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Utilizing Ecosystem Services to Enhance Agro-Climatic Resilience

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Outline

- CC Impacts on Ecosystem Services
- Rationale
- A Typical Case: Rice-Duck-Fish System
- Policies in China

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Climate Change Impacts on Biodiversity in China

Component	Impacts
Genetics	Induce genetic abnormality, threaten the stability of germplasm resources & stability
	Shifts of wild plant resources distribution
Species	Change plant phenology, animal migration, amounts of natural enemies
	Decrease of species & richness
	Invasive alien species
	Alter the species function & properties
	Richness of species be enriched due to CO_2 fertilization effects
	Coral reef bleaching & damage due to warming, acidification, extreme climatic events
	Pollinator cannot adjust to the changed climatic zones
Ecosystem	Degradation of grassland, wetland, shifts of crop climatic suitability
	Fragment of habitat , changes of suitability of habitat
	Changes in ecosystem's structure and function
	Soil degradation (hardening, decrease of organic nutrients, changes in microbial flora, salination)
	Worsen water ecosystem
	Enhanced forest and grass fires
Landscape	Homogenization of landscape due to monoculture

Climate Change Impacts on Agro-ecosystem Services

Service	Impacts
Supply	Capacity of food production reduced due to reduction of agro-biodiversity Yieldincrease due to rising CO_2 concentrition Reduction of wild agricultural germplasm resources
Regulation	Outbreak of crop pest & desease due to weaked ecological control funtion of agro-ecosystem More GHGs emission due to overuse of chemical fertilizer Agro-meteorological disasters enhanced due to extreme climatic events Weaked sevices on water conservaton Soil erosion enhanced
Support	Yield & quality of crop production due to weakened pollination Weakeened capacity on nutrient cycling, primary productivity Weakened capacity on biodegradation on pollutants
Culture	Eco-tour due to damages on agricultural landscape Loss of intangible cultural heritage

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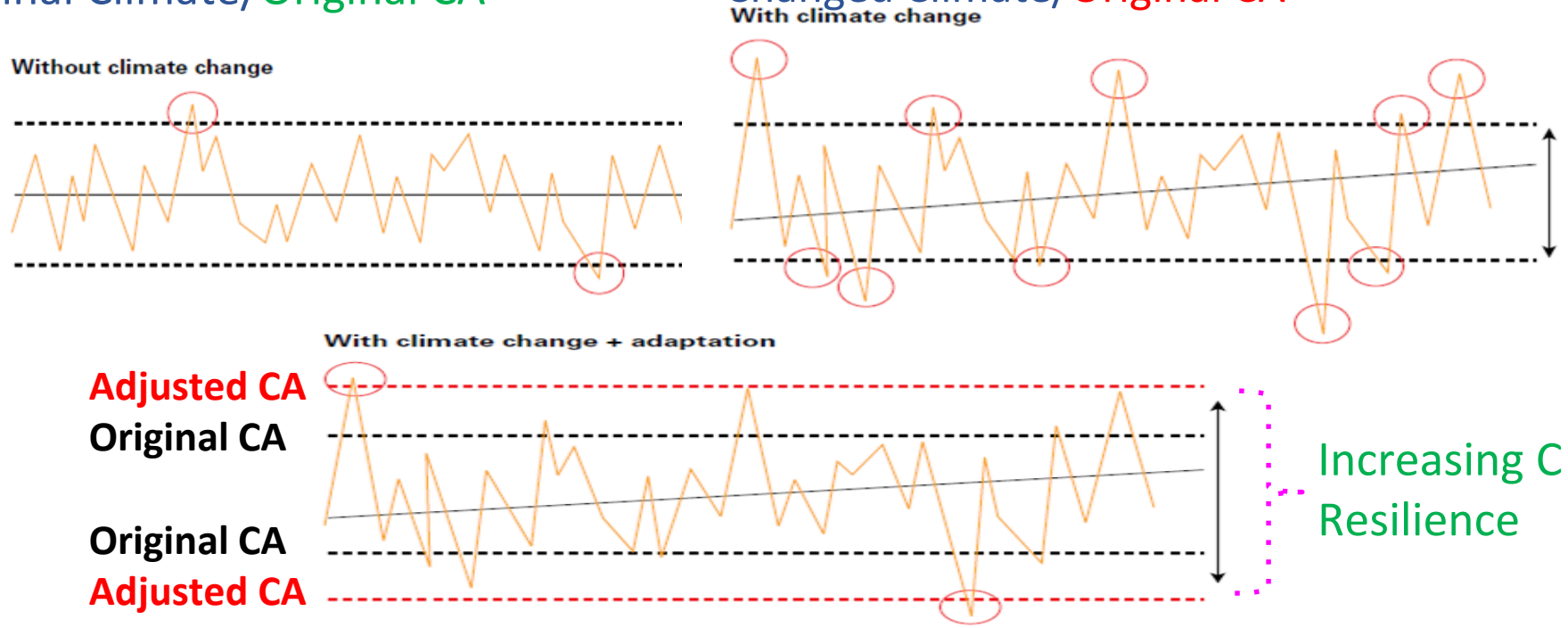
Concepts of Climate Adaptability (CA), CC Adaptation and C. Resilience

