

New Paradigm of IWRM and Revitalization Conflict in Han-River

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I .Introduction

Where is Korea?

A=100,000 sq. km, Population 52mil.

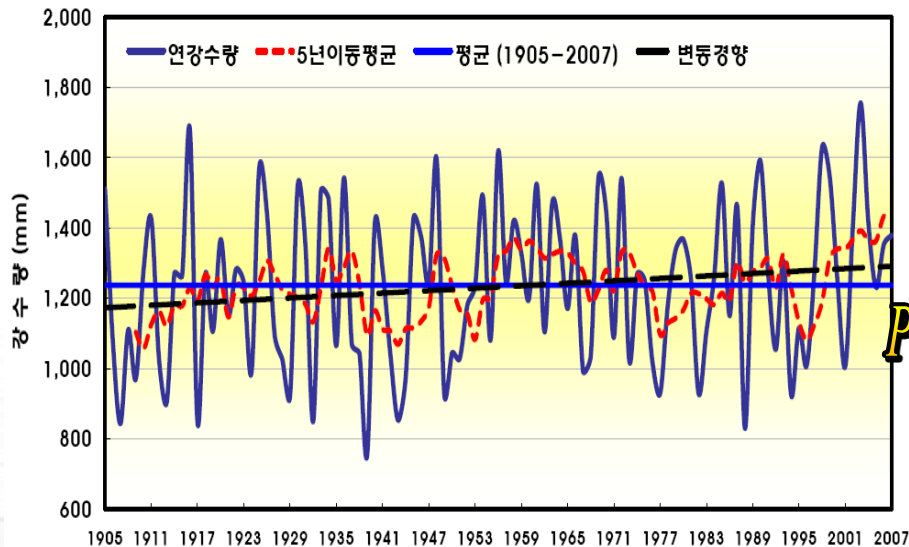


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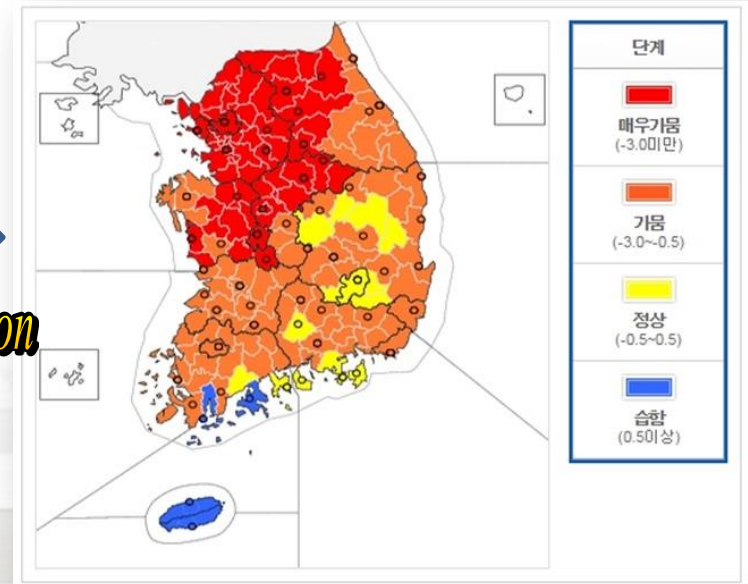
Water Resources Management Conditions

- Average annual Precipitation 1,277.4 mm (1978~2007) in South Korea.

Contents	Republic of Korea	The World Average	Compare
Annual Precipitation	1,277mm	807mm	1.6 times
Annual Water Resources per Person	2,629m ³	16,427m ³	1/6 times



↔
Polarization



- Increasing Tendency in Precipitation

- Increase in Scale and Frequency of Drought

2 Concept and Necessity of Integrated Water Resources Management

- Water Security has evolved water quantity and quality as the water crisis spreads due to climate change, population increase, water pollution and disasters.

Contents	1970s	1980s	1990s	2000s
Issues	Water Quality	Environment	Water Crisis	Water Security
Paradigm	Clean Water	Sustainable Development	Integrated Water Resources Management	

- ❖ Over the past 20 years, the Ministry of Environment(MOE) and the Ministry of Land and Infrastructure and Transportation (MOLIT) have divided water management.
- ❖ However, Water management transferred from MOLIT to MOE in June 2018.
- ❖ Quantity, water quality and disaster prevention need to be reorganized into one consistent system.

Geographical Features

- Narrow National Land Area
(South Korea is about 1/100 of USA)
- Mountain is 70% of the land

Insufficient Water Resources

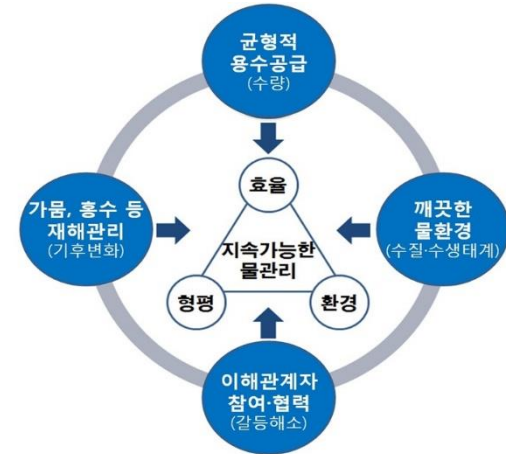
- High Population Density
- Seasonal biases of precipitation
- Water stress is the most serious

Frequent Water Disaster Experience

- The flood risk index is the highest
- Frequent Droughts
('15 West-South Chungcheong Province)

Goals of Integrated Water Resources Management by MOE

- **Efficient management** of water resources instead of water resources development
- **Unified system** establishment of Water quantity and quality
- **Resilience of climate change** against drought, flood and etc.
- **Governance establishment** based on participation cooperation



Grasp current status of Han-river basin and hydraulic structures.

Water resources problem grasp of region's main issues

Exploring the roles and strategies of focus on the Han-river estuary

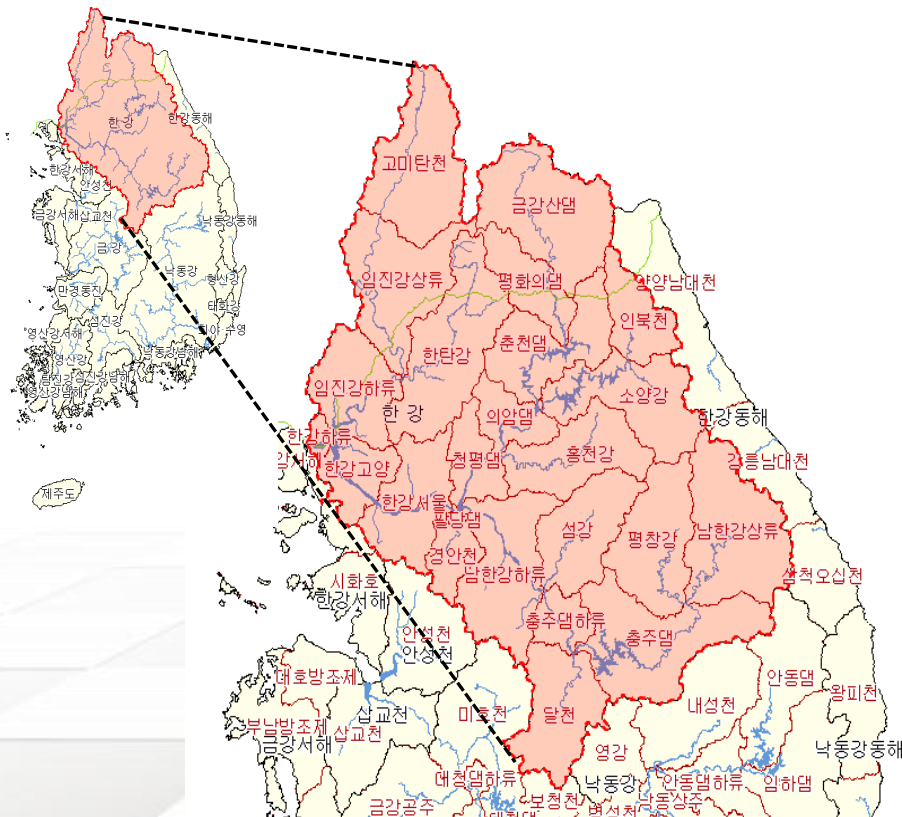


II. Han-River Basin Status and Vision of Integrated Water Resources Management

1

The status of Han-River Basin

- (Area) 34,674.0 km² - (Length) 459.3 km
- (Population) 27.9 million - (Precipitation) 1,409mm
- (Population of Han-River Basin) 29.6 million



