

# How much water do we eat?

16<sup>th</sup> April 2011

Tim Hess



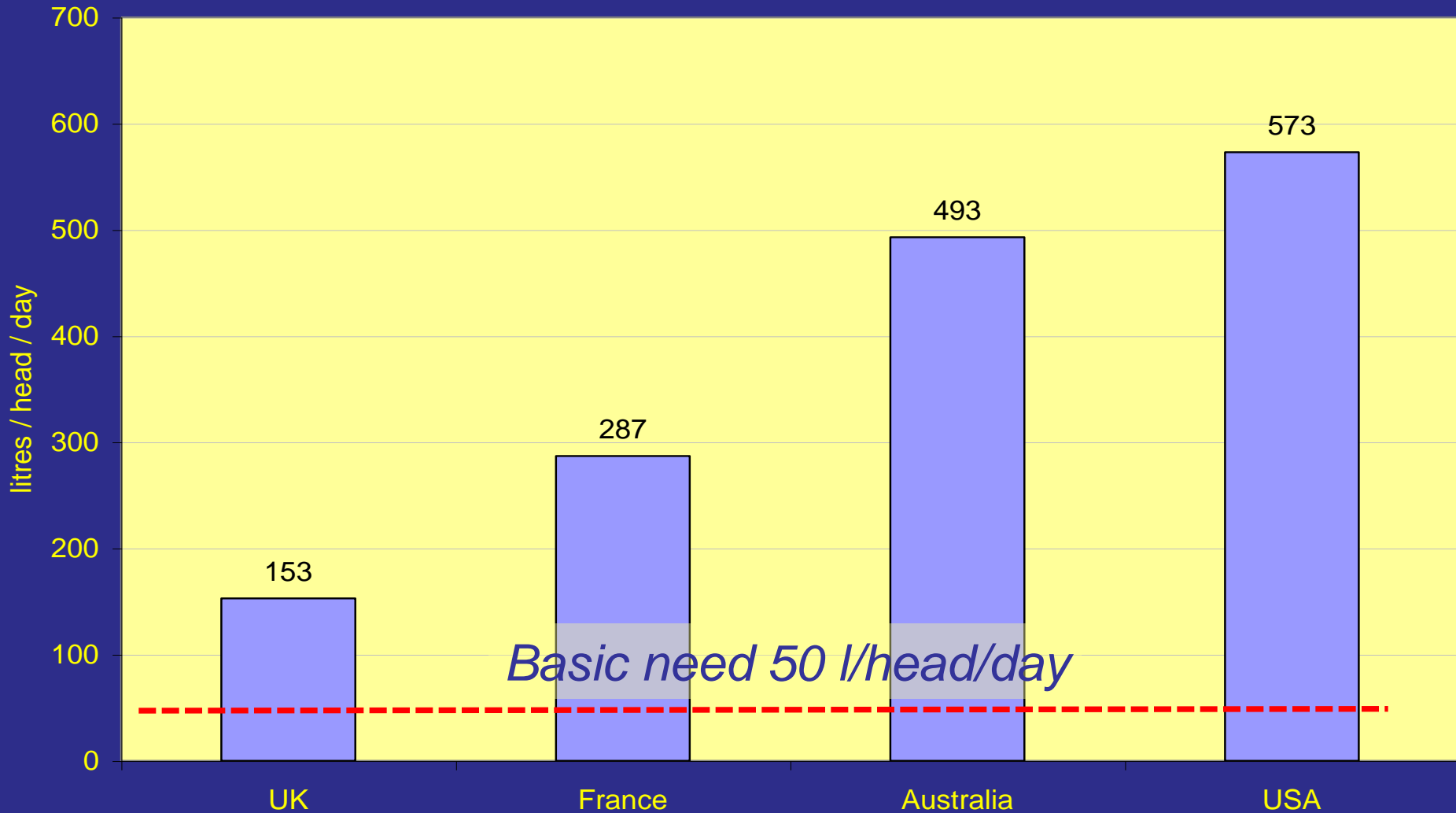
# Outline

- How much water do you need?
- How much water do you eat?
- The colour of water?
- Do we need to worry?
- What can we do about it?

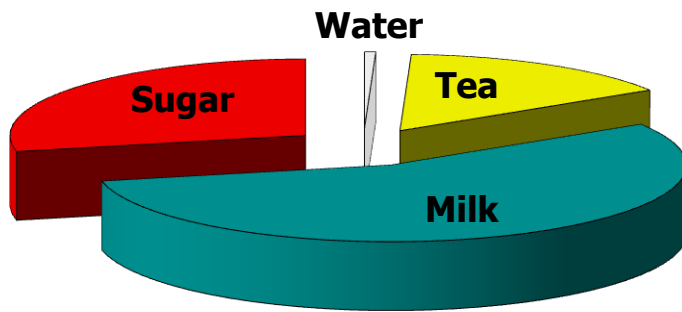
How much water do we  
eat?

How much water do you need?

