



GEOSS Asia Pacific Symposium

Strengthening Regional Cooperation through AOGEOSS for the SDGs,
Paris Agreement and Sendai Framework

24th – 26th October, 2018
Kyoto TERRSA

Evaluation of Ecosystem Services and Biodiversity in River Basin Scale: A Case of Lower Mekong River



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Trans-boundary River Basin



MRC (2011)

- 21st largest river basin
- Area: 795,000 km²:
Upper (24%), **LMB (76%)**.
- Population 61 mill >> 67.5 (2030)
- **Water** - contribute to 80% of people's livelihood
- **World Rice Exporter**- Thailand & Vietnam



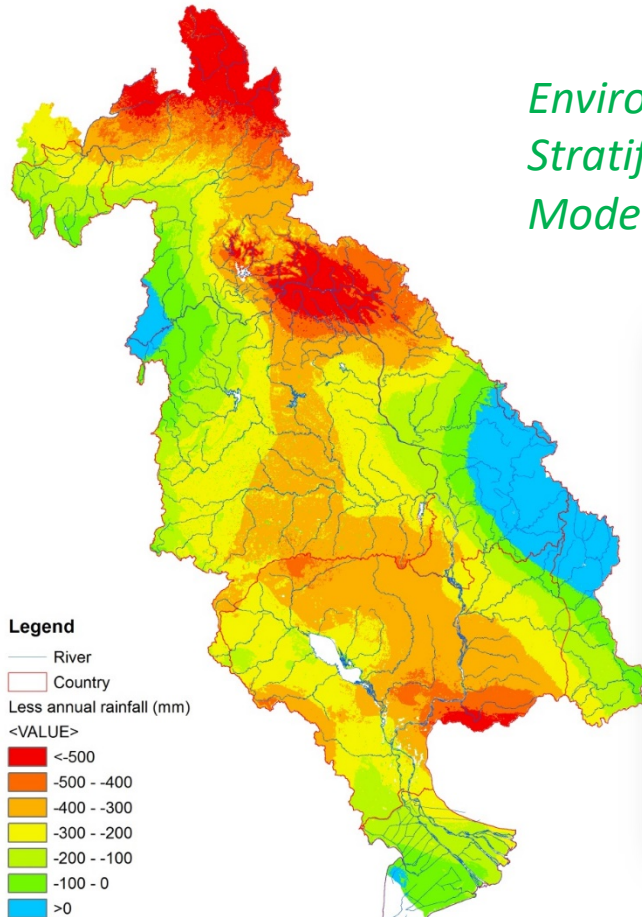
Basin-wide Assessment of Ecosystem Services

Climate Change and Adaptation Initiative (CCAI)



Predicted climate in 2030, 2060

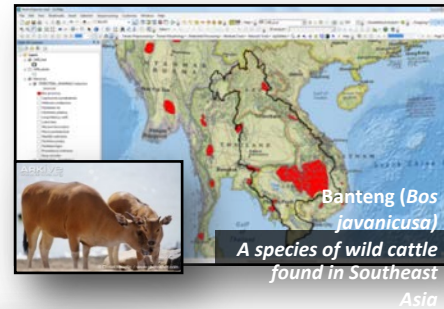
RCP4.5, RCP2.6, RCP 8.5



Rainfall reduction

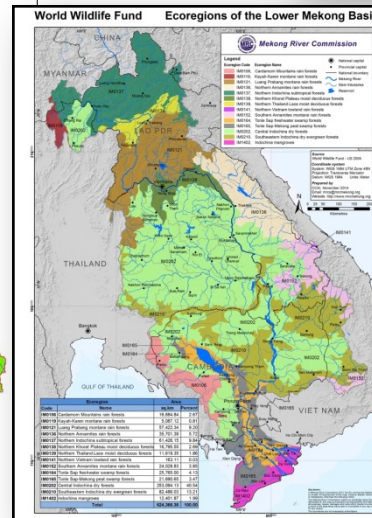
Environmental
Stratification
Model (EnS)

Vulnerable species



IUCN trait-based
framework

InVEST



Shift of
ecoregions



Source: Millennium Ecosystem Assessment, 2005.

Change in ecosystem
services

Lower Mekong Basin

Global Env. Stratification Model

- Growing Temp.-Days (GDD)
- Aridity Wetness Index (AWI)
- Temperature Seasonality
- Potential Evap. Seasonality

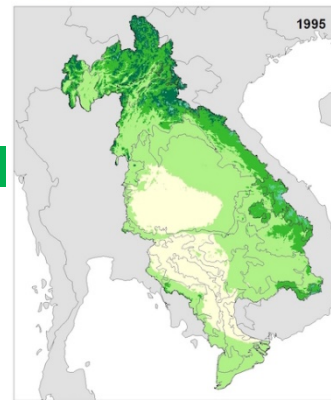
By 2030 under RCP 4.5 & 8.5:
Extremely hot and xeric zone is still generally the largest extent.

