

Evaluating Natural Vegetation Reference For River Restoration Benchmarking

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Outline

- Background
- General objective
- Dynamic Vegetation Model
- Case study
- Conclusions & Discussion



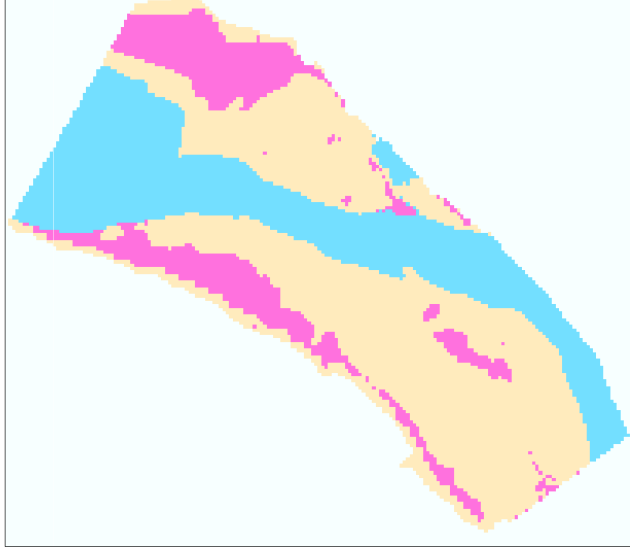
Background

- Natural reference sets restoration goals
- Understanding of ecosystem



General Objective

- Simulate historical natural conditions



Model Concept

- Recruitment vs. Recycling



- Time Progression



Vegetation Succession Phases Time Effect

- Long term variations in space & time



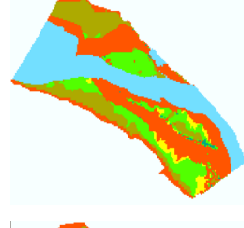
1952



1960



1995



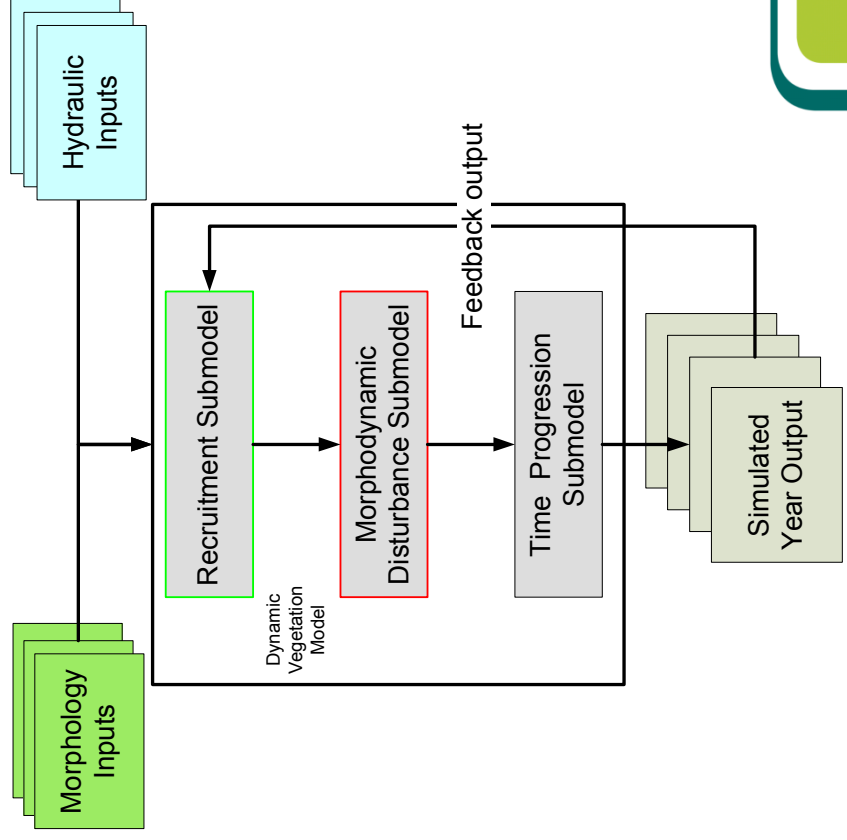
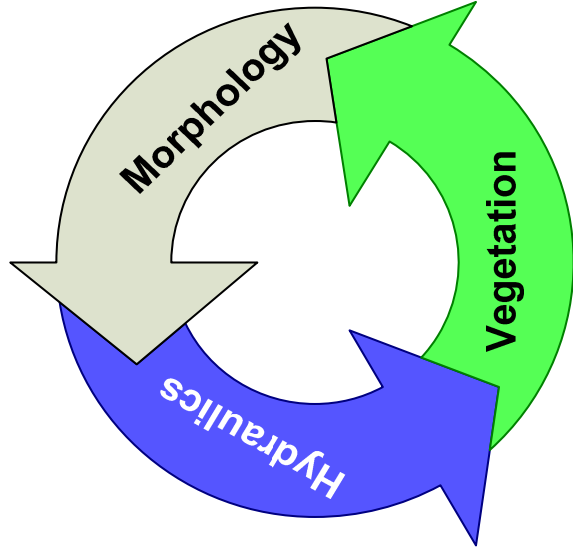
2005



