The Water-Food-Energy Nexus in the Mekong Region

Alex Smajgl, John Ward, John Dore and Silva Larson
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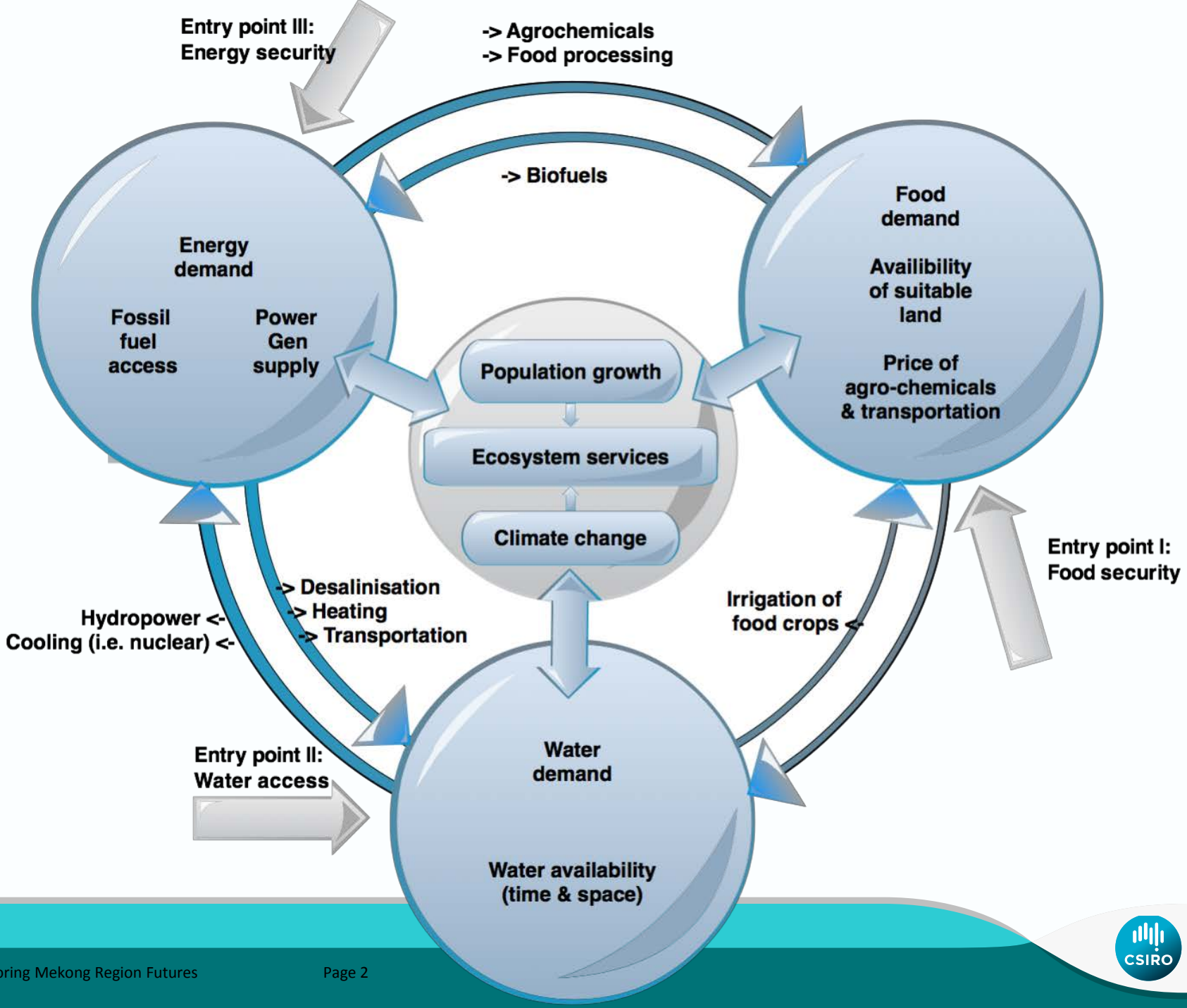
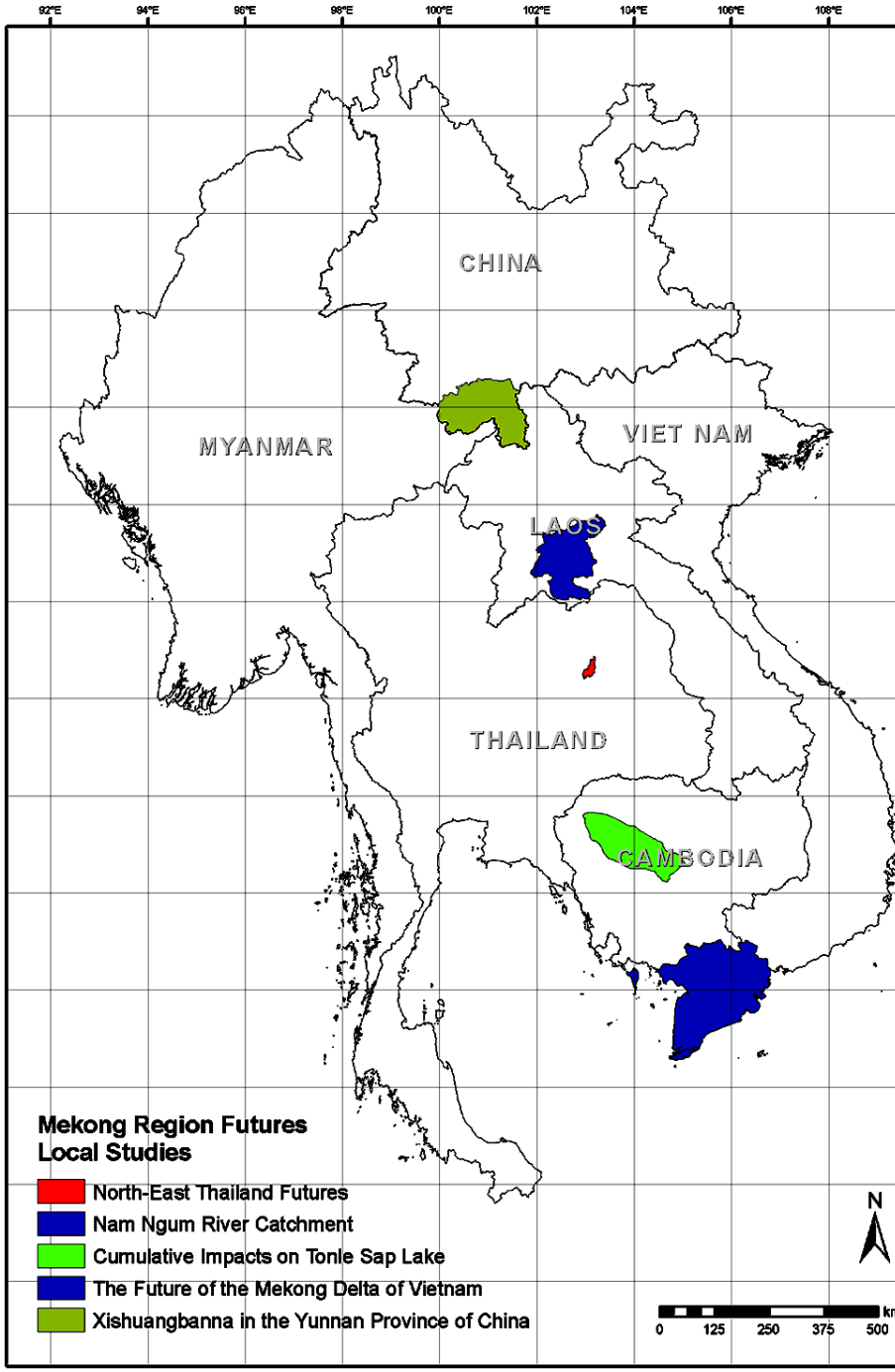

Entry point III:
Energy security
-> Agrochemicals
-> Food processing
-> Biofuels
Energy demand
Fossil fuel access
Power Gen supply
Food demand
Availibility of suitable land
Price of agro-chemicals & transportation
Population growth
Ecosystem services
Climate change
Entry point I:
Food security
-> Desalinisation
-> Heating
-> Transportation
Hydropower <-
Cooling (i.e. nuclear) <-
Irrigation of food crops <-
Entry point II:
Water access
Water demand
Water availability (time & space)

Mekong region

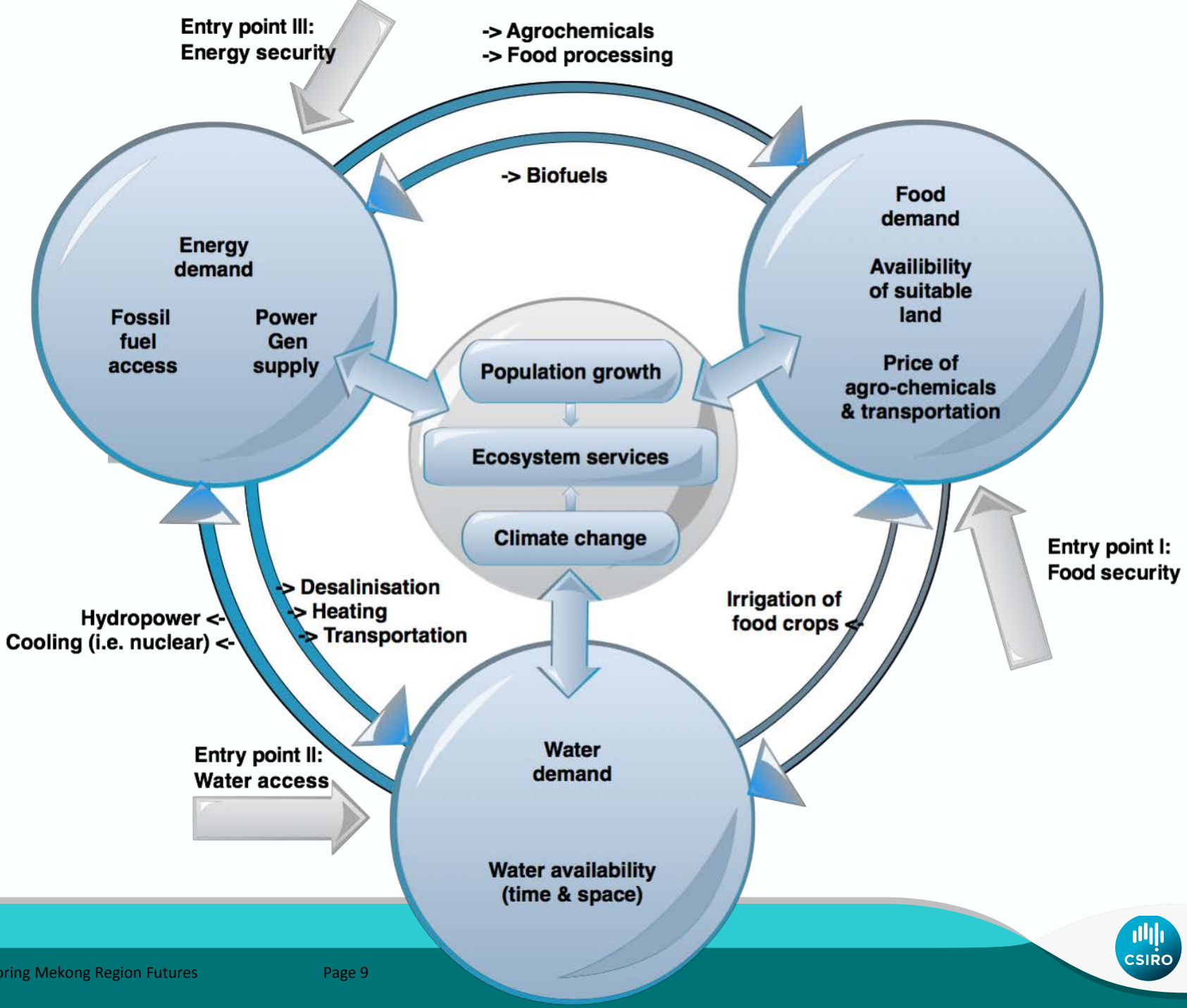
- **Yunnan (ICRAF)**
  Rubber-Reforestation-Biodiversity
- **Lao PDR (IWMI/MoNRE)**
  Irrigation in Nam Ngum catchment & Vientiane plain
- **Thailand (SEI/KKU/RBO)**
  Irrigation for north-eastern Provinces & climate change
- **Cambodia (Aalto/TSA/SNEC)**
  Impacts of mainstream dams on Tonle Sap
- **Vietnam (Can Tho Uni/Prov)**
  Mekong Delta adaptation to sea-level rise



