The Contribution of climate change to land degradation in Sauid Arabia

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The Kingdom of Saudi Arabia

- An arid country of 200 million he (80% of the Arabian Peninsula), with 2410 km of sea coasts,
- Estimated population: 26 million inhabitants
- Major oil and gas producer,
- Water scarcity,
- Reduced vegetal cover,

GCC countries

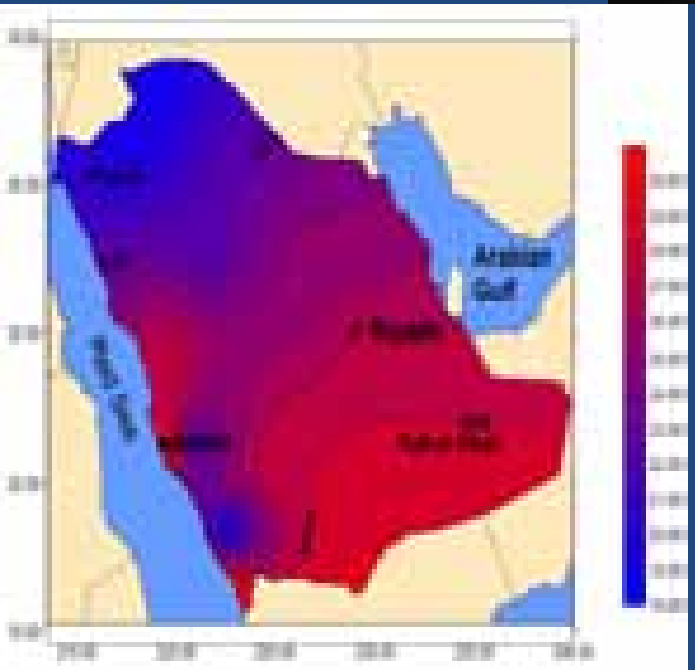
Residents rank among the highest per capita water users in the world

Average water consumption 300-750 liters/person/day (World Bank 2005)

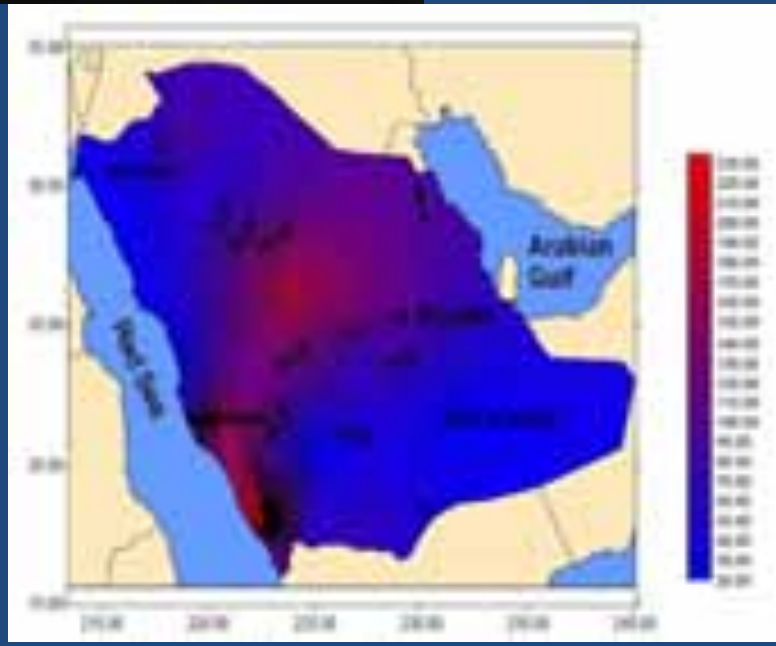
Agricultural water use increased from 73.5 billion m^3 in 1990 to more than 85 billion m^3 1998-2002 period (UNESCWA 2003)