2010



Model - Structure



Model-Raster Inputs

- Topography
- Bank Zone
- Floodplain zone
- Mean Water Level
- Max Shear Stress

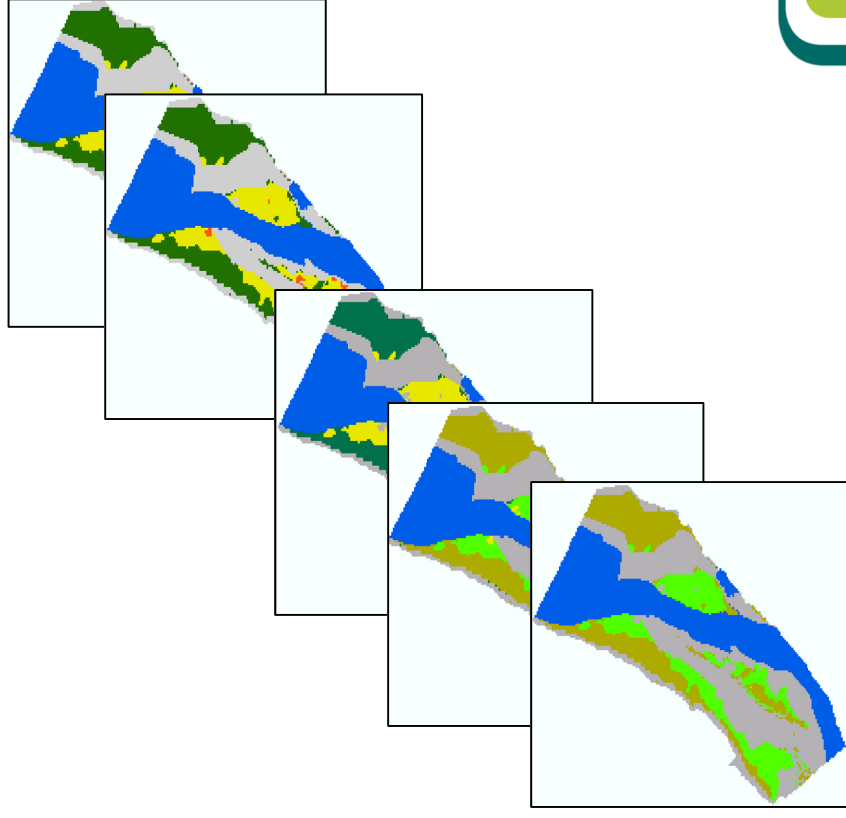
Recruitment submodel inputs

Morphodynamic dist. submodel inputs



Model-Outputs

- One raster for each simulated year
- Area balance table

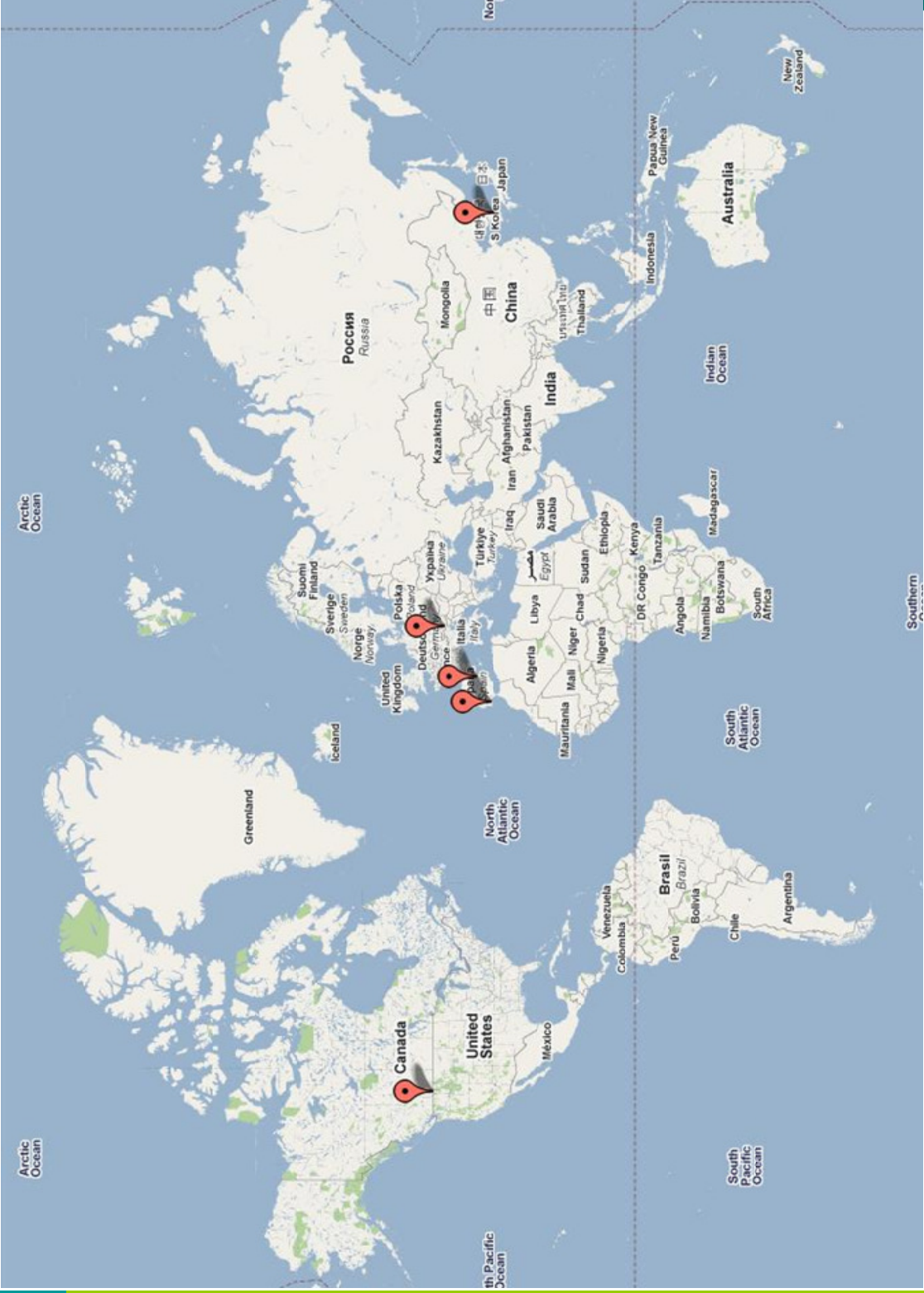


