Modelling the vulnerability of goat production in the Mediterranean region

Olivia F. Godber & Richard Wall

olivia.godber@bristol.ac.uk

University of BRISTOL

BBSRC bioscience for the future

SWBio DTP

Background and aims

- In marginal areas food derived from livestock is a necessity
- Goat physiology is well adapted to the marginal environments found in the Mediterranean region
- Goats support human nutrition and food security, providing both meat and dairy products
- Goats also contribute to financial security

Aim:

- To compare the vulnerability of goat production systems and their contribution to food security in the Mediterranean region

Vulnerability analysis

Vulnerability analysis

- Useful in coupled human-environment systems
- Can be used to aid policy, decision-making and the targeting of interventions

- **Sensitivity**
  - The dependence on a specific factor and its importance to a sector

- **Exposure**
  - The extent to which a system will be influenced by any specific change

- **Adaptive capacity**
  - The ability of a system to undertake mitigating adaptation

Methods: Selection of indicators

Global Change Biology

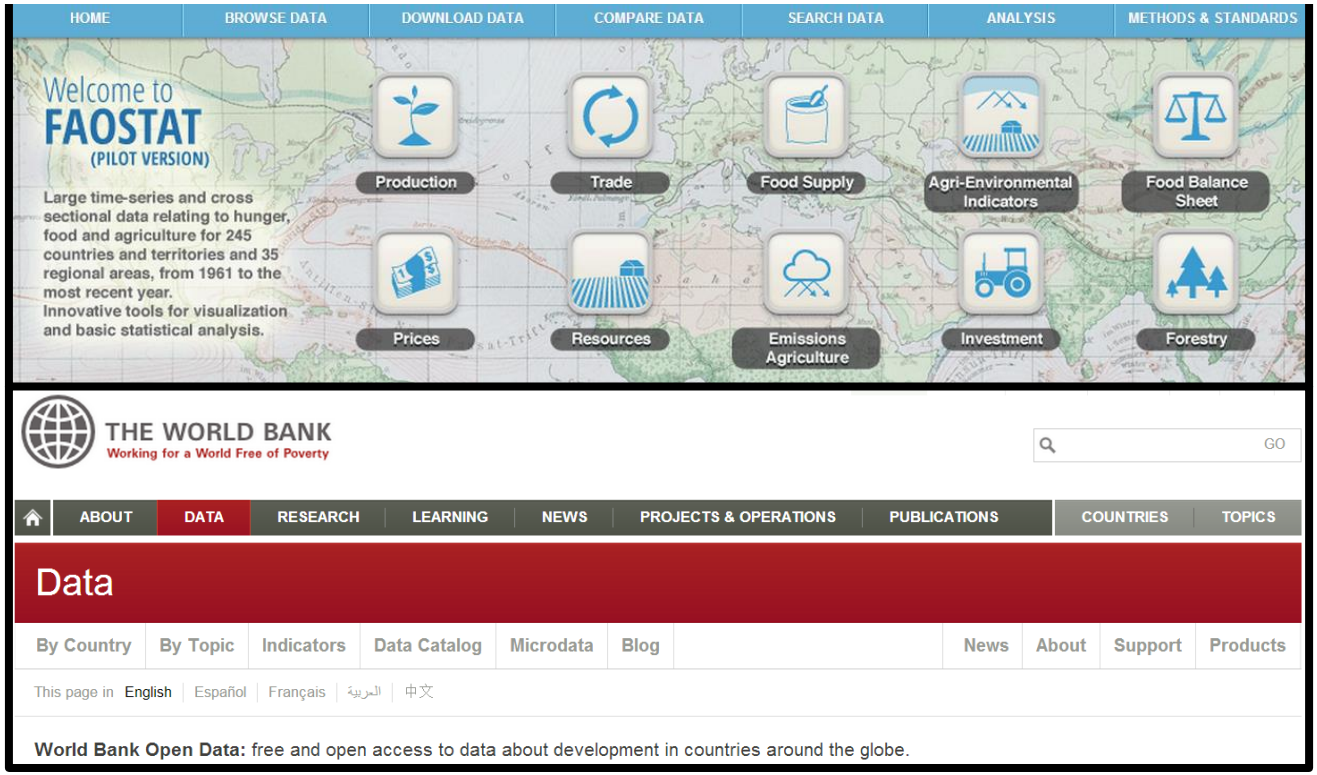
celebrating 20 years

Global Change Biology (2014), doi: 10.1111/gcb.12589

Livestock and food security: vulnerability to population growth and climate change

OLIVIA F. GODBER and RICHARD WALL

Veterinary Parasitology and Ecology Group, University of Bristol, Bristol Life Sciences Building, Bristol BS8 1TQ, UK



