

INCEPTION WORKSHOP FOR THE FORMULATION OF AN INTEGRATED COASTAL ZONE MANAGEMENT (ICZM) PLAN TO PROTECT THE MANGROVES THROUGH ECOSYSTEM BASED ADAPTATION SOLUTIONS

SKY BOARD CONFERENCE ROOM

TUESDAY 28TH FEBRUARY 2023

SOLOMON
ISLANDS

VANUATU



-
- These coastal areas provide many ecosystem services that support human wellbeing. For example, seagrass beds and mangrove habitats are important habitats for spawning, nursery, and feeding grounds for a few species. In many tropical small islands, coral reefs constitute the primary coastal protection structures, and provide sand for the formation of atolls, islets, and beaches. Reefs also provide a critically important source of food and employment for coastal communities throughout the Pacific. Many ecosystems also provide other functions, including protection against extreme events such as storms and hurricanes, storage and cycling of nutrients, sustaining biodiversity, and maintaining water balance





UN 
environment
programme



CTCN

UN Climate Technology Centre & Network
UNFCCC Technology Mechanism

OBJECTIVE OF THE TECHNICAL ASSISTANCE

The objective of this TA will be to formulate an ICZM policy framework that will:

- Promote integrated planning and coordination of coastal developments across the various sectors.
- Promote sustainable economic development to secure livelihoods of coastal communities.
- Conserve the coastal and marine resources and environment for sustainable development.
- Manage environmental risks associated with changes in shoreline and climate.
- Develop capacity in research and education and enhance stakeholder awareness and participation in sustainable resource management.
- Establish effective institutional and legal frameworks for implementation of the ICZM policy.
- Protect the mangroves through Ecosystem based adaptation solutions.

OUTCOMES

- Promote integrated planning and coordination of the protection of mangroves across the various sectors through ecosystem-based adaptation solutions
- Promote sustainable economic development of mangroves through EbA to secure livelihoods of coastal communities.
- Conserve the mangroves and environment for sustainable development.
- Manage environmental risks associated with changes in mangroves and climate.
- Develop capacity in research and education and enhance stakeholder awareness and participation in sustainable mangroves management.
- Establish effective institutional and legal frameworks for implementation of the ICZM plan.

THANK YOU



- Discussion on the Roles and Responsibilities of the National & Local Stakeholders (led by PM, remarks by all participants)
- Strategy to overcome the institutional challenges and barriers
- Ways to link with the global and regional support programs
- Demarcation of mangrove ecosystems in cartography



GUIDING QUESTIONS

- Discussion on the Roles and Responsibilities of the National & Local Stakeholders (led by PM, remarks by all participants)
- Strategy to overcome the institutional challenges and barriers
- Ways to link with the global and regional support programs
- Demarcation of mangrove ecosystems in cartography



Inception meeting for UN/CTCNETA on ICZMP for the Mangroves in SI with EbAdptSol

28 Feb. 2023, Honiara

UNEP/CTCN
NDE SI
KEI

Mr. Hoyoung Jo
Mr. Thaddeus A. Siota
Mr. sang In Kang

Structure of the Inception Meeting (half day, 09:00~, 28 Feb. 2023)

- ▶ Opening (led by NDE SI)
 - opening remarks from MECDM SI, UNEP/CTCN
 - introduction of the Participants, and a group photo
 - introduction of the inception meeting (by KEI)
- ▶ Session 1. Orientation (led by KEI)
 - p1. background & perspectives of the Project by NDE_SI (CTCN-TA/ICZMP for Mngrv. in SI)
 - p2. adjustment of initial Implementation Plan after a bibliographic analysis (by KEI)
 - d1. discussion on the roles and responsibilities of the stakeholders
- ▶ Session 2. Stock-take (led by NDE SI)
 - p3s. stock-take of the existing/relevant works to be integrated or linked (by stakeholders)
 - p4. technological solutions proposed for the project tasks & components, by KEI
 - d2. discussion on the establishment of project coordination platform, by participants
- ▶ Closing (led by NDE SI & KEI)
 - wrap up with key take-ways and next work schedule

Structure of the Inception Meeting (half day, 09:00~, 28 Feb. 2023, revised)

▶ Opening (led by NDE SI)

- opening remarks from MECDM SI, UNEP/CTCN
- introduction of the Participants, and a group photo
- introduction of the inception meeting (by KEI)

▶ Presentations

- p1. background & perspectives of the CTCN ICZMP for SI (by NDE_SI)
- p2. task analysis and adjustment of initial implementation after a bibliographic analysis (by KEI)
- p3. stock-take of the existing policy framework on inland ICZM (by MFR)
- p4. stock-take of national(inland and marine) perspectives of ICZM (by ECD MECDM)
- p5. introduction of technological solutions for ICZM & climate change (by KEI)

▶ Discussions in 2 Groups

▶ Closing

- wrap up with key take-ways and next work schedule

KEI presentation in the Opening

introduction of the inception meeting, by KEI

Korea Environment Institute, one of the CTCN TA providing members

Official Website



www.kei.re.kr/eng/

The mobile version is also available on our official website.

Location



KEI Korea Environment Institute
 8F-11F, Bldg B,
 370 Sicheong-daero,
 Sejong, 30147
 Tel. +82-44-415-7777
 E-mail. webmaster@kei.re.kr

KEI

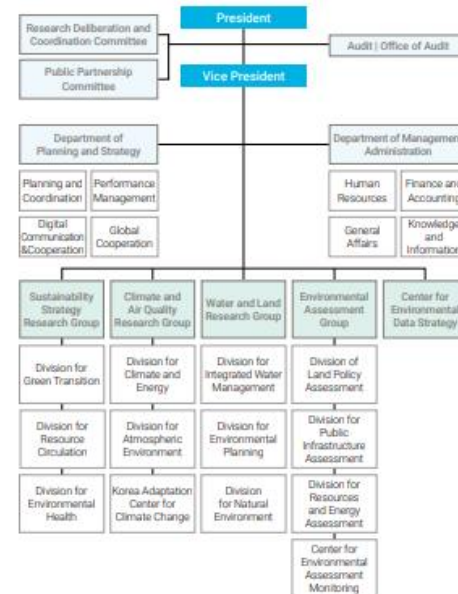
Contributing to
Global Sustainable Development

KEI Korea Environment Institute

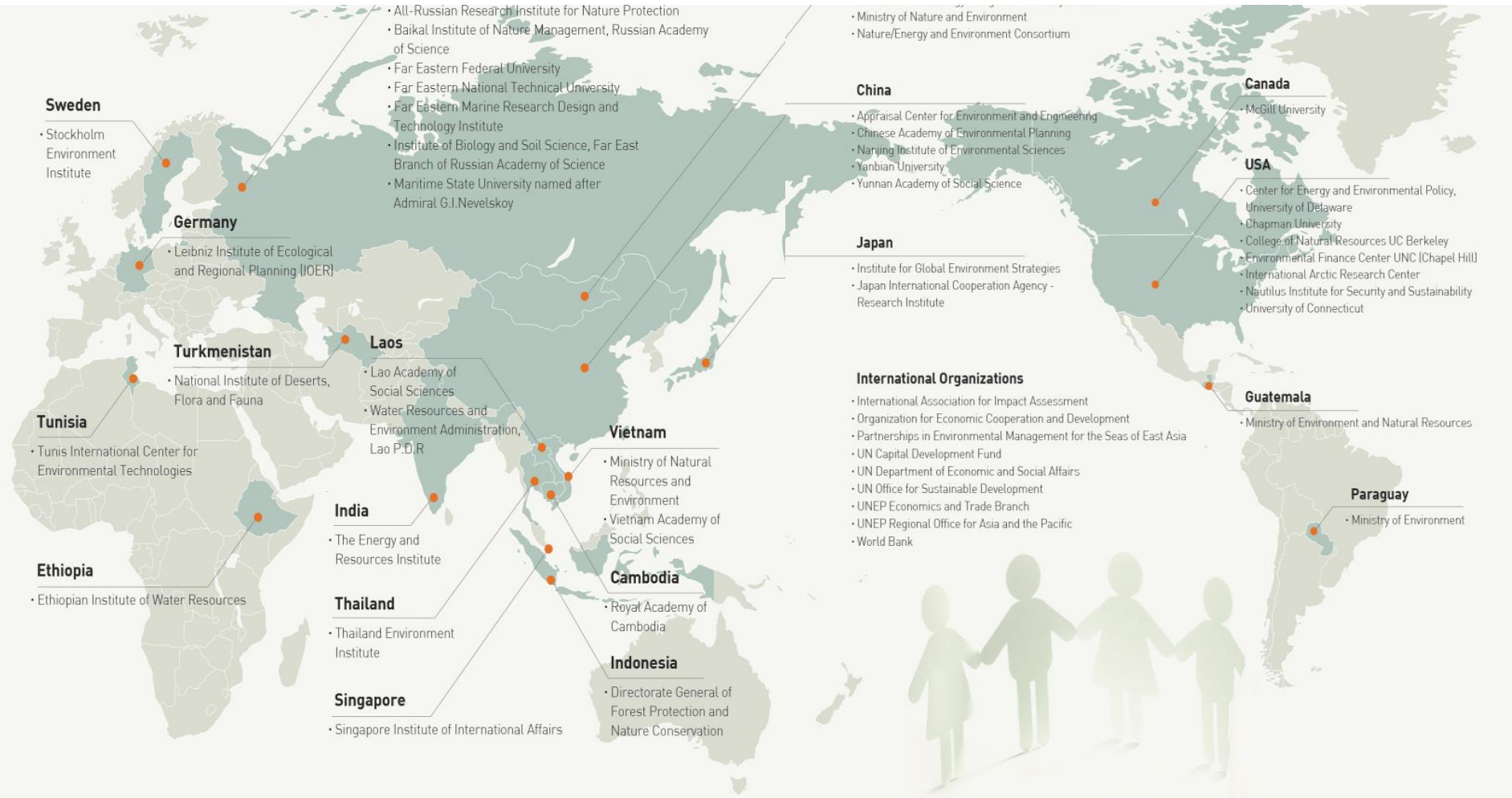
Vision

Vision	Global Environmental Think Tank KEI 2030
Core Values	Sustainability Professionalism Innovation
Management Goals	<ul style="list-style-type: none"> I Enhance problem-solving research to make a leap towards a sustainable society II Strengthen the leadership in environmental assessment and secure acceptability III Maximize research outcomes and establish the basis for becoming a global leader IV Promote innovation in management

Organization Chart



engaging globally on sustainable development, climate change, env. protection...



Structure of the Inception Meeting (half day, 09:00~, 28 Feb. 2023)

▶ Opening (led by NDE SI)

- opening remarks from MECDM SI, UNEP/CTCN
- introduction of the Participants, and a group photo
- introduction of the inception meeting (by KEI)

▶ Session 1. Orientation (led by KEI)

- p1. background & perspectives of the Project by NDE_SI (CTCN-TA/ICZMP for Mngrv. in SI)
- p2. adjustment of initial Implementation Plan after a bibliographic analysis (by KEI)
- d1. discussion on the roles and responsibilities of the stakeholders

▶ Session 2. Stock-take (led by NDE SI)

- p3s. stock-take of the existing/relevant works to be integrated or linked (by stakeholders)
- p4. technological solutions proposed for the project tasks & components, by KEI
- d2. discussion on the establishment of project coordination platform, by participants

▶ Closing (led by NDE SI & KEI)

- wrap up with key take-ways and next work schedule

Back drop of the project in CTCN

'CTCN-TA-ICZMP in Solomon Islands 2022-2023'

The establishment of an Integrated Coastal Zone Management (ICZM) Plan to protect the mangroves through Ecosystem based adaptation solutions



This technical assistance advances the following Sustainable Development Goals:



Context

In the Pacific, both air and sea surface temperatures are projected to increase in coming years due to the effects of climate change. In addition, over the past decade several environmental issues have worsened, including increased unsustainable harvesting of coastal fishery resources, degradation of coastal and marine ecosystems such as mangroves, coral reefs, and seagrass beds; increased groundwater pollution; and a loss of biodiversity due to invasive species, degradation of land resources through unsustainable forestry and poor agricultural practices, and excessive conversion of forest land to alternative uses, climate variability, and sea level rise. The economy of the Solomon Islands is based on agriculture, forestry, and fisheries, which together account for around 40 per cent of GDP and provide employment for the majority of the population.

Coastal areas encompass diverse ecosystems supporting a variety of living and non-living resources, and also provide many ecosystem services that support the population, such as seagrass beds and mangrove habitats, with coral reefs comprising the primary coastal protection structures while also providing an important source of food and employment for coastal communities throughout the Pacific. The Government of Solomon Islands considers it urgent to develop the capacity of the country to assess risks and vulnerabilities associated with climate change, to reduce risks, and adapt to the predicted impacts. For the Solomon Islands, the objective of developing an Integrated Coastal Zone Management (ICZM) framework is to protect the mangroves through ecosystem-based adaptation solutions.

Key words
_ ICZMP...

- integrated
- zone
- mangrove
- Eb-S
- adaptation
- ...

- sectoral/thematic
- GIS based
- terrestrial & under water + human ecosystems

Basic Criteria

Facts	
Date of submission: Thursday, July 21, 2022	Governance and planning
Countries: Solomon Islands	Approach: Disaster risk reduction, Ecosystems and biodiversity
Geographical scope: National	Final type of assistance: Recommendations for law, policy and regulations
Objective: Adaptation	Phase: Design
Sectors: Coastal zones	Request NDE: Ministry of Environment, Climate Change, Disaster Management and Meteorology
Cross-sectoral enabler:	

Project documents



Scale down to scale up with tangible outcomes on the ground..., considering the current national progress on ICZMP LPR for the mangroves

The establishment of an Integrated Coastal Zone Management (ICZM) Plan to protect the mangroves through Ecosystem based adaptation solutions

Request

Progress before inception meeting

- ▶ **NDE SI** requested in 2022 a Technical Assistance to the UNFCCC/CTCN
- ▶ **UNEP**, hosting body of CTCN, developed and countersigned a Response Plan
- ▶ **KEI** and UNEP concluded a Cooperation Agreement to provide technical assistance to the implement the response plan together with MECDM SI
- ▶ UNEP/CTCN, KEI, MECDM held **on-line Kick-off meeting** in 13 Oct. 2022 (a steering group established with UNEP/CTCN, KEI, NDE SI)
- ▶ KEI and NDE SI had **informal consultations** at 6~17 Nov. 2022

Bibliographic analysis for the project implementation

- ▶ **Bibliographic Analysis** was implemented by KEI during Dec.2022-Jan.2023
 - A national ICZMP benchmark case (for Belize 1992, 2003, 2016)
 - KOICA-MFR SI Project for Action Plan for Forest Management (2013-2015)
 - FAO-GEF Integrated Forest Management Project in SI (2020-2021)
 - Submissions: NAPA, 2nd NC 2017, SOE 2019, REDD+ in SI (2014-2020)
 - JICA-SI Renewable Energy Road Map (2021)
 - WB-SI Integrated Economic development and Community Resilient project (2022)
 - GIS Mapping Mangrove Extent, etc
 - Sustainable use of the Mangroves (carbon storage, medicinal use, etc.)
 - Adjustment of initial implementation plan/schedule
- ▶ UNEP/CTCN, KEI, MECDM **decided to hold an inception meeting**

Objective of the inception meeting

- ▶ Establishment of a coordination mechanism/platform with participating stakeholders in current/relevant activities
 - Roles and responsibilities of the participating stakeholders
 - Exploring possible integration with relevant activities: with contribution from & to, for synergy

- ▶ Information sharing on the progress & perspectives on the stage of project implementation
 - Adjustment of initial implementation plan with bibliographic review and task analysis
 - Stock-taking on the current/relevant works by stakeholders
 - Introduction of technological solutions for ICZMP under climate change and development pressure

- ▶ Way forward together...



KEI presentation in the Session I

task analysis and adjusted implementation plan

based on the consultation materials for inception meeting with KEI-NDE SI(27, Feb. 2023)

Tasks with initial schedule (in cascade)

output	1: Biblio. analysis of policies and legal instruments on the use and protection of the mangroves in SI	2: TA coordination mechanism established, and Steering Committee formed	3: Overview of the coastal zone and diversity of resources and their socio-economic importance	4: 5-days workshops to define the ICZM mangrove plan	5: Specific policy statements on integrated planning, and coordination	6: Official review of the first drafts conducted and revised ICZM framework finalized	Outcome 7: Implementation of a framework guide
Activity	1.1: Matrix of existing legal and policy instruments 1.2: Identification of barriers, lack of instruments, opportunities and challenges	2.1: mapping relevant stakeholders, establishing Steering Committee 2.2: conducting inception meeting	3.1: mapping (with satellite images) the mangroves and identify issues and challenges to address 3.2: prioritization of major mangroves issues and challenges through a participative process	Defining 4.1: ICZM mangrove plan's vision and mission 4.2: Policy objectives 4.3: Guiding principles 4.4: Formulate a draft of framework policy based on the inputs 4.5: Share draft of framework policy for comments and review	<u>Policy statements</u> on 5.1: Intg. Planning and Coordination 5.2: Sustainable Eco. Development 5.3: Conservation of Mangroves, Coastal, Marine Environment 5.4: Environmental Risk Management 5.5: CB, Education, Awareness, Research	6.1: First ICZM Framework Policy drafts for official feedback 6.2: Official review workshop 6.3: Comments integrated second ICZM FP draft. 6.4: Official feedback to second drafts 6.5: incorporating comments for final ICZM plan mangroves	7.1: Development of implementation guide of the ICZMP-M 7.2 EbA Mangroves Management technologies suggestion. 7.3 Policy makers & agencies' workshop 7.4: Prepare and conduct an awareness campaign on ICZM for mangroves in SI.
deliverable	1.1 Matrix of existing legal and policy instruments linked to CZM 1.2 Report identifying barriers, challenges, lack of policies on the existing institutional instruments	2.1: Stakeholder & Steering Committee mapping report 2.2: Inception meeting report and Report on the visit on sites of the (at least) 3 mangroves sites.	3.1A. Satellites maps of the mangroves of Salomon Island. 3.1B. 3 Climate scenarios modeled 3.2: Draft report on the main issues and challenges to be addressed by the ICZM policy framework 3.3 Report of the workshop	4.1: Defined vision and mission and report of the workshop 4.2 Report on the selected policy objectives 4.3: Report with the defined guiding principles 4.4: Draft ICZM Framework Policy 4.5: Revised Draft ICZM FP based on SC comments	5.1 to 5.6: Full ICZM policy framework drafted	6.1 Compiled feedback, comments on first draft 6.2 Official workshop review report 6.3 Second draft of ICZM FP 6.4 Compiled feedback and comments on second draft of ICZM FP 6.5 Formulate final Framework policy	7.1 : Implementation guide under a short term perspective (1 year) of ICZM FP 7.2 : Technologies fact sheets (6-8) for Integrated Coastal Zone Management 7.3 : Report on the workshop 7.4 : Report on the awareness campaign held in the Coastal Zones of Salomon Island
month	2	2	4	5~9	9	9-14	13-15

Task analysis

1. Objectives of the TA

The main objective is to support the major stakeholders on the 3 selected mangrove sites in the Solomon Islands (national & local authorities, communities and groups, so-called protectors and users) in protecting and using the mangroves in a sustainable way through Ecosystem-based adaptation solutions within the Integrated Coastal Zone Management (ICZM) Planning.

The resulted strategy and framework policy (so-called masterplan) from the project will serve as a map for a further detailed and actionable programme or project:

- for the government to develop the regulatory framework, infrastructures, and policy measures as well as to approach international and global climate resilience resources
- for other stakeholders to enhance their own capacity to research, manage and use the coastal mangrove ecosystems for the livelihood of the communities in concern
- for all stakeholders to establish a platform on which the relevant stakeholders understand their roles and how they could collaborate during the future development stage for the future generation.

2. Mandatory deliverables

Deliverables	Scheduled Delivery date
1. Implementation plan	31 October 2022
2. Monitoring and evaluation plan	31 October 2022
3. Impact description document (initial and final version)	31 October 2022/ 31 December 2023
4. Closure and data collection report	31 December 2023

Task analysis

1. Tasks & outputs

**adjustment of initial implementation schedule was discussed between KEI and NDE SI at COP 27 Sharm-El Sheikh, and to be confirmed at inception meeting.*

Task 2: TA coordination mechanism established, and Steering Committee formed

**Stakeholder mapping and the modality of Bibliographic analysis will be concluded at inception meeting*

Outputs	Delivery date*
2.1 Stakeholder mapping report containing a complete stakeholder list and the composition of the Steering Committee.	<i>15 March 2023</i>
2.2 Inception meeting report and including the selection of the (at least) 3 mangroves sites. (with photos, list of participants, a summary of the presentations made, comments received, a draft of the invitation to the meeting, and an explanation of how participants were invited, how long in advance, if the meeting was in-person or organized online in remote mode, etc.) (noting the site visiting is subject to the arrangement with the local community)	<i>15 March 2023</i>

Task analysis

Task 1: Bibliographic analysis* of relevant policies and legal instruments governing the use and protection of the mangroves on Solomon Islands

**In addition to the preliminary identified list for bibliographic analysis, member of working group(participants of inception meetings) will use their own additional documents of work.*

Outputs	Delivery date
1.1. Matrix of existing legal and policy instruments linked to Coastal Zone Management	30 March 2023
1.2. Report identifying barriers, challenges, and lack of policies on the existing institutional instruments	30 March 2023

Task analysis

1. CTCN Monitoring and Evaluation System, 2020, CTCN
2. Guidelines for integrated coastal zone management, ESD Studies and Monographs Series No.9, World Bank, 1996(multi-page.pdf)
3. Coastal zoning, Water Adaptation Technology Brief, CTCN(coastal_zoning.pdf)
4. NAPA Priority Project No.4 Coastal Protection in Solomon Islands: NAPA Project Profile (Solomon_islands.pdf)
5. The Status of Mangrove Ecosystems: Trends in the Utilisation and Management of Mangrove Resources, D. Macintosh and S. Zisman(10700-mangrove-ecosystems.doc)
6. Ecosystem-Based Disaster Risk Reduction, Implementing Nature Based Solutions for Resilience, UNDRR, 2020
7. Integrating global environment commitments in investment and development decision-making: Solomon Islands, UNDP, (5-19-14_Solomon_Island_CD5045_UNDP_Project_REDD5yearDoc)
8. CLIMATE RISK COUNTRY PROFILE: Solomon Islands, World Bank Group, 2021, (15822-WB_Solomon Islands Country Profile-WEB.pdf)
9. Enhancing urban resilience to climate change impacts and natural disasters: Honiara, UNHSP, 2016, (4135-PPR-1-Resilient-Honiara-Project-2019-rev-Feb-2020-for-web.xls, 4135-AF-full-Project-Propoals-SOLOMON-ISLANDS-MIE-UN-Habitat-4-Sept-2017)
10. Solomon Islands REDD+ Readiness Roadmap 2014-2020, ADB, 2013,
11. Solomon Islands State of Environment Report 2019, UNEP, 2019
12. Integrated Forest Management in Solomon Islands 2017-2023, revised template 2021, FAO
13. REDD+ Training Manual: Geospatial Data Management for REDD+, UNDP, 2017
14. Climate Scenario: Solomon Islands (<https://climateknowledgeportal.worldbank.org/country/solomon-islands/climate-data-historical>)
15. Mangroves in Solomon Islands (www.esa-worldcover.org)

Task analysis

✓ A national benchmark case from Belize (1992-2016)

- 16. Guidelines for developing a CZMP for Belize, (1992)
- 17. The National Integrated Coastal Zone Management Strategy for Belize (2003)
- 18. Belize Integrated Coastal Zone Management Plan (2016)

✓ A sectoral benchmark case on Forestry in SI and others (2015-2015, KOICA-Ministry of Forest and Research case)

- 19. Web site user manual _ Ministry of Forest and Research, (2015)
- 20. Education Program for Reforestation (2015)
- 21. Enhancement of Forest Information and Statistics (2015)
- 22. Strategy for and direction of strengthening forest legal system (2015)
- 22. Integrated Forest management in Solomon Islands (GEF-FAO, 2000-2021)
- 23. Report of TA of the proposed forest reference level for SI in 2019 (UNFCCC)

✓ Available technological options and stock

- 24. Status and Distribution of mangrove forests of the world using earth observation satellite data (2011)
- 25. Mapping mangrove mapping and change (2018)
- 26. Multi-hazard Early Warning System (2020, UNESCAP)
- 27. Climate Assessment modelling system(2022, Gwangju metropolitan city, Korea)
- 28. Traditional medicinal use of the mangrove (scientific articles, 2015~)
- 29. Restauration of the Mangroves (Bangladeshi-KOICA case, 2000~)
- 30. Climate services for Agriculture (2022, OSCAR system, SPREP-APEC Center Korea case)

✓ and other thematic Articles on the Mangroves in the Solomon Islands...

Task analysis

Task 3: Overview* of the coastal zone and diversity of resources and their socio-economic importance

**Based on the bibliographic analysis and selected 3 mangrove sites, satellites imagery map will be developed by working group. Prioritization of major mangroves issues and challenges will be initiated by a steering committee (UNEP/CTCN, NDE SI and KEI), then approved by a Coordination mechanism (Steering Committee and Working Group).*

Outputs	Tentative Schedule
3.1.A: Satellites maps of the mangroves of Solomon Islands.	<i>30 April 2023</i>
3.1.B: 3 Climate scenarios modeled (1.5°C _ conservative, 2°C _ probable, more than 2°C _ alarmist)	<i>30 April 2023</i>
3.1.C: Draft report on the main issues and challenges to be addressed by the ICZM policy framework	<i>30 April 2023</i>
3.2: Report of the 2 days steering committee-led prioritization workshop (to be held around the end of April, list of participants, photos, PWP) and a prioritization approved by the Coordination mechanisms (working group) of these issues and challenges.	<i>15 May 2023</i>

Task analysis

Task 4: 5-days workshops to define the ICZM mangrove plan*

**5-days workshops seems better to be organized at the end of May or early June, considering the availability of the working group member from the ministries. A preparation for sectoral/thematic policy statement work (the main body of ICZM Mangrove planning) could be done during April and May by the working group member. During 5-days workshops will check the overall balance and progress of sectoral policy statement work.*

Outputs	Delivery date
4.1: Defined vision and mission of the policy framework with description (1 or 2 days – open to all <u>extended</u> stakeholders)	31May 2023
4.2: Selected policy objectives with description (2nd -3rd day for TA Steering Committee)	31 May 2023
4.3: Defined guiding principles with description (4th and 5th day for TA Coordination team _ working group).	31 May 2023
4.4: Formulation of a Draft ICZM Framework Policy with report of the workshop held (list of participants, questions, photos, the participatory process used to ensure the participation of all members, results, questions raised, comments addressed, etc.) as well as outputs of Task 5.	30 June 2023
4.5: Revised Draft ICZM Framework Policy based on Steering Committee's comments	31 July 2023

Task analysis

Task 5: Specific policy statements addressing issues on integrated planning and coordination of mangroves, community empowerment and resource use conflicts, environmental conservation, management of environmental risks, awareness creation and education.*

**the development of specific policy statement could be done during May & June following the sectoral works on defining the policy framework of ICZM Mangrove (vision, mission, objectives, guiding principles).*

Outputs	Delivery date
<p>Fully drafted ICZM framework policy including sectoral/thematic policy statement on <u>focusing on the mangroves sites</u></p> <ul style="list-style-type: none">- 5.1 Integrated Planning and Coordination- 5.2 Sustainable Economic Development- 5.3 Conservation of the Mangroves and the Coastal and Marine Environment- 5.4 Environmental Risk Management- 5.5 Capacity Building, Education, Awareness and Research- 5.6 Institutional Arrangements and Legal Frameworks	<p>15 July 2023</p>

Task analysis

Task 6: Official review* of the first drafts conducted and revised ICZM framework finalised

** Circulation of the first draft of ICZM framework policy could be made between 15 July and 31 July, to collect official feedback.*

Outputs	Delivery date
6.1: <u>Compiled feedback and comments on the first draft of ICZM Framework policy, including vision, mission, principles, objectives, and all policy statements</u> _ The first draft of the full ICZM plan on mangroves, including the vision, mission, principles, objectives, and all policy statements, will be circulated to all concerned national ministries, governing authorities, and the stakeholders's working group for official feedback and comments.	<i>31 July 2023</i>
6.2: <u>Official review workshop</u>	<i>30 August 2023</i>
6.3: <u>Second draft</u> of ICZM Framework policy	<i>30 September 2023</i>
6.4: <u>Compiled feedback and comments on the second draft of ICZM Framework policy following the circulation of the second (revised) draft</u>	<i>31 October 2023</i>
6.5: <u>Formulate final Framework policy</u>	<i>30 November 2023</i>

Task analysis

Task 7: Develop implementation guide* of the ICZM plan on mangroves

** Implementation guide seeking for a follow-up project development.*

Outputs	Delivery date
7.1: <u>Implementation guide under a short-term perspective (1 year)</u> of the ICZM framework policy _ by sectoral/thematic policy statement listing the objective, policy statement, strategic actions requested, results expected, Timeline, Institution responsible for its implementation, budget associated (and crediting line if available), and quantitative monitoring indicators.	<i>31 October 2023</i>
7.2: <u>Technologies fact sheets (6-8)</u> for Integrated Coastal Zone Management, based on Based on the results of task 3.	<i>31 October 2023</i>
7.3: <u>Implementation guiding workshop</u> for policy makers and implementing agencies (photos, list of participants, comments and answers received and provided) seeking official endorsement	<i>30 November 2023</i>
7.4: <u>Awareness Campaign</u> with Report held in the Coastal Zones of Solomon Islands)	<i>31 December 2023</i>

Task analysis

Reminder – adjusted schedule considering a participatory process for all stakeholders in the process the original Implementation period

Start date	<i>1 October 2022</i>
End date	<i>31 December 2023</i>

Reference to UNFCCC/CTCN, UNEP, KEI

As the operational arm of the United Nations Framework Convention on Climate Change (UNFCCC)'s Technology Mechanism, the CTCN received from the UNFCCC the mandate **to promote the accelerated transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries** (cf. COP decisions 1/CP.16, 2/CP.17, 14/CP.18, and 25/CP.19). To achieve this, the CTCN provides technology solutions, capacity building and technical advice on policy, legal and regulatory frameworks tailored to the needs of individual countries and based on specific country requests submitted by a National Designated Entity (NDE). The CTCN is therefore a demand-driven mechanism; as its services are offered upon request by developing countries, the volume and specific nature of activities ultimately depend on countries' requirements and needs.

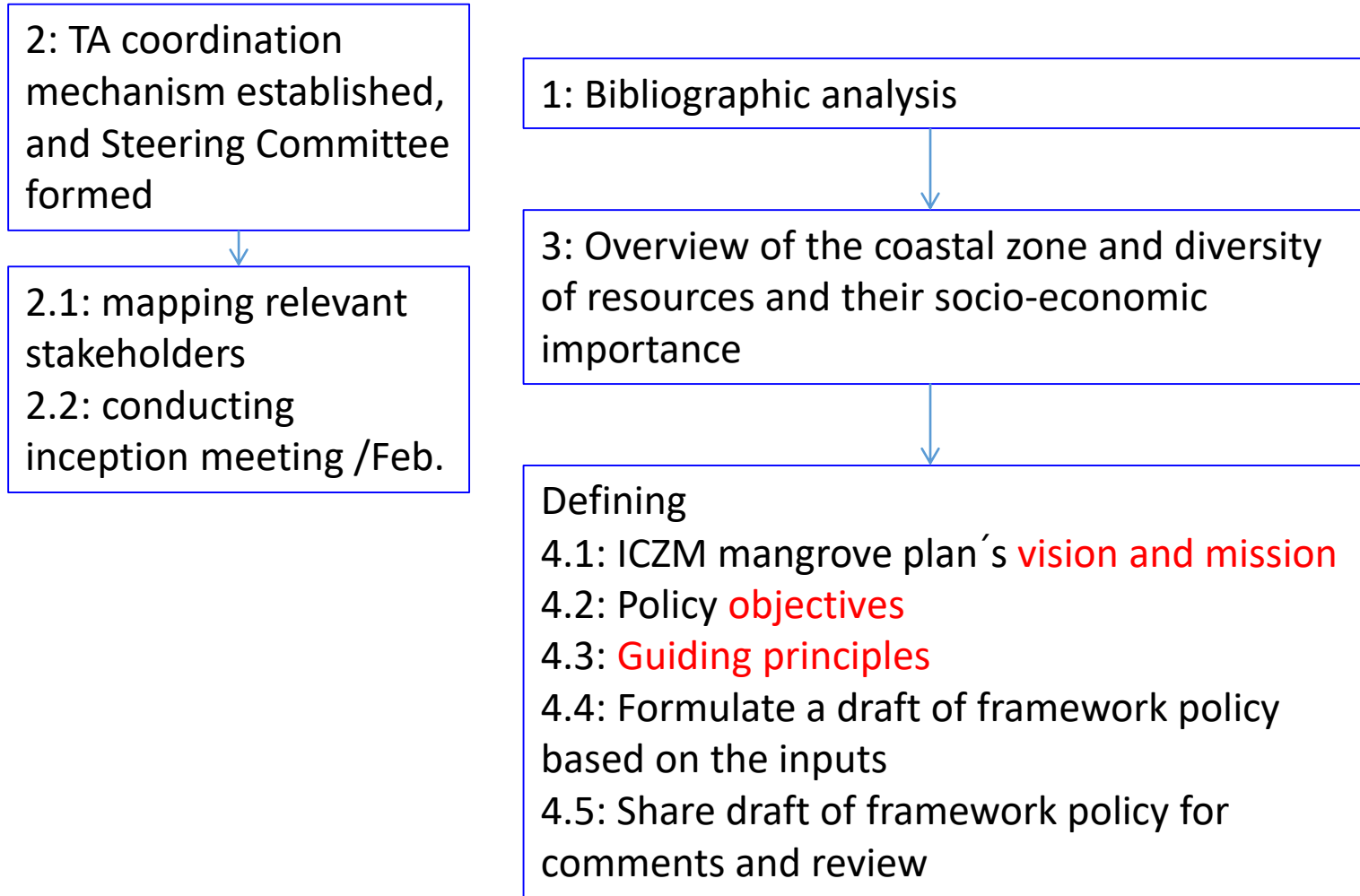
Task analysis

The CTCN is composed of a Climate Technology Centre (CTC) and a Network (cf. COP decision 2/CP.17). The CTCN is hosted by the United Nations Environment Programme (UNEP). The **CTC network, including the Korea Environment Institute (KEI), Republic of Korea**, consists of institutions forming a Technical Resource Pool and is responsible for supporting the CTC Climate Technology Manager in the initial appraisal, refinement, and technical support of requests received through NDEs.

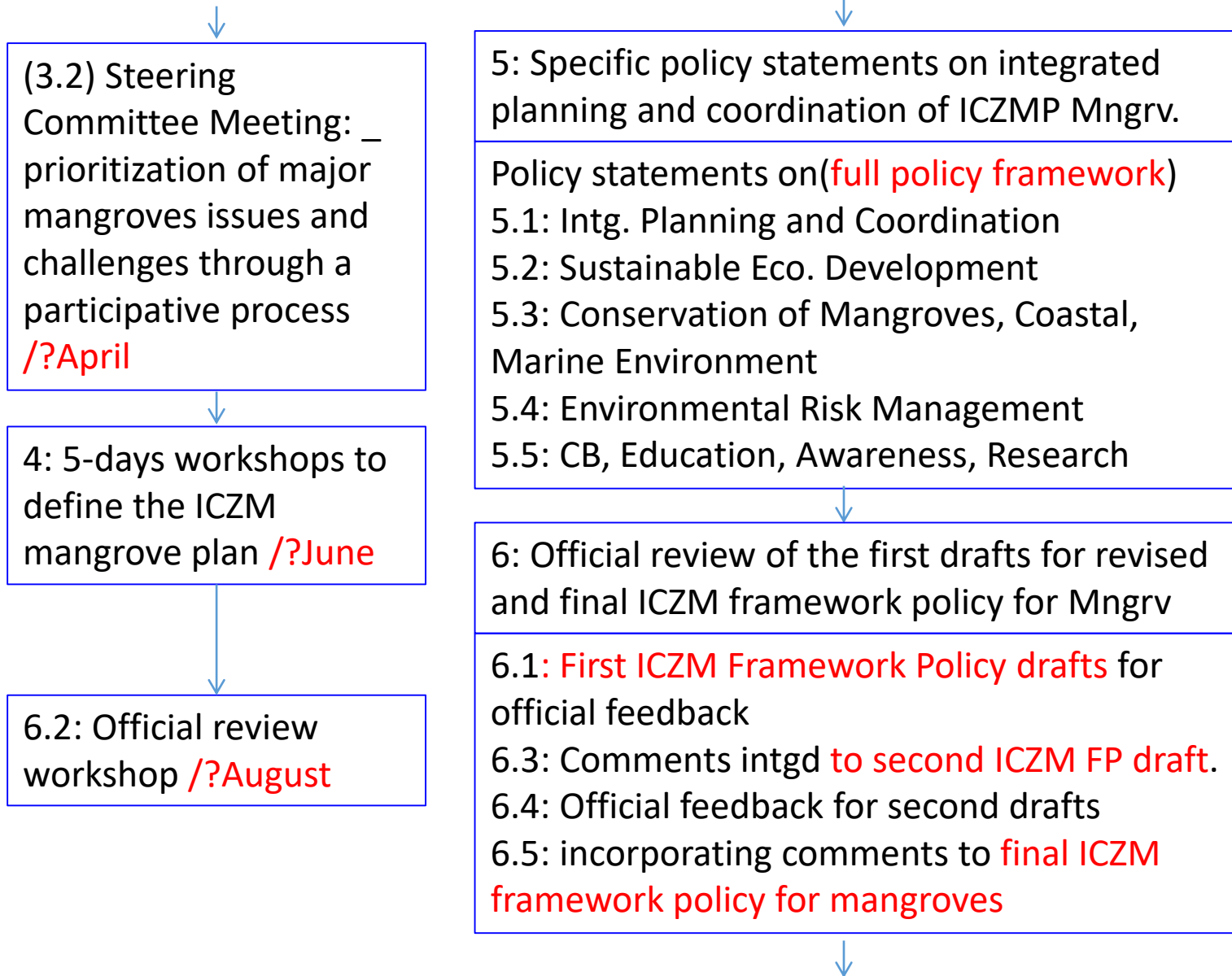
When necessary, **a small expert team from these institutions** is established to support the Climate Technology Manager in responding to a request, prepare a response plan for more in-depth support, and deliver immediate technical assistance assuring a rapid and flexible response and implementation (flexibility and speed that have been one of the main selling points of the UNEP proposal to the UNFCCC). The network partners, including KEI, also provide **support to the CTCN's capacity building, networking, knowledge sharing, and awareness-raising activities**.

