

# Food wastage footprint

## Impacts on natural resources

Global footprint of food wastage & global food waste quantification

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# Food wastage – Why is it an issue?



**Each year, about  $\frac{1}{3}$  of all food produced for human consumption in the world is lost or wasted**

**Food wastage represents a missed opportunity:**

- ☐ **To improve global food security: by 2050, food production will need to be 60 % higher than in 2005/2007;**
- ☐ **To mitigate environmental impacts generated by agriculture: food supply chains have important environmental externalities.**



# New global intelligence & response on food waste

## Growing global response

- ❑ The FAO Food Wastage Footprint was published in September 2013, the first estimate of the global environmental impacts of food waste
- ❑ The WRI-UNEP Food Loss & Waste Protocol was launched in October 2013 to develop measurement standards that will enable global efforts on food waste reduction
- ❑ The SAVE FOOD initiative of the FAO, UNEP & Messe Düsseldorf continues dialogue on food losses and waste between industry, research, policymakers and civil society, with a major upcoming conference on May 7th 2014



# WRI-UNEP Food Loss & Waste Protocol

## FAO Global Food Wastage Footprint

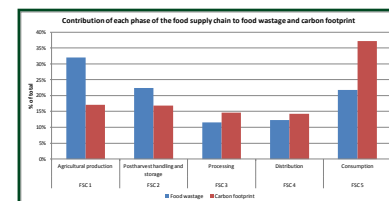
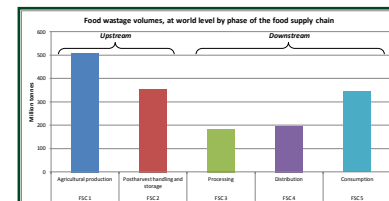
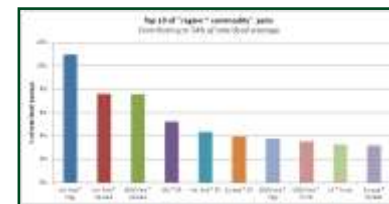
## Food wastage – Why is it an issue?



To date, no study has analyzed the environmental impacts of global food wastage

The Food Wastage Footprint (FWF) model was developed to answer 2 key questions:

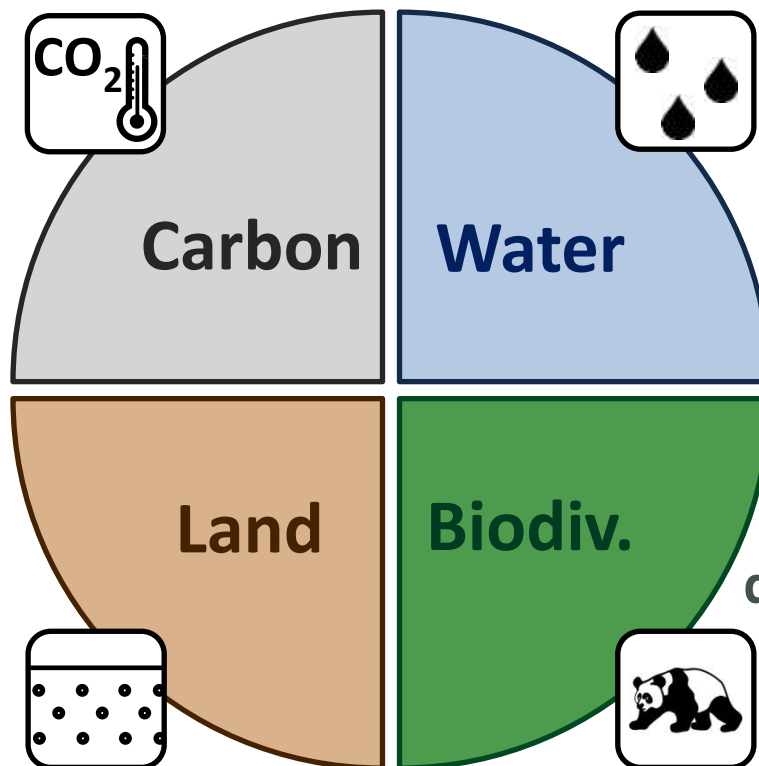
- ❑ What is the magnitude of the impacts?
- ❑ Where do these impacts come from? (in terms of regions, commodities or phases the supply chain)





## The environmental footprint of food waste is assessed through 4 indicators

A quantitative assessment has been made for **carbon footprint**, **blue water footprint**, and **land occupation**.



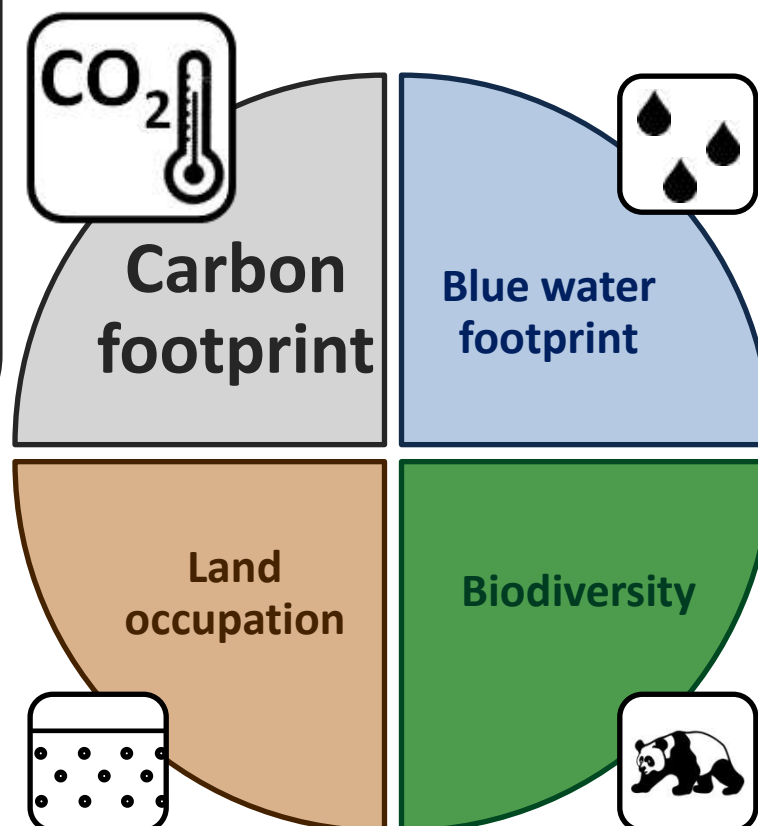
For **biodiversity** a combined semi-quantitative/qualitative approach was used.



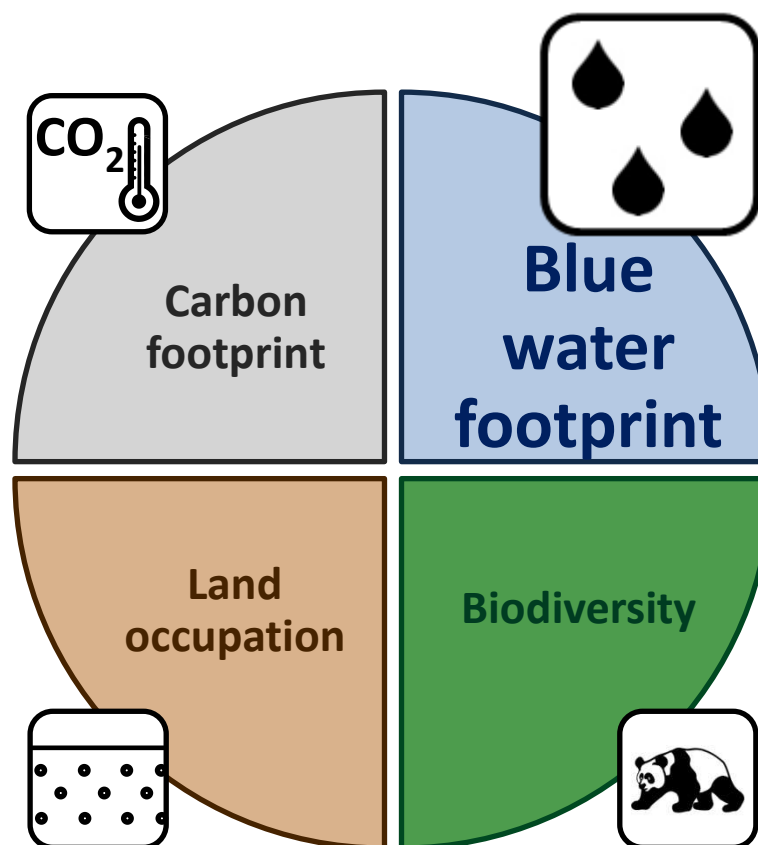
The environmental assessment is complemented by an **economic quantification**.

# Indicators – Carbon footprint

**Carbon footprint of food wastage:** the total amount of **GHG** emitted throughout the life cycle of the product, expressed in **kg of CO<sub>2</sub> eq.**



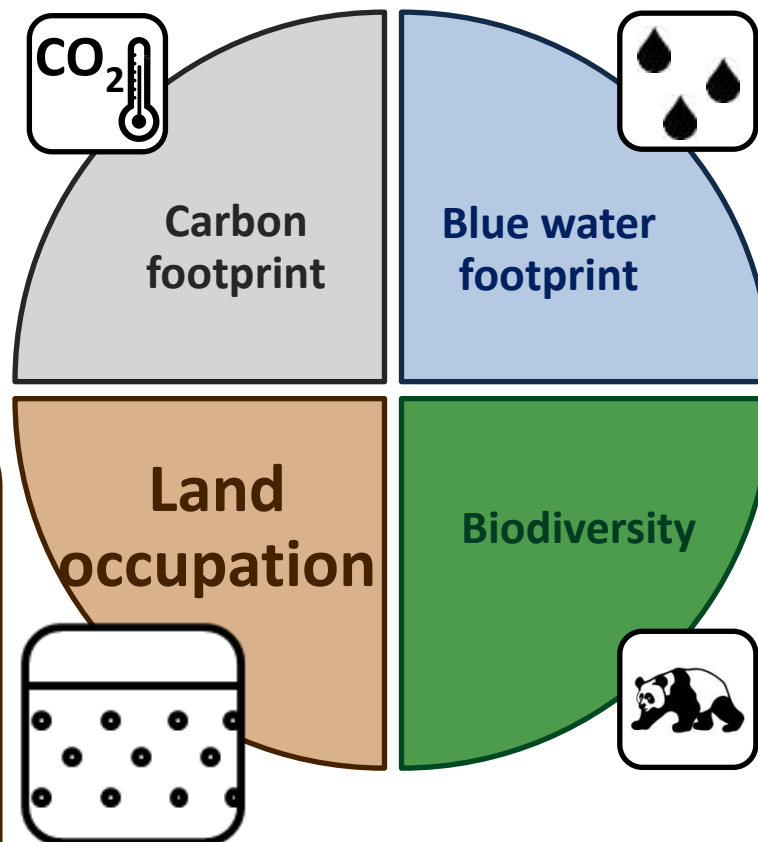
# Indicators – Blue water footprint



**Blue water footprint of food wastage:** the total consumption of surface and groundwater resources to produce the product. It is expressed in  $\text{m}^3$ .



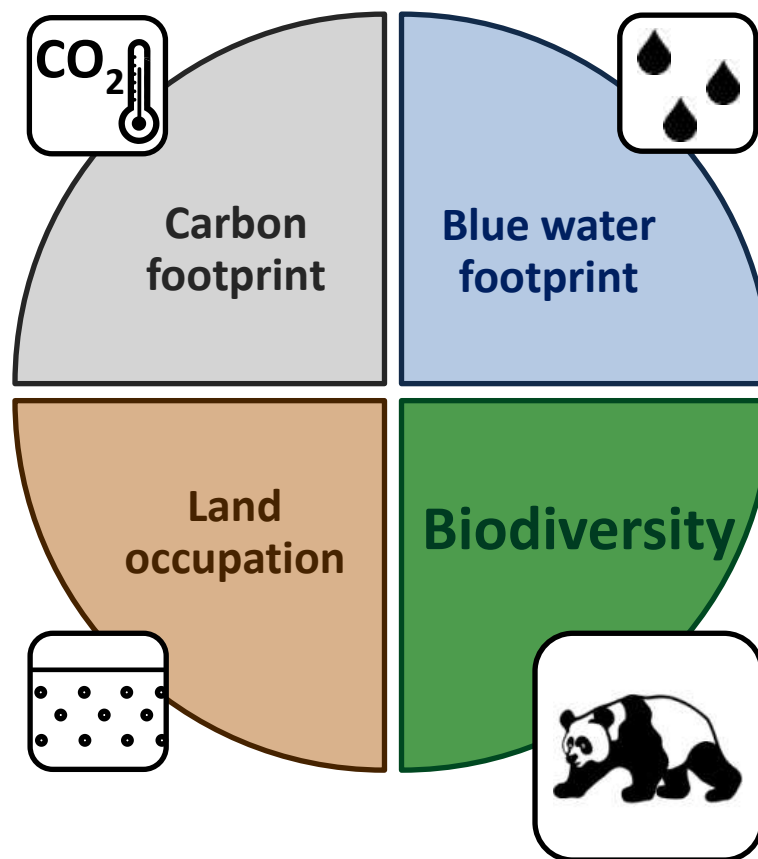
# Indicators – Land occupation



## Land occupation of food wastage:

“Physical” surfaces –  
i.e . areas of  
agricultural land  
necessary to produce  
foodstuff (both arable  
and non-arable land)  
expressed in **hectares**.