Methods: Modelling vulnerability

V = S + E - AC

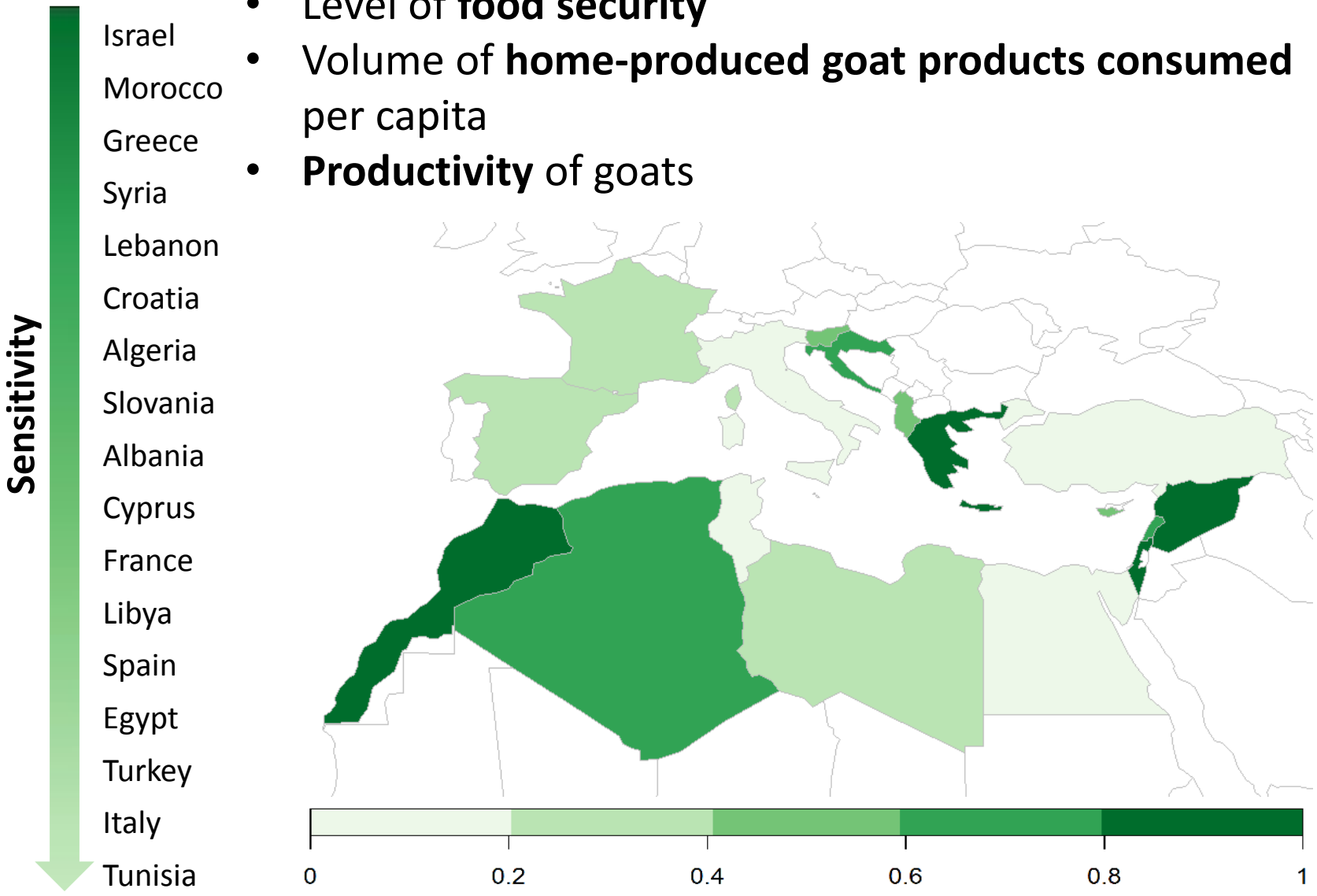
Vulnerability
(scaled 0 – 1)

- **Sensitivity**
  - Food insecurity
  - Goat productivity
  - Nutritional contribution
- **Exposure**
  - Change in level of precipitation
  - Change in temperature
  - Extreme weather events
  - Population growth
  - Disease risk