As a CTC network partner, KEI is enhancing the CTCN capacities to foster the transfer of climate technologies in developing countries through its strong international presence and specifically in Asia and the Pacific as a leading technical expert in various sectors. KEI has solid expertise in developing energy technologies and practices, advancing related science and engineering, and **providing knowledge and innovations to integrate systems at all scales**.

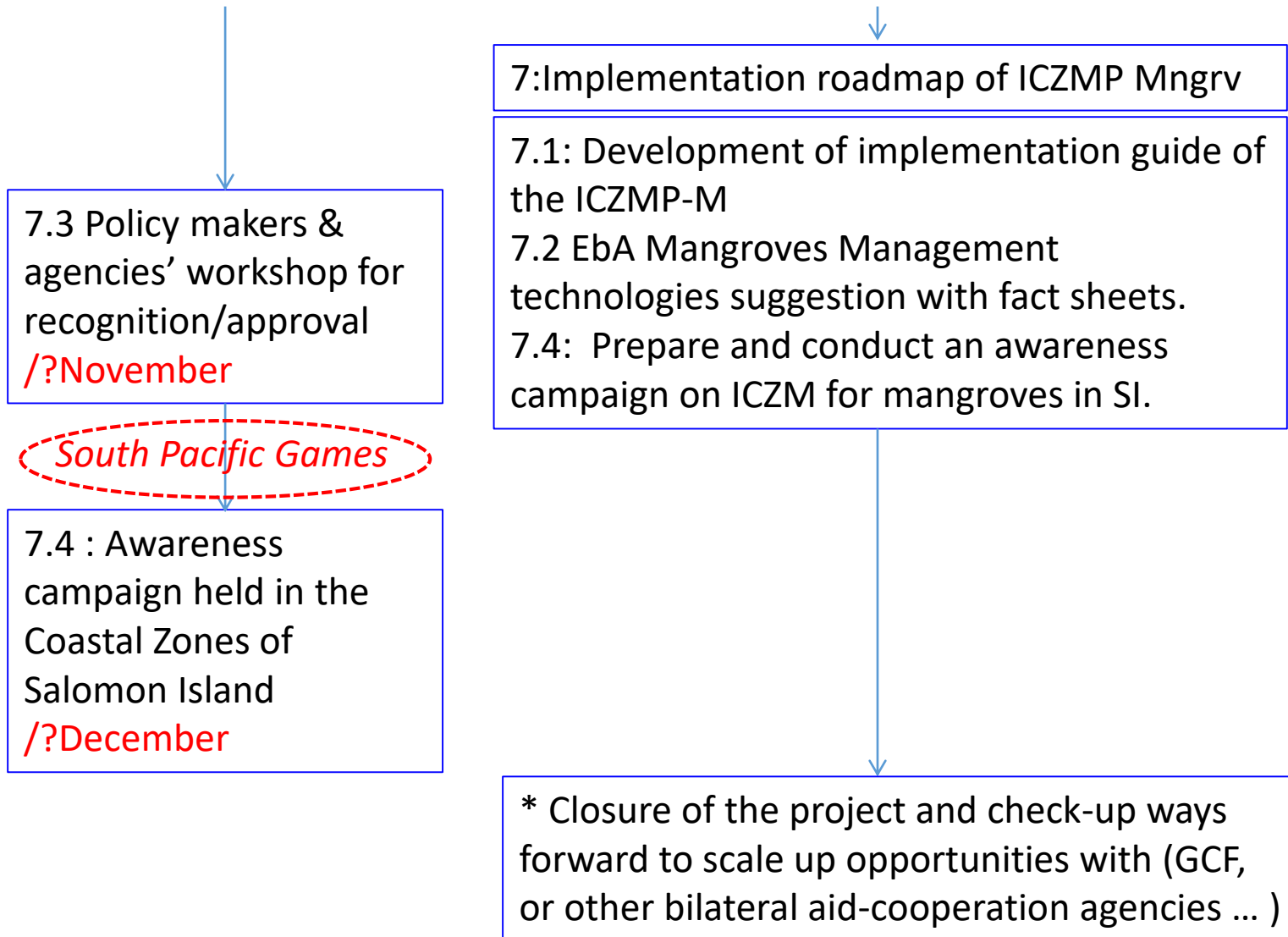
Adjusted structure of the Implementation



Adjusted structure of the Implementation



Adjusted structure of the Implementation

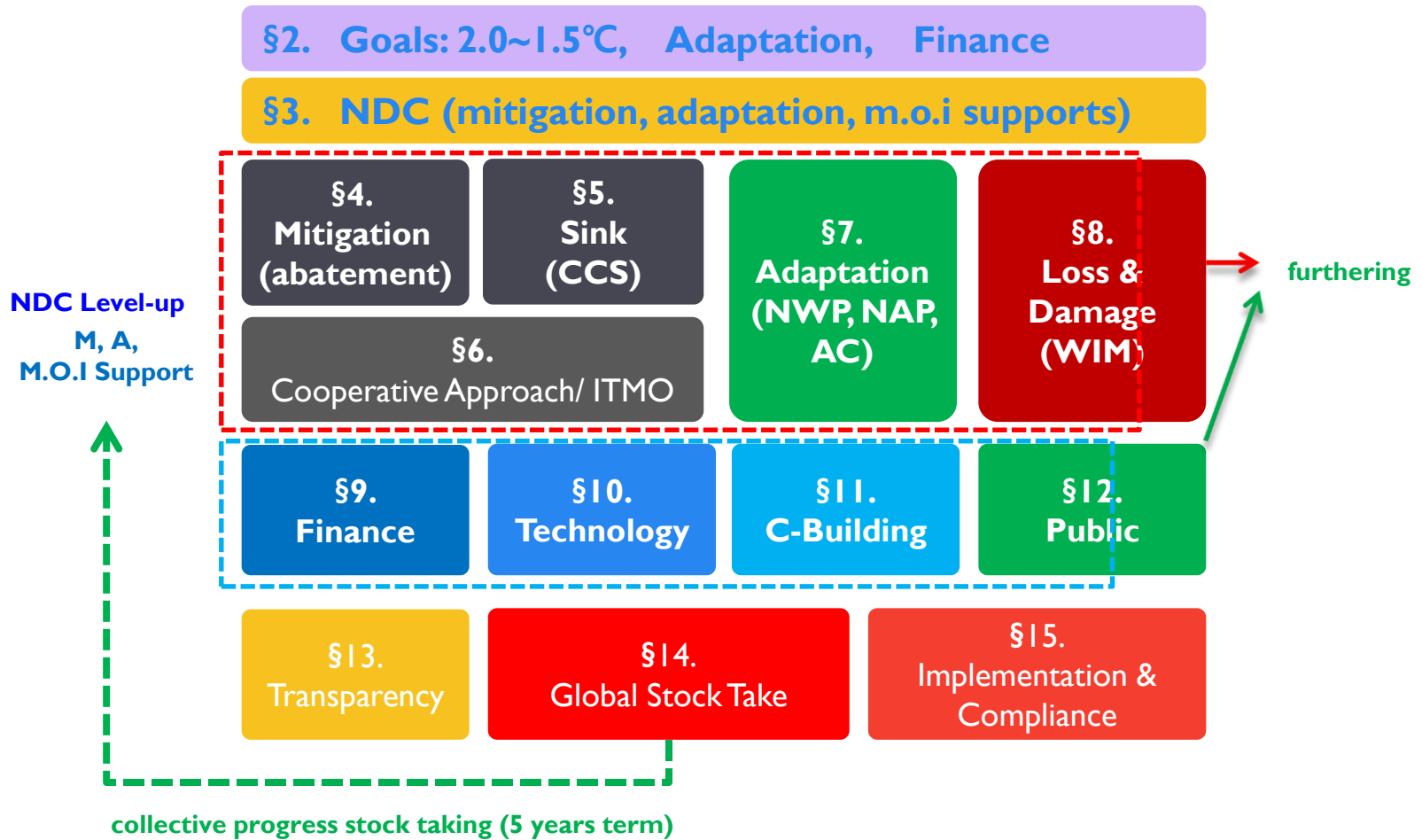


KEI presentation in the Session2

stock of tech. solutions for the project tasks & components

non exhaustive, to be complemented during the project implementation by KEI & NDE SI

Overview on Climate Change Response with Paris Agreement(2015)



Strategy in Glasgow Climate Pact (Draft decision -/CMA.3 2021)

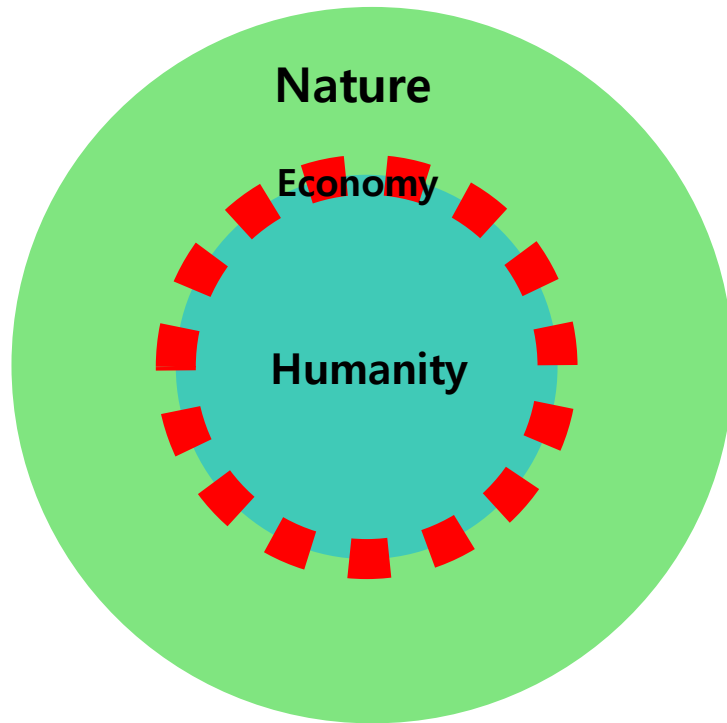
- Organization of work, including for the sessions of the subsidiary bodies -
 - I. **Science and urgency** _ IPCC AR6 by WG1, WG2, WG3
 - II. **Adaptation** _ 2 year Work Programme on Global Goal on Adaptation(2022-2023)
 - III. **Adaptation finance** _ Adaptation Fund, Doubled Collective Pledge
 - IV. **Mitigation** _ Carbon Phase-down, 1.5°C with Net Zero 2050
 - V. **Finance, technology transfer and capacity-building for mitigation and adaptation**
 - VI. **Loss and damage*** _ Operationalization of Santiago Network with Finance
 - VII. **Implementation**
 - VIII. **Collaboration**

*

footnote 9. It is noted that discussions related to the governance of the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts did **not produce an outcome**: this is without prejudice to further consideration of this matter.

footnote 10. Draft decision entitled “Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts” proposed **under agenda item 7 of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its third session.**

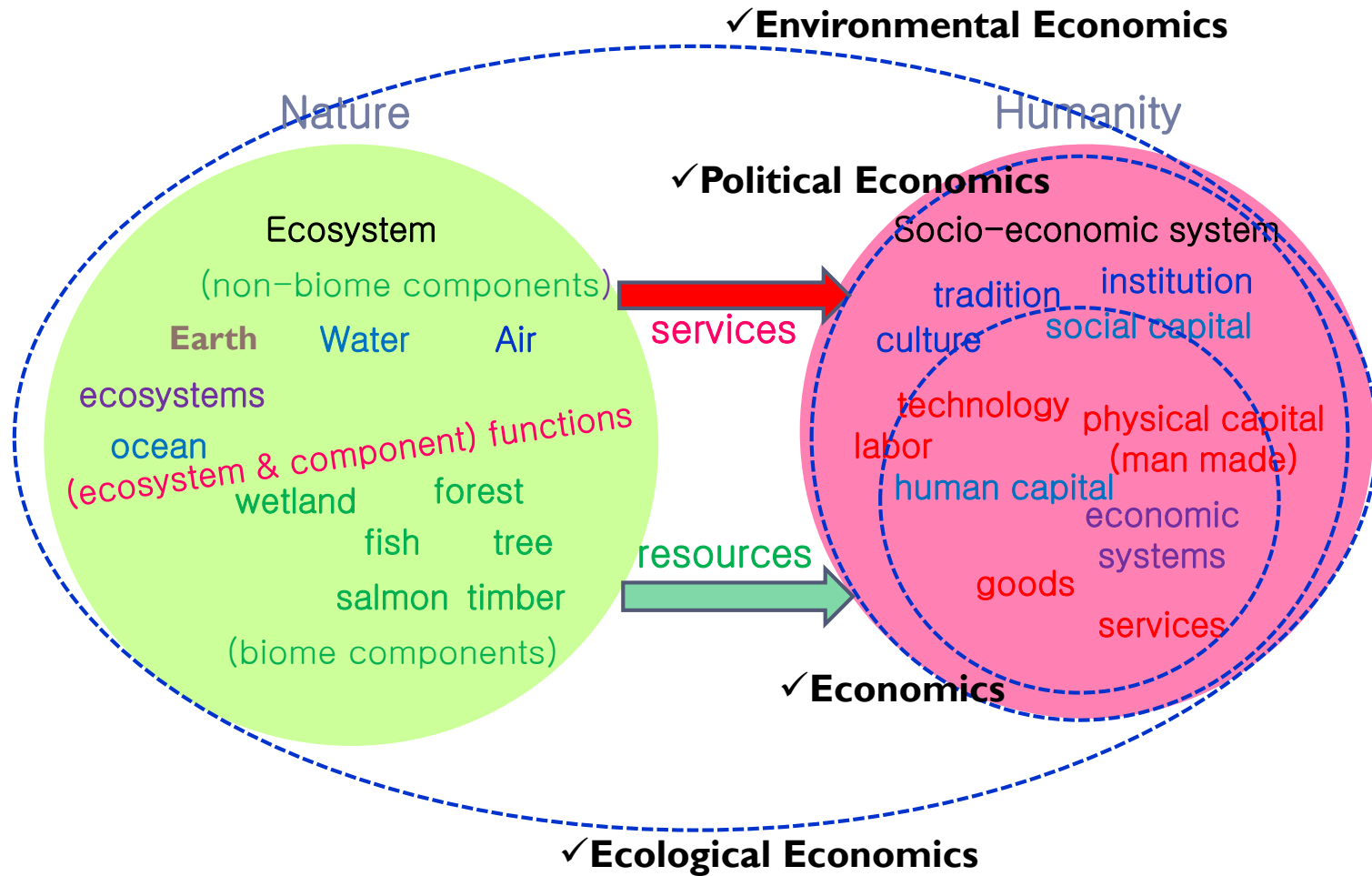
Integration: Nature, Economy, Humanity



Biocentrism vs. Anthropocentrism
Ecology vs. Environment

- ▶ The Nature provides material base of human civilization.
- ▶ Economy is a mode of interaction between the Nature and Man.
 - ✓ Human gets materials from the Nature, produces, consumes and accumulates goods and services for the present and future generations.
 - ✓ **Central Planning** and **Market** represent two major resource allocation and income distribution mechanism throughout the economy.
- ▶ Some part of the nature can not be **appropriated** by human (neither privately nor collectively), but it serves to the basic needs of humanity indirectly (eco-system services).

Integrated Eco-system: Biodiversity in the perspective of Economics



Economy, Economics

✓ **Oikos**-The ancient Greek word **oikos** (ancient Greek: οἶκος, plural: οἴκοι; English prefix: eco- for ecology and economics) refers to three related but distinct concepts: **the family, the family's property, and the house.**^[1]

✓ <https://en.wikipedia.org/wiki/Oikos>

✓ **Nomos** or Nomoi may refer to: from the Greek term for "law" (νόμος, *nómos*; pl. νόμοι, *nómoi*).

- custom, traditional social norm, the equivalent of Latin Mores

- Laws (dialogue), a work by Plato

- Nomos (sociology), "**meaningful orders or worldviews of individuals**" in Peter L. Berger's sociology of religion

- from the Greek νομός, meaning "**pasture, field; division, distribution; district, province**"

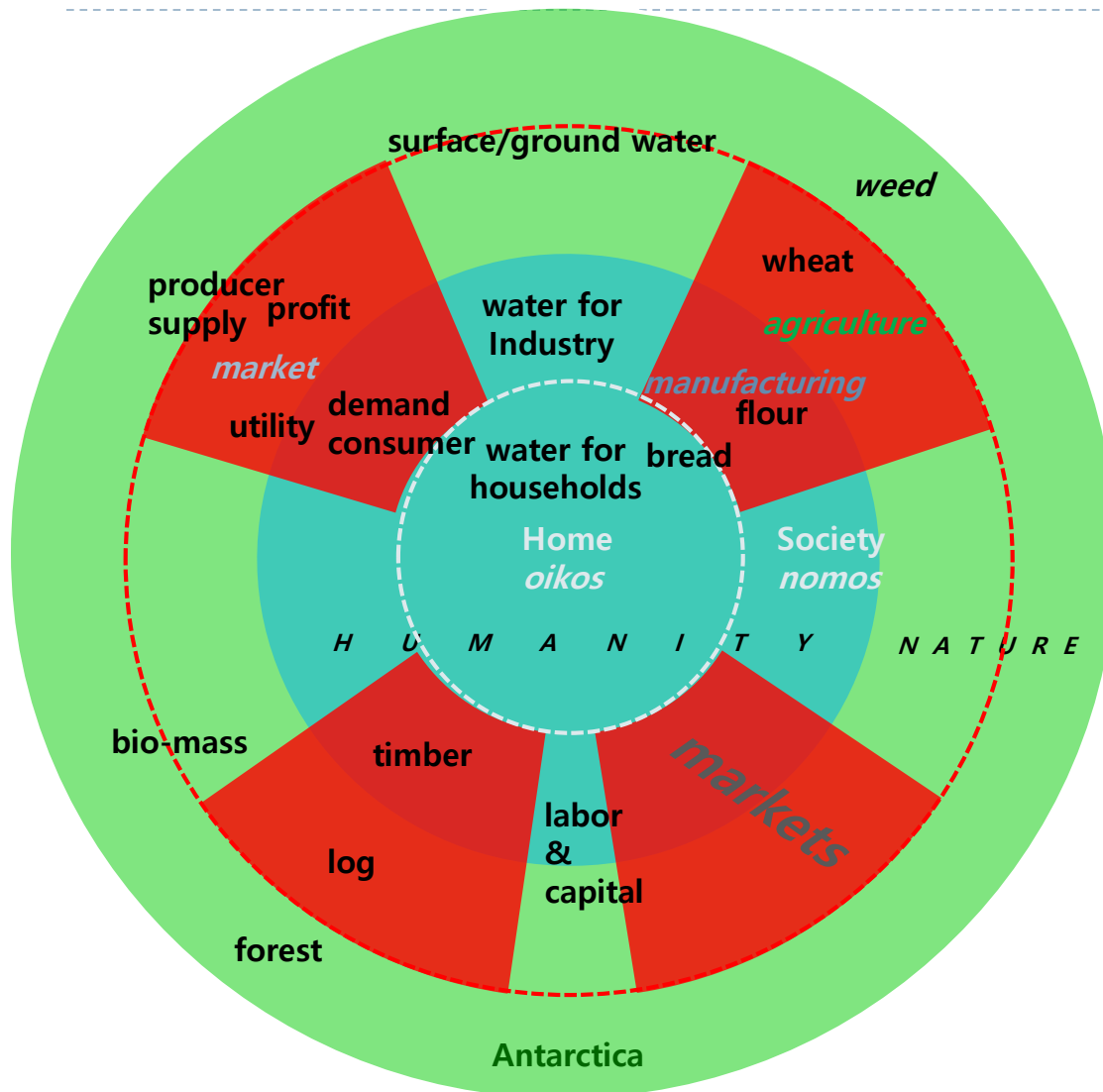
Nome (Egypt), a subdivisions of Ancient Egypt

Nome (Greece), the administrative division immediately below the *peripheries* of Greece (Greek: νομός, *nomós*; pl. νομοί, *nomoí*)

-The nouns *nómos* and *nomós* both derive from the verb νέμω, némō, to dispense or to allot, with *nomós* being the *result* of allotment and *nómos* being the *manner* of allotment or dispensing (justice).

(<https://en.wikipedia.org/wiki/Nomos>)

... market & policy for the individual (personal) & the collective (common) ...



- ✓ Physics vs. Nomos
- ✓ Positive vs Normative

- ✓ Oikos vs. Nomos
- ✓ Privatus vs. Publicus

- ✓ homo economicus vs. homo reciprocans

Linkage with UN 2030 Agenda for Sustainable Development(2015)

Economic Development

- 8.Economic Development and Employment(12)
- 7.Energy(5)
- 9.Infra-structure and Industrialization(8)

Global Partnership

- 17.Implementation and Global Partnership(19)

Social Development

- 3.Ensure healthy lives
- 4.Equitable quality education(10)
- 5.Gender Equality(9)
- 10.Reduce inequality within and among countries(10)
- 16.Promote peaceful and inclusive societies(12)

Poverty

- 1.End Poverty(7)
- 2.End hunger, achieve food security and promote sustainable agriculture(8)



Environment

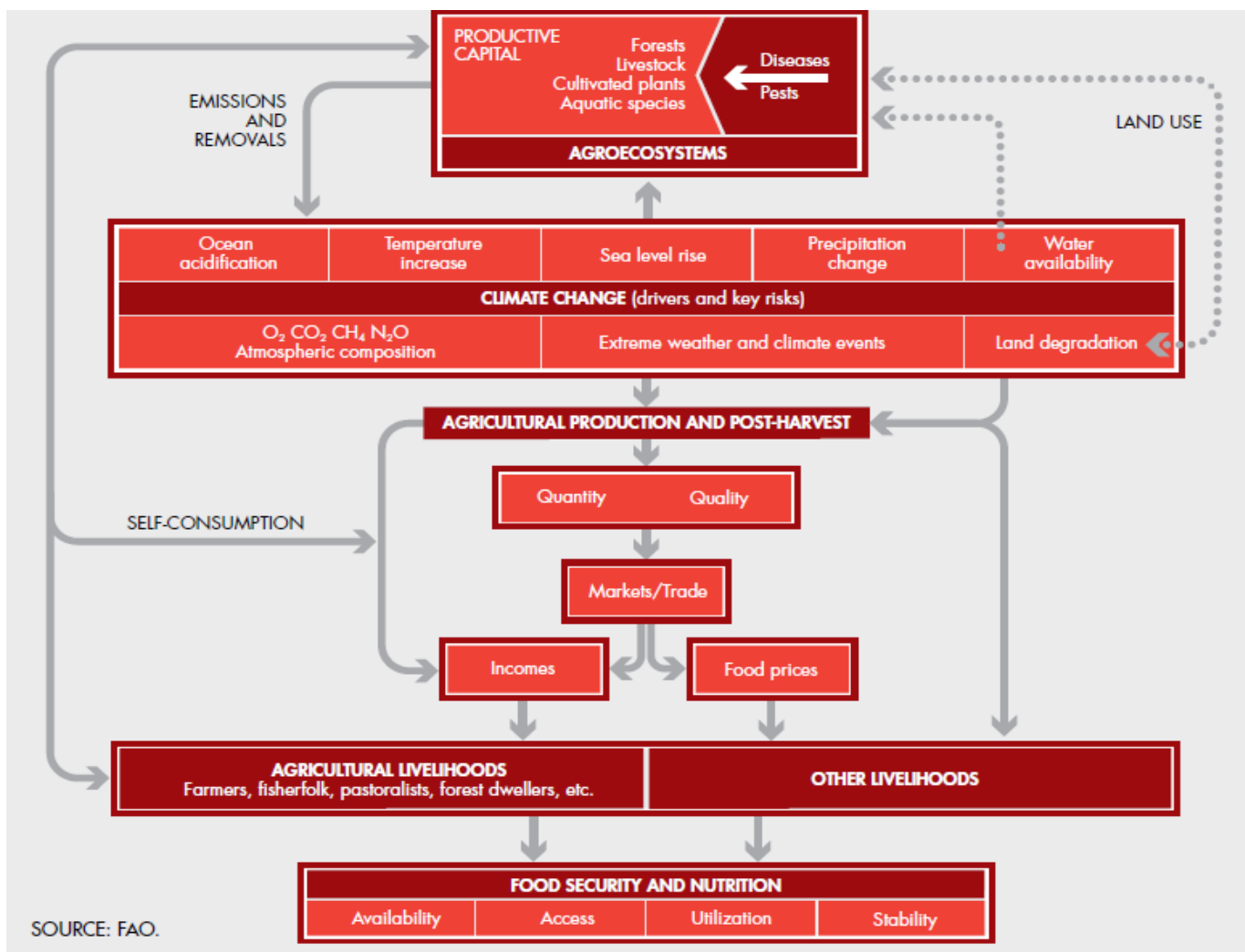
Natural Environment

- 13.Climate Change(5)
- 14.Marine Resources(10)
- 15.Terrestrial Ecosystem(12)

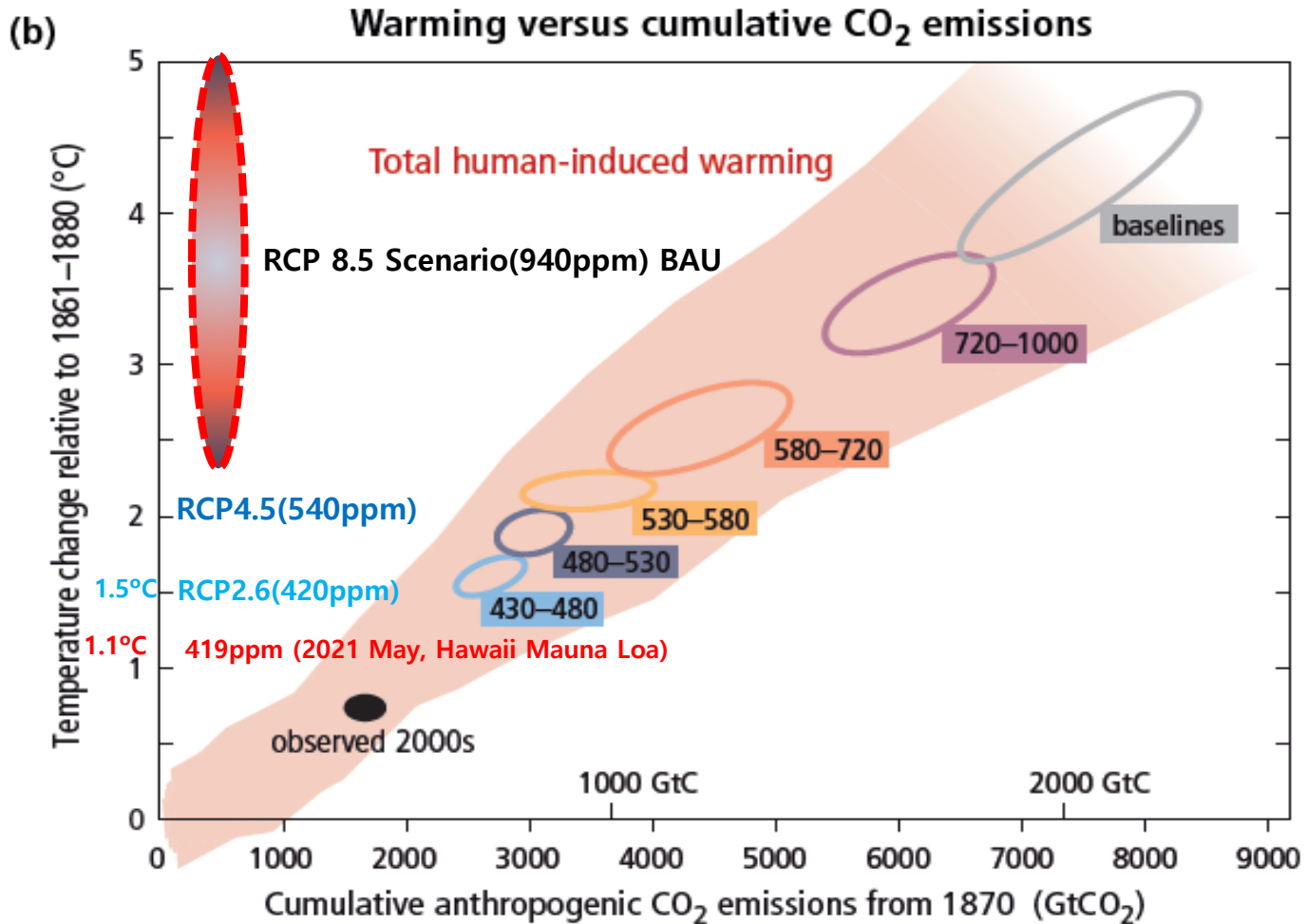
Ambient Environment

- 6.Water and Sanitation(12)
- 11.Make cities(10)
- 12.Sustainable consumption and production patterns(11)

Climate Resilience Management in Value Chain Approach



Climate Scenario _ around 2°C to RCP8.5* Death Valley(*incremental SR=8.5W/m²)

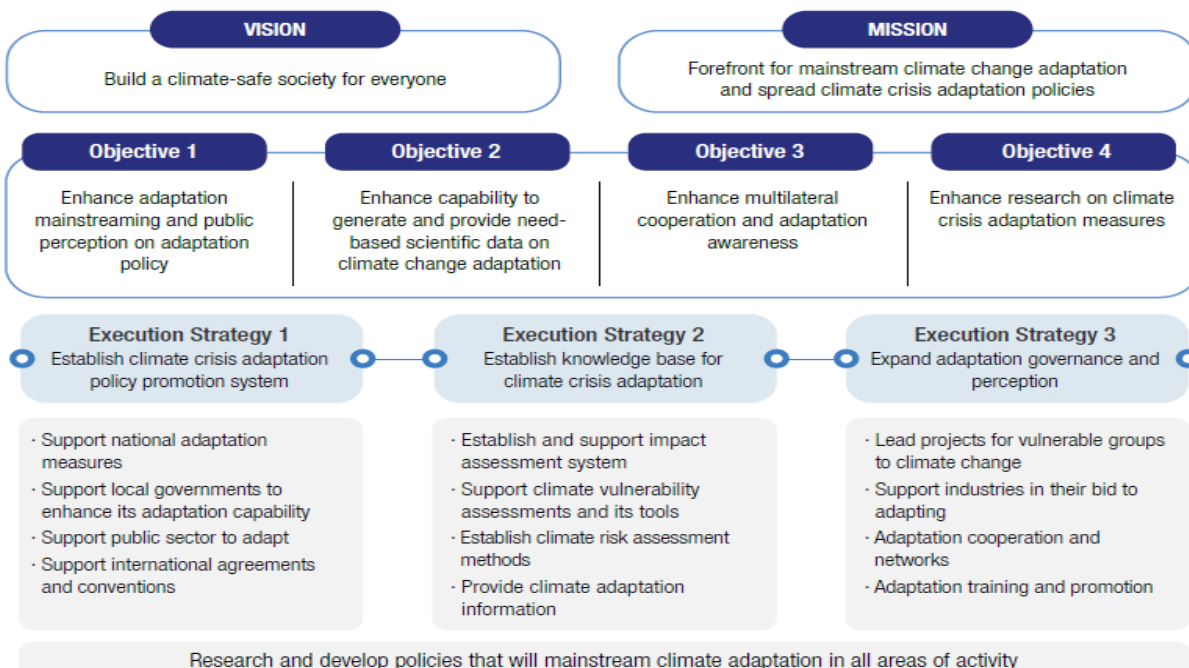


KEI/KACCC (<https://kaccc.kei.re.kr/home/eng/main.do>) provides

Korea Adaptation Center for Climate Change
of the Korea Environment Institute (KEI)

KACCC

The Korea Adaptation Center for Climate Change (KACCC)'s mission is to foster a nation safe from climate crisis by minimizing the impact of climate change through a scientific approach.



- 1 Established legislative and institutional ground
- 2 Provided support to national and local governments on adaptation measures
- 3 Implemented policy measures in line with the public's awareness while establishing a policy feedback mechanism
- 4 Provided need-based support to climate change adaptation entities
- 5 Establish a scientific basis while generating and providing information for adaptation
- 6 Revitalize domestic and international cooperation networks while supporting developing nations
- 7 Training custom-tailored for adaptation entities and awareness raising through promotion

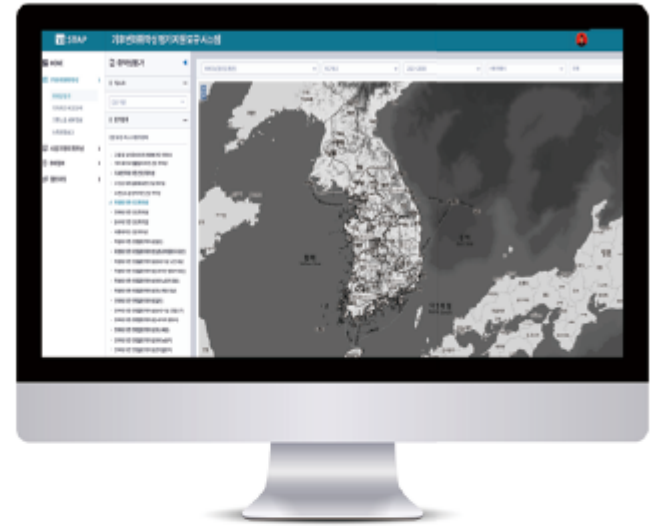
KACCC tools for climate change response _ VESTAP

Vulnerability Assessment Tool to Develop a Climate Change Adaptation Plan

VESTAP

VESTAP is a vulnerability assessment tool that has been available since November 2014. It supports local governments' climate change vulnerability assessments and was expanded in December 2015 to support regional and local climate change vulnerability assessments.

<https://vestap.kei.re.kr/>



What is climate change vulnerability assessment?

- **Vulnerability assessments** integrate climate exposure, sensitivity, and adaptive capacity (*) to determine the degree to which a system of interest is susceptible to continuous damage caused by climate change or the extent to which a system (a unit such as a local or metropolitan government) is incapable of coping with the adverse effects of climate change.
- **Climate change vulnerability** refers to the relative measure of a system's ability to adapt to climate change; generally, a high susceptibility to climate change and a low adaptive capacity indicates high vulnerability (IPCC, 2007).
 - **Exposure:** the degree to which a system is exposed to the impacts of climate change (temperature, precipitation, etc.)
 - **Sensitivity:** the degree to which a system, such as population, infrastructure, or topography, is susceptible to climate change
 - **Adaptive capacity:** the ability of a system to adapt socially and economically to climate change (policies, GRDP, etc.)

KACCC tools for climate change response _ VESTAP

- Provides 57 assessment items across 7 categories (as of October 2021)
 - 32 items (2012) ▶ 41 items (2018) ▶ 45 items (2019) ▶ 57 items (2020)



Health (15 items)



Territorial and Coastal
Infrastructure
(11 items)



Agriculture and
Livestock
(7 items)



Forests/Ecosystems
(10 items)



Water Management
(7 items)



Marine Fisheries
(3 items)



Industries/Energy
(4 items)

Main functions of VESTAP

- VESTAP analyzes indicators based on RCP4.5 and RCP8.5 scenarios. It also provides user definitions for performing vulnerability assessments that are customized to reflect the characteristics of each local government.



Vulnerability to climate change

- Inquiry into the vulnerability assessment map and raw data
- Comparative analysis of the evaluation results between regions (2 regions)
- Additional climate exposure information (grid map, climate model details)
- Accumulated status (adaptive capacity and sensitivity)



Customization of vulnerability

- Creates evaluation indicators
- Creates evaluation items
- Self assessment of vulnerability



Providing DB information

- Raw data
- Indicators
- Information on evaluation items

KACCC tools for climate change response _ VESTAP

Usage by local governments

- The 2nd Detailed Implementation Plan for Climate Change Adaptation Plan for Metropolitan Cities and Provinces using VESTAP was established.

- A detailed implementation plan for metropolitan cities and provinces/a detailed implementation plan for each local government.



Future plans

- Development of vulnerability assessment items that consider user needs in order to increase its utilization by metropolitan/local governments.
- Development of customized education, training programs, and educational textbooks.

VESTAP organized by the Ministry of Environment is operated and supported by the Korea Adaptation Center for Climate Change of the Korea Environment Institute.
More detailed system descriptions and manuals are available on the VESTAP online.

<https://vestap.kei.re.kr>

5F SBC Bldg. B, 232 Gareum-ro, Sejong-Si, Republic of Korea

TEL. +82-(0)44-415-7485(INF) EMAIL kaccc@kei.re.kr WEBSITE <https://kaccc.kei.re.kr>

COPYRIGHT © 2021 KEI KOREA ADAPTATION CENTER FOR CLIMATE CHANGE ALL RIGHTS RESERVED.

KACCC tools for climate change response _ MOTIVE

MOTIVE

Korean Model Of InTegrated Impact and Vulnerability Evaluation of Climate Change

MOTIVE is an integrated impact and vulnerability evaluation model that has been available since April 2021. It provides basic technologies for establishing realistic climate change adaptation plan for central and local governments.

