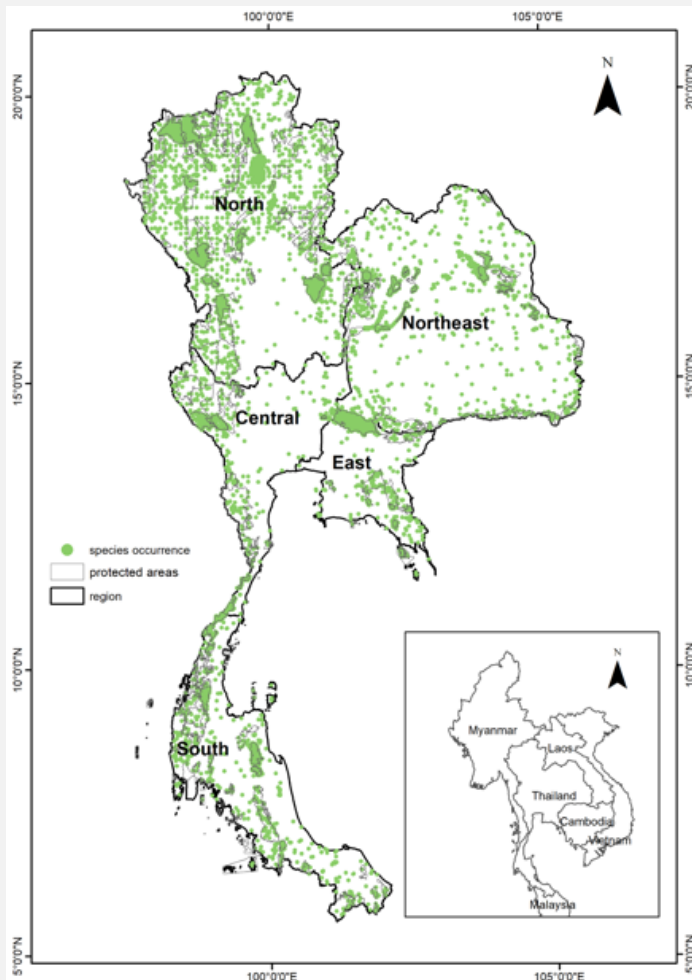


Y. Kano (Kyusyu University, Japan)



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

Biodiversity monitoring



<http://geospecies.dyndns.org/GeoSpecies/examples/tree/>

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)

Hiroyuki Muraoka | APBON

Climate change impact on species distribution and ecosystem changes

diversity MDPI

Article
Climate Change Impacts on Species Composition and Floristic Regions in Thailand

Yongyut Trisurat^{1,*}, Nantida Sutumwong^{1,2}, Patrick R. Roehrdanz² and Auschada Chitechote³

¹ Faculty of Forestry, Kasetsart University, Bangkok 10900, Thailand; fomis@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: froyyt@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.

Application and use

Thailand's CBD Kunming-Montreal GBF 30 x 30

diversity MDPI

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, Mengla 666303, China; nirunrut@xtbg.ac.cn (N.P.); ach_conservation2@hotmail.com (A.C.H.)
² University of Chinese Academy of Sciences, Beijing 100049, China
³ Faculty of Forestry, Kasetsart University, Bangkok 10900, Thailand; froyyt@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.

Biodiversity Informatics

Engaging research communities for data mobilization

Organized Biodiversity Data Mobilization

- **KBA e-Learning & Biodiversity Data Mobilization Workshops**
21-24 August 2023, Philippines
- **Workshop on Establishment of National Clearing-House
Mechanism Using Bioland Tool**
9-12 October 2023, Thailand

Workshops and Trainings

- **Training of Trainers: Multisector Framework for
Mainstreaming Biodiversity Workshop**
25-26 July
- **Philippine Biodiversity Strategy and Action Plan Expert's
Consultation Meeting**
27 July Philippines
- **Completion of the Internship Program**
August 2023 Philippines



Monitoring, capacity building and data sharing in the Hindu Kush Himalaya

Monitoring and assessment

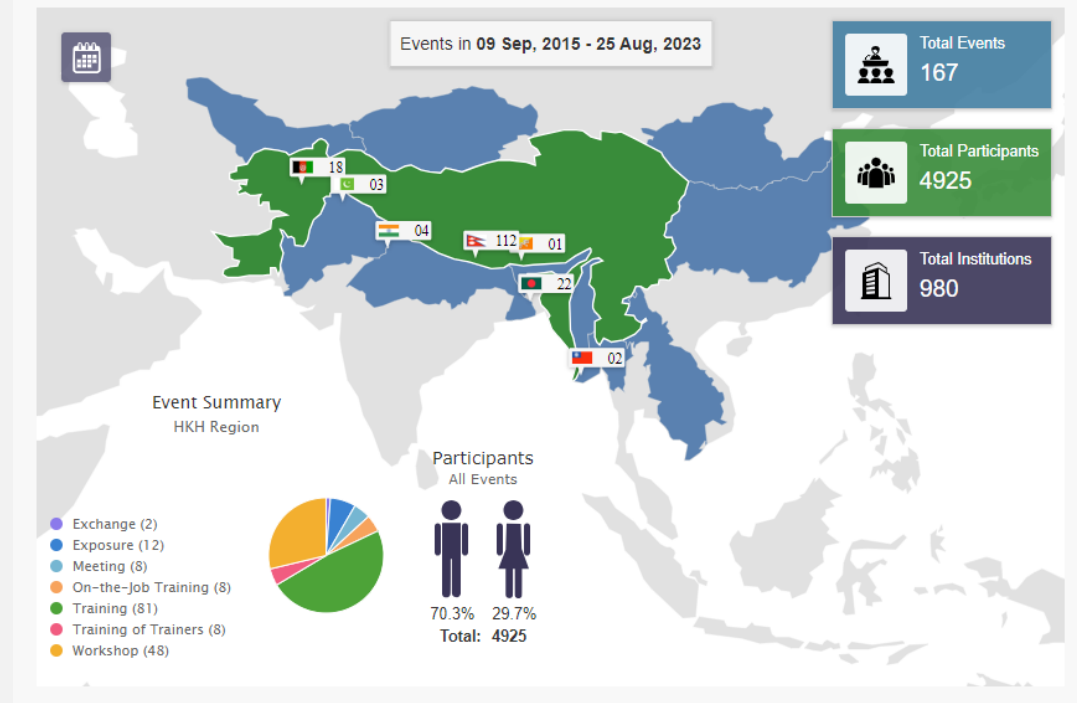
- Regular climate and discharge monitoring at higher altitude with sites in Langtang and Manang valleys
- Vegetation monitoring including tree coring in Langtang valley of Nepal
- Permafrost monitoring started in far-western Nepal
- Springs inventory and biodiversity assessment
- [Regional Database System](#)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