By 2060 under RCP 8.5:

- **Extremely hot and mesic** zone covers most of the area.
- the area of **4** of the 25 zones is reduced by at 90%.
- **≥ 2 small zones** seem to disappear completely in the future under most scenarios.

Year: 1995

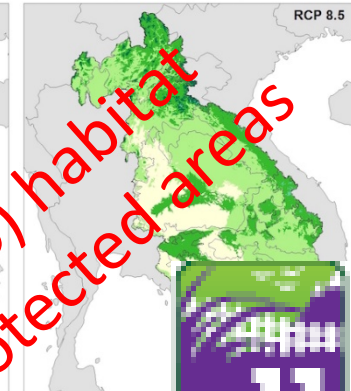
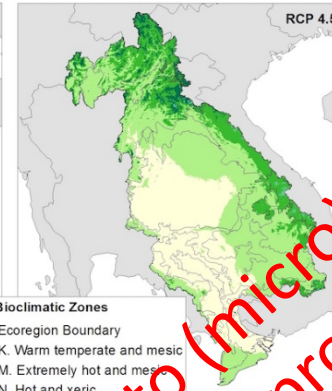
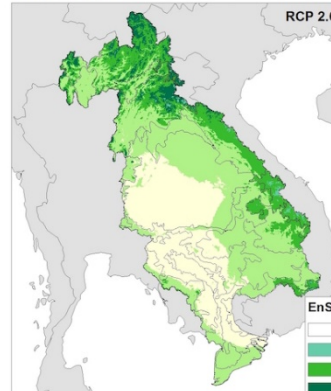
EnS Bioclimatic Zones within Ecoregions
Lower Mekong Basin - MRC Scenario: Wetter (Model: gf)



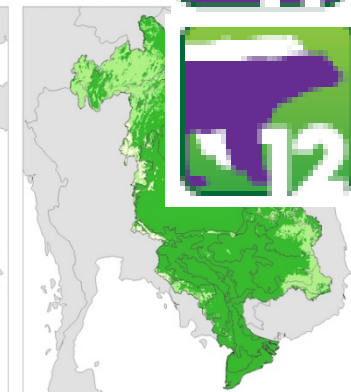
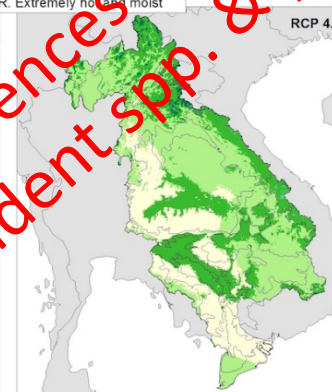
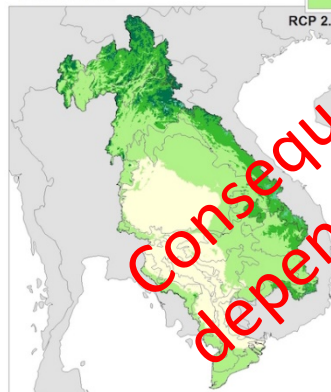
EnS Zones

- K. Warm temperate and mesic
- M. Extremely hot and mesic
- N. Hot and xeric
- Q. Extremely hot and xeric
- R. Extremely hot and moist