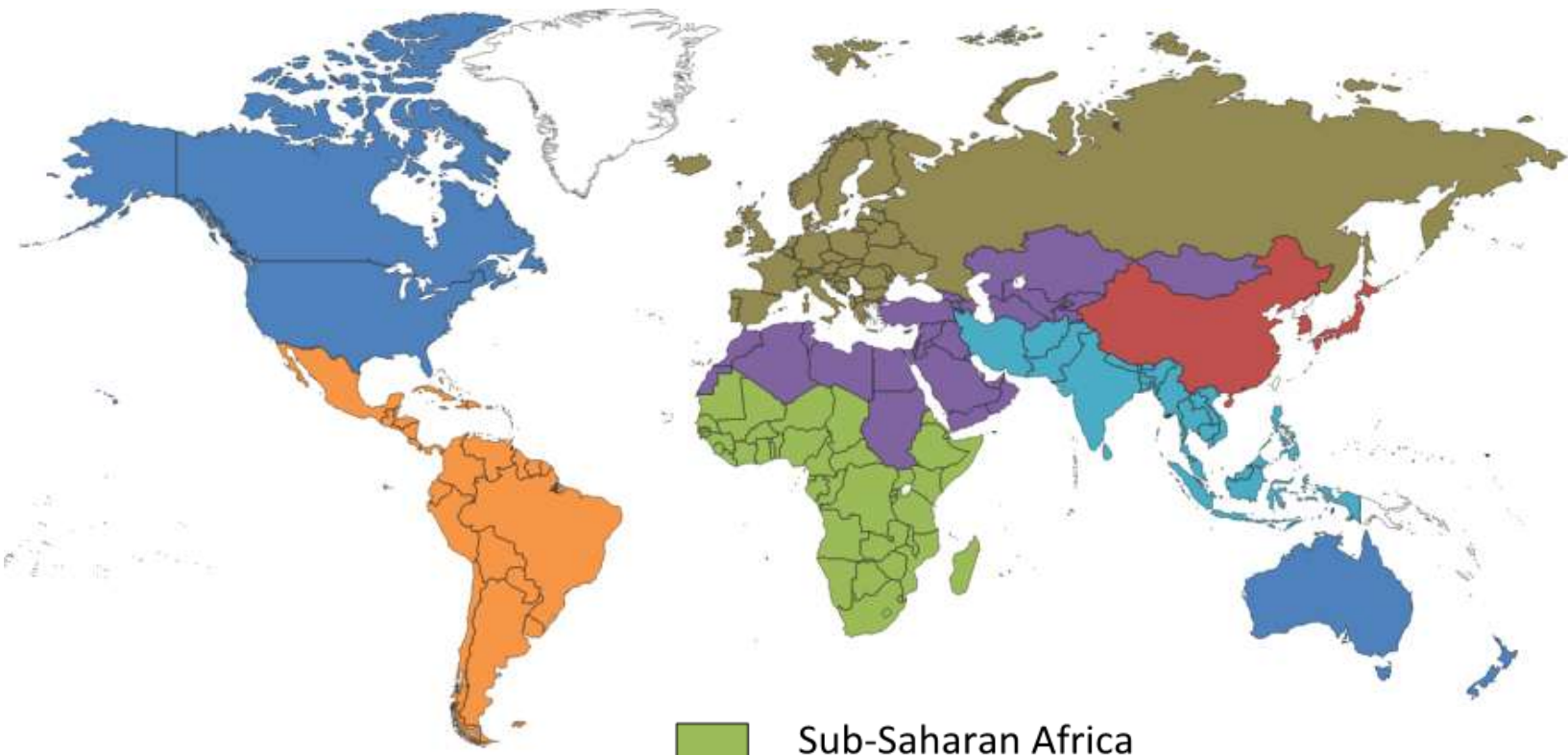
# Indicators – Biodiversity



**Diversity of life** on Earth. **The impact of food on biodiversity** is assessed through deforestation due to agriculture, Red Listed species, Marine Trophic Index.



The scope is global in terms of world regions



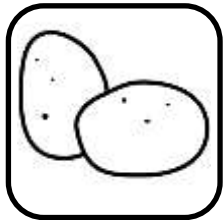
- Europe
- North America & Oceania
- Industrialized Asia
- Sub-Saharan Africa
- North Africa, Western Asia & Central Asia
- South and Southeast Asia
- Latin America



The scope is global in terms of agricultural commodities



Cereals (excluding beer)



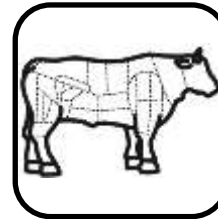
Starchy roots



Oilcrops & Pulses



Fruits (excluding wine)



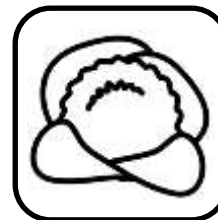
Meat



Fish & Seafood



Milk (excluding butter)  
& Eggs

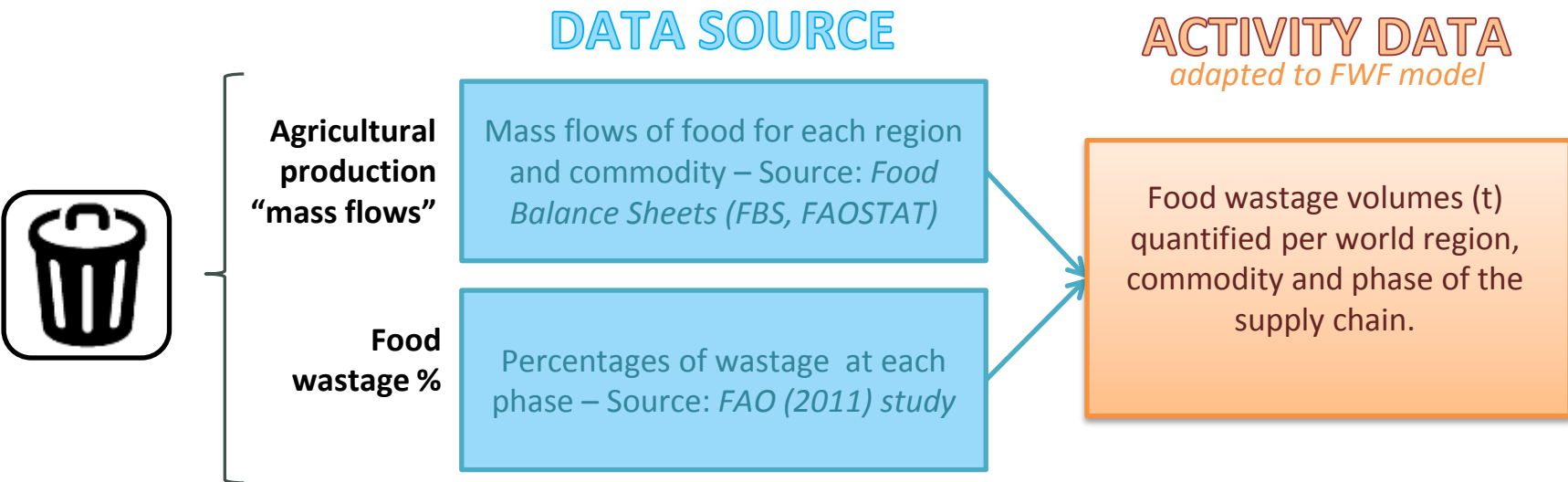


Vegetables

# Data sources – Food wastage volumes



Food wastage quantities are obtained by combining data on food mass from FAO and wastage percentages from literature



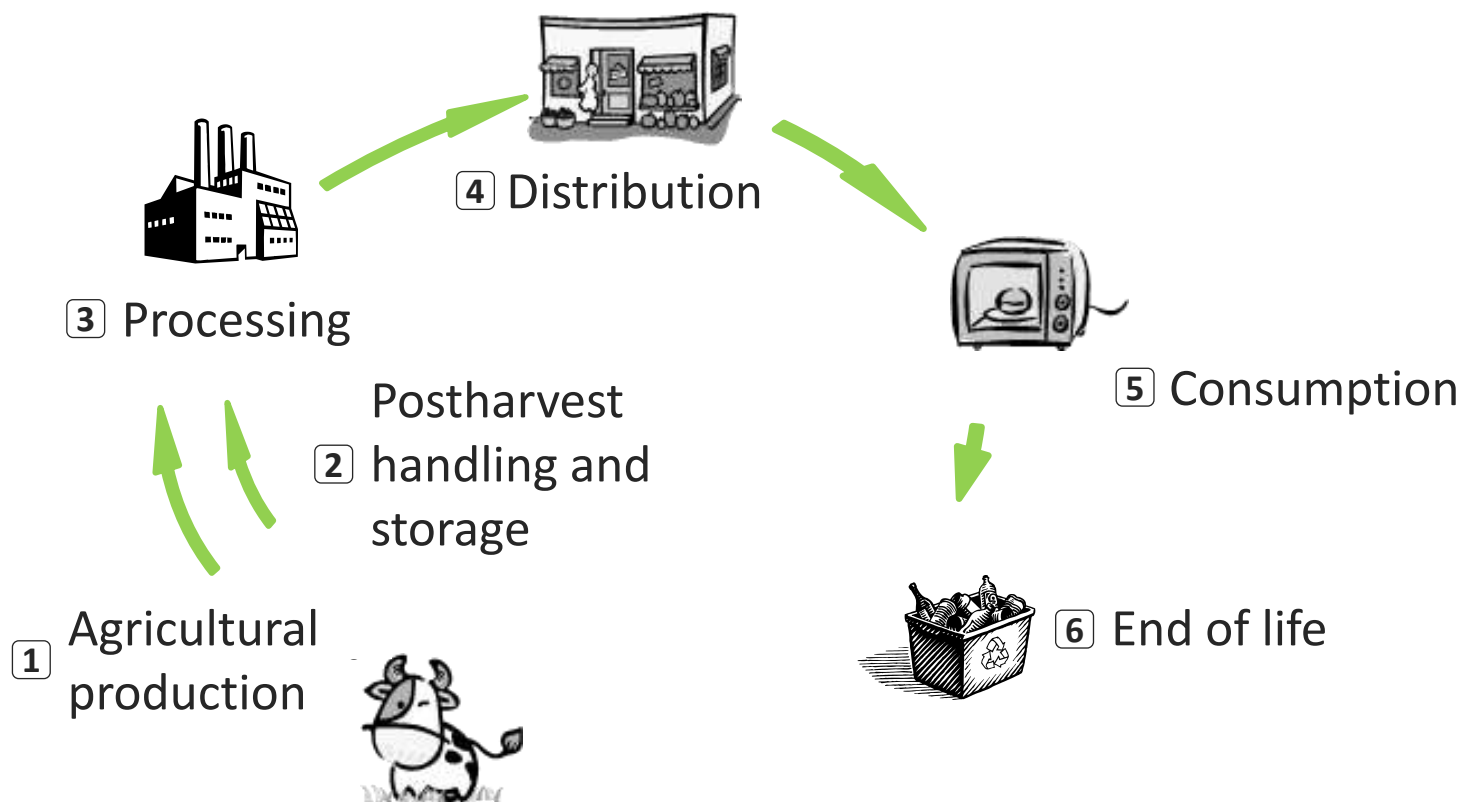
❑ The model has also calculated 2 types of food wastage volumes:

- Volumes for the edible and the non-edible parts of food;
- Food wastage for only the edible part of food.

# What is the environmental impact of food waste?



The later in the life cycle a product is wasted, the greater the impacts of its useless production and transformation



Sources of food wastage (stages 1 to 5) and sources of environmental impacts (stages 1 to 6) in the food life cycle.