# Domestic water consumption



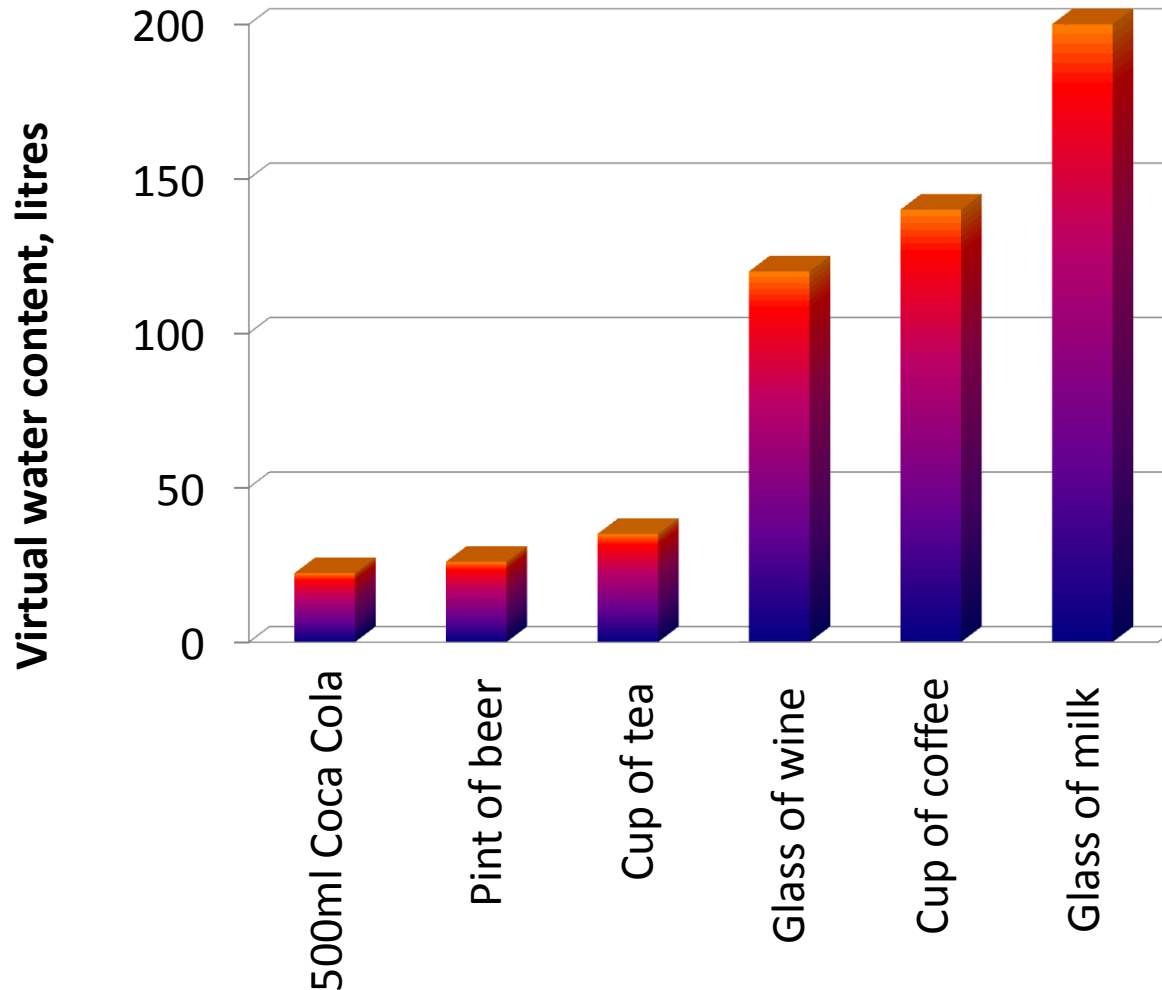
# How much water does it takes to make a cup of tea?



- Hot water 0.2 lt
- Tea leaves 2 g  
5 lt to grow the tea
- Milk 0.02 lt  
18 lt to grow the grass
- Sugar 8 g  
9.2 lt to grow the cane
- Total 32.4 litres

Ignores all the water used in manufacturing the cup, processing the tea, milk and sugar, producing electricity for the kettle and washing up!

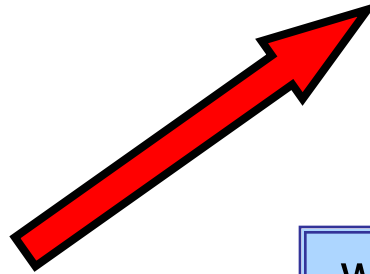
# If you think that's a lot .....



All food contains “embedded”  
or “virtual water”



Water for plant growth



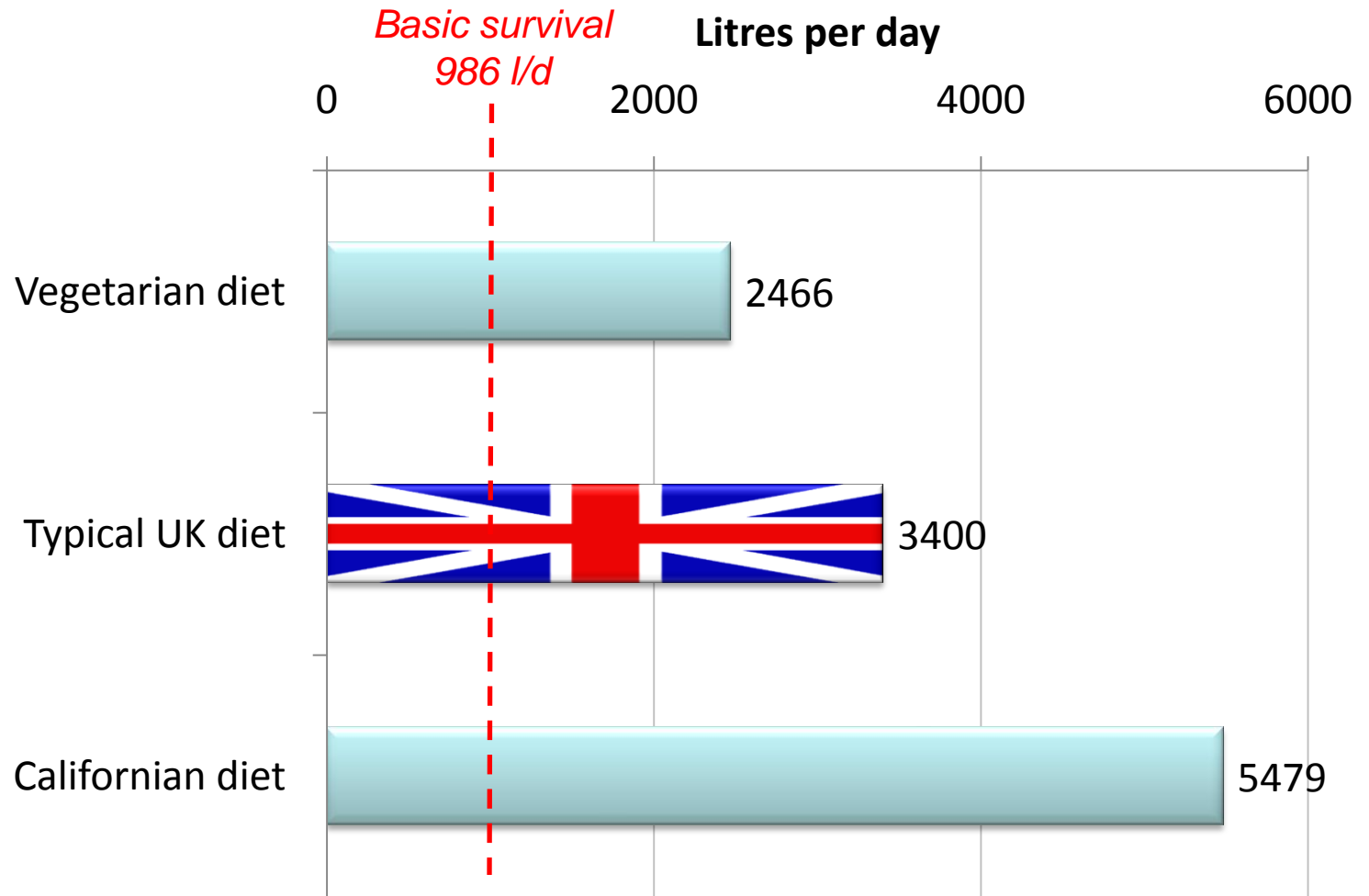
water for drinking, cleaning, etc.