Capacity building

Thematic areas:

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



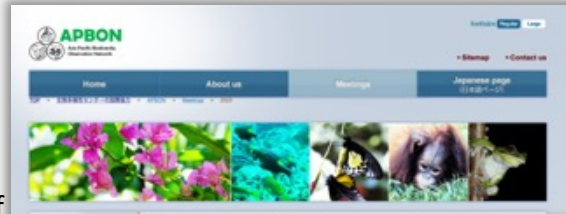
Data and Knowledge sharing – Database and Publications



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

APBON knowledge sharing

(Presentation files of workshops / webinars)



ASEAN Biodiversity Dashboard

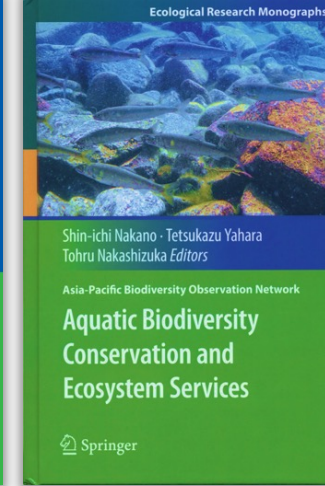
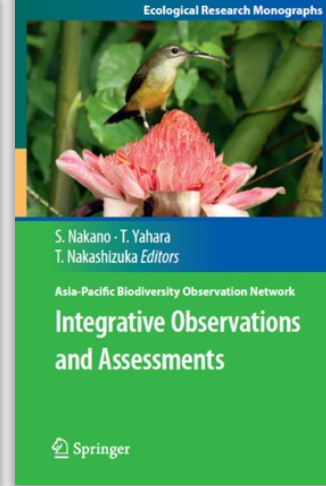
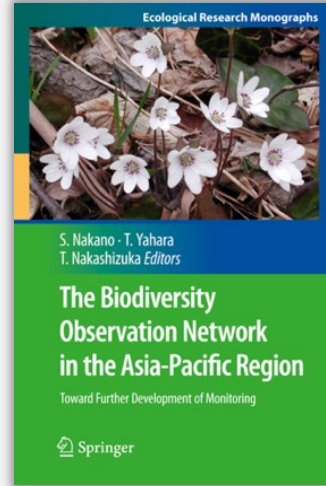
Biodiversity databases

(Biodiversity Center of Japan, MoE)

[ffish.asia/floraZia](https://sketchfab.com/ffishAsia-and-floraZia)

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

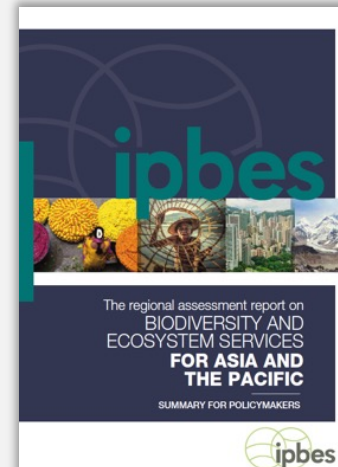
“APBON Books” (Springer, 2012, 2014, 2016)



CBD report



IPBES Regional Assessment Report (2018)



Hiroyuki Muraoka | APBON

Data paper + Database



APBON Highlights



Workshop summary



Data and Knowledge sharing

– Seminars



2023

8 September 2023	18th APBON seminar
21 July 2023	17th APBON seminar
12 April 2023	16th APBON Web seminar
1-2 February 2023	14th APBON Workshop 15th APBON seminar

2022

22 November 2022	14th APBON Web seminar
28-30 September 2022	15th AOGEO Symposium
13 September 2022	13th APBON Web seminar Special meeting for the 15 th AOGEO Symposium
8 July 2022	12th APBON Web seminar Dr. Charlie D. Heatubun (Provincial Government of West Papua) Dr. Nirunrut Pomoim (Department of National Parks, Wildlife and Plant conservation)
4 March 2022	11th APBON Web seminar (Special) Understanding the role and potential of Other Effective Area-based Conservation Measures (OECMs) in the Asia Pacific Region Dr. Sunita Chaudhary (ICIMOD) Dr. Madhu Rao (IUCN World Commission on Protected Areas) Dr. Ruchi Pant (Biodiversity, Climate Change UNDP India) Dr. Taku Kadoya (Biodiversity Division, NIES, Japan) Dr. Nakul Chettri (Transboundary Landscapes, ICIMOD) Ms. Cristina Lazaro (UNEP-WCMC)