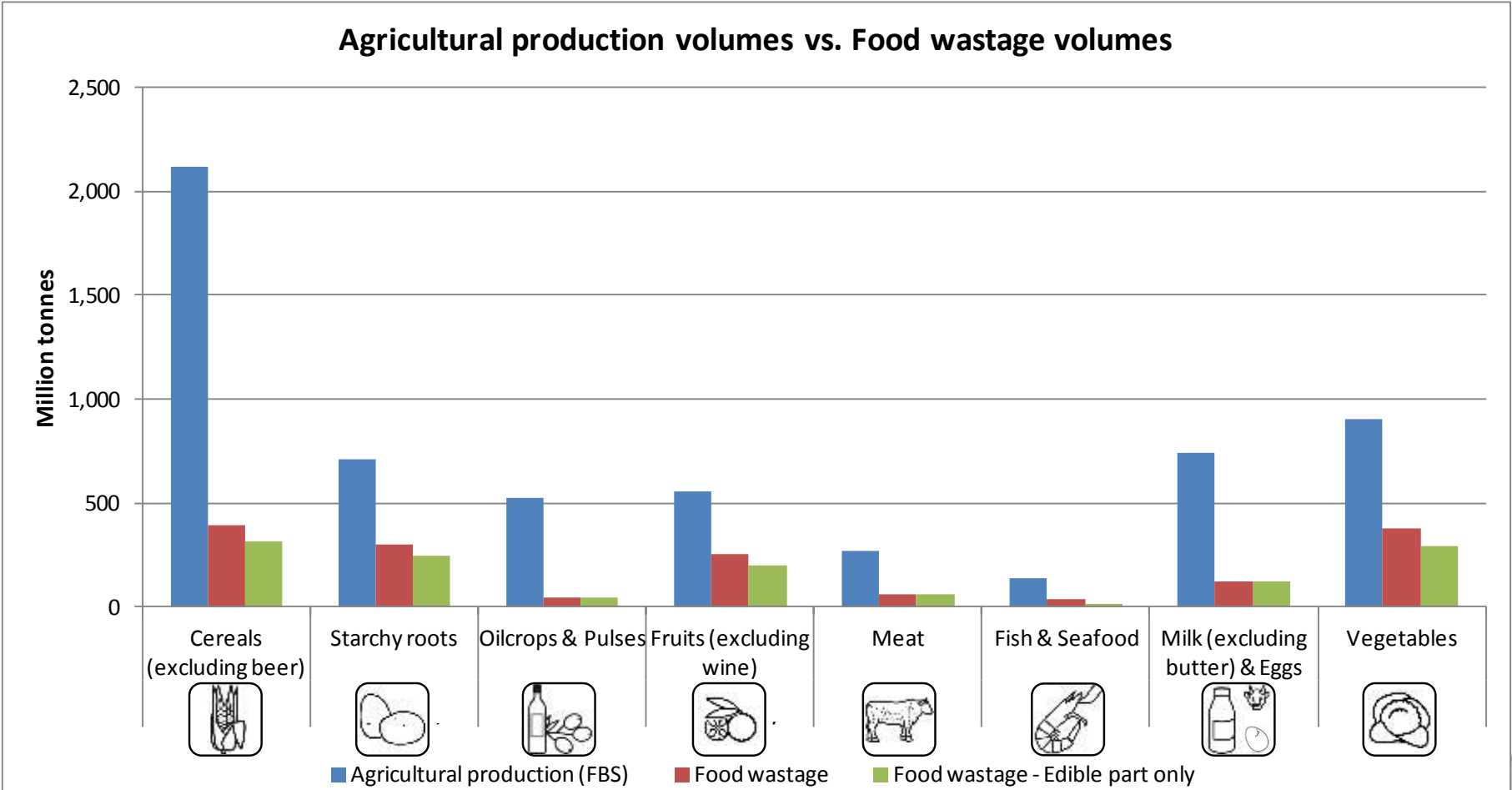


The global volume of food wastage in 2007 is estimated at 1.6 Gt of “primary product equivalents”



The food wastage for the edible part of food only is 1.3 Gt

Agricultural production volumes vs. Food wastage volumes

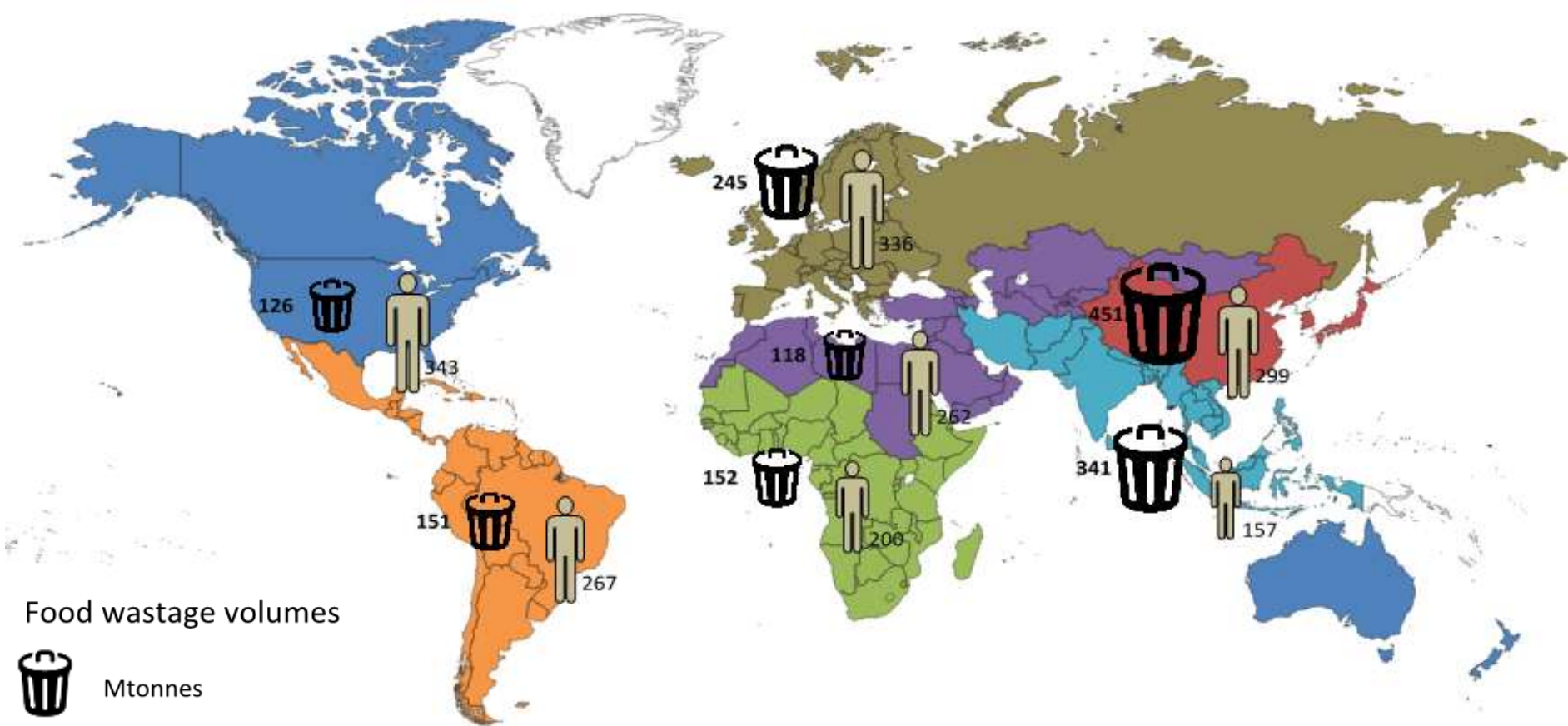


The sum of the domestic agricultural production of all countries is about 6 Gtonnes. This value includes also agricultural production for other uses than food.






Each world region has a specific profile in terms of food wastage (volumes, type of commodities)



Food waste volumes

 Mtonnes

Food waste per capita

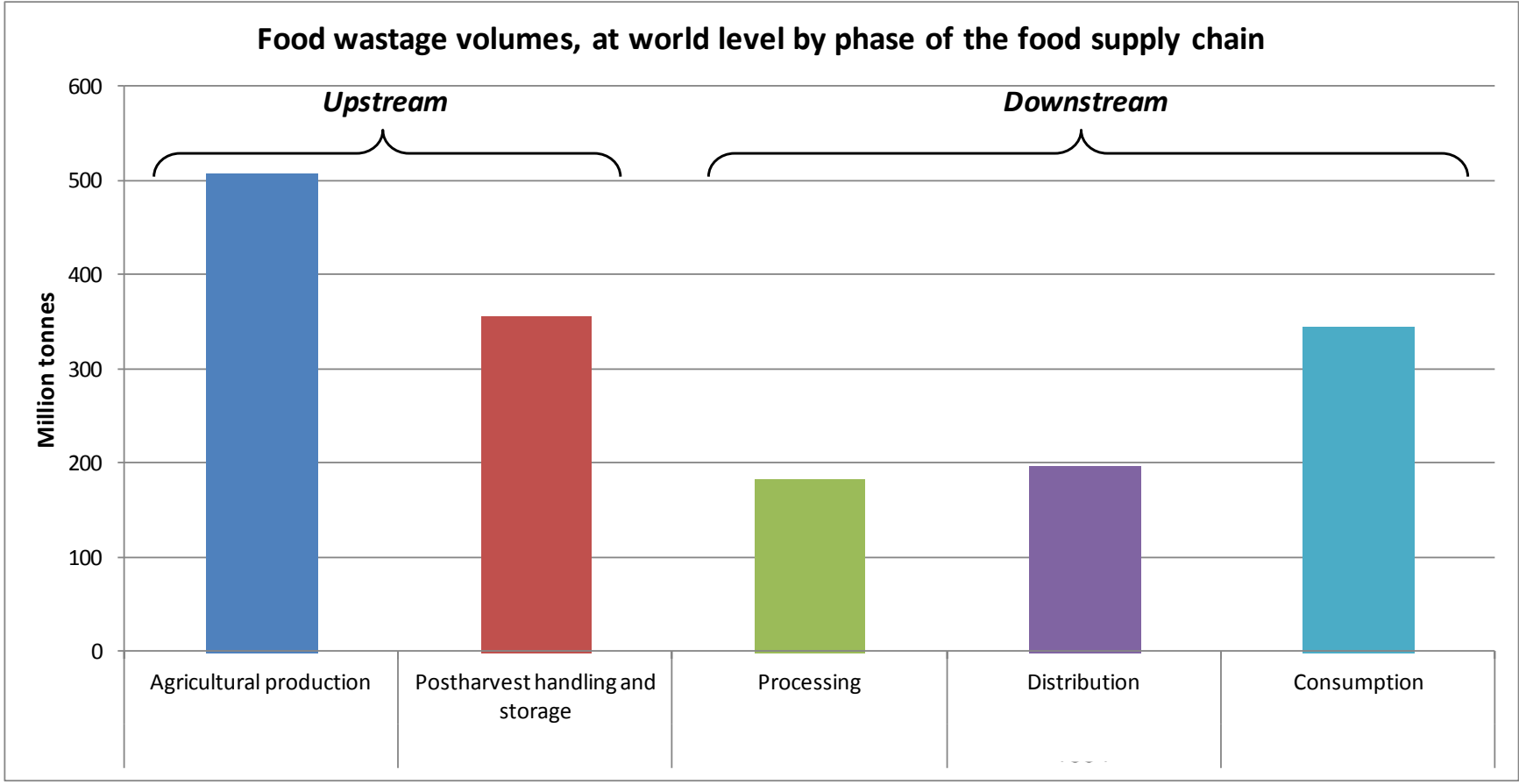
 kg of food waste per capita and per year

Volumes for the edible and the non-edible parts of food.





At global level, food wastage is balanced between the upstream (54%) and downstream (46%) of the supply chain