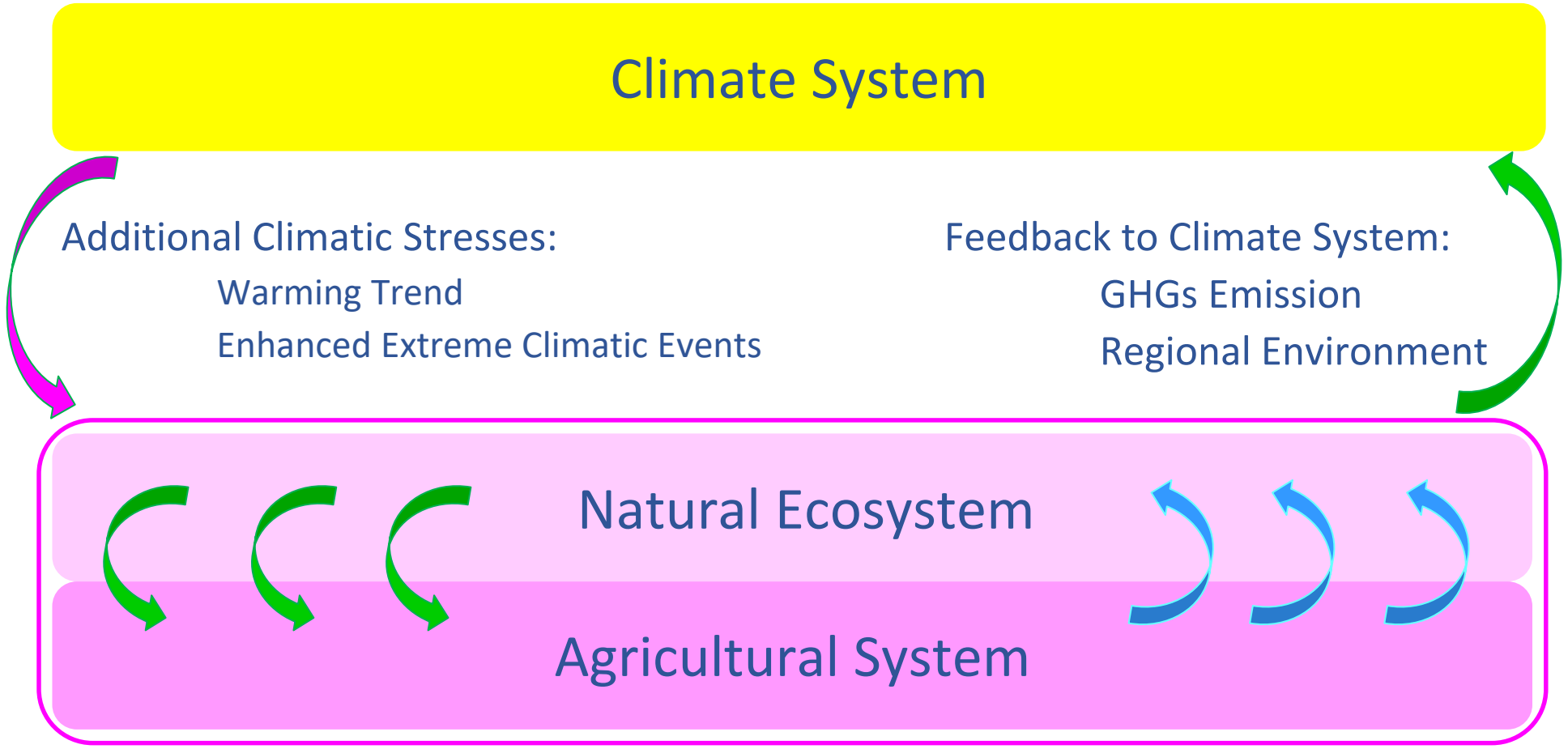
Original Climate/Original CA

Changed Climate/Original CA