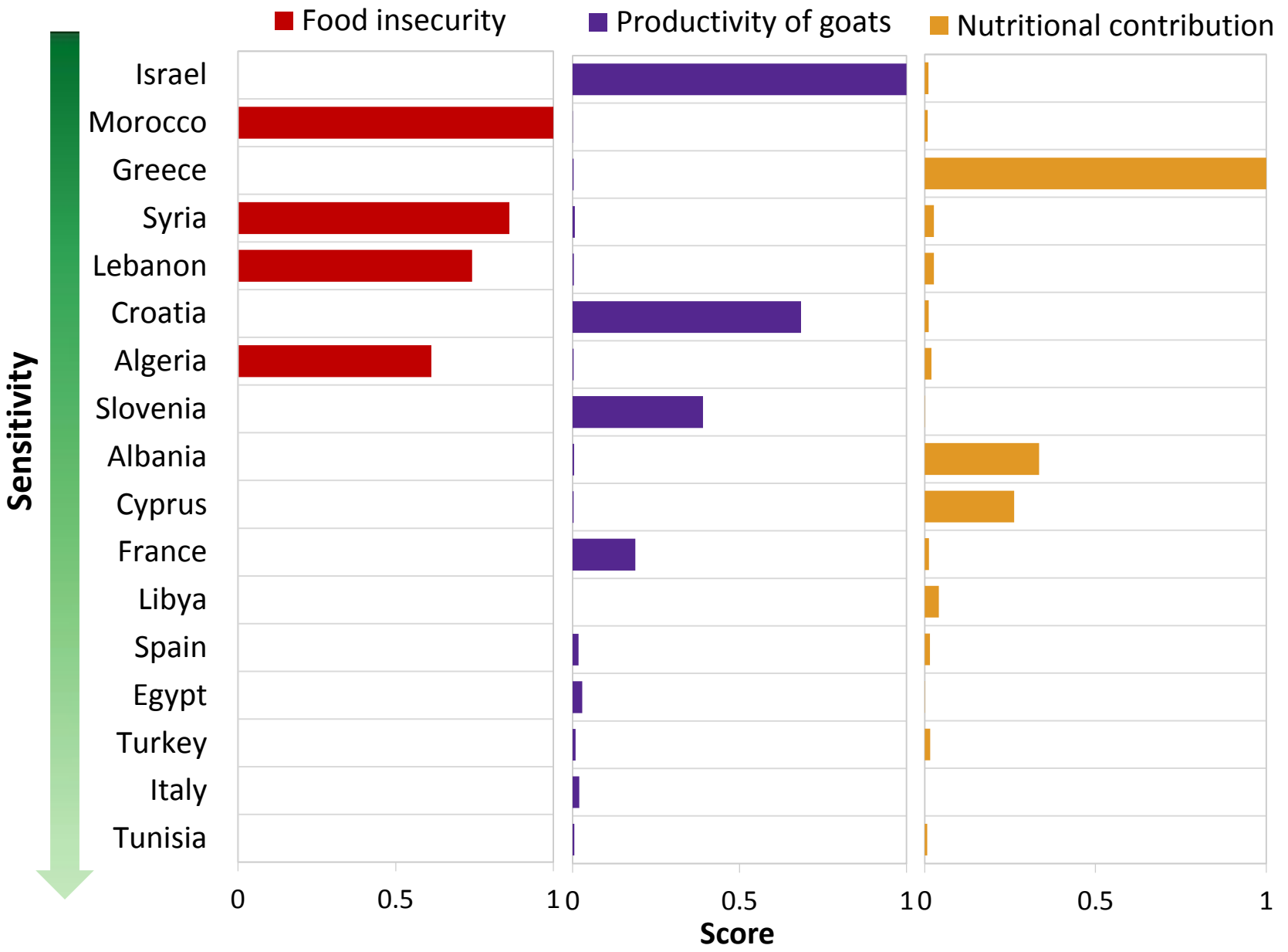
  Climate change
- **Adaptive capacity**
  - Health
  - Economy
  - Governance

Results: Sensitivity

- Level of **food security**
- Volume of **home-produced goat products consumed** per capita
- **Productivity** of goats