2021

22 November 2021	10th APBON Web seminar Dr. Tetsukazu Yahara (Kyushu University) Dr. Ai Nagahama (Kyushu University)
10-12 November 2021	14th Asia-Oceania Group on Earth Observations Symposium

All presentation files and discussion notes are shared/opened on APBON website

19 October 2021	13th APBON Workshop Scoping collaborative work plan of APBON in the next ca. 4 years (~2025), which is the first half of APBON's strategic plan toward 2030.
30 September 2021	9th APBON Web seminar Dr. Alice Hughes (Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences) Dr. Angela Quiros (Akkeshi Marine Station, Field Science Center for Northern Biosphere, Hokkaido University)
8 July 2021	8th APBON Web seminar Dr. Po Teen Lim (University of Malaya) Dr. Chaodong Zhu (Chinese Academy of Sciences)
27 May 2021	7th APBON Web seminar Dr. Yuichi Kano (Kyushu University) Dr. Asanee Kawtrakul (Kasetsart University)
25 February 2021	6th APBON Web seminar Dr. Eun-Shik Kim (Kookmin University)
22 January 2021	12th APBON Workshop
	5th APBON Web seminar Dr. Bunthang Touch (Inland Fisheries Research and Development Institute) Dr. Chheang Dany (Forestry Administration, Cambodia)

2020

10 December 2020	4th APBON Web seminar Mr. Yao Tze Leong (Forest Research Institute Malaysia) Dr. Takashi Hosono (Japan Agency for Marine-Earth Science and Technology)
22 October 2020	3rd APBON Web seminar Dr. Po Teen Lim (University of Malaya) Dr. Laetitia Navarro (GEO BON)
27 August 2020	2nd APBON Web seminar Dr. Alice Hughes (Xishuangbanna Tropical Botanical Garden) Dr. Yuichi Kano (Kyushu University)
6–10 July 2020	GEO BON Open Science Conference & All Hands Meeting
29 June 2020	Kick-off Meeting 1st APBON Web seminar Dr. Yongyut Trisurat (Kasetsart University) Dr. Sheila Vergara (ASEAN Centre for Biodiversity)

APBON assessment of data and observation needs

Respondent	data type	data description	region	taxa	no. surveys	start year	end year	agency	data availability
ACB	ASEAN Species occurrences and species checklist	Biodiversity data that includes Aquatic both Fish and Non-Fish species, Terrestrial, Bacteria and Fungi	ASEAN Region	All taxa	-	-	-	ASEAN Member States	Scientific journals, online web services (e.g. API), ASEAN Clearing House Mechanism and ASEAN Biodiversity Dashboard
ACB	Species in ASEAN protected areas and ASEAN heritage sites	Data overlays for Aquatic and terrestrial species	ASEAN Region	All taxa	-	-	-	ASEAN Member States	Online platforms
Eric Crandall, Assistant Research Professor, Pennsylvania State University	Genetic Information	>40,000 mtDNA sequences from >200 Indo-Pacific species	Indo-Pacific	Mostly	-	1994	2020	NA	https://geome-db.org/workbench/project-
Japan (Nagai)	Text (so-called "historical dark data")	Species name, phenology, locations, human used of living things	World	Plants, animals, fishes	enormousnes	Since about 2010	Current	Social media platform (e.g., Twitter/X; Instagram; Flickr; Mapiillary; YouTube; Spotify podcasts)	"Open access data": Now, we can mine invaluable archives on local and national diet available on line; digital collection) "analog" (i.e., non-digitalized) big data.
Japan (Nagai)	Test, video, pictures, sounds	Species name, phenology, locations, human used of living things	World	Plants, animals, fishes	enormousnes	Since about 2004 (in the case of Google)	Current	Google; Yandex	"Open access data": We can freely analyze the statistic tools on "Google Trends" and "Yandex statistics".
Japan (Takeuchi)	e.g.: plant community	Plant indiv. Size, species, location	Japan	Tree/plants	191<	1980	2021	JaLTER, NIES ect.	Data paper(Yoshikawa et al. under review)
Japan (Nakaoka)	Species occurrence and abundance data	Species list and abundance of marine plants and animals	Japan	Invertebrates, algae and seagrass	15	2008	ongoing	BiodiversityCenter of Japan, Ministry of the Environment Japan (BIODIC-MoEJ)	Available from BIODIC homepage https://www.biodic.go.jp/moEJ/index.html