Microsoft Excel - AreaBalance.June8

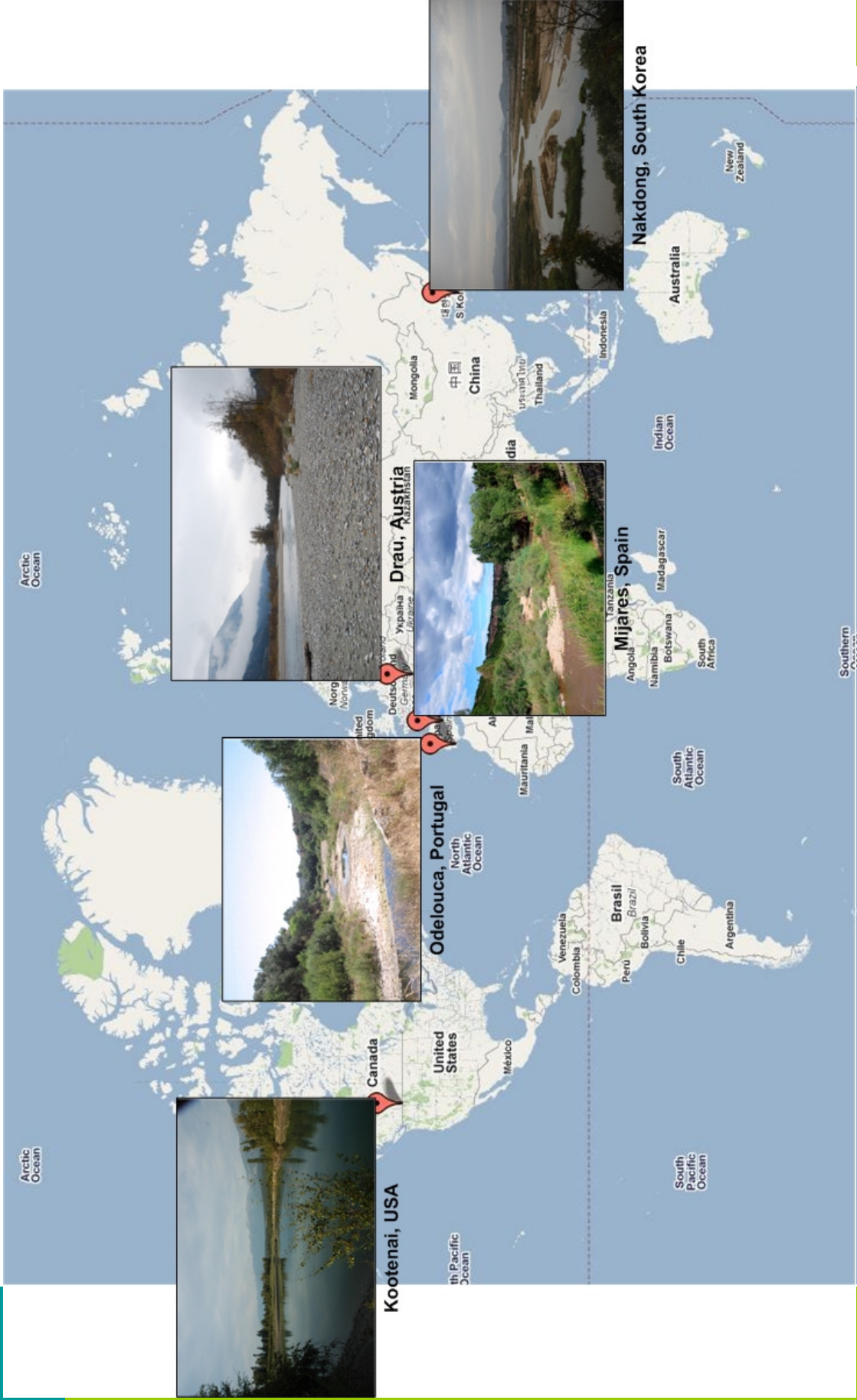
Year	Initial Phase	Pioneer	Herb Phase	Shrub Phase	Young Phase	Mature Phase
1977	8441	0	0	0	0	0
1978	6364	2057	0	0	0	0
1979	6368	2073	0	0	0	0
1980	6368	16	2053	4	0	0
1981	6368	0	2069	4	0	0
1982	6368	0	2069	4	0	0
1983	4252	2117	2068	4	0	0
1984	6361	16	2068	4	0	0
1985	6360	11	2068	12	0	0
1986	4796	1695	2068	12	0	0
1987	6361	0	2068	8	4	0
1988	6360	1	2068	8	4	0
1989	5347	1014	2068	8	4	0
1990	6360	0	2069	8	4	0
1991	6360	0	2069	8	4	0
1992	4751	1609	2069	0	12	0
1993	6360	0	2069	0	12	0
1994	6360	0	2069	0	12	0
1995	3623	2737	2069	0	12	0
1996	3623	2737	17	2052	12	0
1997	3623	0	2527	2278	8	4
1998	3756	0	2427	2246	8	4