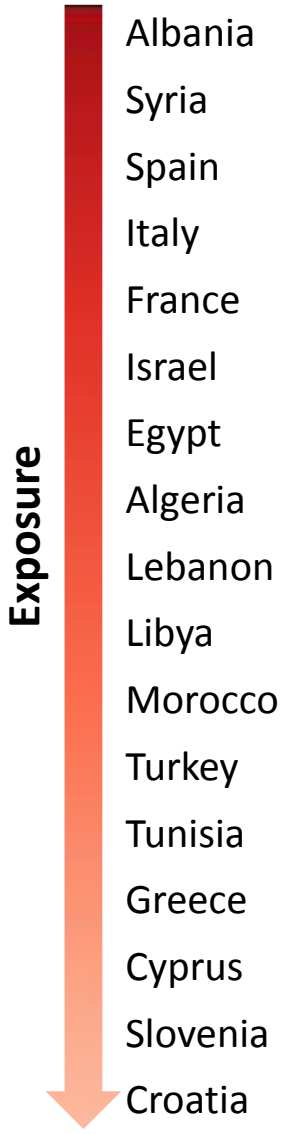


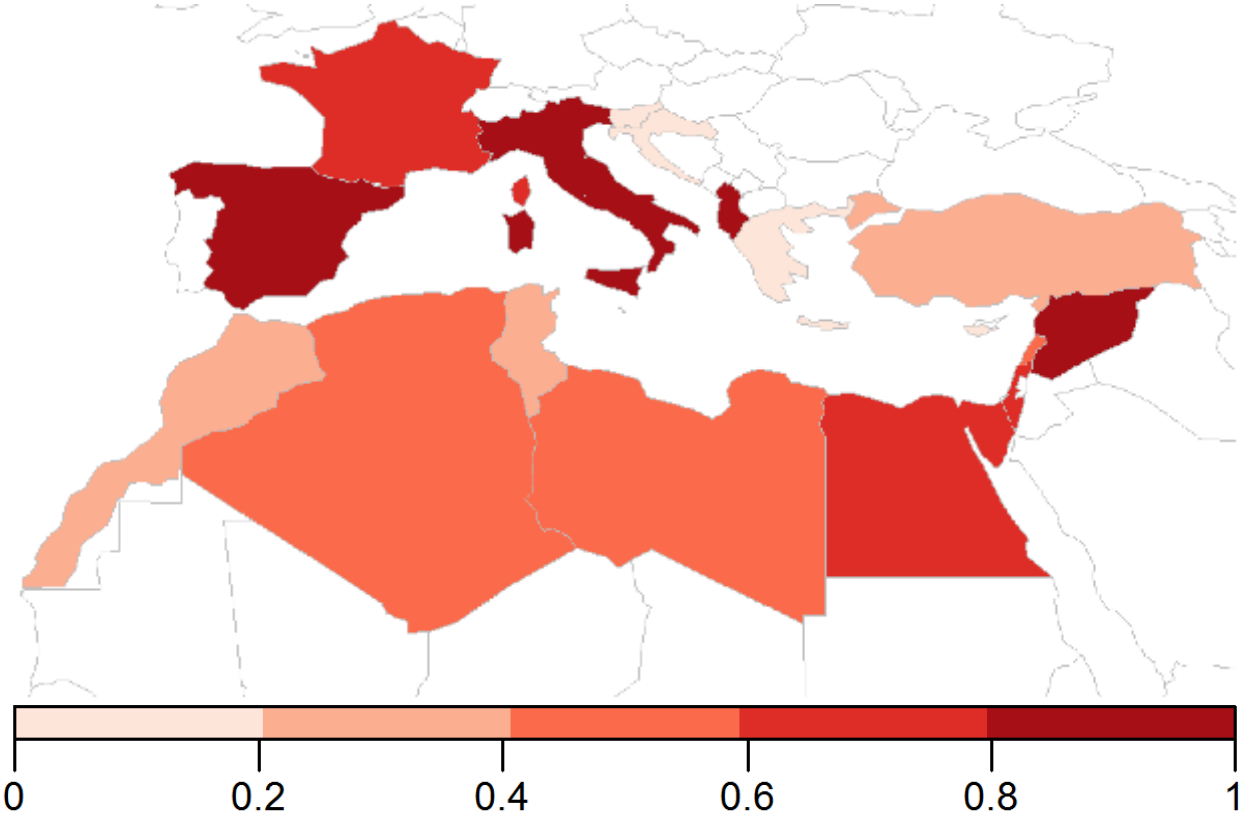
Results: Sensitivity



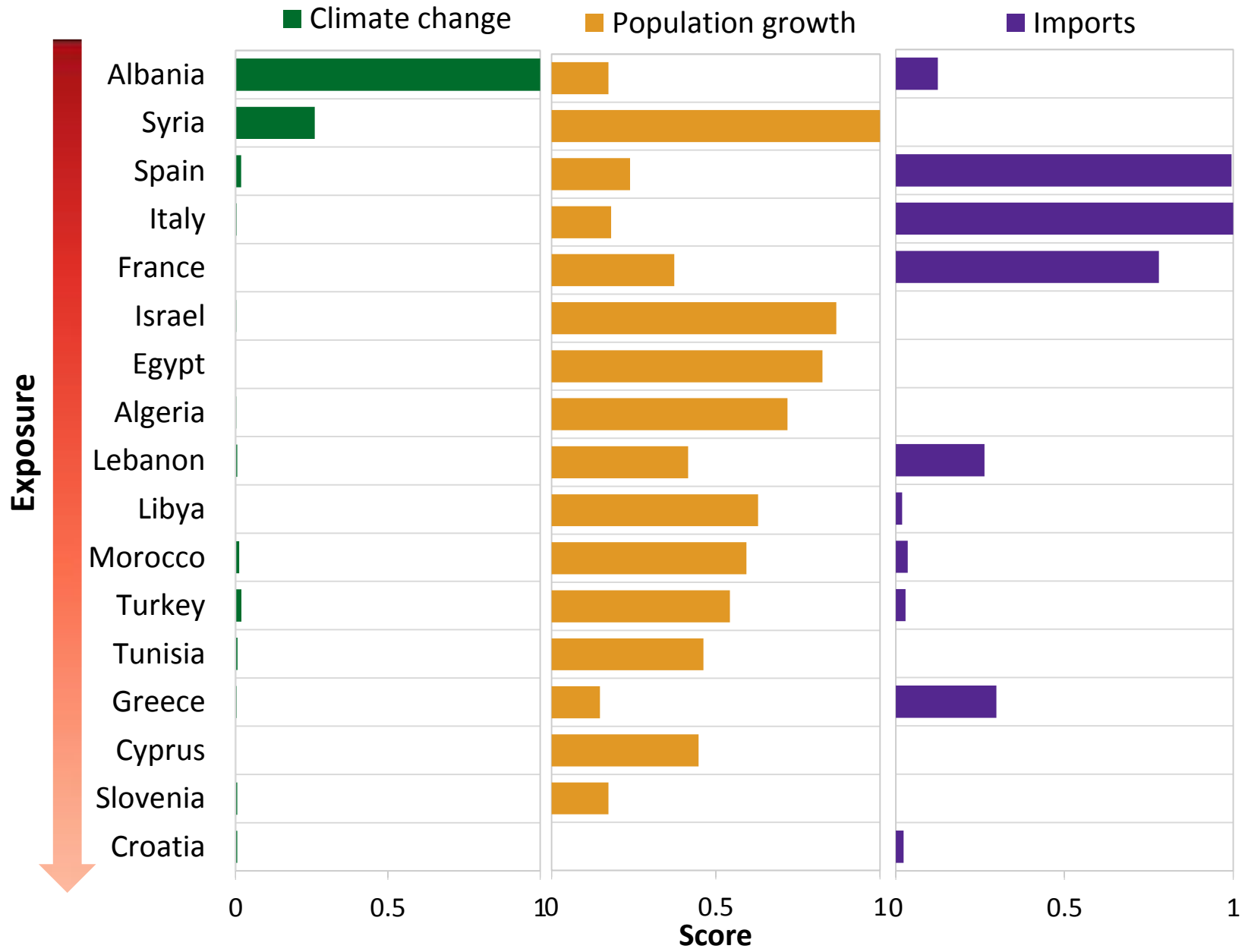
Results: Exposure

- Impact of projected changes in **climate**
- Current percentage of the population affected by **drought, flooding and extreme weather**
- Projected **population growth** of nations
- Risk of importing **novel goat disease**