Saudi Arabia: land and climate

- Different landforms



Climate gradient



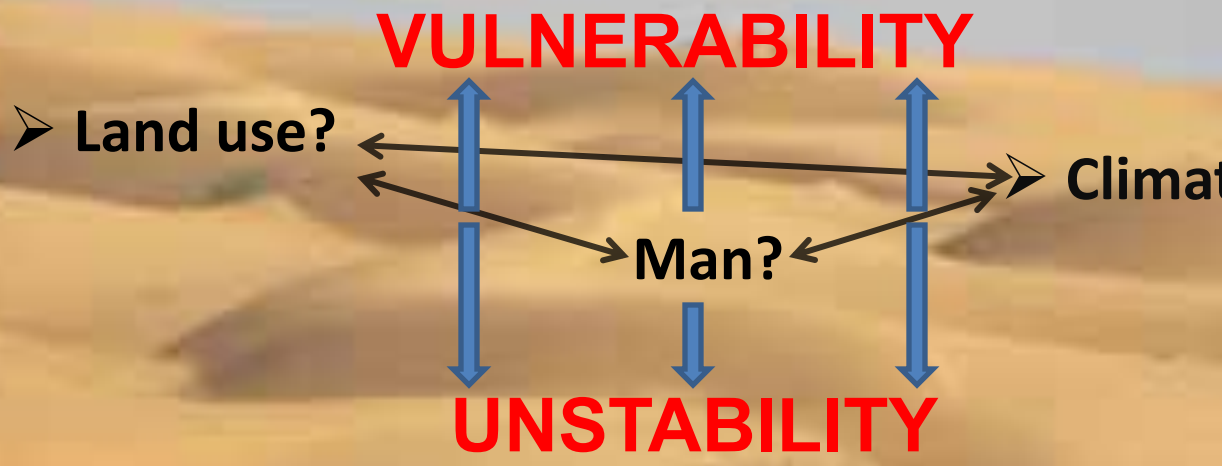
Saudi Arabia: land and climate

Average annual rainfall distribution

- Diverse overlapping habitats

History of impacts

- Driver of changes: which is the main one?



Awareness on climate change in KSA

- **Arab Forum for Environment & Development (2009):**
  - 98% surveyed individuals believed climate is changing,
  - 81% thought CC is a serious problem for the country,
  - 92% thought CC is due to human activities,
    - *36% thought that the Saudi Government was not acting sufficiently to address the problem,*
    - *44% thought the opposite,*
    - *20% did not have an opinion.*
- **Behavioral problem**

- **Impacts**
  - Land-use
  - Climate change

- **Impacts on Ecosystems**
  - Soil erosion
  - Biodiversity

- **Impacts on agricultural lands**
  - Deterioration of aquifers.
  - Soil salinization
  - Abandoning fields

