

# WATER AS AN EXPLANATORY FACTOR FOR FOOD SECURITY IN DRYLAND COUNTRIES



**POLITÉCNICA**

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# Motivation & nature of the study

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- THE CONTEXT

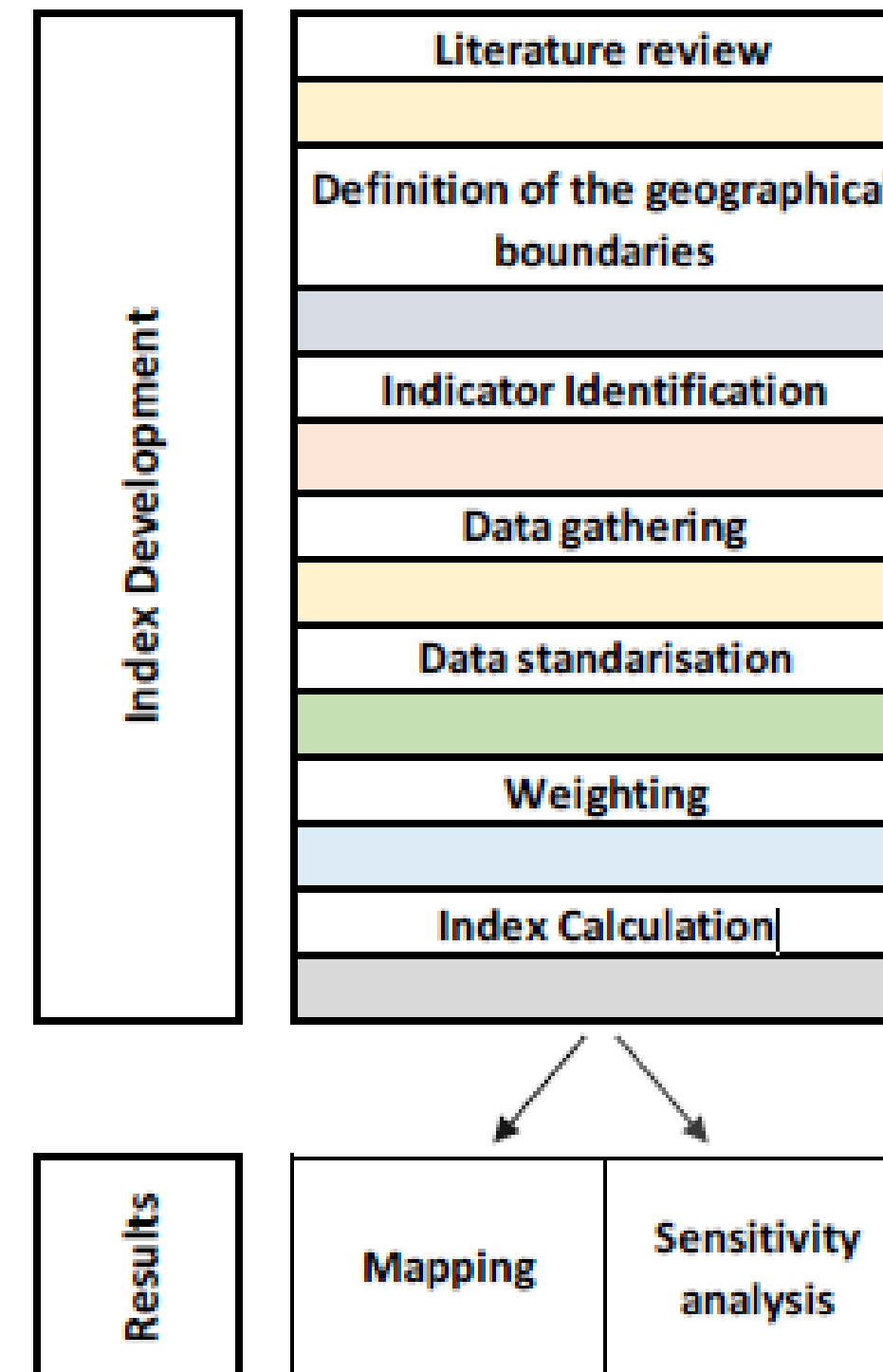
- **Hunger numbers** are on the rise (+10 million last year), FAO
- The world has a rapidly **rising population** (+1.1% last year), World Bank
- **Climate change** is increasing pressure on resources Feeding population requires a proportional increase in **water consumption** (Stephan Pfister,2011)
- Clean and **fresh water** is diminishing (Kümmerer,2018)