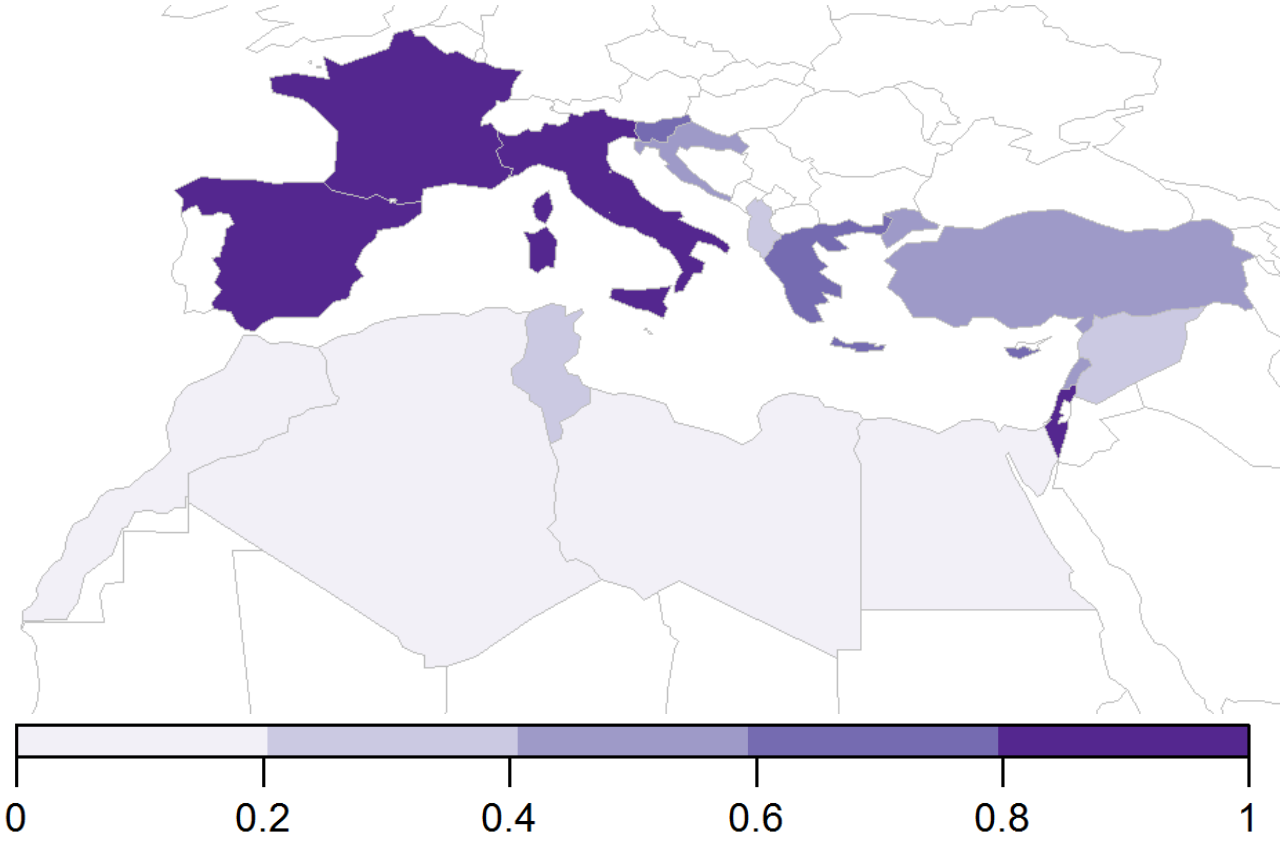
Results: Exposure



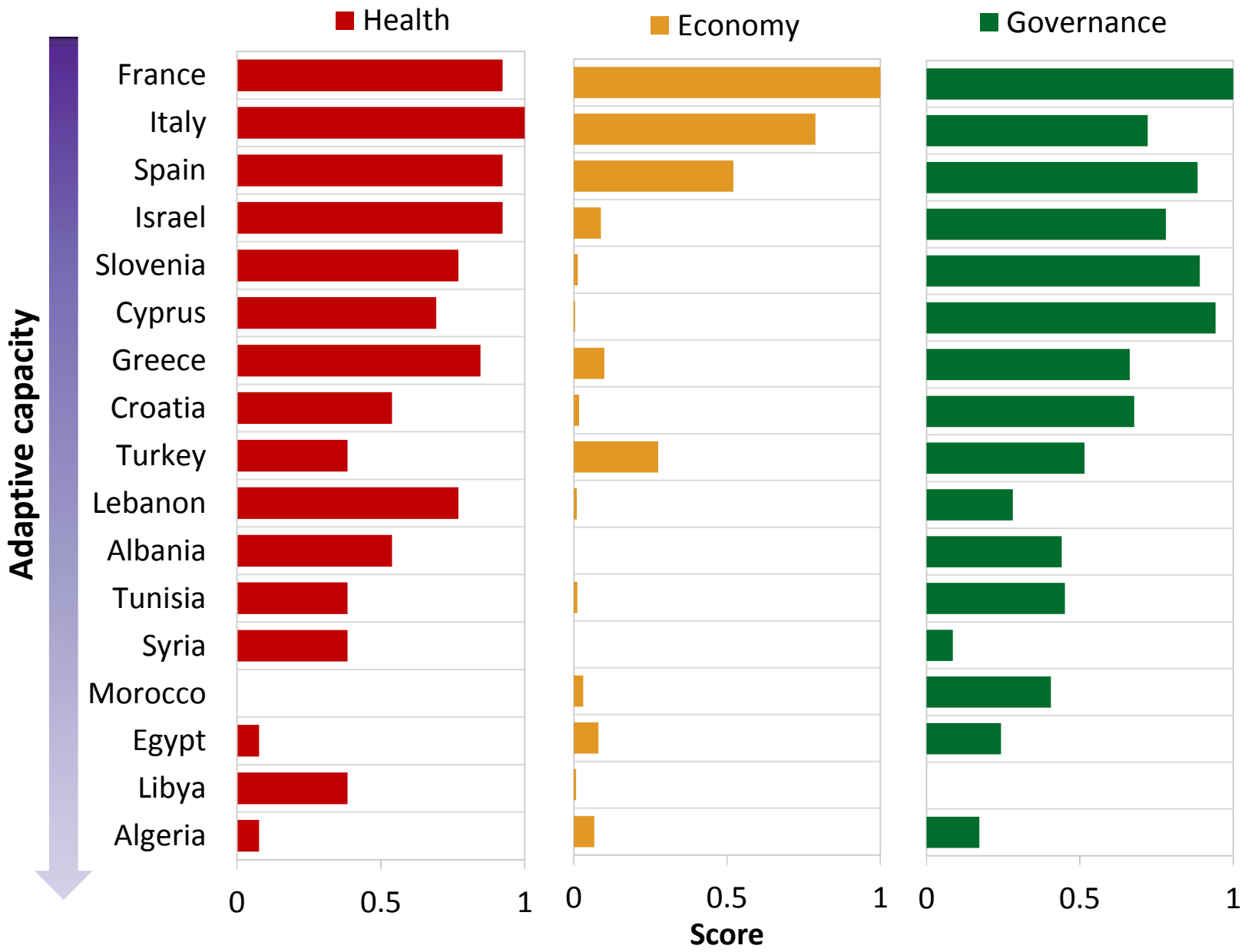
Results: Adaptive Capacity

France
Italy
Spain
Israel
Slovenia
Cyprus
Greece
Croatia
Turkey
Lebanon
Albania
Tunisia
Syria
Morocco
Egypt
Libya
Algeria