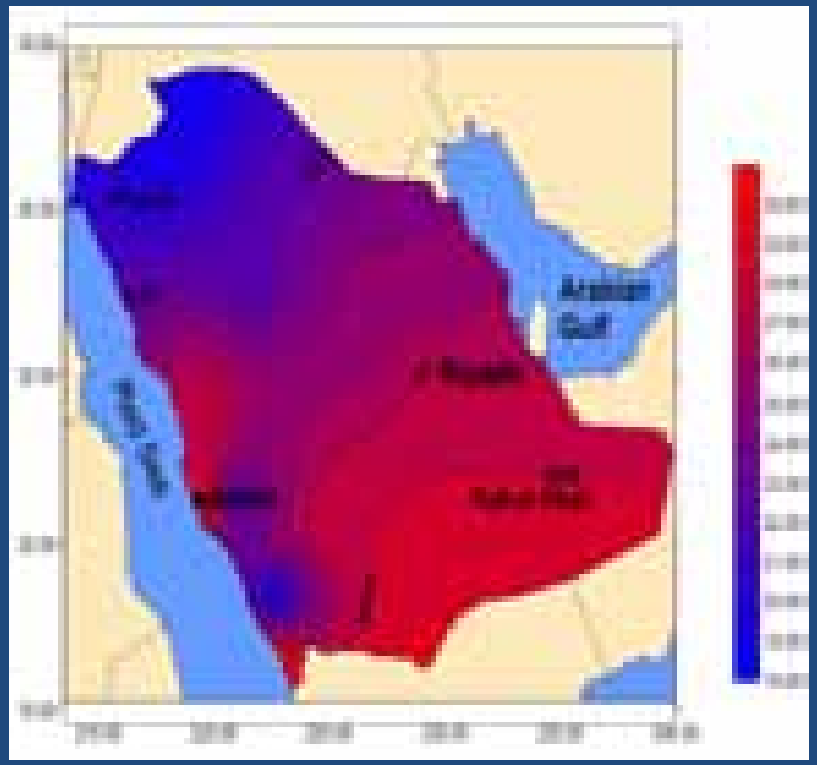
✓**Conclusions and perspectives**

History of impacts: land use

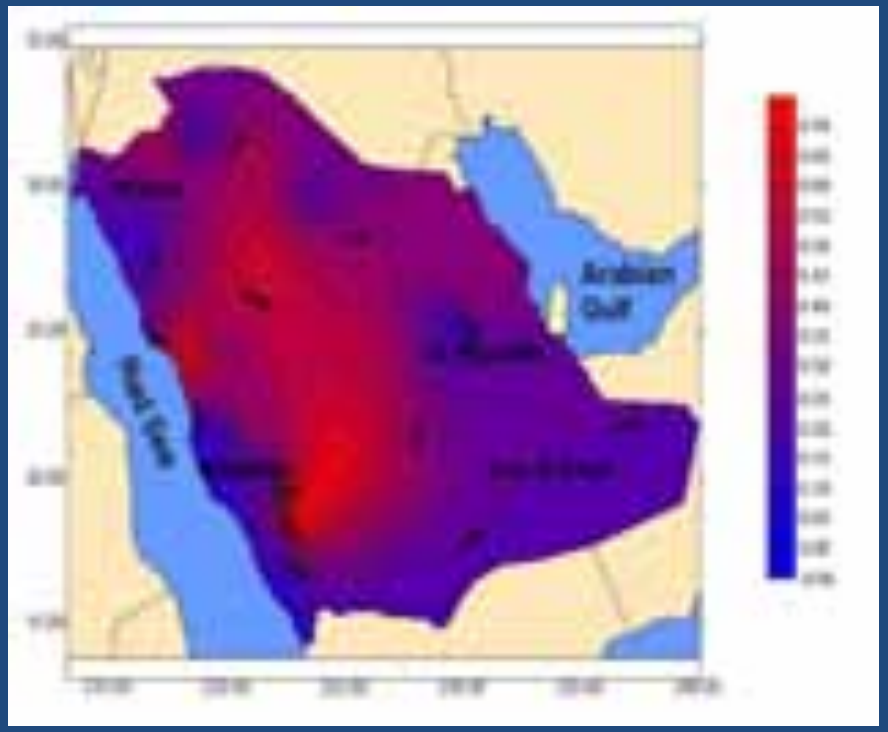
- **Population Change = Land Use Change = = = More Impact**

History of impacts: Climate change

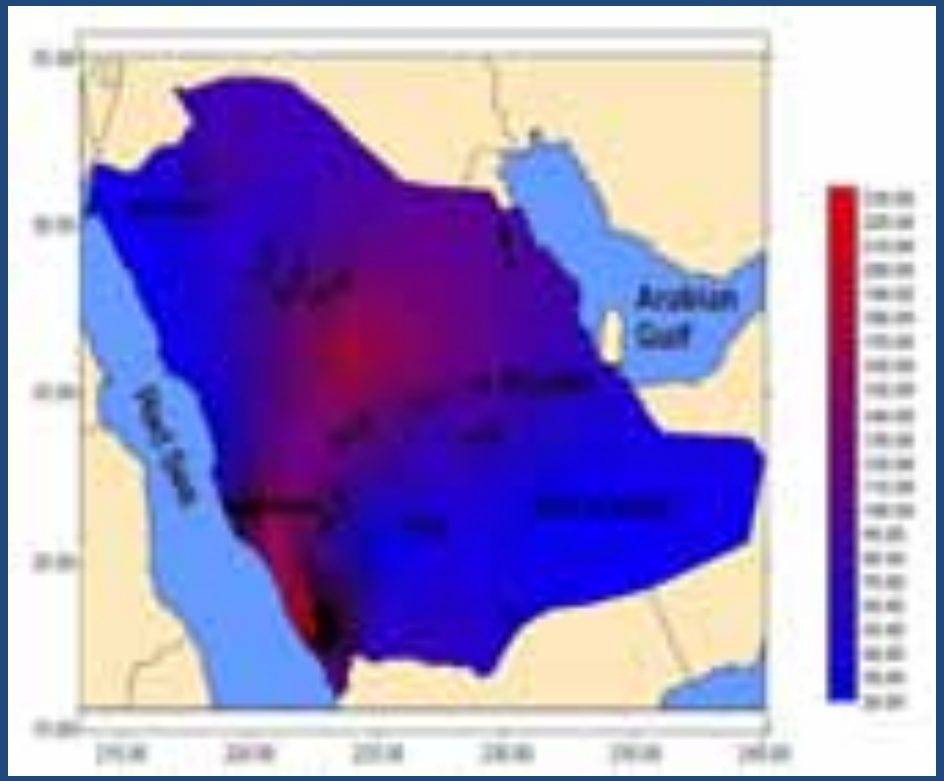
Temperature variations (1970-2003)