http://www.csiro.au/science/MekongFutures

Nexus Synthesis

1. Food security decrease
   - – Less fish
   - ? More irrigation potential but more energy crops and rubber
   - – Food prices increase with bigger pressure on the poor
2. Water access will see big change
   - ? Flood risks shift from natural to operational risks
   - – Peaks and timing change will erode many livelihoods
   - ? Substantial shift between six countries (possible conflict)
3. Energy
   - + Increasing demand could be satisfied
   - – Higher energy prices
4. Livelihoods and Migration
   - ? Shift from subsistence to paid labour
   - ? More migration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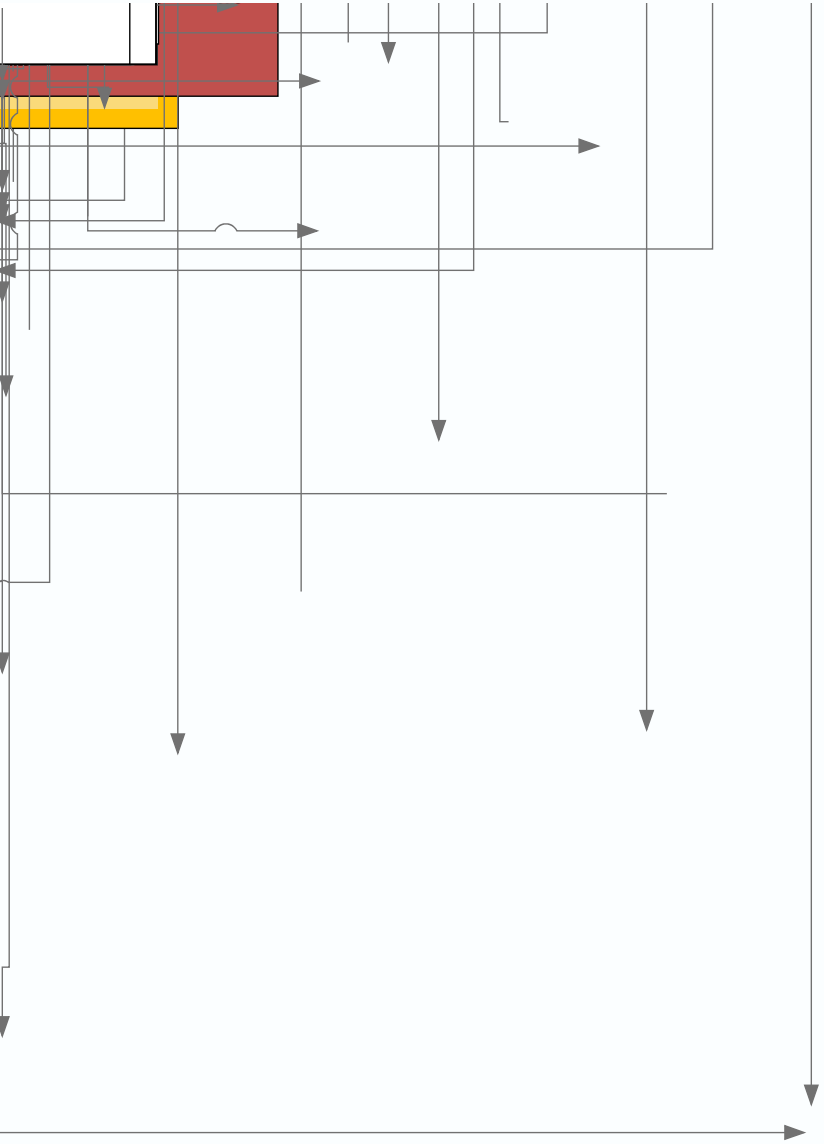
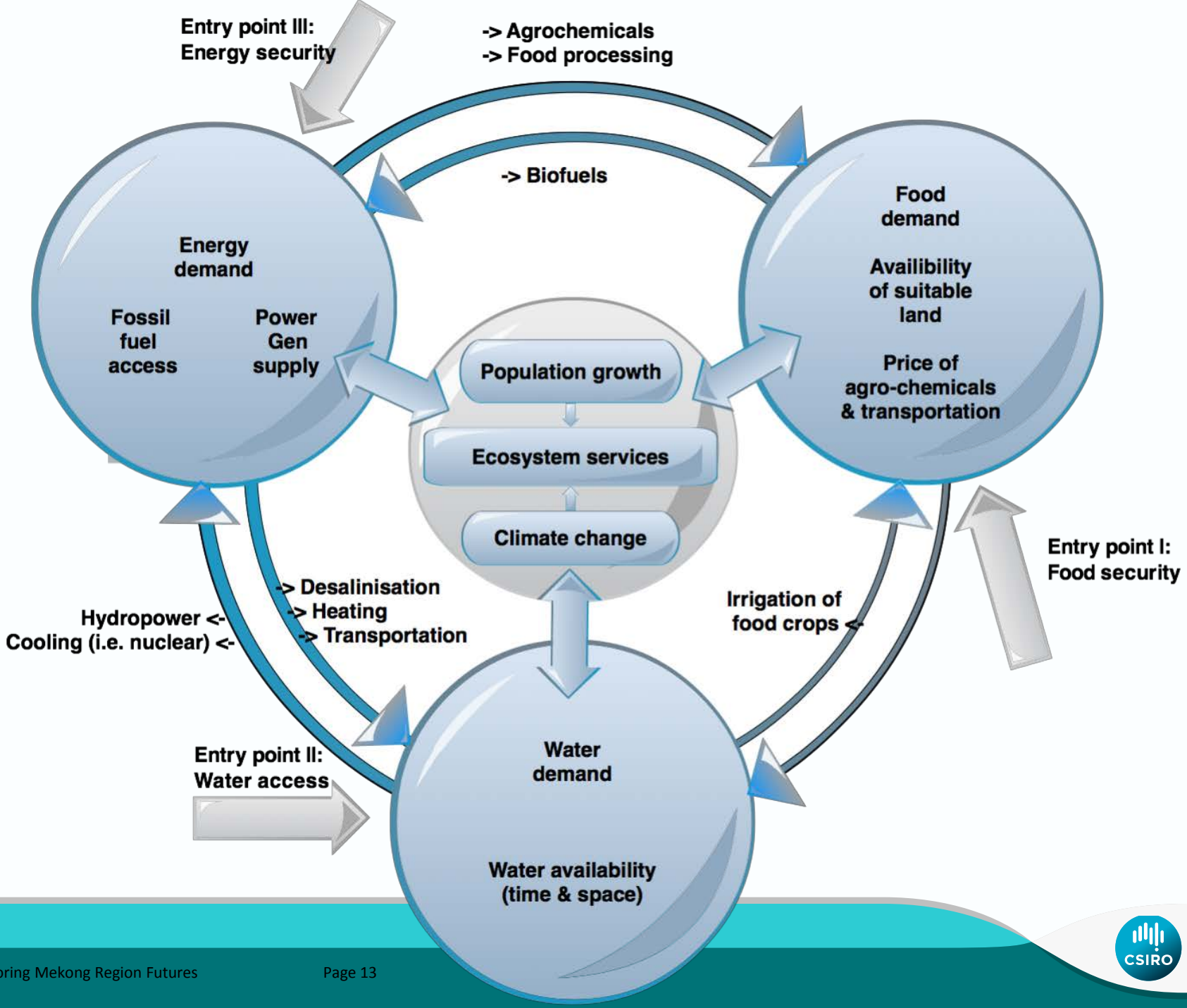
Complex world



Nexus System Criticalities

- Transboundary **fish stock** management
- Instruments to manage **risks** from **monocultures**
- Strategies to avoid **migration peaks** due to change in access to natural resources
- Strategies for **labour transition** from primary to secondary sectors in the context of urban growth
- Explicit management of **energy demand** instead of sole focus on energy supply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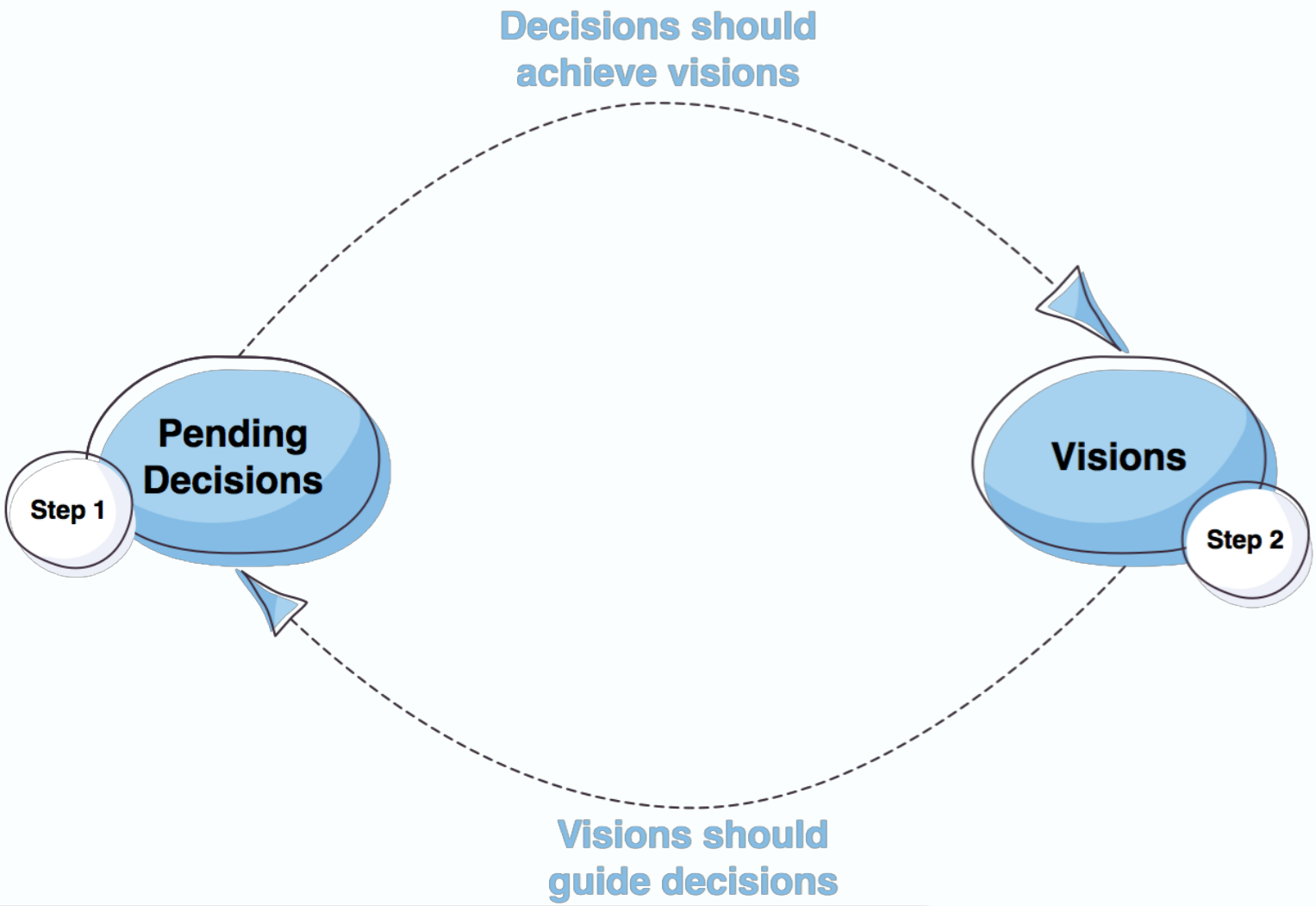
Challenge and Reconstruct Learning (ChaRL)