<https://motive.kei.re.kr/>

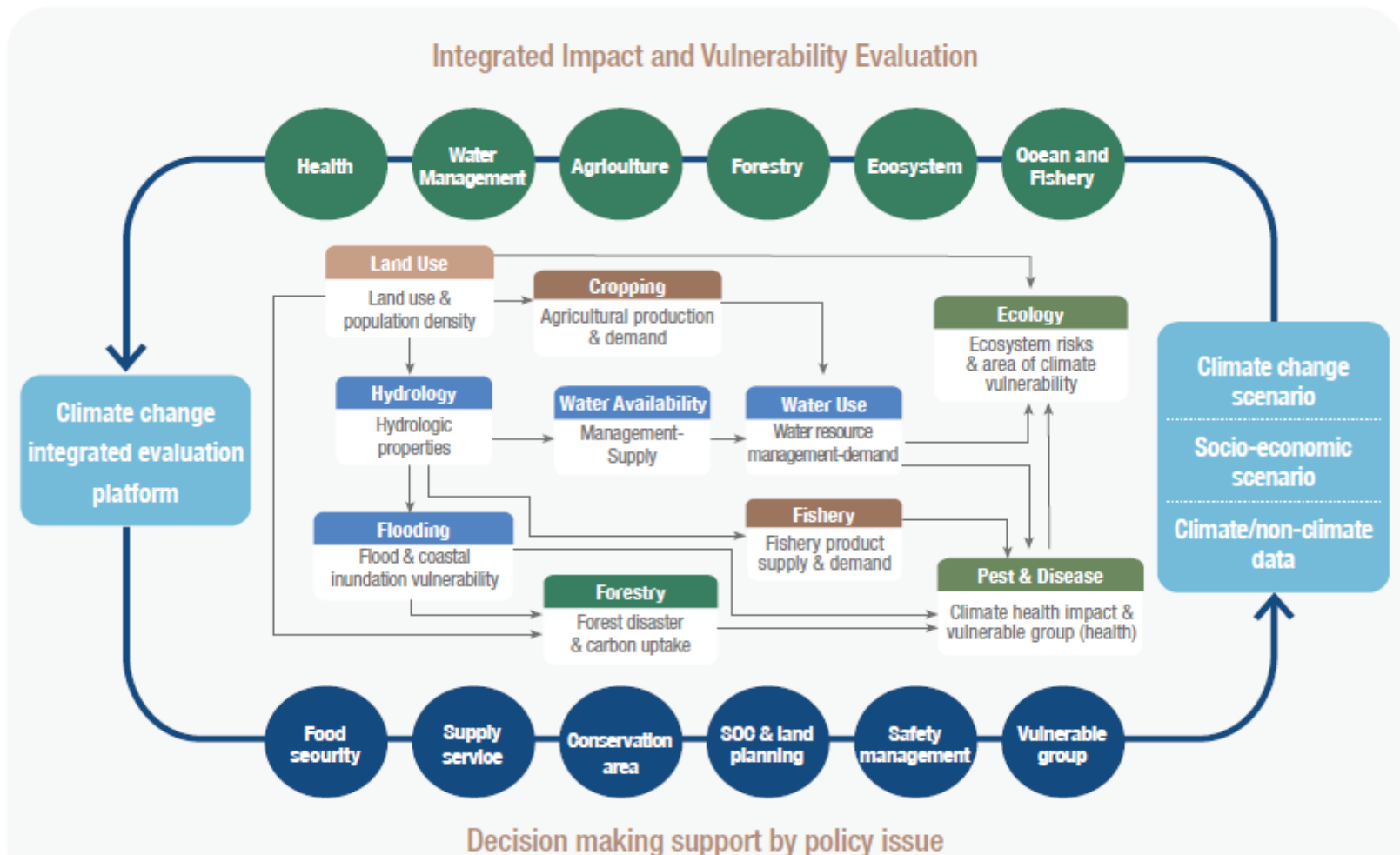


Model of integrated impact and vulnerability evaluation of climate change: MOTIVE

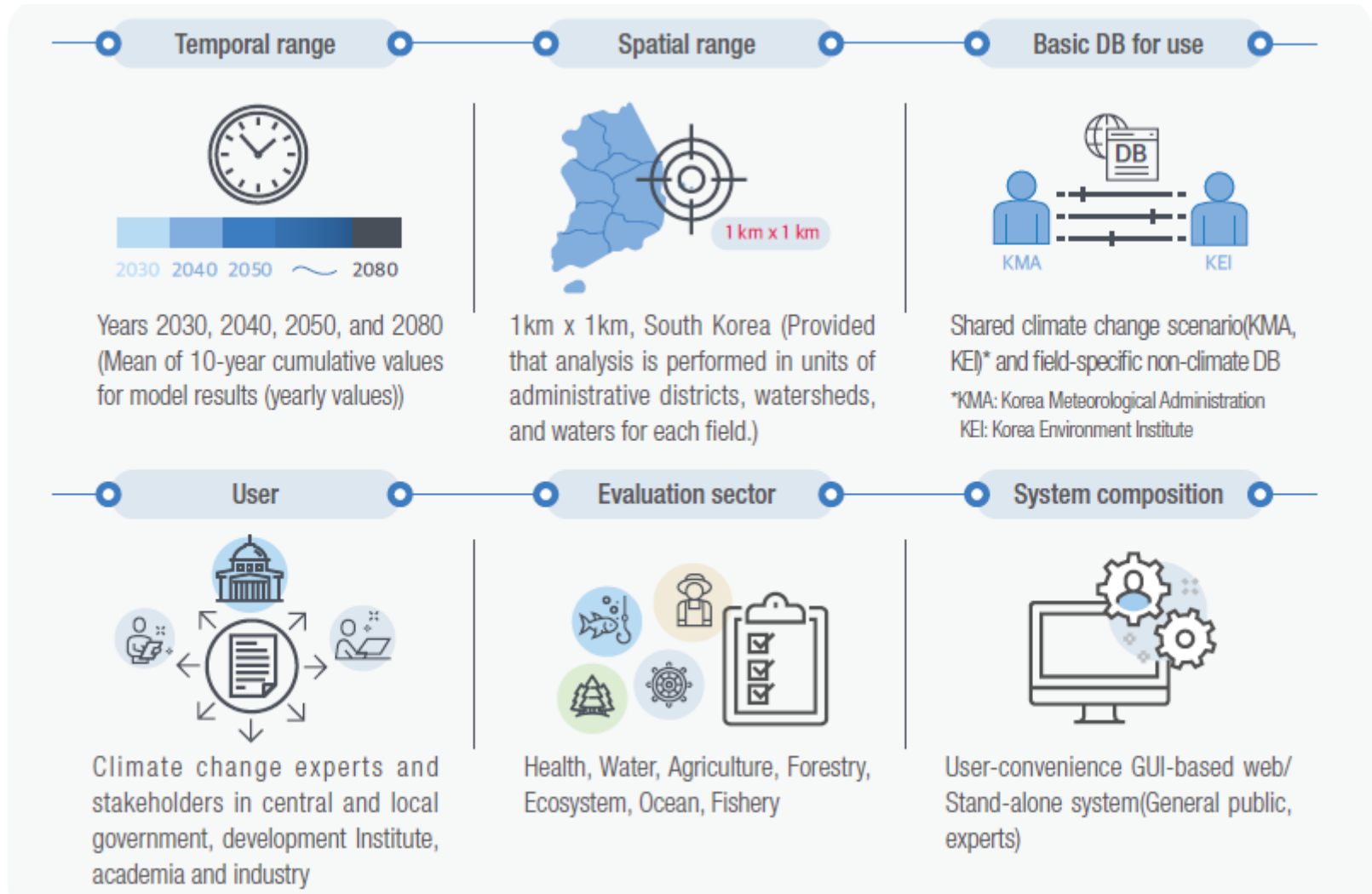
- MOTIVE is a means of scientific and policy support to improve capabilities in national and regional responses to climate change
 - Provides risk assessment results through an integrated platform for evaluating climate change impact and vulnerability
 - Reinforces the link between the results and climate change adaptation policies and improving in policy utility through the platform
 - Provides information on climate change risk standardization (grade, economic ripple effect), hotspots, and guidance on risk management by zone/region

KACCC tools for climate change response _ MOTIVE

A Schematic Diagram of MOTIVE




KACCC tools for climate change response _ MOTIVE





KACCC tools for climate change response _ MOTIVE

Evaluation items of impact by sector

Health  Heatwaves, air pollution, vector-borne infectious disease

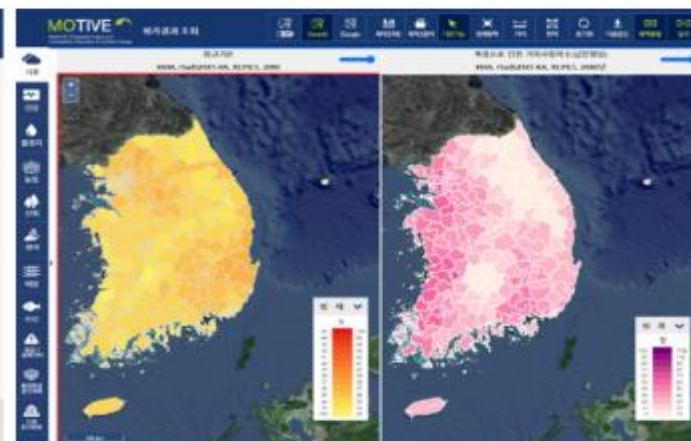
Water management  Water quality, water volume of aquatic ecosystem

Forestry  Forest tree species distribution, forest growth, forest carbon cycle, forest disaster (wildfires, landslides), changes in land cover

Agriculture  Crop productivity, suitable cultivation land, greenhouse gas circulation in farmland, pest control

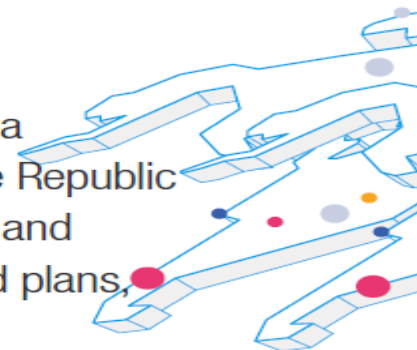
Eco system  Invasive species in the ecosystem, Climate-sensitive species, Vulnerable habitat

Ocean& Fishery  Sea level rise
Biomass size spectrum, red tide event



Korea Adaptation Center for Climate Change Network and Cooperation

The Korea Adaptation Center for Climate Change (KACCC) of the Korea Environment Institute (KEI) supports the Ministry of Environment of the Republic of Korea in communicating and networking with various stakeholders and partner institutions to establish and implement adaptation policies and plans, and promotes adaptation-related international cooperation.



Cooperative partnerships

Supports the establishment of domestic and international cooperative networks with relevant institutions



International events

Hosts and/or organizes annual international events on climate change adaptation



Capacity Building

Supports capacity building of developing countries with regard to adaptation by providing training courses



Consulting Services

Provides consulting services to stakeholders for the development and implementation of adaptation policies and plans



Research collaboration

Designs and conducts research projects on adaptation in partnership with domestic and international institutions

Tools by sub-national initiatives (ICEC of Gwangju Metropolitan)



Key Functions

- > Conduct R&D and education/training on climate change and other environmental issues
- > Develop and implement programs that promote low-carbon, green lifestyles
- > Facilitate exchange and cooperation on climate change and other environmental issues between cities around the world
- > Organize UEA summits

Founded in 2012

4 key values

- Sustainability
- Global + Local
- Glocality
- Collaboration & Communication
- Professionalism

4 Strategic Goals

- Strengthen research capacity
- Increase cooperation at global level
- Enhance civic values
- Foster sustainable management

3 Teams

- Management and Cooperation
- Policy and Research
- Education Project

12 Strategic Tasks

5 UEA Summits

ICEC By the Numbers

도시환경협약
URBAN ENVIRONMENTAL ACCORDS
 SIGNED ON THE OCCASION OF UNITED NATIONS ENVIRONMENT
 PROGRAMME WORLD ENVIRONMENT DAY JUNE 5TH, 2005
 IN SAN FRANCISCO, CALIFORNIA

GREEN CITIES DECLARATION

RECOGNIZING for the first time in history, the majority of the planet's population now lives in cities and that continued urbanization will result in one million people moving to cities each week, thus creating a new set of environmental challenges and opportunities; and

BELIEVING that as mayors of cities around the globe, we have a unique opportunity to provide leadership to develop truly sustainable urban centers based on culturally and economically appropriate local actions; and

RECALLING that in 1945 the leaders of 50 nations gathered in San Francisco to develop and sign the Charter of the United Nations; and

ACKNOWLEDGING the importance of the obligations and spirit of the 1972 Stockholm Conference on the Human Environment, the 1992 Rio Earth Summit (UNCED), the 1996 Istanbul Conference on Human Settlements, the 2000 Millennium Development Goals, and the 2002 Johannesburg World Summit on Sustainable Development, we see the Urban Environmental Accords described below as a synergistic extension of the efforts to advance sustainability, foster vibrant economies, promote social equity, and protect the planet's natural systems.

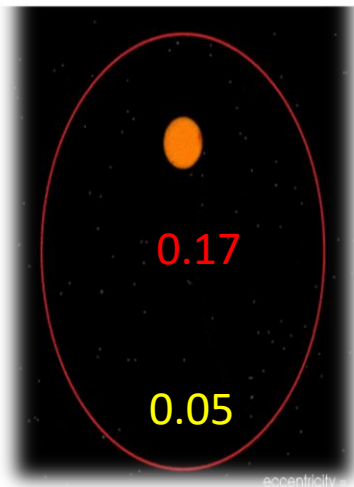
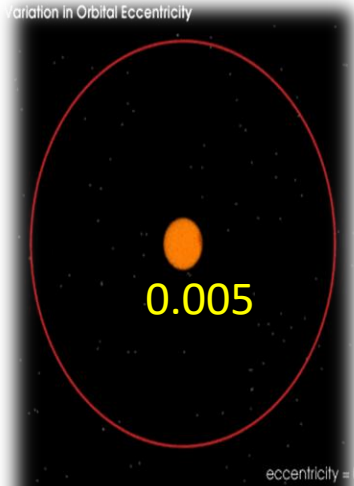
THEREFORE, BE IT RESOLVED, today on World Environment Day 2005 in San Francisco, we the signatory city have come together to write a new chapter in the history of global cooperation. We commit to promote this collaborative platform and to build an ecologically sustainable, economically dynamic, and socially equitable future for our urban citizens; and

BE IT FURTHER RESOLVED that we call to action our fellow mayors around the world to sign the Urban Environmental Accords and collaborate with us to implement the Accords; and

BE IT FURTHER RESOLVED that by signing these Urban Environmental Accords, we commit to encourage our city governments to adopt these Accords and commit our best efforts to achieve the Actions stated within. By implementing the Urban Environmental Accords, we aim to realize the right to a clean, healthy, and safe environment for all members of our society.



3 drivers of Earth Climate System



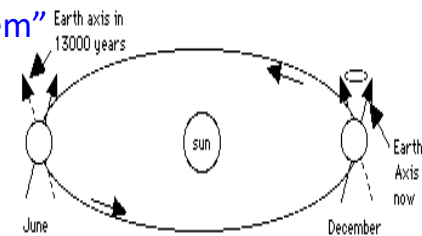
Driver 1. Earth revolves around the Sun with **variable eccentricity** between 0.005~0.05.

- present: 0.017,
- average: 0.028
- Cycle 100,000 year



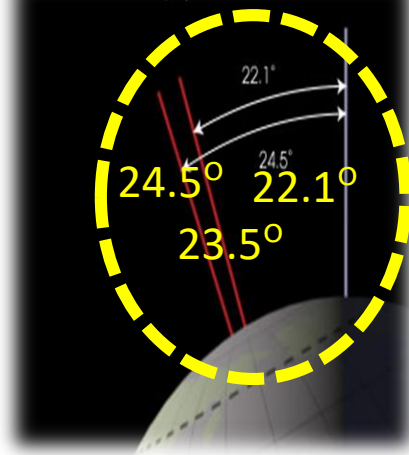
Milutin Milankovic (1879-1958)

“Canon of Insolation and the Ice Age Problem”



3 drivers of Earth Climate System

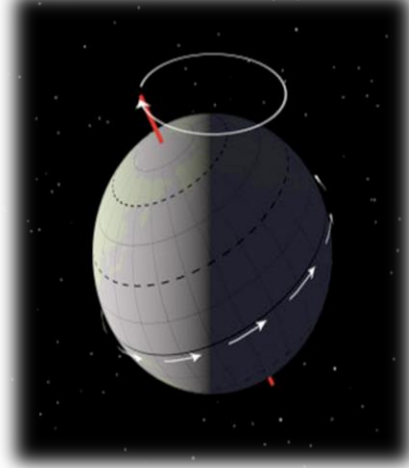
Variation in Axial Obliquity



Driver 2. Axial obliquity varies between 22.1°~24.5°.

- present : 23.5°
- average : 23.3°
- cycle 41,000 year

Precession

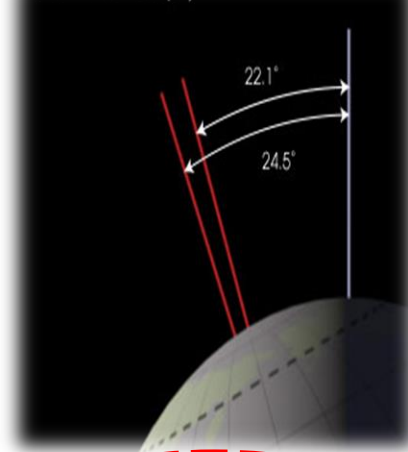


Driver 3. Orientation of rotation axis changes between Polaris and Vega in precession.

- present : Polaris
- in 13,000 years : Vega
- cycle 26,000 year

3 drivers of Earth Climate System

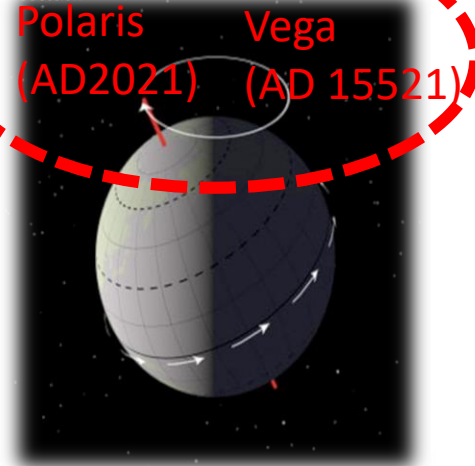
Variation in Axial Obliquity



Driver 2. Axial obliquity varies between 22.1° ~ 24.5° .

- present : 23.5°
- average : 23.3°
- cycle 41,000 year

Precession



Driver 3. Rotation axis changes between Polaris and Vega in precession.

- present : Polaris
- in 13,000 years : Vega
- cycle 26,000 year

Temperature changes, Carbon concentration

Atmospheric carbon dioxide concentration cycle is about 125,000 years, changing in between 180~300 ppm for the past 650,000 years.

But recently, it goes beyond 400ppm. Scientists knows "why?"



IPCC AR5 2014 SPM

Fossil fuel and land use change-induced carbon emission change due to human development(1850-2011)

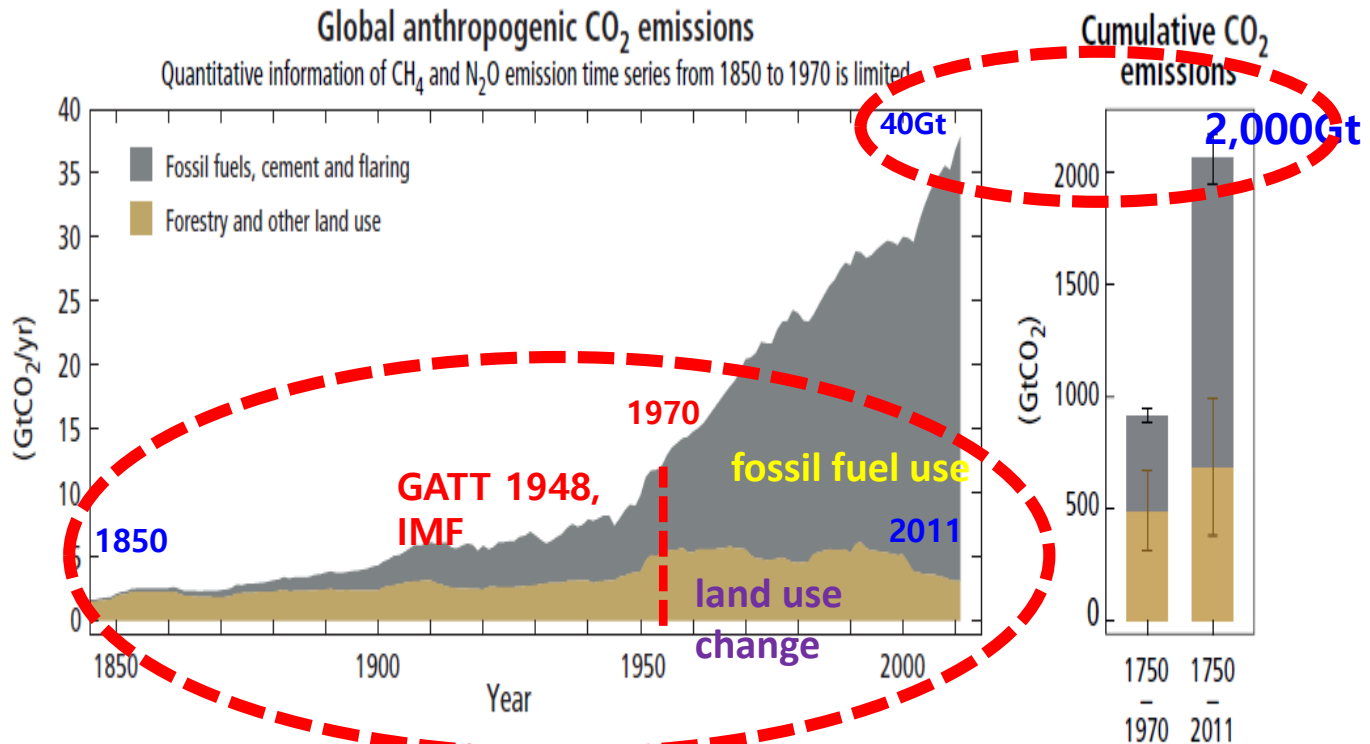


Figure 1.5 | Annual global anthropogenic carbon dioxide (CO₂) emissions (gigatonne of CO₂-equivalent per year, GtCO₂/yr) from fossil fuel combustion, cement production and flaring, and forestry and other land use (FOLU), 1750–2011. Cumulative emissions and their uncertainties are shown as bars and whiskers, respectively, on the right-hand side. The global effects of the accumulation of methane (CH₄) and nitrous oxide (N₂O) emissions are shown in Figure 1.3. Greenhouse gas emission data from 1970 to 2010 are shown in Figure 1.6. (modified from WGI Figure TS.4 and WGIII Figure TS.2)

Ref: IPCC AR5 2014 SPM

Fossil fuel and land use change-induced carbon emission change due to human development(1850-2011)

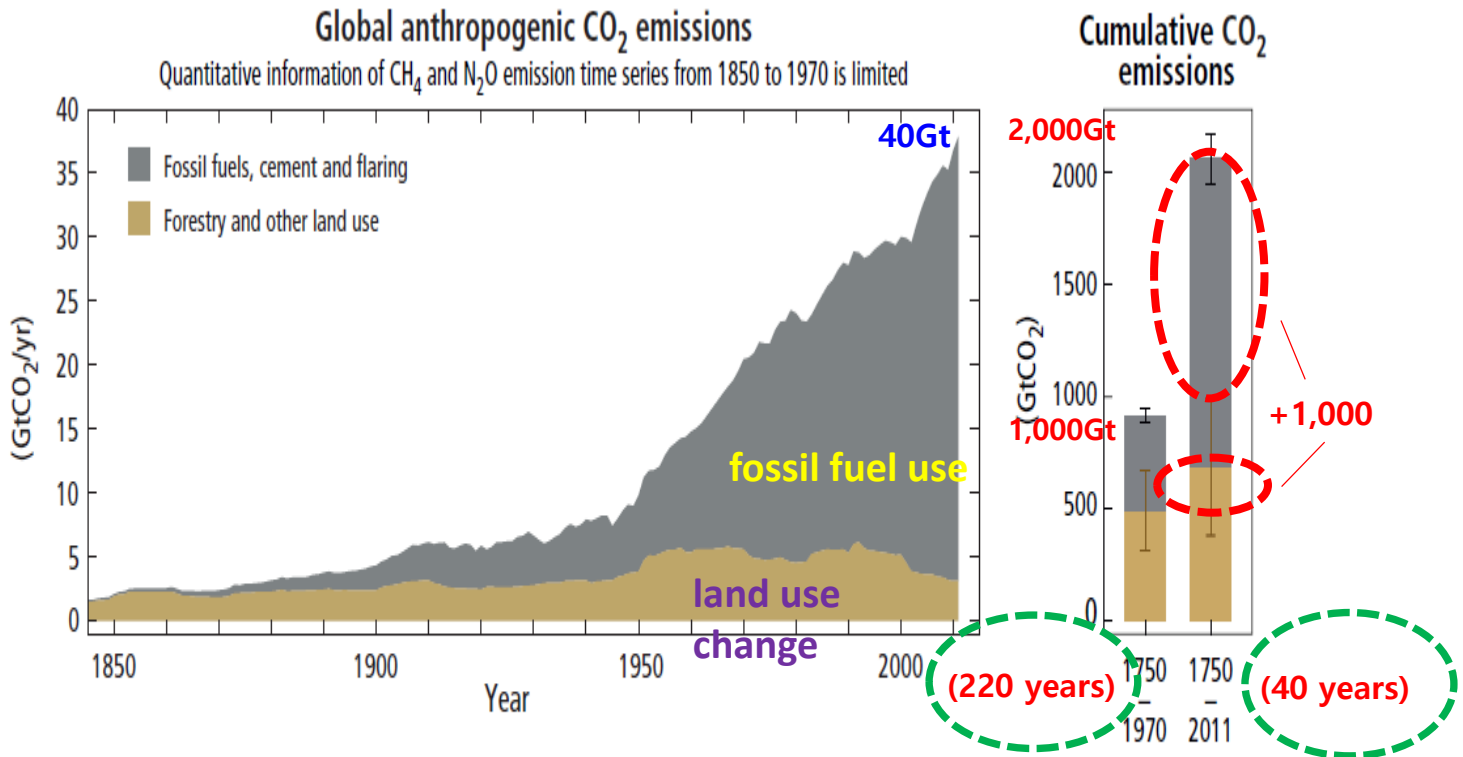


Figure 1.5 | Annual global anthropogenic carbon dioxide (CO₂) emissions (gigatonne of CO₂-equivalent per year, GtCO₂/yr) from fossil fuel combustion, cement production and flaring, and forestry and other land use (FOLU), 1750–2011. Cumulative emissions and their uncertainties are shown as bars and whiskers, respectively, on the right-hand side. The global effects of the accumulation of methane (CH₄) and nitrous oxide (N₂O) emissions are shown in Figure 1.3. Greenhouse gas emission data from 1970 to 2010 are shown in Figure 1.6. (modified from WGI Figure TS.4 and WGIII Figure TS.2)

Representative Concentration Pathway & Socio Economic Scenarios

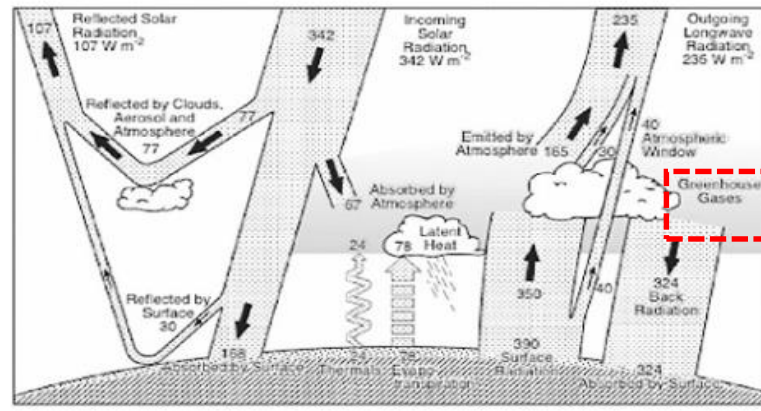
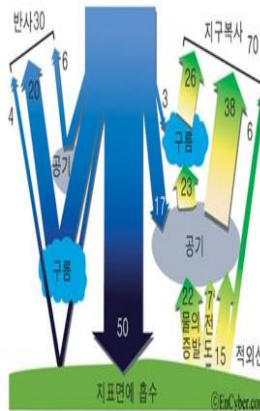


FIGURE 1-3 Energy budget for the atmospheric components of the climate system. SOURCE: Kiehl and Trenberth (1997).

SRES*:
RCP**:

IPCC 2007 4차 특별보고서, (사회경제적) 배출시나리오(Special Report Emission Scenario)
IPCC 2013 5차 보고서, 대표 농도 경로(Representative Concentration Pathway)

Representative Concentration Pathway (RCP)	Forcing compared to 1750 (Wm^{-2})	Climate policy associated with scenario	CO ₂ Equivalent (ppm)	Projected global average temperature increase from 1986-2005 (°C)
2.6	2.6	Mitigation	475	1.0
4.5	4.5	Stabilization	630	1.8
6.0	6.0	Stabilization	800	2.2
8.5	8.5	None	1313	3.7

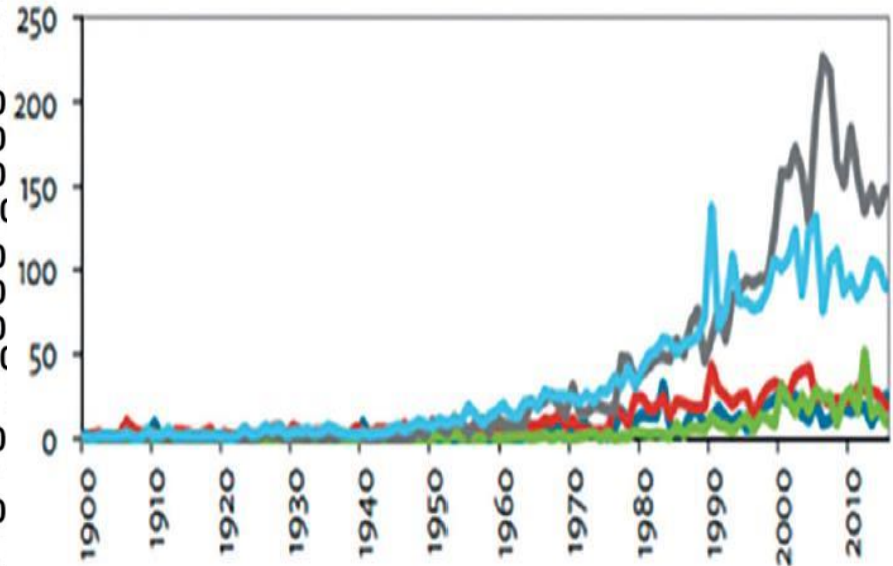
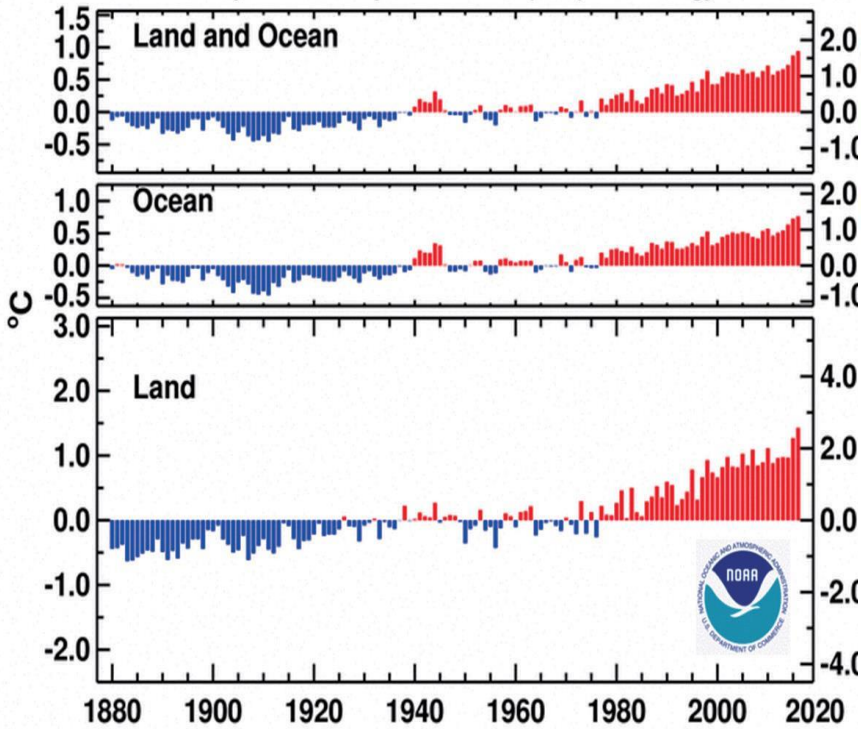
Source: IPCC Fifth Assessment Report Summary for Policymakers, Figure SPM.5 and Box SPM.1.

Recorded Climate Change Anomaly

Jan-Nov Global Surface Mean Temp Anomalies

NCEI/NESDIS/NOAA

Analysis is based upon Smith et al. (2008) methodology.



- 가뭄(Drought)
- 지진(Earthquake)
- 극한 기온(Extreme Temperature)
- 홍수(Flood)
- 폭풍(Storm)

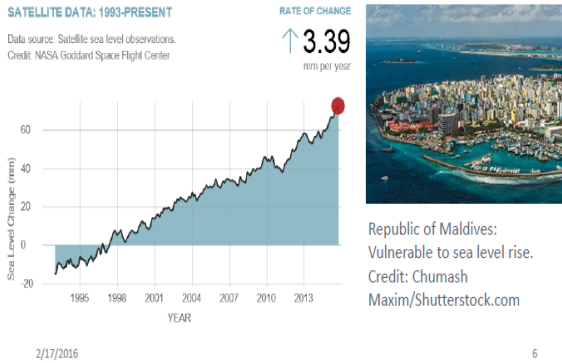
8 Observed Climate Change Impacts

The evidence for rapid climate change is compelling:

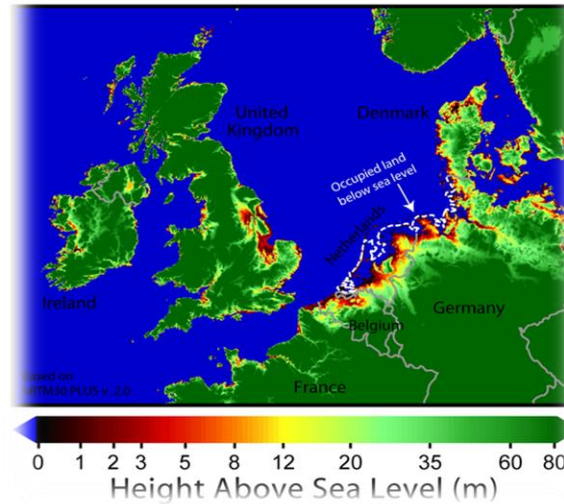
- A. Sea level rise
- B. Global temperature rise
- C. Warming oceans
- D. Shrinking ice sheets
- E. Declining Arctic sea ice
- F. Glacial retreat
- G. Ocean acidification
- H. Extreme events

A. Sea level rise

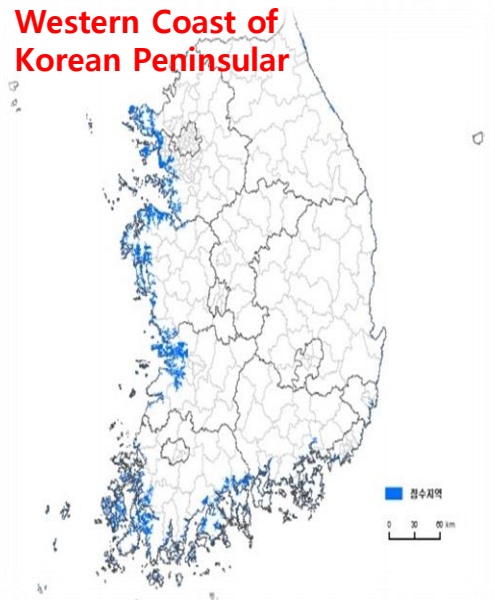
Global sea level rose about 17 centimeters (6.7 inches) in the last century. The rate in the last decade, however, is nearly double that of the last century.



North European Coast Sea Level Risks - North Sea



Western Coast of Korean Peninsular



Kiribati in the Pacific



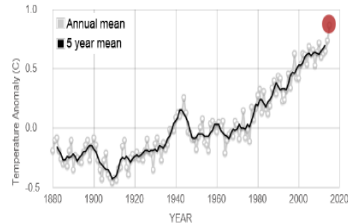
B. Global temperature rise

All evidences show that Earth has warmed since 1880. Most of this warming has occurred since the 1970s, with the 20 warmest years having occurred since 1981 and with all 10 of the warmest years occurring in the past 12 years.

Even though the 2000s witnessed a solar output decline resulting in an unusually deep solar minimum in 2007-2009, surface temperatures continue to increase.