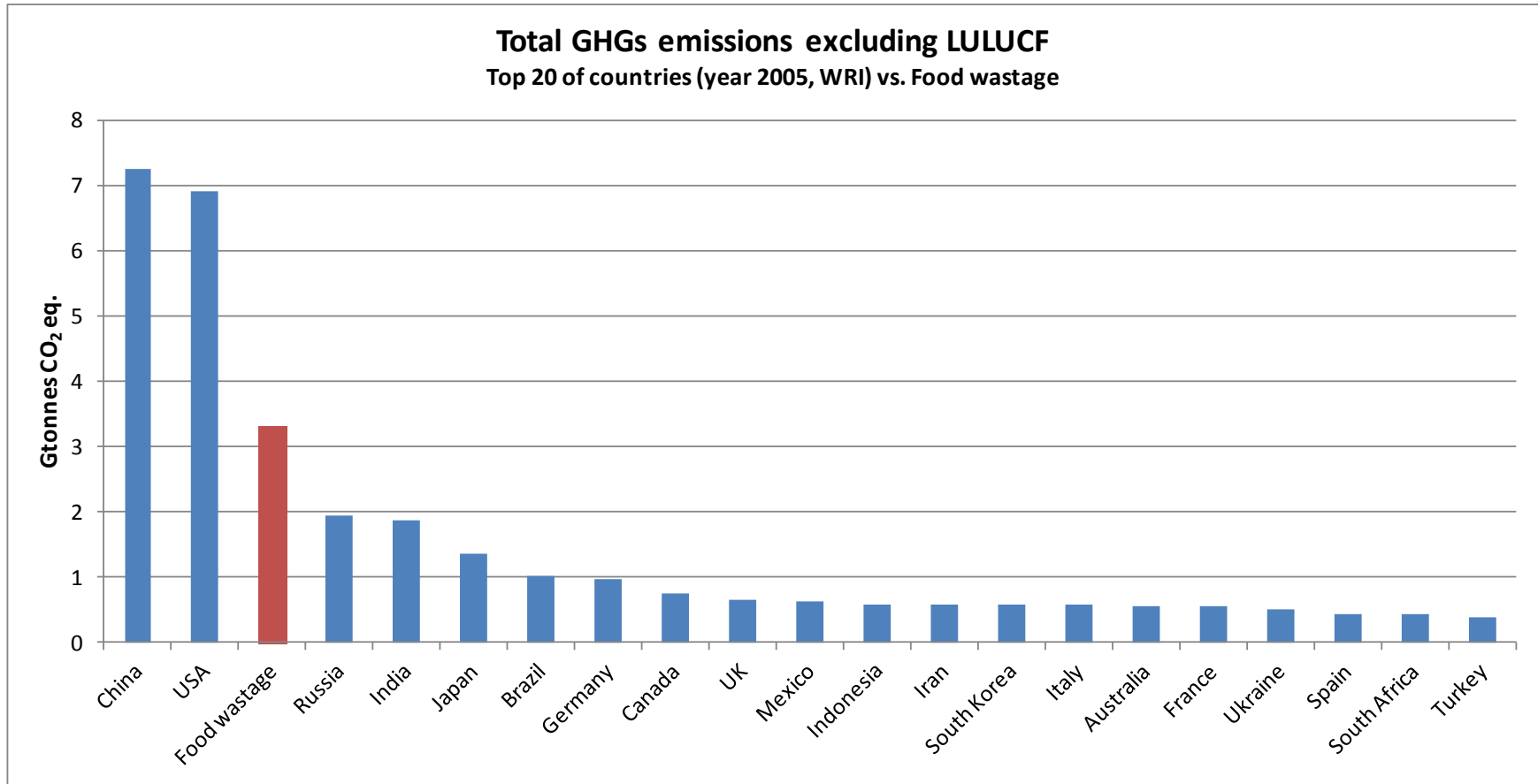




The carbon footprint of food wastage is estimated to 3.3 Gt CO<sub>2</sub> eq., equivalent to more than twice the total GHG emissions of USA road transportation in 2010



If food wastage was a country, it would rank as the 3<sup>rd</sup> top emitter



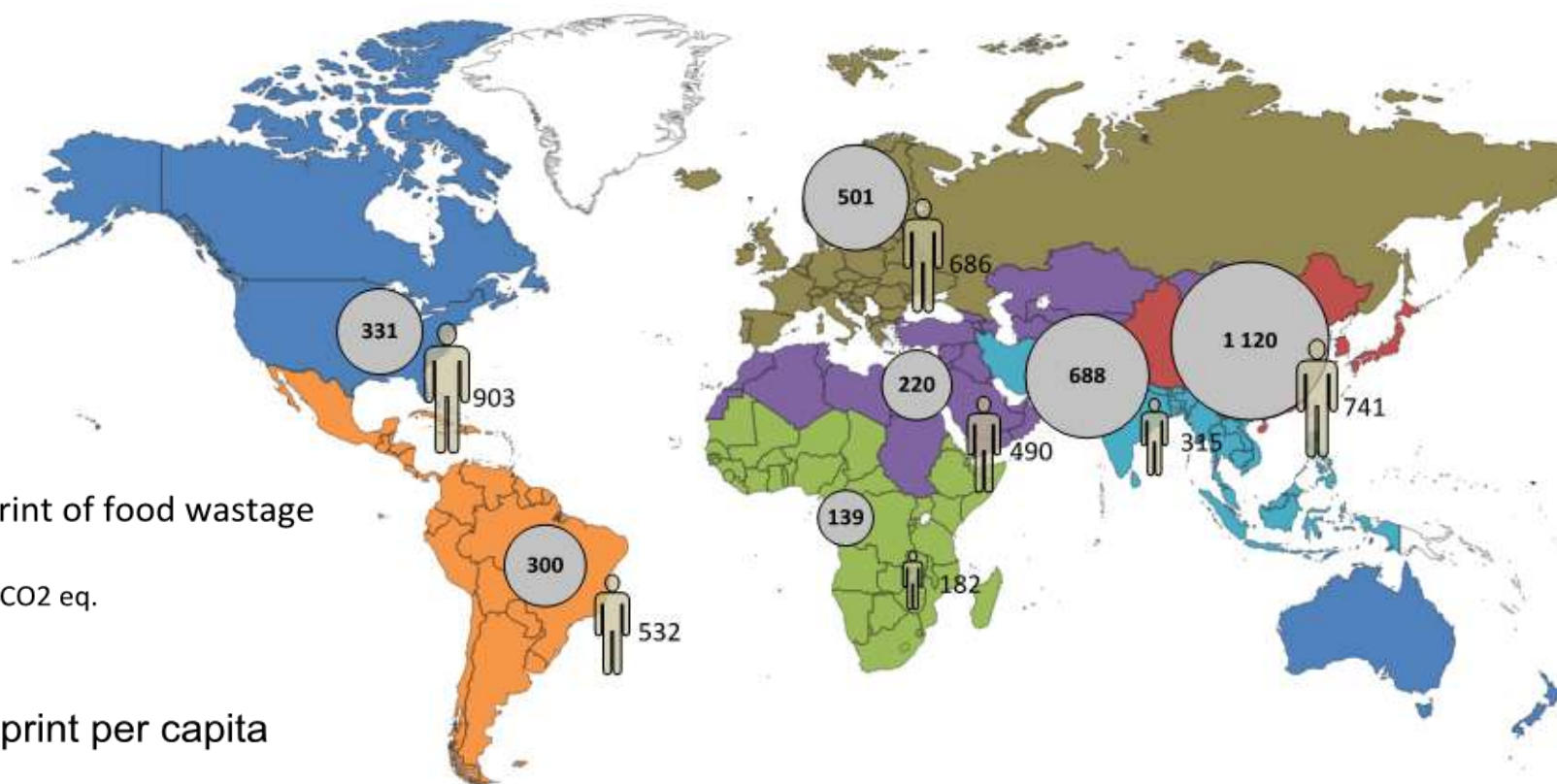
Source for blue bars: WRI, 2012. Climate Analysis Indicators Tool. Available at: <http://cait.wri.org>.



The major contributor to the carbon footprint is Asia, with 44% of the footprint in this continent due to cereals



The average carbon footprint of food wastage is about 500 kg CO<sub>2</sub> eq. per cap and per year, equivalent to 2,300 km in an average car



Carbon footprint of food wastage



Mtonnes CO<sub>2</sub> eq.

Carbon footprint per capita

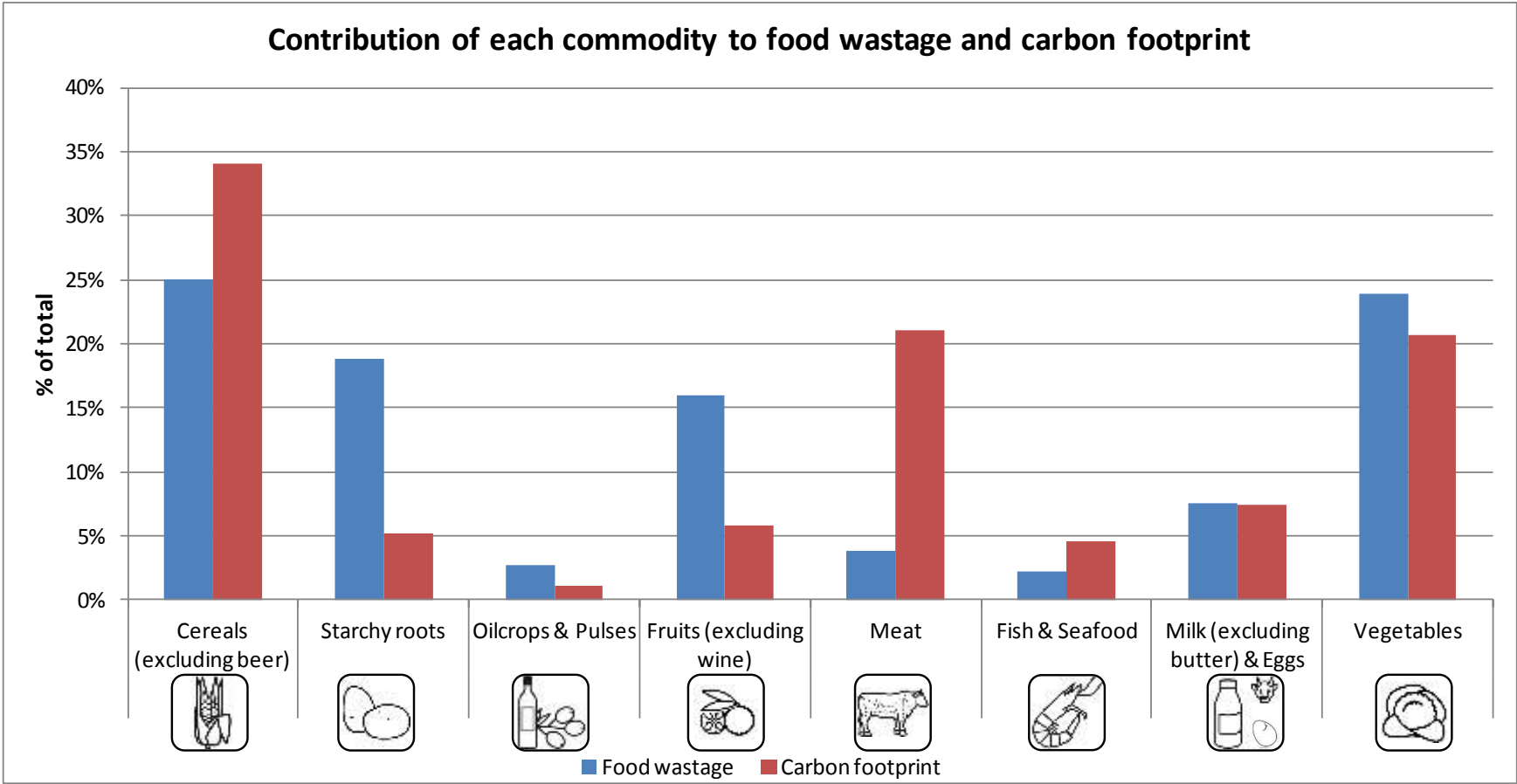


kg CO<sub>2</sub> eq. per cap. and per year



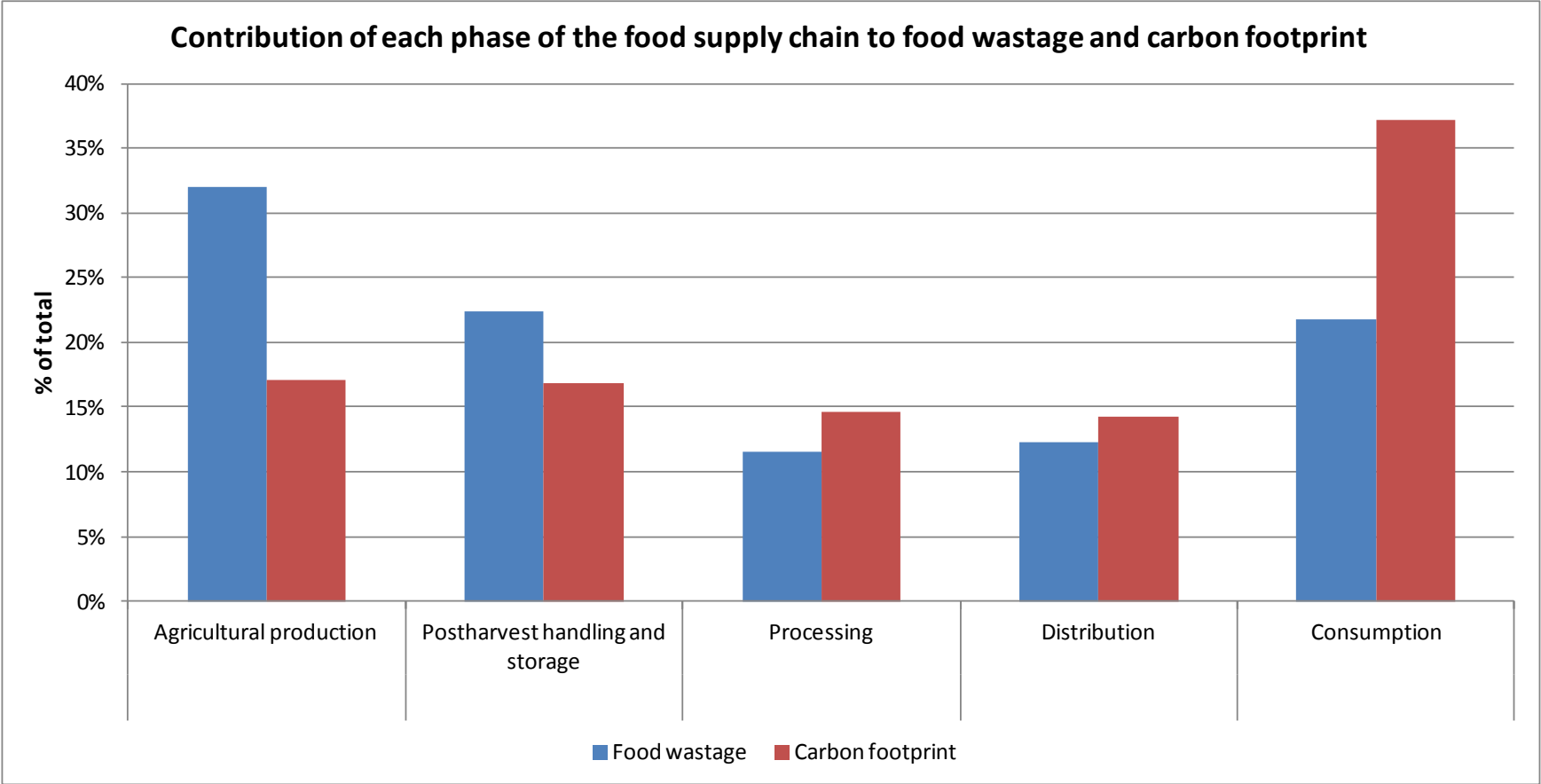
**Animal products: 33 % of global carbon footprint, but only 15 % of food wastage volume**

