National Programs and FUTURE

KOREA

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I. Current programs and relation to FUTURE

– In 2009, we, Korean PICES community, surveyed the programs run at that time with relation to the FUTURE's 18 target questions

– 43 programs were surveyed

Relevance : (0: none, 1: medium, 2: high)

Programs	1						2							3				
	1	2	3	4	5	6	1	2	3	4	5	6	7	1	2	3	4	5
Study on estuary ecosystem management and resilience	2	2					2	2		2	2	2		2	2	2		2
Material flux across the mudflat interface and ecological function	2	2					2	2	2	2	2			2	2	2		2
Yellow Sea LME	2	2	2	2			2	2	2	2	2			2	2	2	2	2
A pilot study on forecasting long-term ecosystem changes in the East sea	2	2	2			2	2	2	2			2	2					
EAST-1	2	2	2				2	2	2									
Ecosystem change in the Northern East China Sea due to the climate change	2	2	2	2		2	2	2	2			2	2	2		2	2	2
Monitoring of the impacts of Three-Gorges Dam on the East China Sea ecosystem	2	2	2	2	2	2	2	2	2	2	2			2	2	2	2	2
Basic survey on Marine Ecosystem	2	2	2	2			2	2	2	2	2			2	2			2
Pacific Ocean Study on Environment and Interactions between Deep Ocean and National seas	2	2	2			2	2	2	2									
New fishing technology based on fisheries				1														

II. Some findings from those programs

– examples by FUTURE questions

1. What determine an ecosystem's intrinsic resilience and vulnerability to natural and anthropogenic forcing?

1.1 What are the important physical, chemical and biological processes that underlie the structure and function of ecosystems?

- Most studies on phytoplankton were focused on the temporal changes and spatial differences at the community level. Causal mechanisms for those changes/differences were also included. But most were small scales, done in the areas off the coasts, a few basin scale.
- Studies on the structural changes of the zooplankton communities with relation to environmental factors were also abundant but similar trends as in case of phytoplankton.
- Fish community were also studied, and the researches on the linkage between plankton and fishes were done, but need more refinement.

1.2. How might changing physical, chemical and biological processes cause alterations to ecosystem structure and function?

- In case of phytoplankton, studies are concentrated on an understanding of the current situations rather than of the mechanisms of alterations, necessitating an understanding of the causes to the changes.

- Entering the 1990s, we are witnessing a blooming of phytoplankton as well as alterations of species due to climate warming and introduced species.

- As we can understand the changes in the marine ecosystems of the polar regions through the changes detected in phytoplankton, which sensitively respond to the physical and biogeochemical changes in the environment, phytoplankton in the coastal regions also showed variation depending on physical and biogeochemical changes in the environment

1.3. How do changes in ecosystem structure affect the relationships between ecosystem components?

- The blooming of phytoplankton and the increase of organic matters in water column caused an enrichment or eutrophication in the benthic ecosystem.

- An observation of the long-term pattern changes in the benthic communities in the Songdo mudflats off the west coast of Incheon revealed that eutrophication had caused an increase in the production of benthic communities. That is, coupling between planktonic and benthic ecosystem has been reported.

1.4. How might changes in ecosystem structure and function affect an ecosystem's resilience or vulnerability to natural and anthropogenic forcing?

- If any changes occur to the habitats of benthos due to anthropogenic influences, the directions of such changes should be toward a simplification of the structure of ecosystem and a functional decrease. This phenomenon is being widely witnessed across the Korean seas.

- In Jinhae Bay and the estuary of Youngsan River off the southern coasts of Korea, the relationship between low oxygen and the structural changes of larger benthos communities was studied. The resilience with recovery of oxygen level was evaluated.