Major 4 river project in Korea (2011)

5

Visions of Han-River Basin by IWRM Forum

- The Final Vision of the Han-River basin reflecting main core values by MOE

Contents	Substance
Vision	<i>Co-operative governance together with upstream and downstream</i>
Core value	<ul style="list-style-type: none"> • Abundant Secure water quantity • Improving water ecology health • Adaptation of the new climate system • Maintaining clean water quality • Establish collaborative basin governance
Vision objectives	<ul style="list-style-type: none"> • Focus on demand management and improving water circulation systems • Enhancement of water-ecosystem health through integrated water resources management realization • Plan for systematic cooperation and development among stakeholders • Prepare a resilience plan to adapt to climate change



III. Main Issues of Han River Basin

- 1. Transboundary River against North Korea**
- 2. Submerged Weir Conflict for the Rehabilitation**

III. Main Issues of Han River_ Transboundary River

Concept of Transboundary River

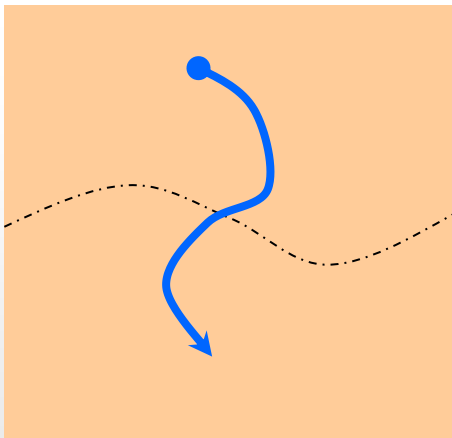
● Spatial Range

- A river that crosses at least one political border, either a border within a nation or an [international boundary](#).

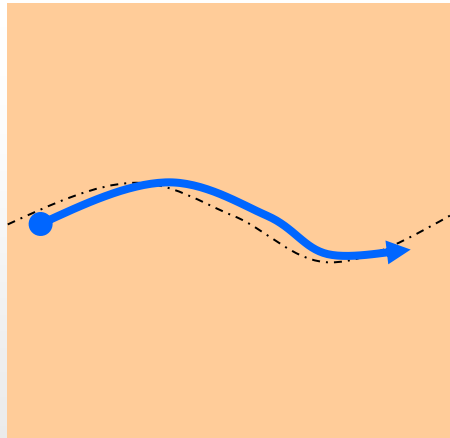
● Water Resources Range

- the aquifers, and lake and river basins shared by two or more countries

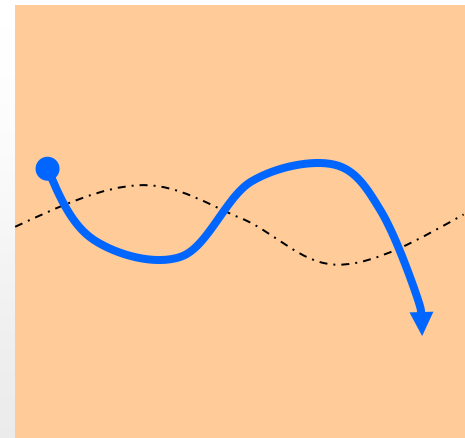
Transboundary River



<Transboundary river>



<Boundary river>



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III. Main Issues of Han River_ Transboundary River

1 The status of South-North Korean Transboundary Rivers

✓ Transboundary rivers belong to North Korea including for Han River at 23% and Imjin River at 63%.

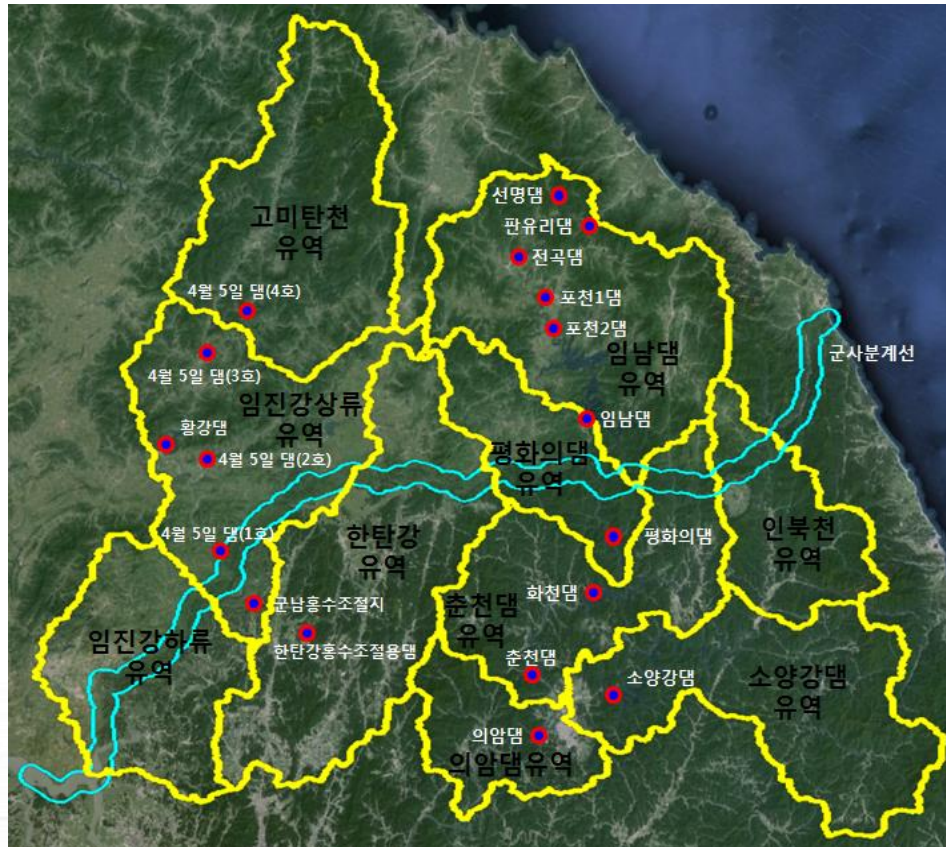
- (Area) Bukhan-River 10,124 km², Imjin-River 8,118 km²
- (Extension) Bukhan-River 291.3 km, Imjin-River 273.5 km

River name	Contents	Total	South Korea	North Korea
Buk Han-River	Basin Area(km ²)	10,124	7,787 (76.9%)	2,337 (23.1%)
	Extension(km)	291.3	158.8	132.5
Imjin -River	Basin Area(km ²)	8,118	3,009 (37.1%)	5,109 (62.9%)
	Extension(km)	273.5	91.1	182.4



III. Main Issues of Han River_Transboundary River

Korean Case between North and South



Classify	Bukhan River Basin	Injin River Basin
North Korea	Panyuri Dam	5 th April Dam(1 st)
	SinMyoung Dam	5 th April Dam(2 nd)
	Jeongok Dam	Hwanggang Dam
	Pocheon 1 st Dam	5 th April Dam(3 rd)
	Pocheon 2 nd Dam	5 th April Dam(4 th)
South Korea	Peace Dam	Gunnam Dam
	HwaCheon Dam	
	Soyanggang Dam	
	Chuncheon Dam	Hantangang Dam
	Uiam Dam	
	Cheungpyeong Dam	
	Paldang Dam	
Red : Flood Control Dam Blue : A Hydroelectric Dam		

- Bukhan River Basin : South Korea 7EA / North Korea 6EA
- Imjin River Basin : South Korea 2EA / North Korea 5EA