# Water required to produce 1 kg

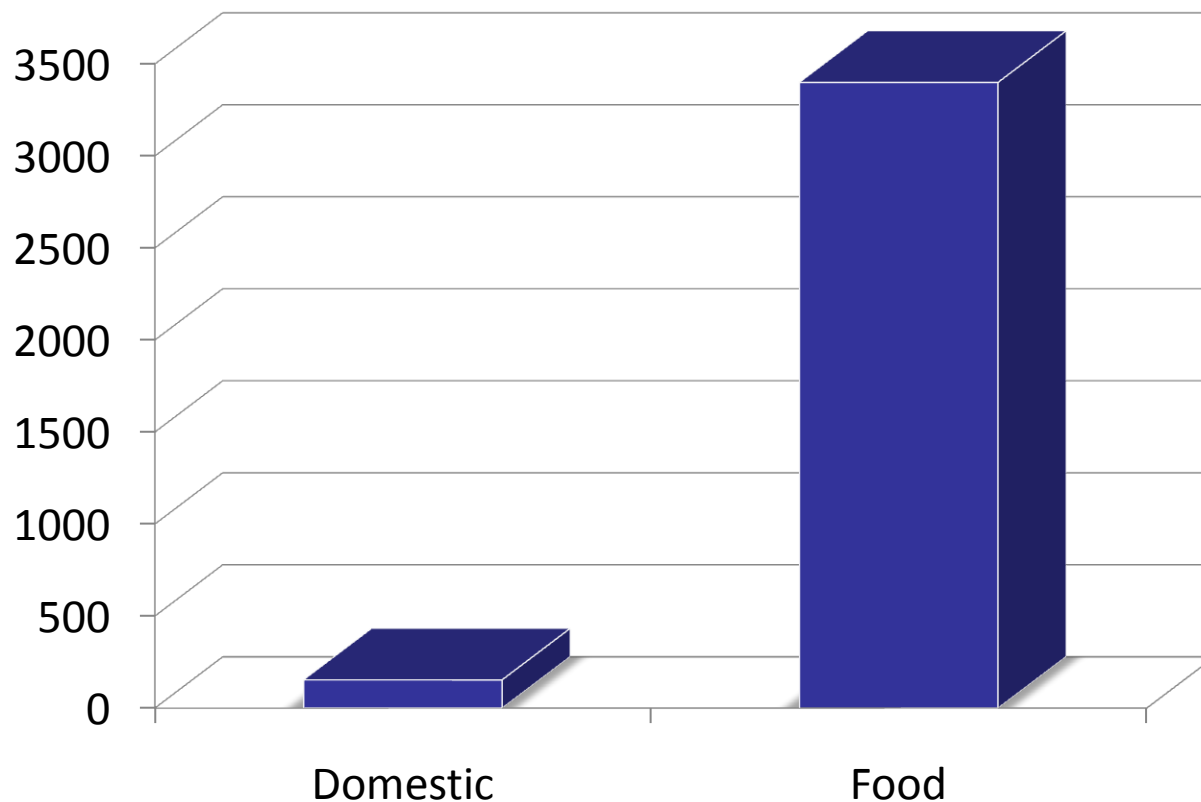
	litres / kg	Location
Tomatoes <sup>2</sup>	74	Spain
Potatoes <sup>3</sup>	95	UK
Sugar (beet) <sup>4</sup>	429	Europe
Sugar (cane) <sup>5</sup>	1 000	Swaziland
Cereals <sup>1</sup>	1 622	Global average
Meat (poultry) <sup>7</sup>	6 000	Global average
Meat (bovine) <sup>6</sup>	17 700	UK

# How much water do we eat?



# Comparison

- Domestic consumption
  - $\approx 153$  l/person/day
  - 95% is returned
- Water for food
  - $\approx 3\,400$  l/person/day
  - Most is evaporated



How much water do we  
eat?

The colour of water

## Blue and green water



- Water used at the point where rain falls – rainfed agriculture
- Low “opportunity cost”



- Water abstracted from rivers, lakes and groundwater – irrigated agriculture
- Competes with other uses