Model Application Case Studies

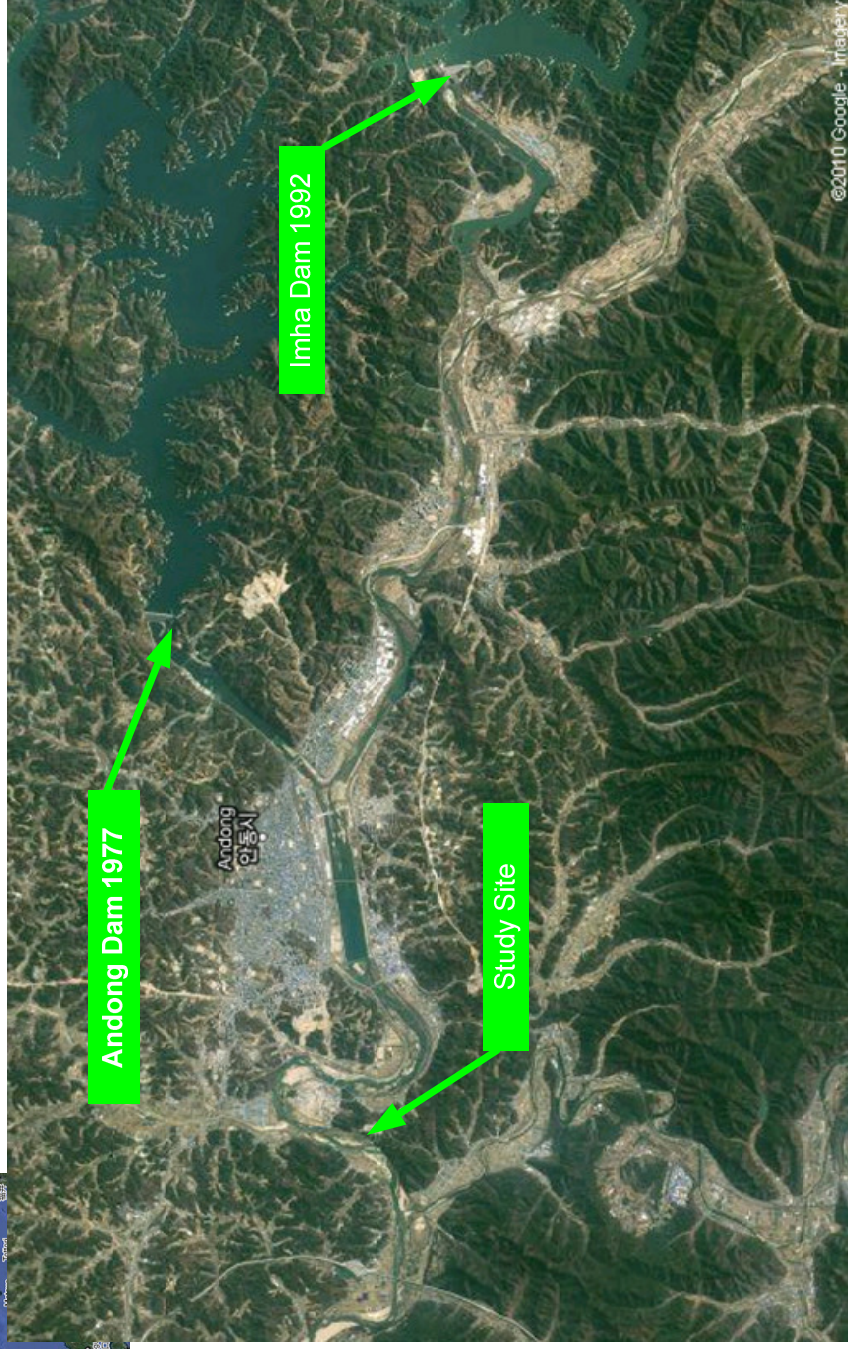
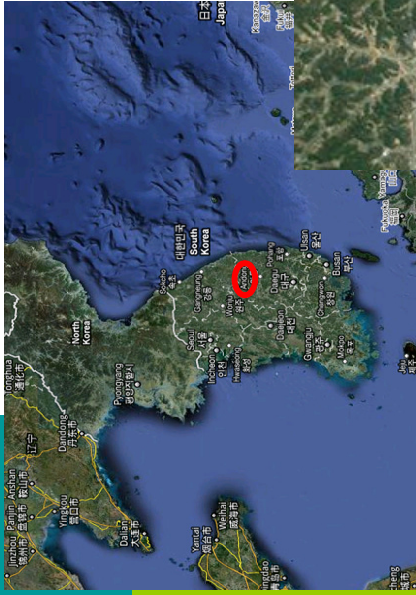