GLOBAL LAND-OCEAN TEMPERATURE INDEX

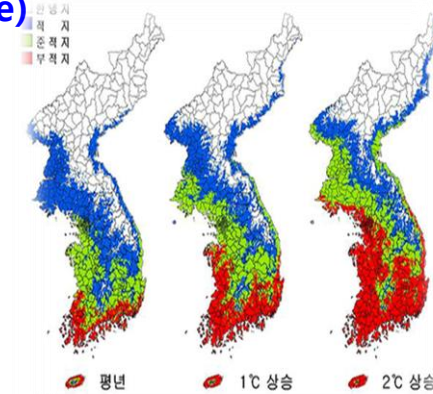
Data source: NASA's Goddard Institute for Space Studies (GISS). Credit: NASA/GISS



2/17/2016

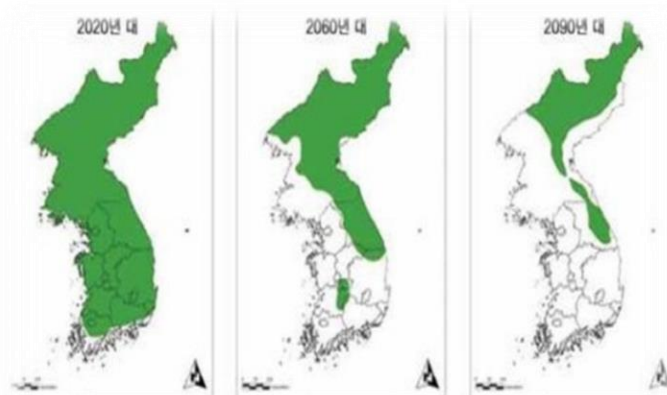
7

Apple tree's habitat decreases, moves to the North (current, +1°C, +2°C, in blue)



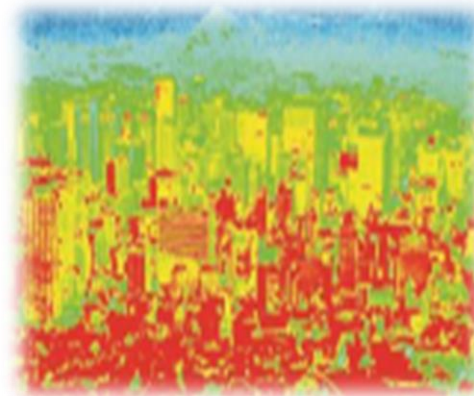
자료출처: 기상청 기후변화예측센터, 기상청 기후변화예측센터, 기상청 기후변화예측센터

Pinus Forest Cover Reduces (2020-2090, in green)



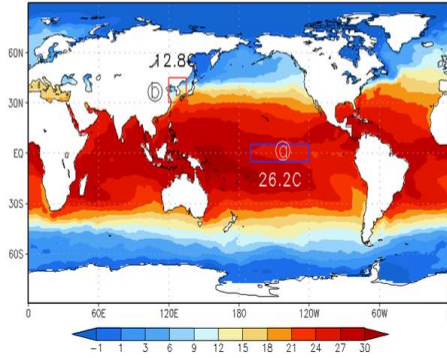
기후변화에 시나리오에 따른 소나무림의 적적 생물분포 범위(산림청, 2009)

Heats accumulation in Urban center (2020, Summer)

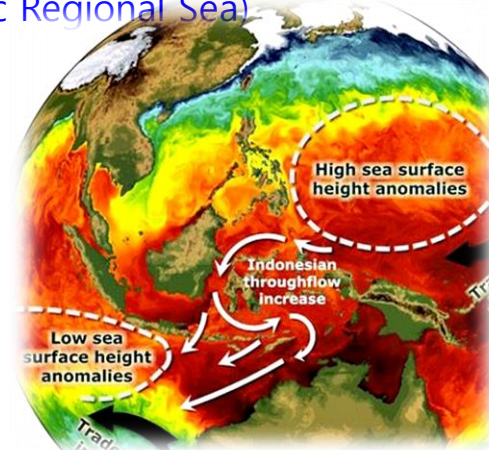


C. Warming oceans

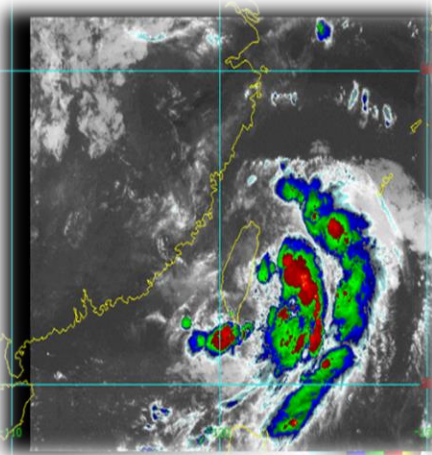
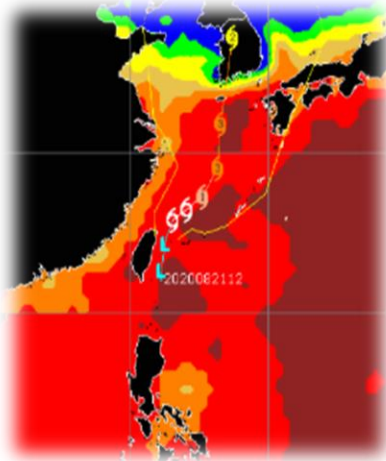
The oceans have absorbed much of this increased heat, with the top 700 meters (about 2,300 feet) of ocean showing warming of 0.302 degrees Fahrenheit since 1969.



High and low sea surface anomalies and throughflow changes (Indo-Pacific Regional Sea)

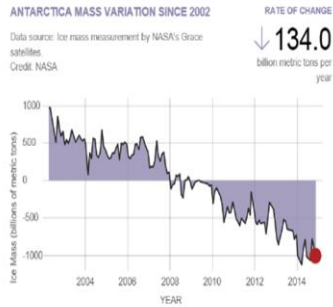


More frequent storm surges and Super-typhoons, Damaged rice yields



D. Shrinking ice sheets

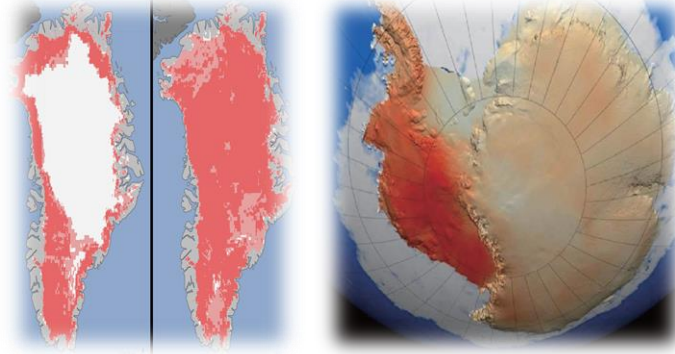
The Greenland and Antarctic ice sheets have decreased in mass. Data from NASA's Gravity Recovery and Climate Experiment show Greenland lost 150 to 250 cubic kilometers (36 to 60 cubic miles) of ice per year between 2002 and 2006, while Antarctica lost about 152 cubic kilometers (36 cubic miles) of ice between 2002 and 2005.



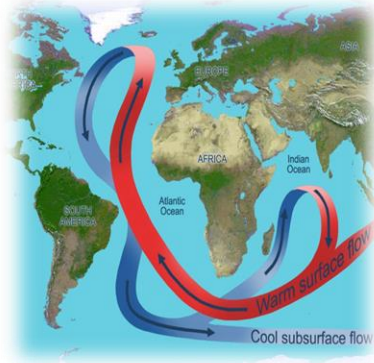
2/17/2016

9

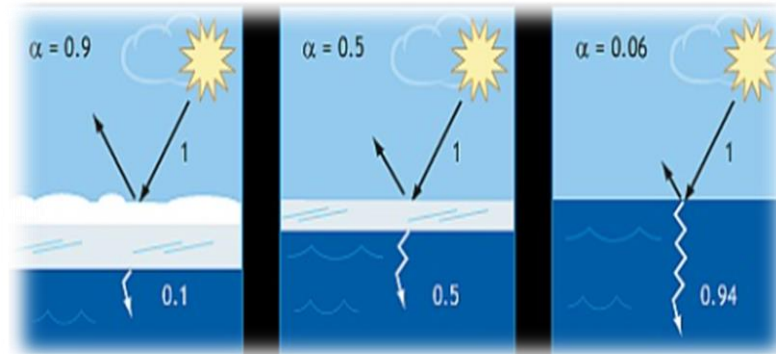
Ice sheet melting in Green Land and Antartics



Low density of melted fresh water disturbs deep-surface ocean exchange causing extreme weather events



Ice melt reduces solar energy reflection, Sea water increases solar radiative forcing causing oceanic heat accumulation

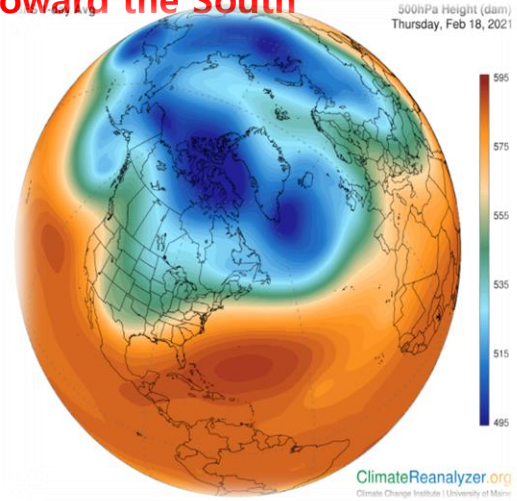


E. Declining Arctic sea ice

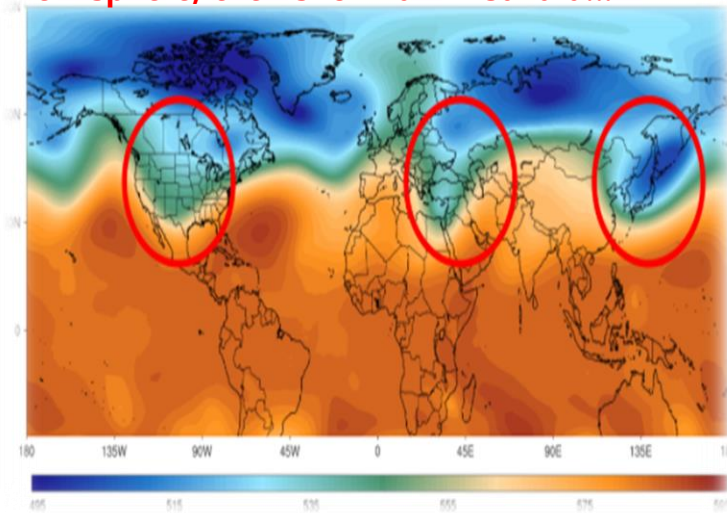
Arctic sea ice reaches its minimum each September. September Arctic sea ice is now declining at a rate of 13.4 percent per decade, relative to the 1981 to 2010 average. This graph shows the average monthly Arctic sea ice extent in September since 1979, derived from satellite observations.



Arctic sea warming releases Jet stream band, expanding toward the South



Arctic sea warming brings extreme cold wave in the overall Northern hemisphere, even snow fall in Sahara...



F. Glacial retreat

Glaciers are retreating almost everywhere around the world — including in the Alps, Himalayas, Andes, Rockies, Alaska and Africa



2/17/2016

11

Flesh flood by the glacial melted flow (Himalyas, Nandadevi Mt. 2021)

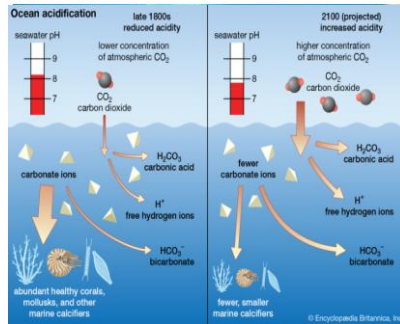


90% of 4,000 glaciers in the Alpes disappear by 2100. Winter industry suffers.



G. Ocean Acidification

Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent. This increase is the result of humans emitting more carbon dioxide into the atmosphere and hence more being absorbed into the oceans. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 2 billion tons per year



Endangered Oceanic Eco-system due to the acidification



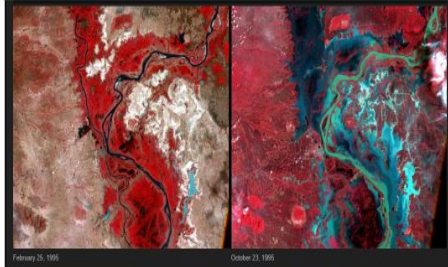
Accelerated acidification destroys the great barrier coral reef in the South Pacific



H. Extreme events

The number of record high temperature events, intense rainfall events, floods, typhoons, Lake shrinkage are increasing.

i.e.: Flood, Cambodia The Mekong River is the 12th longest in the world, flowing 2,600 miles (4,200 kilometers) from western China to the Mekong Delta in southern Vietnam. Every autumn, monsoon rains become too great for the Mekong to carry and a large area of Cambodia is flooded, as seen in the October image. This great influx of water even reverses the flow of the Tonle Sap River, northward to the Tonle Sap ("Great Lake"), which can expand to 10 times its normal size. As seen here, the Tonle Sap flows from the northwest and the Mekong flows from the northeast. They merge and then split into the Basak River and the Mekong, which flow southeast to the South China Sea. Phnom Penh lies just west of the four-river intersection, which is called the Chaktomukh ("Four Faces").

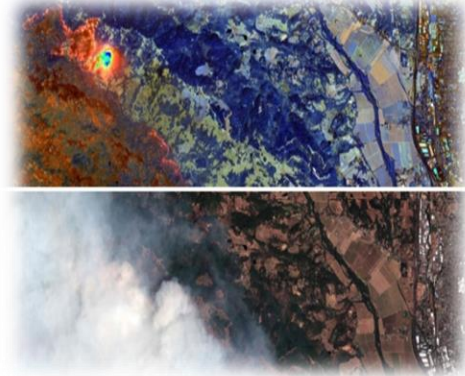


2/17/2016

Source: California Institute of Technology

13

Drought and forest fires in California, USA 2020



Frequent and severe flood, dried water course, crop yields loss ...



ICEC tools for climate change response _ UCMS

Urban Carbon Management System(UCMS)

A Tool for Monitoring GHG Emissions and Providing Information for Decision Makers

Overview

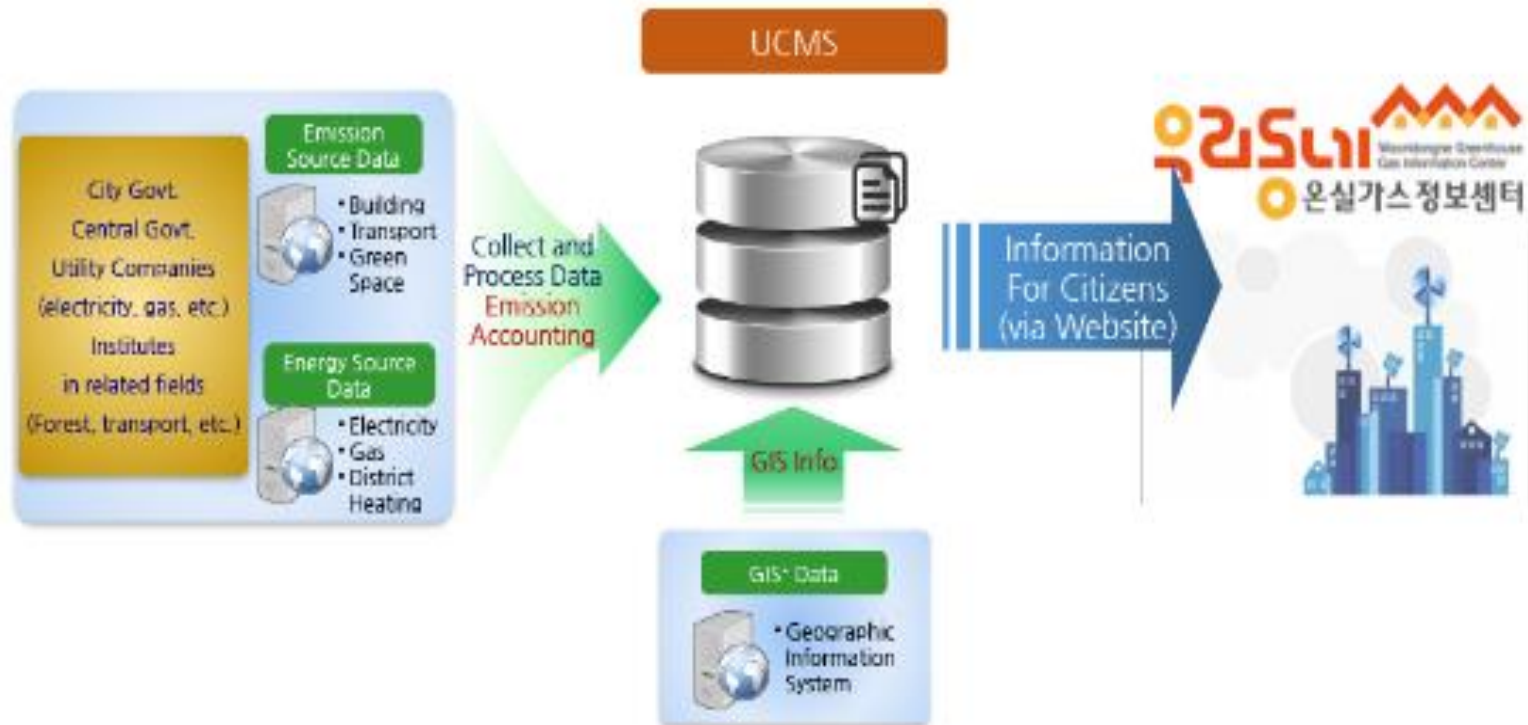


UCMS as a Web-Based Program

The Urban Carbon Management System (UCMS) is a web-based system used to regularly monitor and manage carbon emissions to facilitate the reduction of greenhouse gas produced in urban and suburban areas. The UEA continually monitors carbon emissions in Gwangju (Republic of Korea) and the surrounding metropolitan area. Emissions are monitored by sector and by energy source, and its outcomes are provided in conjunction with GIS information for detailed analysis. Establishing and employing the UCMS in the city, the UEA seeks to identify the characteristics of current GHG emissions to aid in the reduction of future emissions.

ICEC tools for climate change response _ UCMS

Structure and Examples in Figures



ICEC tools for climate change response _ UCMS

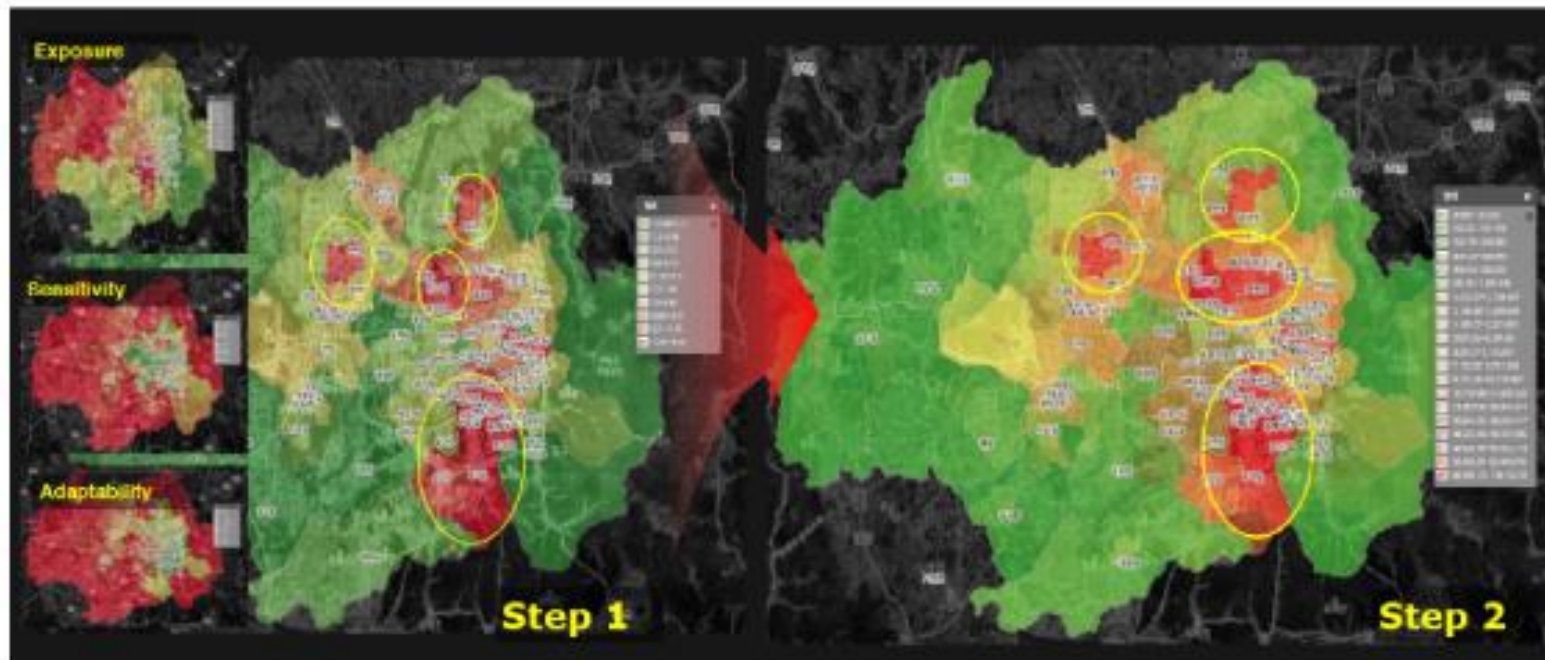


Figure 2.

Applied analysis of Gwangju on the climate Vulnerability-Resilience Index(VRI) in UCMS.

<Source:ICEC 2020 Annual Inventory Report>

ICEC tools for climate change response _ UAMS

Urban Assessment Model System(UAMS)

A Tool for Analyzing the City's Vulnerability against Climate Change
and Providing Information for Decision Makers

Overview

The Urban Assessment Model System (UAMS) is a three-dimensional, mathematical simulation model for calculating air flows, heat waves, and fine dust dispersions in orographically structured terrain. The UAMS is suited for studying the climatic effects of local land use changes as well as for analyzing the climate of urban and suburban areas. The UAMS was developed to evaluate the environmental conditions within entire cities, providing information for decision-making in areas vulnerable to climate change, and it also helps to address the stratification of climate analysis difficulties.

Specification

(Requirements to employ the System)

- › Data from National Centers for Environmental Prediction(NCEP), National Center for Atmospheric Research(NCAR), Global Forecast System(GFS), etc.
- › Super Computer / High Performance Computer and Server / data transfer capacity, etc.



ICEC tools for climate change response _ UAMS

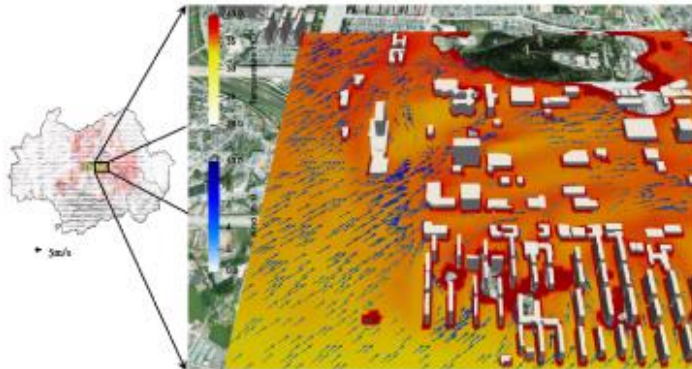
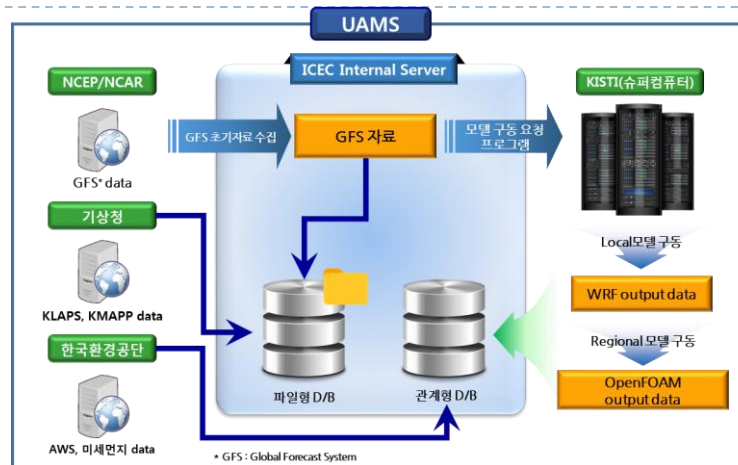


Figure 2.

Results of CFD analysis of 3*5 km area near Gwangju
3-D Analysis of the UAMS City Hall with grid spacing
between 5-28m

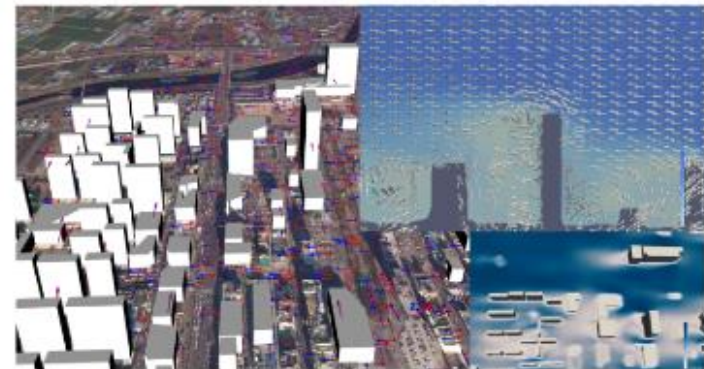


Figure 3.

3-D Analysis of the UAMS

ICEC cooperation windows _ UEA-CB, ICEC-KOICA Global Training Programme

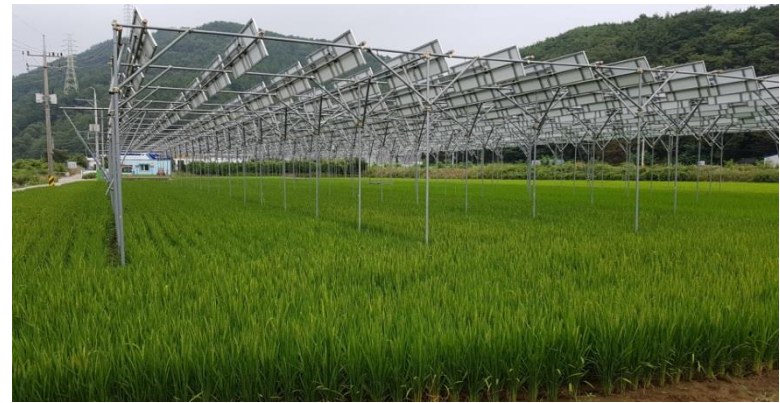
PROGRAM OVERVIEW (ICEC-KOICA Global Training Programme)

TITLE	Sustainable Water Resources Management for Climate Change
DURATION	2020-2022
GOAL	To share knowledge on sustainable and safe water resources management in line with climate change response, and to enhance capacities of participating countries accordingly

	FIRST-YEAR COURSE (2020/Online)		SECOND-YEAR COURSE (2021/Online)		THIRD-YEAR COURSE (2022/Invitational)
TARGET	Working/mid-level officials from the Ministry of Agriculture, Fishery & Forest		Working/mid-level officials in fields of climate change, public health and engineering, water resources, etc.		Mid/high-level officials from the city government of participating countries
OBJECTIVES	To better understand international trends and policies on integrated water management in South Korea		To develop capabilities of policy-makers and project developers for effective planning and implementation of policies in the field of water management as well as climate change response		To develop capacities of project officers for effective project implementation in the field of water management as well as climate change response
ACTIVITIES	<ul style="list-style-type: none"> › Video lectures (non-real time) & online discussion › Online web training › Feedback and Q&A via email 		<ul style="list-style-type: none"> › Video lectures (non-real time) & online discussion › Online web training › Feedback and Q&A via email 		<ul style="list-style-type: none"> › Seminar and presentation in Korea › Follow-up workshop on the implementation of 2020 and 2021 Action Plans
OUTPUT	Action Plan		Action Plan		Revised Action Plan & Final Outcome

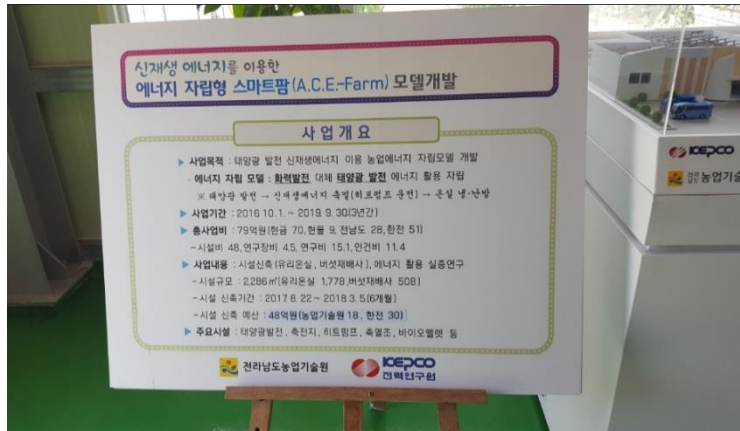
Other solutions in place : Energy-Food Nexus (<https://www.koenergy.kr/kosep/en/main.do>)

✓ _100KW grid connected test bed in rice field (2018)



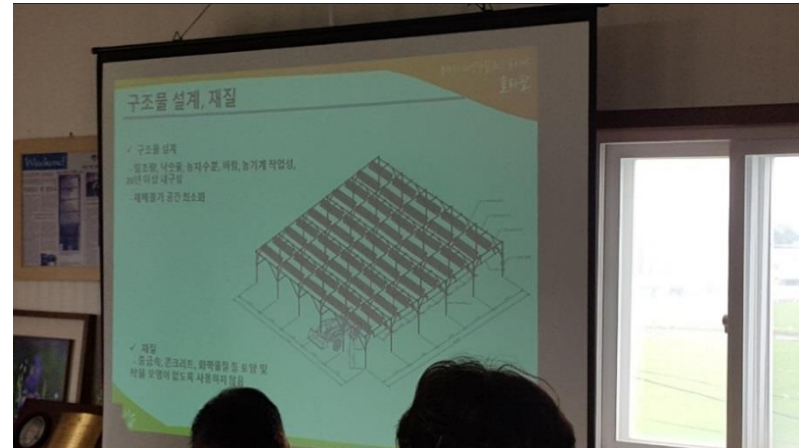
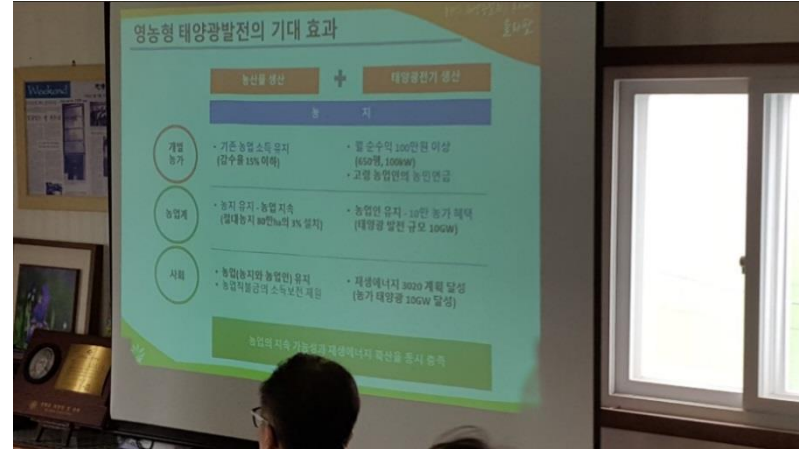
Other opportunities : Water-Energy-Food Nexus (<https://www.jares.go.kr/eng>)

- ✓ 100KW off-grid test bed in vegetable plots and smart farming system (2019)



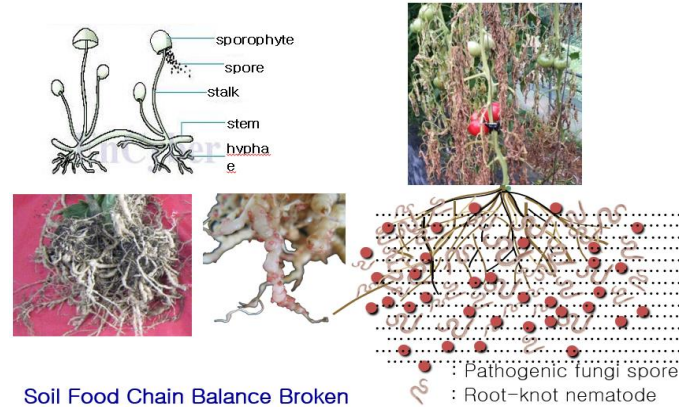
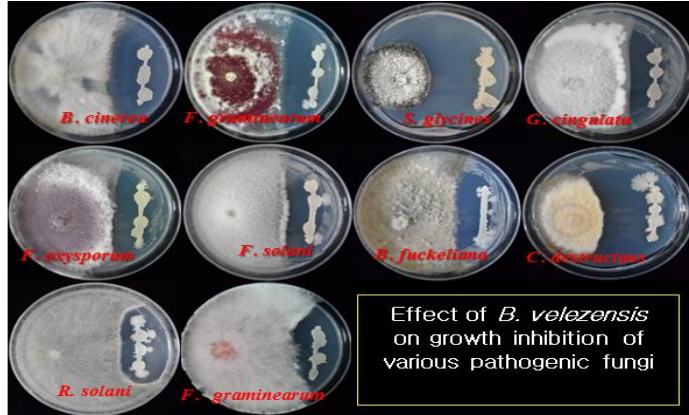
Other opportunities : Farmers in action(<https://cei.creativekorea.or.kr/chungnam/main.do>)

✓ Farmers cooperatives in solar farming workshops (2019)



Other opportunities : Eco-farming practices (<http://iefa.jnu.ac.kr/>)

✓ Organic nutrient and pest control technologies (2019)



C/G powder with micronutrients: 0.25kg,
Chitinase/Gelatinase producing bacteria: 0.25L
Concentrated microbial nutrients: 1L
Sugar: 3kg
Fertilizer(21-17-17): 3kg

Chitin/gelatin powder with micronutrients: 0.25kg
Chitinase/Gelatinase producing bacteria: 0.25L
Concentrated microbial nutrients: 1L
Fertilizer 3kg
Air pump

Cultivating container: 500L

- Gelatin/chitin powder with micronutrients and GCM are added into cultivating container containing 500 L of water.
- 3 days after, add fertilizer, and sugar.
- 3 more days cultivation with air blowing.
- 2~3 times dilution and sprayed to plants.



Way forward together

- ▶ a Web-based portal or platform, where relevant activities and resulted outputs could be linked, shared and harmonized through continuous coordination among lead stakeholders and expertise providers having a capacity to do so...

End of Document



MINISTRY OF FORESTRY AND RESEARCH

UN CTCN TA Project Inception Meeting for Solomon Islands

- Korea Environment Institute (KEI)

The establishment of an Integrated Coastal Zone Management (ICZM) Plan to protect the mangroves through Ecosystem based adaptation solutions

Tuesday, 28th February 2023

Honiara Hotel

by : Terence Titiulu

Deputy Forest Commissioner

Forest Resource Management and Technical Services Division

Phone: 24215 or 7537774

Email: ttitiulu@mofr.gov.sb or ttitiulurukale@gmail.com



Outline Content

1. Brief Introduction
2. Integrated planning & coordination of coastal developments
3. Existing policies, plan and programmes
4. legal and institutional instruments
5. Relevant eco-system based protection of the mangroves
6. Livelihoods of coastal communities.
7. Revenue Data sources for the livelihoods of coastal communities
8. Socio-economic contributions of mangroves to coastal livelihoods
9. Conservation of coastal and marine resources and environment
10. Environmental risks associated with changes in shoreline
11. institutional & legal frameworks for implementation of the ICZM policy
12. Conclusions



Brief Introduction

- Solomon Islands natural forests are classified into these main forest types:
- **Lowland Forests:** Forests on level or nearly level land below 200 m above sea level.
- **Hill Forests:** Forests between 200 m - 600 m above sea level on well-drained soils.
- **Montane Forests:** Forests at higher altitude ridge tops, generally >600 m above sea level.
- **Freshwater Swamp and Riverine Forests:** Forests on land with little relief and impeded drainage.
- **Mangroves and Saline Swamp Forests:** Forests on land subjected to tidal influences such as estuaries and foreshores.



Brief Introduction cont...

- Forests cover 89.9% of the total land area. The forest structure and species composition varies significantly.
- It is estimated that 51% of the natural forests are comprised by Lowland Forests, 38% by Hill Forests, 10% by Montane Forests.
- Only 1% are Mangroves and Saline Swamp Forests,
- and 0,3 % are Freshwater Swamp and Riverine Forests.
- Solomon Islands has reported mangrove forests of about 37,700 hectares (FAO 2010), although this figure could be higher up to 60,200 hectares, making it the second largest area of mangroves in the Pacific after Papua New Guinea (MESCAL. 2013)



Integrated planning & coordination of coastal developments

- Mangrove forest protection
- Protected area laws can play an important role in achieving protection of certain areas for conservation.
- Solomon Islands currently has large number of small community level based protected areas.
- However these protection means are often weak as they are either established under Provincial ordinances, customary law or for conservation interests alone.
- It is therefore do not give strong legal protection against development landuses such as logging.



Integrated planning & coordination of coastal developments Cont...

- In Solomon Islands there are some mechanisms under which areas of land can receive legal protection for conservation;
- 1. Declaration of a protected area under the Protected Areas Act 2010.
- 2. Declaration of conservation areas at Provincial Level. Provincial ordinances which allow for areas to be set aside for conservation. The process can be hiccup due to land tenure system.
- 3. Declaration of a Sanctuary: The Minister can declare any land, including customary land, to be a sanctuary under the Forest Resources and Timber Utilization Act from which timber must not be removed (Section 44(1) (s); Sch 2). However the land must first be completely acquired, which is unlikely to be acceptable to customary landowners.



Integrated planning & coordination of coastal developments Cont...

- 4. Declaration of a state Forest: The Minister can declare Public land to be state forest under the FRTU Act (Section 20-23). However, only if land is state owned.
- 5. Declaration of a Forest Reserve: The Minister can declare a forest to be a forest reserve under the FRTU Act, but only for a limited purpose of protecting water resources (Section 24-28).
- Mangrove and tidal areas can be declared a marine protected areas under the Protected Areas Act 2010.
- The Fisheries Act 1998 empowers Provincial Governments to make ordinances to establish and protect marine reserves and to regulate and prohibit the destruction of mangroves.



Existing policies, plan and programmes (PPP)

- While Solomon Islands does not have a comprehensive legal framework for the protection and management of mangroves, there exists certain **Strategies under the SI NFP 2018.**
- **Relevant Regulations can be drawn from the Recent SI NFP 2018 to address the existing gaps.**
- **Under the SI NFP 2018 are 16 Goals**

The SI Forest Policy's Strategies are:

- **Forest Conservation;**
- **Sustainable Forest Management;**
- **Capacity Development ;**
- **Forest Economy and Markets;**
- **Community Governance ;**
- **Monitoring and Law Enforcement;**
- **Transparency.**



Existing policies, plan and programmes (PPP) Cont...