III. Examples of FUTURE-related Programs

| Research Title	Time-Series Observations and Diagnosis of Ecological Parameters : EAST-1 (Jun. 2011 - May 2016)
PI	*Kyung-Ryul Kim,* GIST (Gwangju IST)
Research Goals	☐ To understand the Oceanographic and ecological processes and responses from the time series observations in the East/Japan Sea
Research Themes	☐ To Predict the global climate change through this case study based on time-series observations ☐ An interdisciplinary research for the understanding of physical, biological, and chemical processes and changes in those process
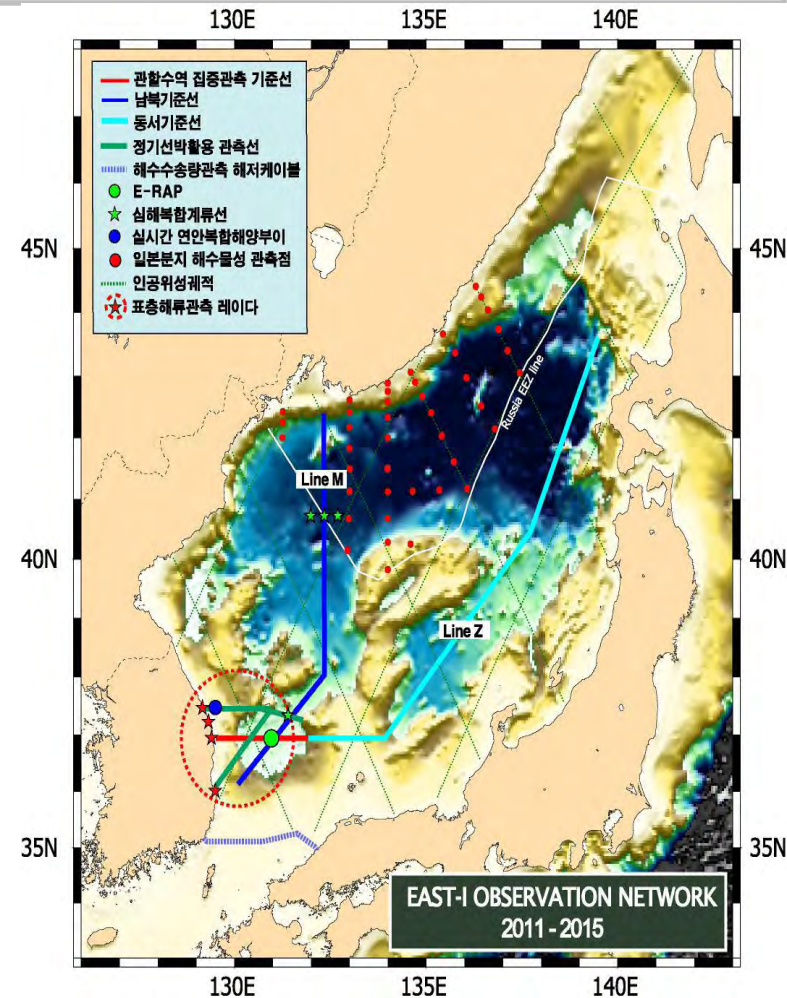
EAST-I OBSERVATION NETWORK 2011 - 2015

|	
Research Title	**Monitoring of Coastal Fisheries and Ecological parameters in East/Japan Sea**
PI	*Jong-Hwa Park (NFRDI)*
Research Goals	- **Monitoring of fisheries resources** - **Provision of the analytical information needed for prediction of fishing conditions and better fishing efficiency** - **Identification of the oceanographic conditions to develop the fishing grounds**
Research Details	○ **Collection of biological and ecological information of major fisheries resources** ○ **Trends in catches** ○ **Fisheries variables such as size composition, CPUE etc. (snow crab and pollack)** ○ **Monitoring of fishing environments** ○ **Real time monitoring of oceanic conditions**

Research Title

Monitoring of Coastal Fisheries and Ecological parameters in East/Japan Sea

Expected contribution of research output

○ **Identification of the changes in ecological features of major fishery resources**
○ **Securing scientific background for the fisheries policy-making**
○ **scientifically efficient management of the coastal fishing grounds**