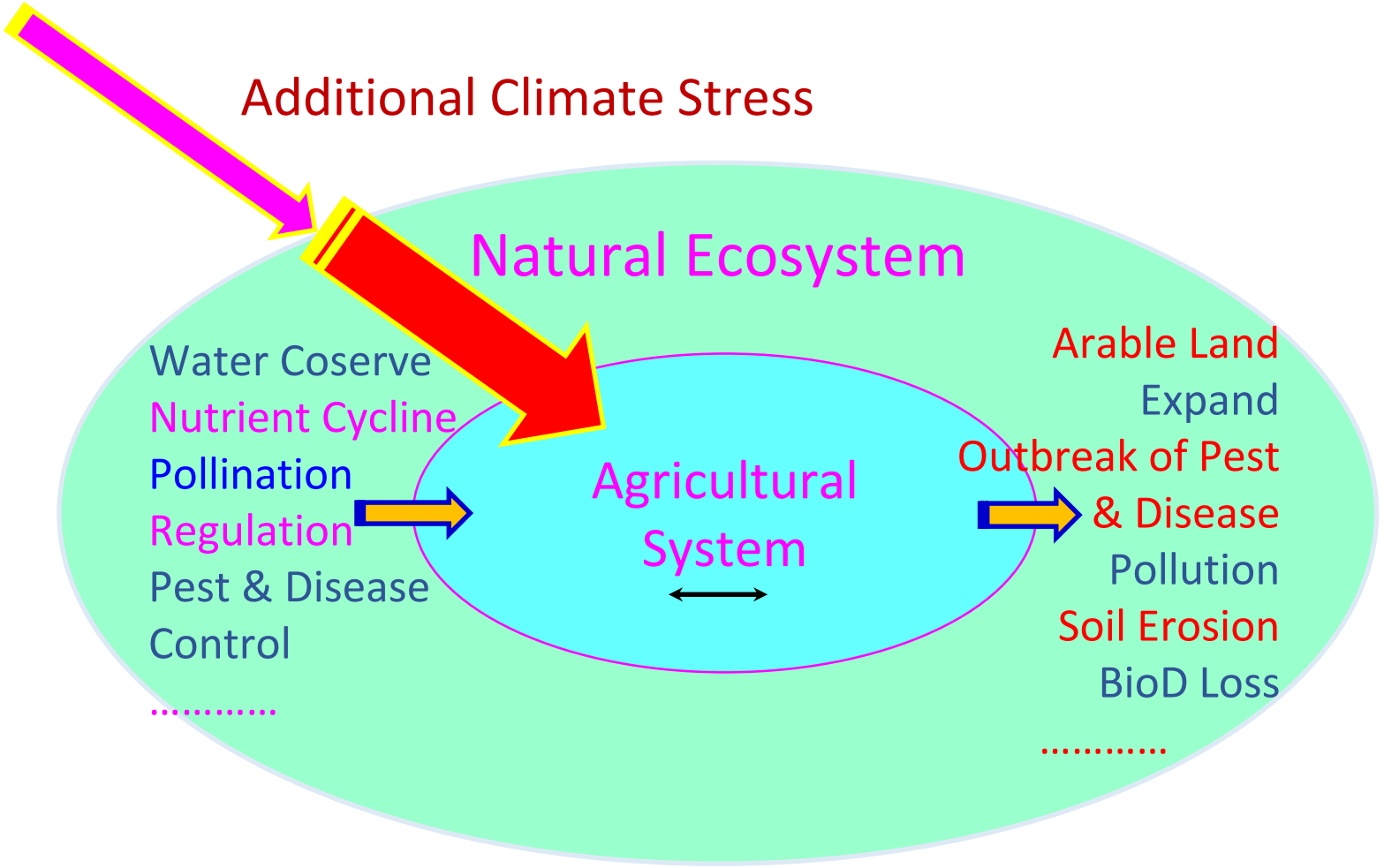


CC Adaptation = Adjusted Climate Adaptability — Original Climate Adaptability