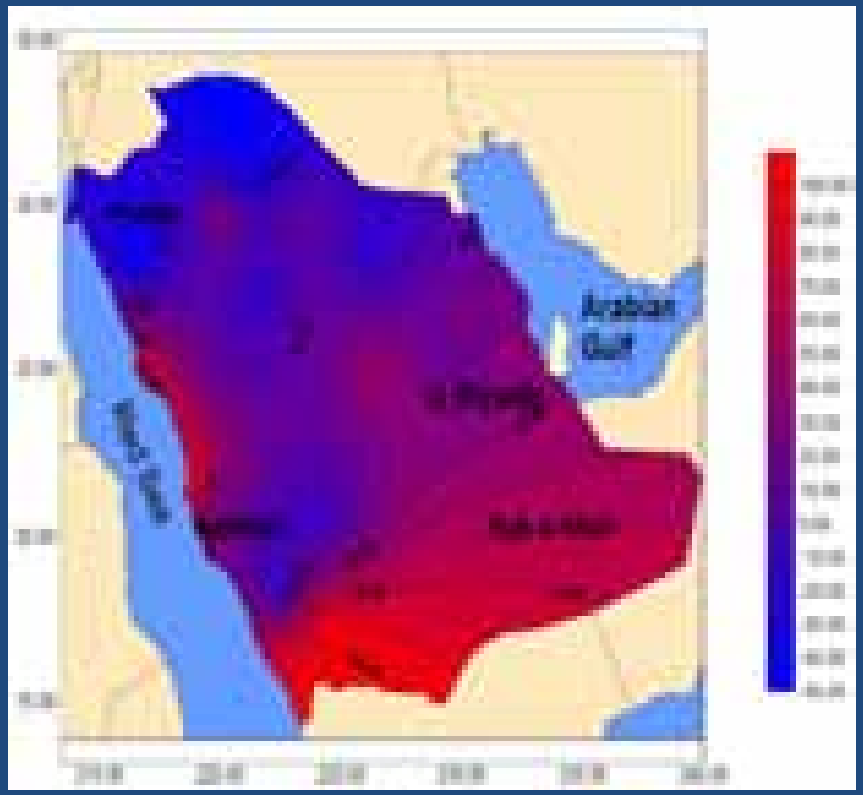
Change in Temperature (1991-2003)



Spatial variations in total ppt



Ppt trend change in percentage (1970-2003)