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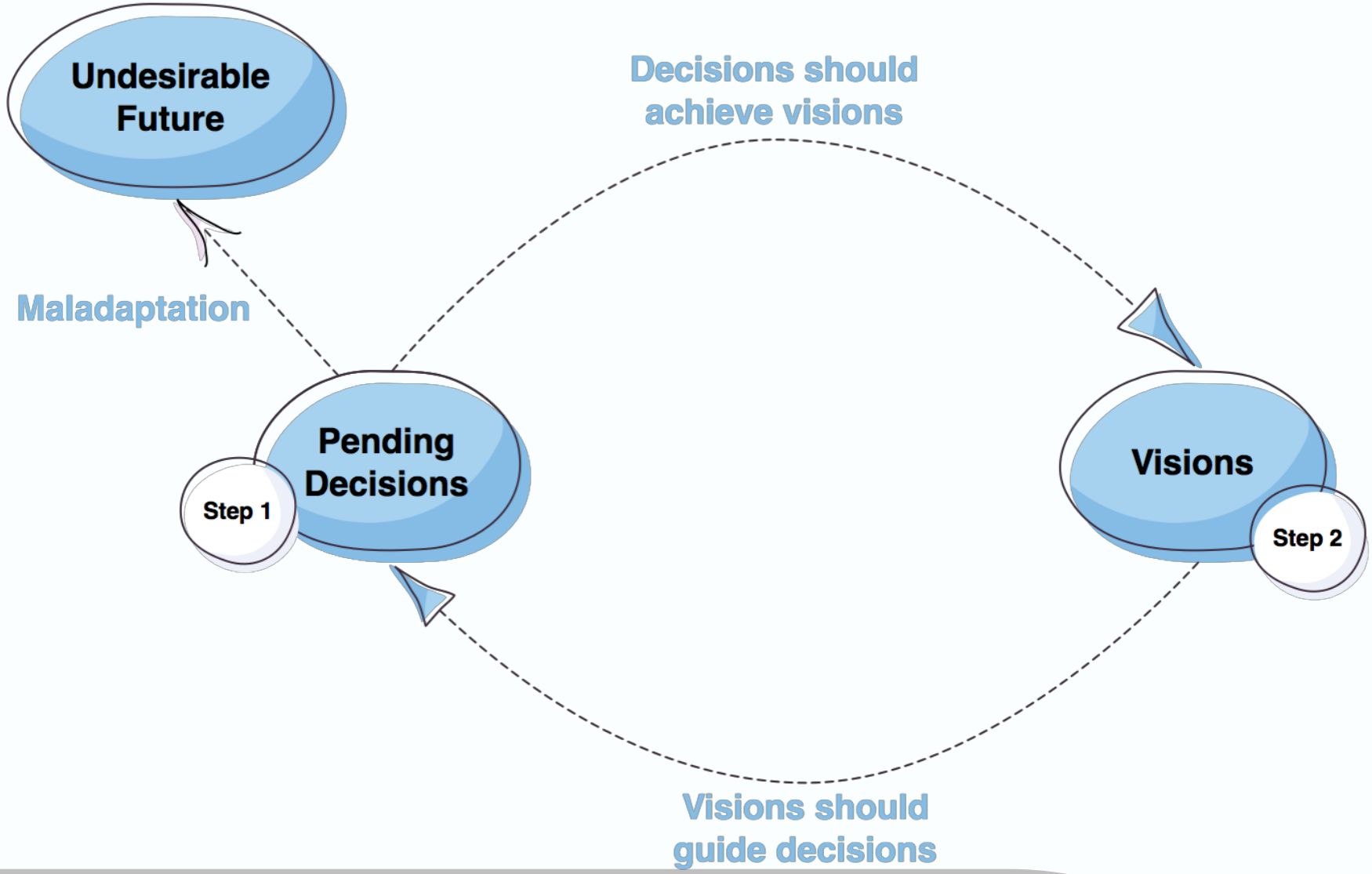

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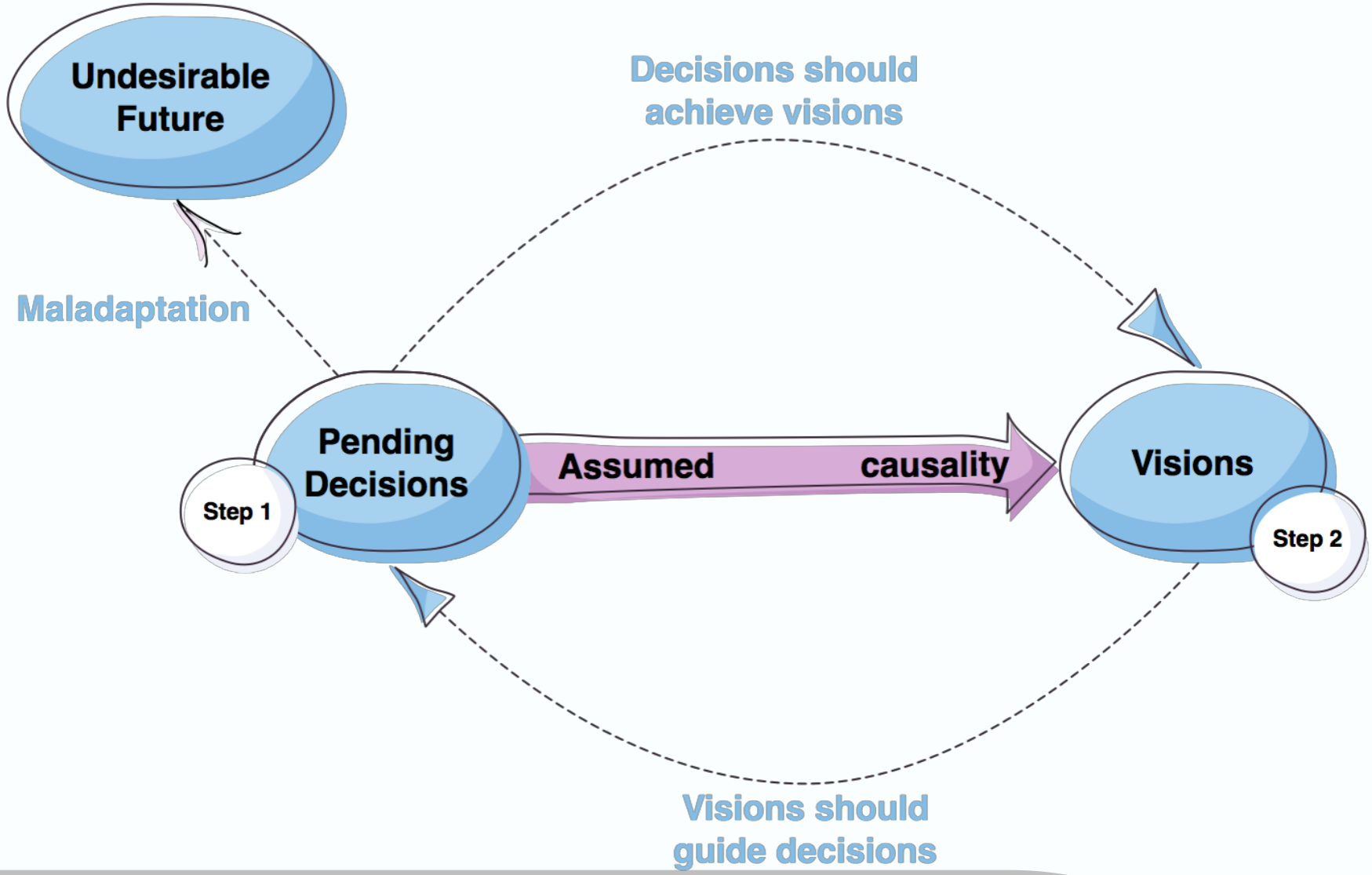

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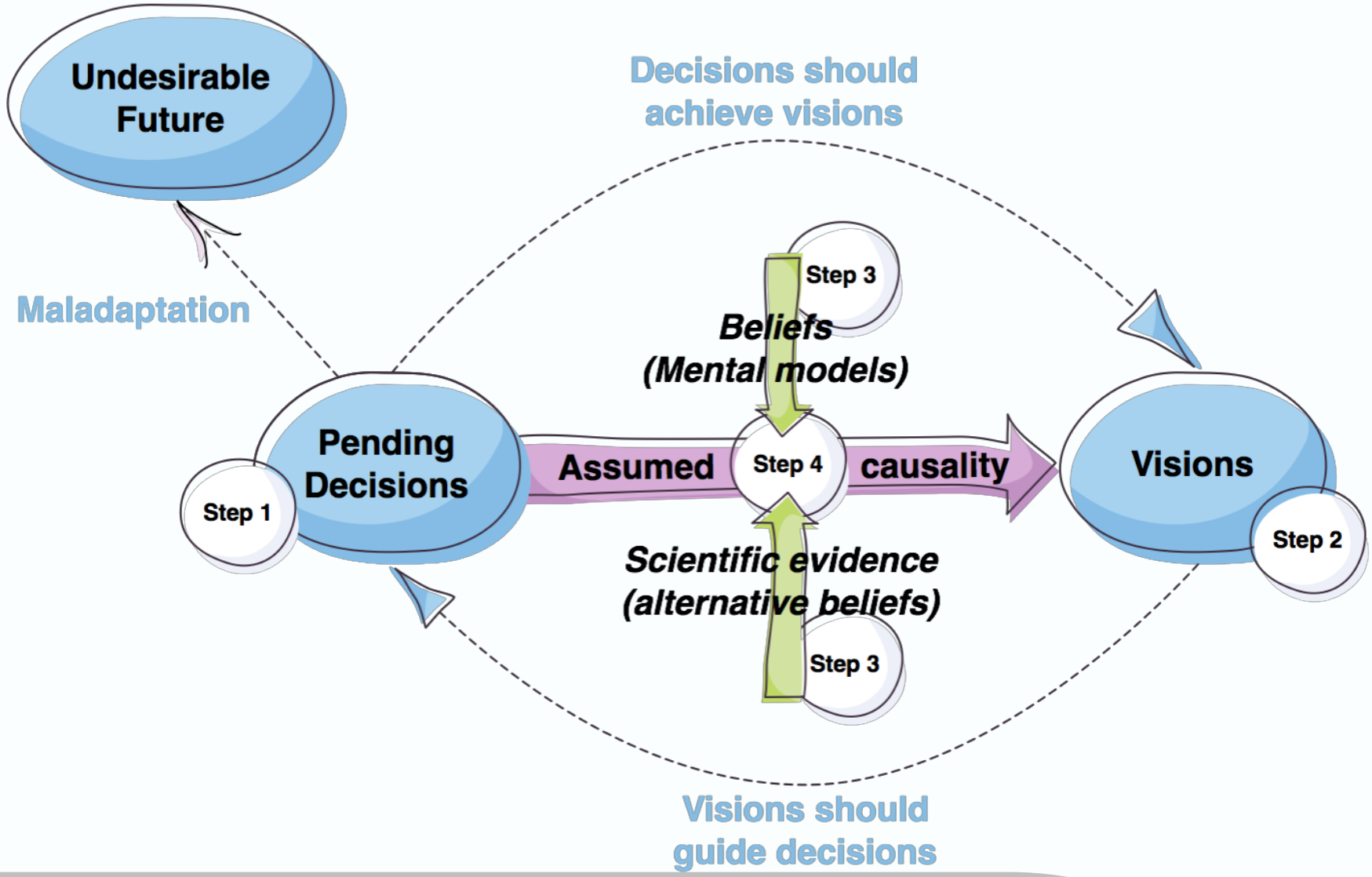