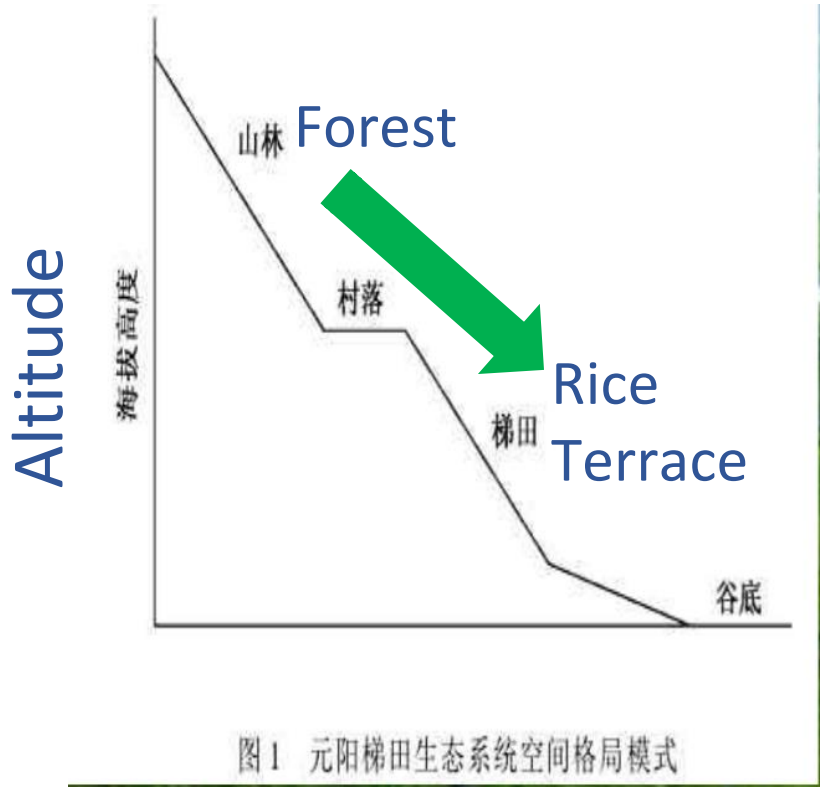
Concepts of Climate Adaptability (CA), CC Adaptation and C. Resilience