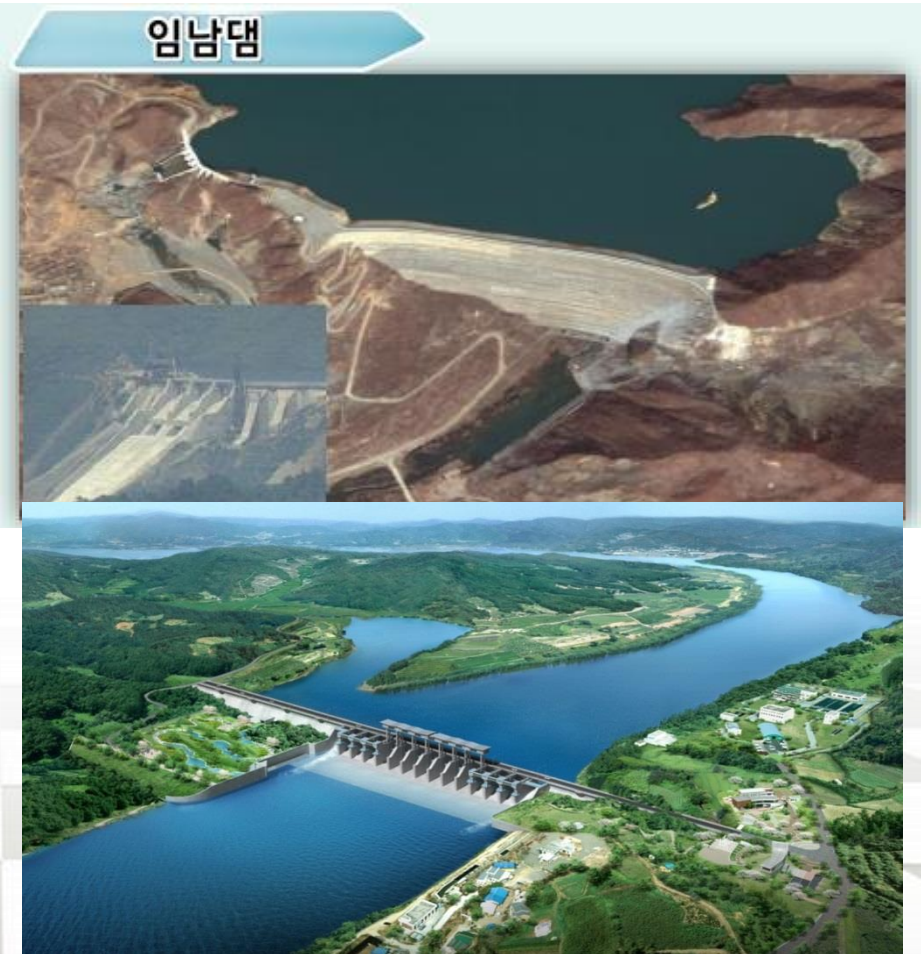
III. Main Issues of Han River_ Transboundary River

2

Transboundary Rivers (Conflict on South-North Korean)

- Changed Yesung-River basin through Hwanggang dam in 2008

Hwanggang Dam → YeSung-River → West Sea



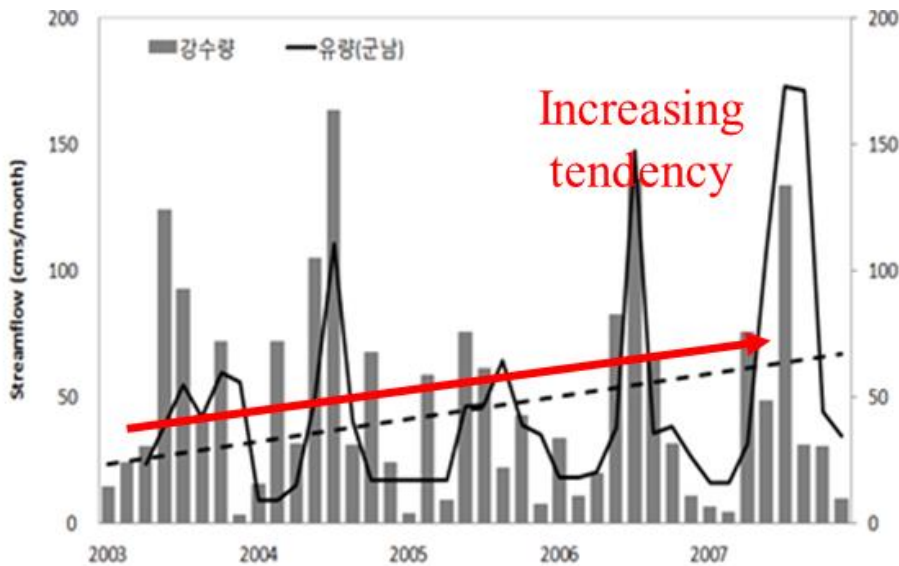
III. Main Issues of Han River_Transboundary River

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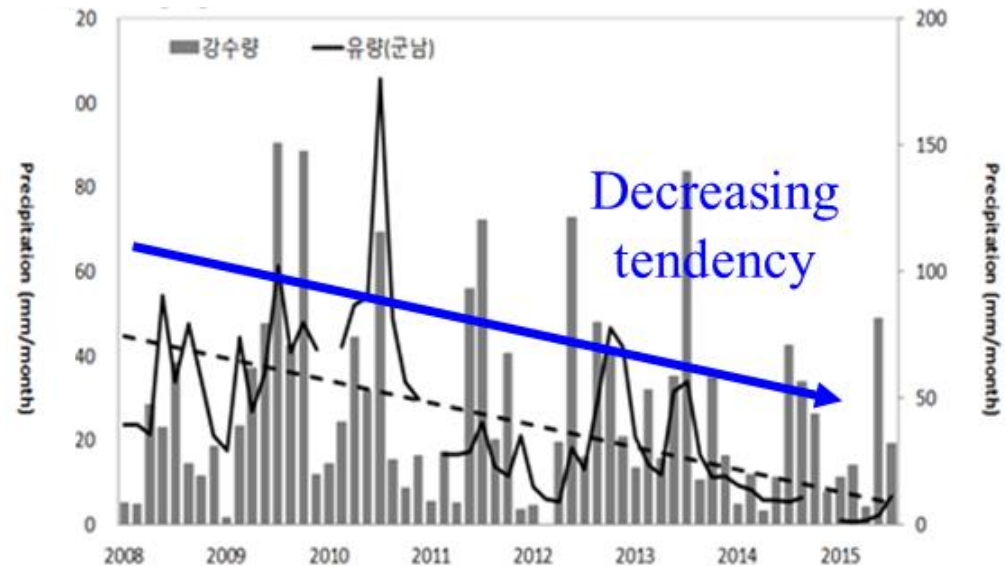
Transboundary Rivers (Conflict on South-North Korean)