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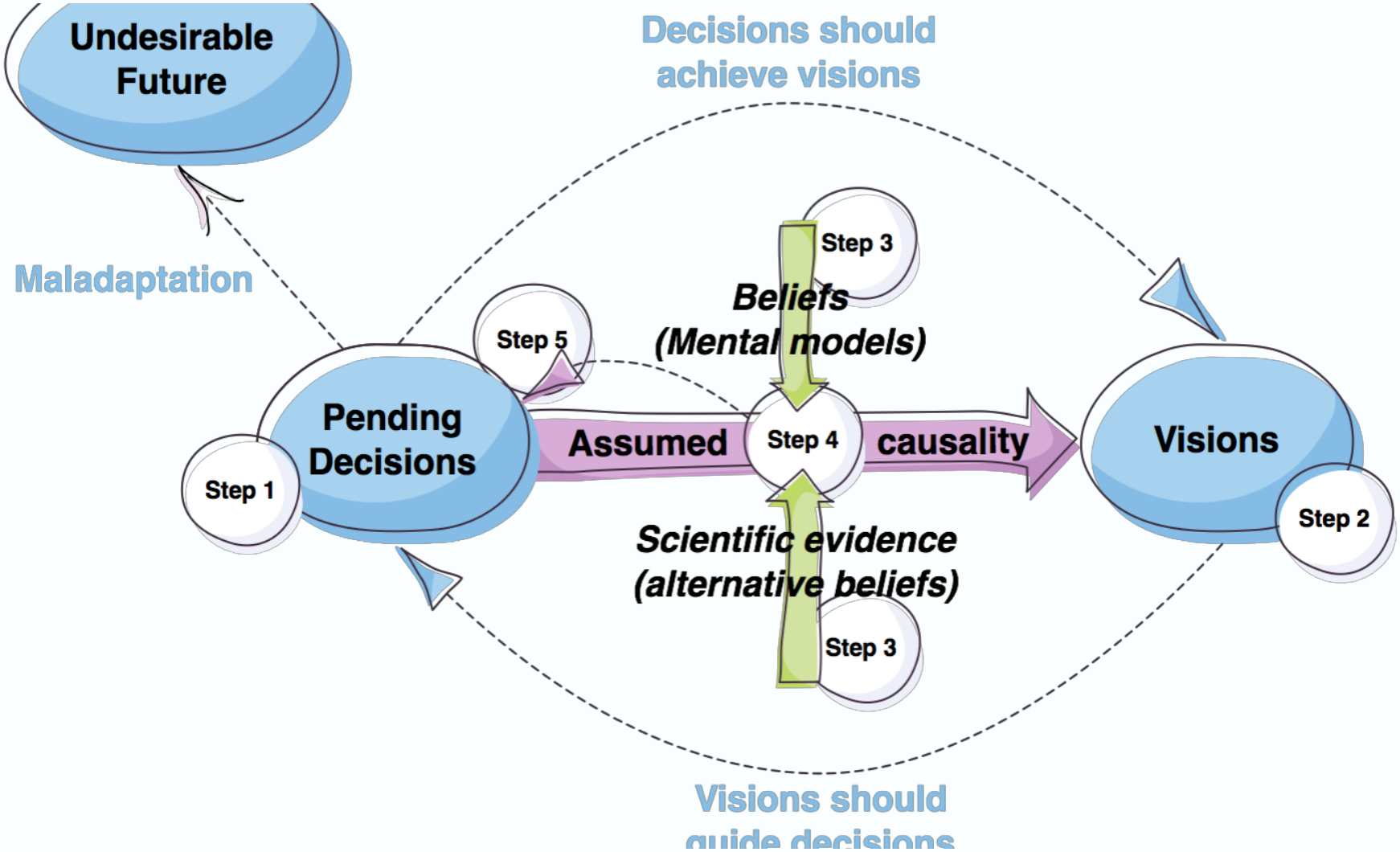

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Lao – Belief 1:

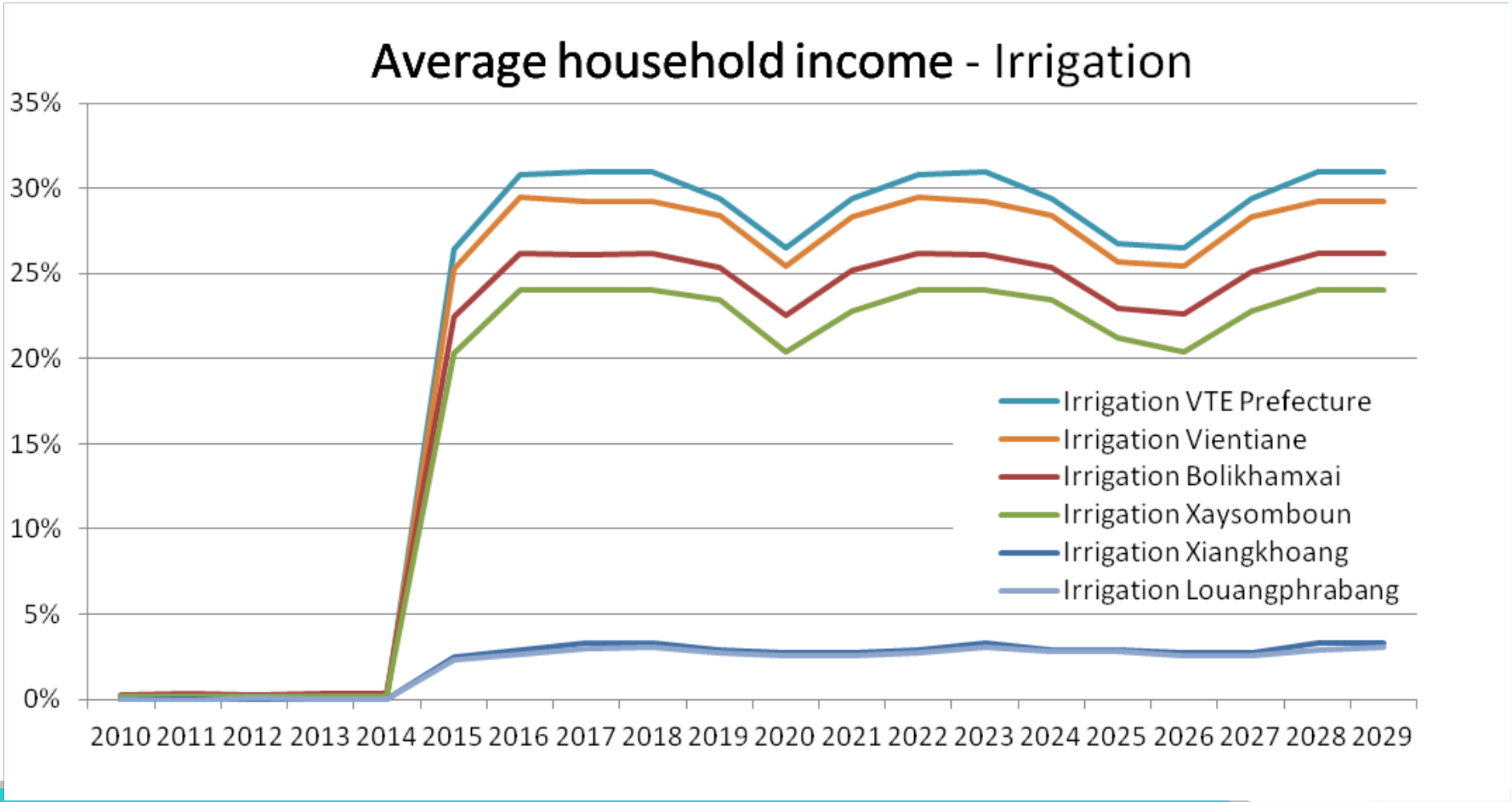
IF

Large scale irrigation schemes

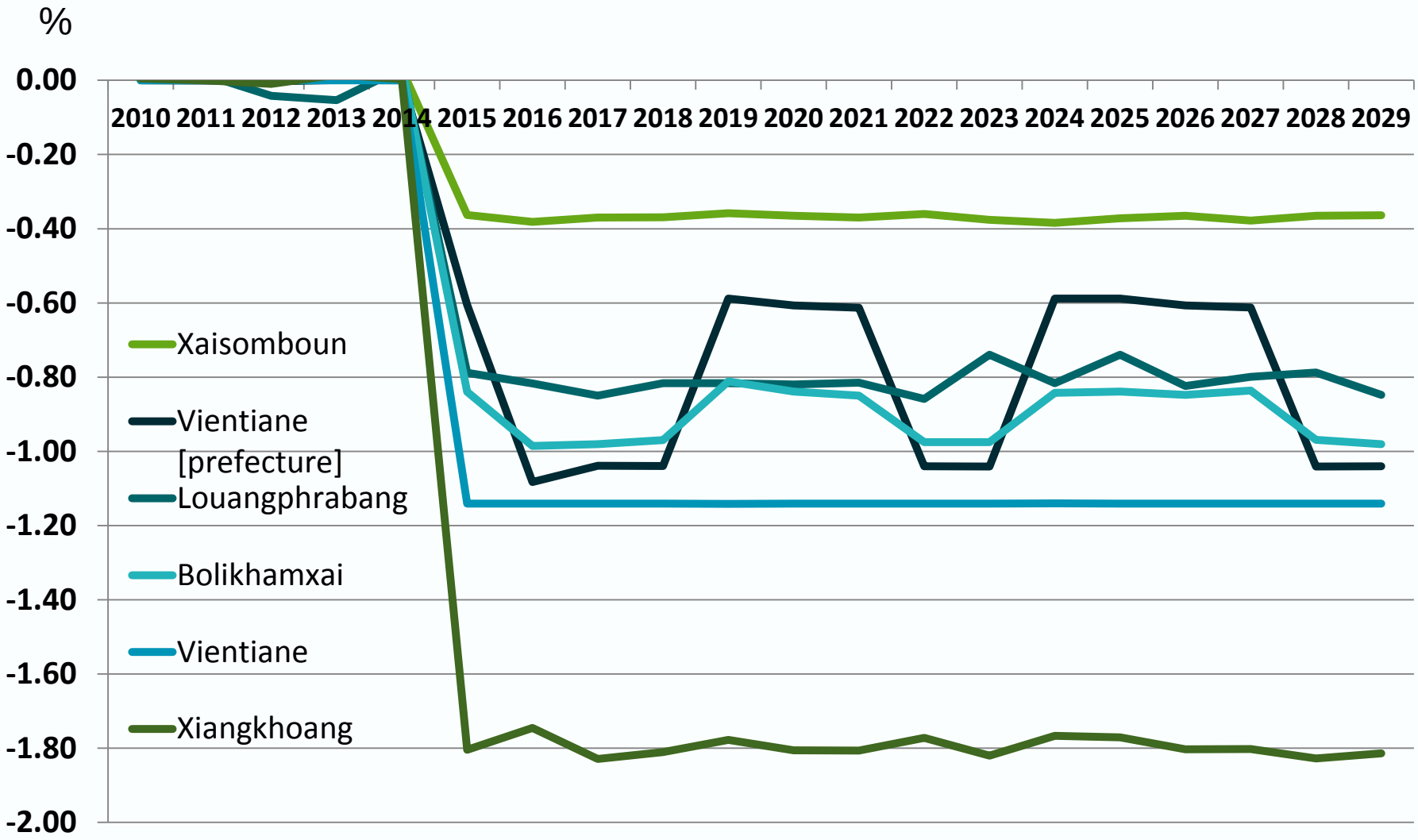
THEN

Poverty decreases

High income effects of irrigation (20-30%) except Louangphrabang and Xiangkhoang



Irrigation has only marginal effects on poverty



Thank you

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Vietnam – Belief 2:

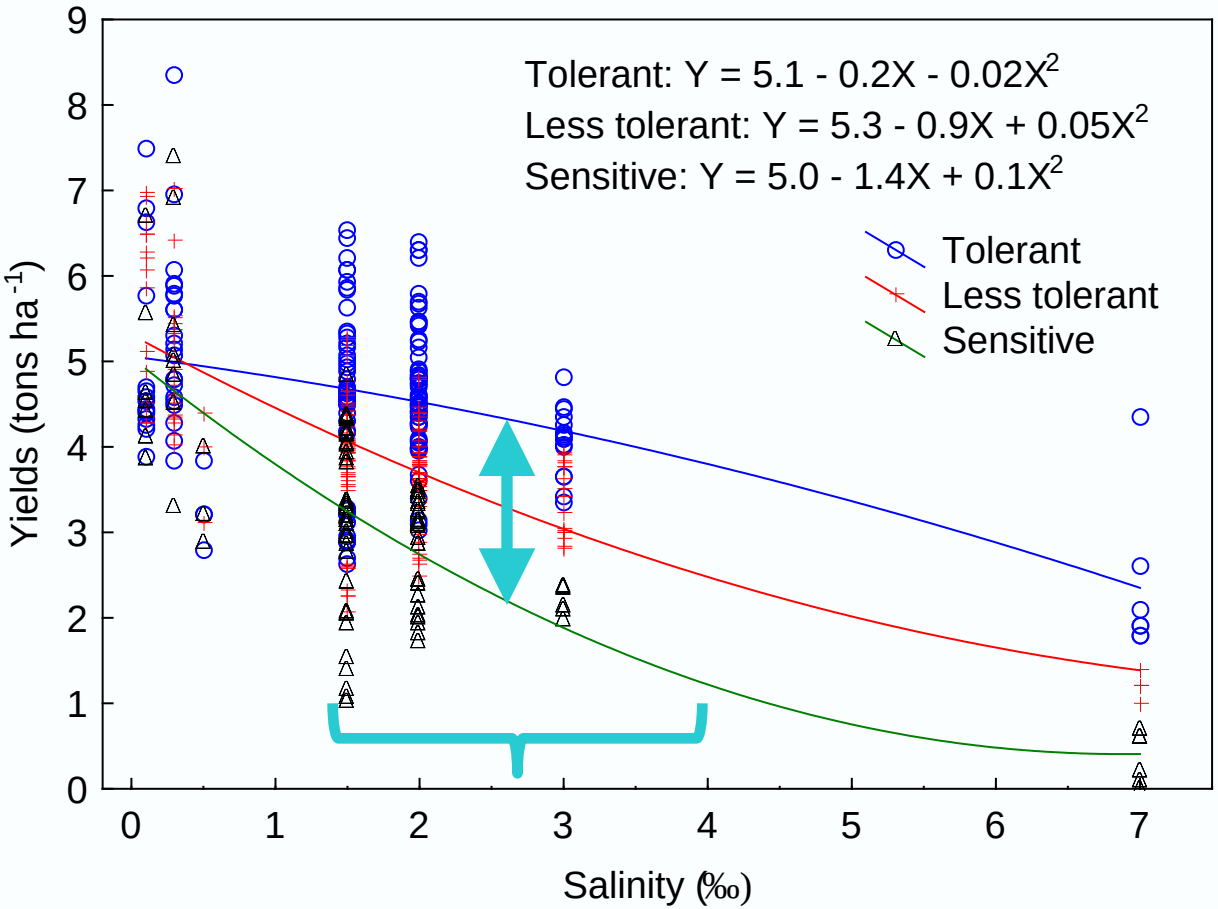
IF

Soft policies are implemented

THEN

livelihoods improve

Alternative investment: Modern rice crops



Rice production response and technological measures to adapt to salinity intrusion in the coastal Mekong delta

Dang Kieu Nhan[1], Vu Anh Phap[2], Tran Huu Phuc[2] & Nguyen Hieu Trung[3]

[1] Agricultural Systems Department, Mekong Delta Development Research Institute, Can Tho University (CTU)

[2] Crop Resources Management Department, Mekong Delta Development Research Institute, CTU

[3] College of Environment and Natural Resources Management, CTU

Alternative land use: Shrimp

In million Vietnamese Dong

Farming systems	Total variable costs		Gross return		Gross margin	Benefit-cost ratio
	Rice	Shrimp	Rice	Shrimp		
Two rice crops (n = 46)	25.3 ± 1.1		46.8 ± 2.0		21.6 ± 1.9	0.9 ± 0.1

Vietnam – Belief 3:

IF

Hard policies are implemented

THEN

Rice production increase and livelihoods will improve

Cailon/Caibe

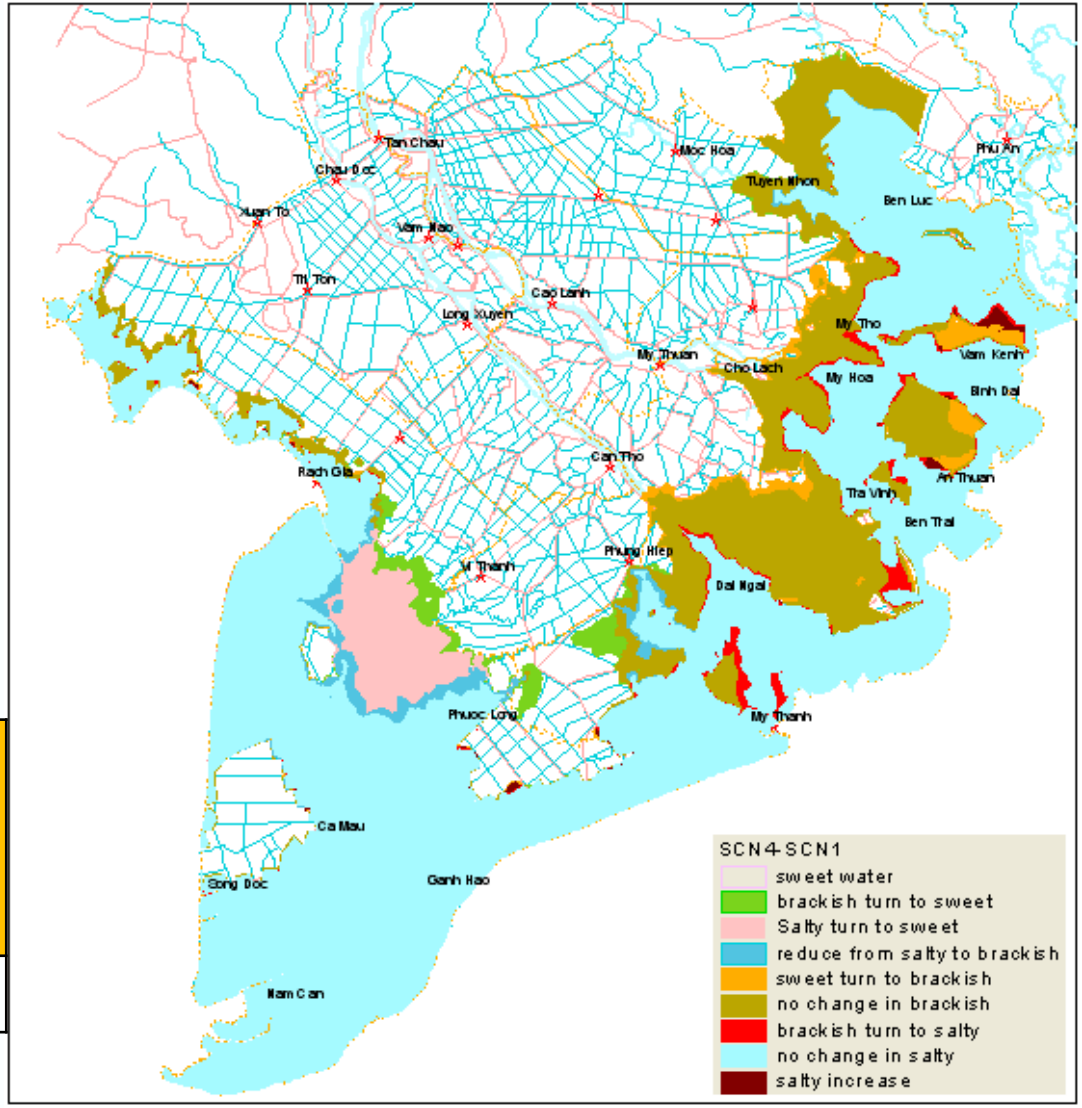
SLR 30 cm

Upstream hydropower

Irrigation extension

Fresh	< 2 g/l	< 2-4 g/l	< 4-10 g/l	< 10-20 g/l	>20 g/l
155	-74	6	36	63	-186

in 1,000 ha



THE MEKONG FUTURE PROJECT FIRST DRAFT REPORT ON THE HYDROLOGICAL SIMULATION

To Quang Toan[1], Nguyen Hieu Trung[2], Dang Kieu Nhan[3]

[1]Southern Institute of Water Resources Research

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[3]Mekong Delta Research Institute, Can Tho University.