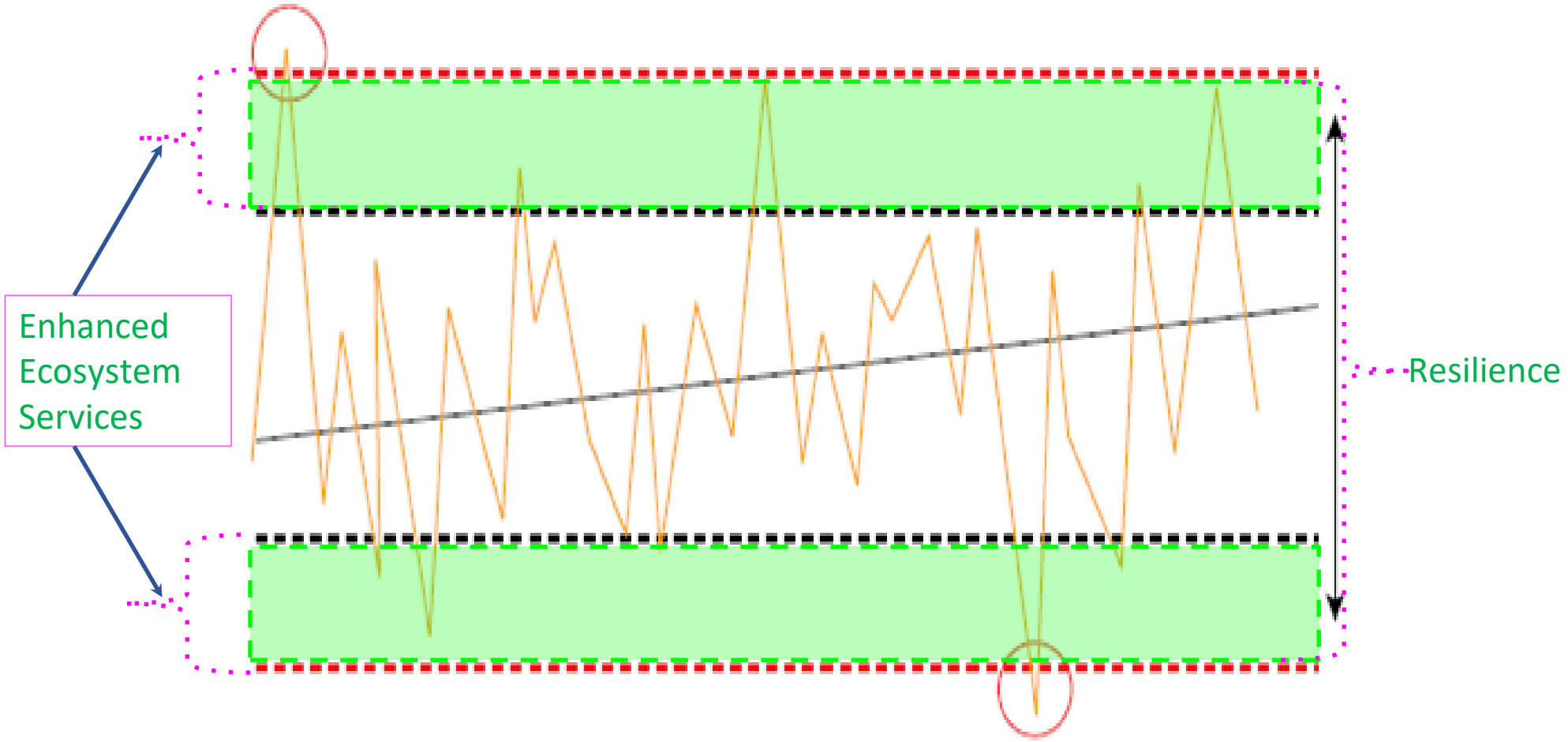
Natural Ecosystem: Reduce Climatic Stress = Increase Agri-Resilience



Rice Terrace in Yunnan, Southwest China



Agro-Ecosystem: Enhance Self Climate Adaptability = Increase Agri-Resilience



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CC-induces Ecological Consequences — Outbreak of Rice Hopper

In May 2007, the outbreak of rice hopper~~the amount even reached 700-1000 for one rice clump in Guangxi, Southwest China

Rice production Seriously Affected from CC

Hot Temperature



Cold Damage



Overcast & Sparse Sunshine



Outbreak of Pest & Disease along Yangtze River

Banded Sclerotial Blight

Leaf Blight

False Smut

A Typical Case in China: Rice-Fish-Duck Symbiosis System

Duck & Fish: eat rice hopper, manure as organic fertilizer and ecological measures to control rice disease; control weeds; loosen the soil & increase soil oxygen content ……

Rice: shading for duck & fish, feeding to duck & fish……

Benefits: organic food; increase of soil nutrients; biodiversity; high resilience to drought & flooding—stable production……

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National Climate Change Adaptation Strategy 2035 — Key Points

- Strengthening soil and water conservation and ecological protection
- Promoting conservation farming
- Developing agroforestry and 3-D farming in hilly areas
- Encouraging intercropping
- Adoption of hi-efficiency pesticide & ecological control on pest & disease
- Preventing invasive alien species
- Increasing agro-biodiversity
- Promoting formula fertilization
- Constructing high standard farmland (1.05 billion Mu, 1 Mu=1/15 ha)
- Enhancing germplasm resource protection, building seed banks
- Protecting agricultural heritage
- Optimizing farm landscape design

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Thank you!