Regional Scenarios for the Wadi Drâa Catchment

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Hydrosphere

Atmosphere

Antroposphere

Biosphere

the IMPETUS method

Problem clusters

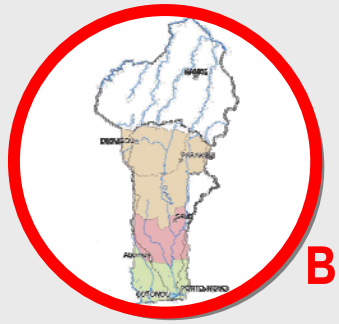
Models & Scenarios

(Spatial) Decision Support Systsems

Why Scenarios ?

- Future cannot be predicted precisely
- Scenarios are contradiction-free projections of the present state of a system into the future
- Assessment of alternative development paths
- Estimation of the uncertainty of likely future development
- Analyse the long-term effect of political decisions

Morocco



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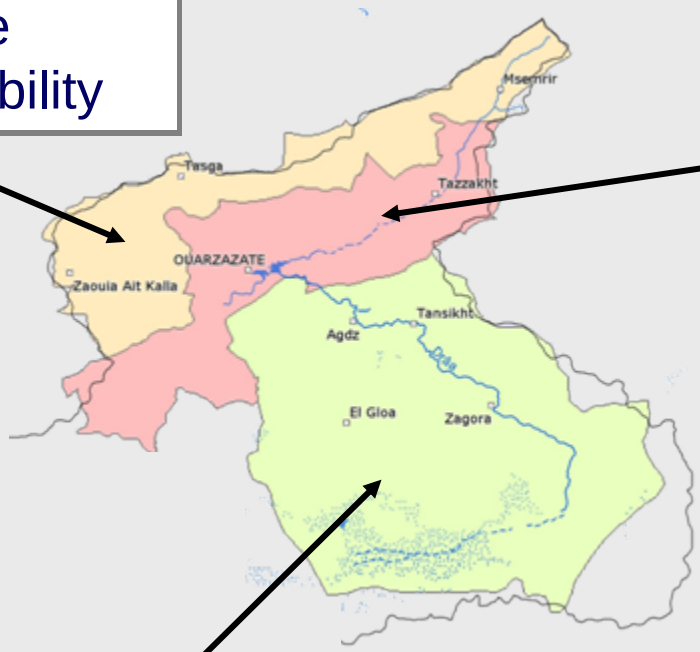
Characteristics of sub-regions WADI DRÂA

High Atlas
- marginalised region
- poor infrastructure
- good water availability



Ouarzazate Basin
- good infrastructure
- strong urban centres
- good water availability

Oases southern of Mansour Eddahbi Dam
- low water availability
- dependency on dam management

M1: Marginalisation – non-support of the Drâa-Region	M2: Rural development in the Drâa-Region through regional funds	M3: Business as usual
Development of main economic framework conditions		
• Stagnation of tourism • Growth rates of the industrial sector stagnate on a low level	• Programs for enabling people to help themselves • Increase of tourism	• Slow increase of tourism • Low rates of industrialization
Development of political framework conditions		
• Funding programs decrease • Traditional forms of decision-making gain importance	• Intensification of funding programs (according to strategy 2002) • Valorization of local governance	• Funding programs for tourism only • Traditional and modern forms of administrations exist in parallel
Developments within the agriculture sector		
• Agriculture areas and livestock farming remains constant • Stagnation of productivity • Missing innovations	• Increasing rate of innovations and productivity • Cash-Crops for regional markets • Reduction of livestock farming	• Low rate of innovations • Agriculture areas and livestock farming remain constant
Development of demographic framework conditions / living quality		
• Increased migration • Demographic polarization • Deterioration of living conditions	• Decline of migration • Improvement of living conditions	• ***Slowly growing population*** • High migration • Slight progress in basic needs supply
Environment and resources		
• Weak resource management • Increase of energy costs • Uncontrolled exploitation of resources	• Management strategies are implemented • ***Water use increases***	• Increase of energy costs • Water scarcity sets limits to the expansion o

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Development of main economic framework conditions

M3: Business as usual

M2: Rural development in the Drâa-
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M1: Marginalisation – non-support of the Drâa-Region

- Stagnation of tourism
- Growth rates of the industrial sector stagnate on a low level

Development of main economic framework conditions

M3: Business as usual

M2: Rural development in the Drâa-Region through regional funds

- Programs for enabling people to help themselves
- Increase of tourism

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Development of main economic framework conditions

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- Slow increase of tourism
- Low rates of industrialization

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- Funding programs decrease
- Traditional forms of decision-making gain importance

Development of political framework conditions

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M2: Rural development in the Drâa-Region through regional funds

- Intensification of funding programs (according to strategy 2002)
- Valorization of local governance

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Development of political framework conditions

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- Funding programs for tourism only
- Traditional and modern forms of administrations exist in parallel