- Results between before and after Dam

Hwanggang Dam fresh water before



Hwanggang Dam fresh water after

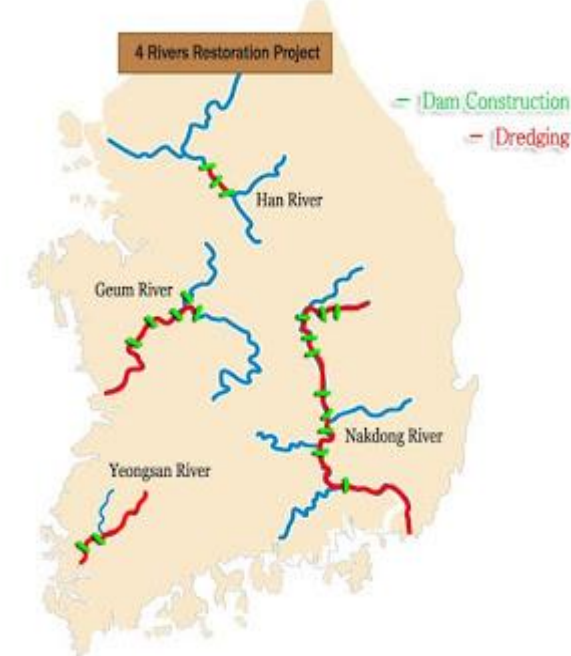
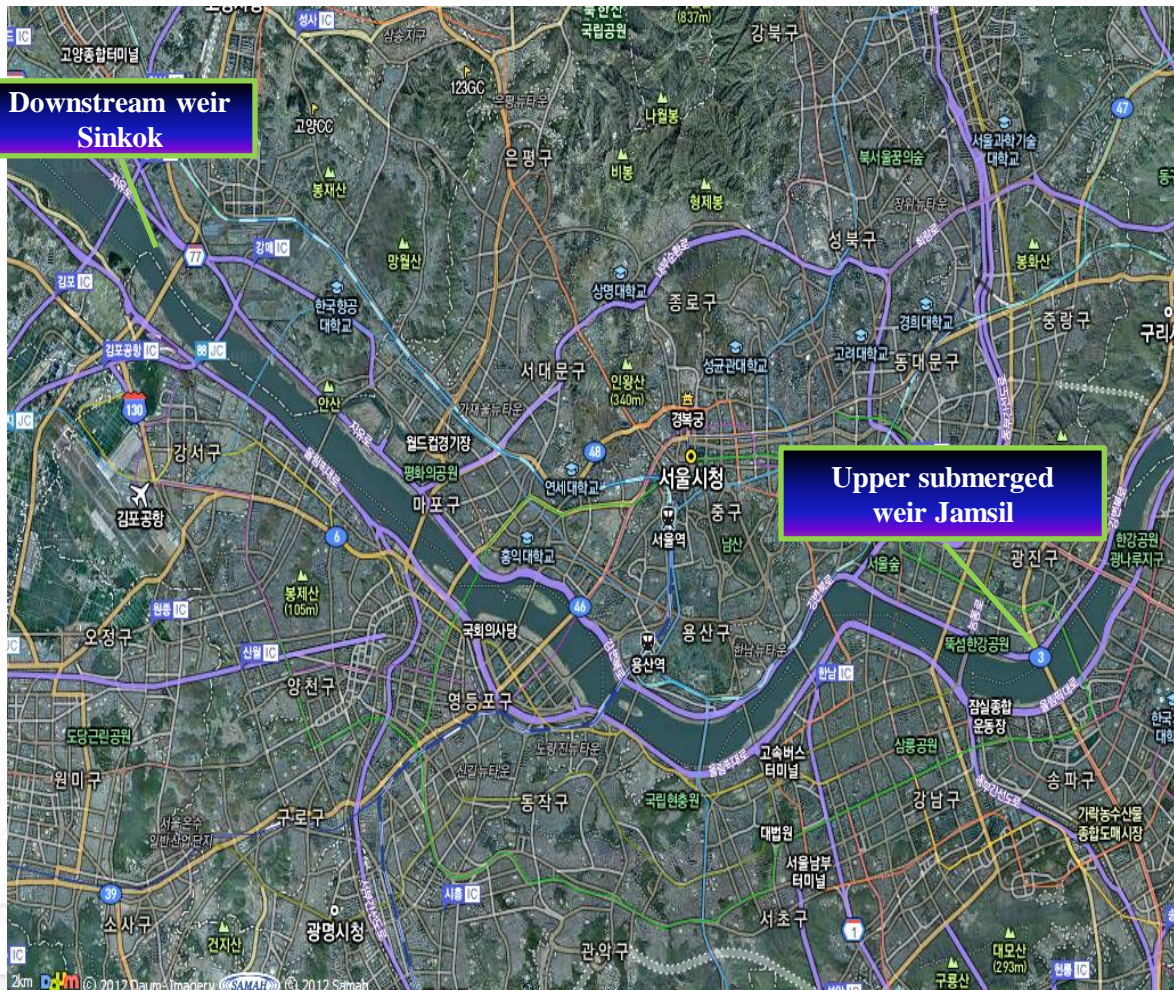


III. Main Issues of Han River_ Weir Removal at Estuary

1

Location of Submerged Weir in Han River

Downstream weir
Sinkok



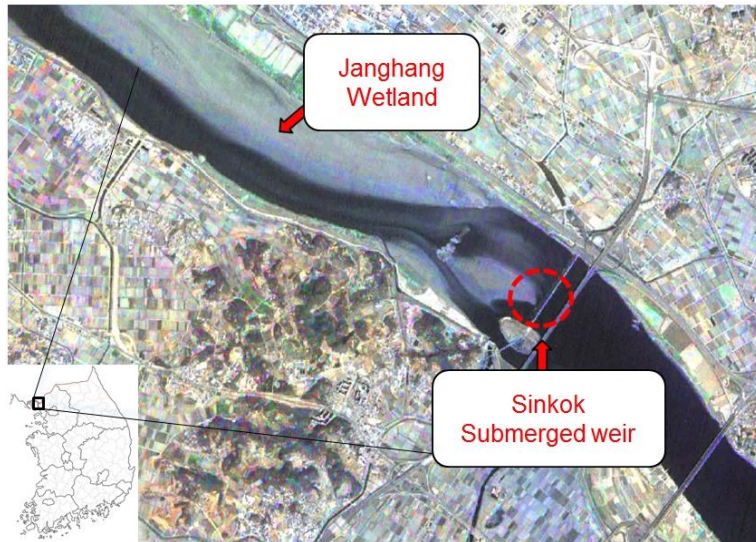
Paldang Dam



Han river has 2 submerged weir discharging from upper dam Paldang to west sea, and 28 bridges

2

Weir and 'Janghang' wetland



- ▶ Sinkok submerged weir in Han river, Seoul Korea was built in early 1980's for the purpose of water level maintenance and protection from sea water intrusion from the estuary
- ▶ Its length is almost 1 km and 2.4 meter height which has two composite structures of rigid and movable weir.
 - Fixed weir : Length 883m, Height 2.4m
 - Movable weir : Length 124m, Sluice gate 5
 - opening and closing operation : at low tide and high tide :
7 hours open per day (average)
- ▶ Huge wetland developed called "Janghang" as the results of weir construction just down to the weir
- ▶ However, recently social conflicts of the weir removal occurred for the river rehabilitation and aqua-eco system recover



III. Main Issues of Han River_ Weir Removal at Estuary

1

Conflicts on Singok Submerged Weir for Restoration

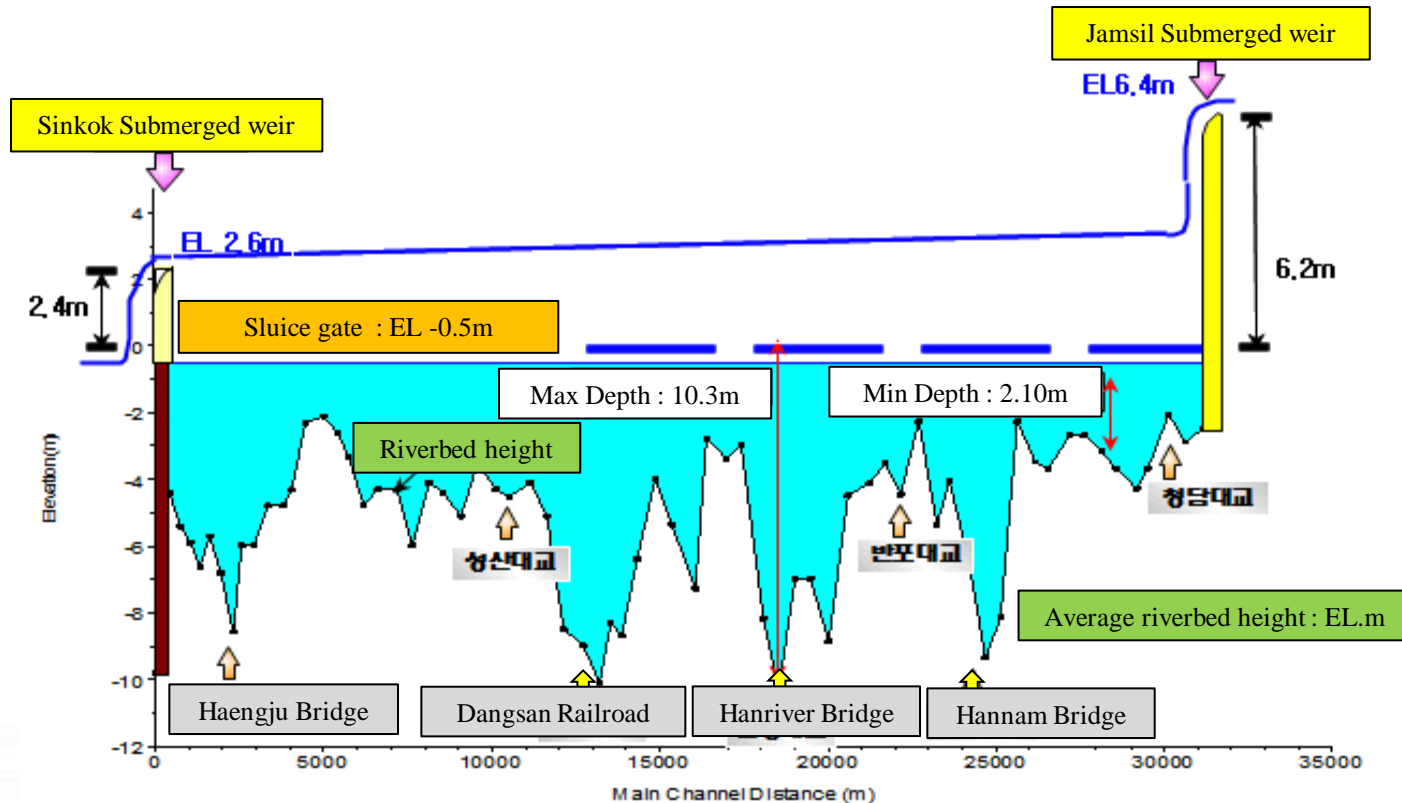
Contents	Substance
Location	- Downstream Estuary Area of Han River Basin
Configuration	- Fixed weir : length 883m, height 2.4m - Movable weir : length 124m, 5 gates to discharge
Original Purpose	- Prevention of sea water intrusion to upstream - Securing groundwater level and water supply - Maintain a minimum 2.6m water level for ship navigation