Year: 2030



Year: 2060



Consequences to (micro) habitat dependent spp. & protected areas



Robert Zomer (MRC), 2016

Species Vulnerability – limited occurrences

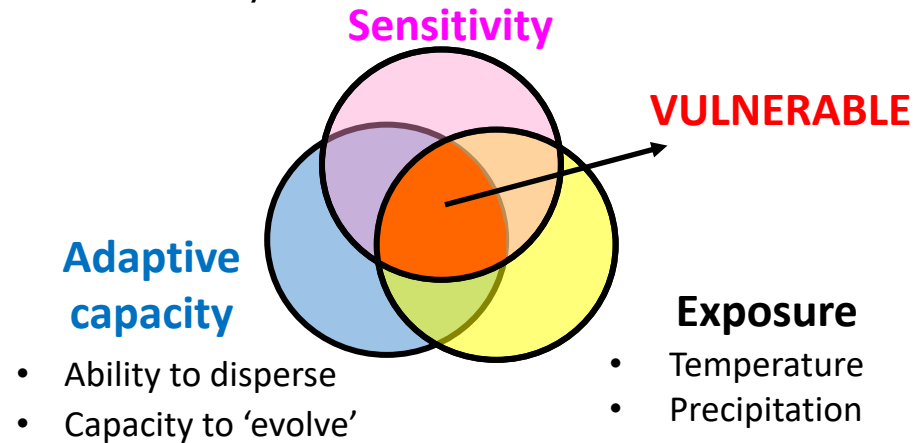
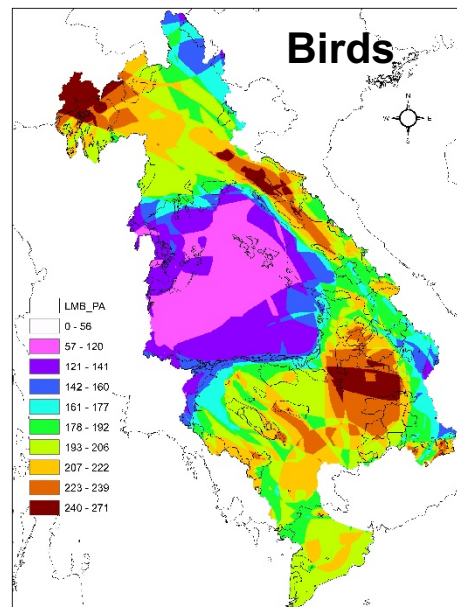
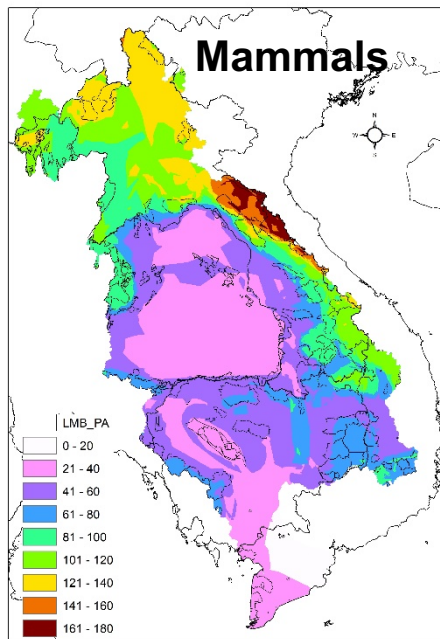
Method:

- **Biological trait-based approach**
- Regional & national experts

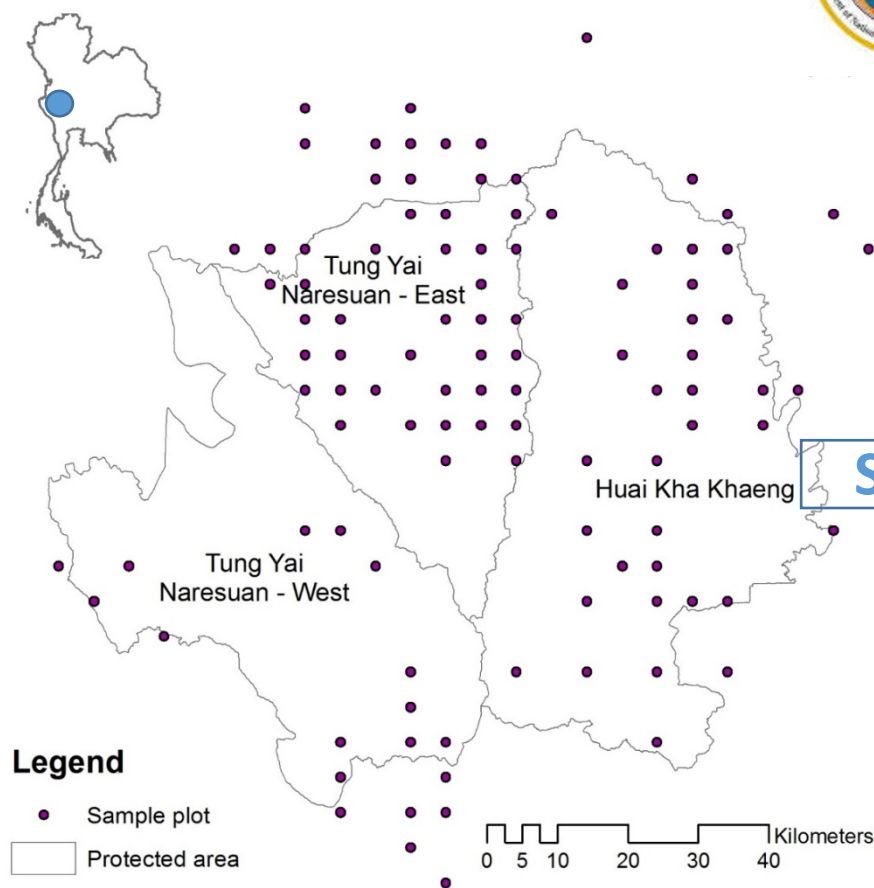
- Habitat and Microhabitat
- Narrow environmental tolerances
- Specific environmental trigger
- Interspecific interactions
- Rarity