# Colour is important

250 g Peanut M&M's<sup>®</sup>  
1,114 litres

575 g Dolmio<sup>®</sup> pasta sauce  
149 litres

Blue 127

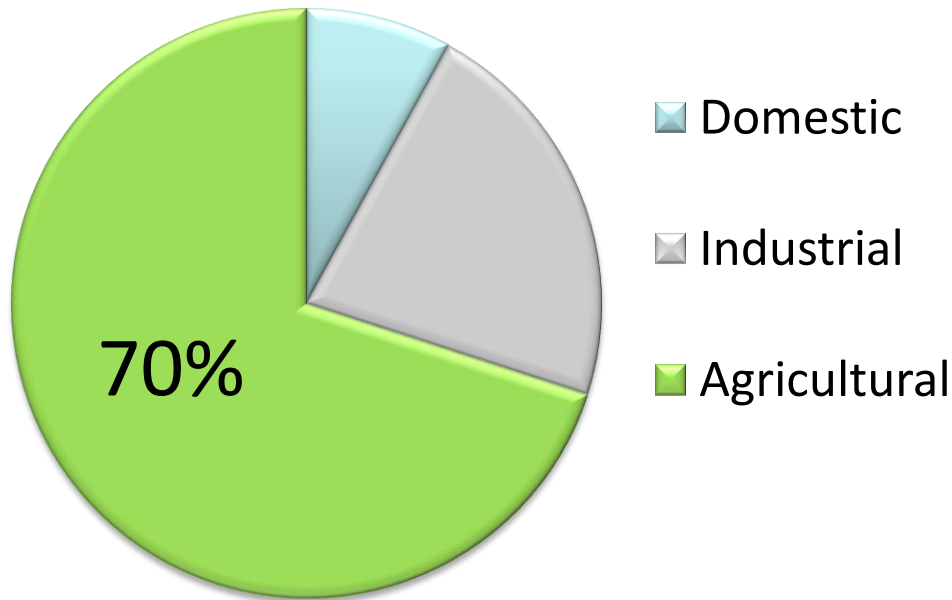
128

Green 987

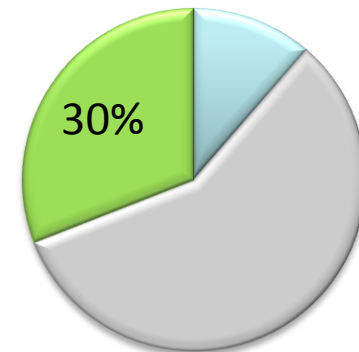
21

# Water abstractions of blue water for agriculture

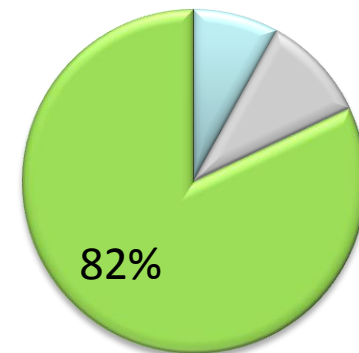
**Global**



**High Income**



**Low Income**



Globally, agriculture accounts for 70% of water withdrawals

How much water do we  
eat?

Do we need to worry?

# Where are we now?

- More than 40% of the world's population live in areas of water scarcity and stress
- 12% of world population are “food insecure”
  - In developing countries, 1 in 6 people suffer from chronic hunger
  - Rising to 1 in 3 in sub-Saharan Africa
- Growth in agriculture has been responsible for much environmental change