Technologic advance

Economic benefit

policy making
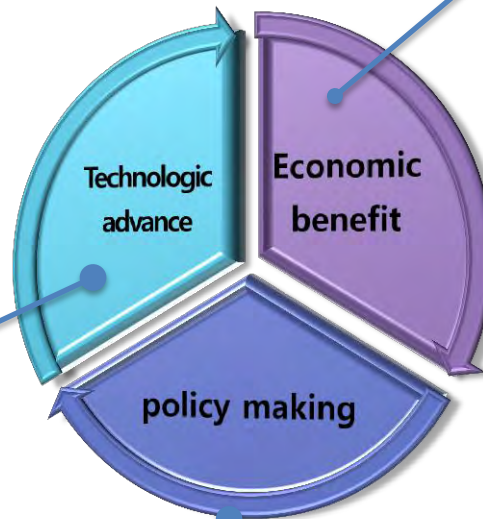
○ **Enhanced management of fishing grounds and improved productivity of the fisheries industry**
○ **Improved predictions on oceanic changes, better understanding of the oceanic conditions would eventually increase the fisheries yield**
○ **Provision of solution to the practical difficulties faced by the fishing community**

○ **Provision of information needed in policy-making**
○ **Adaptation by the fisheries industry (community) to the changes in ecological features**
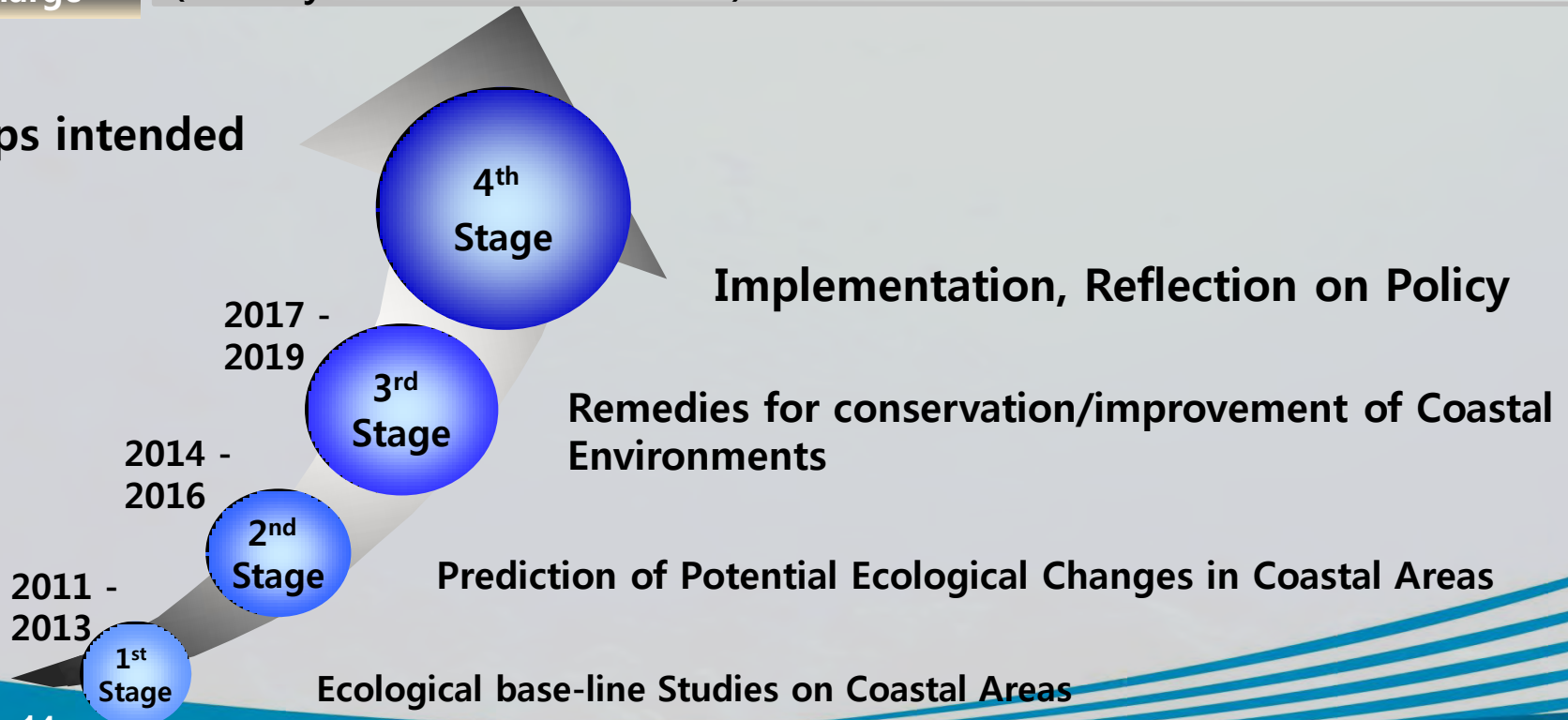
AICE-related Program (general)