Contribution of each commodity to food wastage and carbon footprint



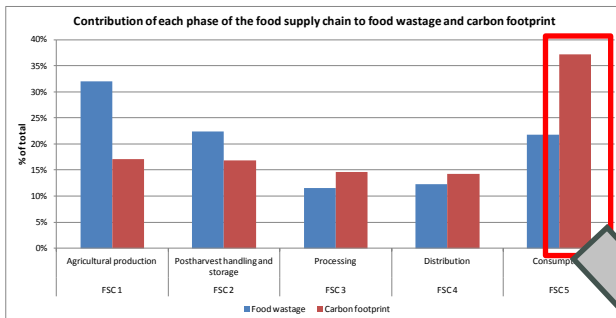


**The highest carbon footprint occurs at the consumption phase because impacts of previous phases add up**

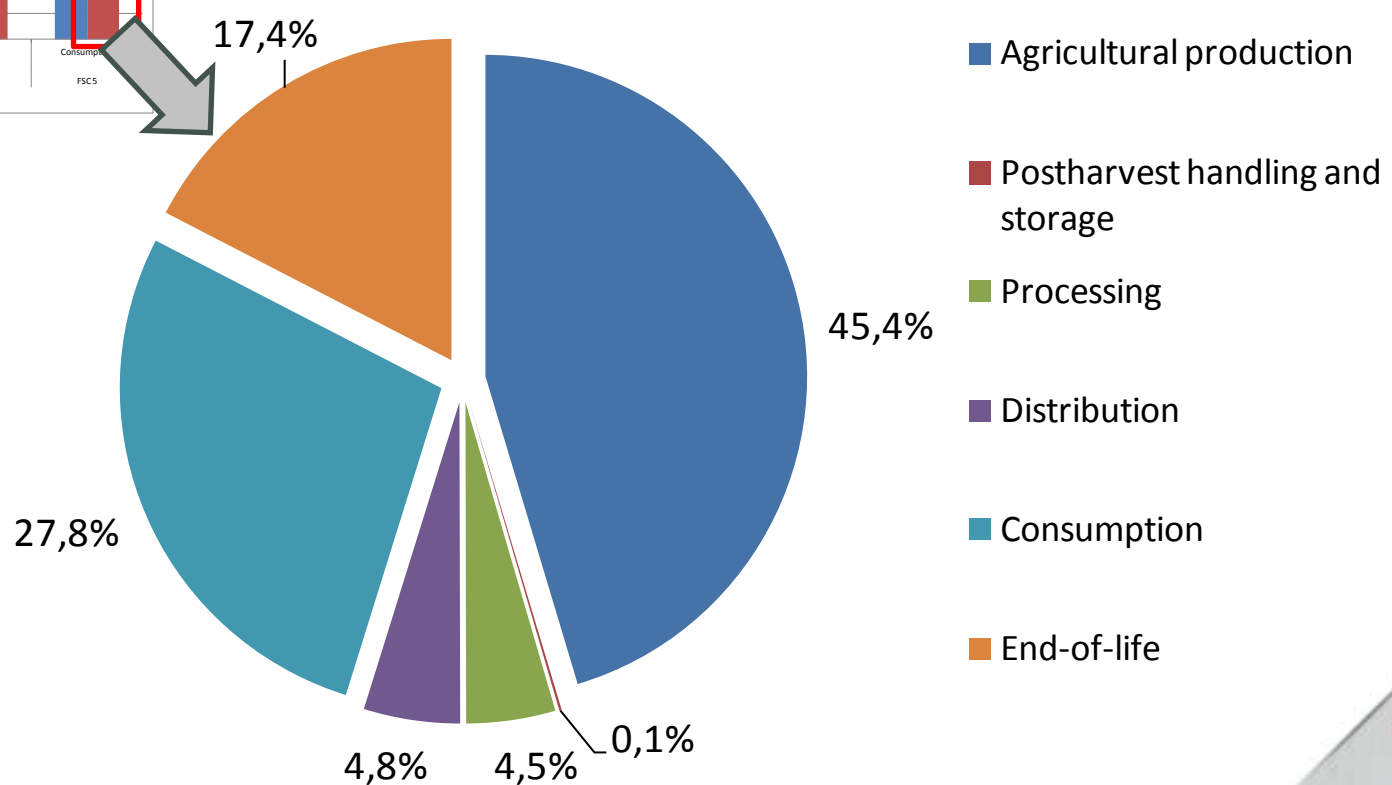




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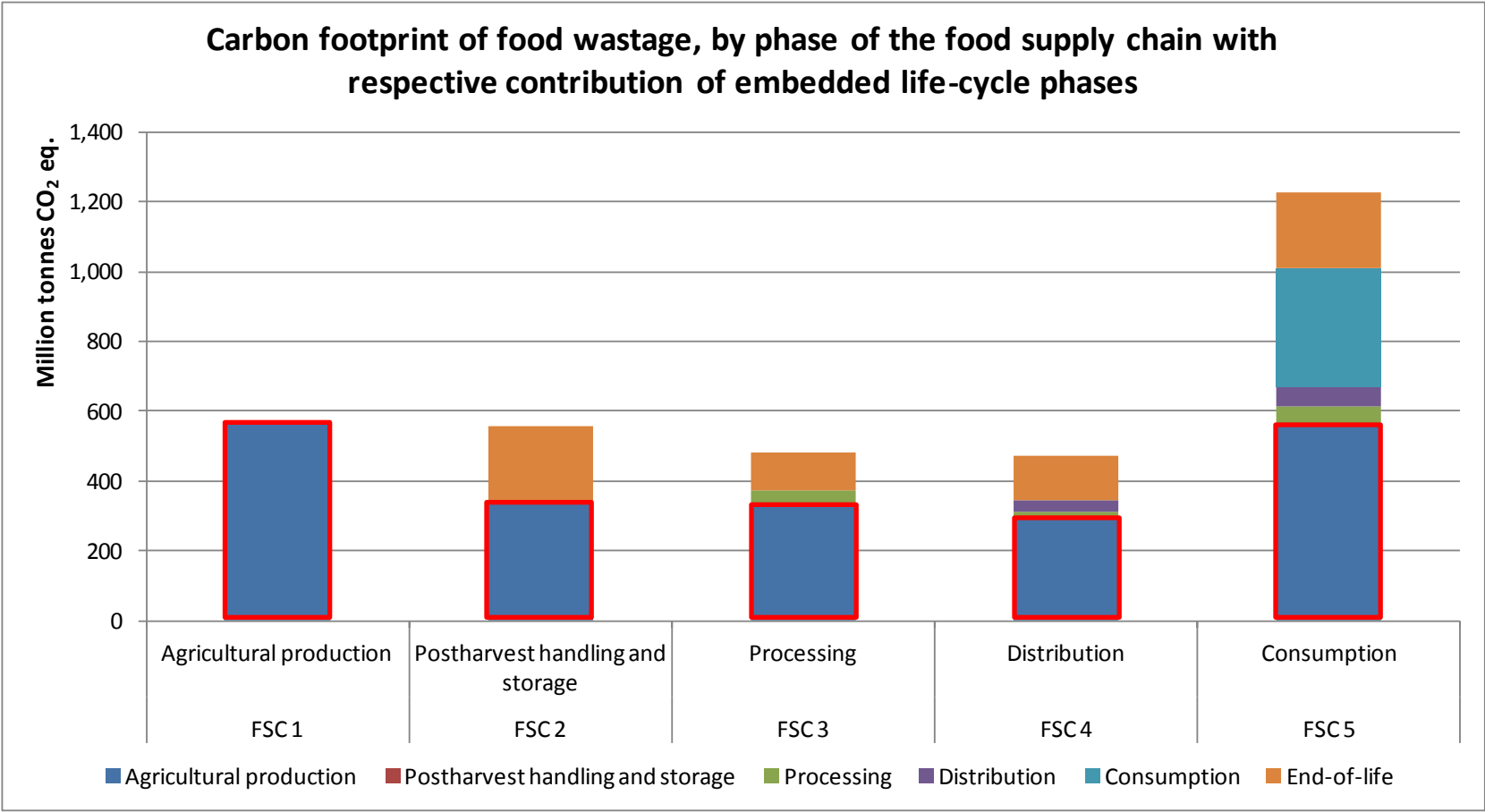


Carbon footprint at consumption phase with respective contribution of embedded life-cycle phases





**GHG emissions from the agricultural phase are always the major contributors to the carbon footprint of each FSC phase**





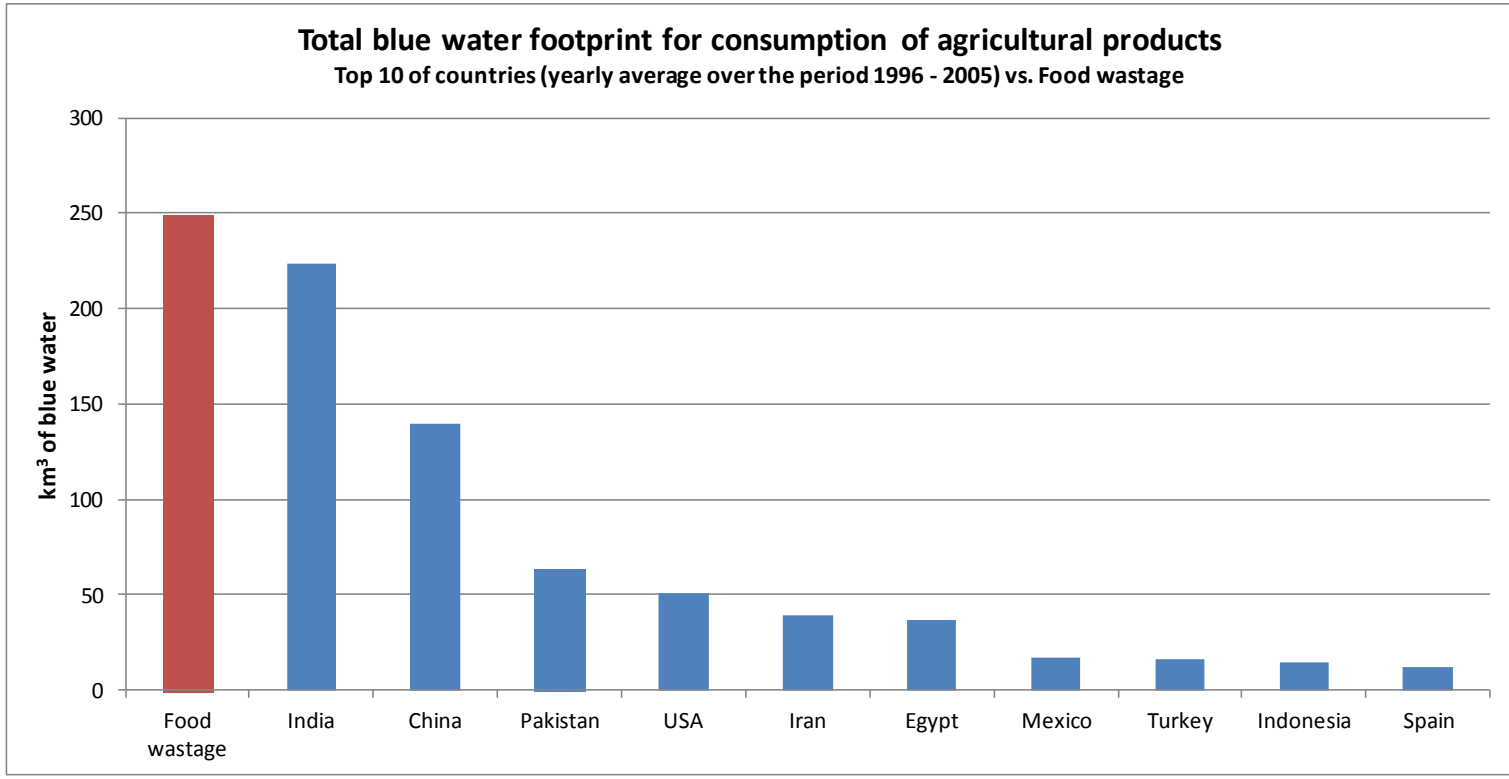
# Blue water footprint



The blue water footprint of food wastage is about 250 km<sup>3</sup>, equivalent to 3 times the volume of lake Geneva