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Developments within the agriculture sector

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- Increasing rate of innovations and productivity
- Cash-Crops for regional markets
- Reduction of livestock farming

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Developments within the agriculture sector

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- Agriculture areas and livestock farming remain constant

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Development of demographic framework conditions / living quality

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- Decline of migration
- Improvement of living conditions

M1:

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Development of demographic framework conditions / living quality

M3: Business as usual

- *Slowly growing population*
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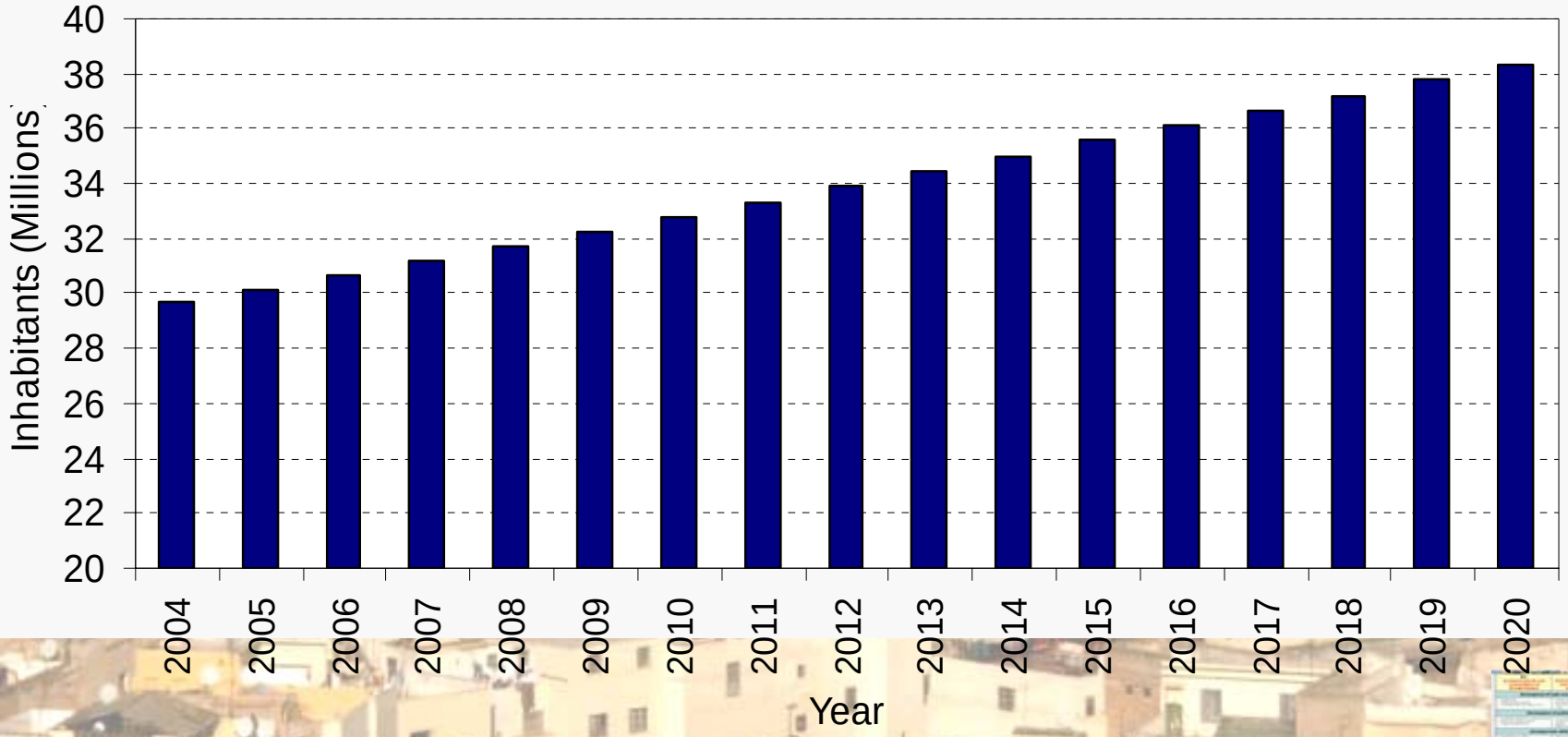
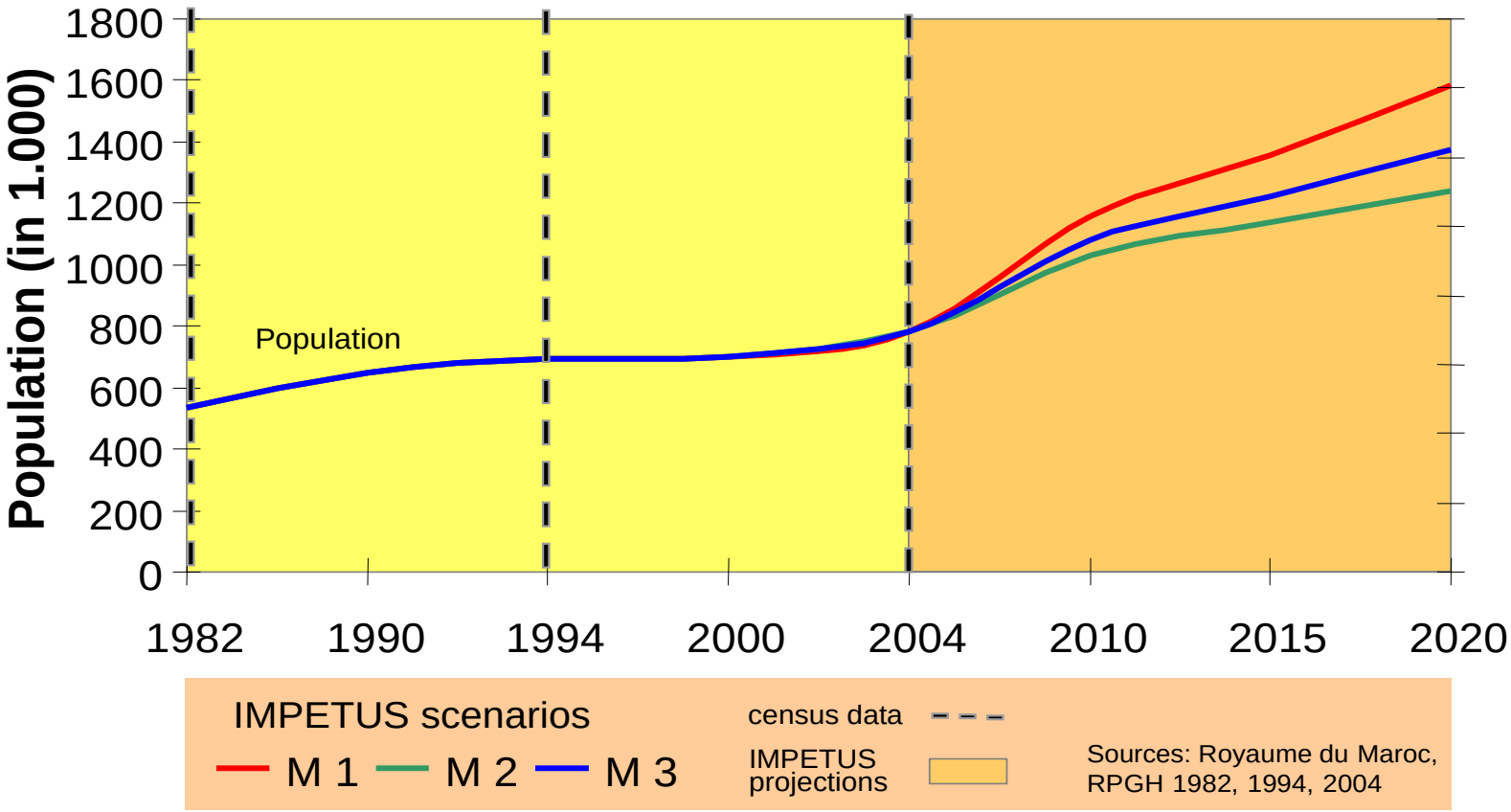
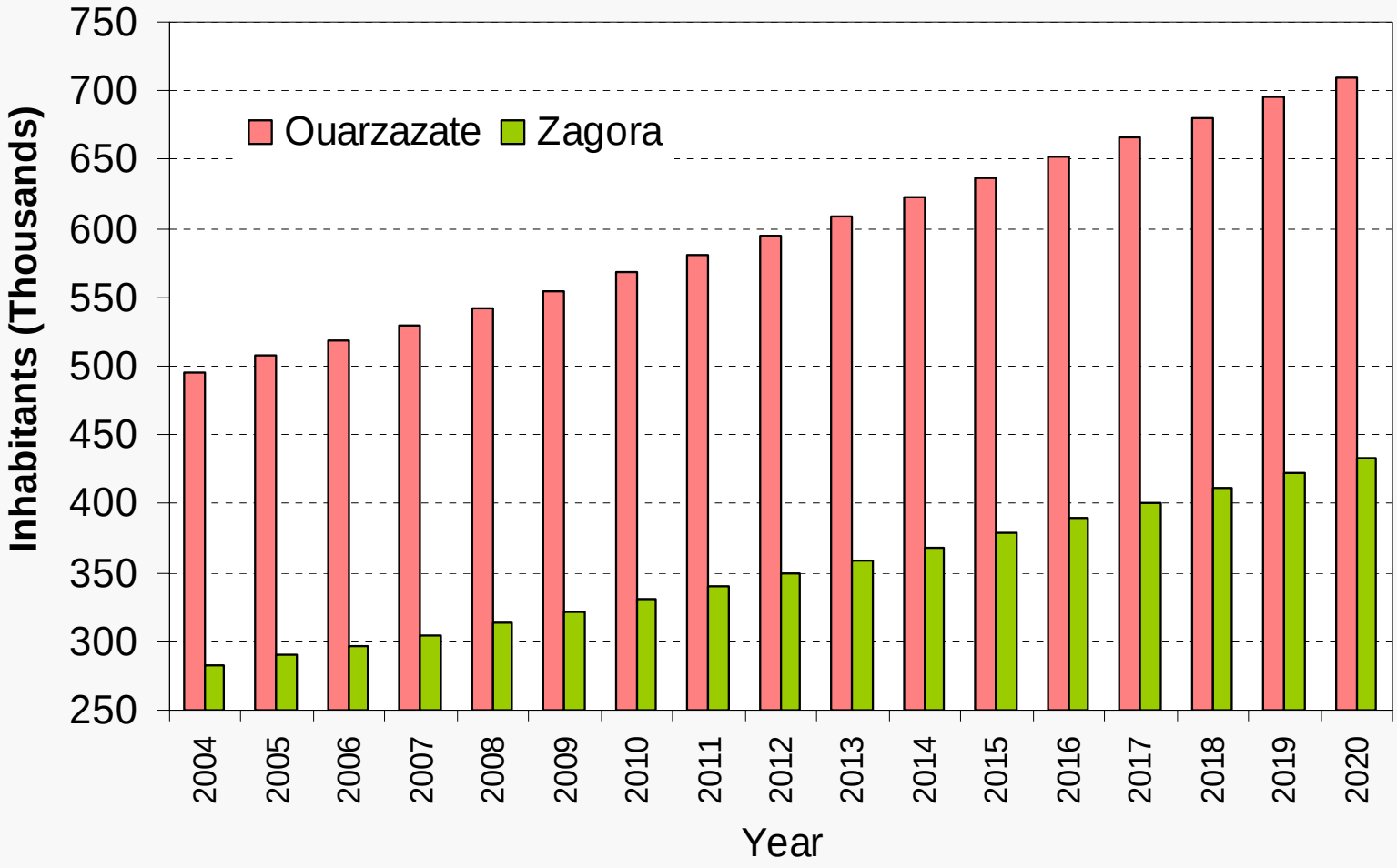
Population Projections Morocco