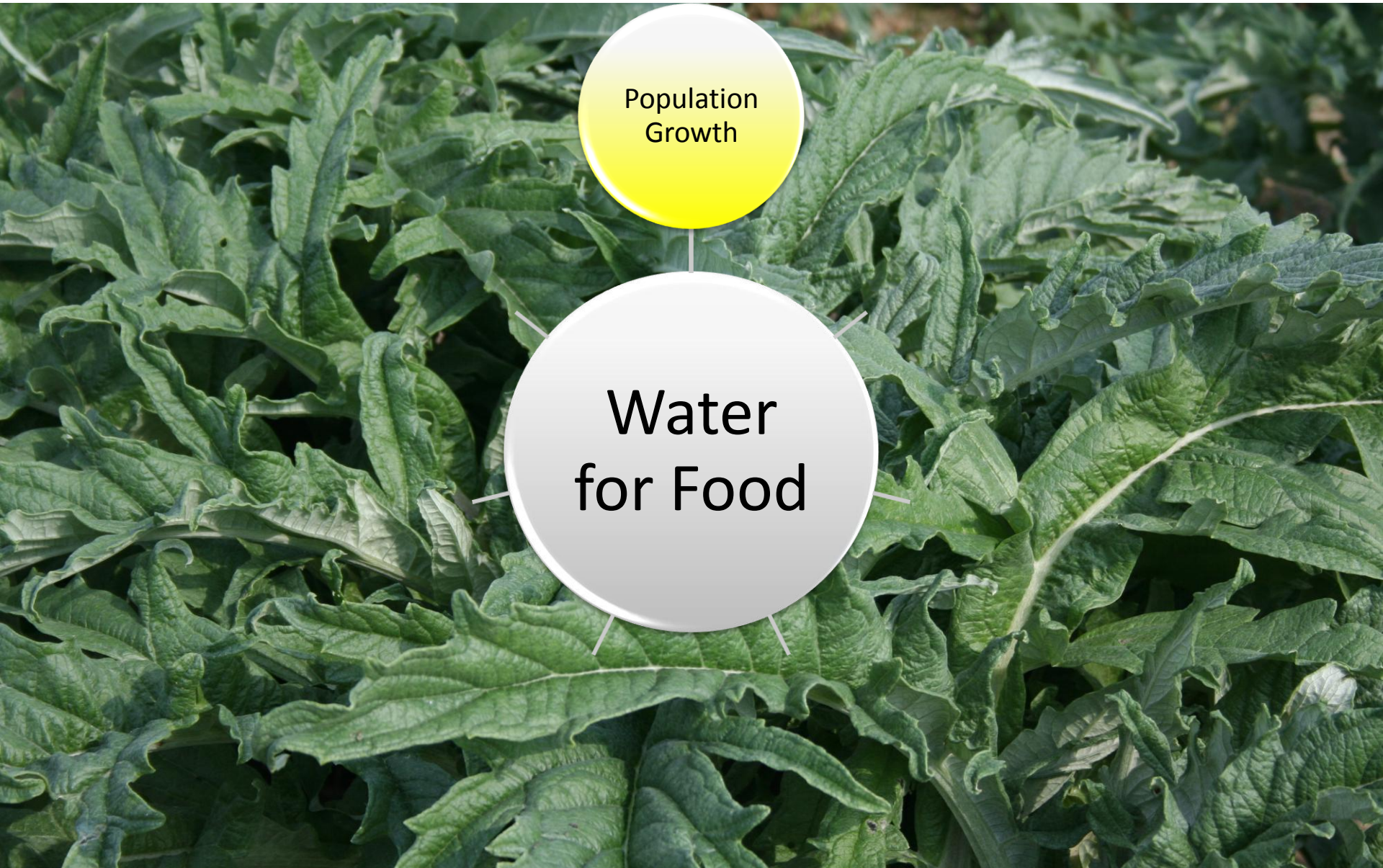


# Pressures on water for food



Water  
for Food

# Pressures on water for food

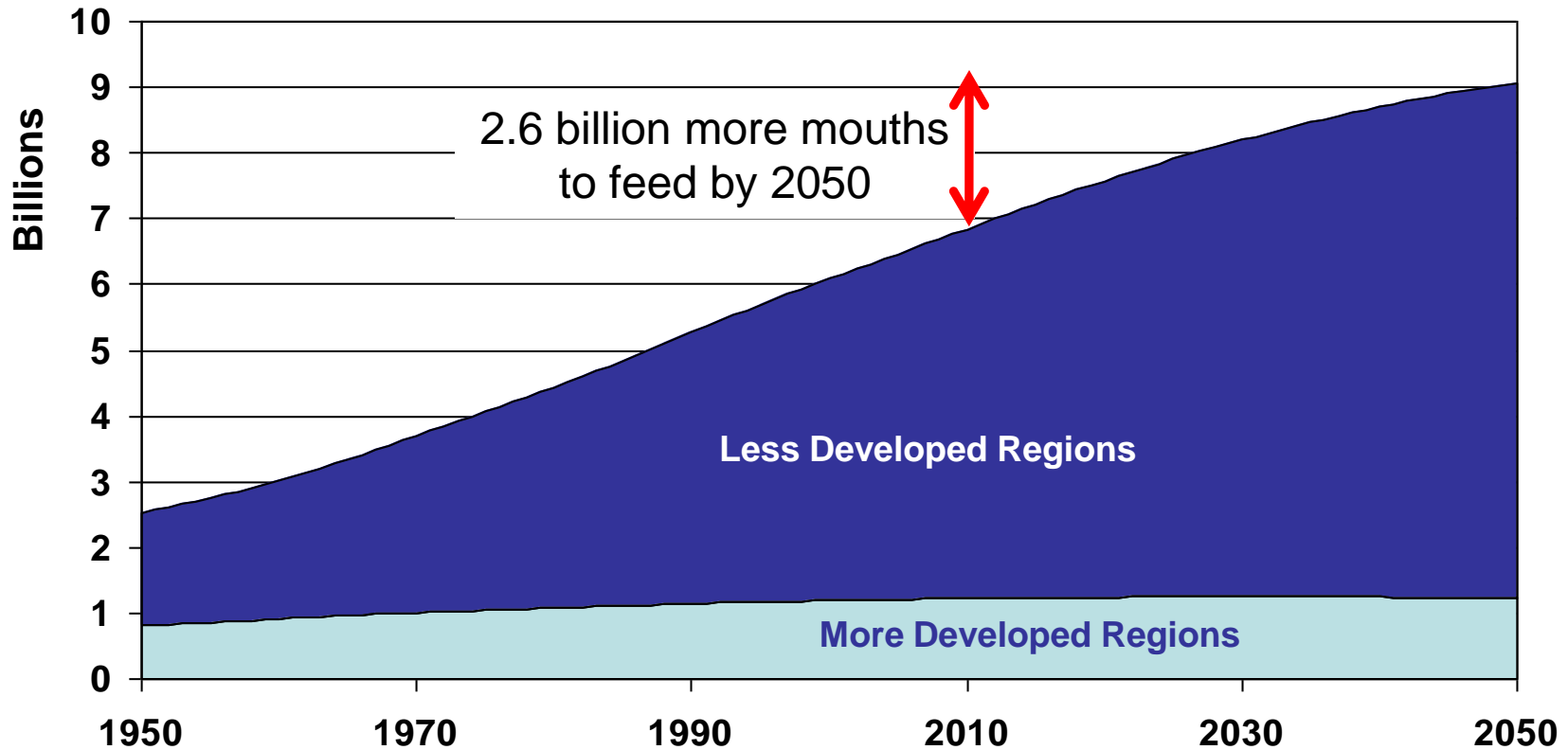


Population  
Growth

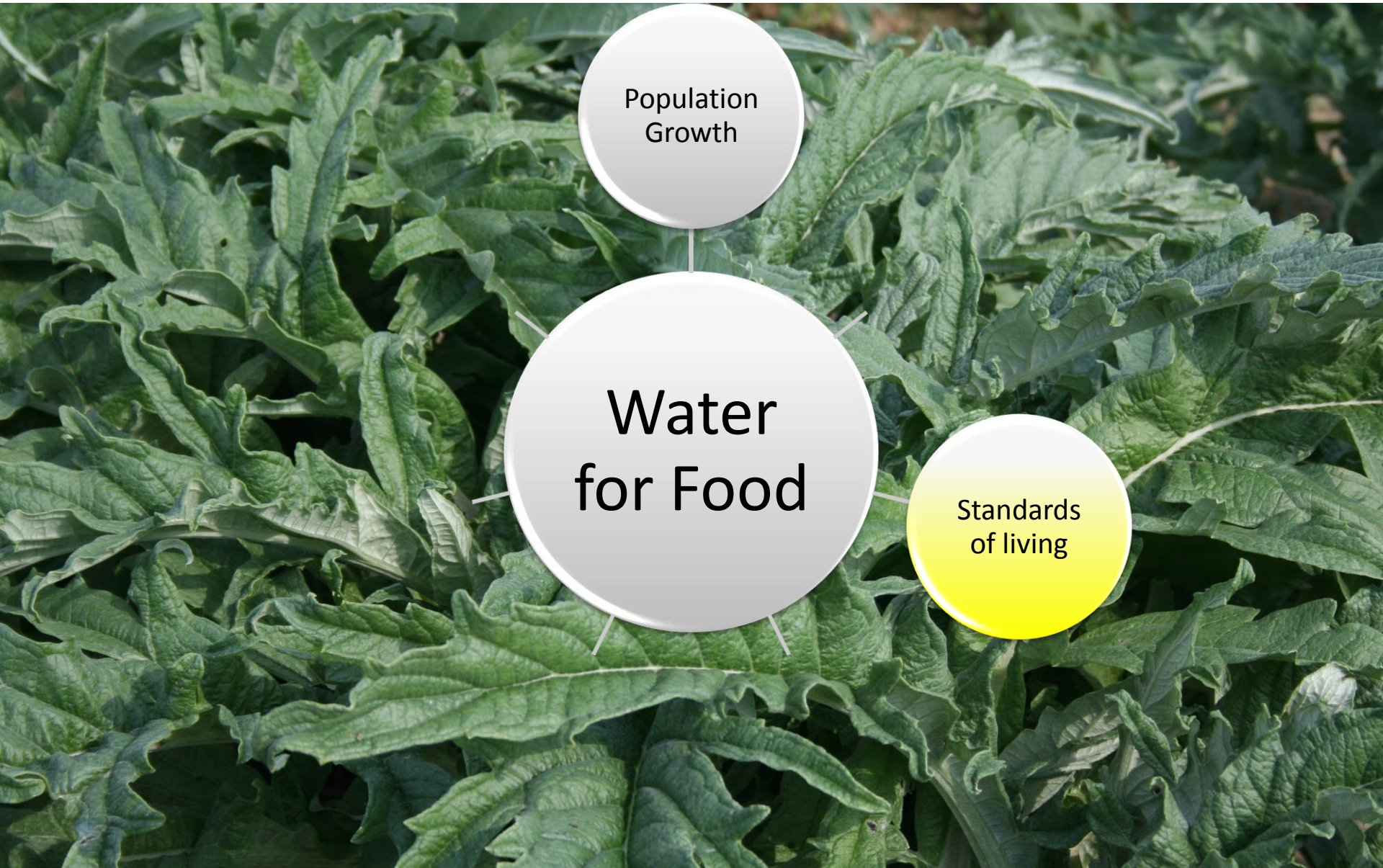
Water  
for Food

# Population growth

- Global increase from 6.9 billion to 9.5 billion by 2050.
  - More developed countries +7%
  - Sub-Saharan Africa +110%



# Pressures on water for food



Population  
Growth

Water  
for Food

Standards  
of living

# Higher standards of living



- With development, diets change
  - Coarse grains → Rice → Wheat
  - Vegetables → Meat
- Since the 1960s average calorie consumption in developing countries rose by 30%
- Meat consumption in China rose from 3.6 kg/capita/yr in 1961 to 52.4 in 2002
- Increased demand for out of season crops

# Pressures on water for food



Population  
Growth

Water  
for Food

Standards  
of Living

Loss of  
Irrigated  
Land

## Loss of irrigated area

- 20% of the world's arable area is irrigated
- This accounts for 40% of food production
- 20% is affected by waterlogging
- 1 mil ha / year lost due to salinisation & waterlogging
- World Bank lending for irrigation has halved since the 1990s