If food wastage was a country, it would rank 1<sup>st</sup> in the list of countries' water footprint for consumption of agricultural products

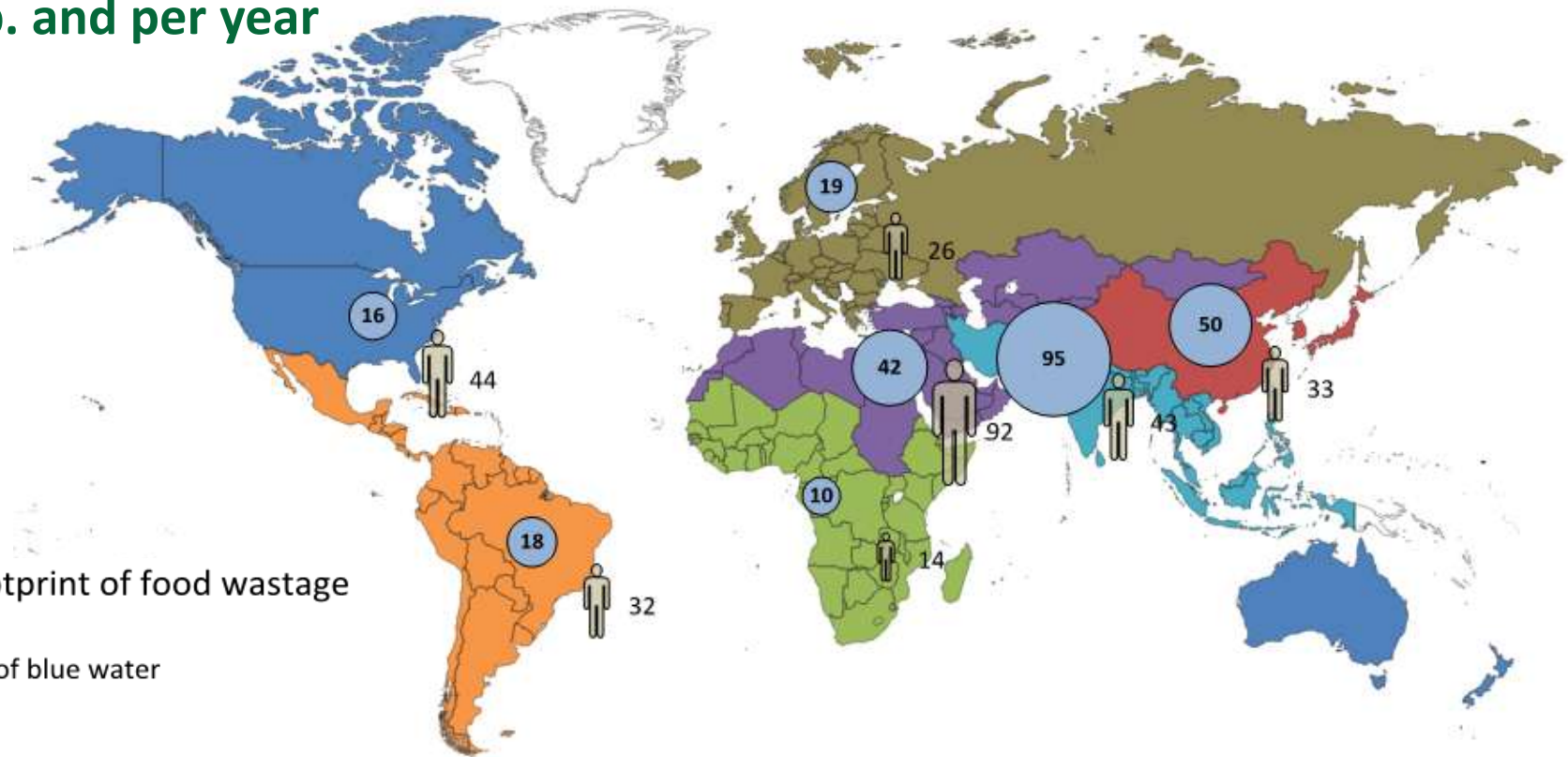







# Blue water footprint


- Major contributors are Asia and NA,WA&CA, with 60% of the footprint in this area due to cereals (mostly wheat and rice)
- The average blue water footprint of food wastage is about 38,000 L per cap. and per year



Water footprint of food wastage

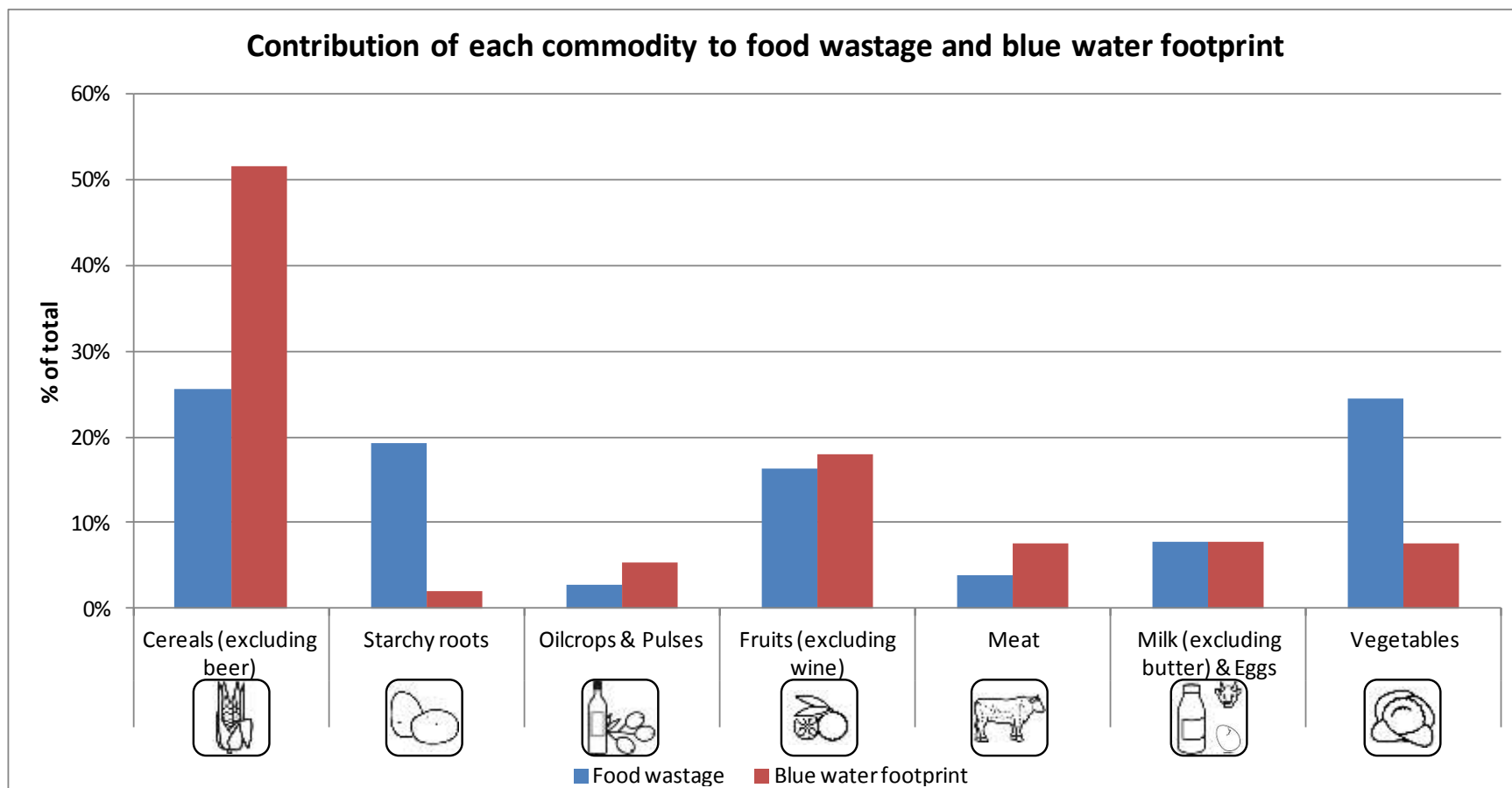
 km3 of blue water

Water footprint per capita

 Blue water m3 per cap. and per year



**Cereals and fruits contribute to 52 % and 18% of total water footprint whereas their contributions to volumes are 26% and 16%**