GS-RCP4.5 2030/2060

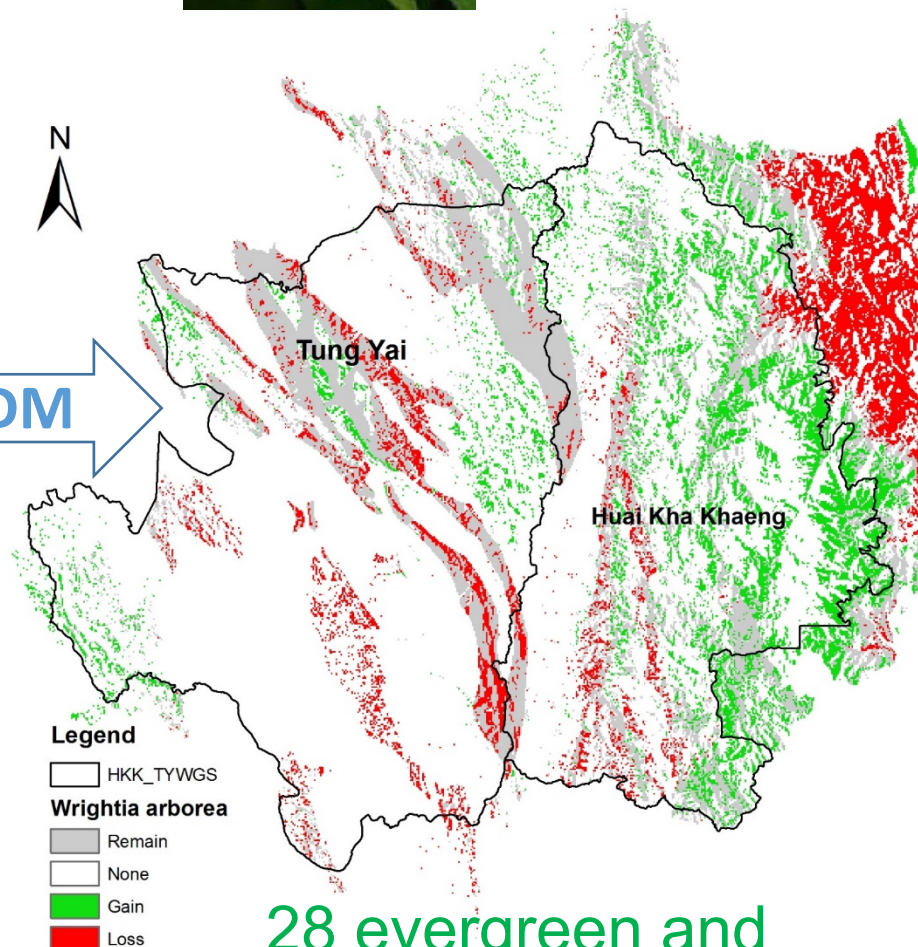
- 108 mammal spp. > 13/56
- 91 amphibian spp. > 10/37
- 158 freshwater spp. > 4/47
- 100 bird spp. > 12/40