- **Objective:** Assess how food security was influenced by water- related factors in 36 countries in drylands of Africa and Asia during the period 2000-2015.
- **Frame:** The present document is framed within the MADFORWATER project.
- **Expertise:** 54 international dryland experts participating in Action COST 'Drylands facing change.
- **Data:** Data were obtained from a large database of recognized international organizations such as FAO, World Bank, World Health Organization, World Global Indicators and UNICEF



# Methodology applied in the development of the indicator

Figure 5. Methodology applied in the development of the indicator



Source: Own elaboration based on Manners (2017)

## Weighting results

- **3 out of 5 top weighted are water-related**
- **Total renewable resources per capita is highly voted as relevant for food security**
- **Water stress also ranks high while Municipal water withdrawal shows one of the lowest significancy**

Table 6. Variables weighting according to experts

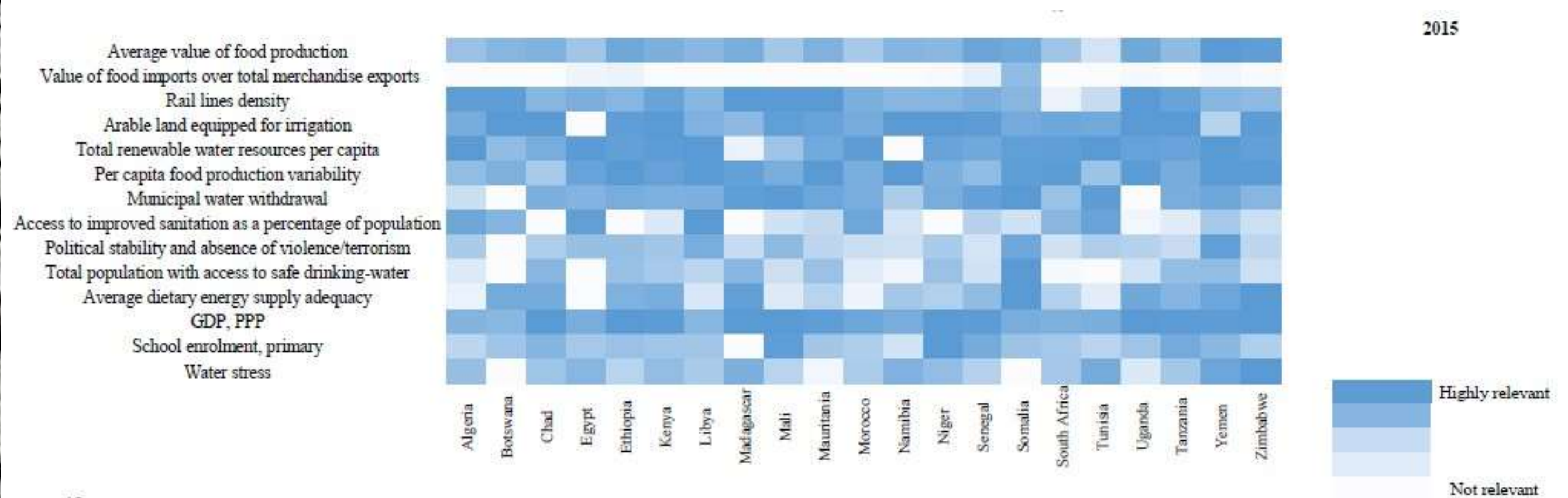
Indicator	Value
Arable land equipped for irrigation	0.078
Average value of food production	0.078
Total population with access to safe drinking-water	0.078
Total renewable water resources per capita	0.076
Political stability and absence of violence/terrorism	0.076
Per capita food production variability	0.073
Water stress	0.073
Average dietary energy supply adequacy	0.073
Access to improved sanitation as a percentage of population	0.072
School enrolment, primary	0.070
Value of food imports over total merchandise exports	0.068
GDP, PPP	0.068
Municipal water withdrawal	0.062
Rail lines density	0.057