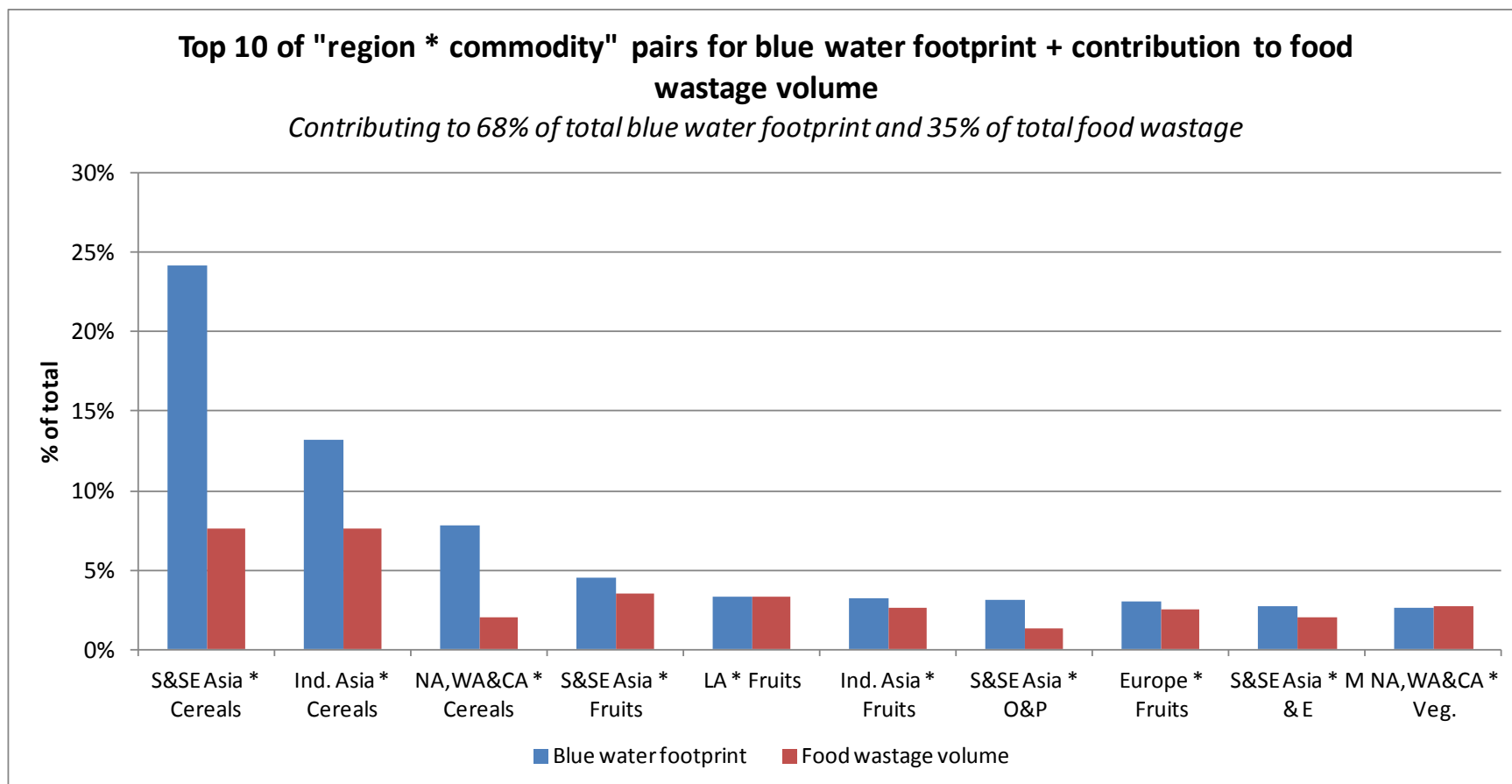


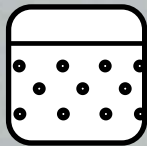


## Blue water footprint

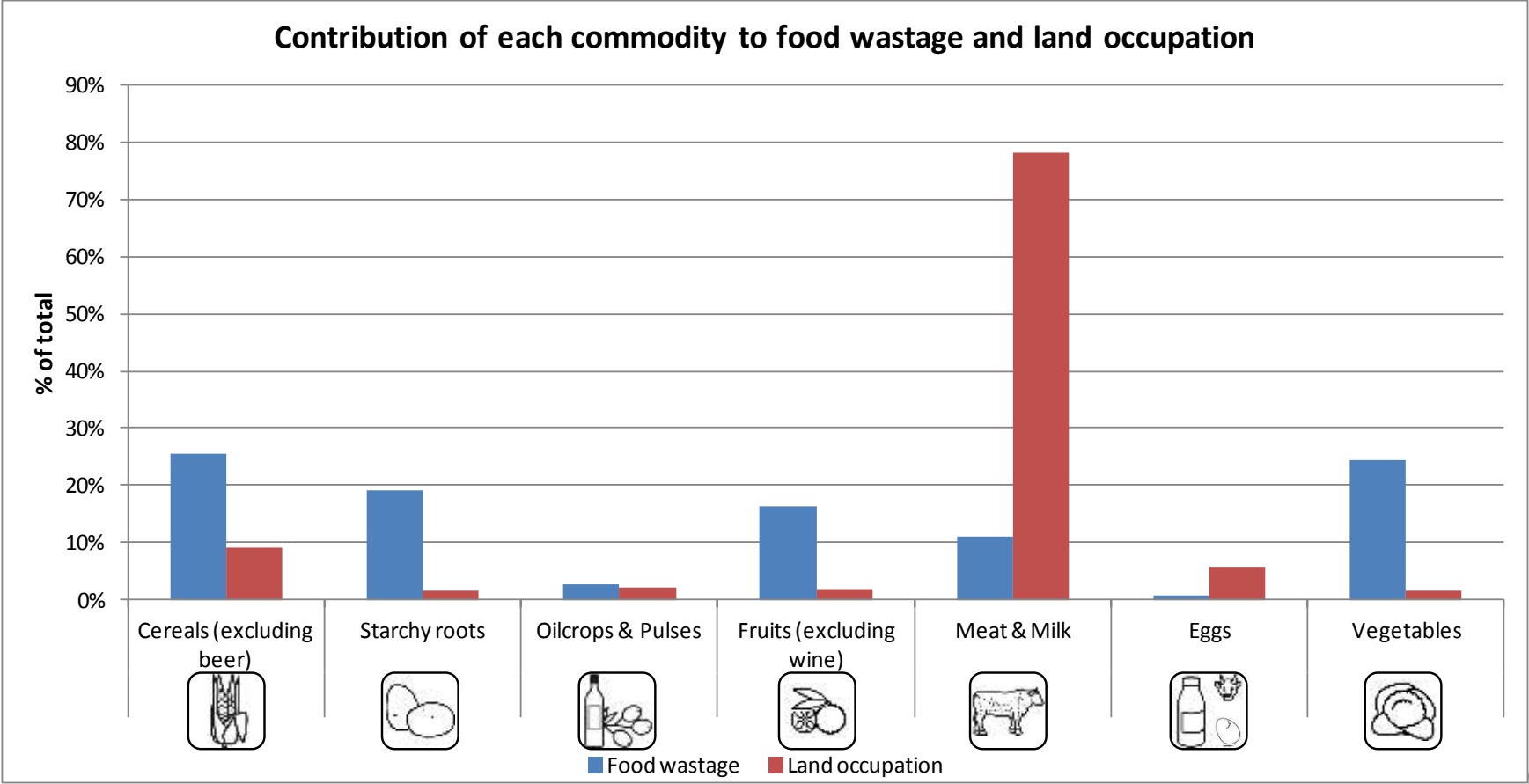


For cereals, the footprint is related to the water intensity of the commodity, whereas for fruits it is more related to the wastage volumes





The major contributors to land occupation of food waste are meat & milk, with 78% of the total surface, whereas their contribution to total food waste is 11%





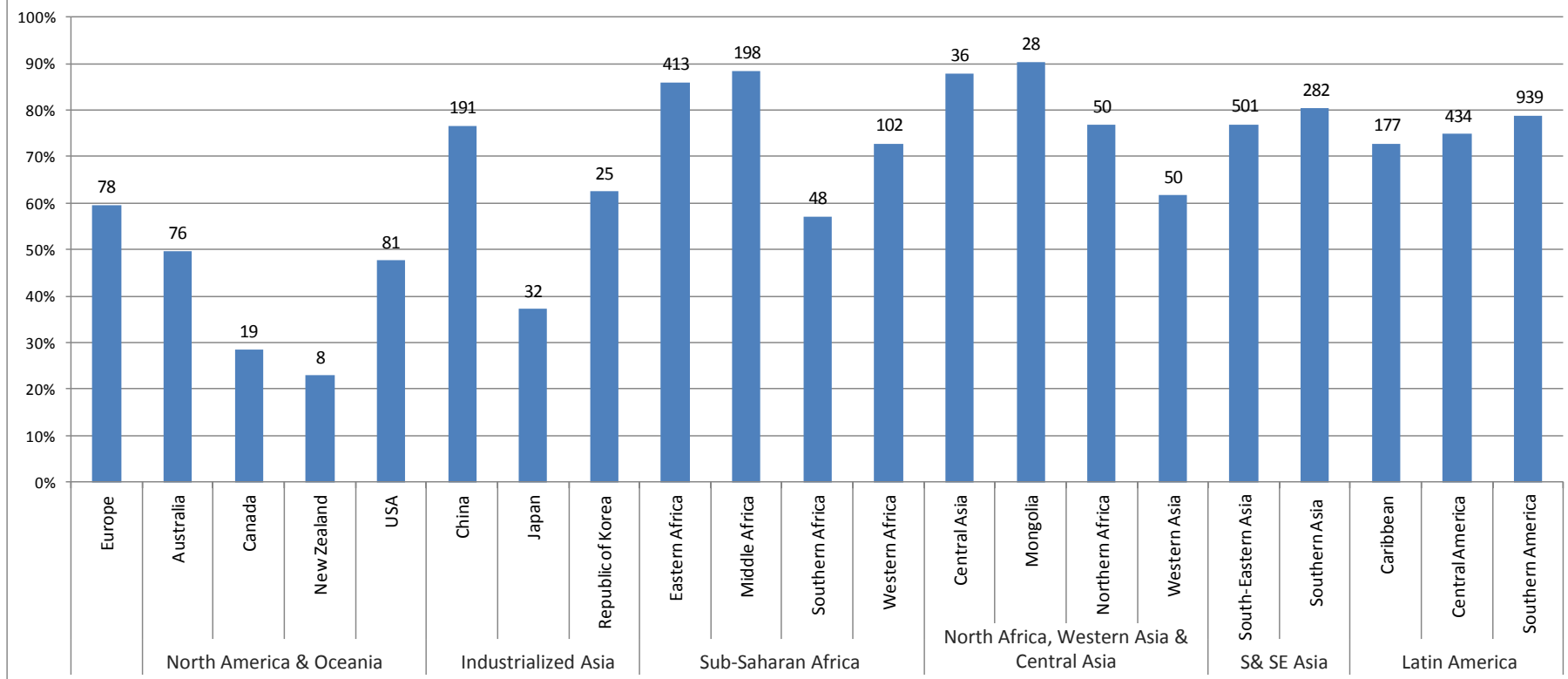
Deforestation due to agricultural expansion seems to occur today mainly in tropical and sub-tropical areas of the African continent, Western and South-Eastern Asia and South America





## Overall 66% of vulnerable/endangered/critically endangered species are threatened by agriculture

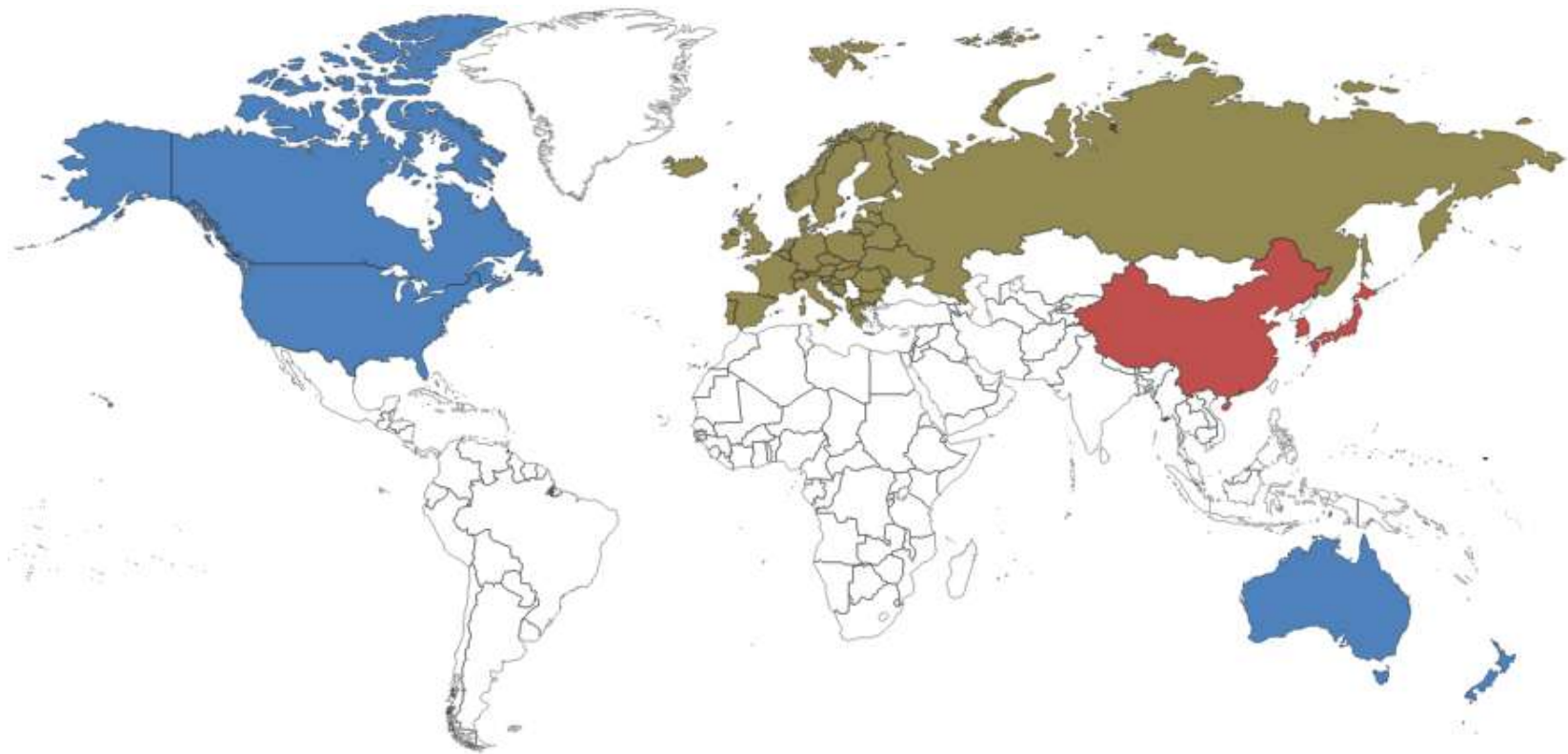
Percentage of red list species threatened by agriculture  
(Mammals, Birds, Amphibians)







Fisheries have been declining or collapsing in most regions' seas since 1950 but this decline occurs at very different rates