III. Main Issues of Han River_ Weir Removal at Estuary

3

Conflict between stakeholders



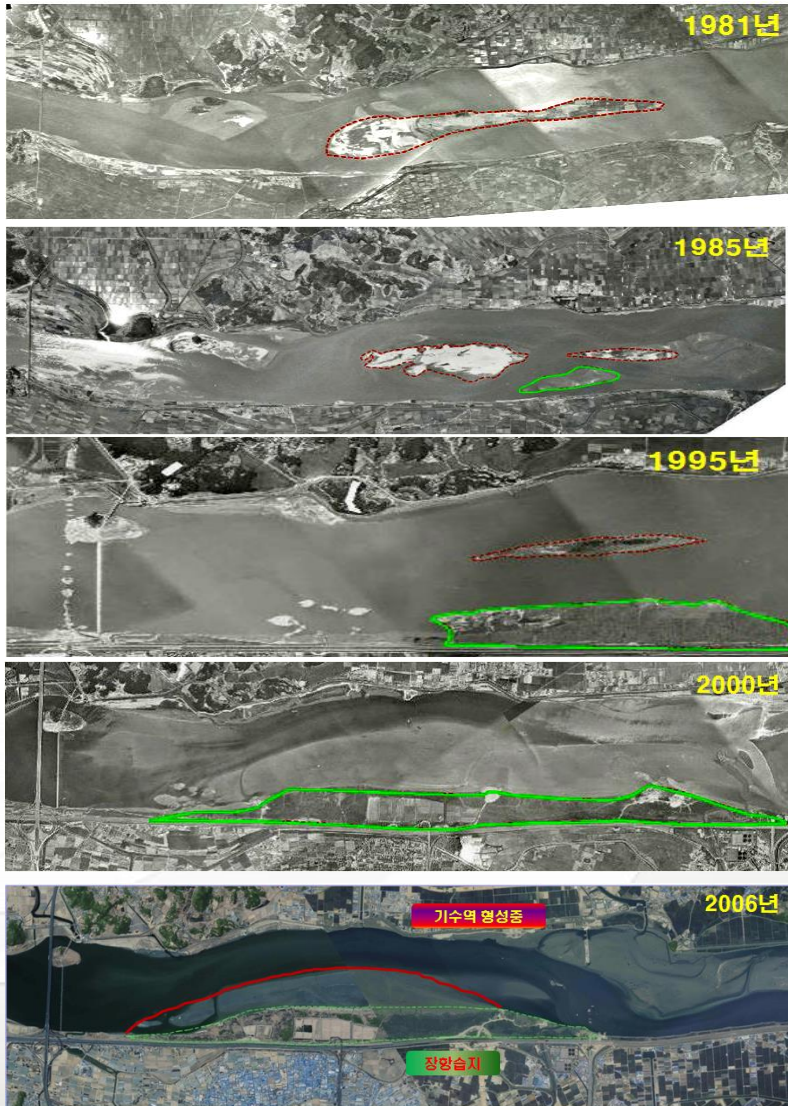
► A prospect of Seoul city government in case of removal

- ✓ Water level decrease in max. 5 meter, min. 3 meter between upper and down submerged weir which influence the water navigation and waterfront activities
- ✓ Salinity intrude to upstream weir.

III. Main Issues of Han River_ Weir Removal at Estuary

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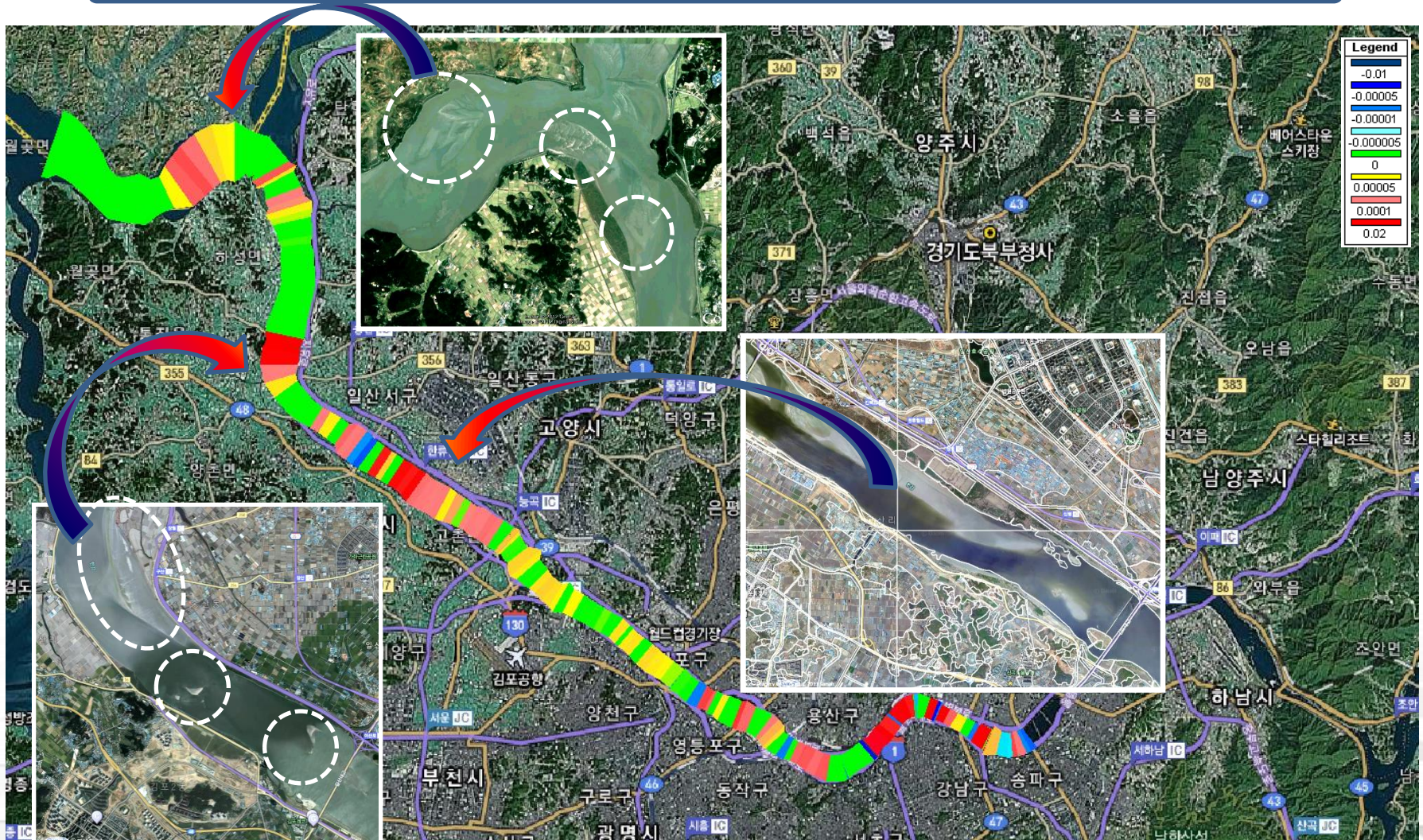
The relationship between weir and wetland



- ▶ Wetland was developed as a by-product of construction of submerged weir and is ready for registration of Ramsar wetlands.
- ▶ Conflicts occur with the weir between two parts-one insists preservation, the other removal.
- ▶ A point of issue is to maintain the water level and secure fresh water resources or rehabilitation of ecosystem of river.