Source: Own elaboration based on the survey responses

Note: Values have been transformed to be as a sum of 1.

# Composite indicator results. Mapping

## Building the FWSI with weights and variables



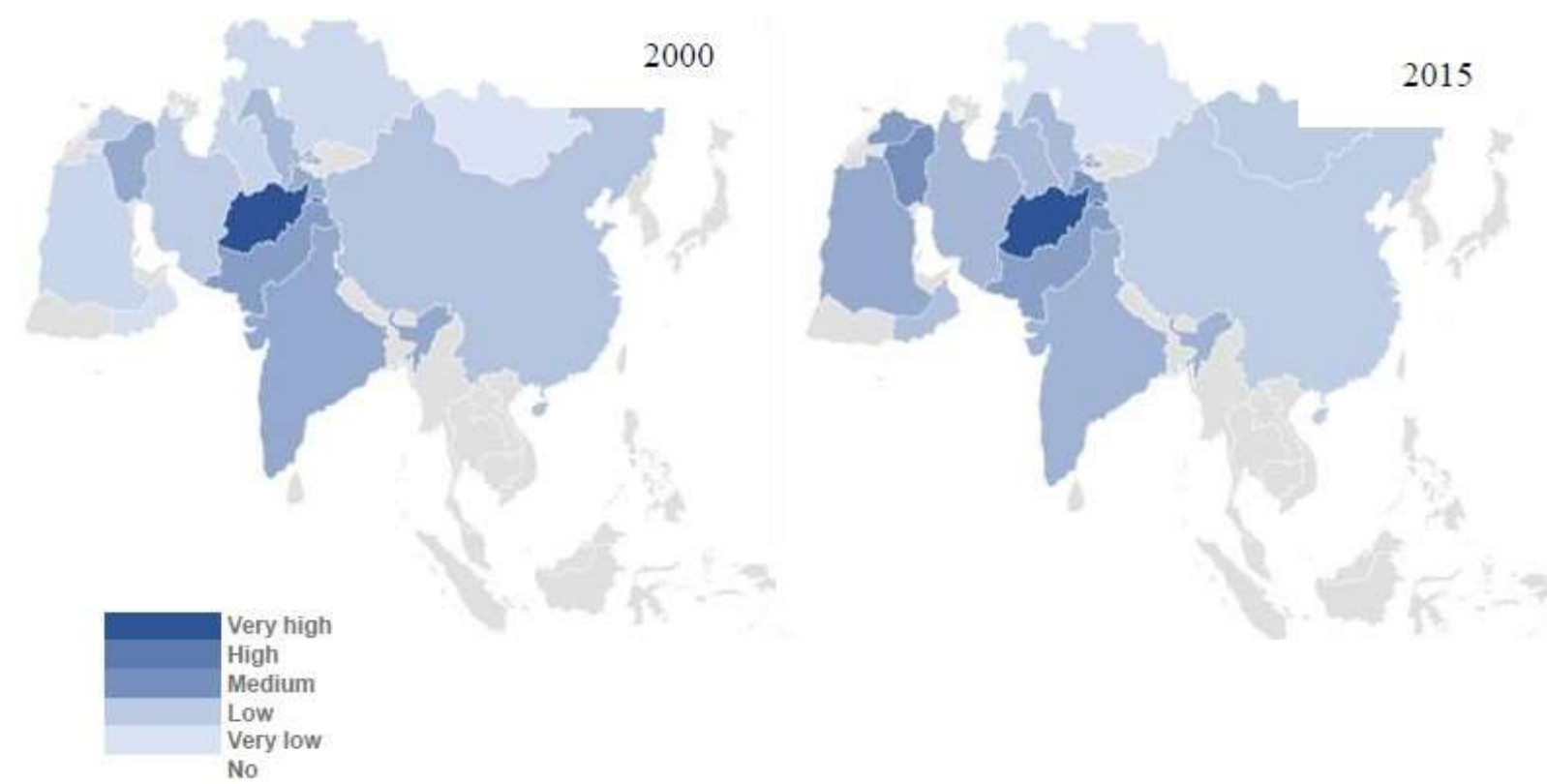
# Composite indicator results.