Geographic 'hotspots' of Vulnerability species



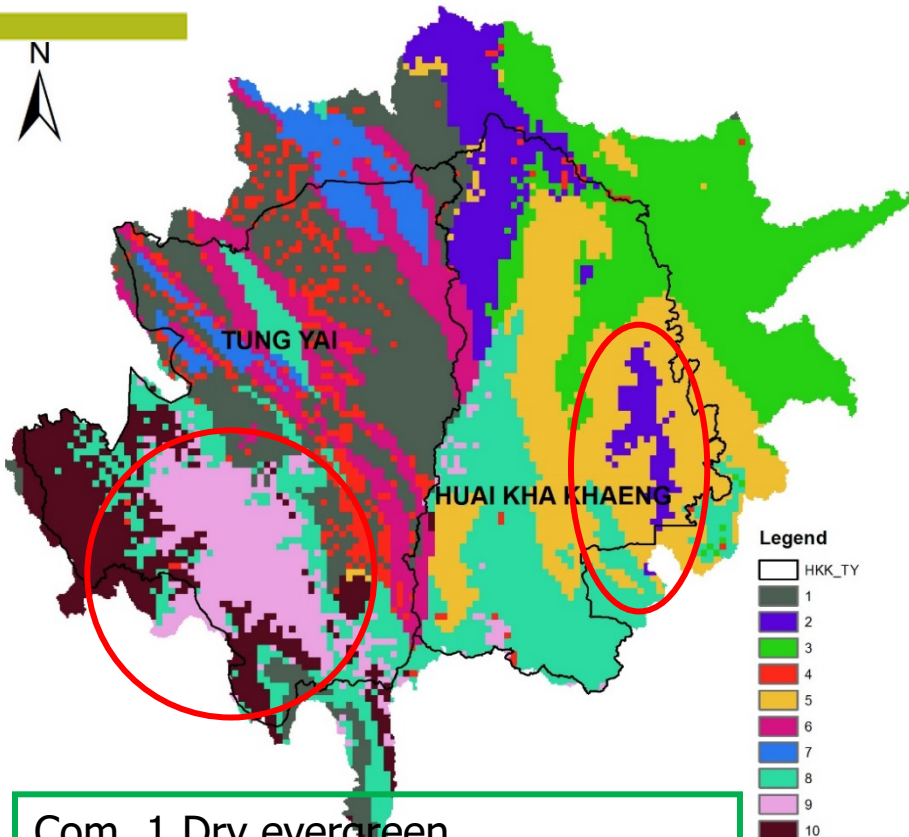
SDM



Area ~ 20,000 km²

28 evergreen and
72 deciduous species

Ecosystem areas & shifts



Com. 1 Dry evergreen.

Com. 2 Montane

Com. 9 Hill evergreen

Com. 6 Hill/dry everg. mosaic

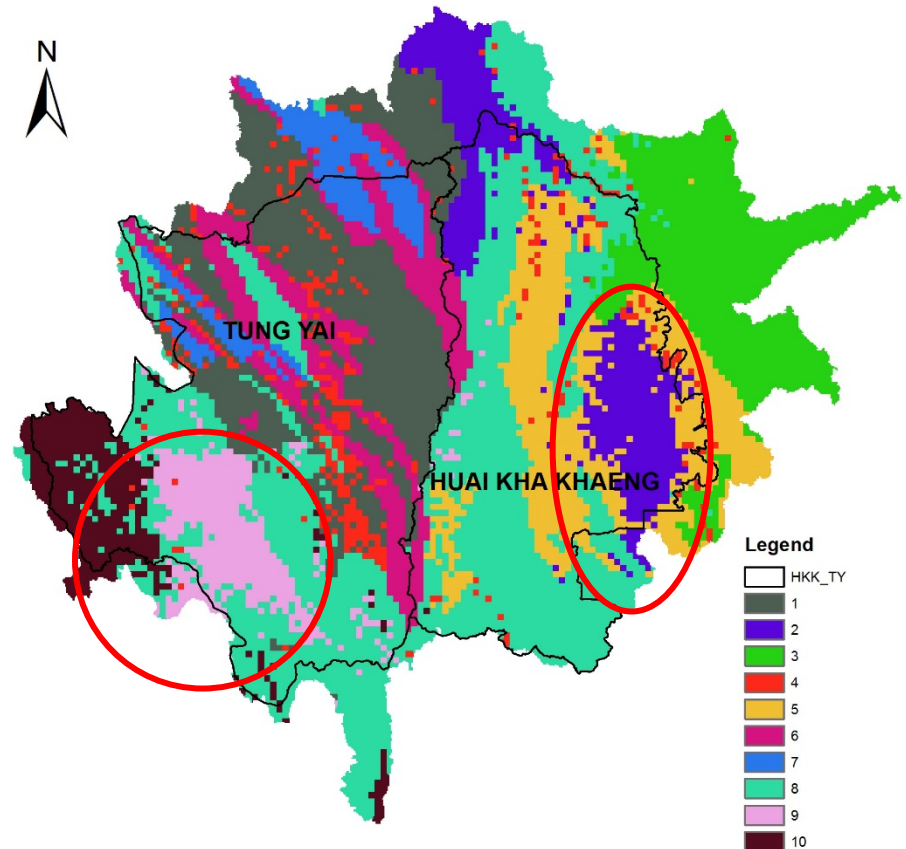
Com. 4 Dwarf everg./savana mosaic

Com. 3 Dry dipterocarp

Com. 5 Mixed deciduous/dry dipt. mosaic

Com. 8 Mixed deciduous

Com. 10 Mixed deciduous with bamboo



Trisurat et al. (preparation)