# Pressures on water for food



Population  
Growth

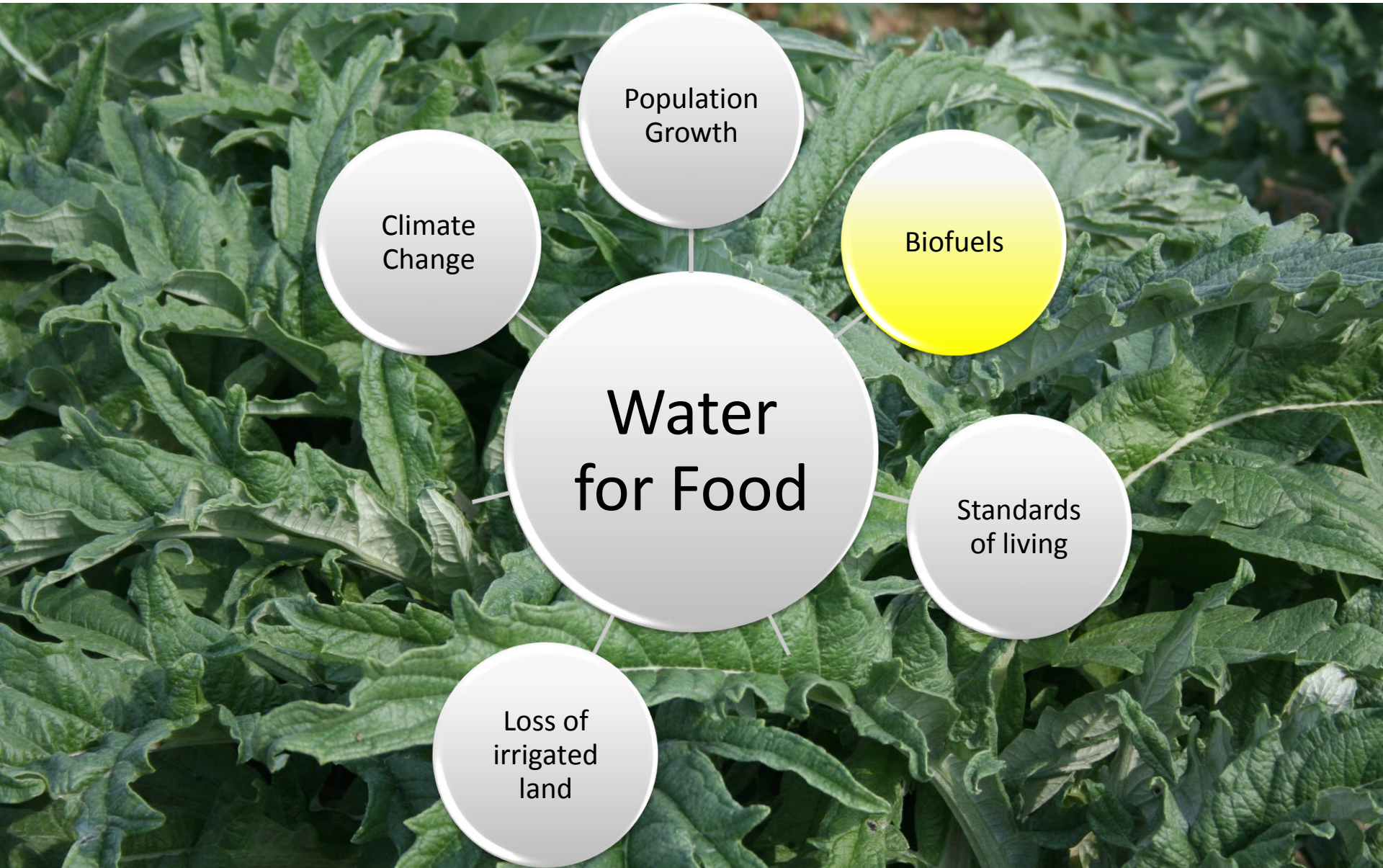
Climate  
Change

Water  
for Food

Standards  
of Living

Loss of  
Irrigated  
Land

# Pressures on water for food



Population  
Growth

Climate  
Change

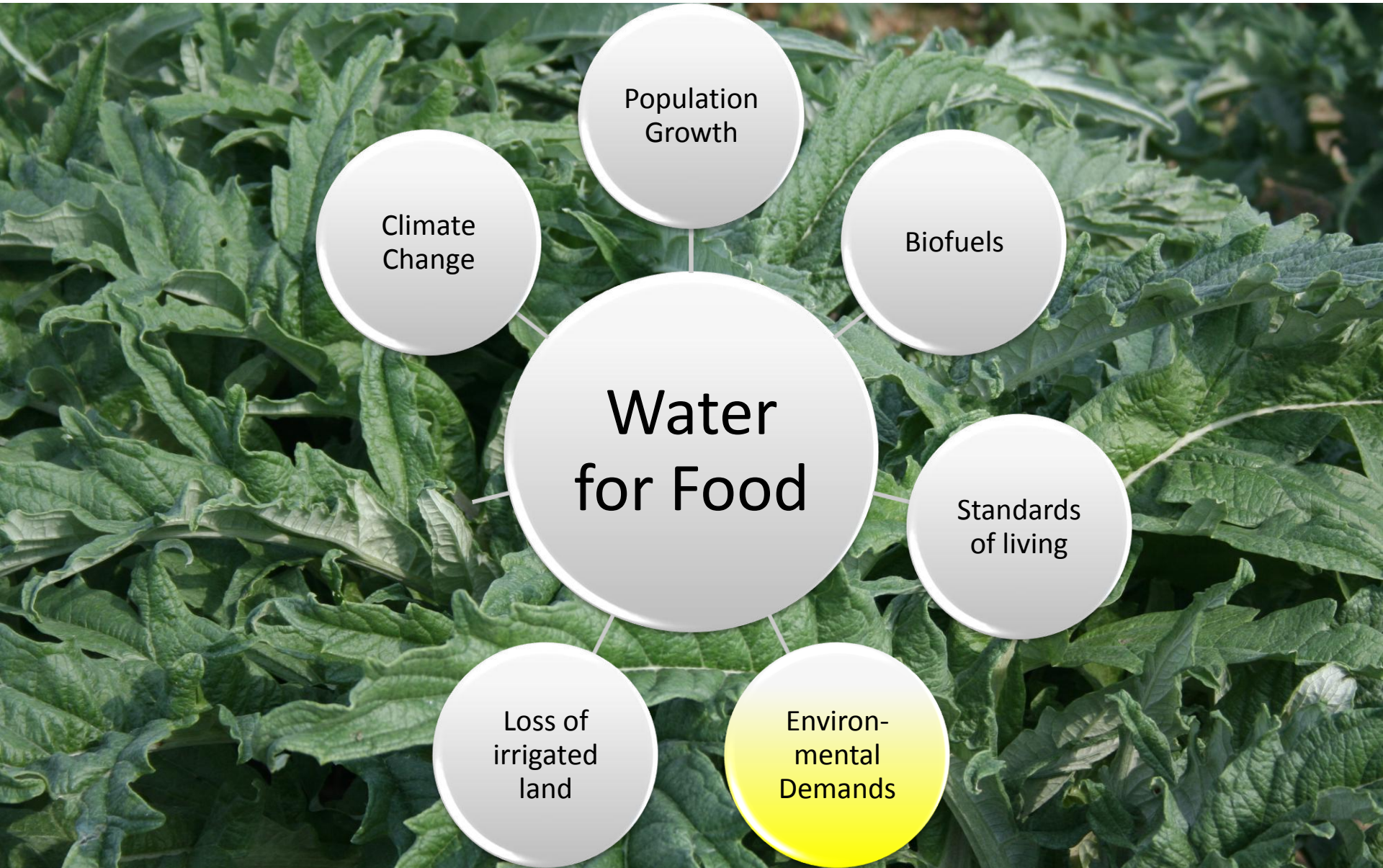
Biofuels

Water  
for Food

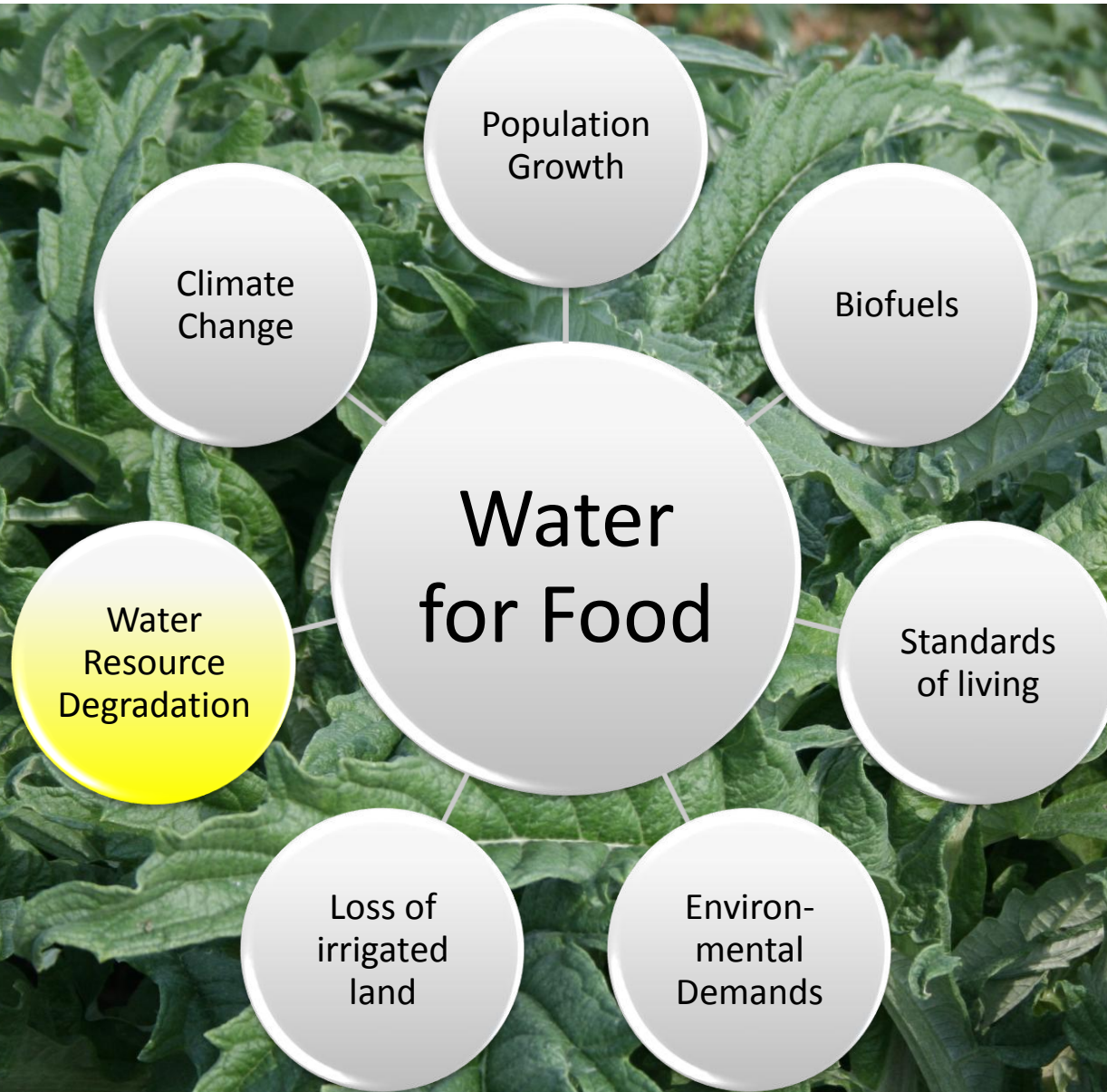
Standards  
of living

Loss of  
irrigated  
land

# Pressures on water for food

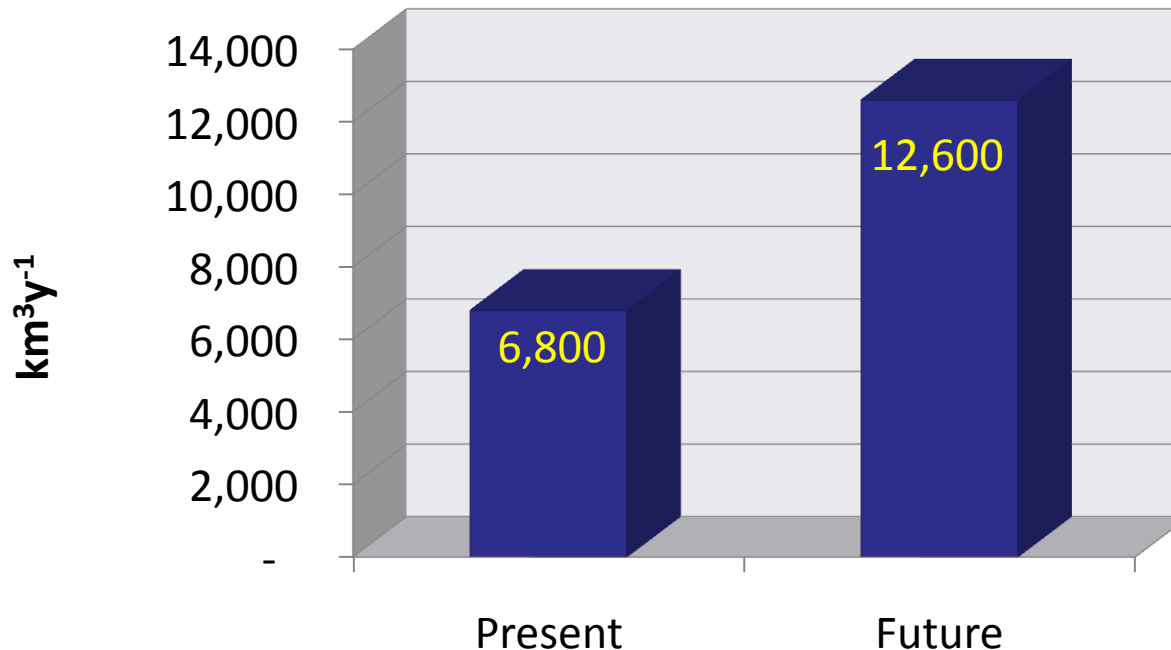


# Pressures on water for food



# A crisis ahead?

- Food production must double by 2050 to meet the demand of the world's growing population (UN, 2009)
- $\approx 85\%$  increase in water use for food production (Rockström, 2003)



# What can we do?

- Change land use
  - Trees use more water than crops
  - Habitat? Carbon sink?
- Change diet
  - 36 x water/kcal to produce beef compared to wheat
  - Blue or green water?
- Increase rainfed productivity (kg/mm)
  - In semi-arid areas only 25 – 50% of potential
- Increase irrigated area & productivity
  - Efficiency of irrigation <40% in many countries



# How much water do we eat?

Some things to think about while you are eating .....

# Importing food: Exporting drought?

- In the UK, 2/3 of our agricultural water footprint is from imported produce

## Spanish Tomatoes

		Blue	Green	Total
Water footprint	m <sup>3</sup> /t	60.5	13.6	74.1
Import to the UK	t/yr			180 000
Virtual water import	Mm <sup>3</sup> /yr	10.89	2.45	13.34

(after Chapagain & Orr, 2009)

Equivalent to the domestic consumption of a town the size of Almeria – what impact is this having in Spain?

# Food waste = Water waste

- In the UK, we waste 30% of our food & drink
- “Avoidable” waste represents 243 litres per person per day
- What is the impact of this water use?



© WRAP