- While MOFR does not have a comprehensive legal framework for the protection and management of mangroves, **there exists legal protection under the following;**
- Felling and removal of mangroves from any land for commercial use without a license is prohibited under the the current FRTU Act (Protected Species) regulations 1990.



What are the legal and institutional instruments in support of the policies plan and programmes (PPP)

- List of laws, regulations and decisions providing legal mandate for the PPP
- Solomon Islands National Forest Policy 2018
- **SI NFP Vision Statement**
“Forests resources and ecosystems are sustainably and responsibly managed for the benefit and resilience of all Solomon Islanders.”
- Protected Areas Act 2010.
- FRTU Act 1969
- SI COLP 2002



MINISTRY OF FORESTRY AND RESEARCH

Do these PPP have any component relevant to the (eco-system based) protection of the mangroves

- MOFR does not have a comprehensive legal framework for the protection and management of mangroves.
 - However some extend of legal protection is available under the following;
 - Felling and removal of mangroves from any land for commercial use without a license is prohibited under the current FRTU Act (Protected Species) regulations 1990.
 - KOICA – MOFR SI Project 2013 – 2015 Action Plan
- (To be reviewed and Cross Checked)**
- Mangrove and tidal areas can be declared a marine protected areas under the Protected Areas Act 2010.
 - The Fisheries Act 1998 empowers Provincial Governments to make ordinances to establish and protect marine reserves and to regulate and prohibit the destruction of mangroves. ||



Do these PPP have any component relevant to the (eco-system based) protection of the mangroves

- If not, what kind of (gap closing) amendment or revision do we need to introduce in each of sectoral PPP?
- Develop integrated Relevant Legal Regulations under current Policies and Legislations.
- Develop a Stand alone Mangrove Policy and Provisions for legal framework, such as Solomon Islands Mangrove Act.
- Inclusion of Mangrove Management under the current Forest Act review.



Livelihoods of coastal communities.

- What are the **main revenue sources** for the livelihoods of coastal communities?
- Sale of Poles for Housing Construction.
- Sale of Poles for Wharf/Jetty Constructions
- Sale of Poles for Firewood
- Shells, Crabs, Fish, Mangrove



Does any data base of the revenue sources for the livelihoods of coastal communities

- If yes, the details of the metadata of that database
- Solomon Islands National Statistics Office, 2018.
- Census 2009. Key Social Indicators
- MECDM
- KOICA – MOFR SI Project 2013 – 2015 Action Plan



Does any data base of the revenue sources for the livelihoods of coastal communities

- If not, what kind of raw data collection and (relational) data base work do we need to support ICZMP
- Check with Statistics Office



MINISTRY OF FORESTRY AND RESEARCH

Are there Research reports or any analysis on the socio-economic contributions of the mangroves to the livelihoods of the coastal communities in Solomon Islands

- If yes, List of existing documents
 - Mescal Report 2013
 - Solomon Islands National Statistics Office, 2018.
 - Census 2009. Key Social Indicators
 - Ridges to reefs conservation for the Solomon Islands, 2010



MINISTRY OF FORESTRY AND RESEARCH

Conservation of coastal and marine resources and environment

- What are the main resources and environmental challenges in coastal & marine eco-systems?
- Solomon Islands currently has large number of small community level based protected areas.
- However these protection settings are often weak as they are either established under Provincial ordinances, customary law or for conservation interests alone.
- It is therefore do not give strong legal protection against development landuses such as logging.
- Monitoring and Enforcement is weak or either not a priority for mandatory enforcement



Environmental risks associated with changes in shoreline and climate

- What are the expected climate change impacts in coastal ecosystem including shorelines?
- Ownership of area below the high water mark belongs to the State or Customary Ownership.
- Sea level rise will be an issue of Concern in determining ownership.
- **Lands and Titles Act needs to be amended.**



Establish **effective institutional and legal frameworks** for implementation of the **ICZM policy**

- What are the existing **institutional and legal frameworks** relevant to the mangroves?
- List of laws, regulations and decisions providing legal mandate for the PPP
- Felling and removal of mangroves from any land for commercial use without a license is prohibited under the current FRTU Act (Protected Species) regulations 1990.
- **Mangrove and tidal areas can be declared a marine protected areas under the Protected Areas Act 2010.**
- **The Fisheries Act 1998 empowers Provincial Governments to make ordinances to establish and protect marine reserves and to regulate and prohibit the destruction of mangroves.**



Conclusion

- **Tools Needed**



- Improved integrated government Policy developed
- Comprehensive Mangrove Policy developed.
- Financial Support for Inventory capturing Mangrove Livelihood
- Technical Capacity Enhanced



Questions?



Integrated Coastal Zone Management

NATIONAL PERSPECTIVE (ECD/MECDM)

28 FEB 2023

PRESENTED DURING THE INCEPTION MEETING - UN CTCN TA PROJECT

HONIARA

BY AGNETHA VAVE-KARAMUI - ECD, MECDM



Outline

- ▶ **ECD/MECDM – legal and policy context for ICZM**
- ▶ **Inshore/Coastal Management & Ecosystem Based Approach related frameworks, initiatives and programs**
 - R2R Initiatives, CBRM, EAFM, LMMAs, MMAs, MPAs etc
- ▶ **Ocean work – Marine Spatial Planning**
- ▶ **Considerations for ICZM**

ECD – legal mandates and functions

- ▶ **Environment Act 1998**
 - Development Control
 - Pollution Control
- ▶ **Wildlife Protection and Management Act 1998, Amendment 2017**
 - CITES, non-CITES, Wildlife Management
- ▶ **Protected Areas Act 2010**
 - PA (marine/terrestrial), Bioresearch & Bioprospecting Research
- ▶ Also aligned to several **Multilateral Environmental Agreements**, UNCBD, CITES, WHC, etc.
- ▶ Workplans



Convention on
Biological Diversity



United Nations
Framework Convention on
Climate Change



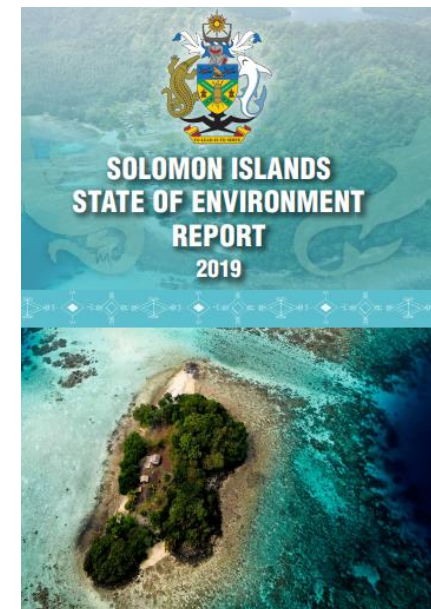
UNCCD

Related frameworks, strategies, plans..– “coastal management”

- ▶ NEMS
- ▶ NBSAP
- ▶ NAPA , SINCCP
- ▶ SI NPOA (CBRM /ICM framework), CBRM Upscaling Strategy, SINIS ..
- ▶ NWMPCS - waste mgt and pollution control
- ▶ SI Ridge-Reef Conservation Plans (Isabel, Choiseul)
- ▶ Species Management Plans (e.g. Marine Turtles, Coral Reefs, Dugong/Seagrass Ecosystems, etc)
- ▶ Others – NDS, IFS, SINOP, RPOA-CTI-CFF, SPREP regional action plans etc

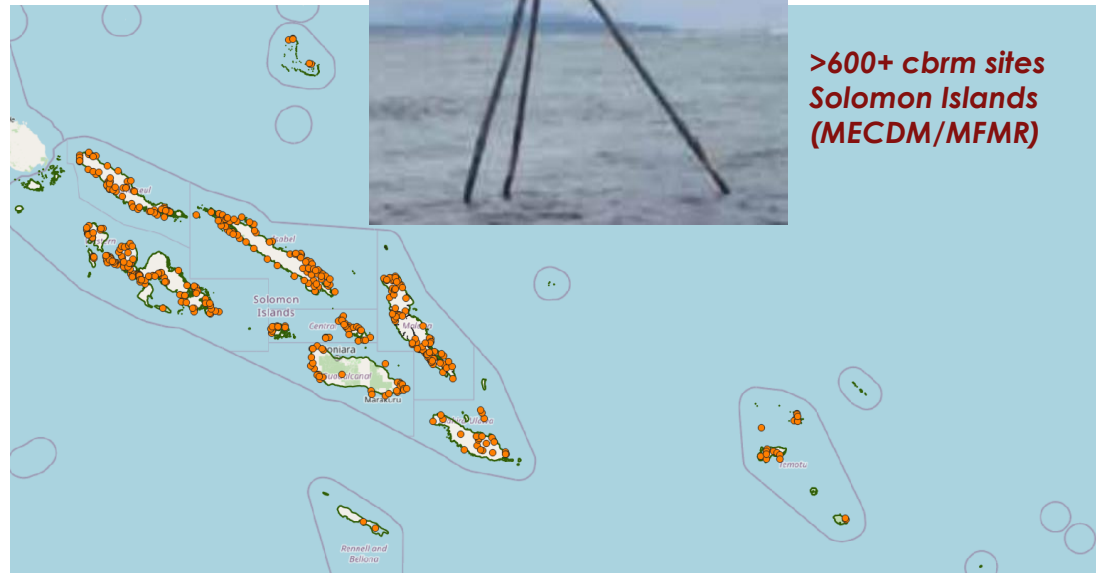
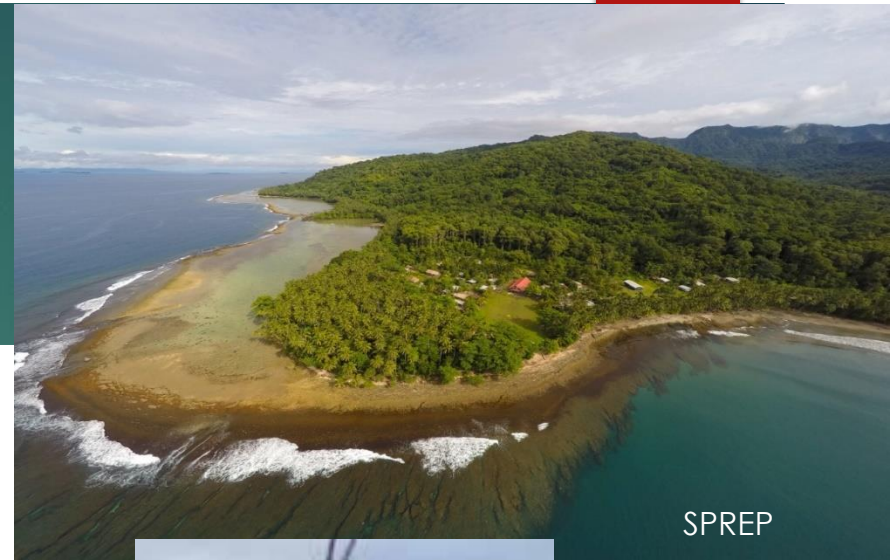


SOLOMON ISLANDS ENVIRONMENT DATA
PORTAL
Environmental Information for Decision Making



Coastal area:

- ▶ 80% coastal communities – 1km inland, islands, +4000 communities
- ▶ Transport, economic hubs, provincial centers,
- ▶ Key habitats – mangroves, beach, coastal forest, seagrass, coral reefs,..
- ▶ Inshore area (MSP analysis) – <200m depth (reef associated bioregions)
- ▶ Conflicting uses/interests – sectoral responsibilities
- ▶ Marine tenure system – traditional use/rights and customary ownership,
- ▶ Management – CBRMs, CBFMs, MMAs, LMMAs, MPAs



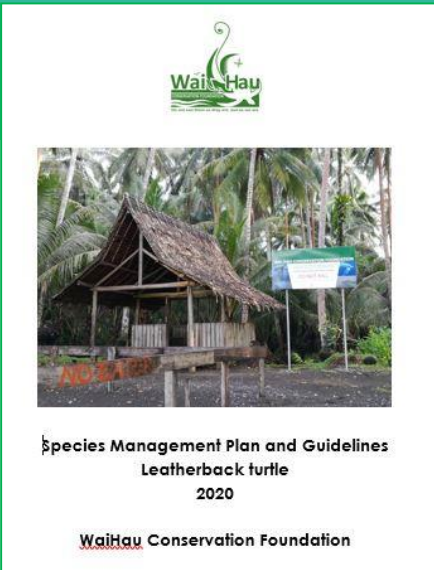
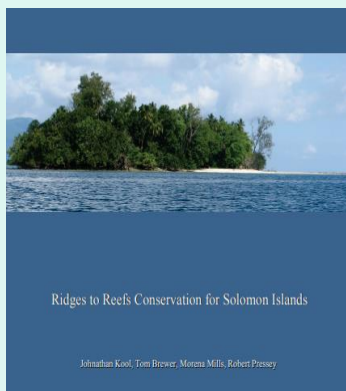
Protecting, Conserving and/or Managing Biodiversity

- Landscape or seascape
- Critical and important ecosystems and habitats – **MANGROVES**
- A unique species – population /community.
- significant genetic, cultural, geological or biological resources
- Cultural heritage sites or taboo areas
- Damaged or degraded areas – restoration, rehabilitate, restock,
- Ex-situ



..demonstrated in many ways

- Kastom/cultural practices – religion
- Community Rules
- Prohibitions/ Restrictions – size, seasonal closures, quote settings, licenses/permits, gears
- Laws/regulations



Conservation, Protection and Resource Management:

- Set up conservation/protected areas or establish conservation/CBRM programs
- Manage – who will look after it and how. Have RULES and also sometimes penalties for breaking the rules.
- Have someone/group to be responsible for looking after the program or area (chief, committee, project, authority, Institution (e.g University)



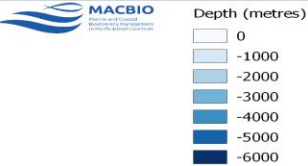
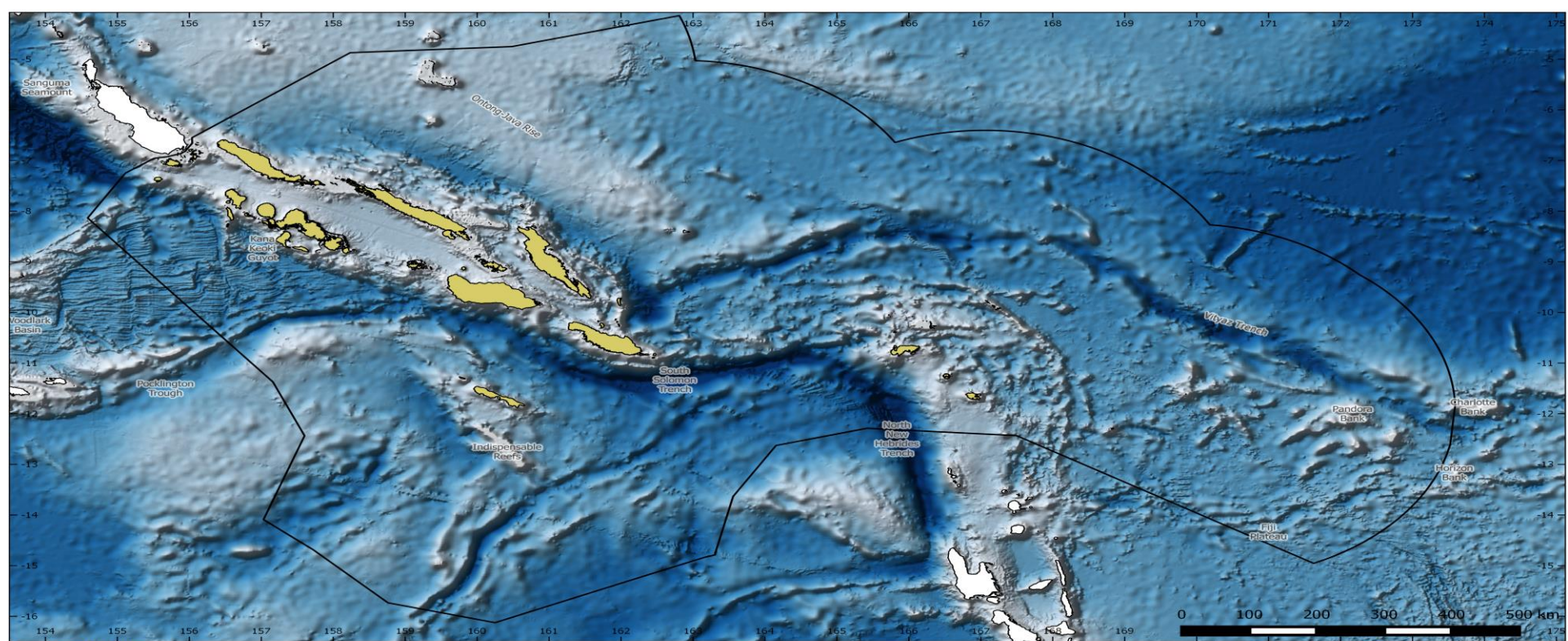
Ocean Policy & Marine Spatial Planning

- ▶ Marine Spatial Planning or Ocean Planning
 - SINOP priority aspect- led by MECDM and MFMR
 - MSP TWG established – co-chairs
 - comprised of multi-disciplined Team (+20 members)

- ▶ **Tasks:**
 - With IUCN ORO team (MACBIO/PEUMP), conducted nation-wide ocean planning consultations and report findings.
 - Development of a draft Marine Spatial Plan and Map/s.
 - Provide feedback to PSs MECDM/MFMR > Ocean12 TWG> Ocean12

Solomon is Ocean

- 1.34 Million sq.km.
- 98% is ocean



Solomon Islands Bathymetry

Bathymetry data was first collected in the deep oceans in the middle of the 19th century using simple plumb-lines (weighted twine or rope), marked at regular intervals to give the depth. The introduction of acoustic measuring systems (single-beam echo-sounders) in the 1930s led to a huge increase in the volume of data collected. Today, multi-beam echo-sounder systems can map swathes of the ocean floor, collecting large volumes of data.

To store the increasing volumes of digital bathymetry data being collected and to make this generally available, the International Hydrographic Organization setup the Data Center for Digital Bathymetry (IHO DCDB), hosted at the US National Centers For Environmental Information (NCEI). In areas of sparse sounding data coverage, satellite altimetry data can help us map the ocean floor. This measures the height of the sea surface. Small variations in sea height can be related to changes in the earth's gravity field. This in turn can be related to the shape of features on the ocean floor.



Data Sources:
Land outlines: Ministry of Lands and Survey
Province Boundaries: Ministry of Lands and Survey
Bathymetry: The General Bathymetric Chart of the Oceans (GEBCO), <http://www.gebco.net>

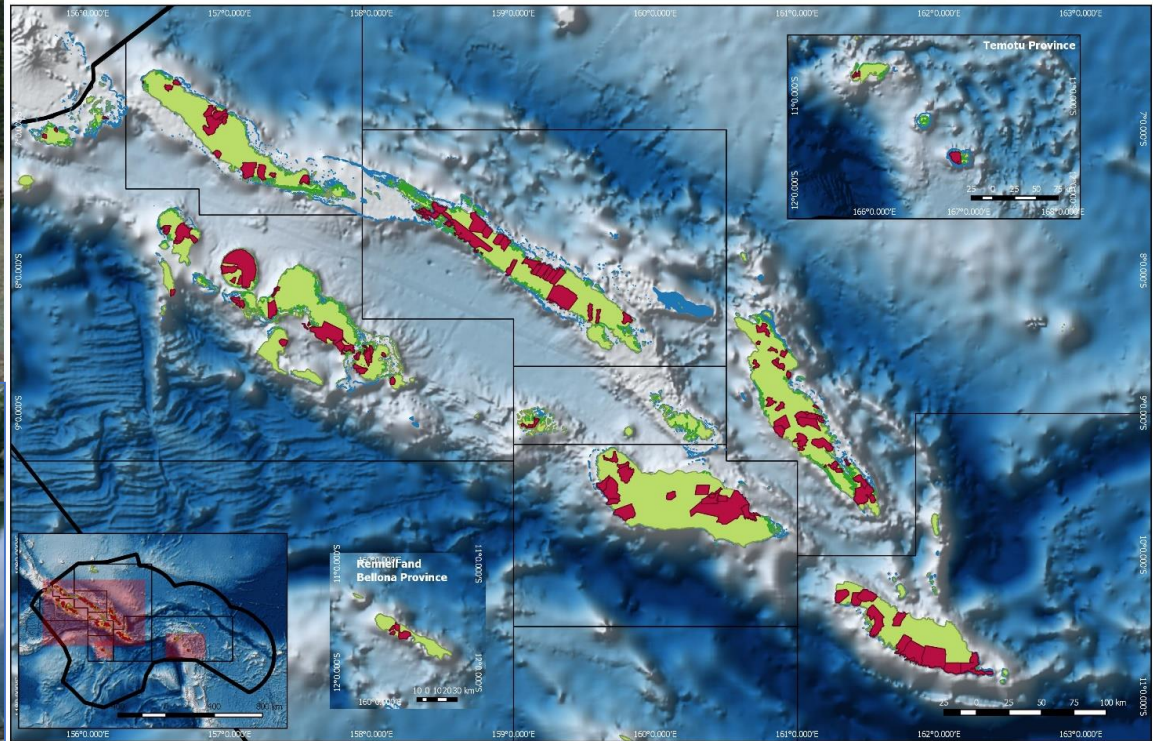
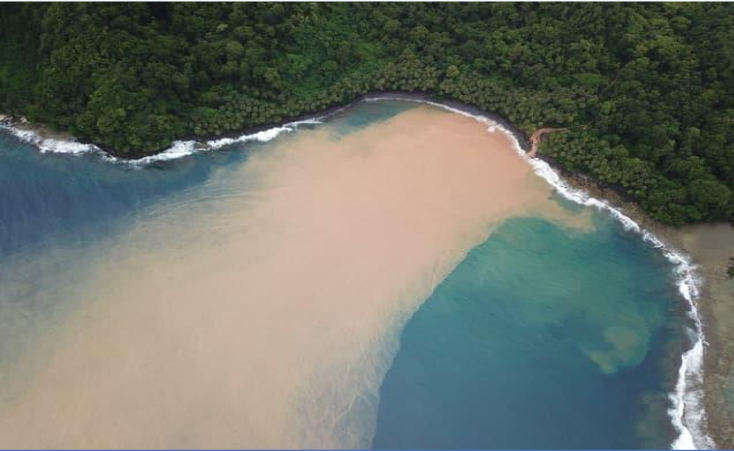
We are Ocean People

Ocean is our Survival and Livelihood

- **Coastal communities -4000+**
- **Food, income, leisure, livelihoods, economy**
- **Est. value SBD\$2.6Billion per annum – marine ecosystem services**
- **Traditions, Songs, Dances, Kastom practices e.g. Kite fishing in Makira**
- **History and heritage (artificial islands, outer islands)**
- **Ownership**



Land – based threats (logging, waste mismanagement...)

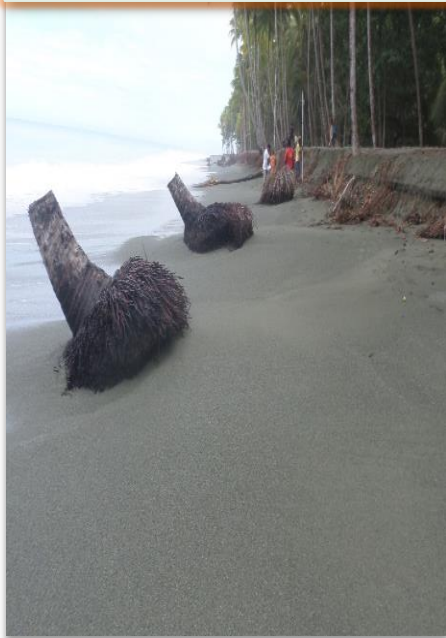
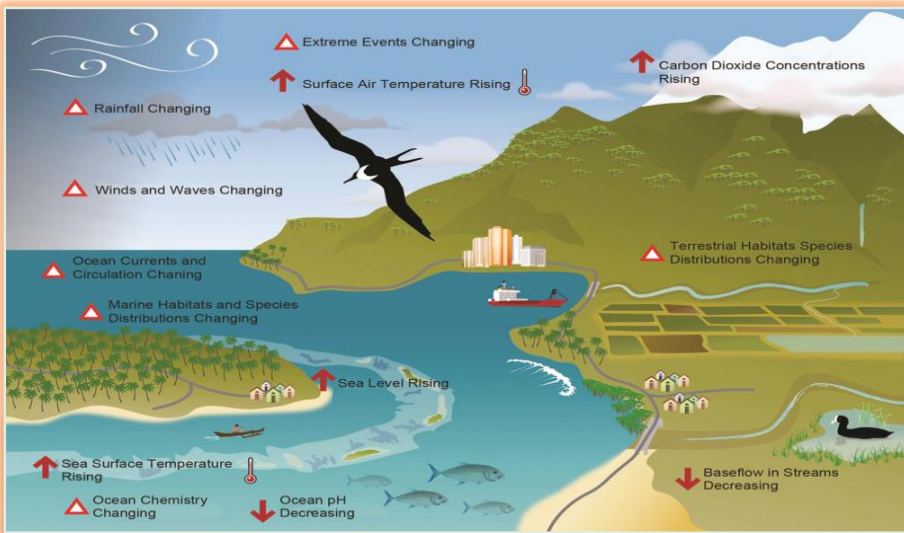


- Current Logging sites
- Mangroves
- Reefs

Current logging sites - 23. April 2018

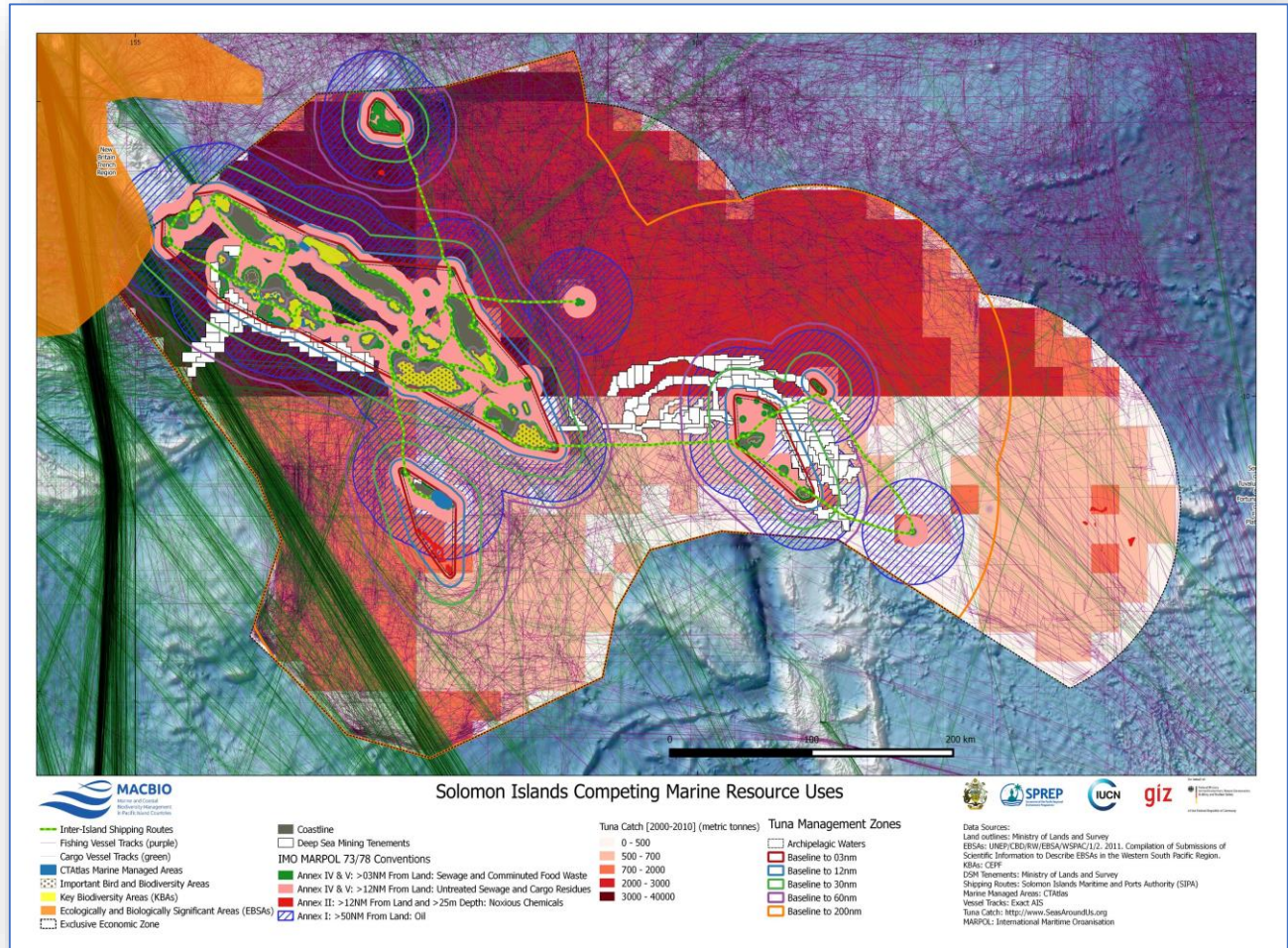
Data Source (Logging sites): Ministry of Forestry & Research
Land outlines: Ministry of Lands and Survey
Province Boundaries: Ministry of Lands and Survey

Climate Change and its impacts



Our ocean reality....

...conflicting/
competing
values and uses



SIG's efforts towards better ocean governance



2015 – Inaugural Ocean Summit

- Attended by 12 Ministries incl. OPMC
- Joint Communique for integrated ocean resource management needed, including spatial planning

Shared vision: SINOP
2018



Ocean12 Meeting
Report

2016 – Ocean12 established

incl. Technical Working Group



2017 – UNOC Voluntary Commitments

Integrated Ocean Governance aiming to achieve National Ocean Policy and Marine Spatial Plan by 2020.

5 themes prioritized by O12TWG.

“A healthy, resilient, secure and productive ocean, that supports sustainable use and development for the benefit of the people of Solomon Islands now and into the future”



2018 – SI National Ocean Policy

endorsed by Cabinet

Biodiversity targets:

- Global Target: Contribute to include 10% of coastal and marine areas in a well-connected systems of protected areas and other effective area-based conservation measures (CBD, 1994). >>> [Global Biodiversity Framework post-2020](#).
- Develop an integrated National Oceans Policy and Marine Spatial Plan for Solomon Islands (UN Oceans Conference, 2017). This was further committed to in UNOC 2022 (5 VCs).
- National Target: Include 15% marine areas as per NBSAP (2016-2020)



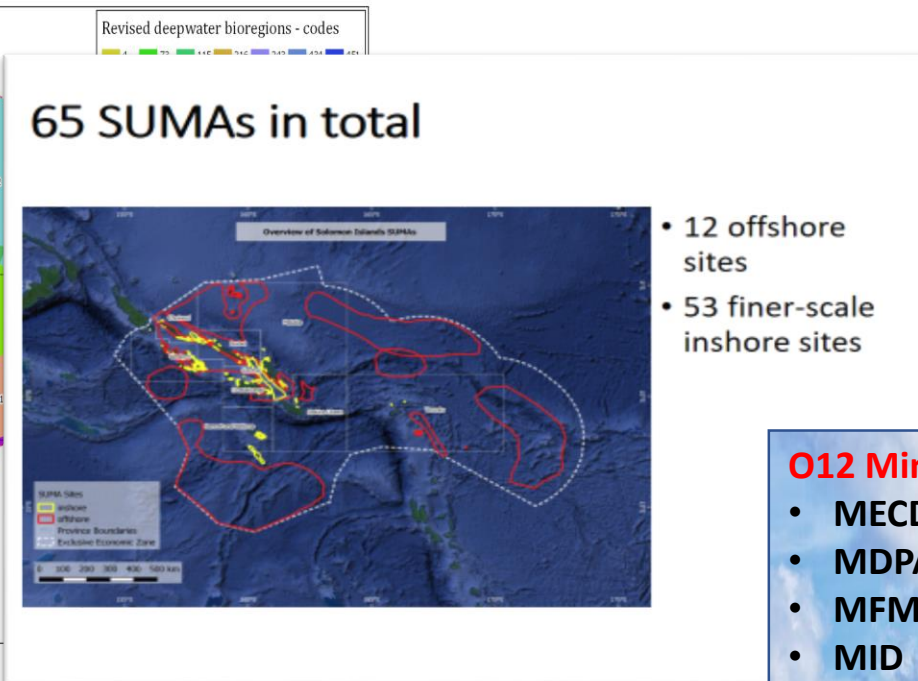
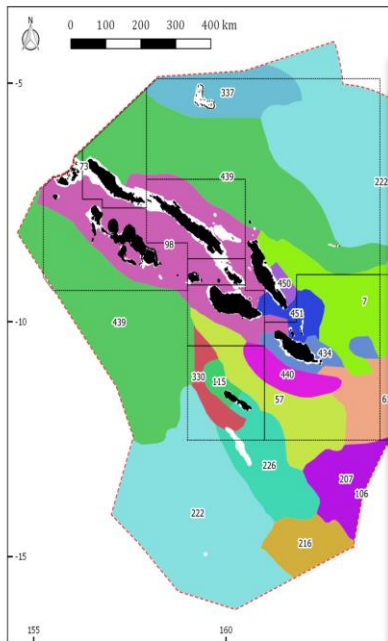
Marine Spatial
Planning is
similar to
land-use
planning

- identifying
activities
allowed,
restricted or
prohibited in
specific areas

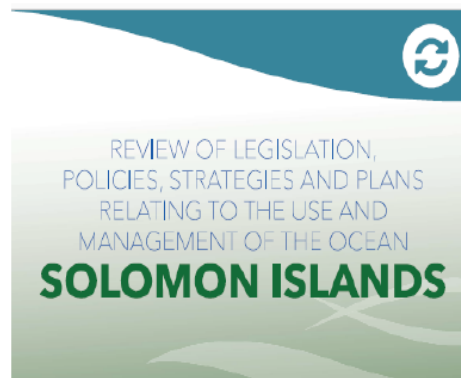


Key building blocks for Ocean Plan

1. Gathering ocean data (65+ datasets)



- **2. Legislative Review (50+ instruments) and understanding authorities and functions**



O12 Ministries

- MECDM
- MDPAC
- MFMR
- MID
- MFAET
- MJLA
- MMERE
- MPNC
- MLHS
- MFR
- MCT
- MPGIS

Key building blocks for Ocean Plan

3. Ocean zones/Typology

- These are the zones (6) that Solomon Islands may use in its Marine Spatial Plan or Ocean Plan.
- Each zone has specific objectives:

	General Use Zone	Locally Managed Marine Zone /Cultural Zone	Sustainable Use Zone	Limited Use Zone	No-take Zone/Marine Protected Zone	Special Zone
Activities						
Mining - (other than non-commercial sand, gravel and aggregate mining) incl exploration, prospecting ¹	Yes	No	No	No	No	No
Benthic disturbance (trawling/ dredging, weighted lines)	Yes	No	Yes	No	No	tbd per site ⁴
Industrial Fishing ^{1,2}	Yes	No	Yes	No	No	tbd per site ⁴
Other non-artisanal fishing ^{1,3}	Yes	tbd per site ⁴	Yes	No	No	tbd per site ⁵
Non-commercial sand, gravel and aggregate mining	Yes	tbd per site ⁴	Yes	No	No	tbd per site ⁵
Fish Aggregating Devices (FADs)	Yes	tbd per site ⁴	Yes	No	No	tbd per site ⁴
Anchoring/walking/standing	Yes	tbd per site ⁴	Yes	No	No	tbd per site ⁴
Traps, Pens and Fences	Yes	tbd per site ⁴	Yes	No	No	tbd per site ⁴
Gleaning	Yes	tbd per site ⁴	Yes	No	No	tbd per site ⁴
Hand spearing	Yes	tbd per site ⁴	Yes	No	No	tbd per site ⁴
Netting (mesh, gill, cast, etc)	Yes	tbd per site ⁴	Yes	No	No	tbd per site ⁴
Hand-line Fishing	Yes	tbd per site ⁴	Yes	Yes	No	tbd per site ⁴
Tow-line fishing	Yes	tbd per site ⁴	Yes	Yes	No	tbd per site ⁴
Non-extractive uses (diving, swimming, snorkelling, kayaking, sailing, boating, canoeing, etc)	Yes	tbd per site ⁴	Yes	Yes	Yes	tbd per site ⁴
Mariculture1a	Yes	tbd per site ⁴	Yes	No	No	No
Works (dredging, reclamation, building, laying cables)	Yes	tbd per site ⁵	Yes	No	No	No
Artificial modification (e.g. beach nourishment, restocking ³ , artificial reefs ⁹)	Yes	tbd per site ⁴	Yes	No	No	No
Ecosystem restoration (e.g. coral or clam re-introduction, stock enhancement ⁸ , removal of crown-of-thorns starfish)	Yes	tbd per site ⁴	Yes	Yes	Yes	Yes
Research	Yes	tbd per site ⁵	Yes	Yes	Yes	Yes
Dumping of solid and liquid waste including sewage and ballast water from marine vessels beyond 12nm	Yes	No	No	No	No	No
Baitfishing	tbd per site	yes	tbd per site	No	No	No
Prescribed development	No	Development consent only (DC)	DC	No	No	No
Research	By permit	By permit	By permit	By permit	By permit	By permit

Ocean Zone Name	Management Objectives
General Use Zone (transparent)	To allow for and manage multiple uses of Solomon Islands' marine resources.
Locally Managed Marine Zone / Cultural Zone	To benefit local communities by sustainable marine resource management and marine resource protection as determined by communities.
Sustainable Use Zone	To allow for sustainable use of Solomon Islands' renewable marine resources including non-artisanal commercial fishing.
Limited Use Zone	To protect the integrity of benthic habitat by supporting limited, including non-artisanal fishing, as well as non-extractive activities that do not directly impact benthic habitats.
No-take Zone	To protect natural biodiversity along with its underlying ecological structure, support natural environmental and fisheries processes and replenishment, and to promote education and recreation by restricting all extractive uses.
Special Zone	To protect, conserve and restore specific species, habitats or cultural value of concern by eliminating the key threats.