## Mapping

Asia has experienced great improvements in these 15 years, which in turn is reflected in higher levels of access to water, economic capacity, infrastructure etc. This great progress has been converted dropping their FWSI 2000 average from 0.53 to 0.49 by 2015.

### Asian highlights

Figure 10. Asian dryland countries 2000 & 2015



Level of food insecurity based on FWSI results

### Starting situation in 2000

- Afghanistan is by far, the country with lowest levels of food security
- Mongolia and Uzbekistan performs well

### 2000-2015 evolution

- The most positive success stories: **Kazakhstan** (0.117\*), **Uzbekistan** (0.103) and **China** (0.101).
- Only 3 countries are in negative values: **Syrian Arab Republic** (-0.037), **Mongolia** (-0.035) and **Saudi Arabia** (-0.02)

## OVERALL TRENDS

The Food-Water Security Index for drylands in Africa and Asia

- **Significant decrease** in vulnerability in most countries, 62%, between 2000 and 2015
- As the years go by, **Africa experienced an improvement in its FWSI by strengthening its food security in 2000 (0.62) compared to the year 2015 (0.59).** However, African countries showed an asymmetric evolution not very homogeneous, concentrating very positive and very negative cases.
- 5 countries (Egypt, Kenya, South Africa, Uganda and Oman) **remained stable** over this period of years
- **Asia evolved in a more stable way**, leaving only 3 countries with negative evolutions, and all others in positive increments. **This great progress has been converted dropping their FWSI 2000 average from 0.53 to 0.49 by 2015.**

## DISCUSSION

### The Food-Water Security Index for drylands in Africa and Asia

- Reflecting this **theoretical framework** on the number of hungry people in the world, has allowed to transfer the theoretical framework to reality, giving solidity to the results.
- **Arable land equipped for irrigation** has turned out to be the most relevant indicator, aligned with the literature (Grafton, 2015).
- **Total renewable water resources per capita** raises the question of the physical dimension of water as a key element to avoid malnutrition. Already highlighted by works such as (Sullivan, 2002) & (Scardigno, 2017)
- **Political instability**, played as a major brake on development, has weighed down many African countries in recent decades as shown in the results for this continent (Martin-Shields C. P., 2019).
- **Comparing the Pou and the FWSI** allows the theoretical framework to be reflected in reality by developing concrete and measurable indicators



# CONCLUSIONS.

## The FWSI

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- **This work contributes to progress** in the study of the water component within food security
- Out of the **top 5 most significant indicators, 3 are water-related.**
- **The world is prospering and hunger is decreasing, yet at different rates.**
- **Africa** is the one that suffers the **most sharpen changes, Asia develops stable.**
- **Each country faces a different reality,** but they share common traits.
- **The FWSI has been shown to be robust as an indicator** to complement the explanation of world hunger trend.
- **Potential for replication** of the study in dryland regions.

Water as an explanatory factor for food security in dryland countries

Thank you for your  
attention

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