Population Developement in the Drâa Region



Population Projections Ouarzazate and Zagora



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- Management strategies are implemented
- *Water use increases*

M1:

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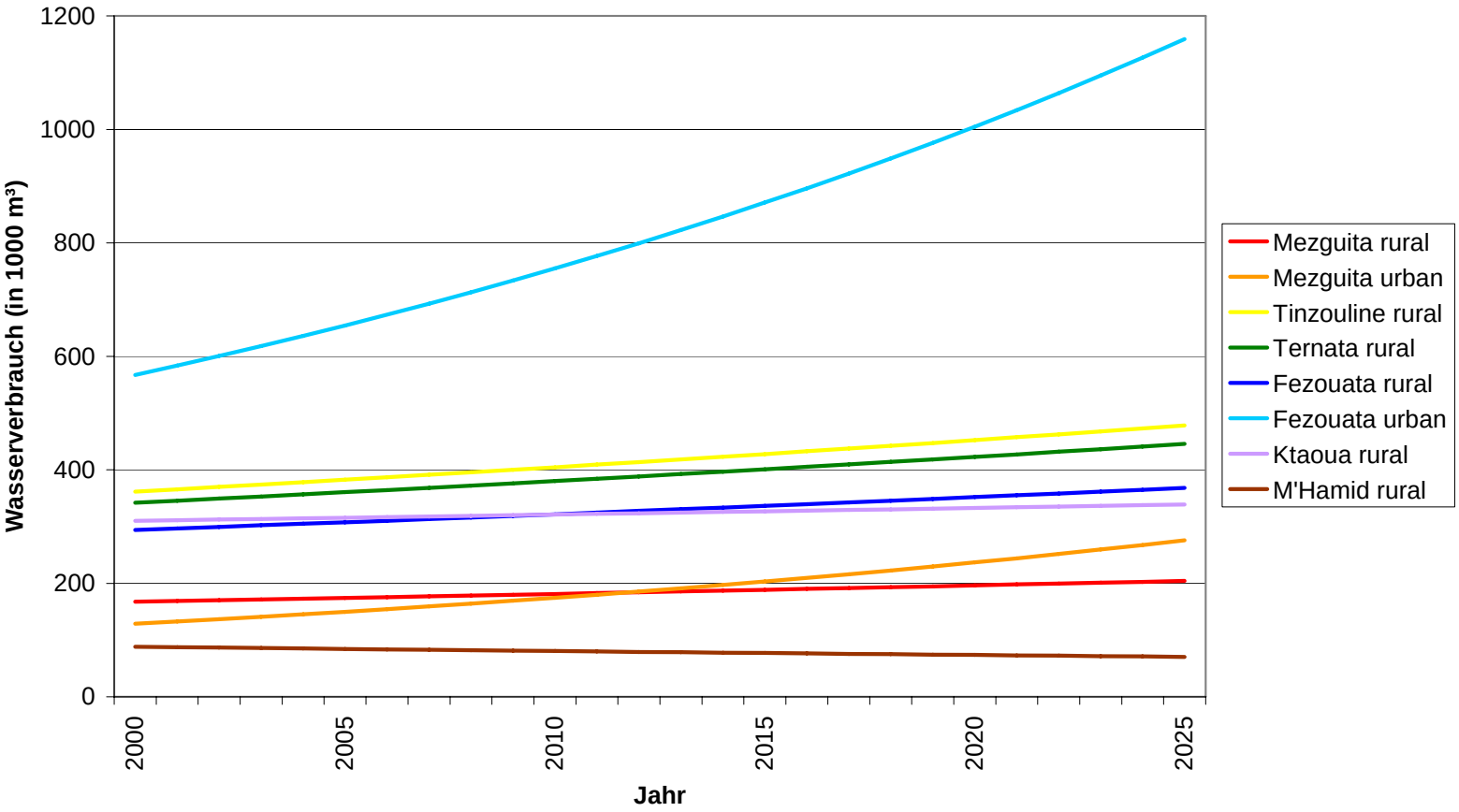
Simulated Annual Water Use in the Drâa Oasis 2000-2020