Model Application Case Studies



Nakdong-Location

Nakdong River-South Korea



Dam Operations Observed Effects

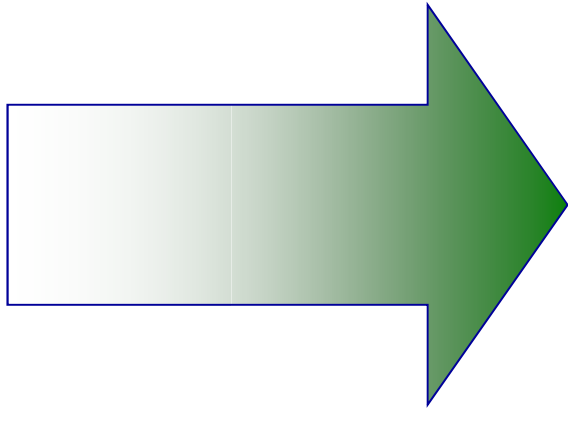


1971-Historic

1988-After 1st Dam

2009-After 2nd Dam

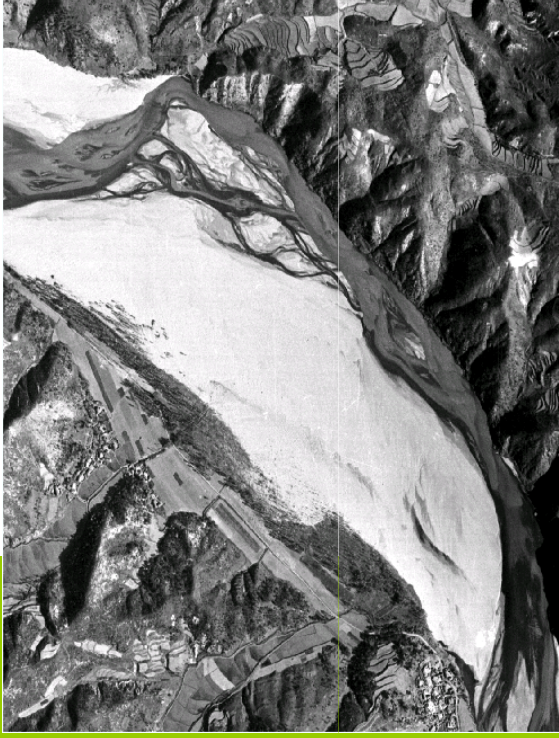
White River



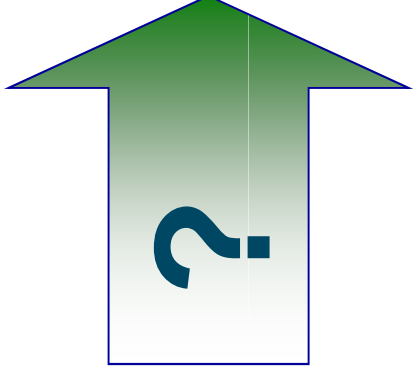
Green River



Nakdong Modeling Objective



Historic Natural Reference