Phase A:

- Introducing the concept of MSP to stakeholders

Phase B:

- Inviting inputs from Stakeholders to the ocean planning

Phase C:

- Inviting submissions to a draft MSP

Phase D:

- Education and information about the final MSP

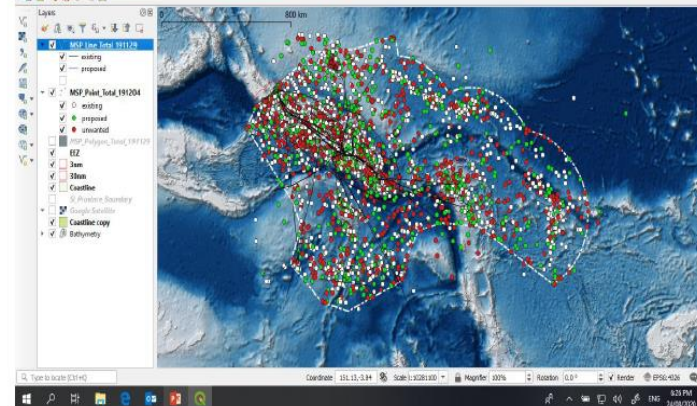
11

4. Stakeholder Consultations

- 2019- set up teams and conduct first round of consultation

Consultation results :

- Completed [9 Provincial and Honiara consultations](#) – June-Sept 2019
- GIS mapping – [spatial maps](#)
- Consultation Report (*final editorials*)



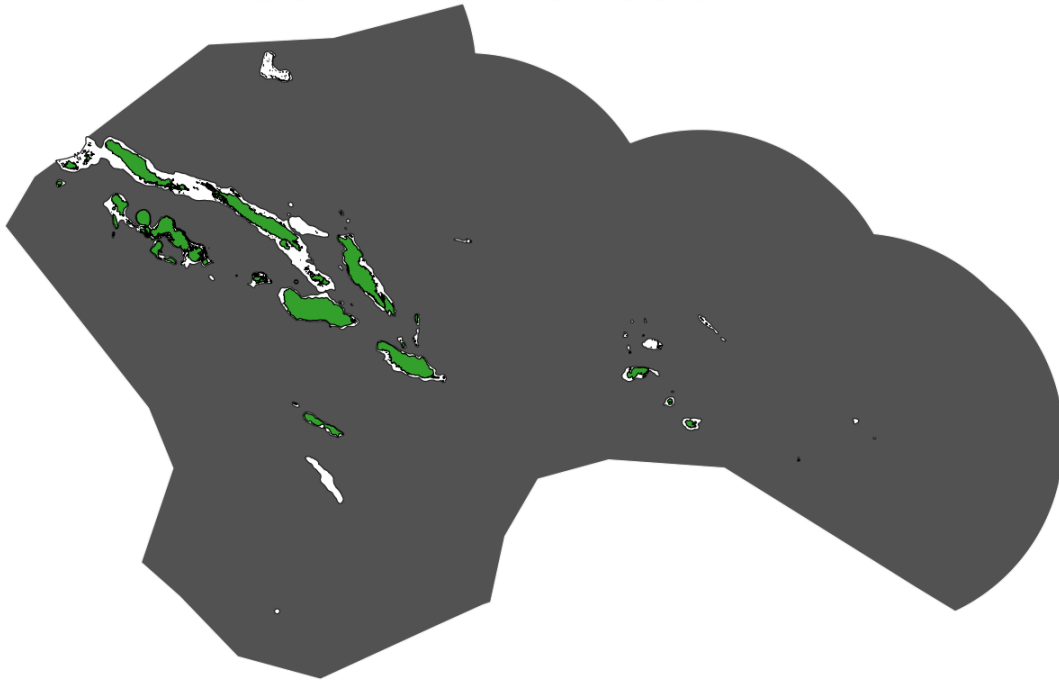
Consultations Round 2:

- Progress of MSP 2nd Consultation Synthesis Report (2020-2021)



Using the data and information to compiled and analyzed for a draft ocean plan (MSP)

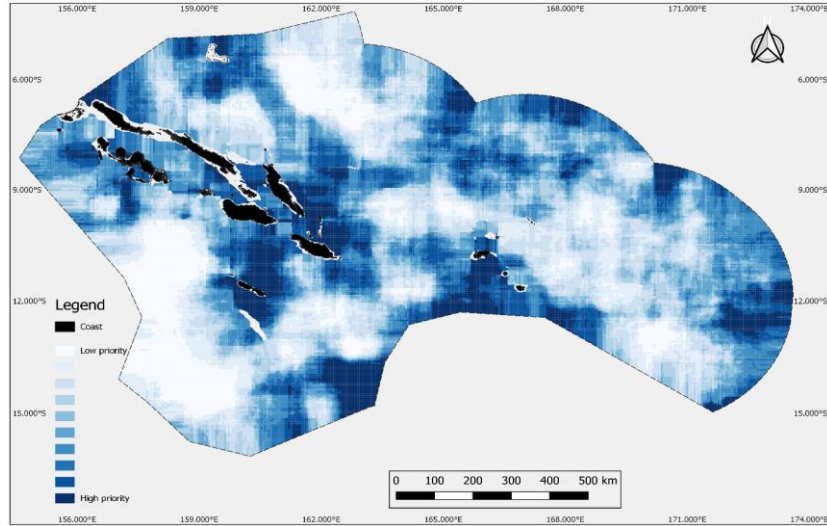
Area of interest



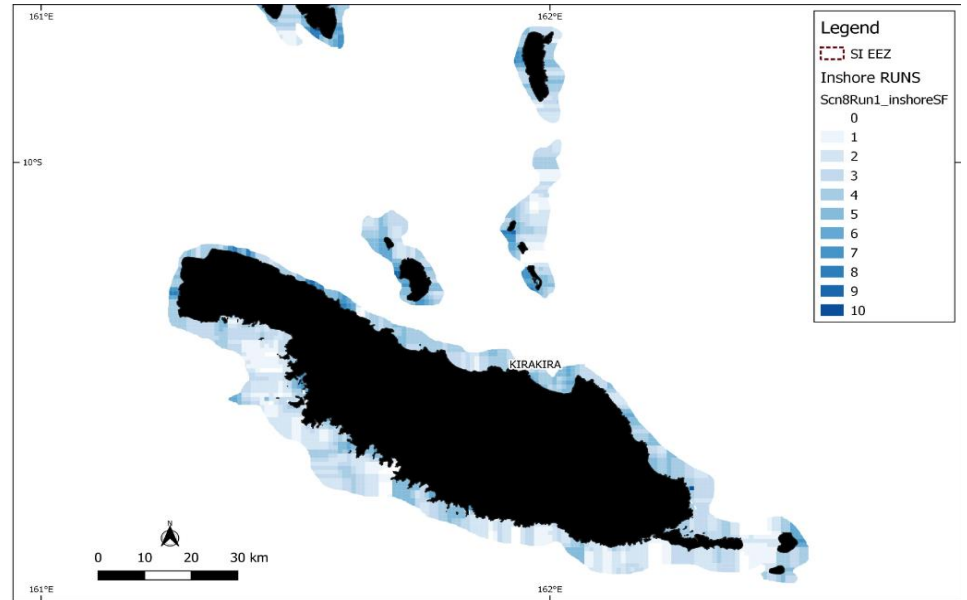
- **Gray** - Offshore
- **White** – inshore – (*reef associated bioregions boundaries*)
- **Green** – land

Inshore – 3NM
& >200m depth

Offshore

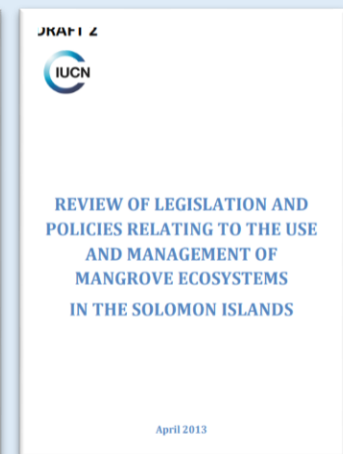
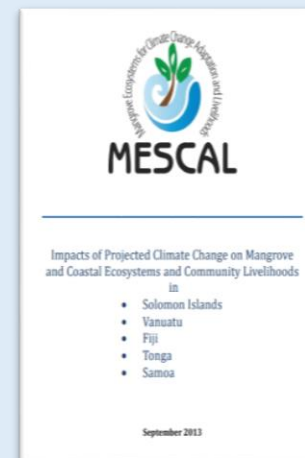


Inshore



Considerations for ICZM

- Terminologies – clarity, defined, communication
- Coastal – inshore? coastal communities?
- Management levels – community, provincial and national “intergrated?”
- Implement existing strategies/plans – NBSAP, NEMS
- Alignment with current programs and initiatives – mangrove management, CBRM upscaling efforts, Marine spatial planning , etc.
- Future prospects – blue carbon ecosystems?





Ministry of Environment, Climate Change, Disaster Management &
Meteorology (MECDM)



Tagio Tumas!!

CONTACT:

Director

**Environment and Conservation Division
Ministry of Environment, Climate Change, Disaster
Management and Meteorology.**

P.O.Box 21, City Center Bldg, Point Cruz, Honiara.

Phone: (677) 26036, Fax: (677) 28054,

<https://solomonislands-data.sprep.org/>

<https://pipap.sprep.org/>

- Discussion on the Roles and Responsibilities of the National & Local Stakeholders (led by PM, remarks by all participants)
- Strategy to overcome the institutional challenges and barriers
- Ways to link with the global and regional support programs
- Demarcation of mangrove ecosystems in cartography



Inception meeting for UN/CTCNETA on ICZMP for the Mangroves in SI with EbAdptSol

28 Feb. 2023, Honiara

UNEP/CTCN
NDE SI
KEI

Mr. Hoyoung Jo
Mr. Thaddeus A. Siota
Mr. sang In Kang

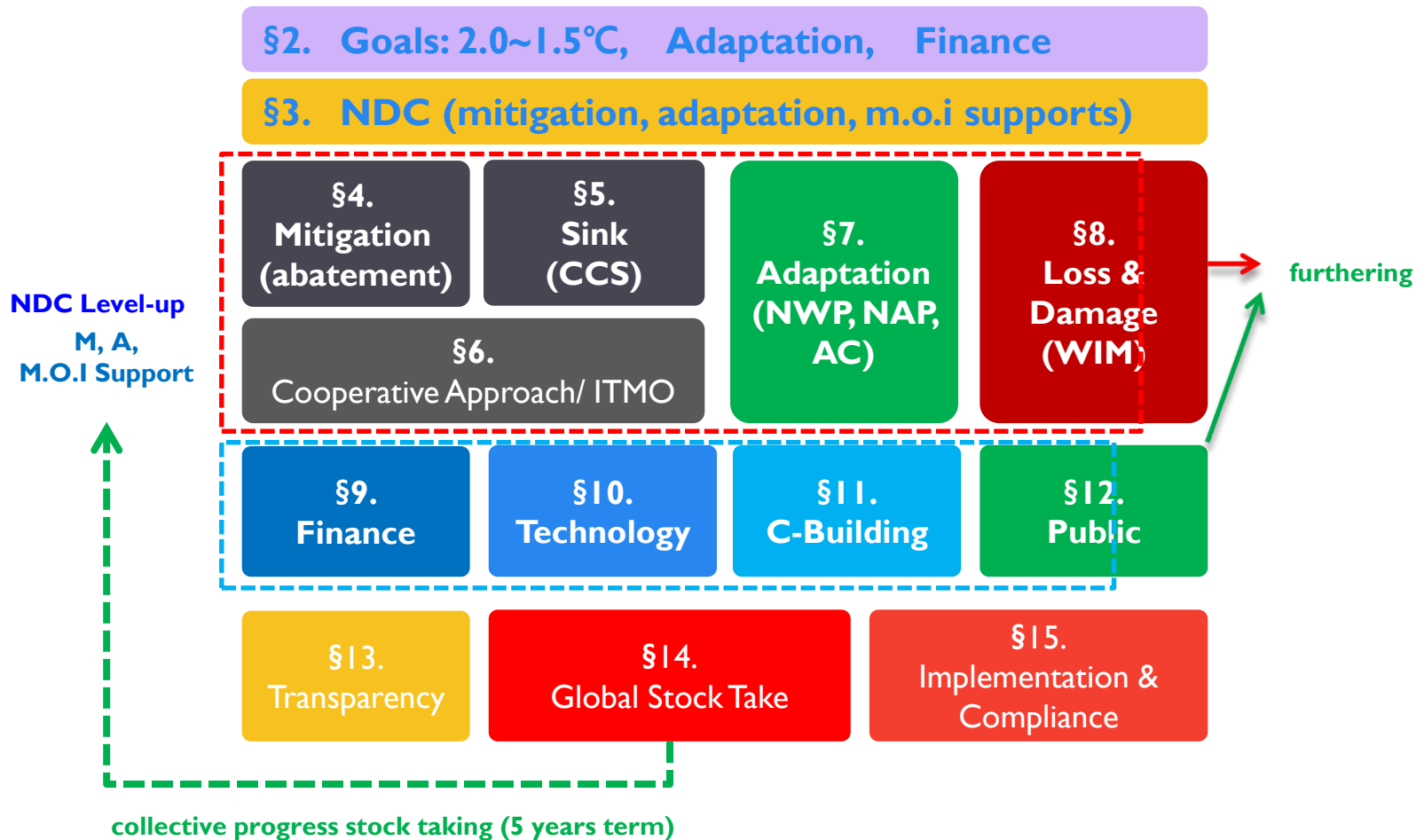


Technological Solutions for ICZM

stock of tech. solutions for the project tasks & components

non exhaustive, to be complemented during the project implementation by KEI & NDE SI

Overview on Climate Change Response with Paris Agreement(2015)



Strategy in Glasgow Climate Pact (Draft decision -/CMA.3 2021)

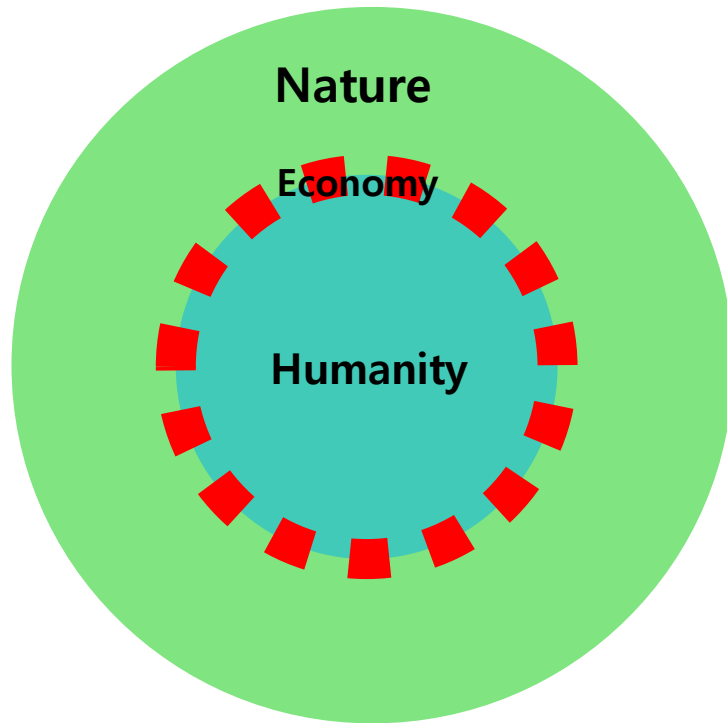
- Organization of work, including for the sessions of the subsidiary bodies -
 - I. **Science and urgency** _ IPCC AR6 by WG1, WG2, WG3
 - II. **Adaptation** _ 2 year Work Programme on Global Goal on Adaptation(2022-2023)
 - III. **Adaptation finance** _ Adaptation Fund, Doubled Collective Pledge
 - IV. **Mitigation** _ Carbon Phase-down, 1.5°C with Net Zero 2050
 - V. **Finance, technology transfer and capacity-building for mitigation and adaptation**
 - VI. **Loss and damage*** _ Operationalization of Santiago Network with Finance
 - VII. **Implementation**
 - VIII. **Collaboration**

*

footnote 9. It is noted that discussions related to the governance of the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts did **not produce an outcome**: this is without prejudice to further consideration of this matter.

footnote 10. Draft decision entitled “Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts” proposed under agenda item 7 of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its third session.

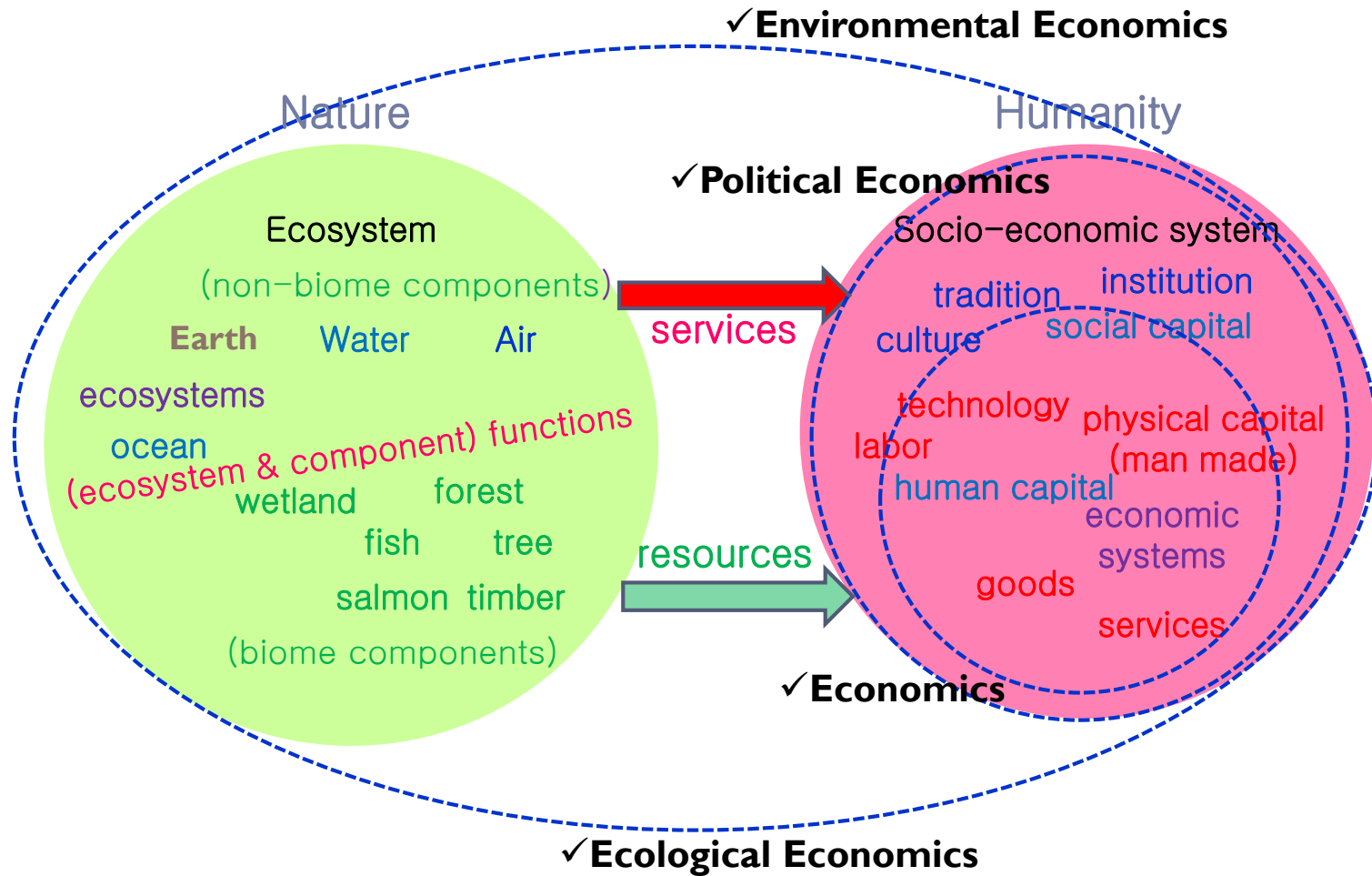
Integration: Nature, Economy, Humanity



Biocentrism vs. Anthropocentrism
Ecology vs. Environment

- ▶ The Nature provides material base of human civilization.
- ▶ Economy is a mode of interaction between the Nature and Man.
 - ✓ Human gets materials from the Nature, produces, consumes and accumulates goods and services for the present and future generations.
 - ✓ **Central Planning** and **Market** represent two major resource allocation and income distribution mechanism throughout the economy.
- ▶ Some part of the nature can not be **appropriated** by human (neither privately nor collectively), but it serves to the basic needs of humanity indirectly (eco-system services).

Integrated Eco-system: Biodiversity in the perspective of Economics



Economy, Economics

✓ **Oikos**-The ancient Greek word **oikos** (ancient Greek: οἶκος, plural: οἴκοι; English prefix: eco- for ecology and economics) refers to three related but distinct concepts: **the family, the family's property, and the house.**^[1]

✓ <https://en.wikipedia.org/wiki/Oikos>

✓ **Nomos** or Nomoi may refer to: from the Greek term for "law" (νόμος, *nómos*; pl. νόμοι, *nómoi*).

- custom, traditional social norm, the equivalent of Latin Mores

- Laws (dialogue), a work by Plato

- Nomos (sociology), "**meaningful orders or worldviews of individuals**" in Peter L. Berger's sociology of religion

- from the Greek νομός, meaning "**pasture, field; division, distribution; district, province**"

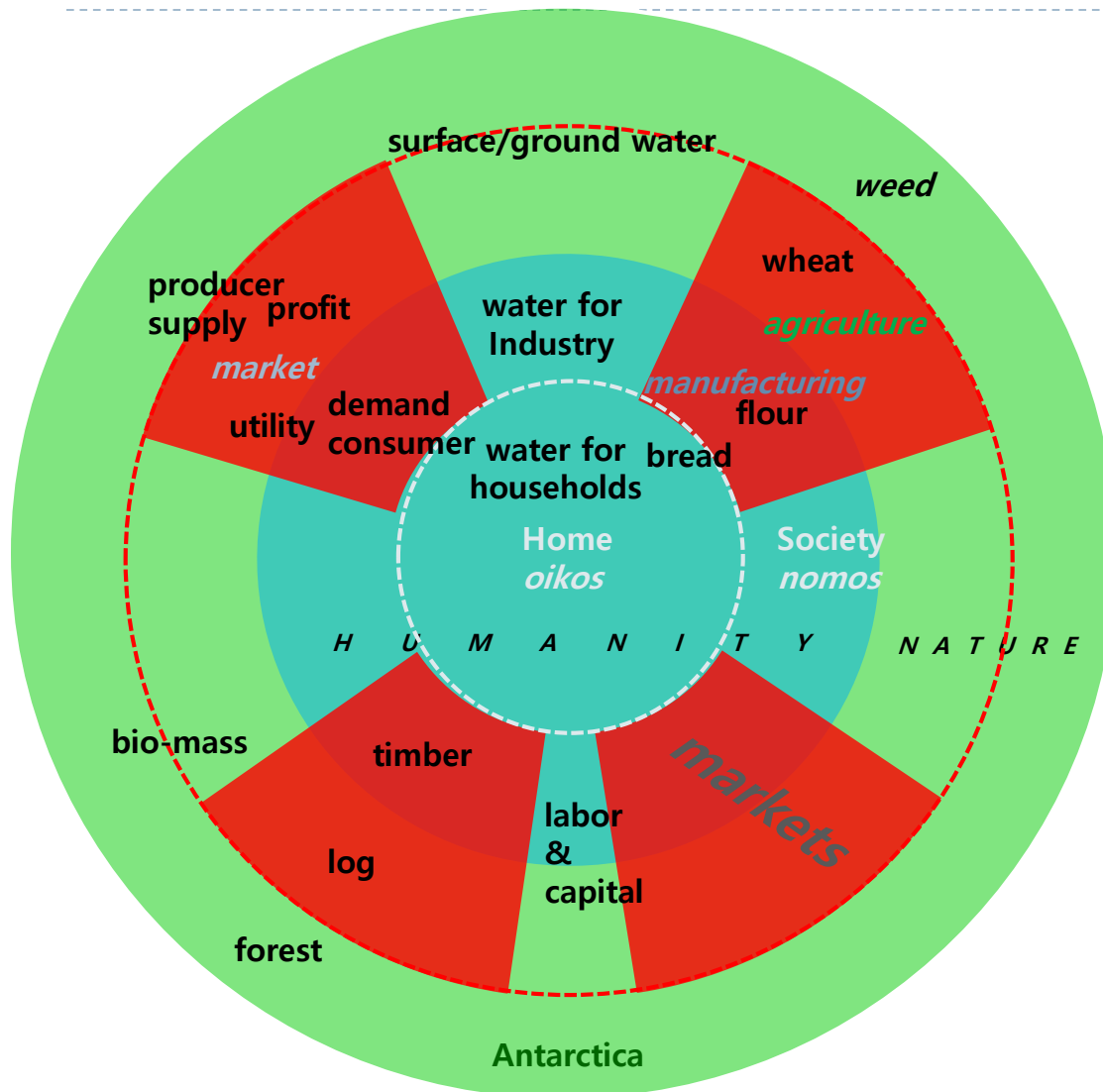
Nome (Egypt), a subdivisions of Ancient Egypt

Nome (Greece), the administrative division immediately below the *peripheries* of Greece (Greek: νομός, *nomós*; pl. νομοί, *nomoí*)

-The nouns *nómos* and *nomós* both derive from the verb νέμω, némō, to dispense or to allot, with *nomós* being the *result* of allotment and *nómos* being the *manner* of allotment or dispensing (justice).

(<https://en.wikipedia.org/wiki/Nomos>)

... market & policy for the individual (personal) & the collective (common) ...



- ✓ Physics vs. Nomos
- ✓ Positive vs. Normative

- ✓ Oikos vs. Nomos
- ✓ Privatus vs. Publicus

- ✓ homo economicus vs. homo reciprocans

Linkage with UN 2030 Agenda for Sustainable Development(2015)

Economic Development

- 8.Economic Development and Employment(12)
- 7.Energy(5)
- 9.Infra-structure and Industrialization(8)

Global Partnership

- 17.Implementation and Global Partnership(19)

Social Development

- 3.Ensure healthy lives
- 4.Equitable quality education(10)
- 5.Gender Equality(9)
- 10.Reduce inequality within and among countries(10)
- 16.Promote peaceful and inclusive societies(12)

Poverty

- 1.End Poverty(7)
- 2.End hunger, achieve food security and promote sustainable agriculture(8)



Environment

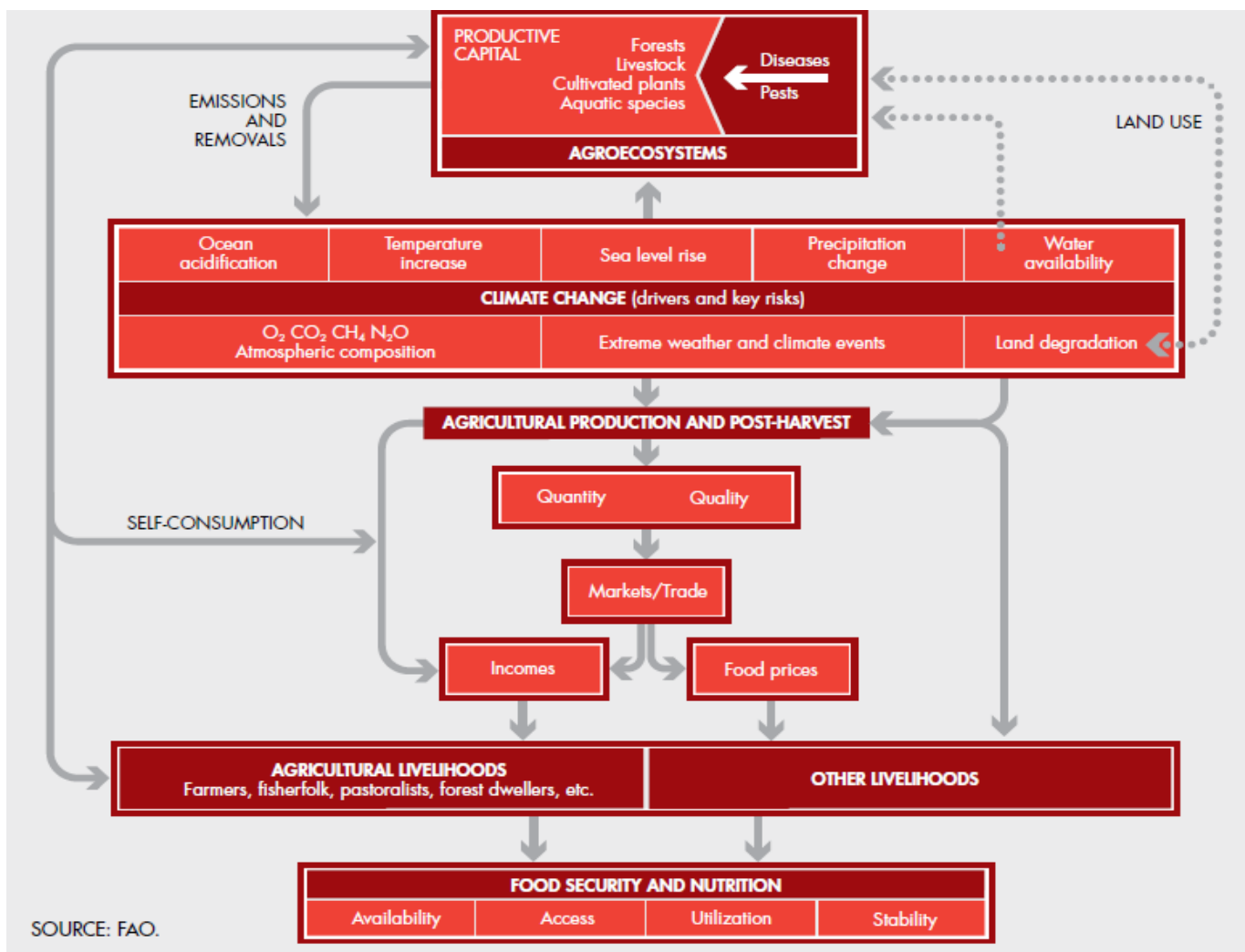
Natural Environment

- 13.Climate Change(5)
- 14.Marine Resources(10)
- 15.Terrestrial Ecosystem(12)

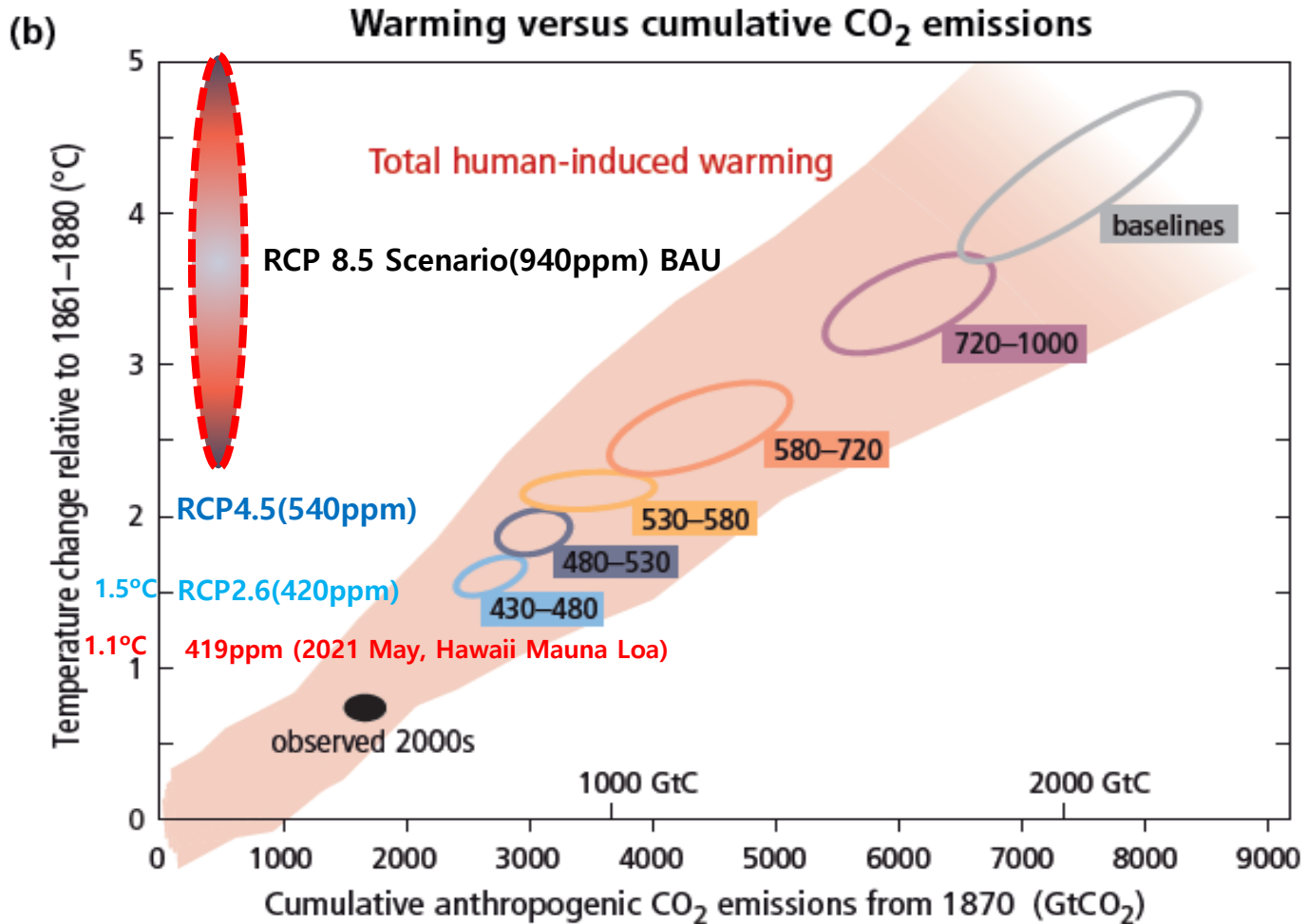
Ambient Environment

- 6.Water and Sanitation(12)
- 11.Make cities(10)
- 12.Sustainable consumption and production patterns(11)

Climate Resilience Management in Value Chain Approach



Climate Scenario _ around 2°C to RCP8.5* Death Valley(*incremental SR=8.5W/m²)

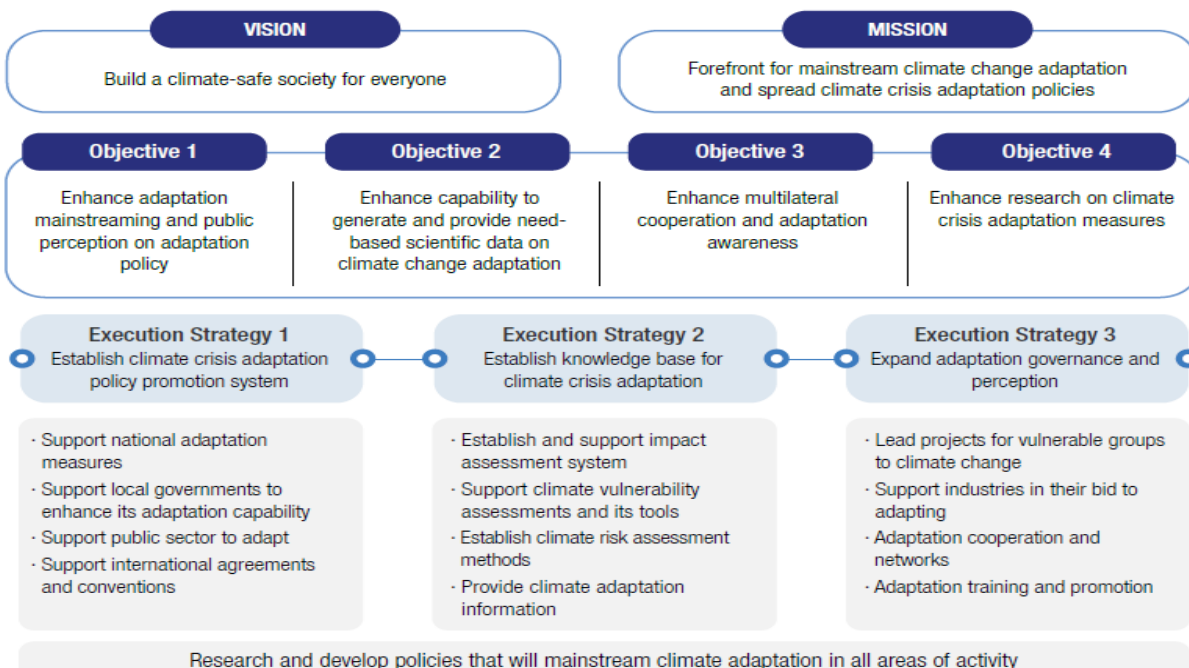


KEI/KACCC (<https://kaccc.kei.re.kr/home/eng/main.do>) provides

Korea Adaptation Center for Climate Change
of the Korea Environment Institute (KEI)

KACCC

The Korea Adaptation Center for Climate Change (KACCC)'s mission is to foster a nation safe from climate crisis by minimizing the impact of climate change through a scientific approach.