Cailon/Caibe + Hamluong/Cochien

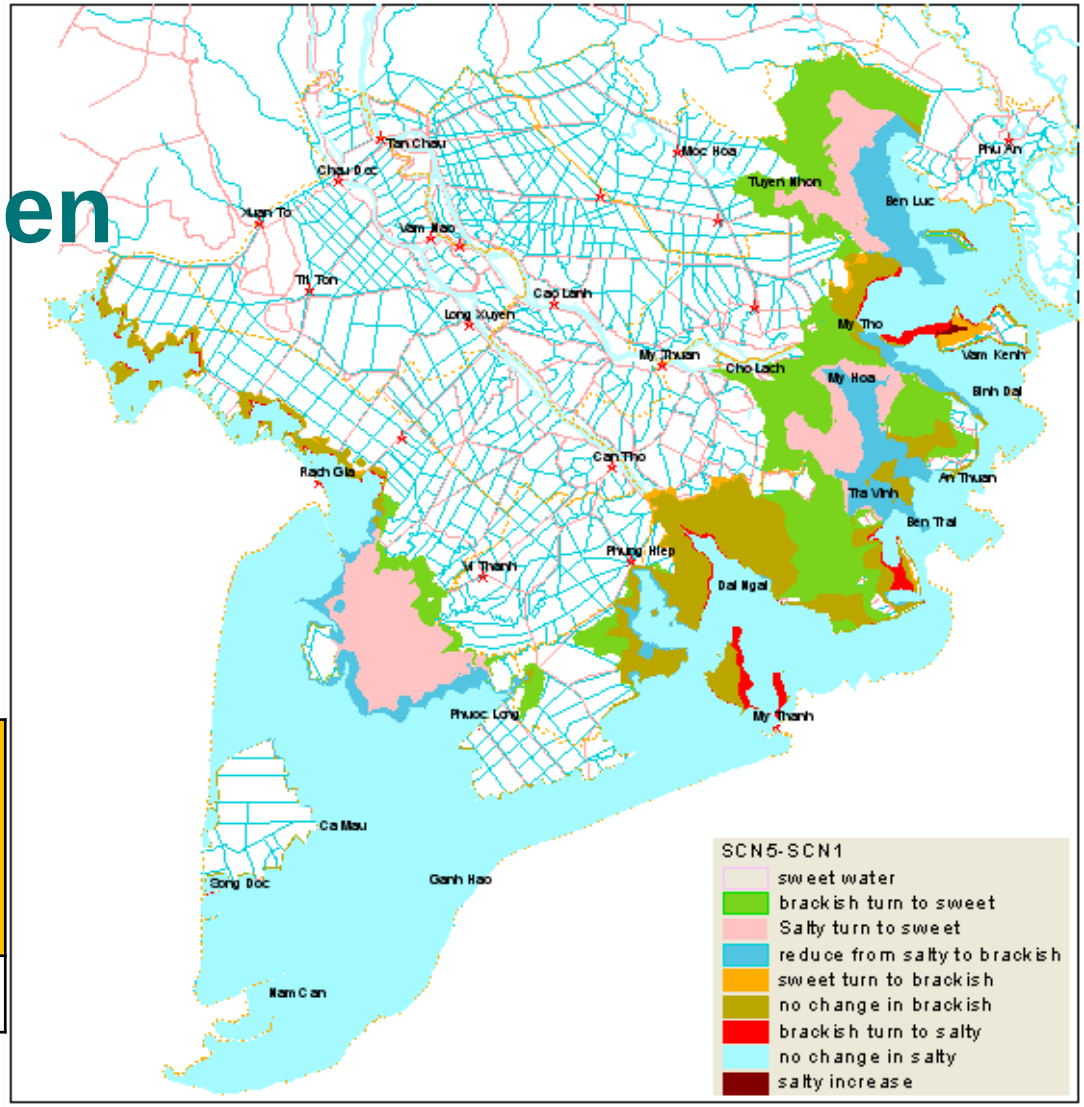
SLR 30 cm

Upstream hydropower

Irrigation extension

Fresh	< 2 g/l	< 2-4 g/l	< 4-10 g/l	< 10-20 g/l	>20 g/l
329	26	-82	-79	-8	-186

in 1,000 ha



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Impact of droughts

SLR 30 cm

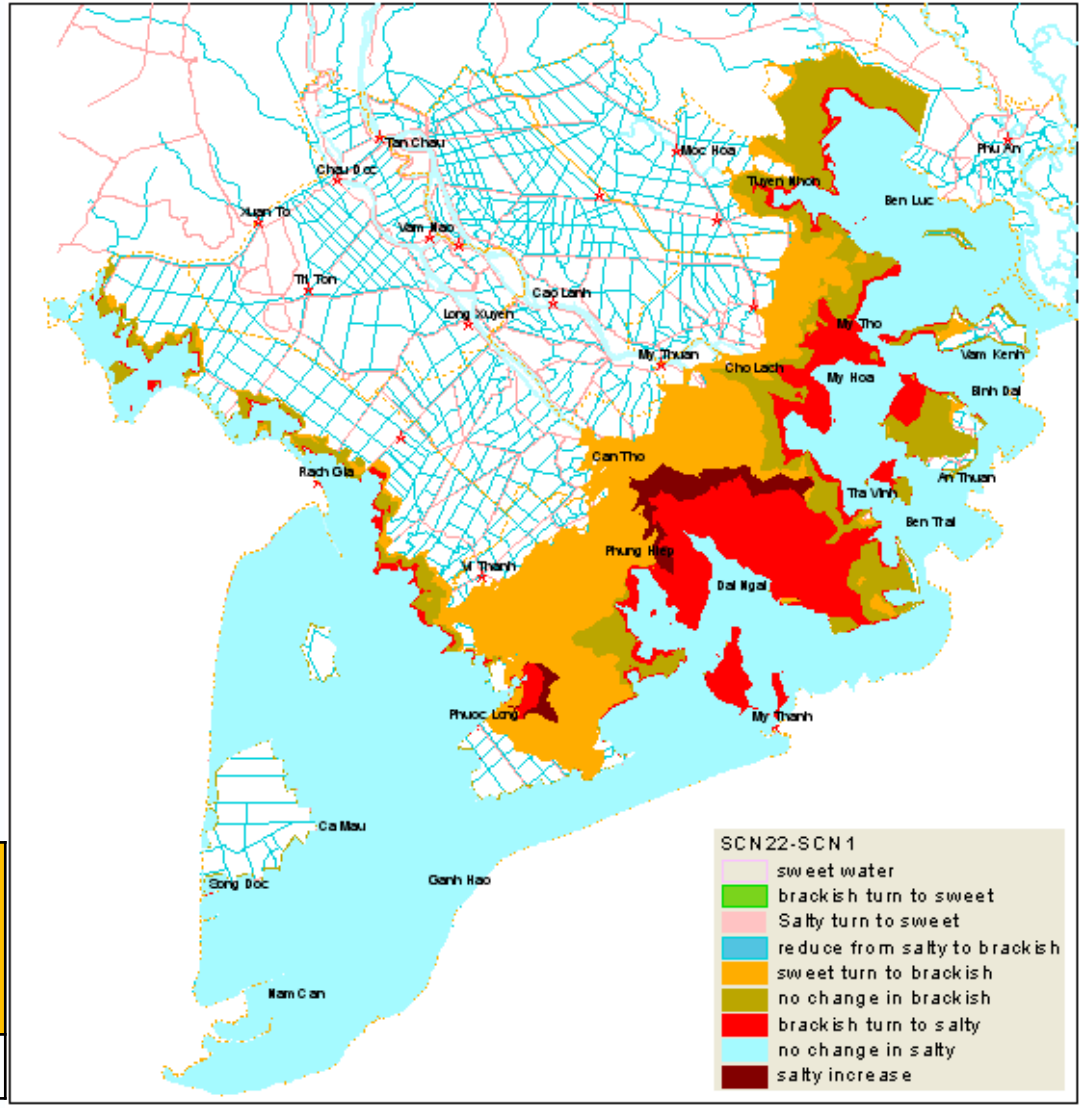
Upstream hydropower

Irrigation extension

Climate change (+droughts)

Fresh	< 2 g/l	< 2-4 g/l	< 4-10 g/l	< 10-20 g/l	>20 g/l
-306	-148	180	163	87	23

in 1,000 ha



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Yunnan Belief 1:

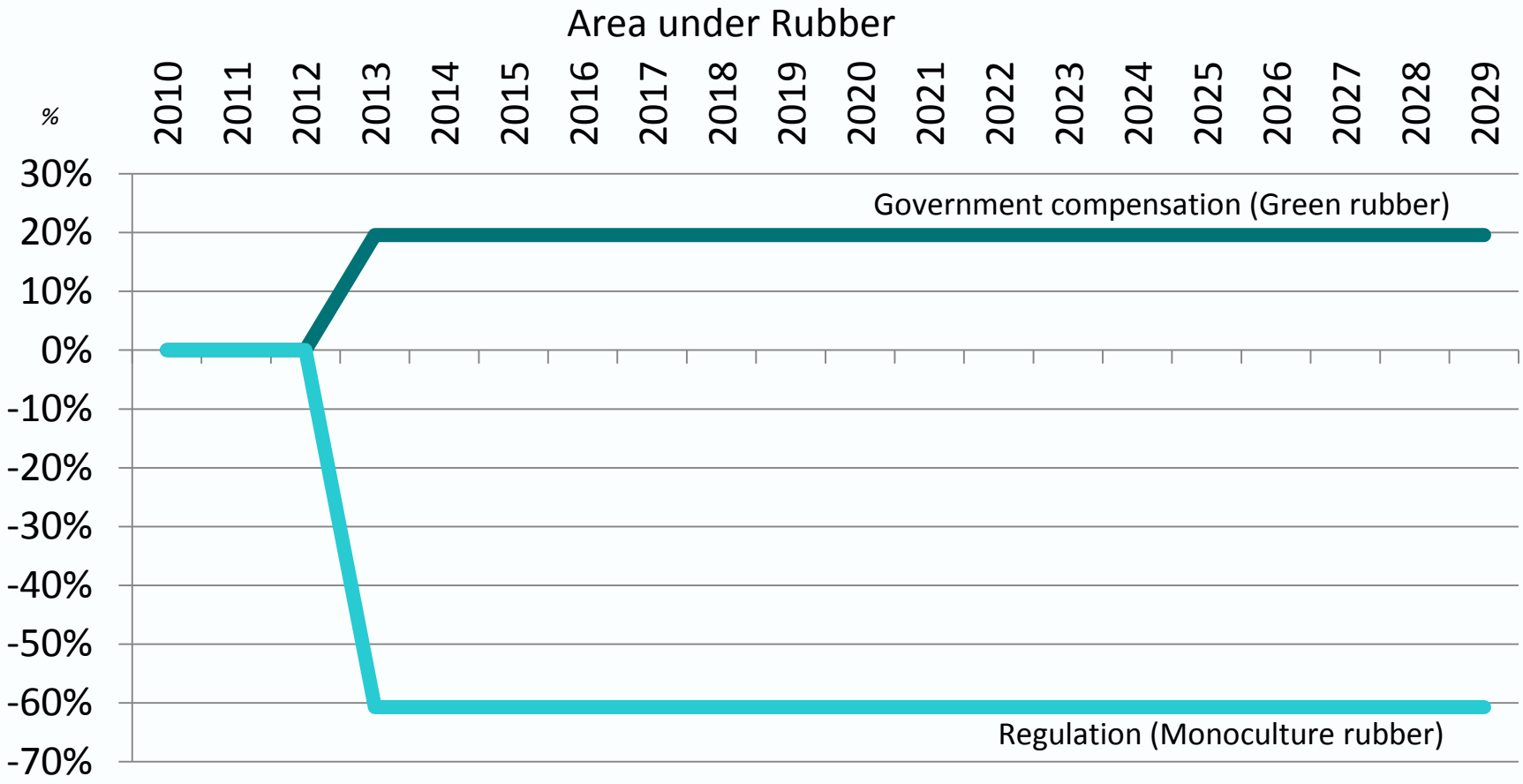
IF

Government provides payments/compensations

THEN

Rubber expansion can be reversed

Evidence from the model



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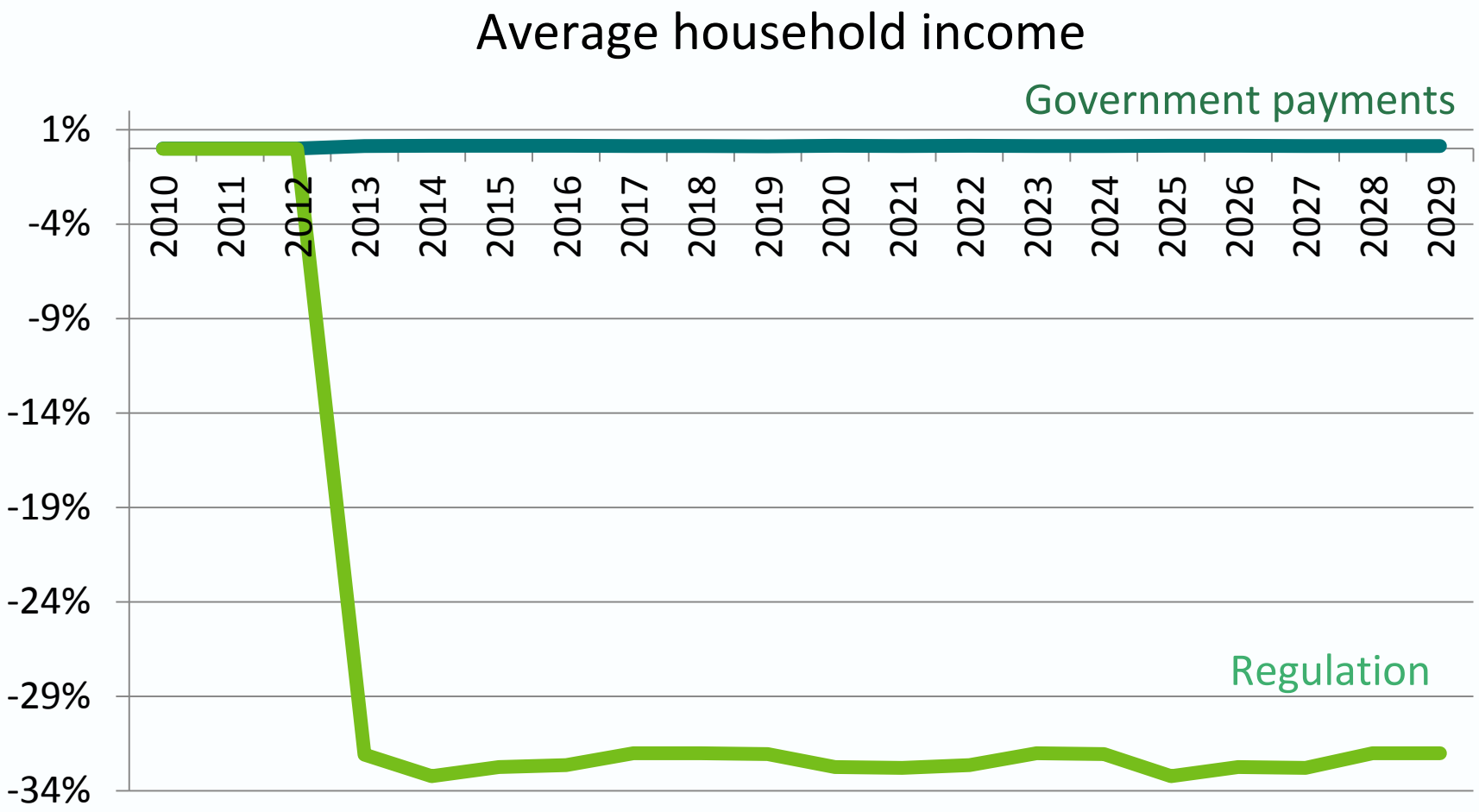


Thailand – Belief 4:

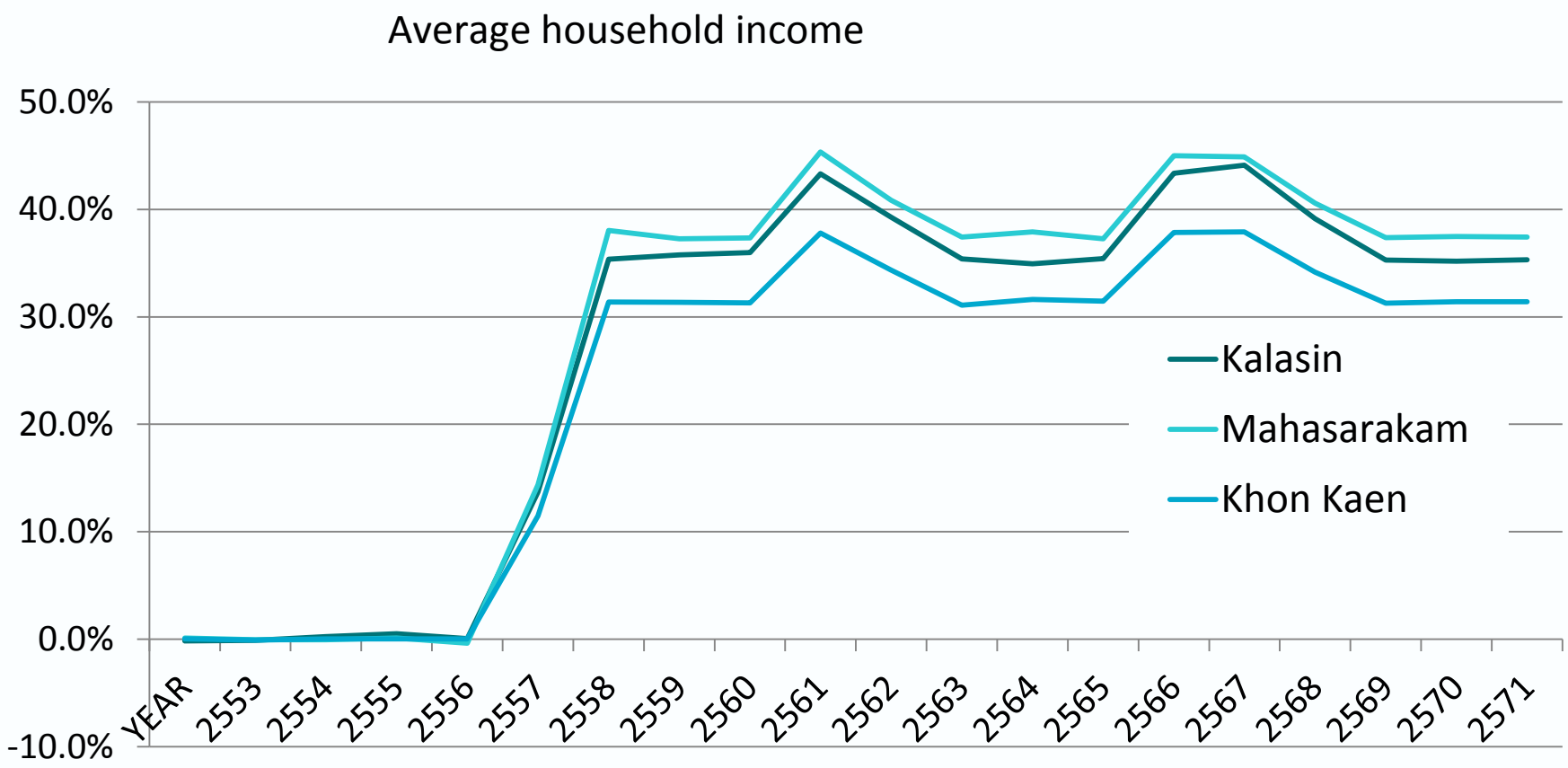
IF

Inter-basin water diversions occurs

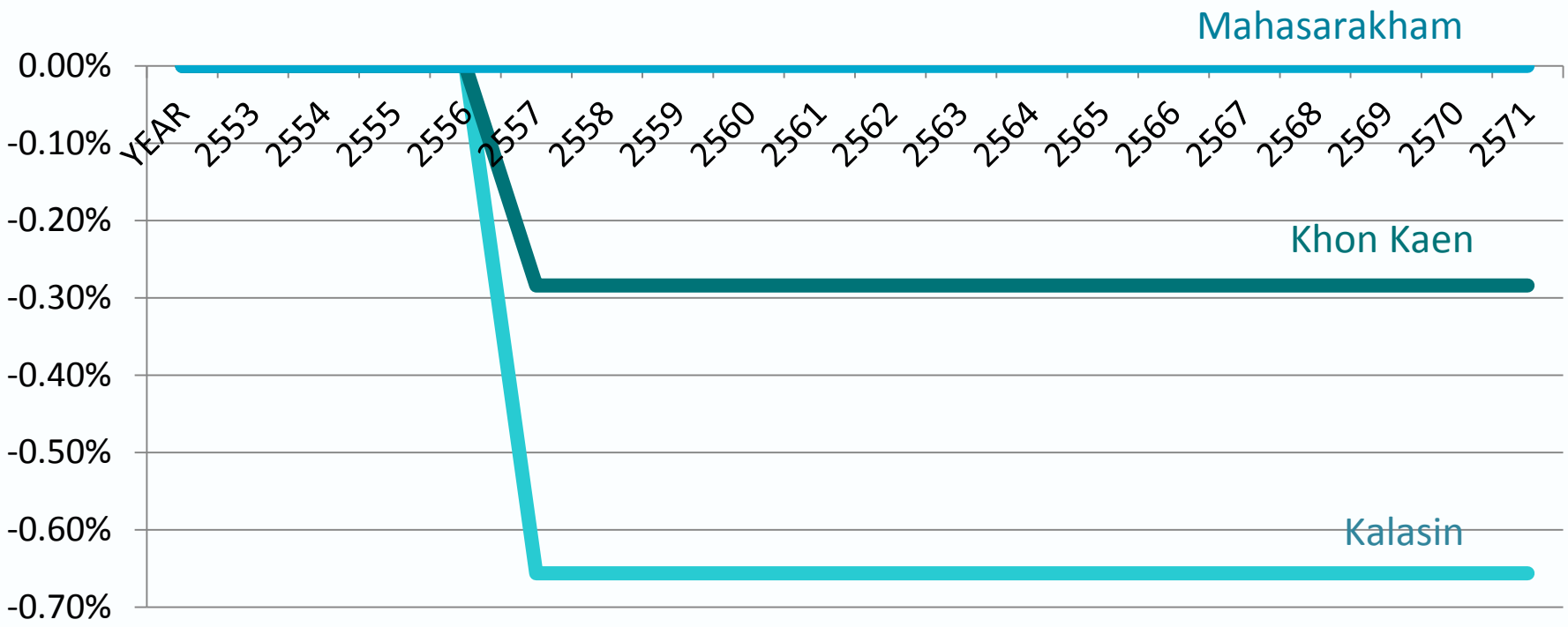
THEN

Income will increase

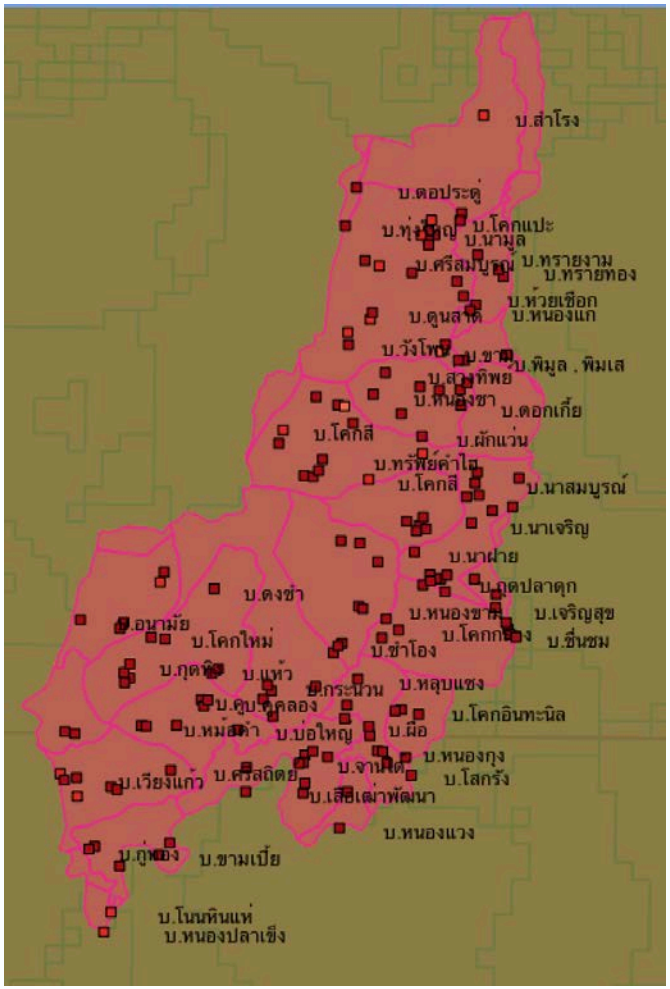
Impact of irrigation on income

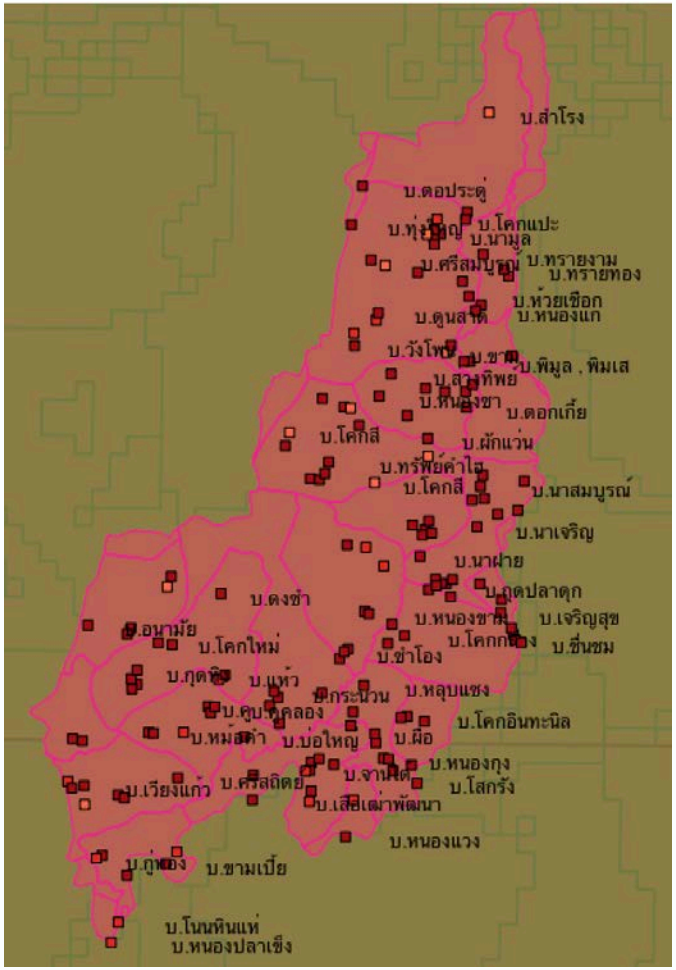


Impact of irrigation on poverty

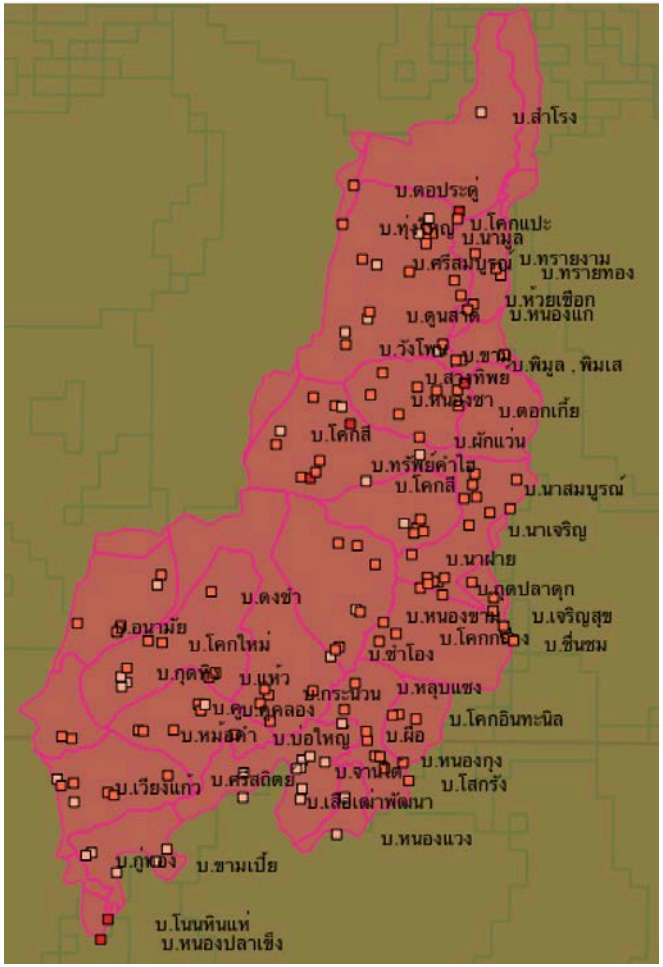


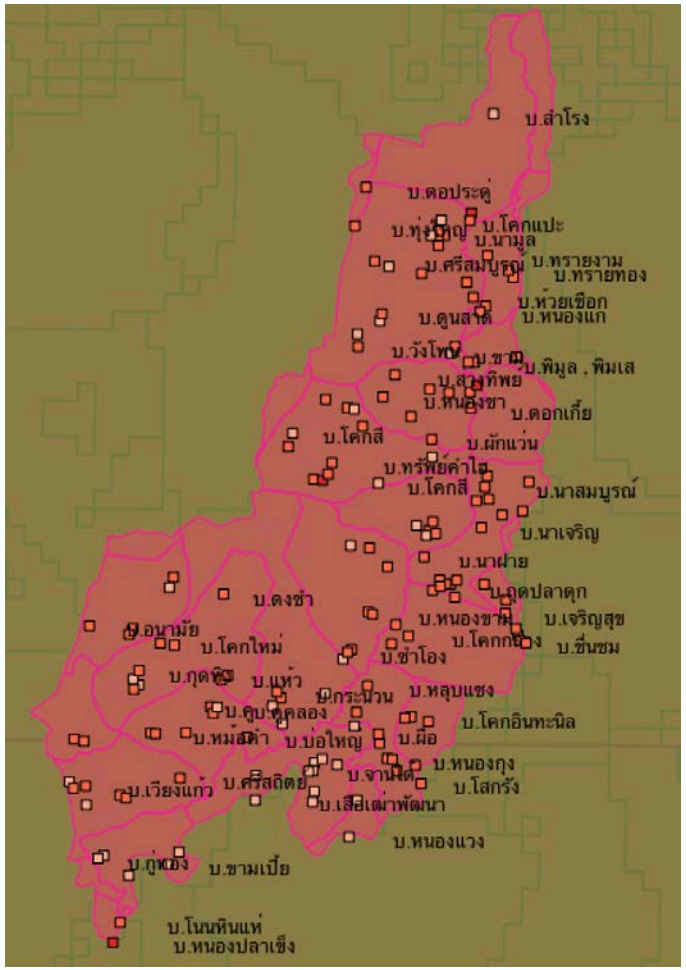
27 January 2010 Base – Scen





07 November 2010 Base – Scen





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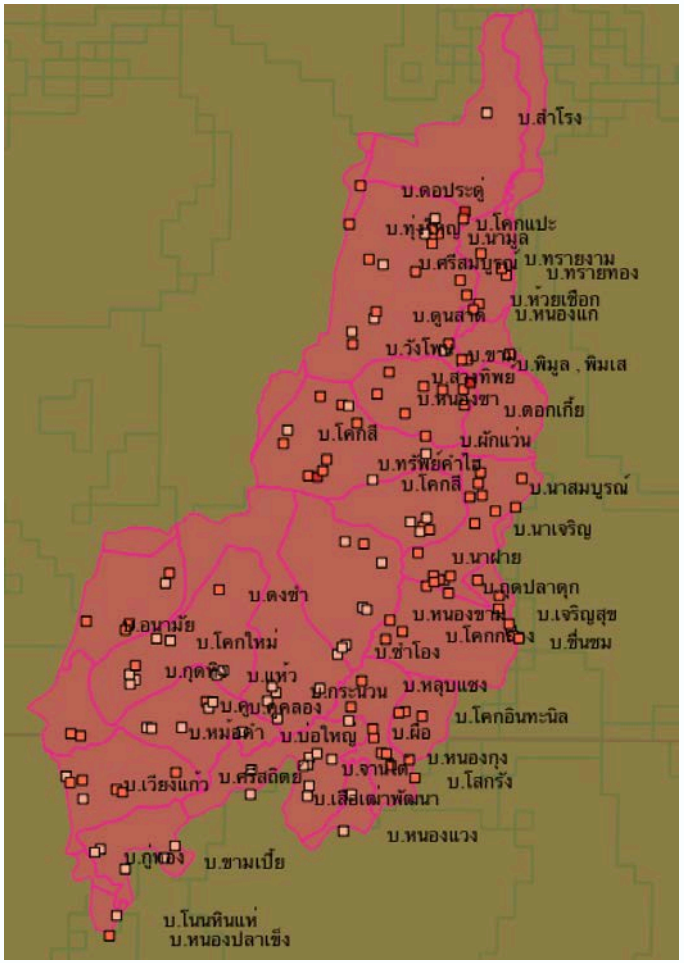
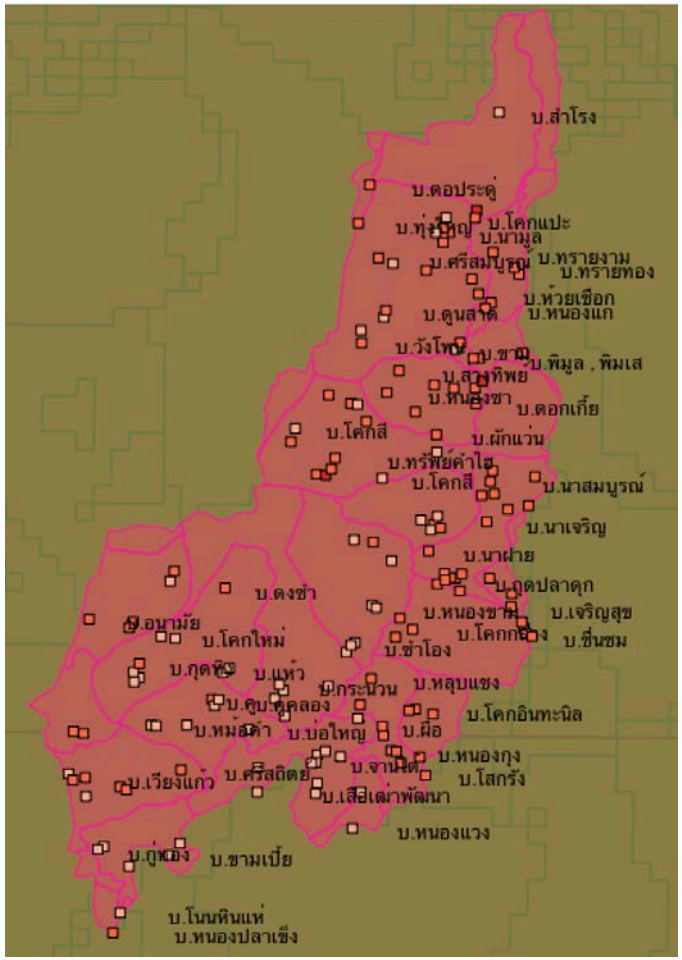