Environment and resources

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- Increase of energy costs
- Water scarcity sets limits to the expansion of agriculture

M2:

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Climate scenarios

Climate scenarios for Morocco

	Morocco		
	High Atlas	**Basin of Ouarzazate**	**Oasis of Zagora**
Scenario X (process oriented)	- snow line rises by 200 m - more intense but less frequent rainfall events - no trend in annual rainfall - more extreme rainfall events	- slightly increased rainfall amount due to enhanced moisture transport for a) tropical-extratropical interaction and b) pressure minima off the Moroc. coast	- slightly increased rainfall amount due to enhanced moisture transport for a) tropical-extratropical interaction and b) pressure minima off the Moroc. coast
Scenario Y (model oriented)	- snow line rise by 200 m - reduced rainfall due to decreasing number of lows from the north - reduced seasonality - strong warming in winter	- substantially reduced rainfall and seasonality - more intense but less frequent rain events from tropical-extratrop. interaction - strong warming in winter	- slightly reduced rainfall - more intense but less frequent rain events from tropical-extratrop. interaction - reduced seasonality - weak warming in winter
Scenario Z (business as usual)	- snow line rise by 200 m - ongoing tendency towards reduced rainfall in winter - still large interannual variability	-no change in the long-term mean rainfall amount - still tendency to dry or wet periods of several years (decadal variability)	-no change in the long-term mean rainfall amount - still tendency to dry or wet periods of several years (decadal variability)