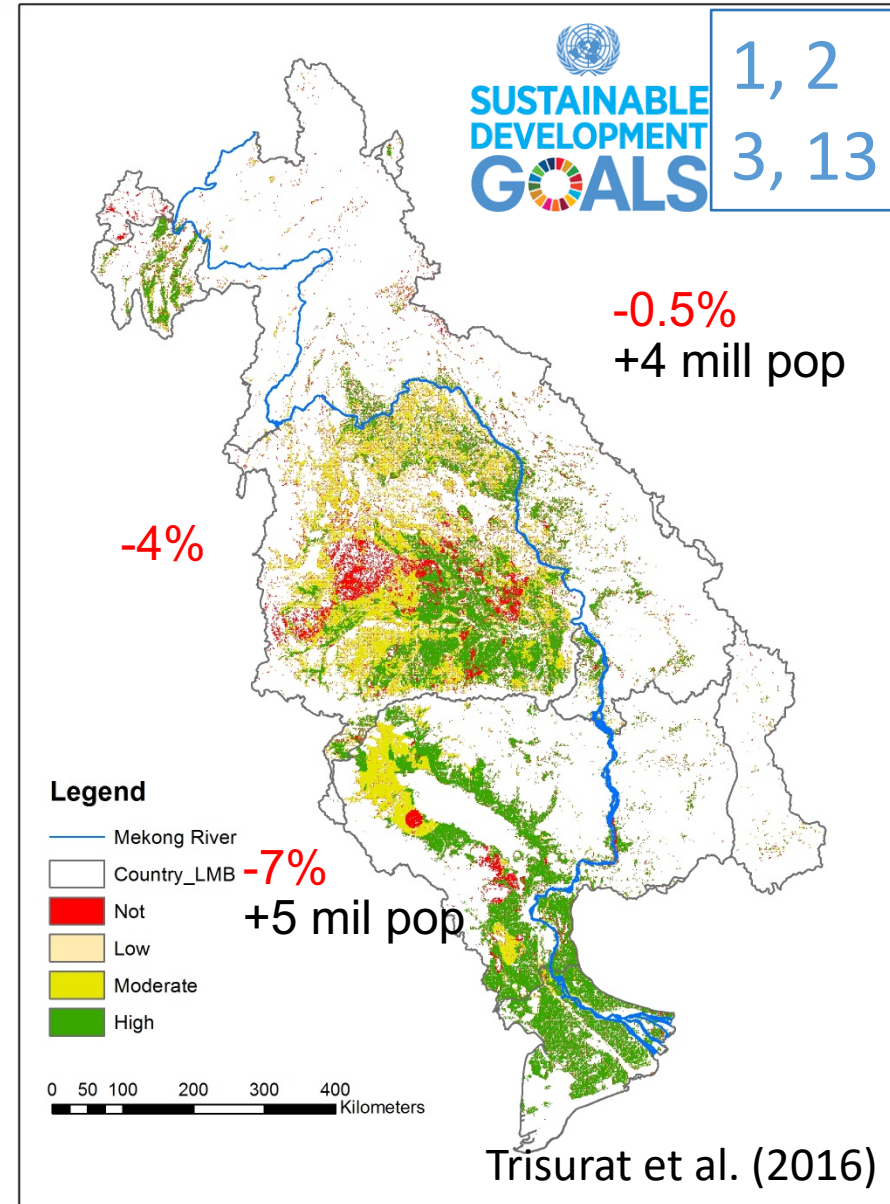
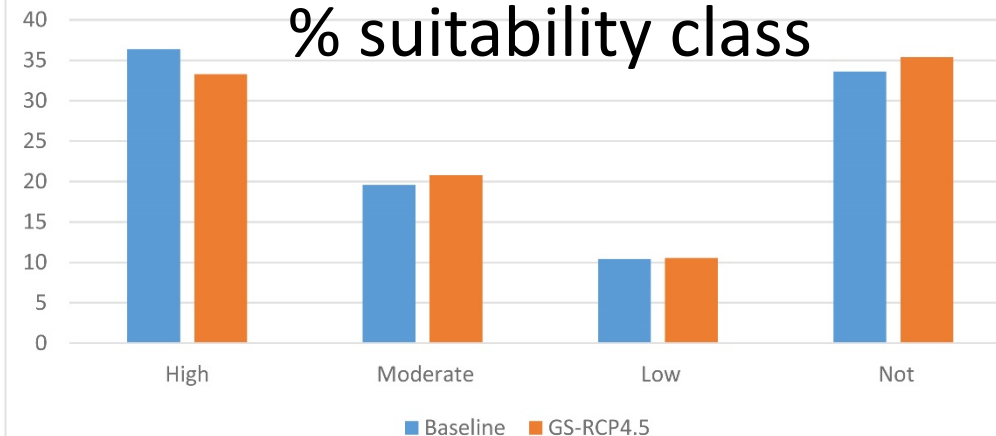