Malaysia

Malaysia (Runi)	Herbarium specimen	Information as printed at the specimen label	Sarawak	Plants	On-going	Specimens were collected since early 1880s	On going	Research & Development Division, Forest Department Sarawak,	Herbarium data in BRAHMS. Limited sharing. Only available upon request through collaborations project or research partners and approved by the Director of Forests.
Malaysi (Yao)	Tree demography	50-ha long-term tree demography datasets. Individuals are tagged, measured, mapped, identified to species, and re-census every five years	Peninsular Malaysia, Negeri Sembilan, Pasoh	c. 830 species of trees with dbh > 1 cm	7 censuses, 8 th is ongoing	1985	2015 and continuing	Forest Research Institute Malaysia (FRIM) and ForestGEO, Smithsonian Institute	In RData files, application to use the data can be made through Pasoh Research Committee.
Nepal, ICOMOD (Sunita)	Species abundance (Tiger)	Abundance	Nepal	Mammal	130 grid cells	2021	2022	Government of Nepal	Electronic report available online (public)
Nepal, ICOMOD (Sunita)	Species abundance (Tiger, Rhino, Ungulates)	Abundance	Nepal	Mammal	2	2021	2022	Government of Nepal	Electronic report available online (public)
Nepal, ICOMOD (Sunita)	Ecosystem biodiversity	Community-level Forest tree occurrence from	Thailand	trees	2	2011	present	Department of National Parks	In electronic format upon receiving approval from the Dept.
Thailand (Yongyut)	Large mammals	17 medium- and large mammal occurrence	Thailand	wildlife	1	2004	2006	Department of National Parks, Wildlife and Plant Conservation	In electronic format upon receiving approval from the Dept.
Thailand (Yongyut)	Wildlife and human threats	Sightings and wildlife tracks and human disturbance are gathered from smart patrol very month in all protected areas	Thailand	wildlife	12	2010	present	Department of National Parks, Wildlife and Plant Conservation	In electronic format and hard copy upon receiving approval from the Dept.
Thailand (Yongyut)	Forest cover	Forest and non-forest cover monitoring from satellite images	Thailand	Forest cover	Very 2-3 years	1989	present	Department of National Parks, Wildlife and Plant Conservation	shapefile upon receiving approval from the Dept.
Thailand (Yongyut)	Mangrove forest	Remaining mangrove forest	Thailand	Forest cover	Very 2-3 years	2012	present	Department of Marine and Coastal Resources	shapefile upon receiving approval from the Dept.
Thailand (Yongyut)	Protected areas	Protected area boundaries (national parks, wildlife sanctuaries, non-hunting areas)	Thailand	Protected area coverage	Yearly update	1962	present	Department of National Parks, Wildlife and Plant Conservation	shapefile upon receiving approval from the Dept.

Nepal

Thailand

Identifying data and knowledge gaps, designing observations, aligning with EBVs, encouraging development of national BONs