III. Main Issues of Han River_ Weir Removal at Estuary

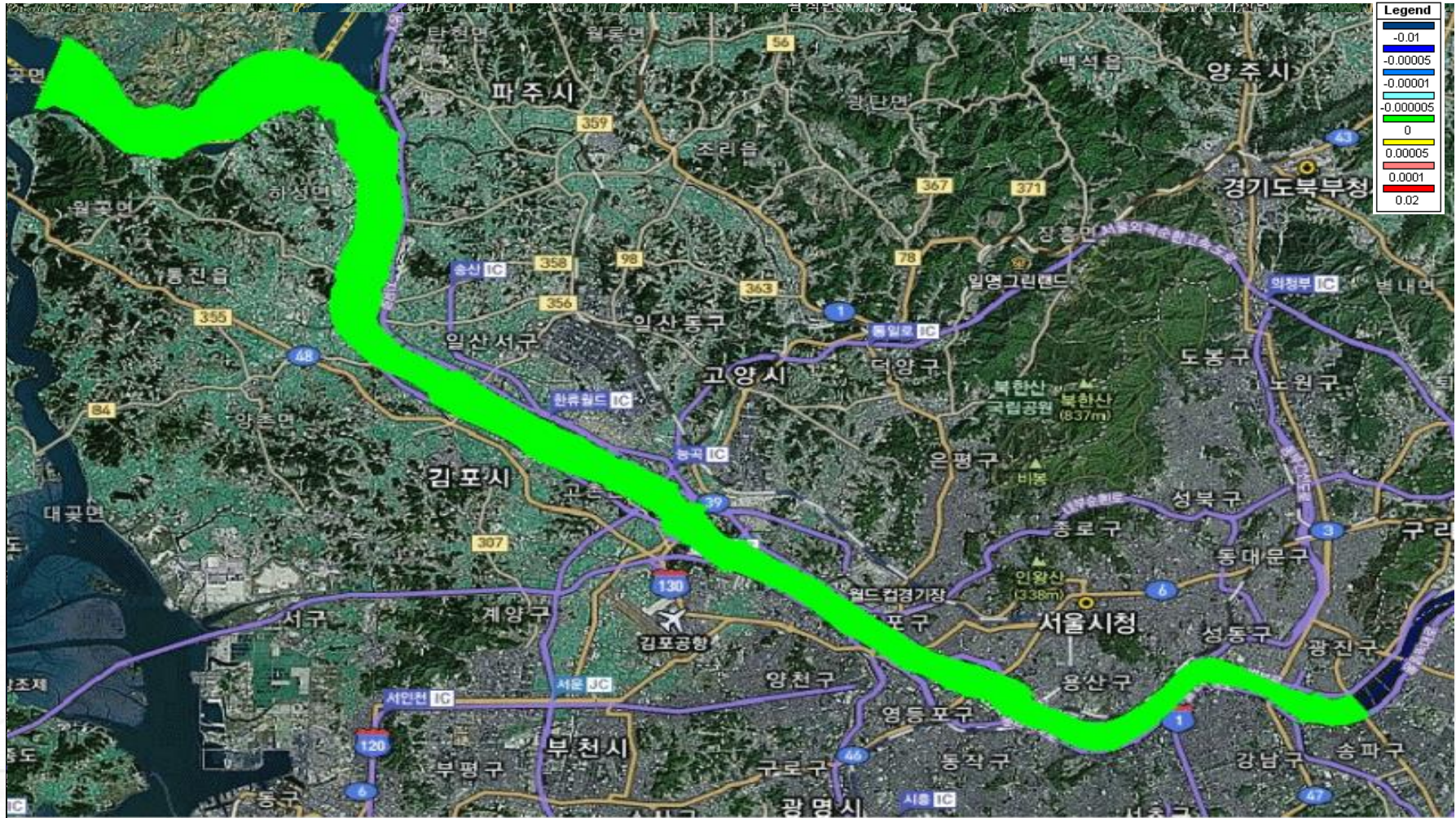
Simulation of riverbed in dry season at present



Sediment transport tends to be affected by high adverse tide rather than discharge from upstream

III. Main Issues of Han River_ Weir Removal at Estuary

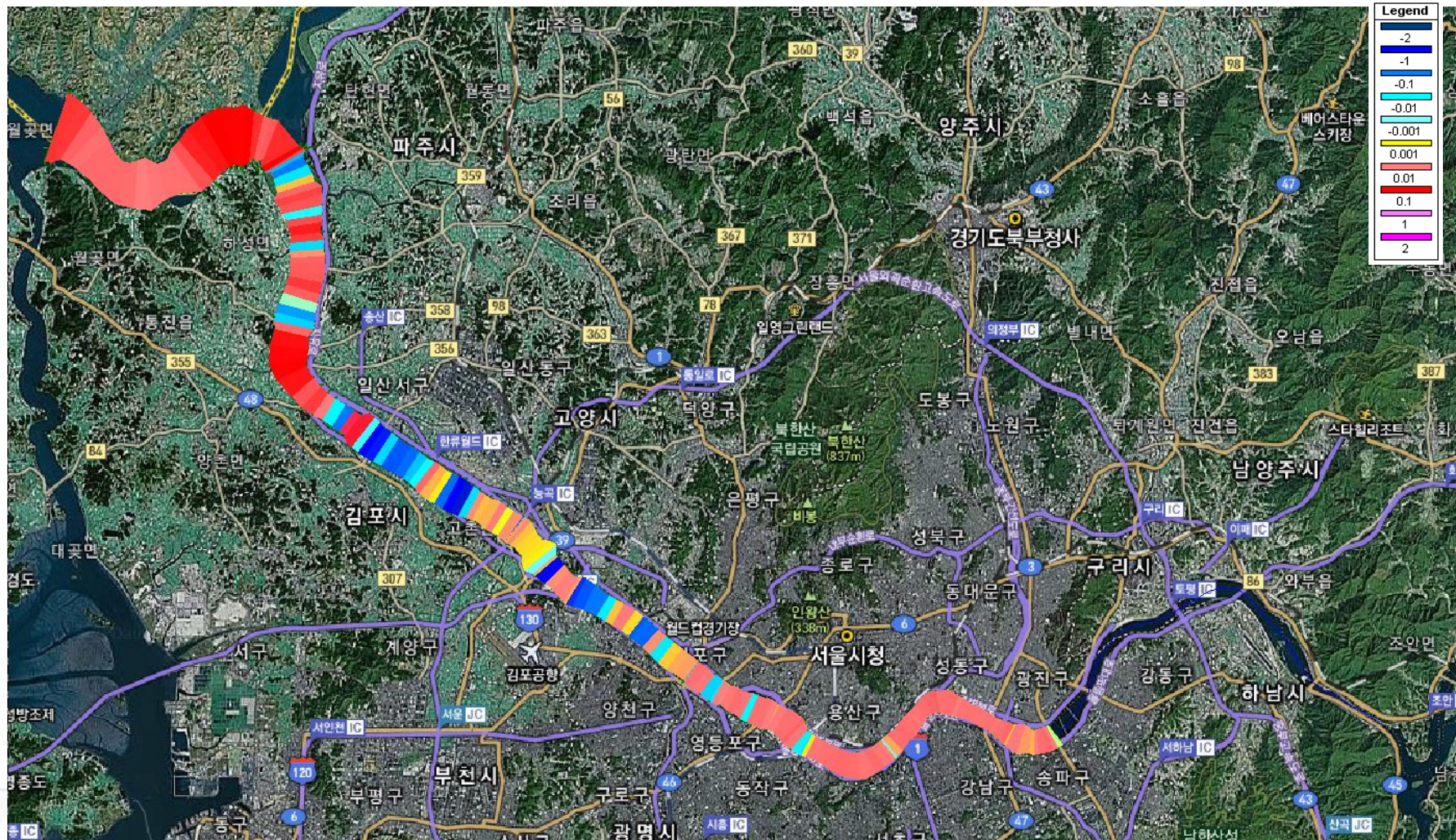
Simulation of riverbed deformation in case of removal of weirs