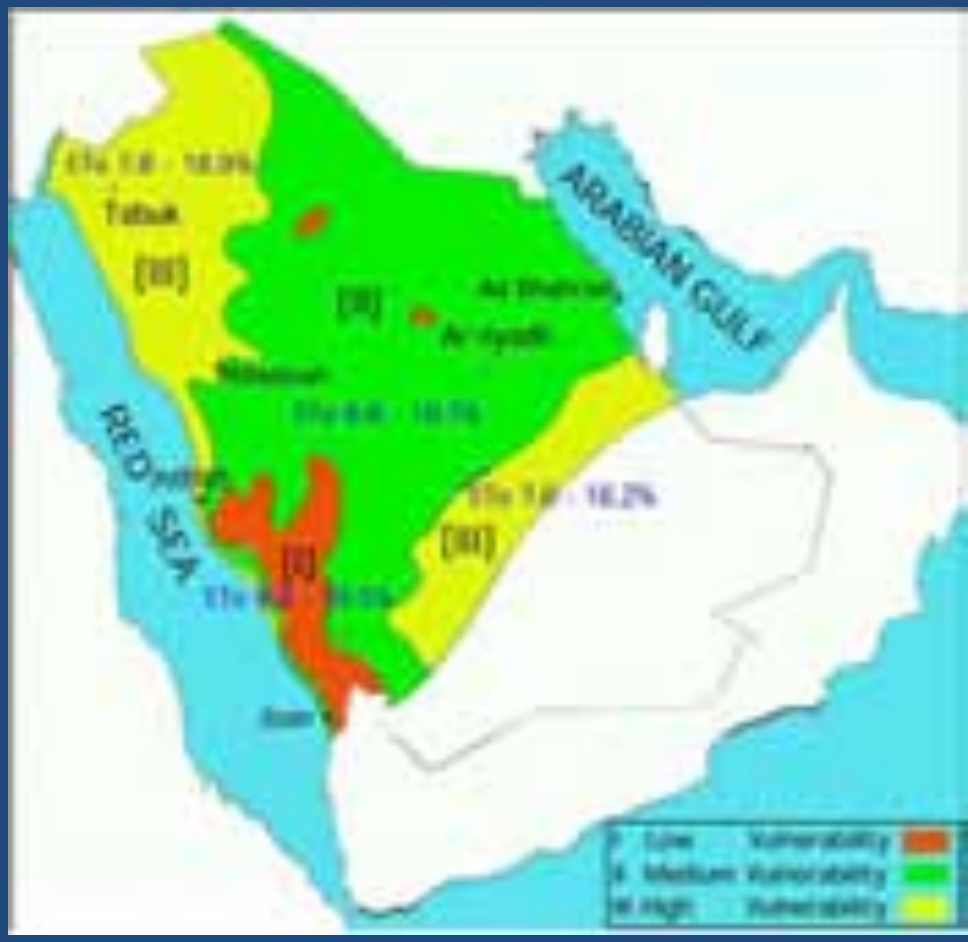


Impacts: Climate change

- **Increase in Temperature = Increase ET = More water requirements**

+ 1 ^{0}C = 1 – 4.5%

+ 5 ^{0}C = 6 – 19.5%



Impacts on Natural Ecosystems

Increased frequency & intensity of extreme climate-related disasters

(IIPCC 2007, Munich Re Group 2006)

likely will
trigger substantial changes in
the structure and functioning of
ecosystems