Water Yields & Food security



Rice production in Laos and Cambodia would be **insufficient** in 2030

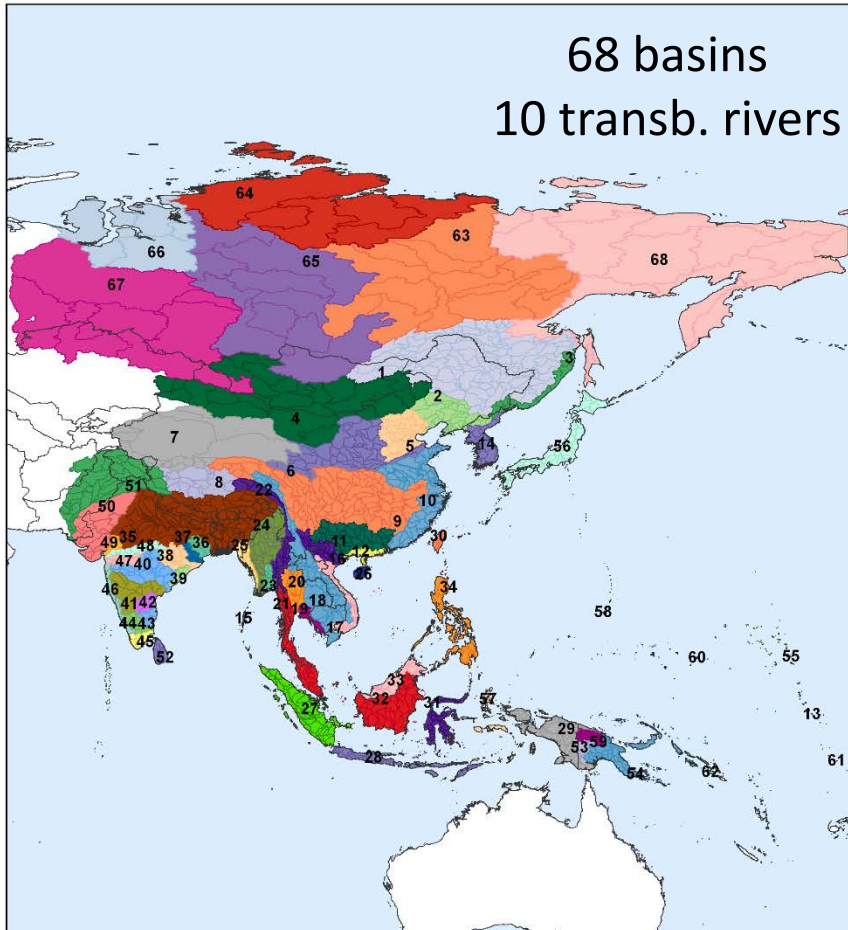
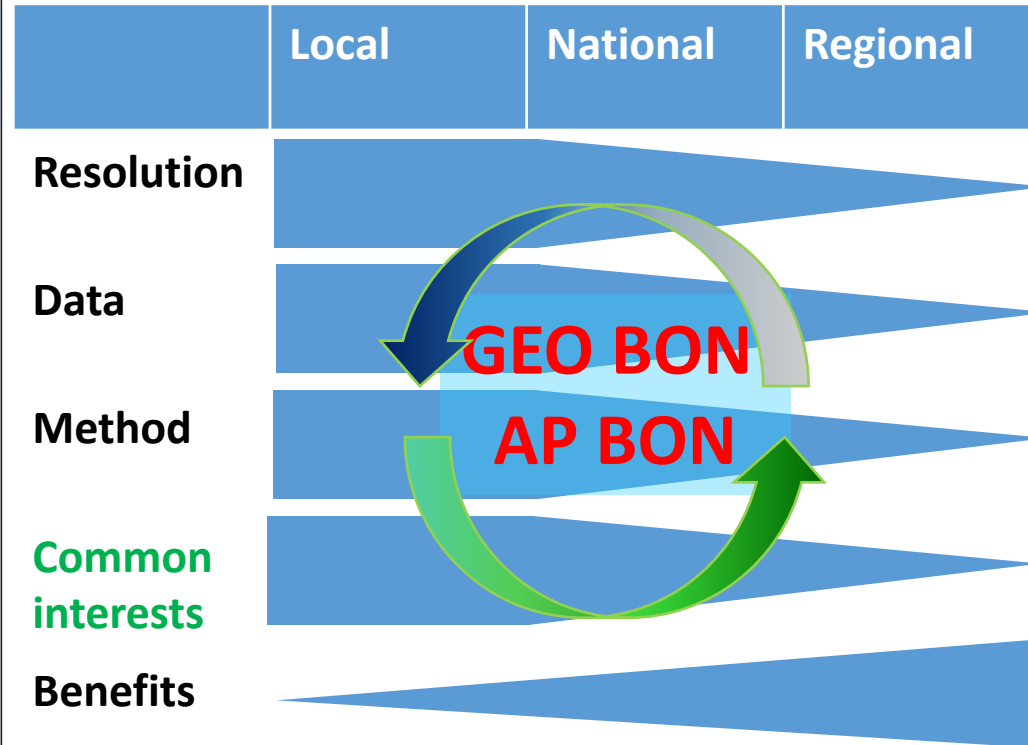
% suitability class