- **Health** (life expectancy)
- **Economy** (GDP)
- **Governance**

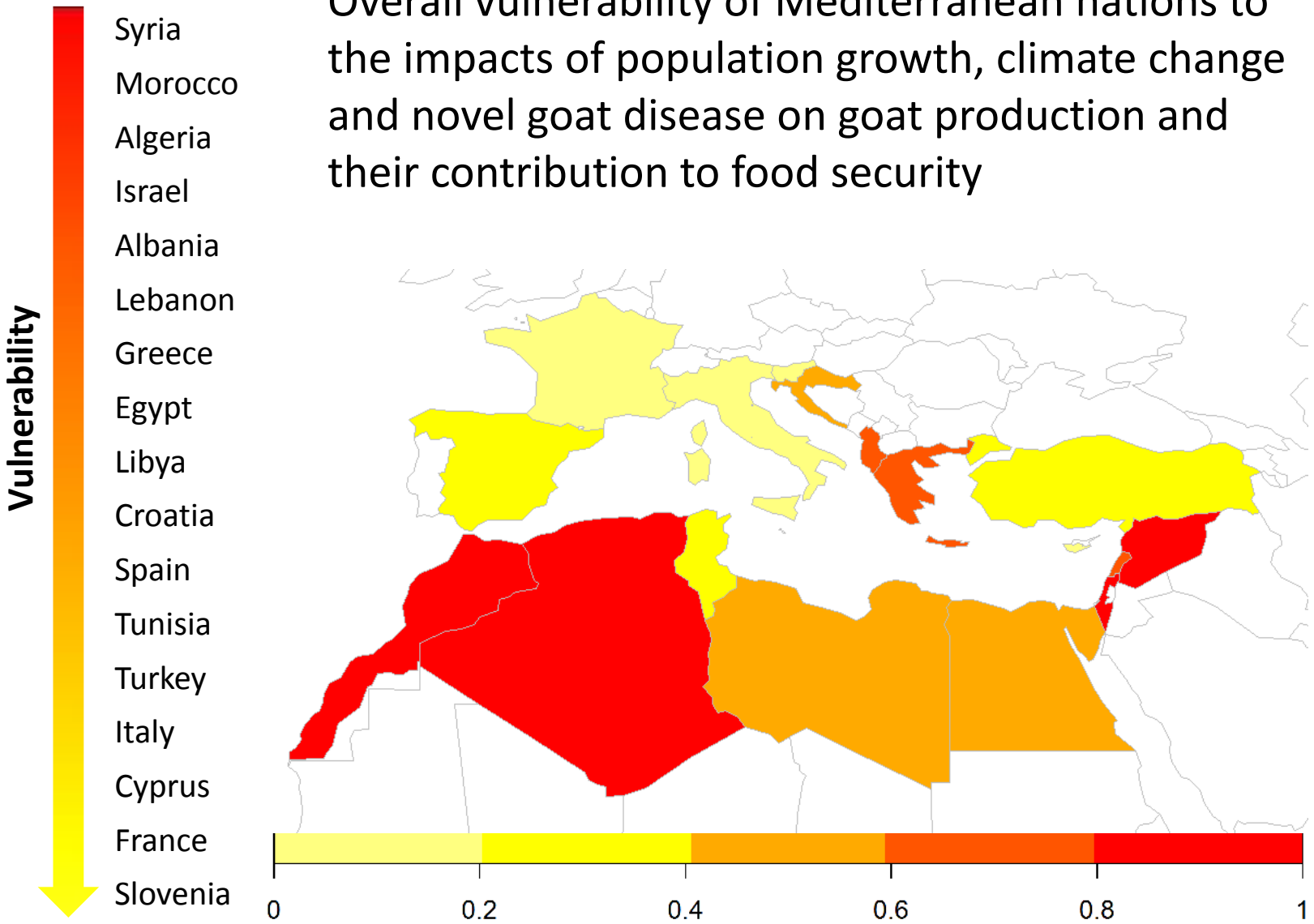


Results: Adaptive Capacity

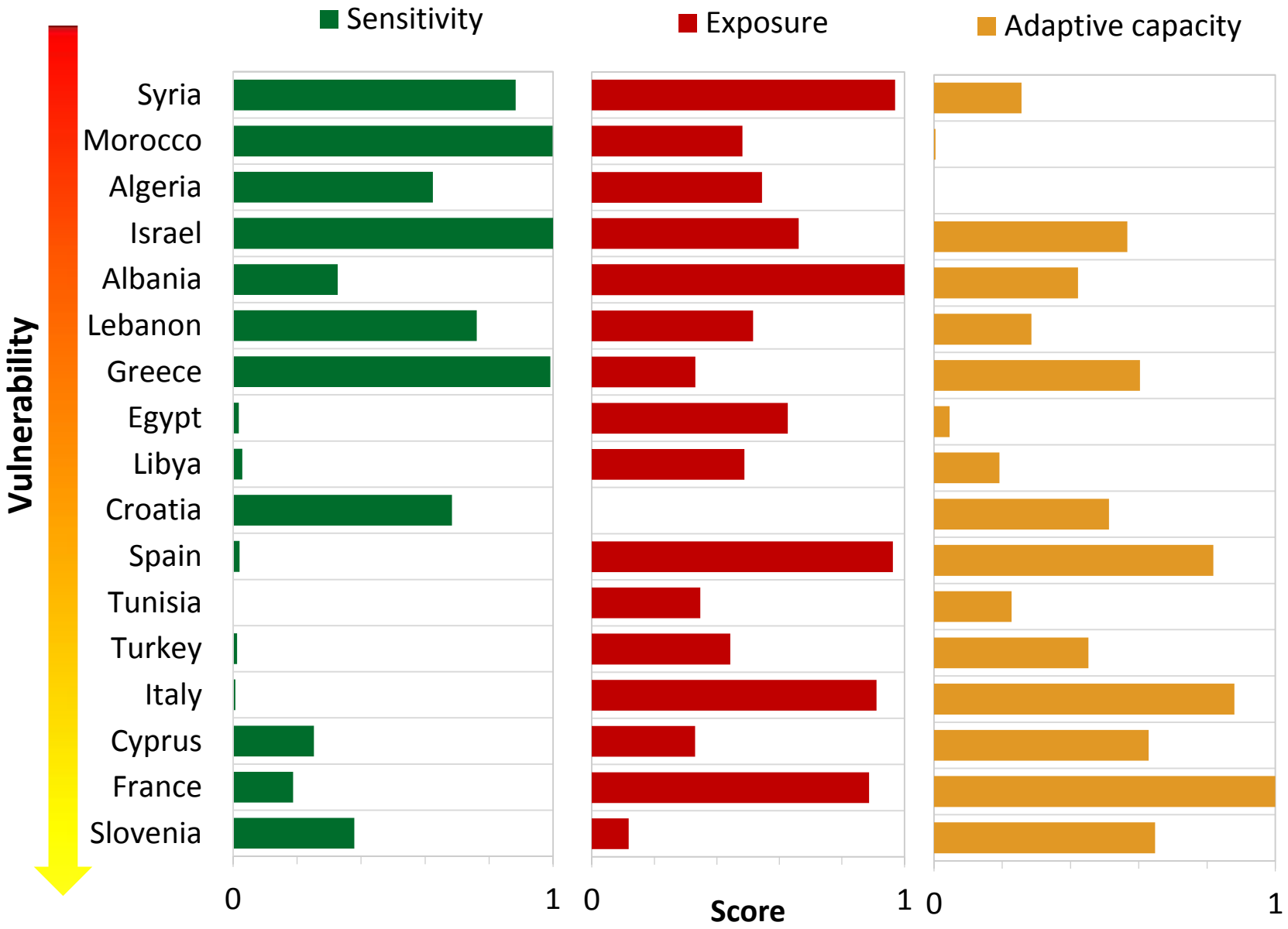


Results: Vulnerability

Overall vulnerability of Mediterranean nations to the impacts of population growth, climate change and novel goat disease on goat production and their contribution to food security



Results: Vulnerability



Conclusions

- Middle East and North African nations are more vulnerable
- It is important to consider all elements of vulnerability
  - France, Italy and Spain have high exposure but their strong adaptive capacity reduces their overall vulnerability
- Interventions need to be nation-specific
- Limitations of the model:
  - Sensitivity element does not capture the economic importance of the goat sector
  - Adaptive capacity element cannot capture the impact of agricultural policy
    - Favourable technical, economic and policy conditions
    - Climate change mitigation strategies
    - Grazing restrictions
- Further work:
  - Bio-economic studies at the farm level to identify constraints

Thank you

Modelling the vulnerability of goat production in the Mediterranean region

Olivia F. Godber & Richard Wall

olivia.godber@bristol.ac.uk

University of BRISTOL

BBSRC bioscience for the future

SWBio DTP