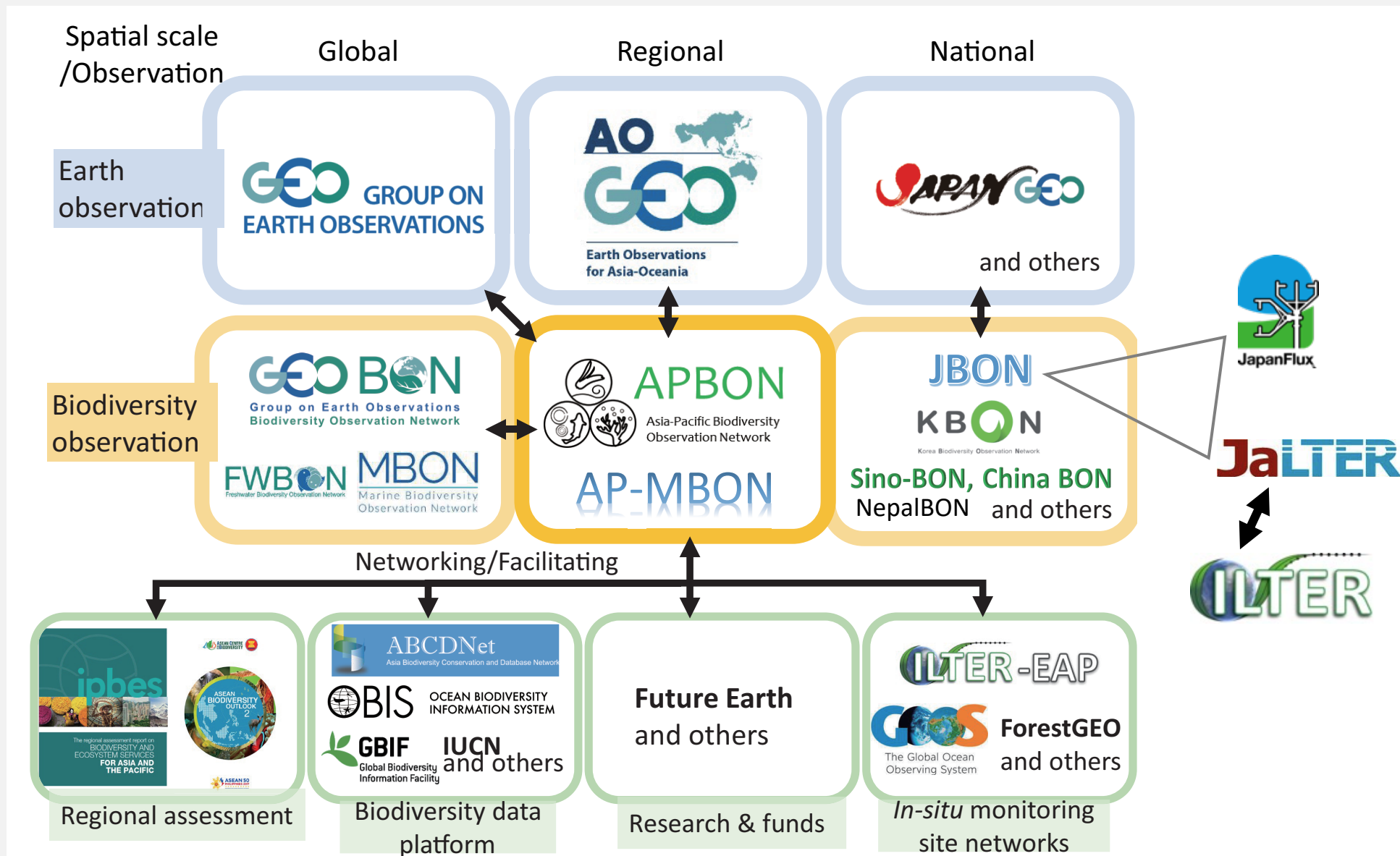
ASEAN

Japan

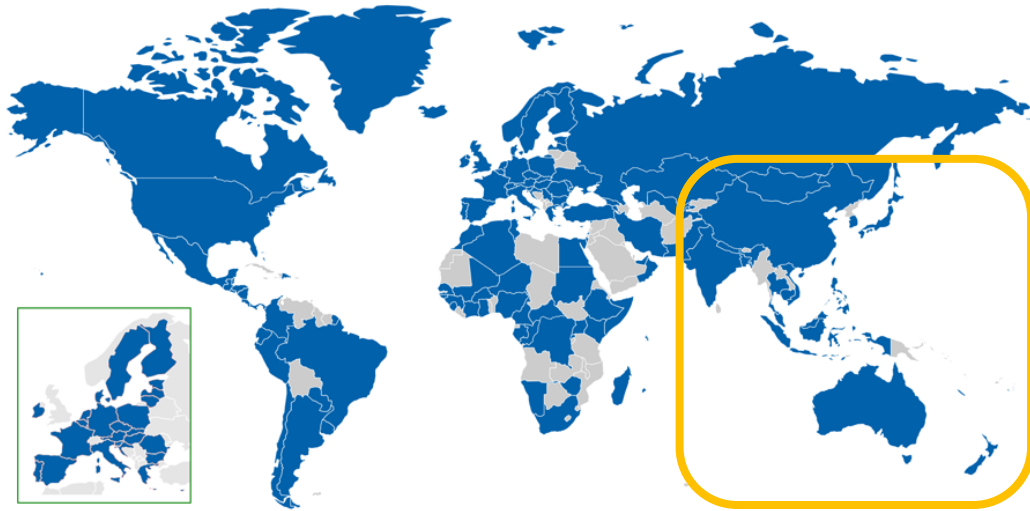
Development of national, regional and global networks

Network(s) of,

- experts,
- institutions,
- public organizations,
- private sectors,
- people, and
- opportunity



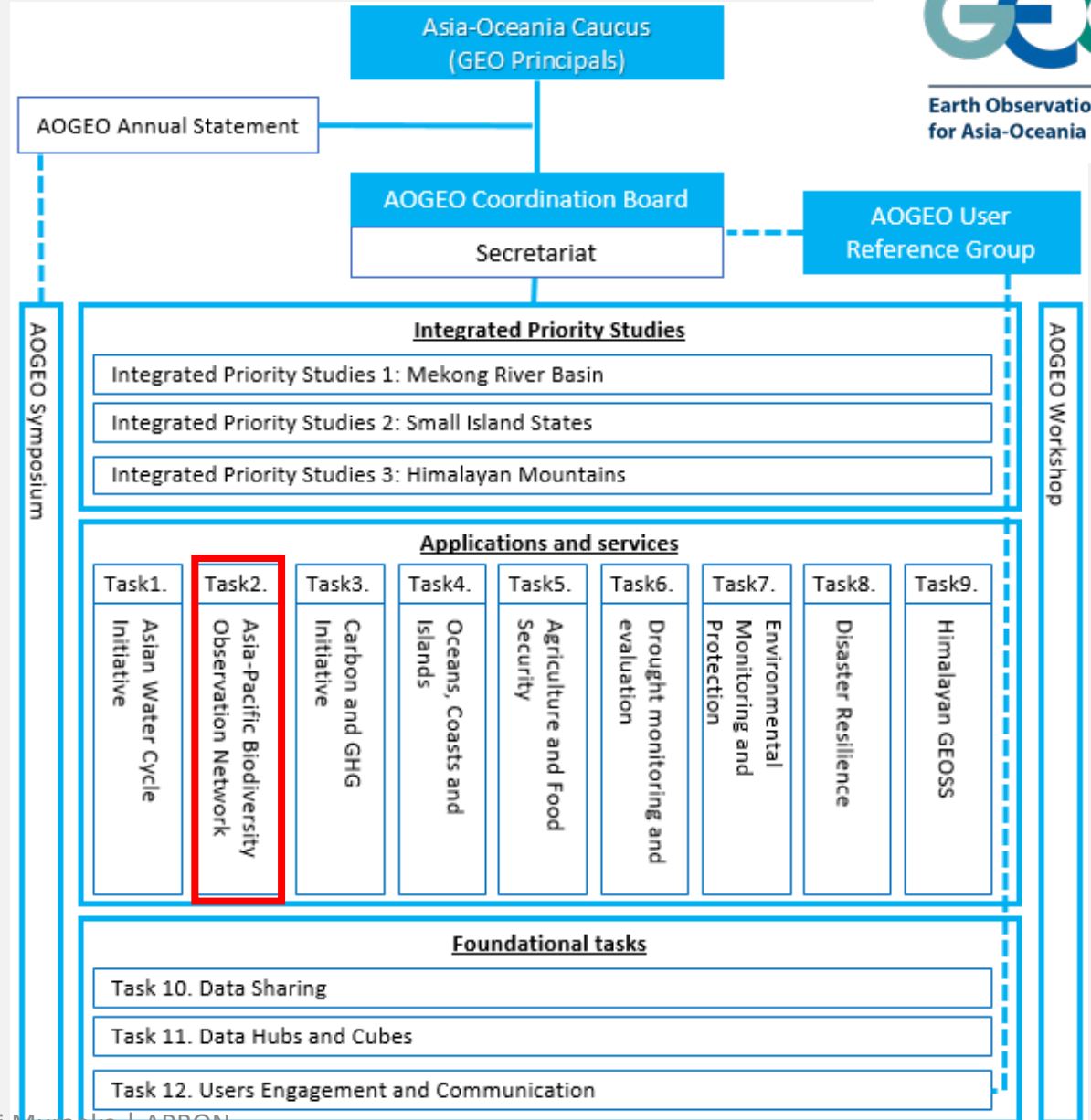
Cooperation with Asia-Oceania Group on Earth Observations