- 1 Established legislative and institutional ground
- 2 Provided support to national and local governments on adaptation measures
- 3 Implemented policy measures in line with the public's awareness while establishing a policy feedback mechanism
- 4 Provided need-based support to climate change adaptation entities
- 5 Establish a scientific basis while generating and providing information for adaptation
- 6 Revitalize domestic and international cooperation networks while supporting developing nations
- 7 Training custom-tailored for adaptation entities and awareness raising through promotion

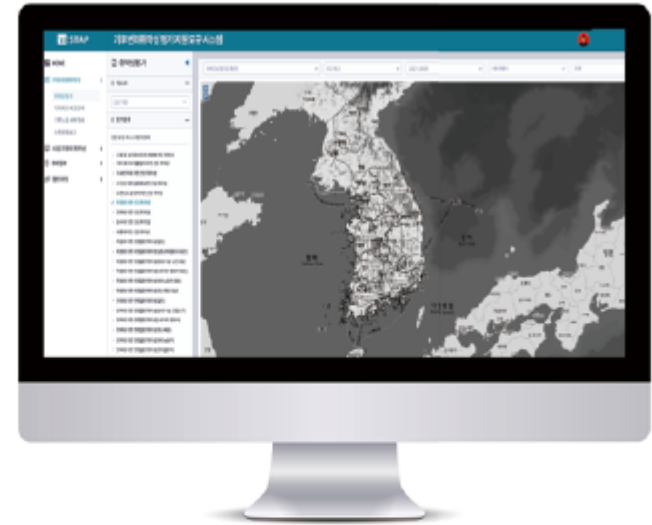
KACCC tools for climate change response _ VESTAP

Vulnerability Assessment Tool to Develop a Climate Change Adaptation Plan

VESTAP

VESTAP is a vulnerability assessment tool that has been available since November 2014. It supports local governments' climate change vulnerability assessments and was expanded in December 2015 to support regional and local climate change vulnerability assessments.

<https://vestap.kei.re.kr/>



What is climate change vulnerability assessment?

- **Vulnerability assessments** integrate climate exposure, sensitivity, and adaptive capacity (*) to determine the degree to which a system of interest is susceptible to continuous damage caused by climate change or the extent to which a system (a unit such as a local or metropolitan government) is incapable of coping with the adverse effects of climate change.
- **Climate change vulnerability** refers to the relative measure of a system's ability to adapt to climate change; generally, a high susceptibility to climate change and a low adaptive capacity indicates high vulnerability (IPCC, 2007).
 - **Exposure:** the degree to which a system is exposed to the impacts of climate change (temperature, precipitation, etc.)
 - **Sensitivity:** the degree to which a system, such as population, infrastructure, or topography, is susceptible to climate change
 - **Adaptive capacity:** the ability of a system to adapt socially and economically to climate change (policies, GRDP, etc.)



KACCC tools for climate change response _ VESTAP

- Provides 57 assessment items across 7 categories (as of October 2021)
 - 32 items (2012) ▶ 41 items (2018) ▶ 45 items (2019) ▶ 57 items (2020)



Health (15 items)



Territorial and Coastal
Infrastructure
(11 items)



Agriculture and
Livestock
(7 items)



Forests/Ecosystems
(10 items)



Water Management
(7 items)



Marine Fisheries
(3 items)



Industries/Energy
(4 items)

Main functions of VESTAP

- VESTAP analyzes indicators based on RCP4.5 and RCP8.5 scenarios. It also provides user definitions for performing vulnerability assessments that are customized to reflect the characteristics of each local government.



Vulnerability to climate change

- Inquiry into the vulnerability assessment map and raw data
- Comparative analysis of the evaluation results between regions (2 regions)
- Additional climate exposure information (grid map, climate model details)
- Accumulated status (adaptive capacity and sensitivity)



Customization of vulnerability

- Creates evaluation indicators
- Creates evaluation items
- Self assessment of vulnerability



Providing DB information

- Raw data
- Indicators
- Information on evaluation items

KACCC tools for climate change response _ VESTAP

Usage by local governments

- The 2nd Detailed Implementation Plan for Climate Change Adaptation Plan for Metropolitan Cities and Provinces using VESTAP was established.

- A detailed implementation plan for metropolitan cities and provinces/a detailed implementation plan for each local government.



Future plans

- Development of vulnerability assessment items that consider user needs in order to increase its utilization by metropolitan/local governments.
- Development of customized education, training programs, and educational textbooks.

VESTAP organized by the Ministry of Environment is operated and supported by the Korea Adaptation Center for Climate Change of the Korea Environment Institute.
More detailed system descriptions and manuals are available on the VESTAP online.

<https://vestap.kei.re.kr>

5F SBC Bldg. B, 232 Gareum-ro, Sejong-Si, Republic of Korea

TEL. +82-(0)44-415-7485(INF) EMAIL kaccc@kei.re.kr WEBSITE <https://kaccc.kei.re.kr>

COPYRIGHT © 2021 KEI KOREA ADAPTATION CENTER FOR CLIMATE CHANGE ALL RIGHTS RESERVED.

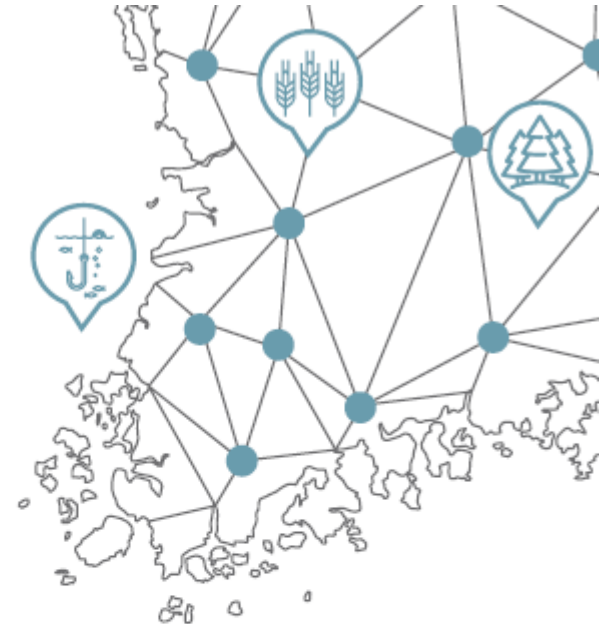
KACCC tools for climate change response _ MOTIVE

MOTIVE

Korean Model Of InTegrated Impact and Vulnerability Evaluation of Climate Change

MOTIVE is an integrated impact and vulnerability evaluation model that has been available since April 2021. It provides basic technologies for establishing realistic climate change adaptation plan for central and local governments.

<https://motive.kei.re.kr/>

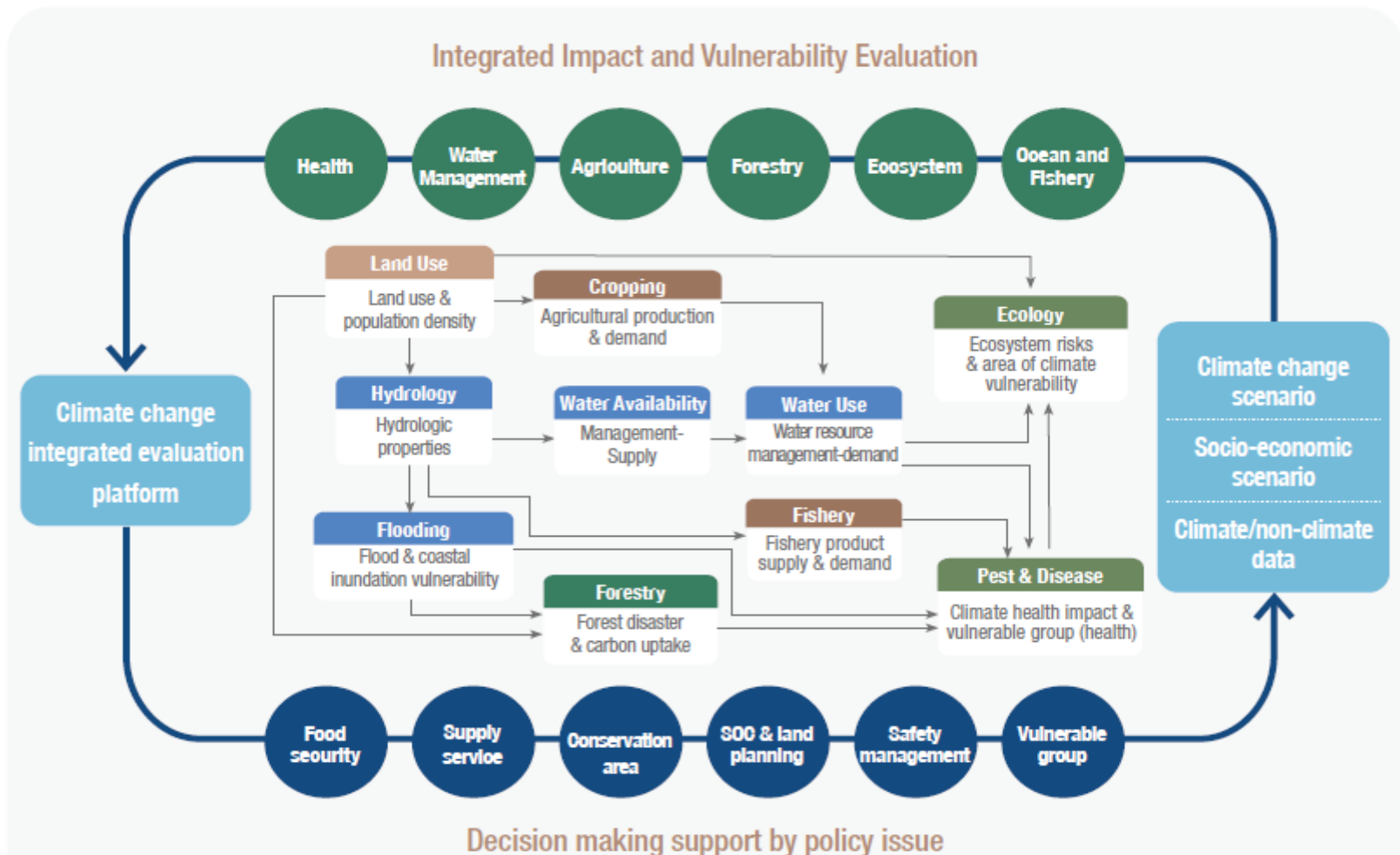


Model of integrated impact and vulnerability evaluation of climate change: MOTIVE

- MOTIVE is a means of scientific and policy support to improve capabilities in national and regional responses to climate change
 - Provides risk assessment results through an integrated platform for evaluating climate change impact and vulnerability
 - Reinforces the link between the results and climate change adaptation policies and improving in policy utility through the platform
 - Provides information on climate change risk standardization (grade, economic ripple effect), hotspots, and guidance on risk management by zone/region

KACCC tools for climate change response _ MOTIVE

A Schematic Diagram of MOTIVE



KACCC tools for climate change response _ MOTIVE

Temporal range



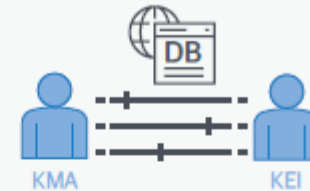
Years 2030, 2040, 2050, and 2080
(Mean of 10-year cumulative values
for model results (yearly values))

Spatial range



1km x 1km, South Korea (Provided
that analysis is performed in units of
administrative districts, watersheds,
and waters for each field.)

Basic DB for use



Shared climate change scenario(KMA,
KEI)* and field-specific non-climate DB

*KMA: Korea Meteorological Administration
KEI: Korea Environment Institute

User



Climate change experts and
stakeholders in central and local
government, development Institute,
academia and industry

Evaluation sector



Health, Water, Agriculture, Forestry,
Ecosystem, Ocean, Fishery







System composition

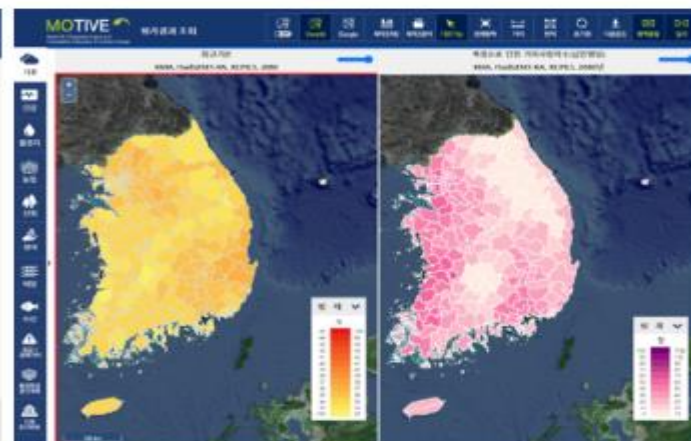


User-convenience GUI-based web/
Stand-alone system(General public,
experts)

KACCC tools for climate change response _ MOTIVE

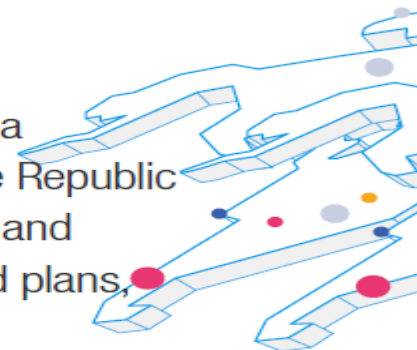
Evaluation items of impact by sector

<p>Health</p> 	<p>Heatwaves, air pollution, vector-borne infectious disease</p>	<p>Water management</p> 	<p>Water quality, water volume of aquatic ecosystem</p>
<p>Forestry</p> 	<p>Forest tree species distribution, forest growth, forest carbon cycle, forest disaster (wildfires, landslides), changes in land cover</p>	<p>Agriculture</p> 	<p>Crop productivity, suitable cultivation land, greenhouse gas circulation in farmland, pest control</p>
<p>Eco system</p> 	<p>Invasive species in the ecosystem, Climate-sensitive species, Vulnerable habitat</p>	<p>Ocean& Fishery</p> 	<p>Sea level rise Biomass size spectrum, red tide event</p>



Korea Adaptation Center for Climate Change Network and Cooperation

The Korea Adaptation Center for Climate Change (KACCC) of the Korea Environment Institute (KEI) supports the Ministry of Environment of the Republic of Korea in communicating and networking with various stakeholders and partner institutions to establish and implement adaptation policies and plans, and promotes adaptation-related international cooperation.



Cooperative partnerships

Supports the establishment of domestic and international cooperative networks with relevant institutions



International events

Hosts and/or organizes annual international events on climate change adaptation



Capacity Building

Supports capacity building of developing countries with regard to adaptation by providing training courses



Consulting Services

Provides consulting services to stakeholders for the development and implementation of adaptation policies and plans



Research collaboration

Designs and conducts research projects on adaptation in partnership with domestic and international institutions

Tools by sub-national initiatives (ICEC of Gwangju Metropolitan)



Founded in 2012

4 key values

- Sustainability
- Global + Local
- Glocality
- Collaboration & Communication
- Professionalism

4 Strategic Goals

- Strengthen research capacity
- Increase cooperation at global level
- Enhance civic values
- Foster sustainable management

3 Teams

- Management and Cooperation
- Policy and Research
- Education Project

12 Strategic Tasks

5 UEA Summits

ICEC By the Numbers

Key Functions

- > Conduct R&D and education/training on climate change and other environmental issues
- > Develop and implement programs that promote low-carbon, green lifestyles
- > Facilitate exchange and cooperation on climate change and other environmental issues between cities around the world
- > Organize UEA summits

MISSION To create a sustainable, low-carbon, green city

VISION To be a leader in responding to climate change and shaping a green future

4 Strategic Goals

- Strengthen research capacity in climate change
- Increase cooperation at glocal level
- Enhance civic values
- Foster sustainable management

12 Strategic Tasks

- Advance research on policy responses to climate change
- Develop proactive responses to climate change
- Build a research results management system
- Forge national and global partnership networks
- Increase person-to-person exchanges
- Strengthen climate change responses in greater city areas
- Create a low-carbon, green city
- Provide education and awareness about climate change
- Promote the growth of green jobs
- Expand contract research services
- Work to achieve financial independence
- Advance a management system

도시환경협약
URBAN ENVIRONMENTAL ACCORDS
 SIGNED ON THE OCCASION OF UNITED NATIONS ENVIRONMENT PROGRAMME WORLD ENVIRONMENT DAY JUNE 5TH, 2005
 IN SAN FRANCISCO, CALIFORNIA

GREEN CITIES DECLARATION

RECOGNIZING for the first time in history, the majority of the planet's population now lives in cities and that continued urbanization will result in one million people moving to cities each week, thus creating a new set of environmental challenges and opportunities; and

BELIEVING that as mayors of cities around the globe, we have a unique opportunity to provide leadership to develop truly sustainable urban centers based on culturally and economically appropriate local actions; and

RECALLING that in 1945 the leaders of 50 nations gathered in San Francisco to develop and sign the Charter of the United Nations; and

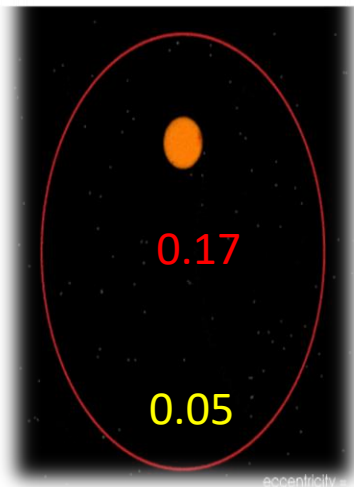
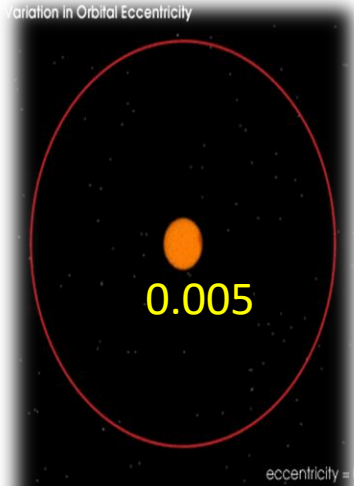
ACKNOWLEDGING the importance of the obligations and spirit of the 1972 Stockholm Conference on the Human Environment, the 1992 Rio Earth Summit (UNCED), the 1996 Istanbul Conference on Human Settlements, the 2000 Millennium Development Goals, and the 2002 Johannesburg World Summit on Sustainable Development, we see the Urban Environmental Accords described below as a synergistic extension of the efforts to advance sustainability, foster vibrant economies, promote social equity, and protect the planet's natural systems.

THEFORE, BE IT RESOLVED, today on World Environment Day 2005 in San Francisco, we the signatory city have come together to write a new chapter in the history of global cooperation. We commit to promote this collaborative platform and to build an ecologically sustainable, economically dynamic, and socially equitable future for our urban citizens; and

BE IT FURTHER RESOLVED that we call to action our fellow mayors around the world to sign the Urban Environmental Accords and collaborate with us to implement the Accords; and

BE IT FURTHER RESOLVED that by signing these Urban Environmental Accords, we commit to encourage our city governments to adopt these Accords and commit our best efforts to achieve the Actions stated within. By implementing the Urban Environmental Accords, we aim to realize the right to a clean, healthy, and safe environment for all members of our society.

3 drivers of Earth Climate System

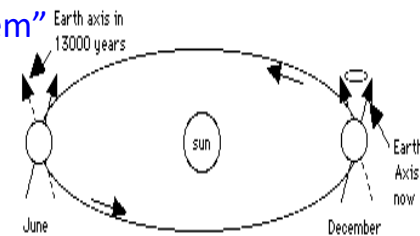


Driver 1. Earth revolves around the Sun with **variable eccentricity** between 0.005~0.05.

- present: 0.017,
- average: 0.028
- Cycle 100,000 year

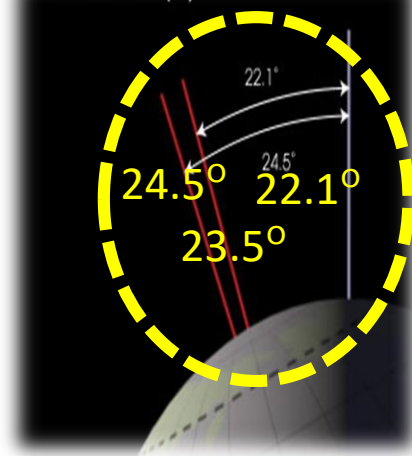


Milutin Milankovic (1879-1958)
“Canon of Insolation and the Ice Age Problem”



3 drivers of Earth Climate System

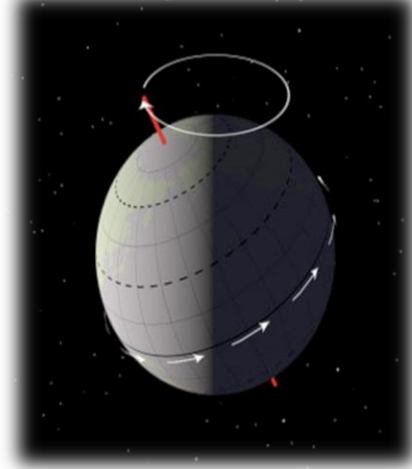
Variation in Axial Obliquity



Driver 2. Axial obliquity varies between 22.1°~24.5°.

- present : 23.5°
- average : 23.3°
- cycle 41,000 year

Precession

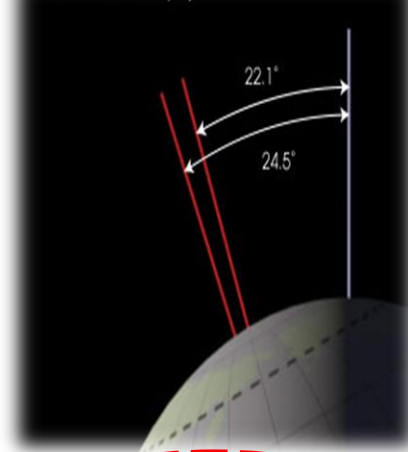


Driver 3. Orientation of rotation axis changes between Polaris and Vega in precession.

- present : Polaris
- in 13,000 years : Vega
- cycle 26,000 year

3 drivers of Earth Climate System

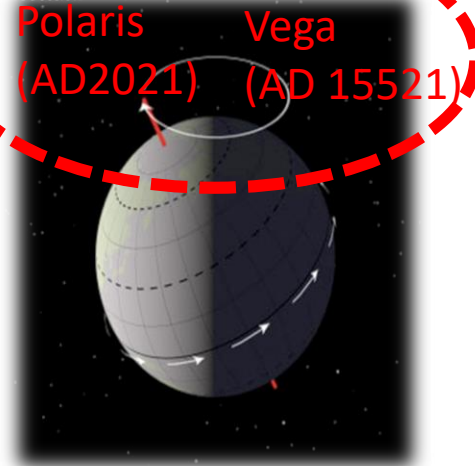
Variation in Axial Obliquity



Driver 2. Axial obliquity varies between 22.1° ~ 24.5° .

- present : 23.5°
- average : 23.3°
- cycle 41,000 year

Precession



Driver 3. Rotation axis changes between Polaris and Vega in precession.

- present : Polaris
- in 13,000 years : Vega
- cycle 26,000 year

Temperature changes, Carbon concentration

Atmospheric carbon dioxide concentration cycle is about 125,000 years, changing in between 180~300 ppm for the past 650,000 years.

But recently, it goes beyond 400ppm. Scientists knows "why?"



IPCC AR5 2014 SPM

Fossil fuel and land use change-induced carbon emission change due to human development(1850-2011)

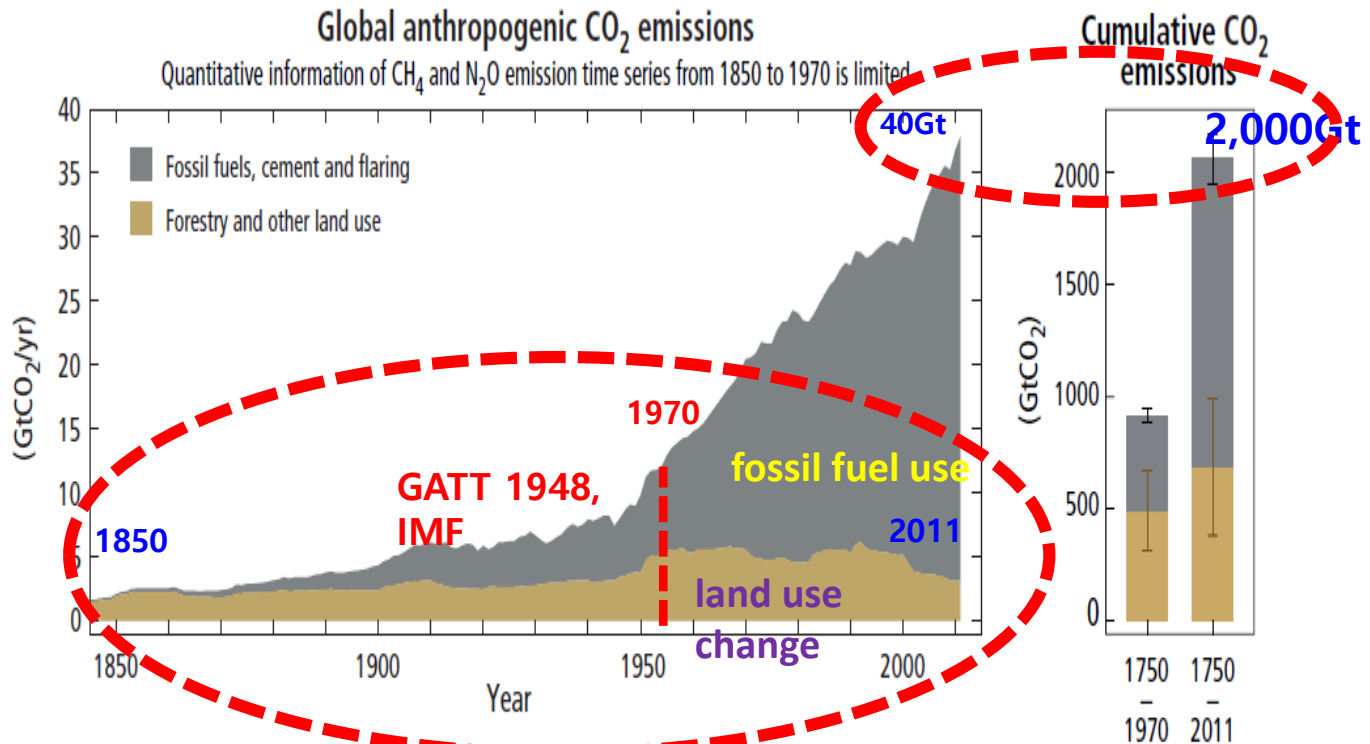


Figure 1.5 | Annual global anthropogenic carbon dioxide (CO₂) emissions (gigatonne of CO₂-equivalent per year, GtCO₂/yr) from fossil fuel combustion, cement production and flaring, and forestry and other land use (FOLU), 1750–2011. Cumulative emissions and their uncertainties are shown as bars and whiskers, respectively, on the right-hand side. The global effects of the accumulation of methane (CH₄) and nitrous oxide (N₂O) emissions are shown in Figure 1.3. Greenhouse gas emission data from 1970 to 2010 are shown in Figure 1.6. (modified from WGI Figure TS.4 and WGIII Figure TS.2)

Ref: IPCC AR5 2014 SPM

Fossil fuel and land use change-induced carbon emission change due to human development(1850-2011)

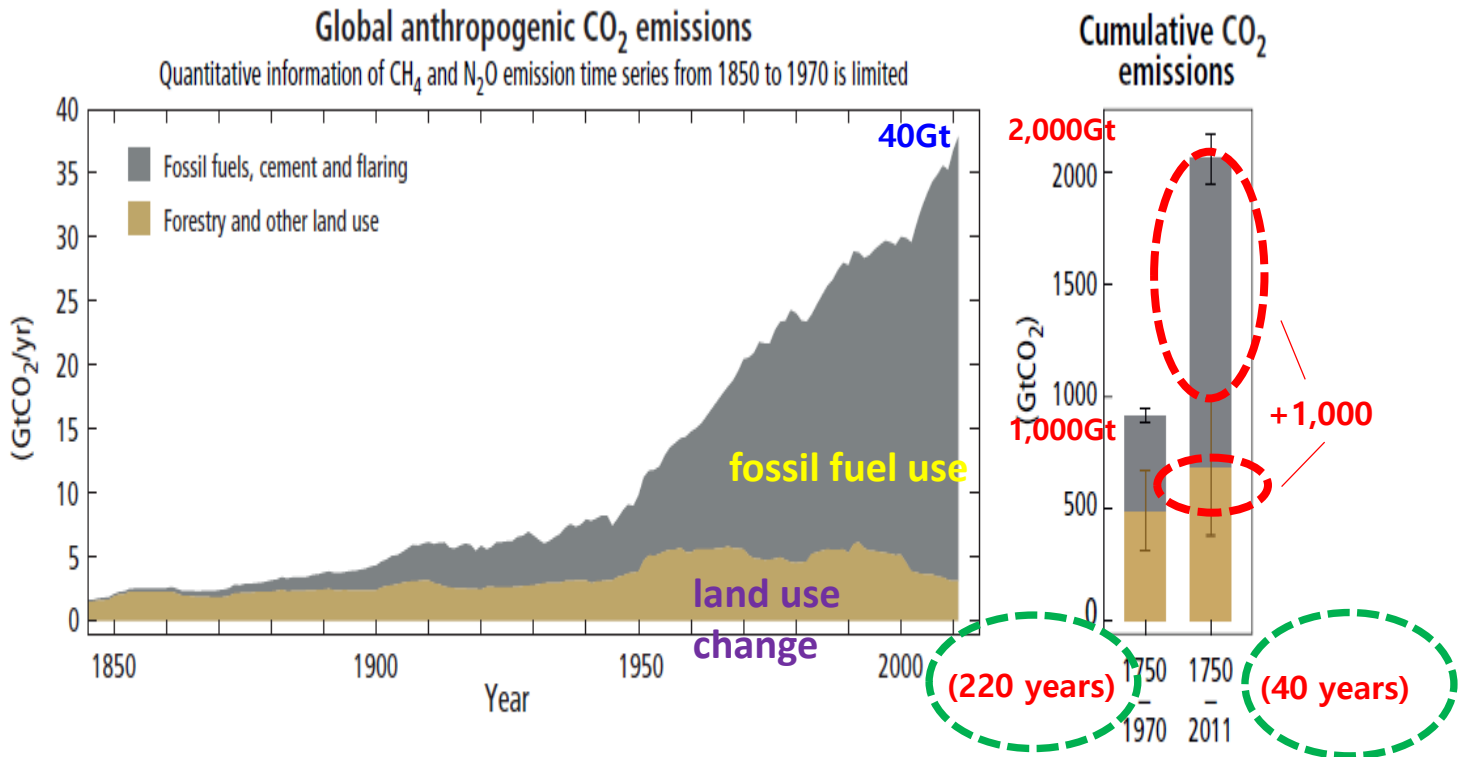


Figure 1.5 | Annual global anthropogenic carbon dioxide (CO₂) emissions (gigatonne of CO₂-equivalent per year, GtCO₂/yr) from fossil fuel combustion, cement production and flaring, and forestry and other land use (FOLU), 1750–2011. Cumulative emissions and their uncertainties are shown as bars and whiskers, respectively, on the right-hand side. The global effects of the accumulation of methane (CH₄) and nitrous oxide (N₂O) emissions are shown in Figure 1.3. Greenhouse gas emission data from 1970 to 2010 are shown in Figure 1.6. (modified from WGI Figure TS.4 and WGIII Figure TS.2)

Representative Concentration Pathway & Socio Economic Scenarios

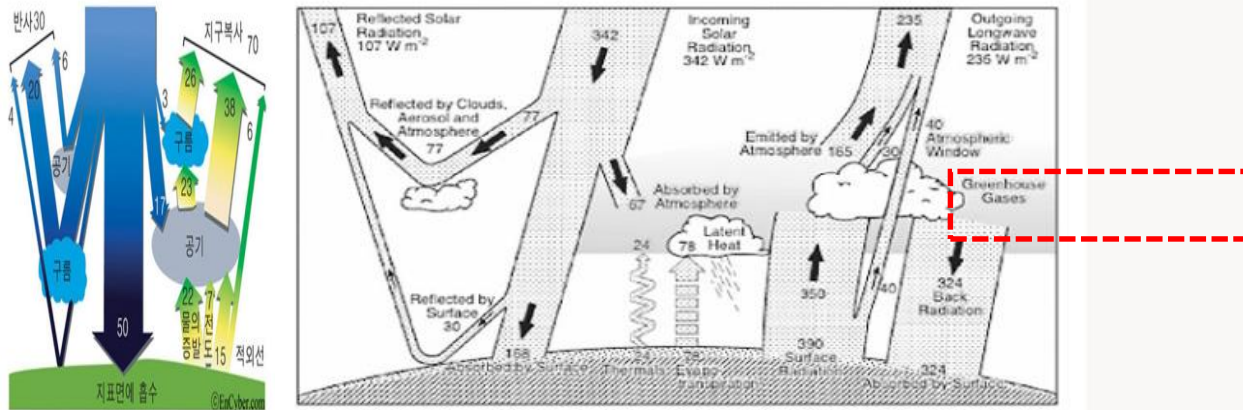


FIGURE 1-3 Energy budget for the atmospheric components of the climate system. SOURCE: Kiehl and Trenberth (1997).

SRES*:
RCP**:

IPCC 2007 4차 특별보고서, (사회경제적) 배출시나리오(Special Report Emission Scenario)
IPCC 2013 5차 보고서, 대표 농도 경로(Representative Concentration Pathway)

Representative Concentration Pathway (RCP)	Forcing compared to 1750 (Wm^{-2})	Climate policy associated with scenario	CO ₂ Equivalent (ppm)	Projected global average temperature increase from 1986-2005 (°C)
2.6	2.6	Mitigation	475	1.0
4.5	4.5	Stabilization	630	1.8
6.0	6.0	Stabilization	800	2.2
8.5	8.5	None	1313	3.7

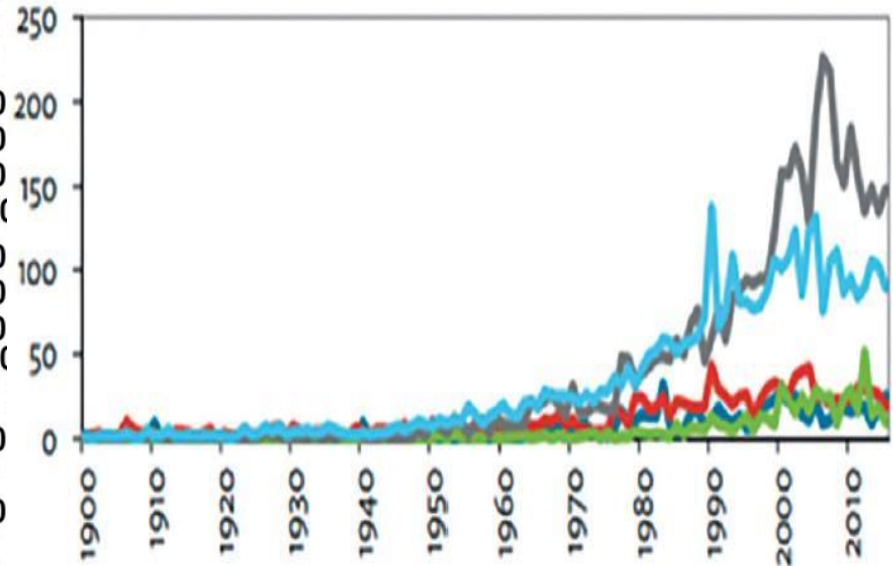
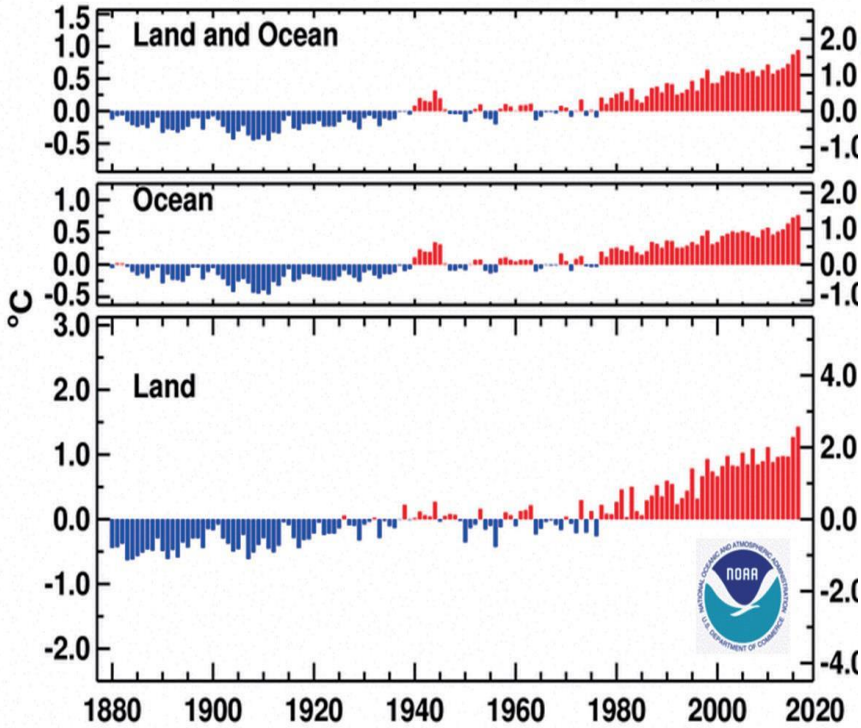
Source: IPCC Fifth Assessment Report Summary for Policymakers, Figure SPM.5 and Box SPM.1.

Recorded Climate Change Anomaly

Jan-Nov Global Surface Mean Temp Anomalies

NCEI/NESDIS/NOAA

Analysis is based upon Smith et al. (2008) methodology.