Titles (or aims)	o Identification of the Anthropogenic Influences on the Coastal Ecosystems o Impacts of the Coastal Ecosystem Changes on the Society and Economy o Development of the Ecosystem Status Index o Development of the Ecological Assessment tools, and applications of these to Management and Risk Analysis
Person in Charge	*Jung-Hee Jung,* (Ministry of Oceans and Fisheries)

Steps intended

4th Stage

2017 - 2019

3rd Stage

2014 - 2016

2nd Stage

2011 - 2013

1st Stage

Implementation, Reflection on Policy

Remedies for conservation/improvement of Coastal Environments

Prediction of Potential Ecological Changes in Coastal Areas

Ecological base-line Studies on Coastal Areas

|	
Research Title	**Research on the Changes in the Oceanic and Coastal Ecosystem (parameters) Due to Climate Change and Human Activities**
PI	*Hyun-Woo Kim* **(Pukyong University)**
Research Goals	**Provide oceanic ecological knowledge to the development of a model on the climate change and coastal ecological structures, establish the network of the counter-measures based on an analysis of the vulnerability of the coastal ecosystems, proposition of policies in response to the changes in the hydrological and oceanic resources caused by climate change and human activities. (Chasing two rabbits?)**
Research Themes	**- Selection of target fish species for experiments that can reveal the ecological changes caused by climate change and human activities** **- Experiments to measure the population parameters in changing conditions such as individual growth rate, spawning rate, survival rate, hatching rate, etc.** **- Field data collection for those chosen species** **- Population dynamics of the target species (not specified in the proposal).**

Research Title

Research on the Changes in the Oceanic and Coastal Ecosystem (parameters) Due to Climate Change and Human Activities

Expected contribution of research output

Selection of Indicator species can be used in impact analysis of anthropogenic and natural variation

Variability Partitioning

Improved Scientific Management Of fish stock

Economic contribution
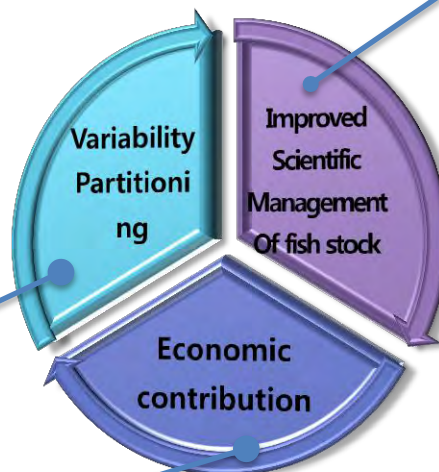
Population dynamics of commercially important species can give us the needed information for better management