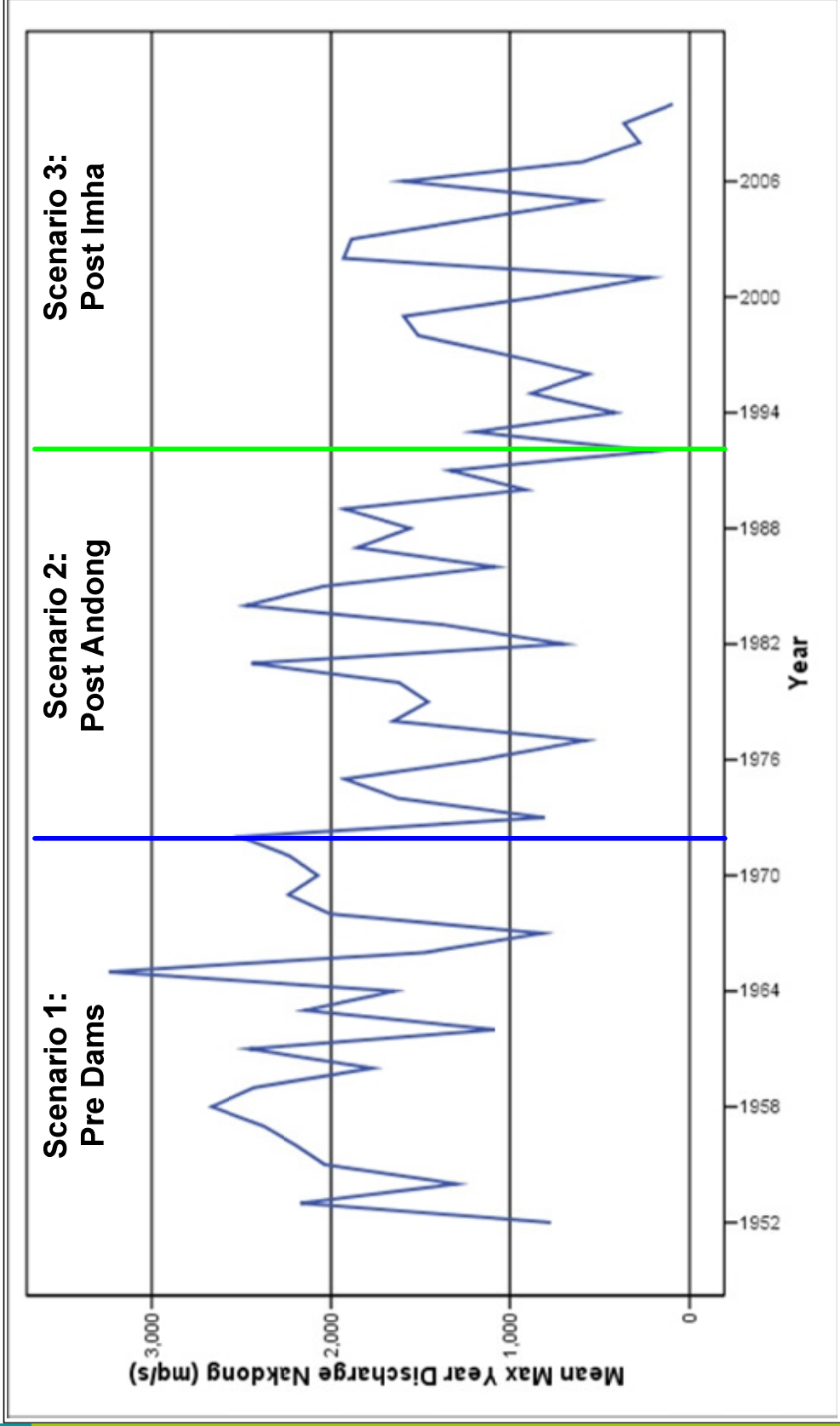


Post Imha-Current Situation

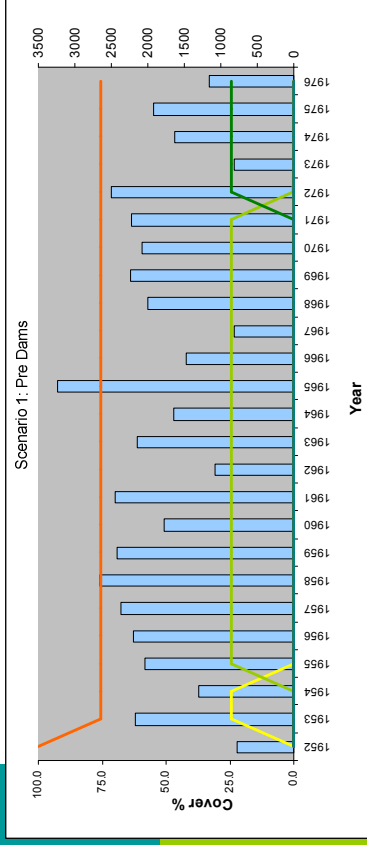
- **Imha dam trigger ?**



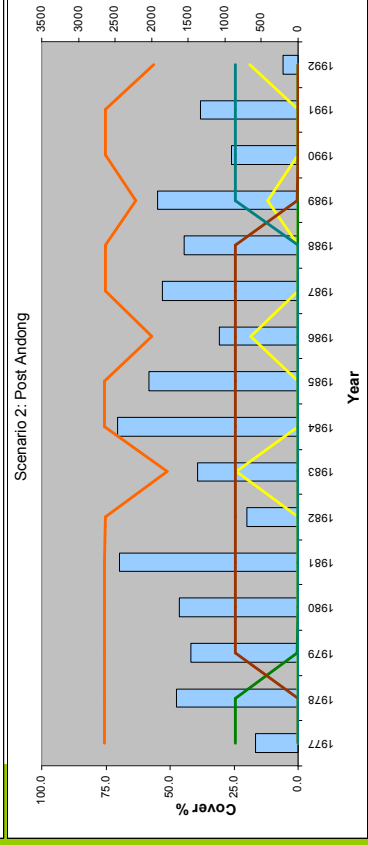
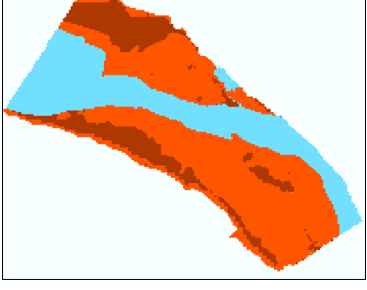
Scenario Boundary Conditions



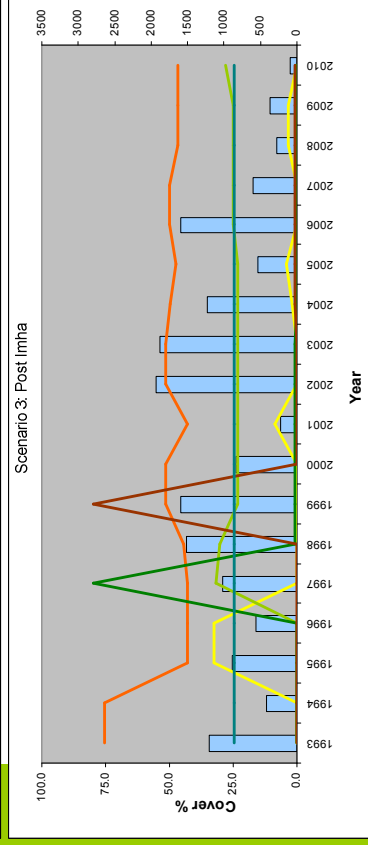
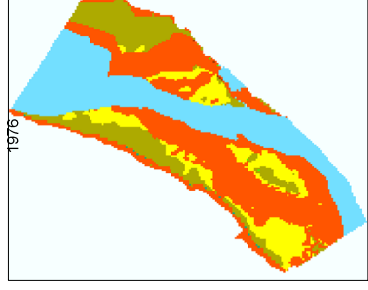
Nakdong Results