- 가뭄(Drought)
- 지진(Earthquake)
- 극한 기온(Extreme Temperature)
- 홍수(Flood)
- 폭풍(Storm)

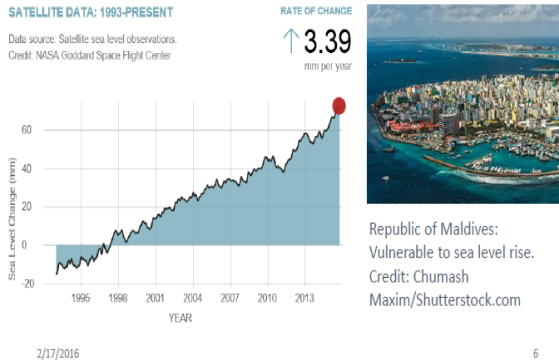
8 Observed Climate Change Impacts

The evidence for rapid climate change is compelling:

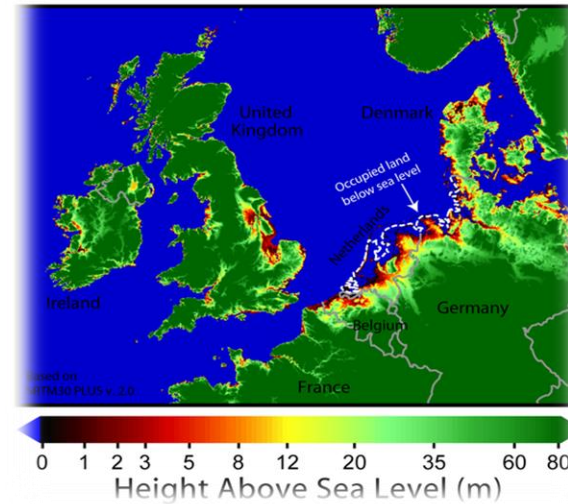
- A. Sea level rise
- B. Global temperature rise
- C. Warming oceans
- D. Shrinking ice sheets
- E. Declining Arctic sea ice
- F. Glacial retreat
- G. Ocean acidification
- H. Extreme events

A. Sea level rise

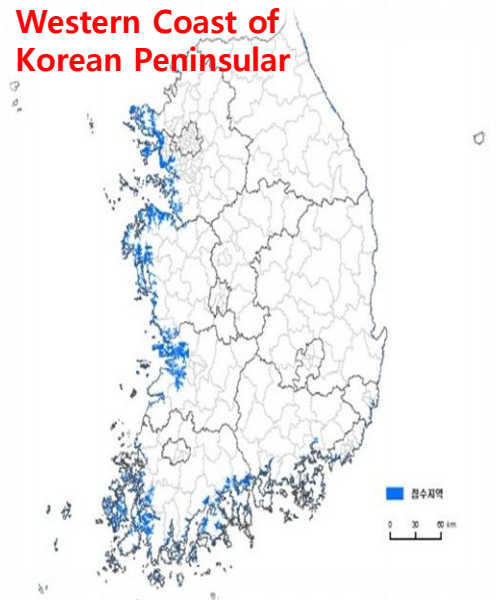
Global sea level rose about 17 centimeters (6.7 inches) in the last century. The rate in the last decade, however, is nearly double that of the last century.



North European Coast Sea Level Risks - North Sea



Western Coast of Korean Peninsular



Kiribati in the Pacific



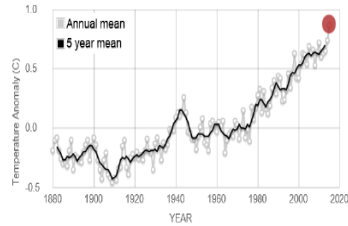
B. Global temperature rise

All evidences show that Earth has warmed since 1880. Most of this warming has occurred since the 1970s, with the 20 warmest years having occurred since 1981 and with all 10 of the warmest years occurring in the past 12 years.

Even though the 2000s witnessed a solar output decline resulting in an unusually deep solar minimum in 2007-2009, surface temperatures continue to increase.

GLOBAL LAND-OCEAN TEMPERATURE INDEX

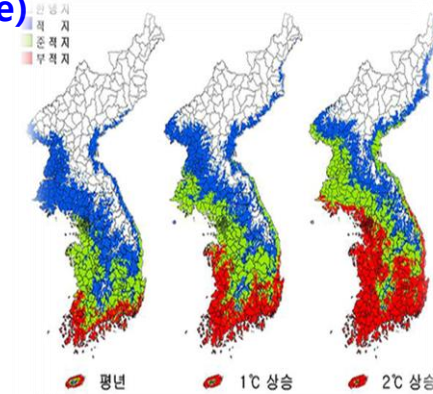
Data source: NASA's Goddard Institute for Space Studies (GISS). Credit: NASA/GISS



2/17/2016

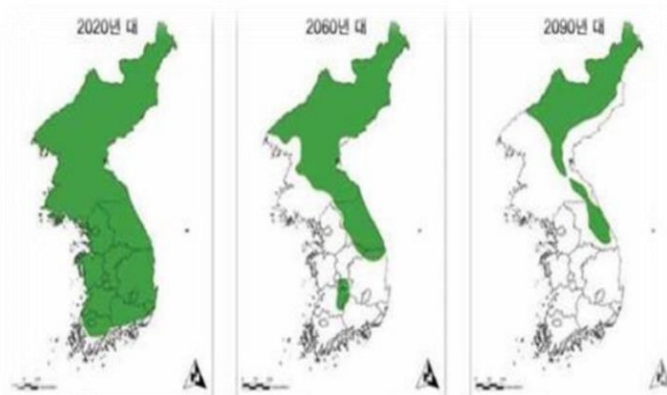
7

Apple tree's habitat decreases, moves to the North (current, +1°C, +2°C, in blue)



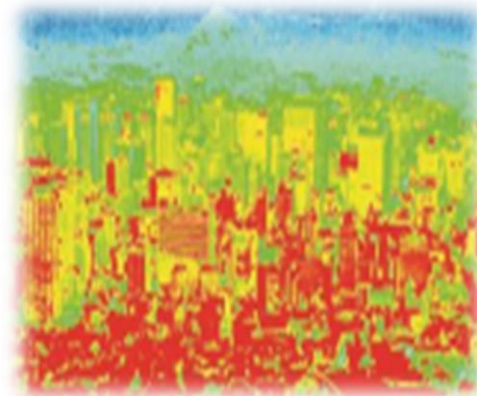
자료출처: 기상청 기후변화예측센터, 기상청 기후변화예측센터, 기상청 기후변화예측센터

Pinus Forest Cover Reduces (2020-2090, in green)



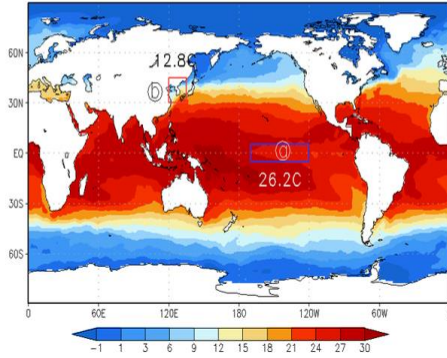
기후변화에 시나리오에 따른 소나무림의 적정 생물분포 범위(산림청, 2009)

Heats accumulation in Urban center (2020, Summer)

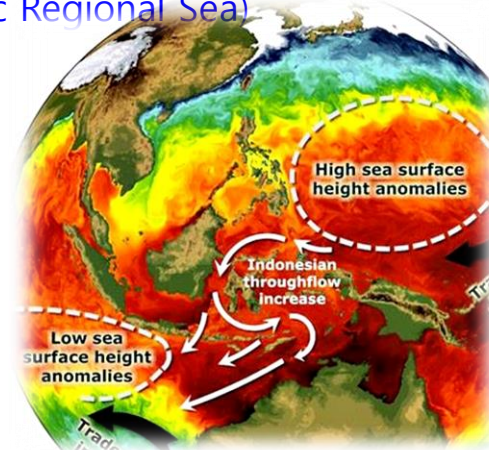


C. Warming oceans

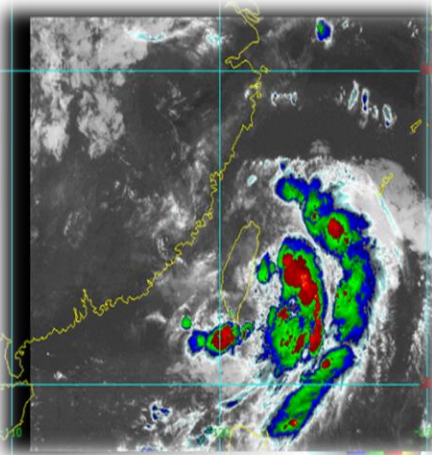
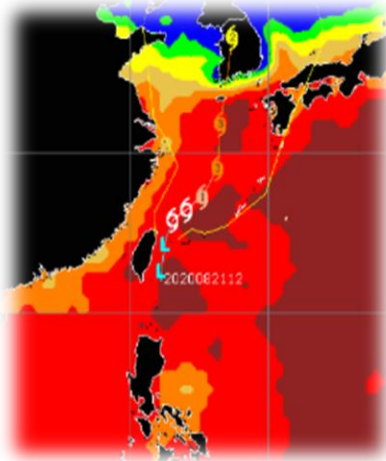
The oceans have absorbed much of this increased heat, with the top 700 meters (about 2,300 feet) of ocean showing warming of 0.302 degrees Fahrenheit since 1969.



High and low sea surface anomalies and throughflow changes (Indo-Pacific Regional Sea)

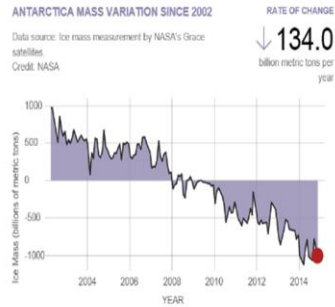


More frequent storm surges and Super-typhoons, Damaged rice yields



D. Shrinking ice sheets

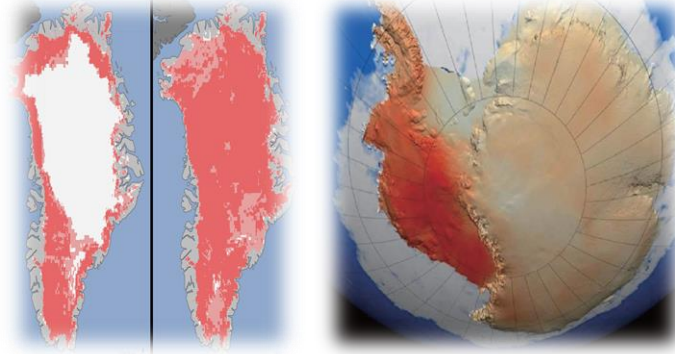
The Greenland and Antarctic ice sheets have decreased in mass. Data from NASA's Gravity Recovery and Climate Experiment show Greenland lost 150 to 250 cubic kilometers (36 to 60 cubic miles) of ice per year between 2002 and 2006, while Antarctica lost about 152 cubic kilometers (36 cubic miles) of ice between 2002 and 2005.



2/17/2016

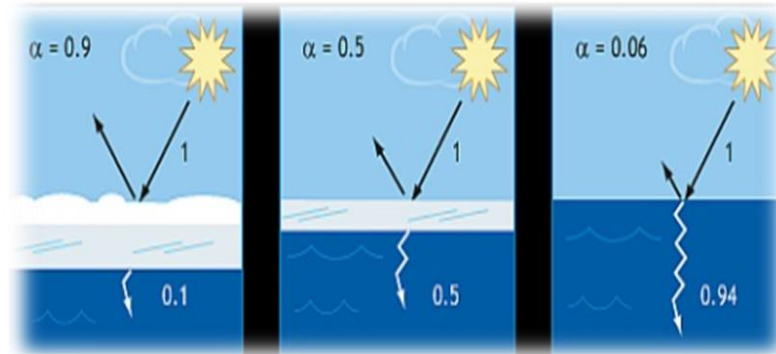
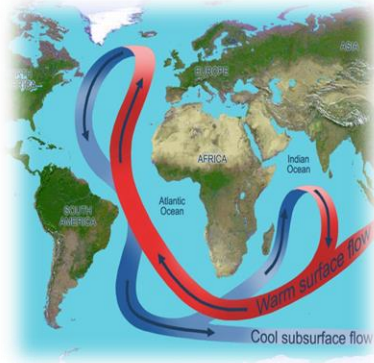
9

Ice sheet melting in Green Land and Antartics



Low density of melted fresh water disturbs deep-surface ocean exchange causing extreme weather events

Ice melt reduces solar energy reflection, Sea water increases solar radiative forcing causing oceanic heat accumulation

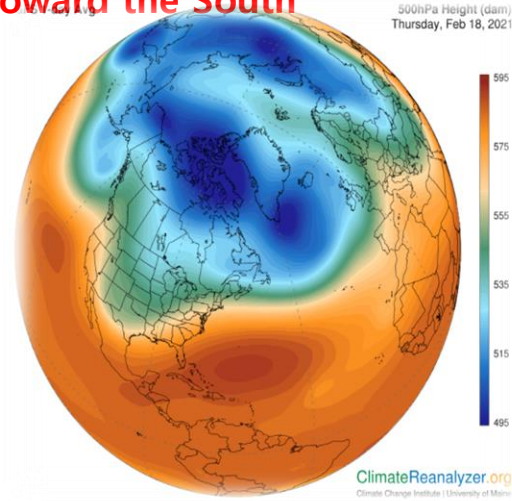


E. Declining Arctic sea ice

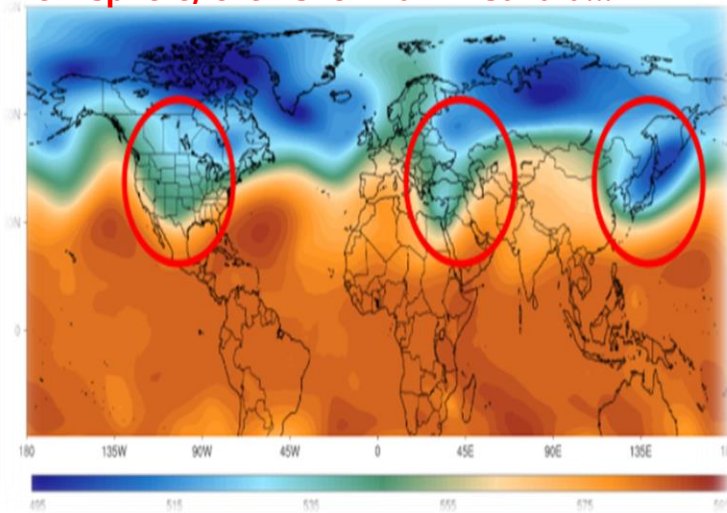
Arctic sea ice reaches its minimum each September. September Arctic sea ice is now declining at a rate of 13.4 percent per decade, relative to the 1981 to 2010 average. This graph shows the average monthly Arctic sea ice extent in September since 1979, derived from satellite observations.



Arctic sea warming releases Jet stream band, expanding toward the South



Arctic sea warming brings extreme cold wave in the overall Northern hemisphere, even snow fall in Sahara...



F. Glacial retreat

Glaciers are retreating almost everywhere around the world — including in the Alps, Himalayas, Andes, Rockies, Alaska and Africa



2/17/2016

11

Flesh flood by the glacial melted flow (Himalyas, Nandadevi Mt. 2021)

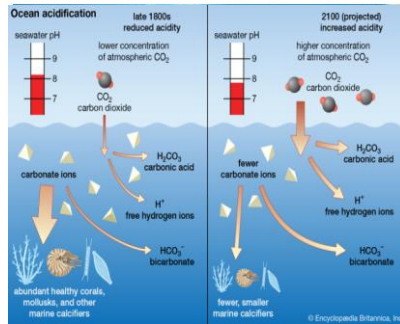


90% of 4,000 glaciers in the Alpes disappear by 2100. Winter industry suffers.



G. Ocean Acidification

Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent. This increase is the result of humans emitting more carbon dioxide into the atmosphere and hence more being absorbed into the oceans. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 2 billion tons per year



2/17/2016

12

Endangered Oceanic Eco-system due to the acidification



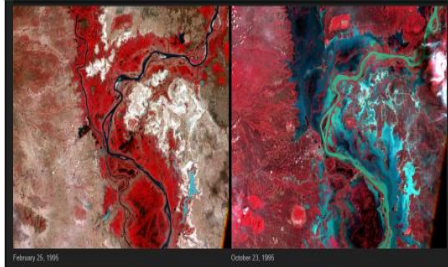
Accelerated acidification destroys the great barrier coral reef in the South Pacific



H. Extreme events

The number of record high temperature events, intense rainfall events, floods, typhoons, Lake shrinkage are increasing.

i.e.: Flood, Cambodia The Mekong River is the 12th longest in the world, flowing 2,600 miles (4,200 kilometers) from western China to the Mekong Delta in southern Vietnam. Every autumn, monsoon rains become too great for the Mekong to carry and a large area of Cambodia is flooded, as seen in the October image. This great influx of water even reverses the flow of the Tonle Sap River, northward to the Tonle Sap ("Great Lake"), which can expand to 10 times its normal size. As seen here, the Tonle Sap flows from the northwest and the Mekong flows from the northeast. They merge and then split into the Basak River and the Mekong, which flow southeast to the South China Sea. Phnom Penh lies just west of the four-river intersection, which is called the Chaktomukh ("Four Faces").

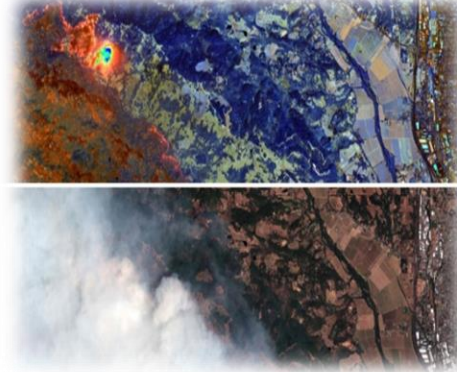


2/17/2016

Source: California Institute of Technology

13

Drought and forest fires in California, USA 2020



Frequent and severe flood, dried water course, crop yields loss ...



ICEC tools for climate change response _ UCMS

Urban Carbon Management System(UCMS)

A Tool for Monitoring GHG Emissions and Providing Information for Decision Makers

Overview

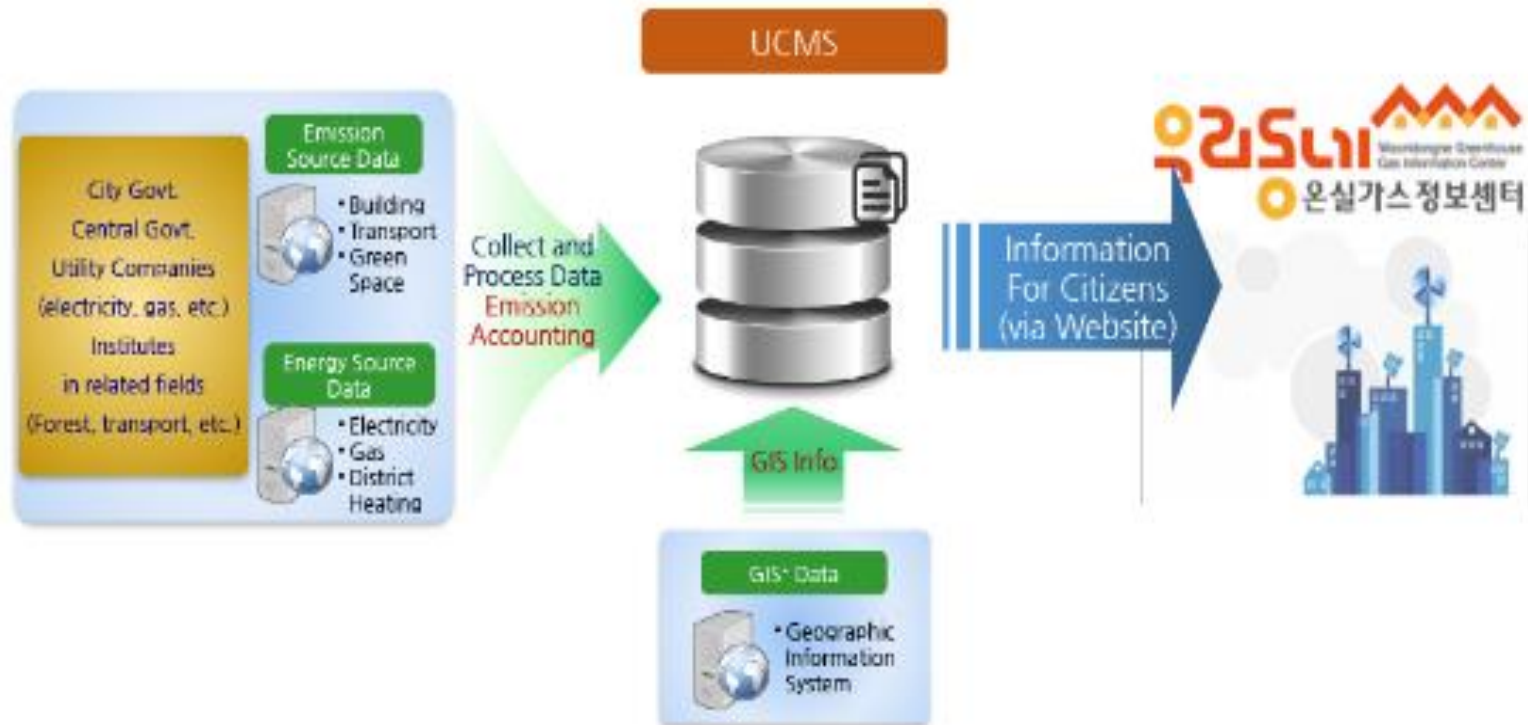


UCMS as a Web-Based Program

The Urban Carbon Management System (UCMS) is a web-based system used to regularly monitor and manage carbon emissions to facilitate the reduction of greenhouse gas produced in urban and suburban areas. The UEA continually monitors carbon emissions in Gwangju (Republic of Korea) and the surrounding metropolitan area. Emissions are monitored by sector and by energy source, and its outcomes are provided in conjunction with GIS information for detailed analysis. Establishing and employing the UCMS in the city, the UEA seeks to identify the characteristics of current GHG emissions to aid in the reduction of future emissions.

ICEC tools for climate change response _ UCMS

Structure and Examples in Figures



ICEC tools for climate change response _ UCMS

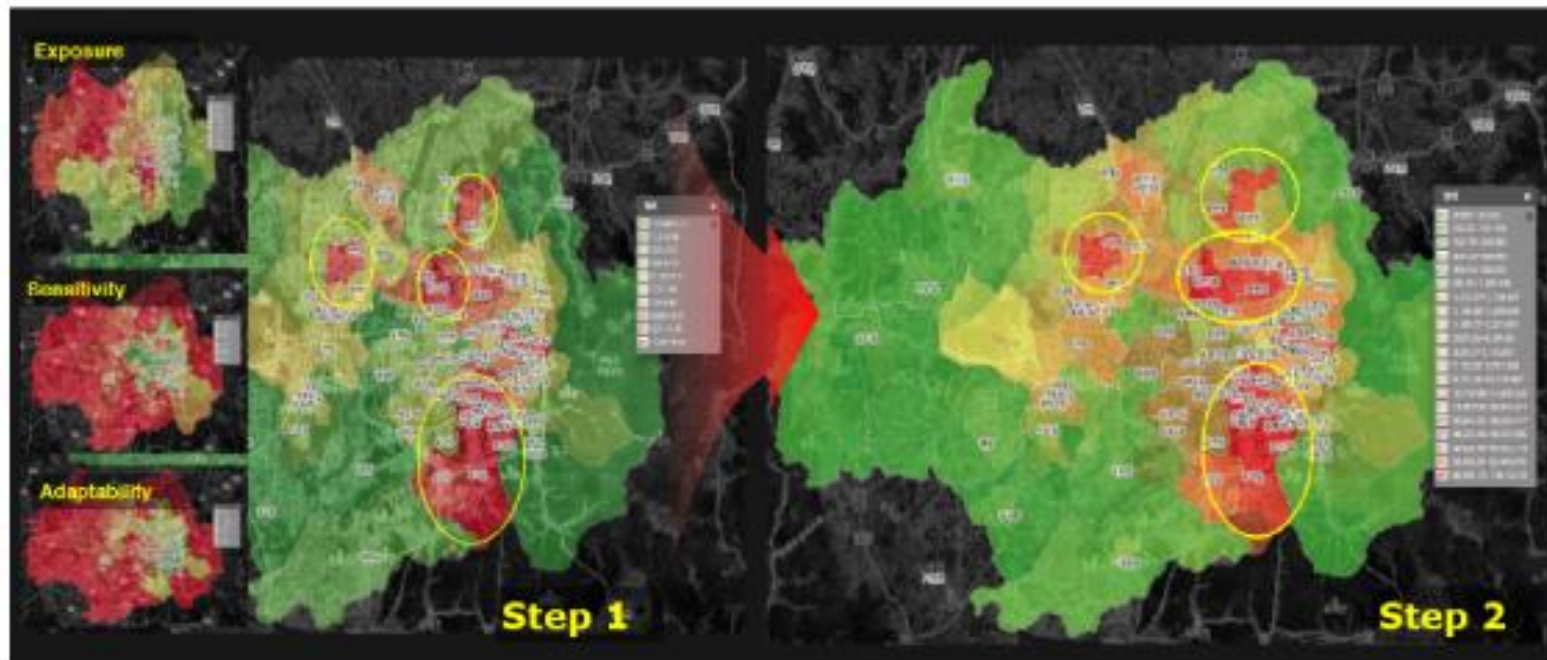


Figure 2.

Applied analysis of Gwangju on the climate Vulnerability-Resilience Index(VRI) in UCMS.

<Source:ICEC 2020 Annual Inventory Report>

ICEC tools for climate change response _ UAMS

Urban Assessment Model System(UAMS)

A Tool for Analyzing the City's Vulnerability against Climate Change
and Providing Information for Decision Makers

Overview

The Urban Assessment Model System (UAMS) is a three-dimensional, mathematical simulation model for calculating air flows, heat waves, and fine dust dispersions in orographically structured terrain. The UAMS is suited for studying the climatic effects of local land use changes as well as for analyzing the climate of urban and suburban areas. The UAMS was developed to evaluate the environmental conditions within entire cities, providing information for decision-making in areas vulnerable to climate change, and it also helps to address the stratification of climate analysis difficulties.

Specification

(Requirements to employ the System)

- › Data from National Centers for Environmental Prediction(NCEP), National Center for Atmospheric Research(NCAR), Global Forecast System(GFS), etc.
- › Super Computer / High Performance Computer and Server / data transfer capacity, etc.



ICEC tools for climate change response _ UAMS

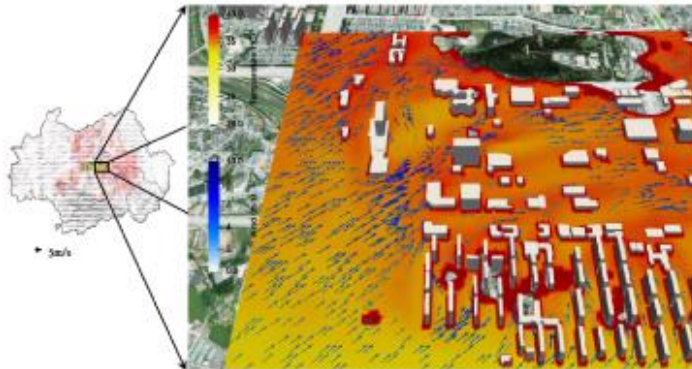
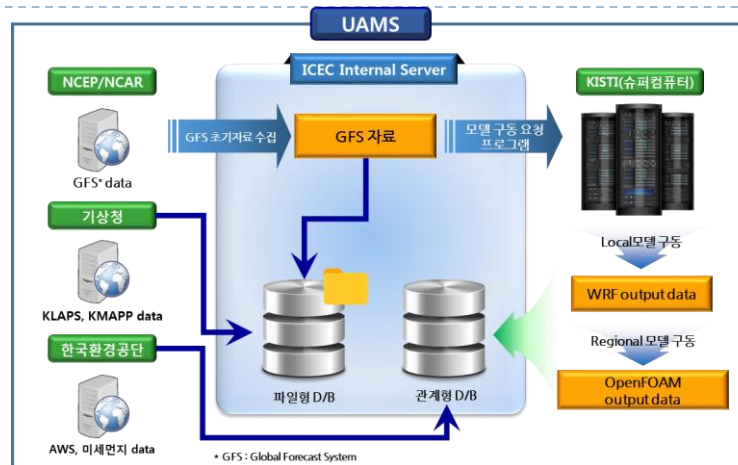


Figure 2.

Results of CFD analysis of 3*5 km area near Gwangju
3-D Analysis of the UAMS City Hall with grid spacing
between 5-28m

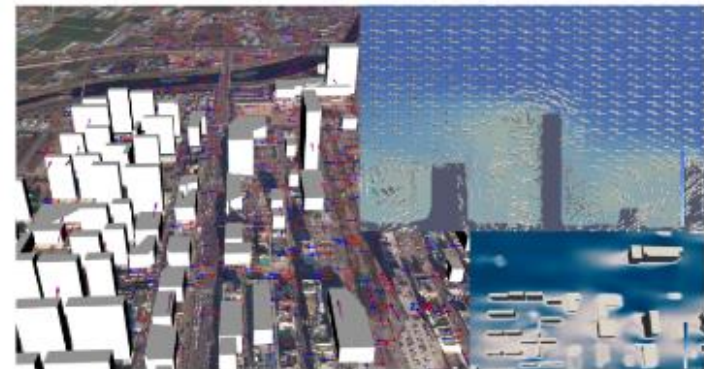


Figure 3.

3-D Analysis of the UAMS

ICEC cooperation windows _ UEA-CB, ICEC-KOICA Global Training Programme

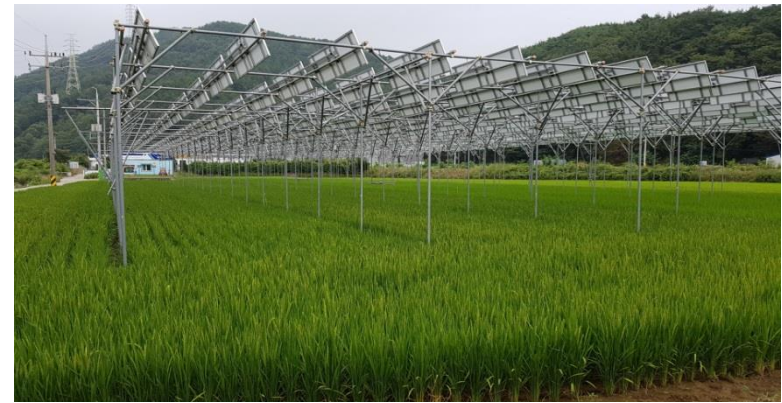
PROGRAM OVERVIEW (ICEC-KOICA Global Training Programme)

TITLE	Sustainable Water Resources Management for Climate Change
DURATION	2020-2022
GOAL	To share knowledge on sustainable and safe water resources management in line with climate change response, and to enhance capacities of participating countries accordingly

	FIRST-YEAR COURSE (2020/Online)		SECOND-YEAR COURSE (2021/Online)		THIRD-YEAR COURSE (2022/Invitational)
TARGET	Working/mid-level officials from the Ministry of Agriculture, Fishery & Forest		Working/mid-level officials in fields of climate change, public health and engineering, water resources, etc.		Mid/high-level officials from the city government of participating countries
OBJECTIVES	To better understand international trends and policies on integrated water management in South Korea		To develop capabilities of policy-makers and project developers for effective planning and implementation of policies in the field of water management as well as climate change response		To develop capacities of project officers for effective project implementation in the field of water management as well as climate change response
ACTIVITIES	<ul style="list-style-type: none"> › Video lectures (non-real time) & online discussion › Online web training › Feedback and Q&A via email 		<ul style="list-style-type: none"> › Video lectures (non-real time) & online discussion › Online web training › Feedback and Q&A via email 		<ul style="list-style-type: none"> › Seminar and presentation in Korea › Follow-up workshop on the implementation of 2020 and 2021 Action Plans
OUTPUT	Action Plan		Action Plan		Revised Action Plan & Final Outcome

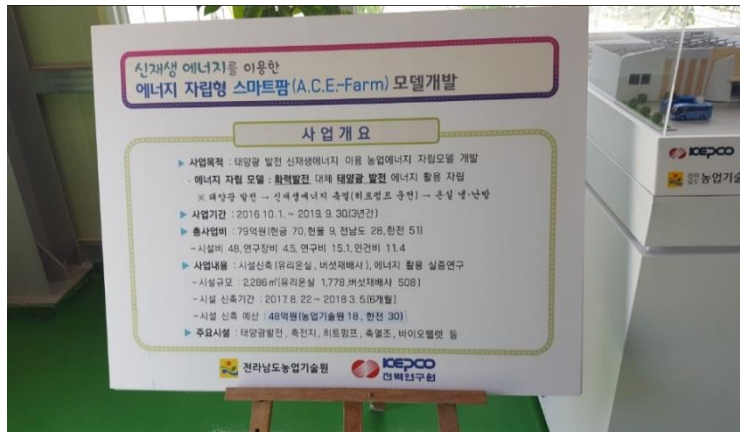
Other solutions in place : Energy-Food Nexus (<https://www.koenergy.kr/kosep/en/main.do>)

✓ _100KW grid connected test bed in rice field (2018)



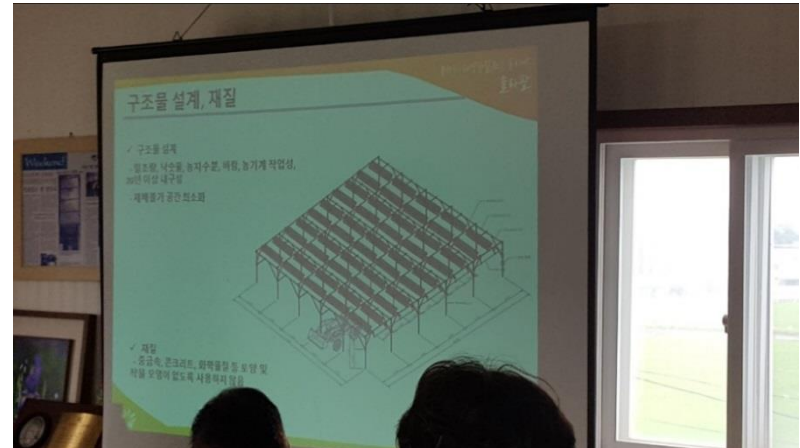
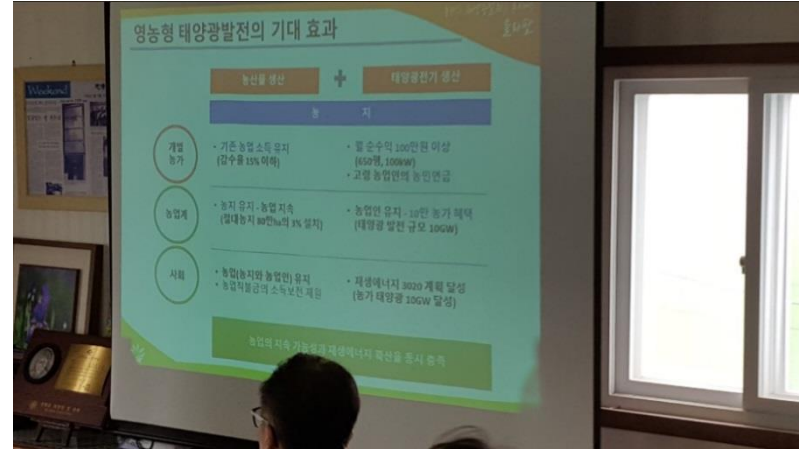
Other opportunities : Water-Energy-Food Nexus (<https://www.jares.go.kr/eng>)

- ✓ 100KW off-grid test bed in vegetable plots and smart farming system (2019)



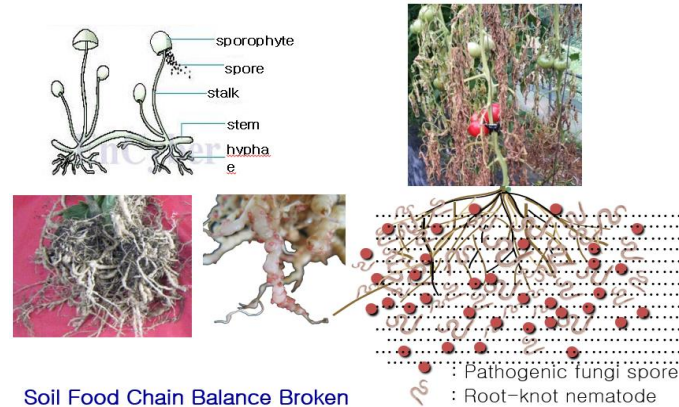
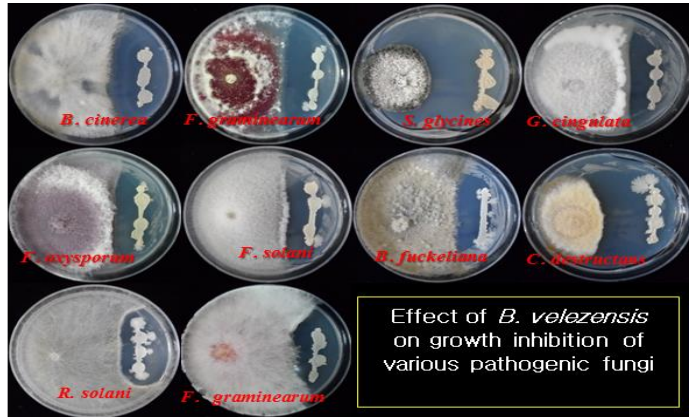
Other opportunities : Farmers in action(<https://cei.creativekorea.or.kr/chungnam/main.do>)

✓ Farmers cooperatives in solar farming workshops (2019)



Other opportunities : Eco-farming practices (<http://iefa.jnu.ac.kr/>)

✓ Organic nutrient and pest control technologies (2019)



C/G powder with micronutrients: 0.25kg,
 Chitinase/Gelatinase producing bacteria: 0.25L
 Concentrated microbial nutrients: 1L
 Sugar: 3kg
 Fertilizer(21-17-17): 3kg

Chitin/gelatin powder with micronutrients: 0.25kg
 Chitinase/Gelatinase producing bacteria: 0.25L
 Concentrated microbial nutrients: 1L
 Fertilizer 3kg
 Air pump

Cultivating container: 500L

- Gelatin/chitin powder with micronutrients and GCM are added into cultivating container containing 500 L of water.
- 3 days after, add fertilizer, and sugar.
- 3 more days cultivation with air blowing.
- 2~3 times dilution and sprayed to plants.



Way forward together

- ▶ a Web-based portal or platform, where relevant activities and resulted outputs could be linked, shared and harmonized through continuous coordination among lead stakeholders and expertise providers having a capacity to do so...

End of Document