Good management based on scientific back ground can increase the efficiency of fisheries
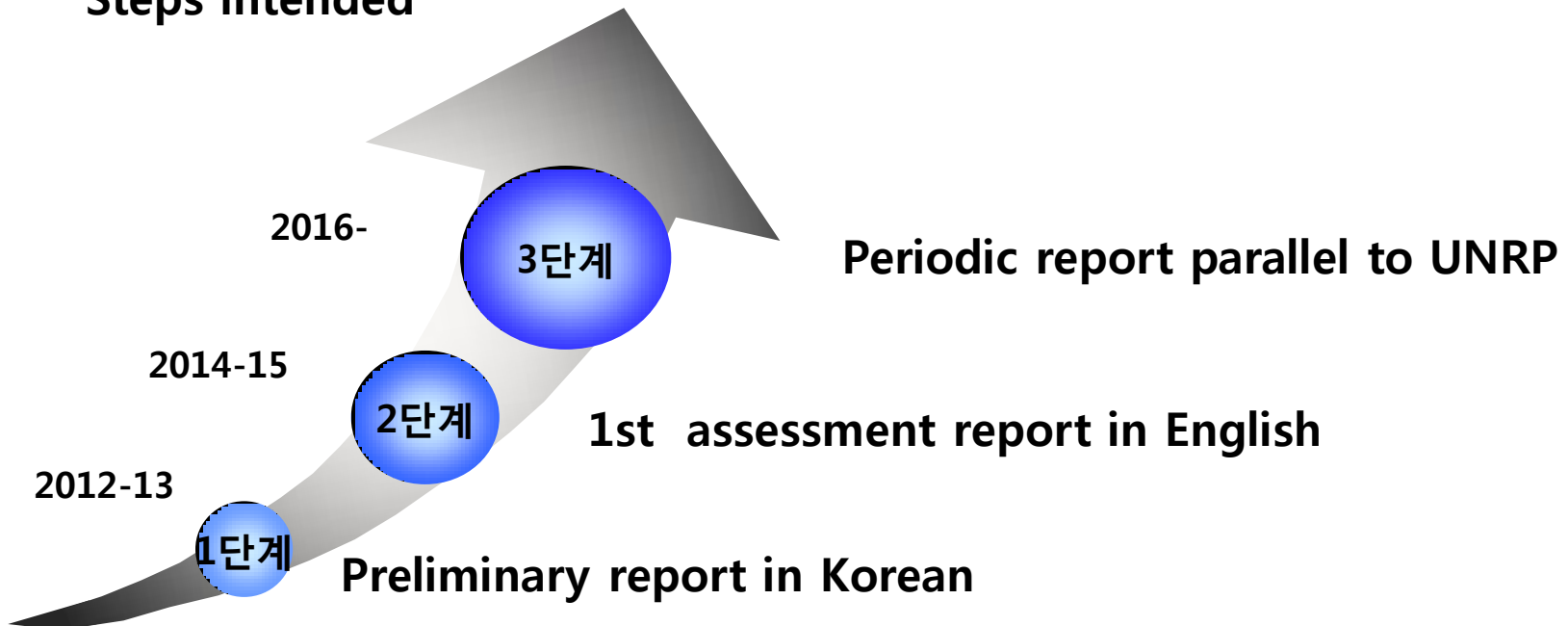
SOFE-related Program

Program Title	o **Assessment of marine environment including socio-economic aspects - Korean Regular Process**
P I	**Kyungjin Kim, KIOST**

Steps intended

2016-
3단계 — **Periodic report parallel to UNRP**

2014-15
2단계 — **1st assessment report in English**

2012-13
1단계 — **Preliminary report in Korean**

SOFE-related Information Management Systems

Agency	System	Applications
Ministry of Oceans & Fisheries	Coastal Area Management Information System	Management of coastal areas & comprehensive planning Management of artificial fish ranch Management of public waters
National Fisheries Research & Development Institute (NFRDI)	Oceans & Fisheries Experiment & Research Information System	Research on marine fisheries resources Forecasts on fishing conditions Studies on fish diseases Research on marine environments Red tide studies and forecasts Research with marine observational data
	Oceanographic Information System	Establishment of marine resources development policies Establishment of marine observations and research policies Establishment of marine environmental policies
	Ecosystem Forecast System (Coastal Area)	Management of comprehensive fisheries information
	Red Tide Image Information	Red tide forecasts

Agency	System	Applications
Korea Hydrographic & Oceanographic Administration (KHOA)	Information System of Physical Characteristics of the Ocean	Public service of provisioning marine conditions
	Real-time Coastal zone Information System	Provision of raw data for oceanographic researches / Forecasting ocean conditions
	Real-time Seawater Movement Information System	Provision of raw data for oceanographic researches / Forecasting ocean conditions
	Tidal Information System	Provision of raw data for oceanographic researches / Forecasting tide and tidal currents
	Marine Spatial Information System	Provision of data for coastal zone management

Agency	System	Applications
Korea Institute of Ocean Science & Technology (KIOST)	**Marine Environment Information System**	**Provision of information for policy making Provision of marine information to public**
	Marine Data System	**Data provision for various Marine Researches (Biological data included)**
	Marine Forecast System	**Marine forecasts**
	Marine Wave Information System	**Port technology development and management-related services**

Ⅳ. Status and Steps forward

- – Since 2009, no action was made to make present programs to be linked with FUTURE
- – Lack of linkage to Socio-economic aspects
- – Korea Maritime Institute need to be involved
- – FUTURE oriented output management is needed （who will take care?）

Mahalo nui loa !