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Morocco – High Atlas

Scenario Z – Business as usual

Scenario Y – model oriented

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Morocco – High Atlas

Scenario Z – Business as usual

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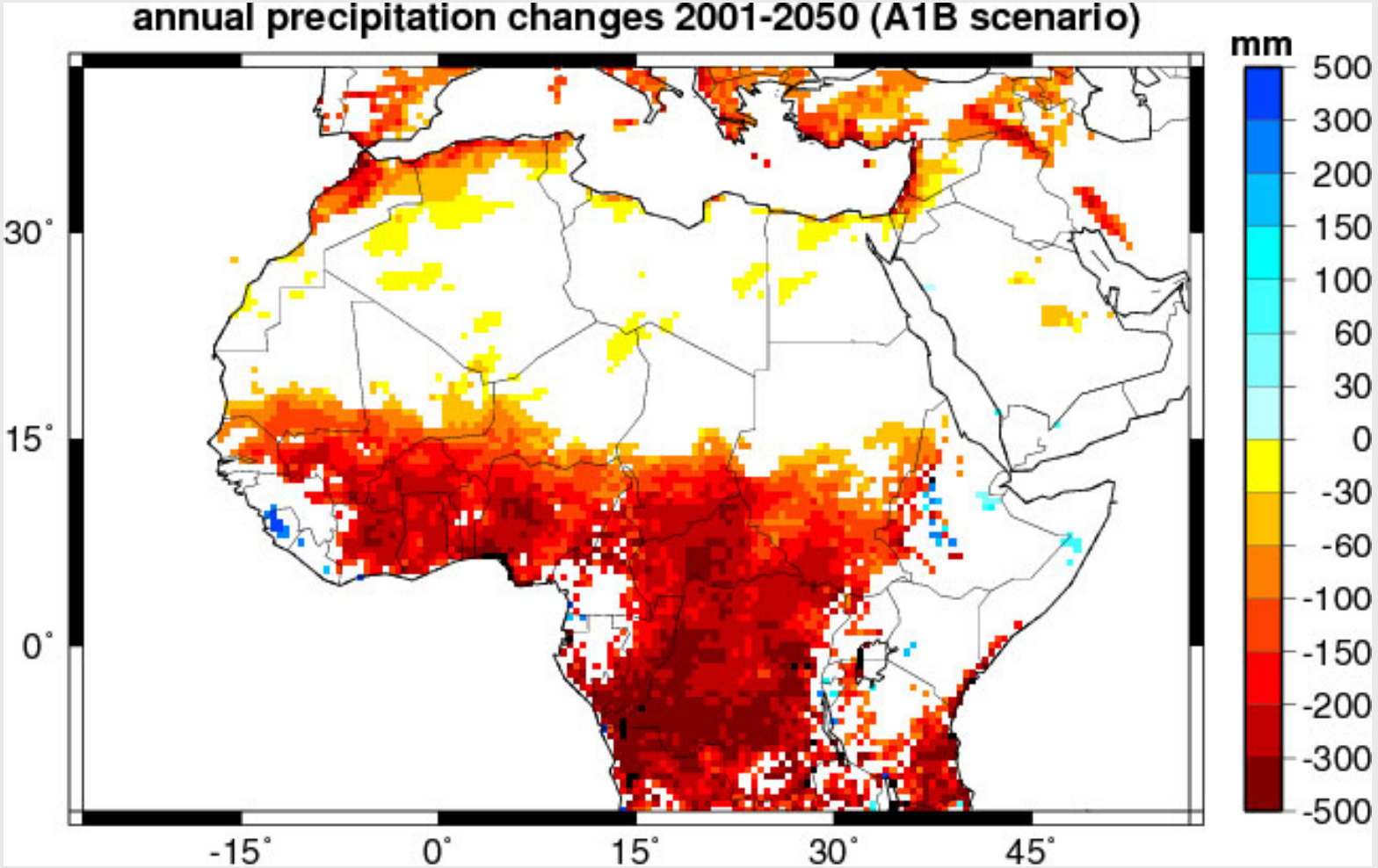
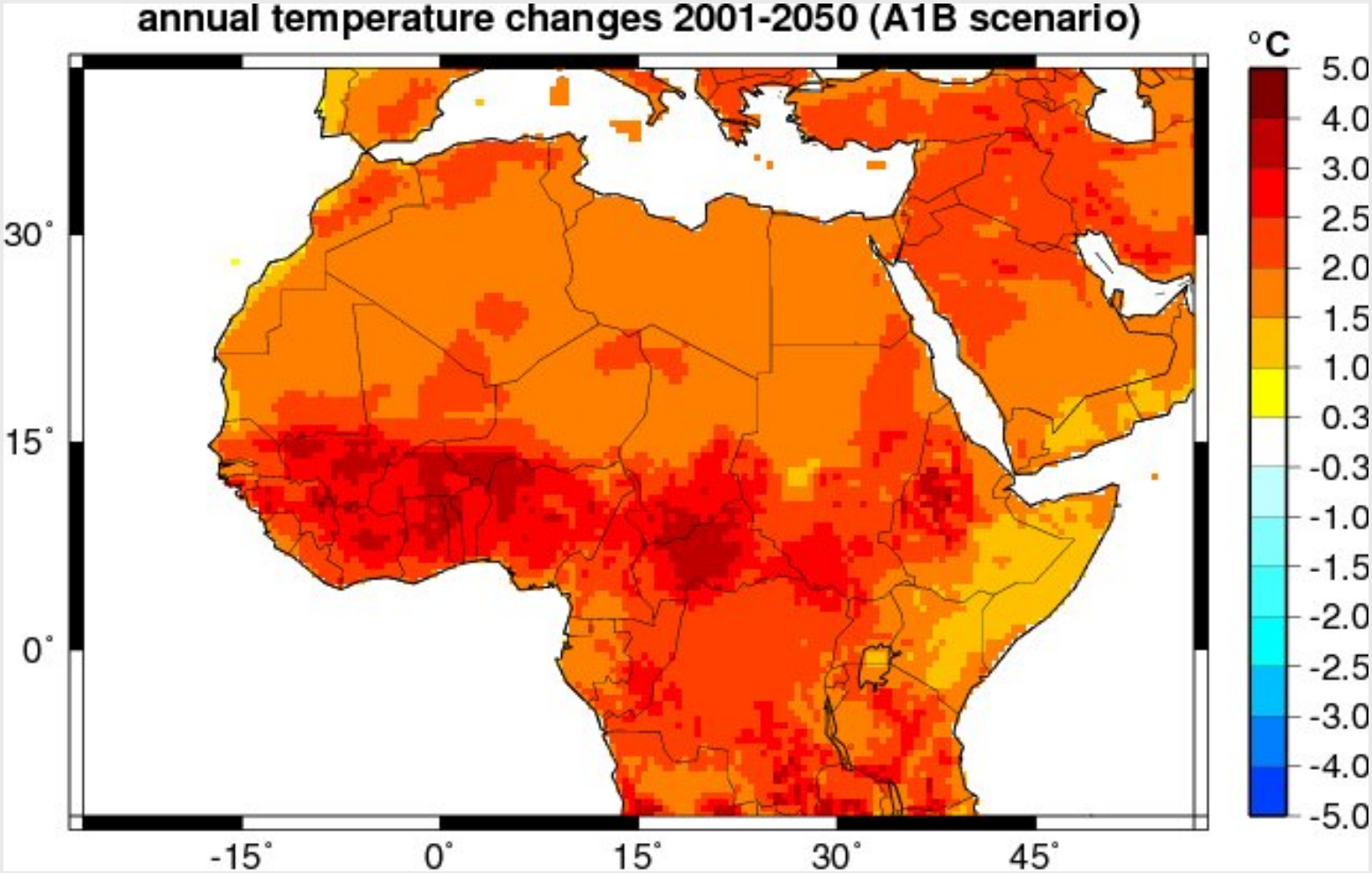
Reduced rainfall due to decreasing number of lows from the north