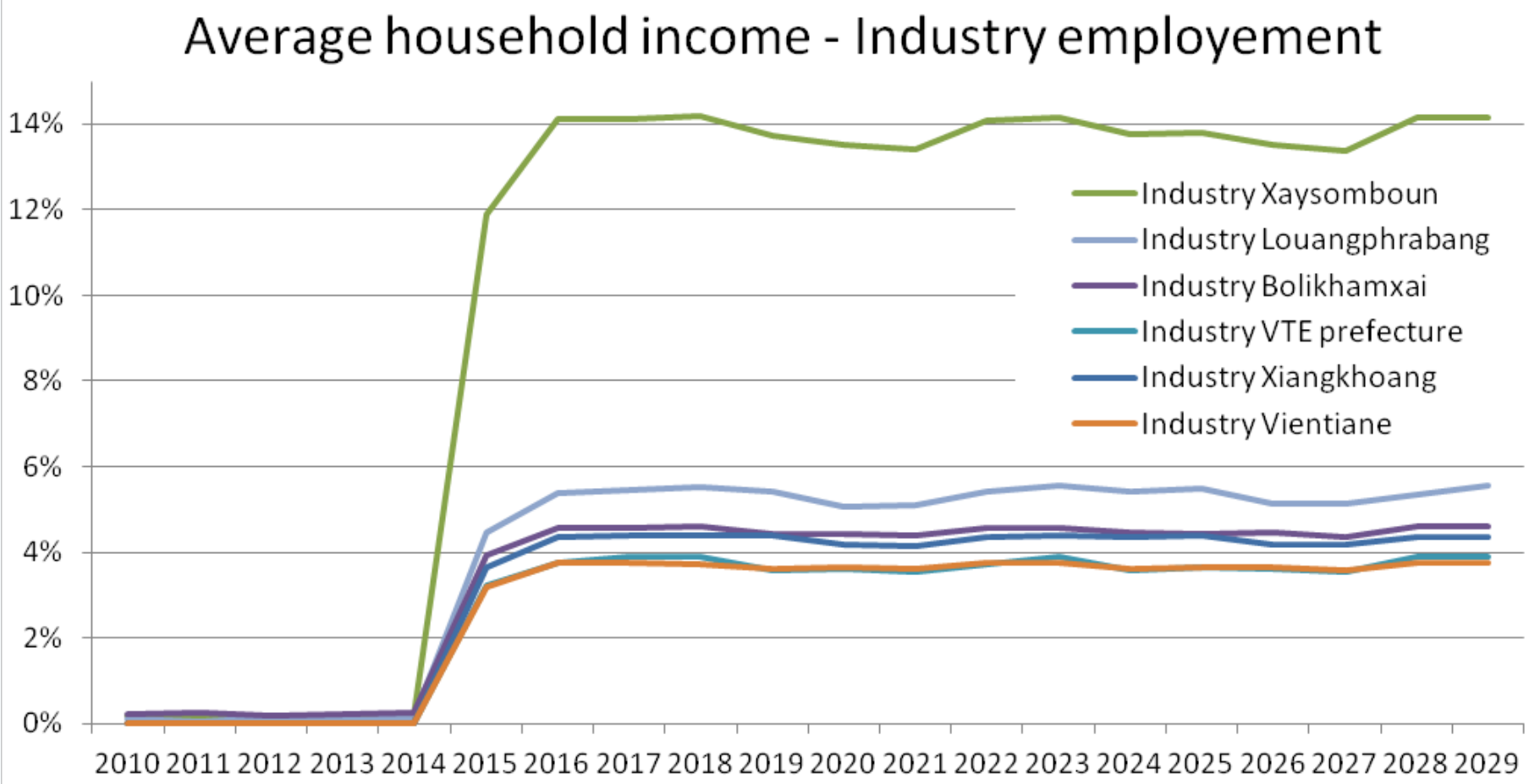




Nexus effects – Livelihoods

1. **Reduced income from fish in all LMB countries**
2. **Increased migration from Laos, Myanmar and Cambodia into Thailand**
3. **More employment in commercial farming, while decrease in both small and subsistence farming households**
4. **Less income from riverside gardens**
5. Maybe higher income from rice (potential productivity increase)
6. Increase wage employment in NE Thailand

Low income effects of industry employment (3-6%) except Xaysomboun (14%)



Industry employment effective to alleviate poverty