Impacts on agricultural lands

- Salinization

- Deterioration of aquifers

- Dryness

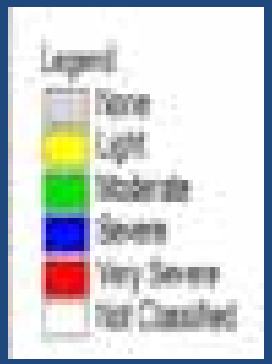
Impacts on agricultural lands

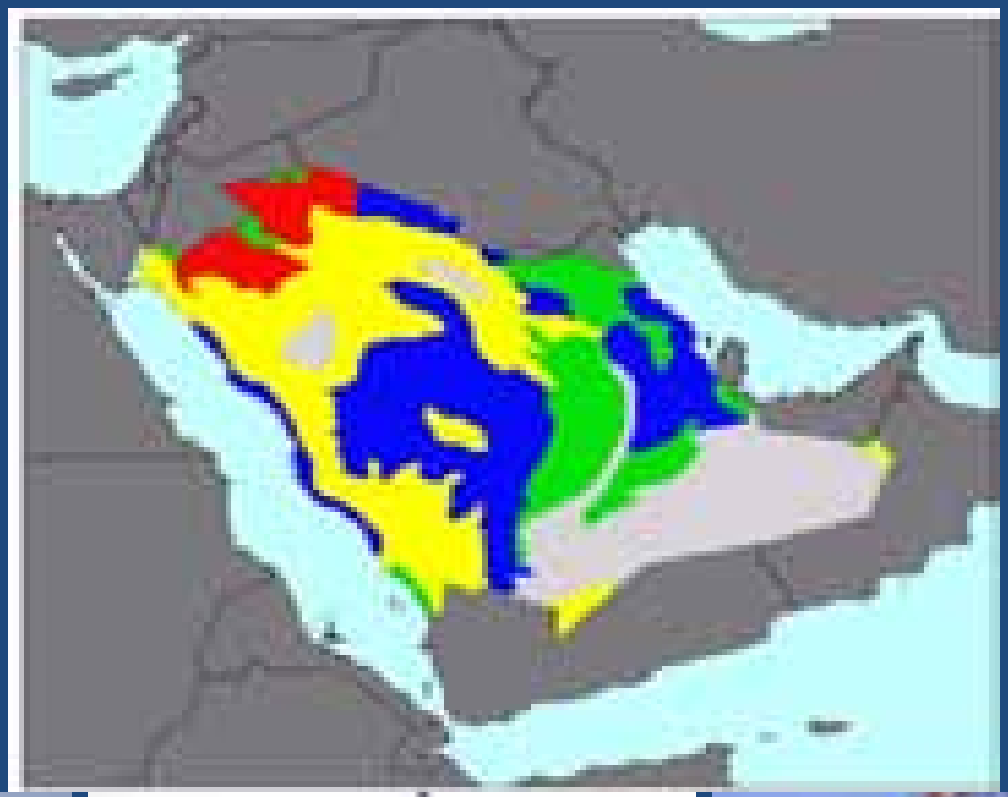
- Soil salinity

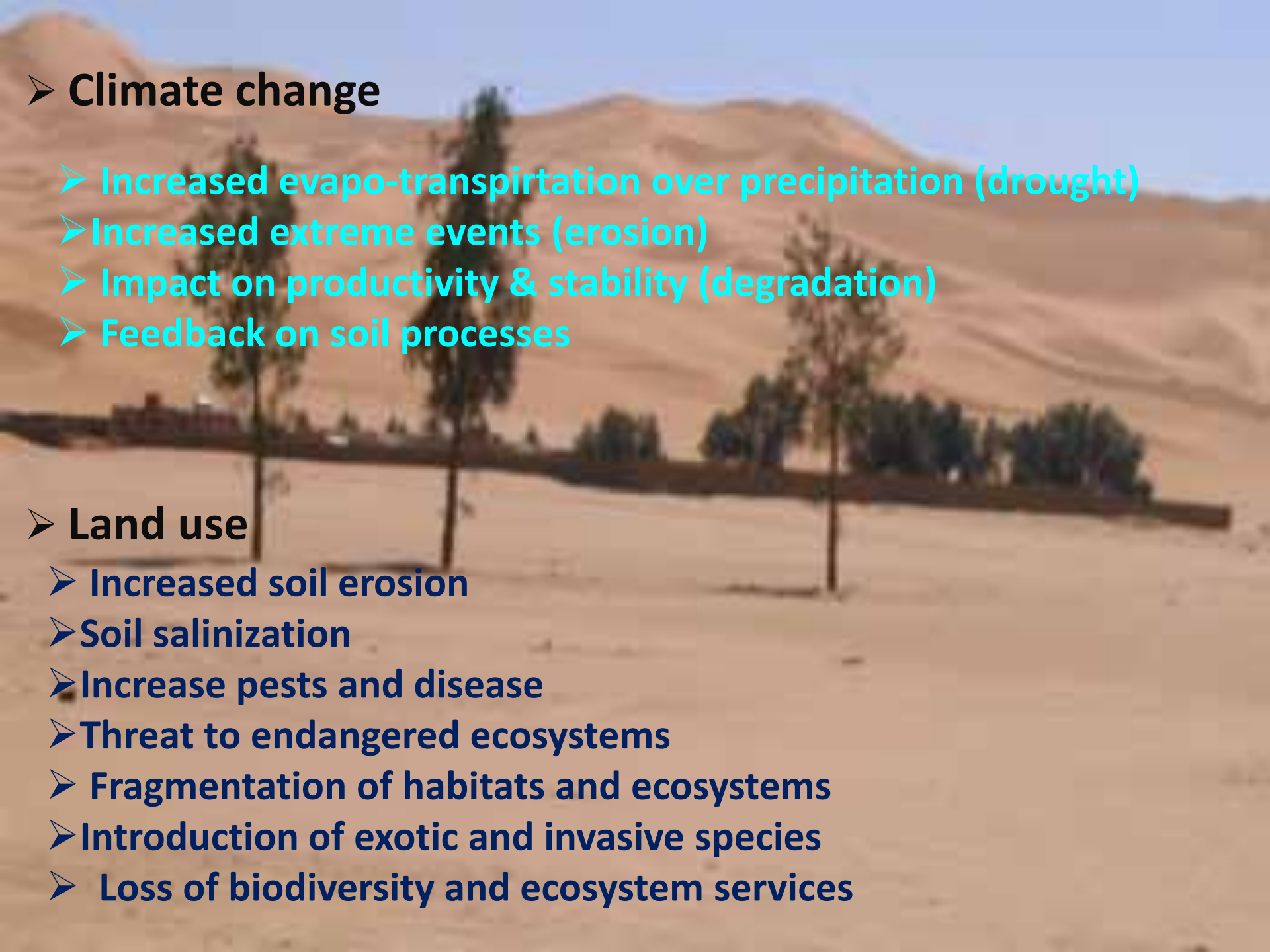
- Soil erosion

- Abandoned fields

Land degradation







- **Climate change**
  - Increased evapo-transpirtation over precipitation (drought)
  - Increased extreme events (erosion)
  - Impact on productivity & stability (degradation)
  - Feedback on soil processes
- **Land use**
  - Increased soil erosion
  - Soil salinization
  - Increase pests and disease
  - Threat to endangered ecosystems
  - Fragmentation of habitats and ecosystems
  - Introduction of exotic and invasive species
  - Loss of biodiversity and ecosystem services

Forests, rangelands, biodiversity

- Anticipated negative impact of CC on range and forest lands over the next 50-100 years include:
  - ⇨ increase in the frequency and changes in the patterns of natural disturbances (drought, storms, diseases),
  - ⇨ change in species composition and a decrease in biodiversity,
  - ⇨ drop in productivity (fodder, meat, honey…).
  - ⇨ Increase in desertification,
  - ⇨ Increase of rural exodus.


What can be done?

Forest and range activities

- KSA adopted strategies and regulations (NFS-AP, NAP-UNCCD, NRS-AP, Forest &Range law…)
- Juniper ecosystem rehabilitation and green belts activities,