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 withing the Asia-Oceania region.



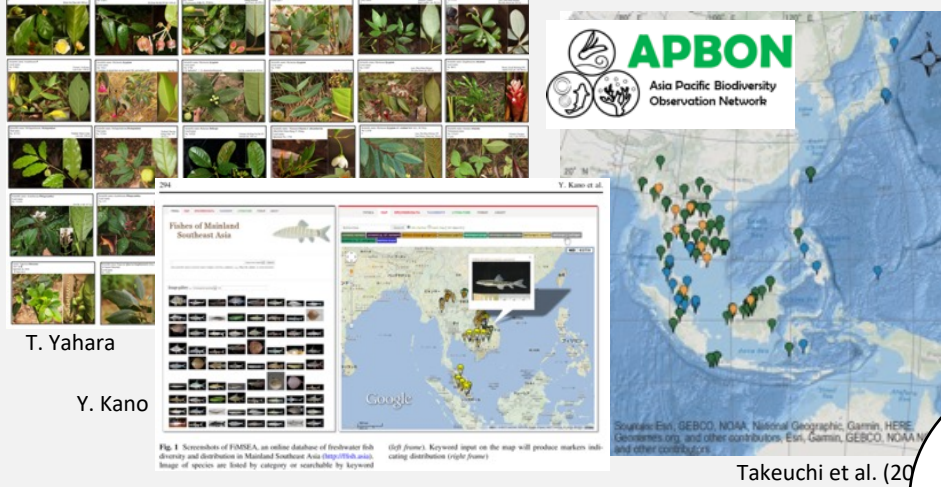
History of APBON along development of AOGEO and GEO community

Year	AOGEO/GEOSS-AP Symposia	GEO BON	AP BON Meetings	National BONs	CBD COPs	IPBES
2009	3rd GEOSS AP (Kyoto, February)		1st AP BON (July, Japan) 2nd AP BON (December, Japan)	Japan BON (May)		
2010	4th GEOSS AP (a session, Bali, March)	GEO BON Meeting (February, USA)	3rd AP BON (CBD COP10 Preconference, March, Japan)		COP10 (Japan, Side-event)	
2011			4th AP BON (December, Japan)			
2012	5th GEOSS AP (Tokyo, April)	GEO BON Meeting (December, USA)	WCC of IUCN (September, Korea)	Korea BON, Nepal BON, Bangladesh BON	COP11 (India, Side-event)	
2013	6th GEOSS AP (Ahmedabad, February)		5th AP BON (November, ACB, Philippines)	Philippines BON		Plenary-1
2014	7th GEOSS AP (Tokyo, May)	IC and AB (June, Germany)	6th AP BON (October, NIBR Korea)		COP12 (Korea, Side-event)	Plenary-2
2015	8th GEOSS AP (Beijing, September)	IC and AB (June, Germany)		Sino BON Indonesia BON		Plenary-3
2016	2016-2025 A New GEO Strategy Plan Initiated	All-Hands Meeting (July, Germany)	7th AP BON (ACB, Thailand) 8th AP BON (Taipei, Taiwan)	WCC of IUCN (September, USA)	COP13 (Mexico)	Plenary-4
2017	9th GEOSS AP (Tokyo, January), 10th GEOSS AP (Hanoi, September)	IC and AB (July, Germany)				Plenary-5
2018	11th GEOSS AP (October, Kyoto)	All-Hands Meeting (July, Beijing)	9th AP BON (Bangkok, February), 10th AP BON (Kuching, July)		COP14 (Egypt)	Plenary-6
2019	12th AOGEO (November, Canberra)		11 th AP BON (KL, Malaysia)			Plenary-7
2020		Open Science Conference & All Hands Meeting			COP15 (China) (postponed)	Plenary-8 (tbc)
2021	13 th AOGEO (March, Online) 4 th AOGEO WS (July) 14 th AOGEO (Nov. Online)		12 th APBON (Online) 13 th APBON (Online)		COP15 (China)	Plenary-8 (June)
2022	15 th AOGEO (Sep, Tokyo + Online)				COP15 (Canada)	
2023		GEO BON Conference (Oct., Montreal)	14 th APBON (Fukuoka + Online)	Hiroyuki Muraoka APBON		