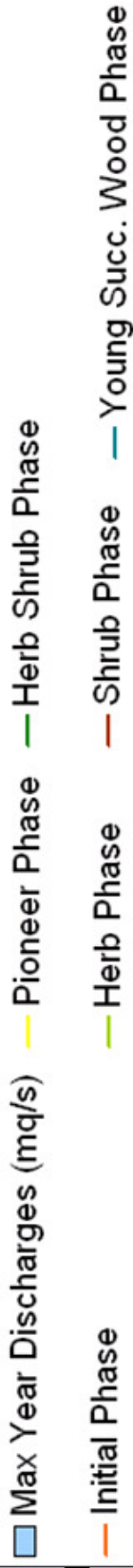
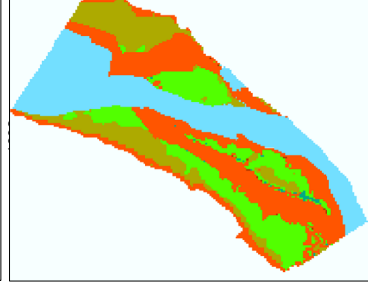
**Scenario 1:
Pre Dams**



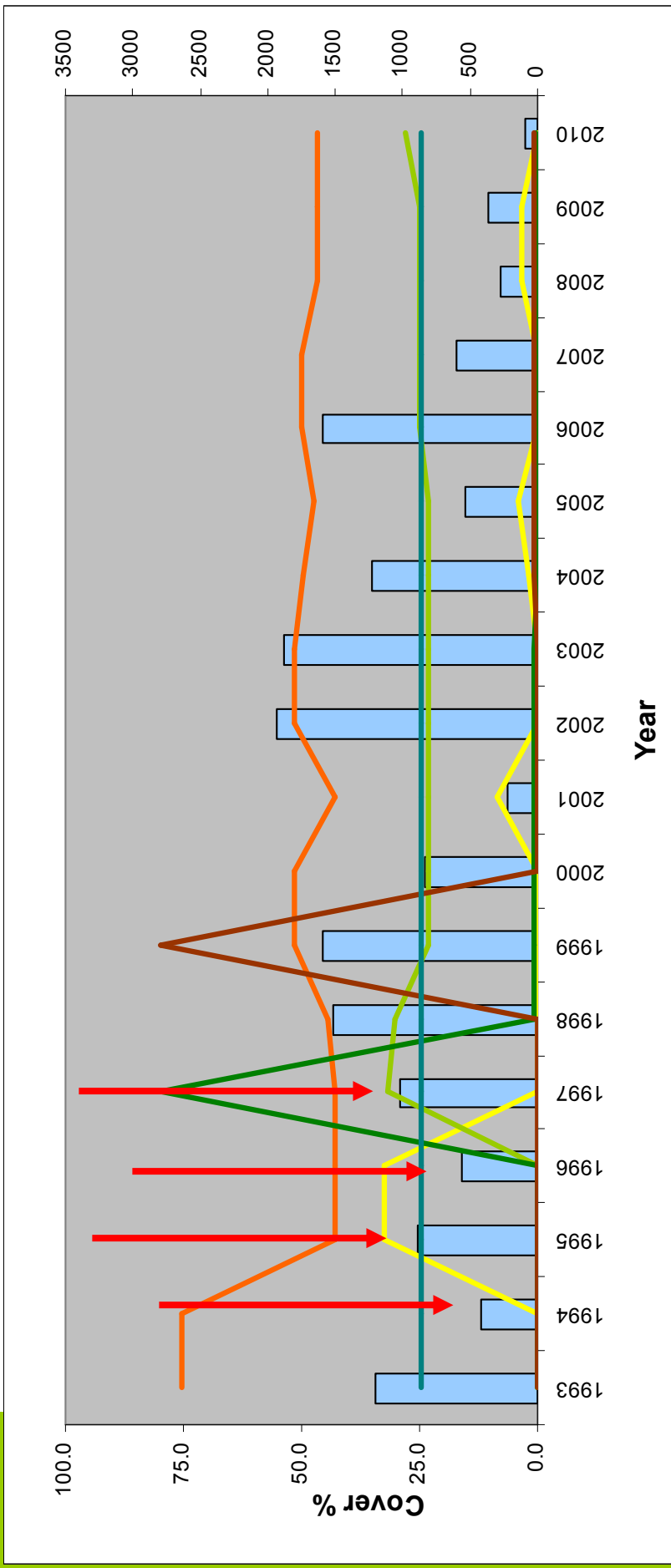
**Scenario 2:
Post Andong**



**Scenario 3:
Post Imha**



Imha Dam Natural Reference Alteration



- Max Year Discharges (mq/s)
- Herb Phase
- Young Succ. Wood Phase
- Initial Phase
- Herb Shrub Phase
- Pioneer Phase
- Shrub Phase



Nakdong Natural Reference Benchmarks

Morphodynamic

- **Frequency, intensity,**
- **vegetation resistance**

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Thank you

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