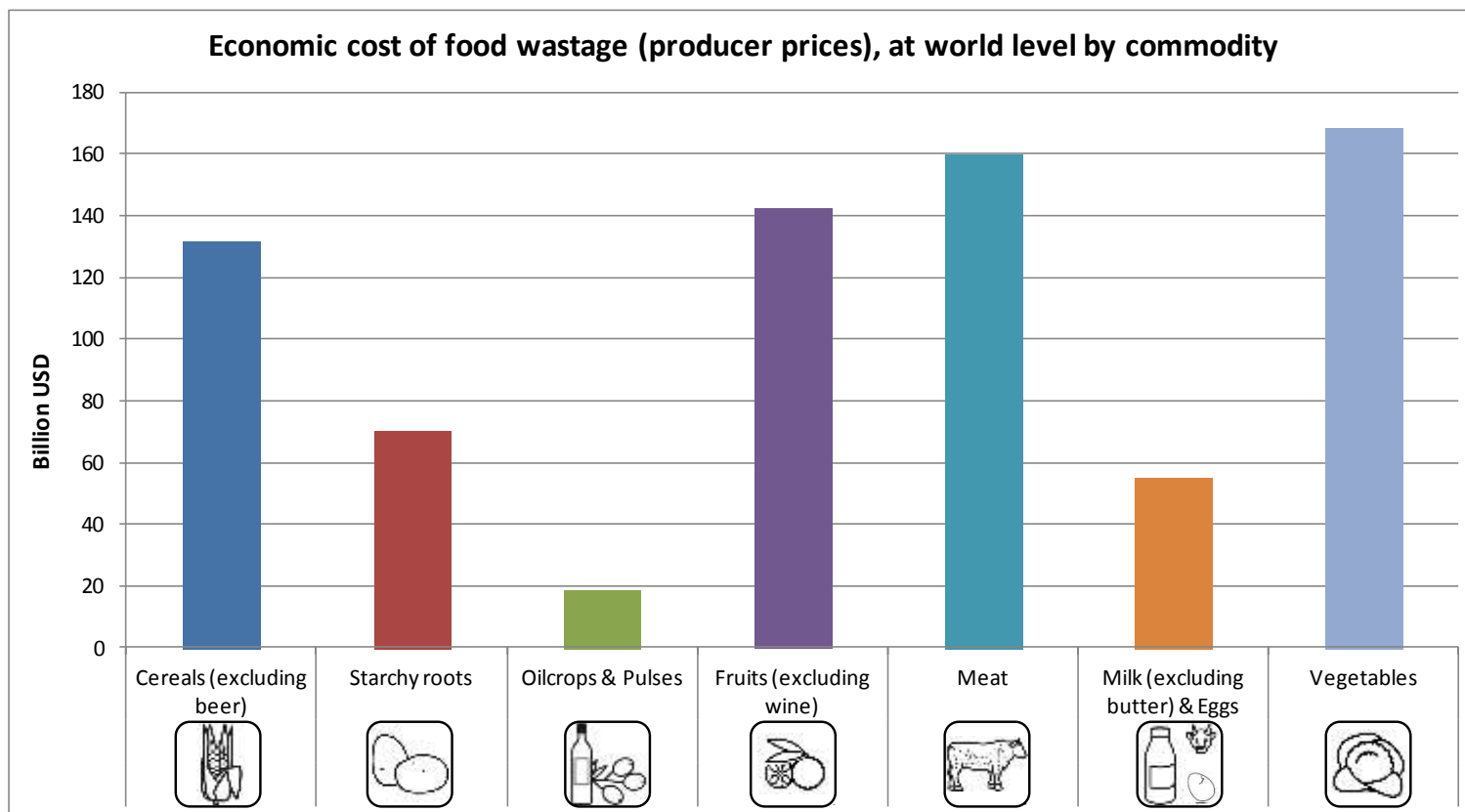
Europe, NA&Oce, Ind. Asia have approximately  $\frac{2}{3}$  of their seas showing declining trends in Marine Trophic Index since 1950.



On a global scale, the cost (based on 2009 producer prices) of wastage is 750 billion USD



The major contributors are vegetables, meat, fruits and cereals





- ❑ Food wastage ranks as the **3<sup>rd</sup> top emitter** after USA and China and occupies close to **30% of the world's agricultural land area**. Its annual blue water footprint is equivalent to **3 times the volume of lake Geneva**.
- ❑ With such figures, a reduction of food wastage at global, regional, and national scales would have a **substantial positive effect** on natural and societal resources.
- ❑ By **highlighting the magnitude** of the environmental footprint of food wastage, the results of this study – by regions, commodities or phases of the food supply chain – allow **prioritizing actions and defining opportunities** for various actors' contributions to resolving this global challenge.

## Potential improvement areas



### There are several potential improvement areas for future research

#### ☐ Quantification of food wastage : Definition of food waste / Food wastage percentages

- Need for a harmonization, which would enable more comparability of national data and between studies quantifying food waste arisings.

#### ☐ Quantification of environmental impacts

- In further research, priority should be given to the integration of land use change in the carbon footprint accounting.
- Certain aspects could not be taken into account (e.g. land occupation and water footprint relating to non-agricultural phases; water footprint and land occupation for fish & seafood ).



# WRI-UNEP Food Loss & Waste Protocol

## WRI-UNEP Food Loss & Waste Protocol

# Addressing food waste is an opportunity for...

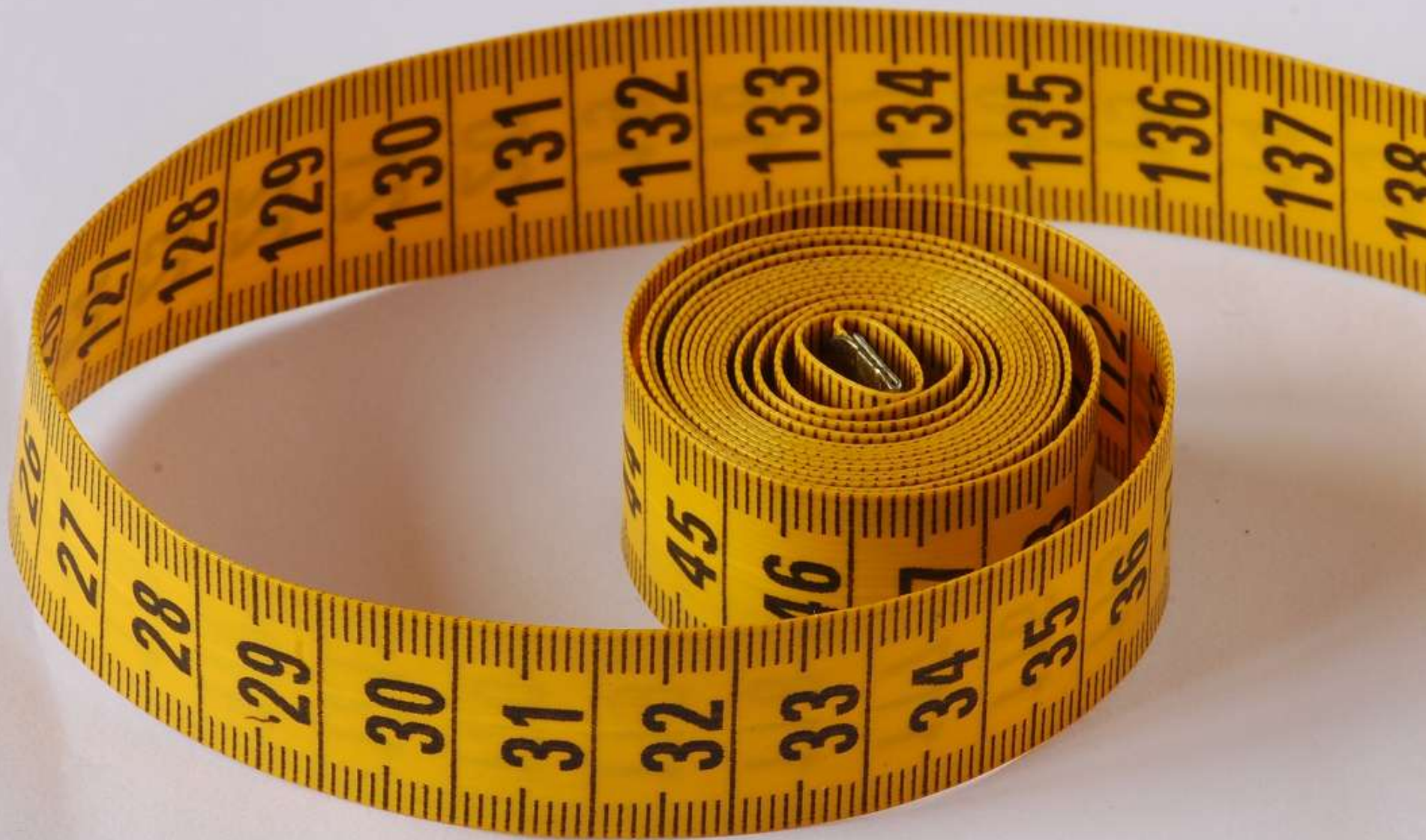
- ✓ Economic gains
- ✓ Environmental improvements
- ✓ Supply chain stability
- ✓ Social benefits
- ✓ Employee morale

... a kaleidoscope of benefits



**Key recommendation:**

**Develop a global “food loss and waste protocol”**

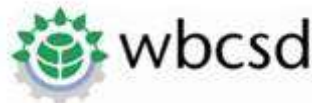




# About the Food Loss & Waste (FLW) Protocol

The vision of the FLW Protocol is that wide use of the measurement standards will empower the world to minimize food loss and waste, thereby enhancing food security, economic growth, and environmental health.

Steering Committee members:



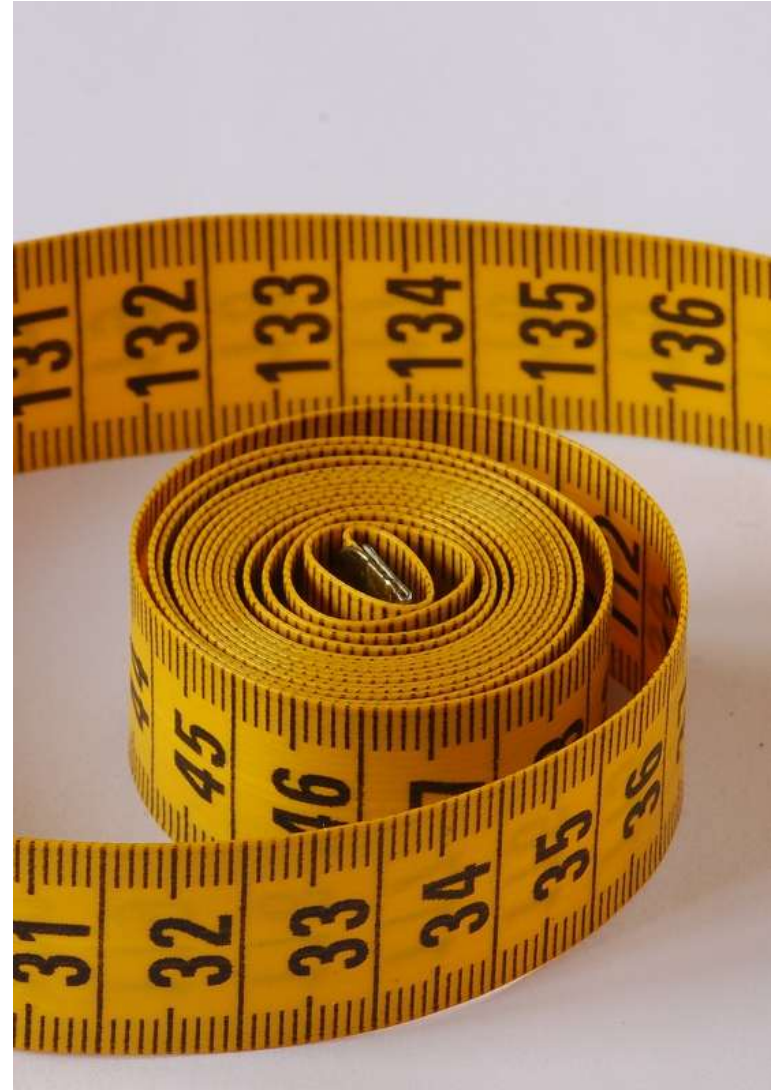
# Expected outcomes

1. Define best practice methods and data sources
2. Harmonize measurement approaches
3. Enable comparability between geographies and entities
4. Facilitate transparency across users



# Principles guiding the process

- Use multi-stakeholder process
- Build on existing initiatives
- Keep scope broad
- Meet user needs
- Avoid letting the “perfect become enemy of the good”
- Be amendable to differences





# Governance



# FLW Protocol timeline

Activities	2013		2014				2015			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Announce FLW Protocol process		√								
Confirm Steering Committee and governance		√								
Send call for participation for Technical Working Groups & External Review Group			√							
Define scope of Technical Working Groups			√							
Outline structure of FLW Protocol										
Develop draft content (Technical Working Groups)										
Identify pilot testers										
Complete first full draft of FLW Protocol										
Pilot test draft FLW Protocol										
Gather feedback from External Review Group										
Revise draft FLW Protocol										
Publish FLW Protocol version 1.0*										
Provide public updates on FLW Protocol development (quarterly emails, webinars, conference presentations)										

\*Aspiration is to launch September 2015 to correspond with the annual UN General Assembly meeting.

# Technical Working Groups

## Upstream

- 1. Pre-harvest** (before harvest or slaughter on the farm) – tbd by TWG
- 2. Agricultural harvest** (during harvest operation, animal slaughter, milking, fishing)
- 3. Post harvest handling and storage** (handling, storage and transportation between farm & downstream)

## Downstream

- 1. Processing** (industrial or domestic processing and/or packaging)
- 2. Wholesale and Retail** (system related to retail stores primarily engaged in selling food for home preparation and consumption)
- 3. Institutional** (establishments selling and distributing prepared foods & drinks for consumption on premises or to be taken away)
- 4. Consumption away from home** (food and drink eaten on the go, in the workplace etc.)
- 5. Consumption at home** (food and drink that enters the home)

**Subgroups will be determined by  
TWG chairs**

# Basic high-level structure of FLW Protocol

## Main content

Guidance for users on why, what and how to measure

- Step 1. Clarify why measuring food loss/waste
- Step 2. Select what to measure
- Step 3. Identify how to measure in a credible, consistent, practical way

## Supplementary material

- Case studies about how data has been measured and collected, and how users are applying it
- Other resources to answer user questions about developing strategies (ex. FAO/UNEP/WRAP guide, FAO toolkit, FDE toolkit, FWRA best practices guide)



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