Networking in-situ research networks

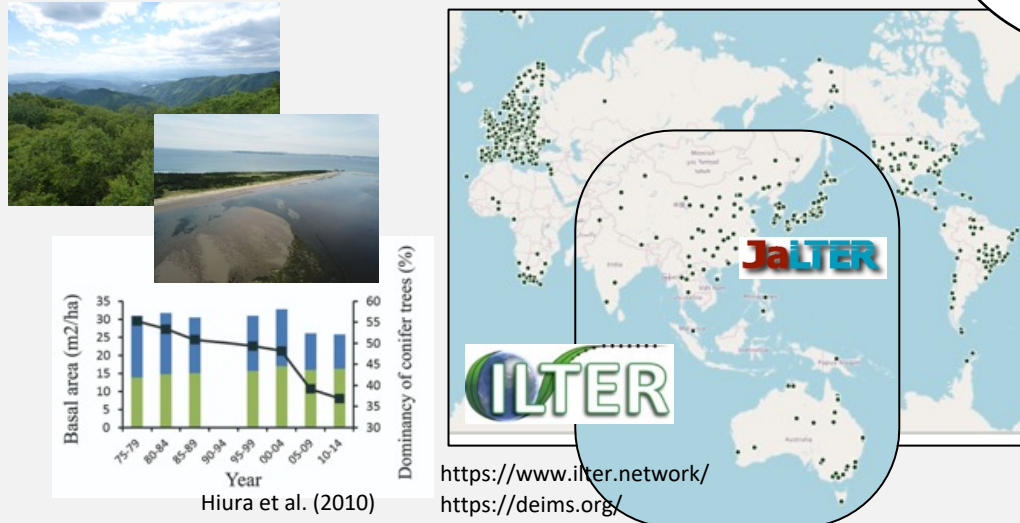
Biodiversity observation network



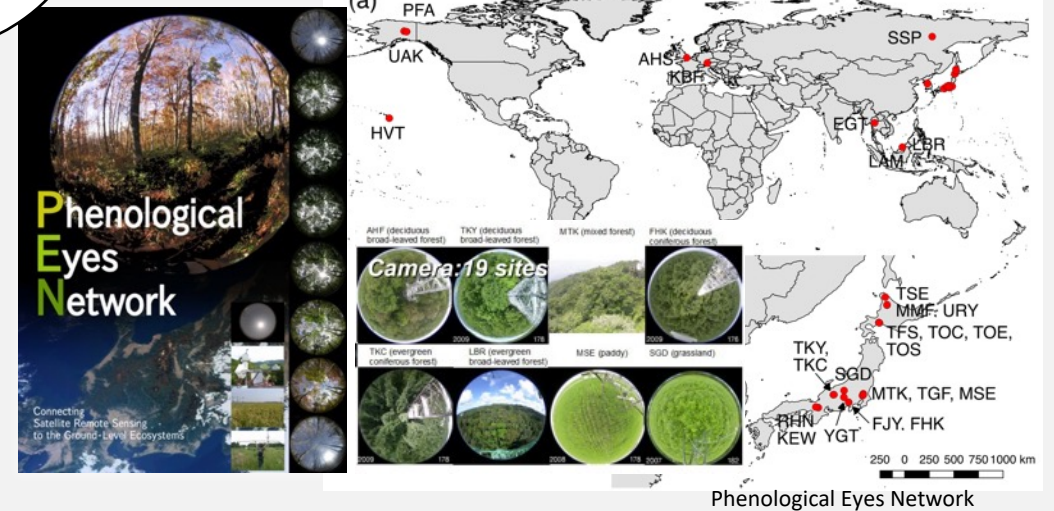
CO₂ flux and GHG research network



Long-term Ecological Research network



In-situ remote sensing observation network



Growing needs to develop value chain --

Observations, Data processing, and Users to address challenges



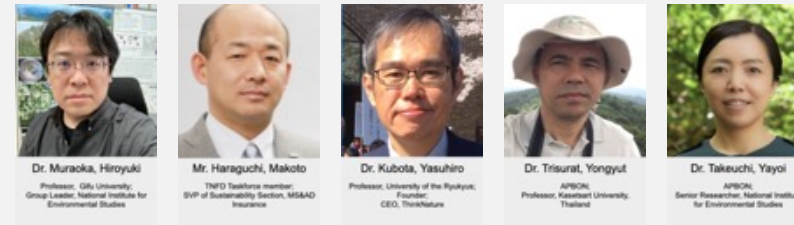
Special Session -- Biodiversity for Addressing Climate Change & Disaster Risk Reduction