Adverse tides affect to upstream and increasing sediment concentration. Showing deposition increase forecasted

IV. Riverbed change deformation in flood season

Simulation of riverbed in flood season at present



In flood season, it tends that sediment transport and deposition move to downstream due to heavy flood, which causes to repeat erosion and deposition

IV. Riverbed change deformation in flood season

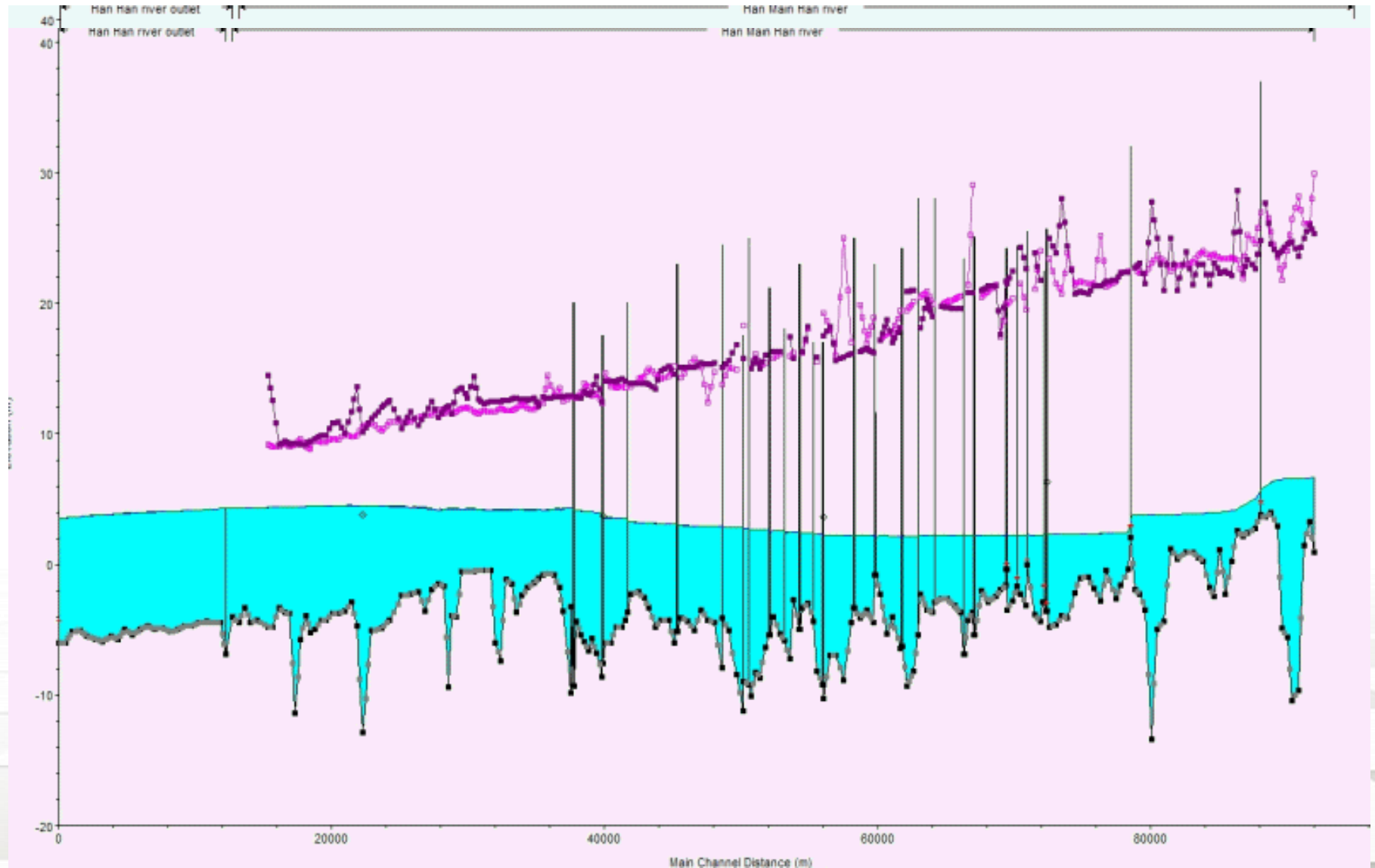
Simulation of riverbed in flood season in case of weir removal



In flood season, there is little change in riverbed comparing with present situation in case of removal of weirs

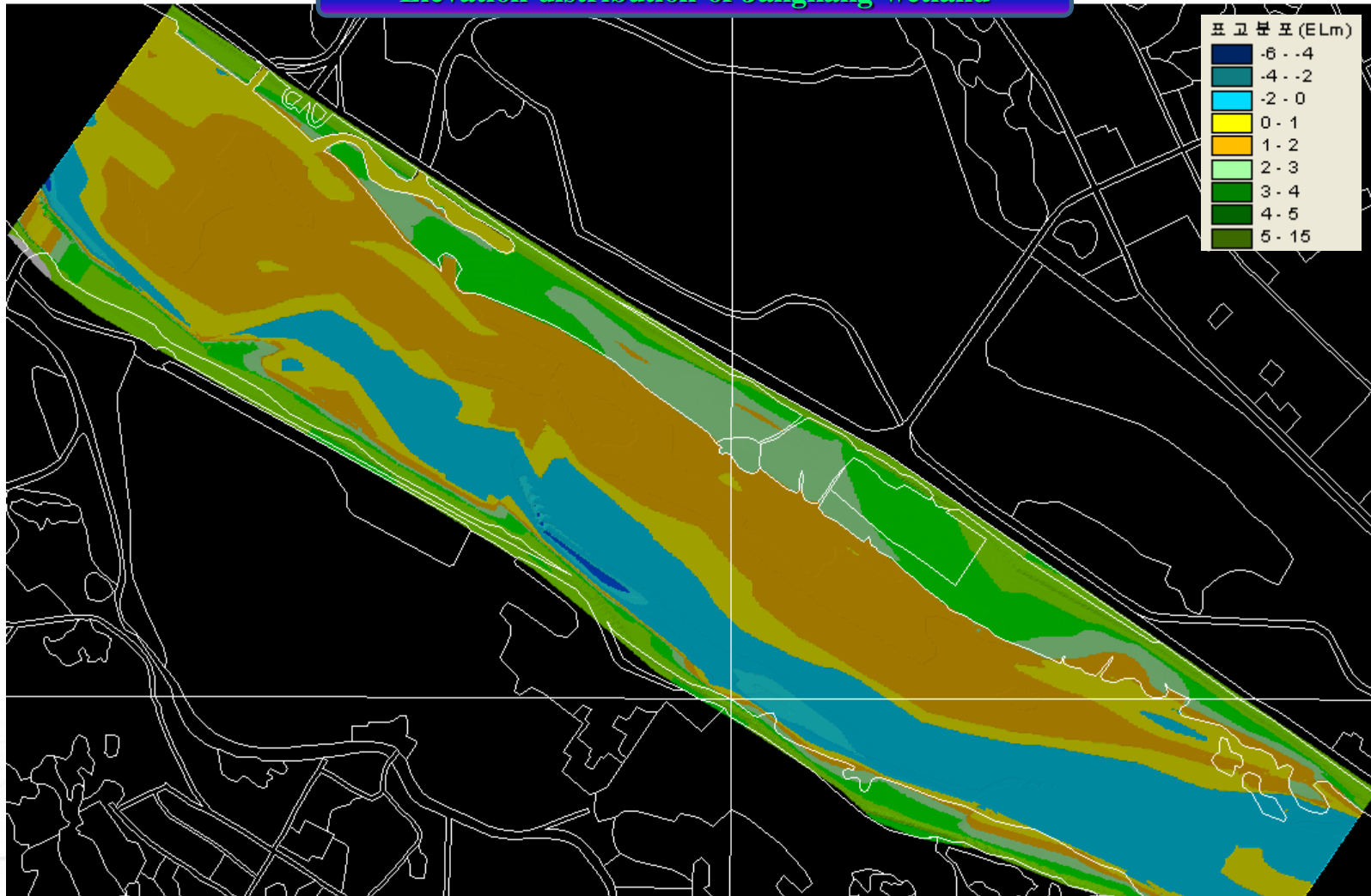
III. Main Issues of Han River_ Weir Removal at Estuary

Changes in water level (Dry season)