- Mangrove rehabilitation by Government agencies and PS.
- Range rehabilitation activities hindered by the common land tenure, (Al Jouf Center; Seed multiplication centers).
- 15 protected areas covering about 5% of the land area and conserving about 43% of the country's flora,
- A regional drought monitoring and early warning centre (PME).

What can we do?

➢Sustainable management and protection

- ✓15 protected areas (5% country)
- ✓Conservation of woodlands
- ✓ Enhancing rangeland production
- ✓ Introducing integrated watershed management jointly with communities.
- ✓ to improve drought resilience
- ✓ to combat land degradation
- ✓ Restoration treatments

What can we do?

- Al Ghada (*Haloxylon persicum*) Nature Reserve

Enhancing knowledge and capacity of local community for sustainable management of natural resources

Alghada Festival Every Year

Funding opportunities

- The total KSA 9th development plan budget (2010-2014) is 1,444 billion SR (385 billion US$), of which 26.5 is allocated to the Ministry of Agriculture (6.6%).
- In 2007 KSA reserved US$300 million + PS funds to support cleaner and efficient oil technologies & promote CCS and transfer of environmentally friendly technologies.
- Public & private sectors invest in water resource assessment, development and management.
- In 2009, 3 billion SR ($800 million), to support investment by Saudi PS in agricultural projects abroad.