CHALLENGES & OPPORTUNITIES

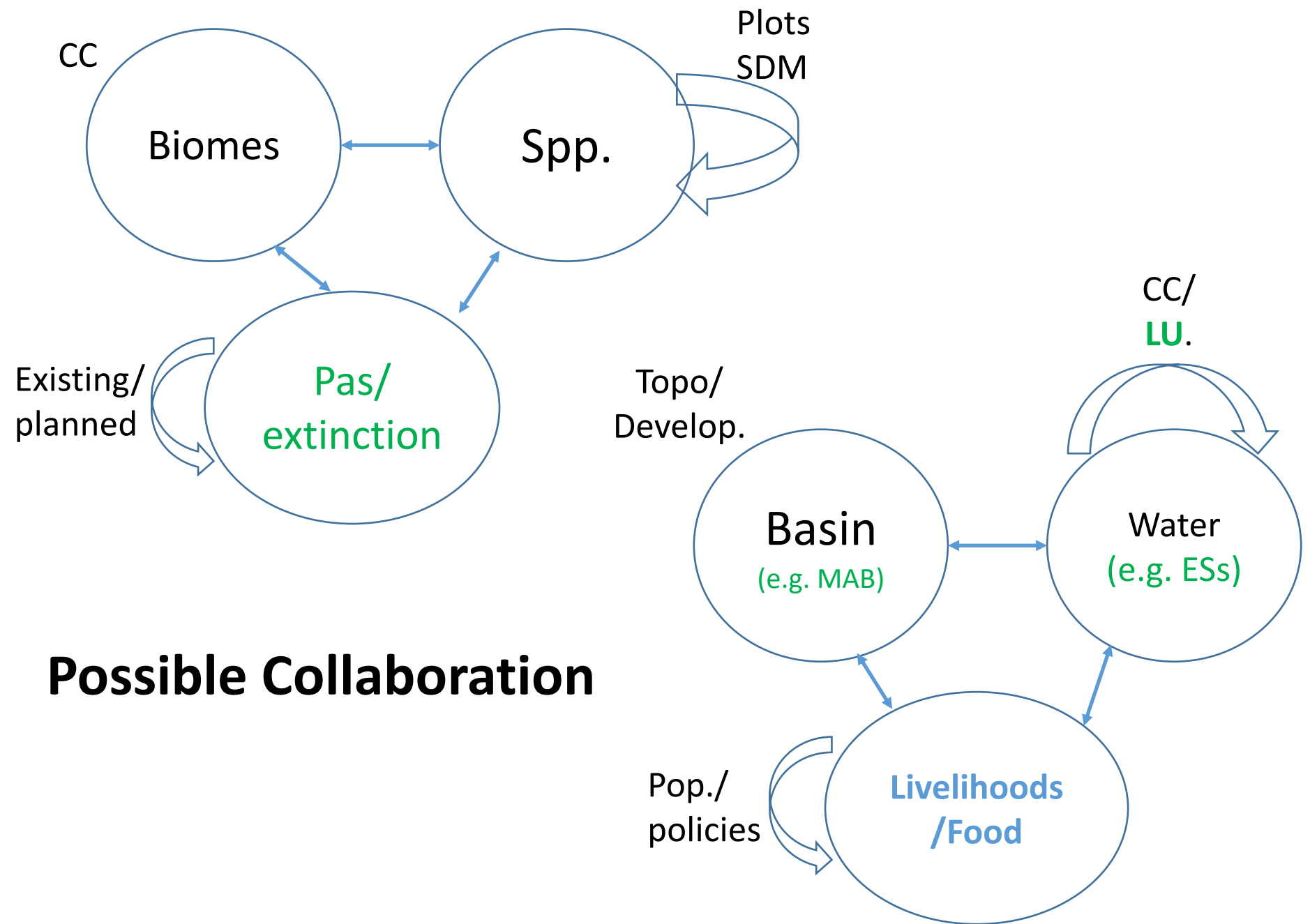


Trade-offs



Source: FAO Aquastat (2011)

Modified from P. Haase
ILTER Meeting 14-17 Oct 2018





INCHEON, Republic of Korea 8 October 2018

Limiting global warming to 1.5°C

What happens if we don't act (>2°C) ?

- coral reefs would be essentially 100% wiped out
- sea-level will rise about 10cm > the risks of flooding > 10 mil pop).
- significant impacts on ocean temperatures (hurricanes) and acidity,
- Vulnerable to food security and human well-being
- Irreversible changes of some species & ecosystems leading to extinction



Convention on
Biological Diversity

