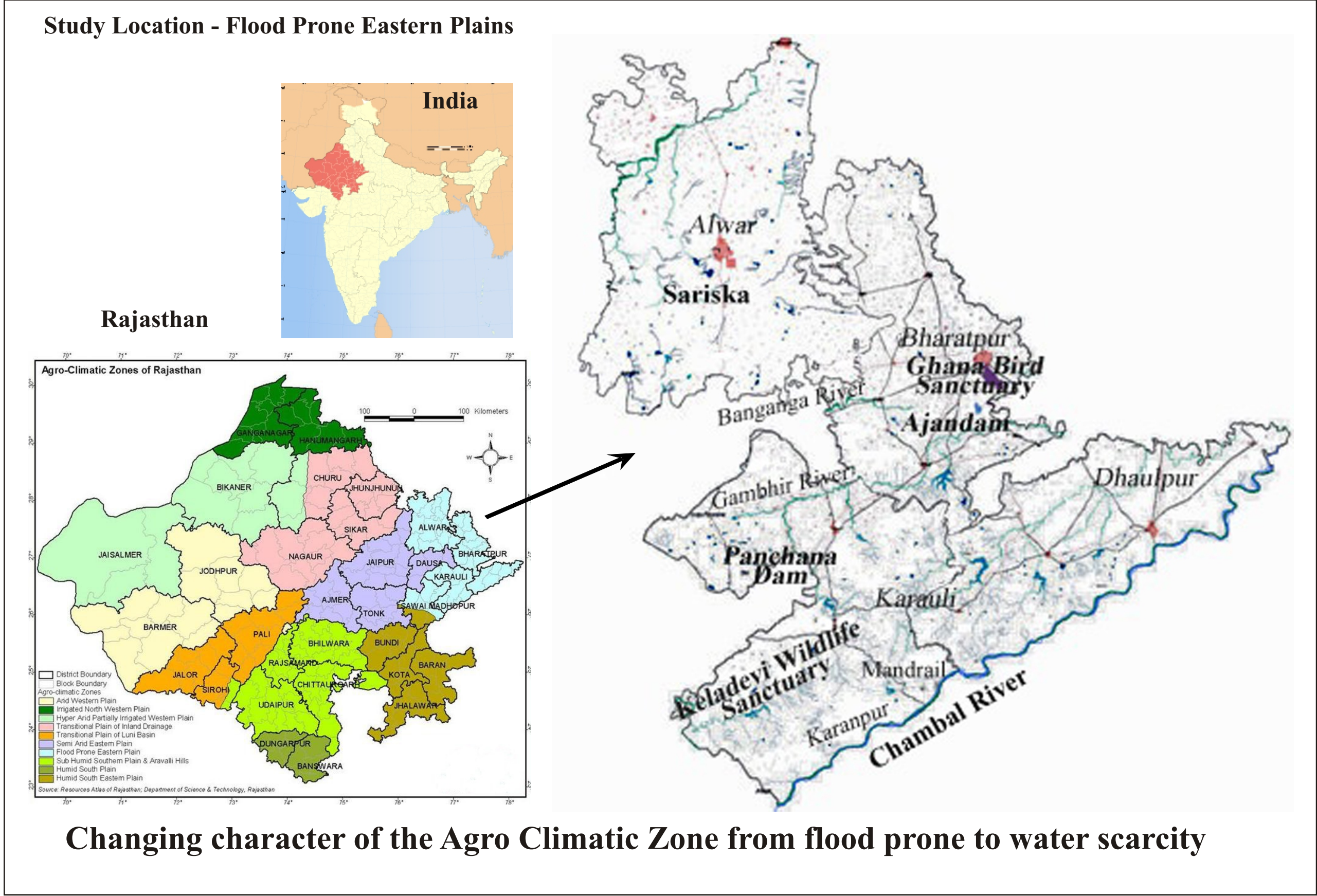


Adaptation to change in interlinked cultivated and wetland ecosystem: a study in Western India

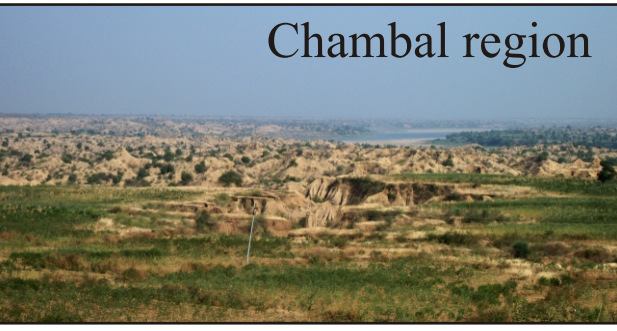
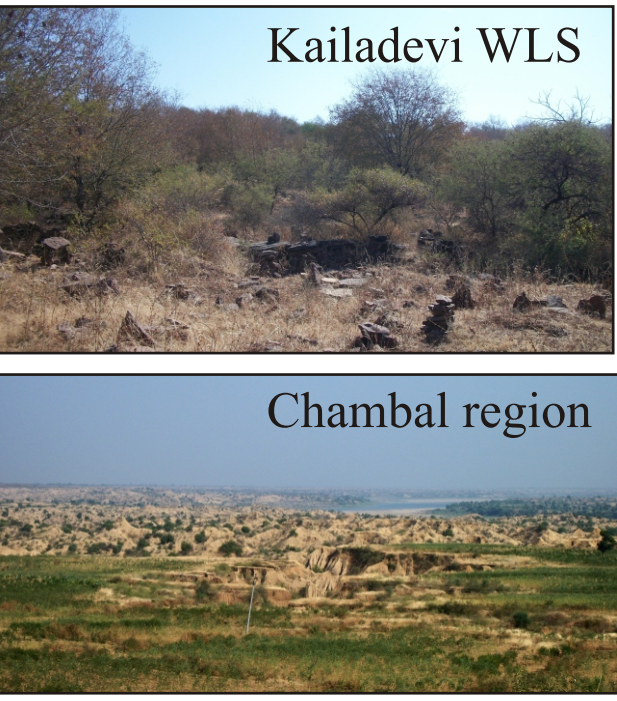
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Ecosystems Assessed:

- Forests:** Ghana NP, Sariska core area, Mandrail Alligator Sanctuary, Kailadevi WLS
- Grasslands:** Bharatpur environs, Kailadevi pastures, Pasture resources of Sariska (Core & Buffer zone),
- Mountains:** Aravallis of Alwar
- Drylands:** Bharatpur, Alwar, Area between Kundanpur to Mandrail
- Agriculture:** Sariska Buffer zone, Karauli, Bharatpur, Alwar, Kundanpur
- Urban:** Bharatpur, Alwar, Karauli



Ecosystem Services Assessed:

1. Provisioning:

- Food:** Wild edibles, fruits, vegetables, crops & spices
- Water:** River Chambal, Ruparel, Gambhiri, Chambal canal, water bodies of Orans (Sacred groves)
- Genetic resources:** Wild relatives of Crop plants, Wild relatives of breeds
- Energy/Fuel:** Existing forest depended & other biomass energy resources

2. Regulating:

- Erosion prevention:** Tree cover, Ground cover, *Cyperus* beds in rivulets, contributions of Orans
- Pollination:** Diversity of pollinating agents
- Climate regulation:** Tree cover (air) & ground cover (earth) for moisture retention

3. Supporting:

- Nutrient cycling:** Leaf-litters biomass, ground insects, regular functioning food webs
- Soil formation & fertility:** Organic biomass from leaf-litters, nutrition cycles
- Primary production:** Richness & diversity of primary producers (flora)

4. Cultural:

- Recreation & tourism:** Tiger Reserve, Ghana NP-Ramsar Site, Mandrail Alligator Sanctuary, Orans

Ecological Indicators used in Ecosystem & Services Assessment (All indicators with detail in separate document available)

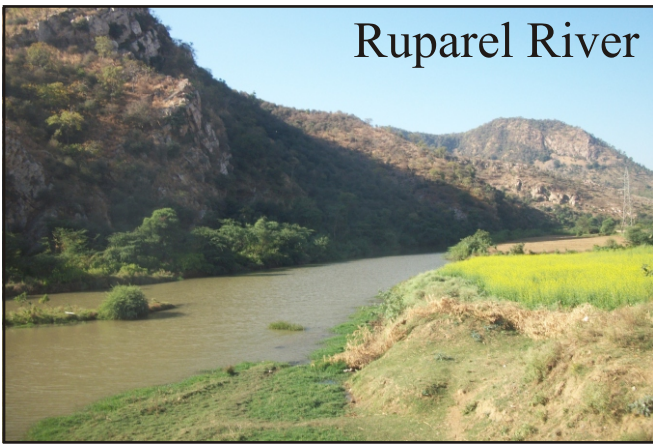
Species diversity, richness, distribution	Habitat diversity, quality, complexity	Natural regeneration
Plant Biomass	Grass diversity, cover	Keystone Species, Umbrella Species
Pollinators	Seed dispersal agents (Zoochory)	Biological pest controlling agents
Rare, Threatened, Endangered species	Root stock availability	Species loss
Food web	Epiphytes (Lichen, moss, Orchids, ferns)	Lower taxa
Bulbous plants	Plus Tree traits	Leguminous plants
Invasive Species	Parasites (Plants)	Aquatic Species
Water colour, odor	Change in Runoff	Soil texture, colour, depth, microbes

Negative changes in Ecosystems (Sariska, Bharatpur)

- Deterioration in soil health; Soil erosion increased
- Decreasing ground water table
- Change in diversity & richness of indigenous flora-fauna
- Conflicts in Pasture resources
- Negative impacts on indigenous seeds & livestock breeds
- Increasing human-wildlife conflicts
- Water supply in Ghana Bird NP by Canal instead of Ecological flow - quality and quantity of feed changed
- Heavy disturbances in Protected Areas

External Forces

- Market fluctuations
- Change in cropping pattern (high inputs)
- Faulty policy implementation



Positive Changes in Ecosystems (CCA- Orans):

- Enhancement of vegetation cover, prevent Soil erosion
- Better Soil Health, Better productivity
- Increasing Biodiversity (Flora & Fauna)
- Increasing Plant Genetic diversity
- Quality & quantity increased of Surface water bodies
- Positive impacts on Ground water table
- Better Pasture resources
- Increased Biomass
- Enhancement of Agriculture fields
- Diversity & rich population of Pollinators
- Availability of economically important plants
- Community involvement in conservation & management of resources

Possible Remedies for Negative Changes

- > Sustainable Agriculture with low inputs (Soil health enhancing), Indigenous Seed bank creation in the region
- > Ecologically sound & Community rights supporting management strategy to ensure sustainability of natural resources & reduce conflicts
- > Regular assessment of ecological economics

Ongoing Tasks

- > Data collection for Ecosystem mapping & Modelling
- > Status of Aravalli ridge as ecological barrier to combat desertification
- > Stakeholder consultations

Future Tasks

- > Implementation of Biodiversity Act 2002; Creation of BMCs to protect Common resources
- > Ecosystem Modelling
- > Manual for assessment of Interlinked Ecosystems