Strong warming in winter



Morocco – High Atlas

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Morocco – Basin of Ouarzazate

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Morocco – Basin of Ouarzazate

Scenario Z – Business as usual

Scenario Y – model oriented

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Morocco – Basin of Ouarzazate

Scenario Z – Business as usual

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Morocco – Oasis of Zagora

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Morocco – Oasis of Zagora

Scenario Z – Business as usual

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Morocco – Oasis of Zagora

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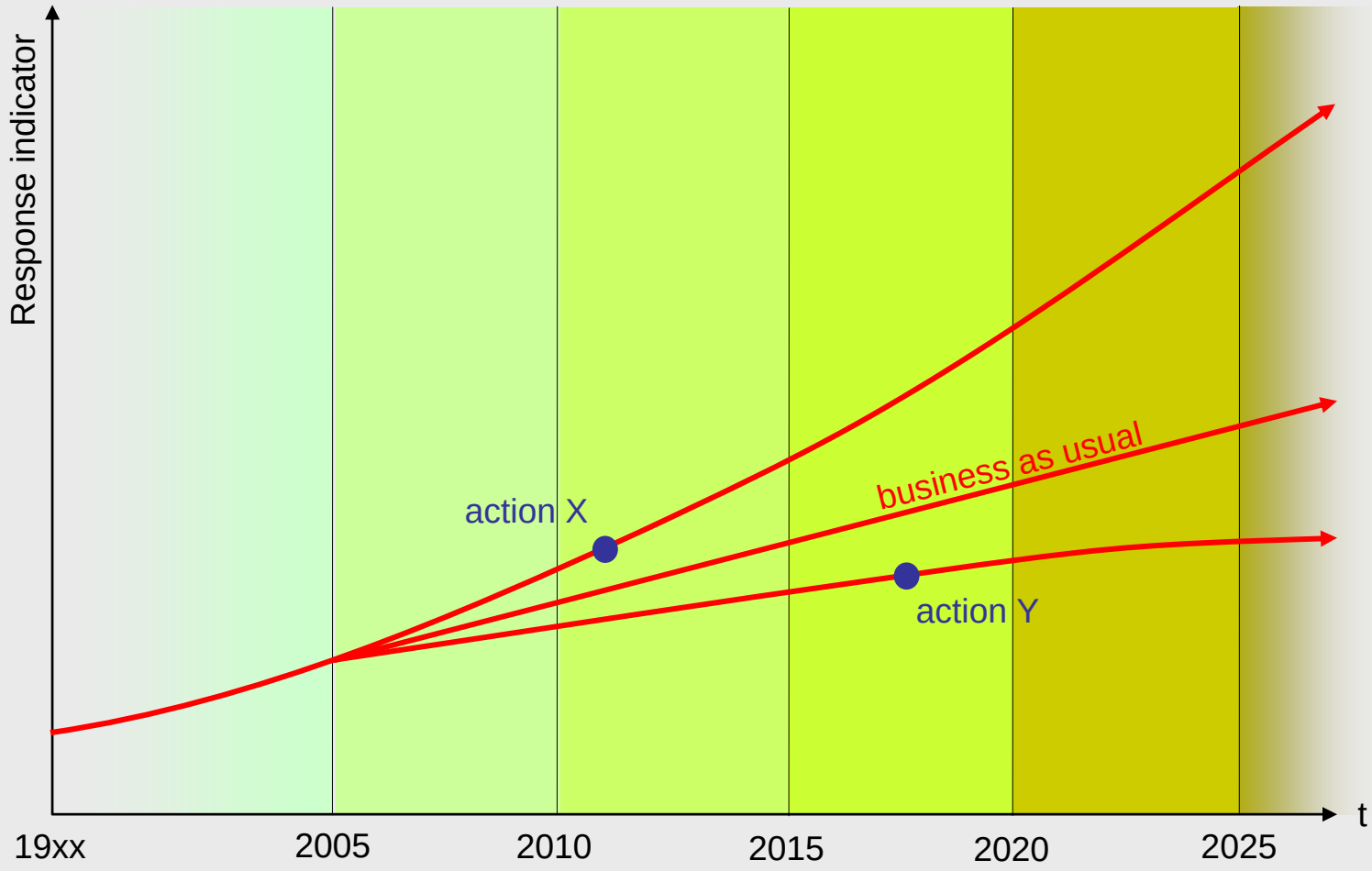
Response indicator
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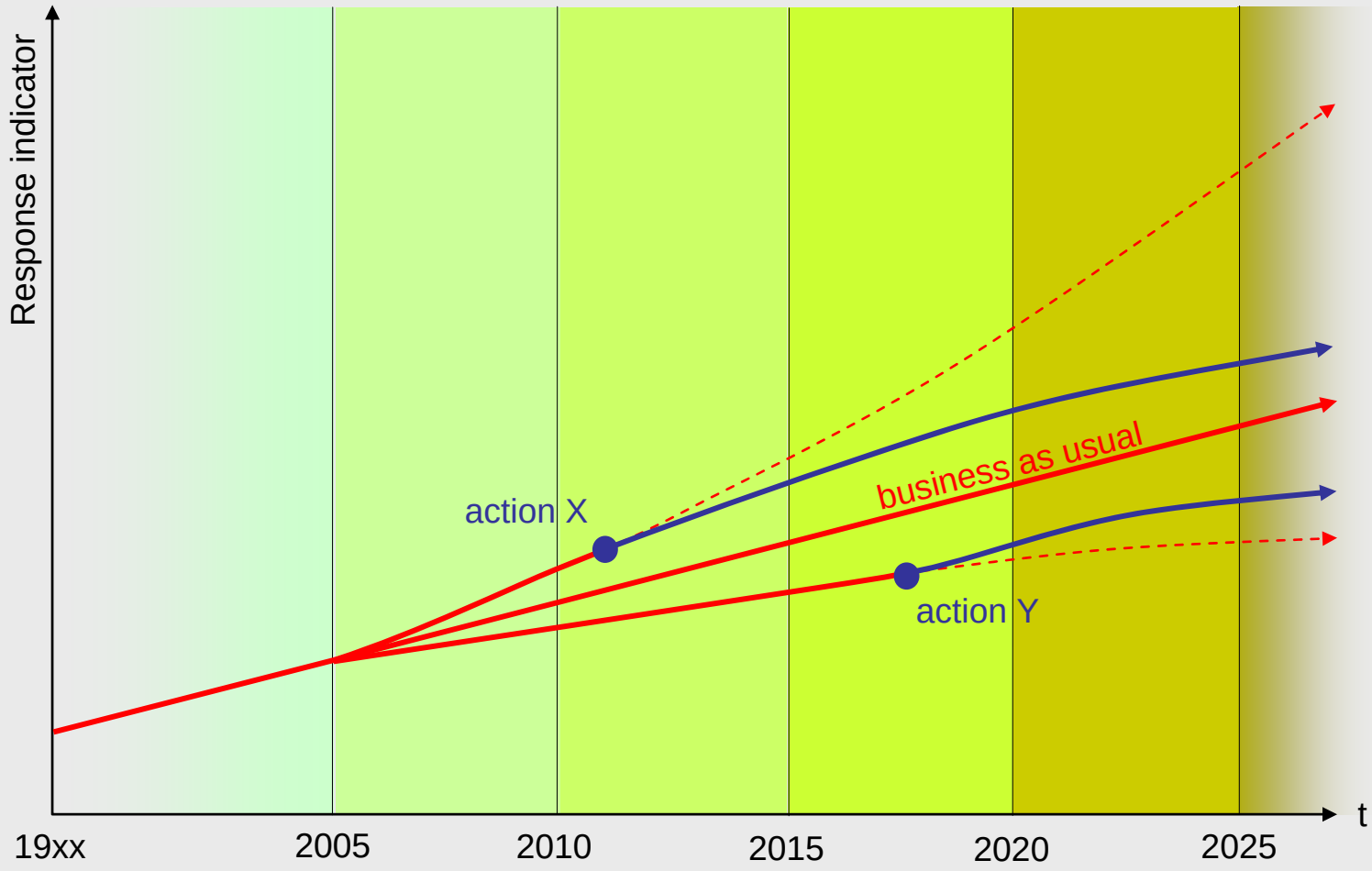
Scenarios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Thanks for your attention!