III. Main Issues of Han River_ Weir Removal at Estuary

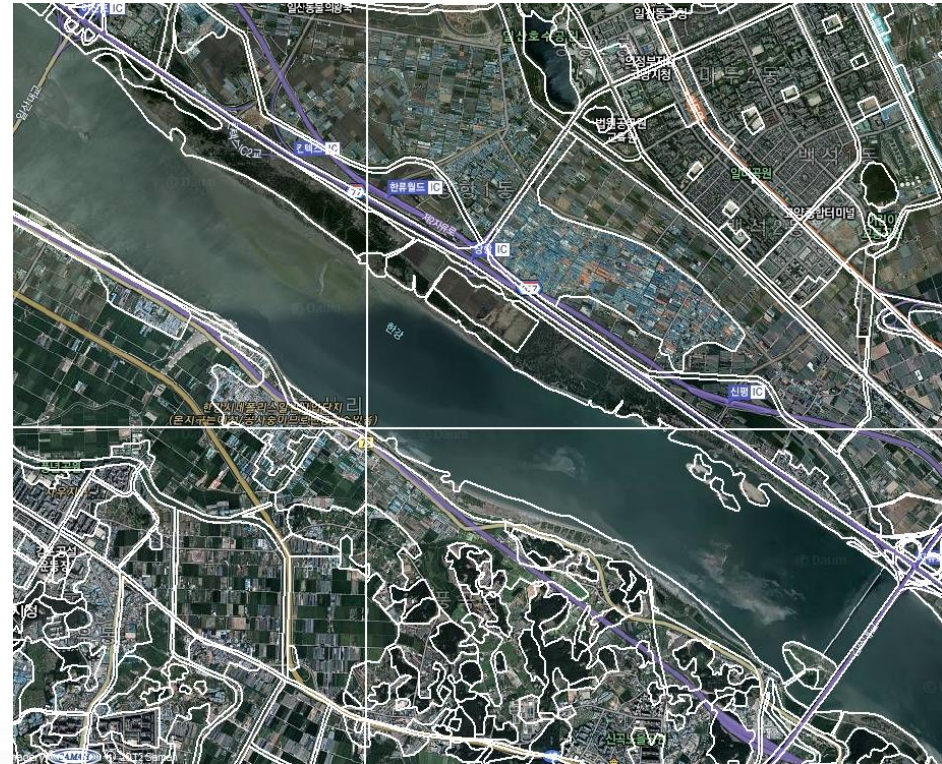
Elevation distribution of Janghang wetland



If the weir is removed, the area of wetland “Janghang” will reduce to 38% of the total wetland area to 1.24 km² due to water level rise in dry season and vegetation area decreases 5% to 0.11 km².

III. Main Issues of Han River_ Weir Removal at Estuary

Satellite picture of dry season in 2011



☞ Gray is the transition area with the muddy tidal flat deposition

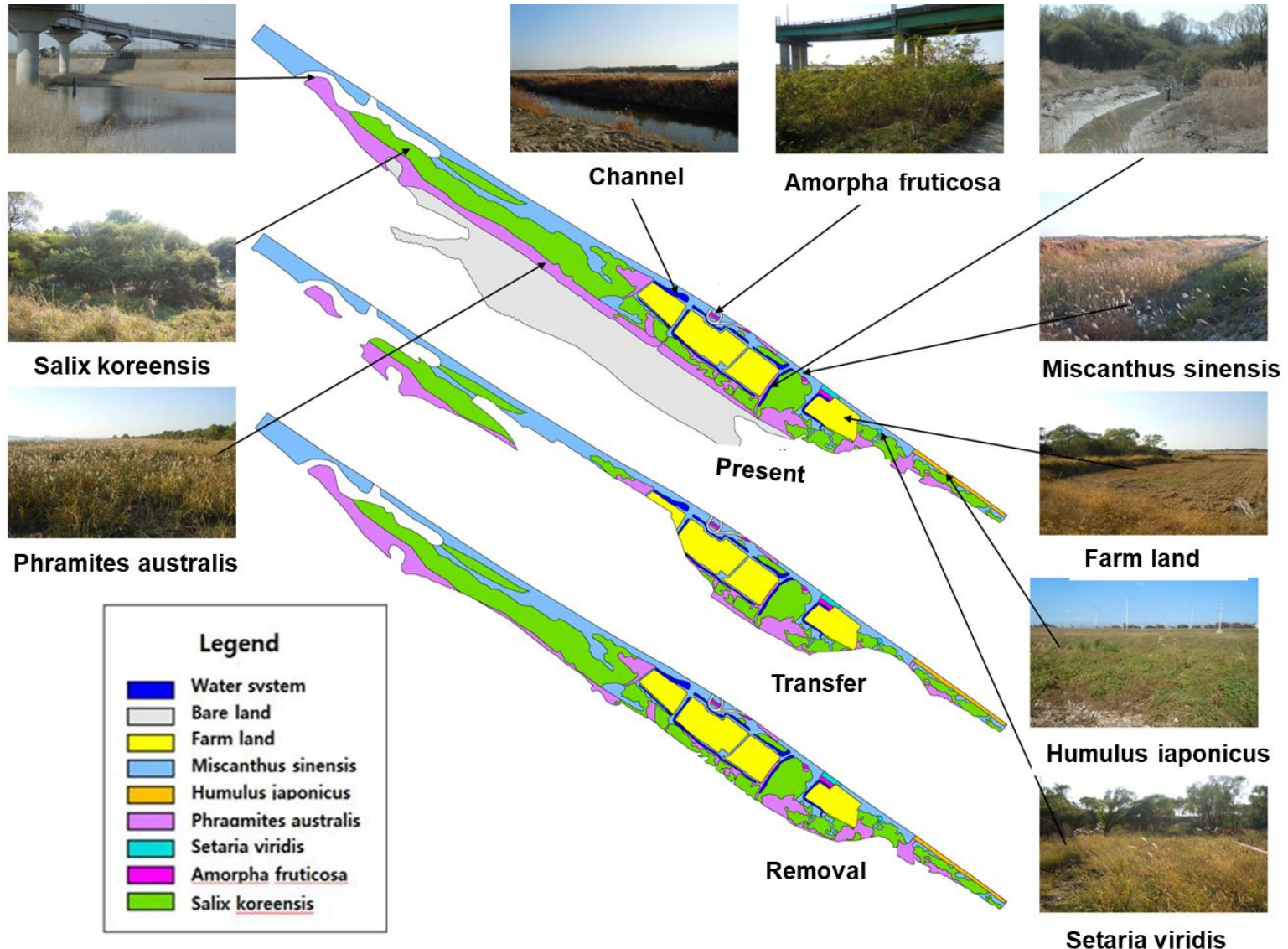
The total area of wetland is 5.1 km² including transition area and land vegetation area is 2.1 km²
Its magnitude is as same as that of 90's. not grown any more – wetland old and safe condition-

Muddy transition flat area varies along the flood condition

☞ Flood more than 27,000 occurred in July 2011

III. Main Issues of Han River_ Weir Removal at Estuary

► Existing vegetation of Janghang wetland and influences (Dry season)

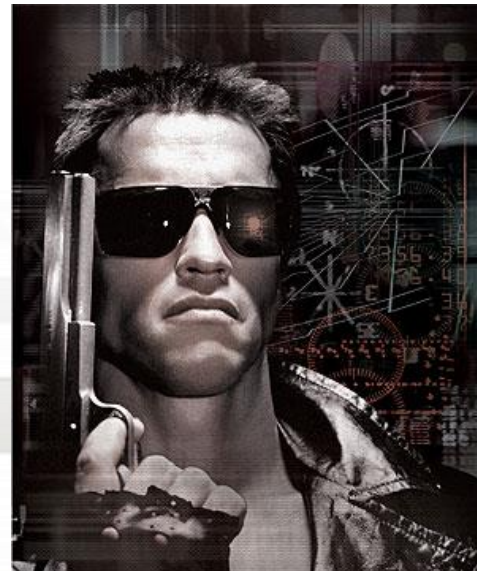


Paradigm Shift in River Management Is it Appropriate Time ?

**It is difficult to decide to remove the weir or not.
All those things also should be considered
comprehensively such as hydraulic influences,
environmental aspects as well as socio-economic condition.**



**Building with Nature
Room for the River**





**Thank you for your
attention**