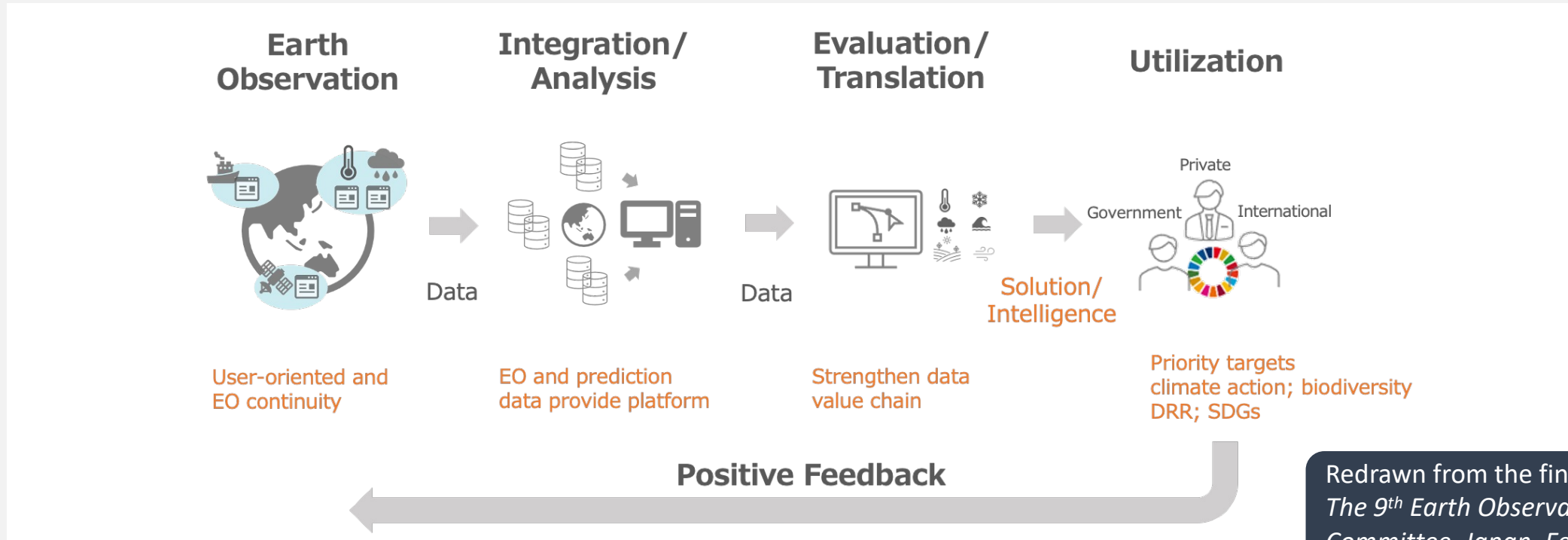
Special Session -- Biodiversity and Sustainable Society: How EO contributes to integrating nature into economic activities



Dr. MURAOKA Hiroyuki (Professor, River Basin Research Center, Gifu University, Group Leader, Biodiversity Collaborative Research Group, National Institute for Environmental Studies)
 Dr. Ruzi Sylvester Pungga (APBON Co-chair, Forest Department Sarawak, Malaysia)
 Dr. YAMANO Hiroya (Director, Biodiversity Division, National Institute for Environmental Studies)
 Dr. Paul Anderson (Secretariat of the Pacific Regional Environment Programme (SPREP))
 Dr. Alice C. Hughes (Xihuangshan Tropical Botanical Garden, Chinese Academy of Sciences (CAS), APBON)
 Dr. Petteri Vihervaara (Finnish Environment Institute (SYKE), GEO BON)



Dr. Muraoka, Hiroyuki (Professor, Gifu University, Group Leader, National Institute for Environmental Studies)
 Mr. Haraguchi, Makoto (TNFD Taskforce member, SVP of Sustainability Section, MSAAD Insurance)
 Dr. Kubota, Yasuhiro (Professor, University of the Ryukyus, Founder, CEO, Tenkabure)
 Dr. Trisurat, Yongyut (APBON Professor, Kasartart University, Thailand)
 Dr. Takeuchi, Yayoi (APBON Senior Researcher, National Institute for Environmental Studies)



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

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

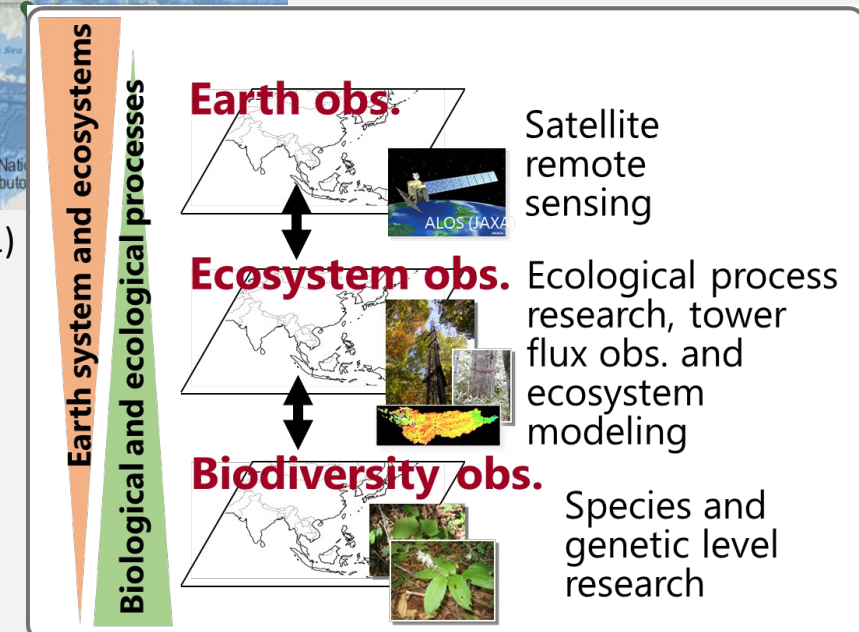
Data / Knowledge generation and sharing through national and regional cooperative capacity development, citizen science

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 on-line seminars

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

Presentation files from seminars and workshops are available

Contact: Hiroyuki Muraoka

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



APBON website

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



AP-MBON website

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

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