

# Lost food, wasted water: global food supply chain losses and their impacts on freshwater use

Reducing food losses and waste is considered to be one of the most promising measures to improve food security in the coming decades [1]. Food losses also affect our use of resources, such as freshwater, cropland, and fertilizers.

## Objectives

In this study we aim to estimate the global food supply losses due to lost and wasted food crops, and the water resources used to produce these losses. We also aim to quantify the potential savings of food supply and related resources that could be made by reducing food losses and waste.

We used publically available global databases to conduct the study at the country level. The food supply chain (FSC) data were derived from FAO Food Balance Sheets [2], food loss and food waste percentages from Gustavsson et al [3] and water footprint data from Mekonnen and Hoekstra [4].

## Results

We found that around one quarter of the produced food supply intended to human food (614 kcal/cap/day) is lost within the FSC (Fig 1A). The production of these lost and wasted food crops accounts for 24% of total freshwater resources used in food crop production (27 m<sup>3</sup>/cap/yr) (Fig 1B). The

largest per capita food supply losses occur in North America & Oceania (1334 kcal/cap/day) and the lowest in South & Southeast Asia (404 kcal/cap/day) (Fig 2A). The per capita use of water resources for food losses is largest in North Africa & West-Central Asia while it is the smallest in Sub-Saharan Africa (Fig 2B).

The freshwater resources used for FSC losses account for 215 km<sup>3</sup>/yr, which is around 12-15% of the global consumptive water use. In three countries, the use of water resources for FSC losses exceeds the available resources, namely Kuwait (595%), Saudi Arabia (115%), and United Arab Emirates (222%).

## Discussion and conclusions

If the lowest loss and waste percentages achieved in any region in each step of the FSC could be reached globally, food supply losses could be halved. By doing this, there would be enough food for approximately one billion extra people. Reducing the food losses and waste would thus be an important step towards increased food security, and would also increase the efficiency of water resources use in food production.

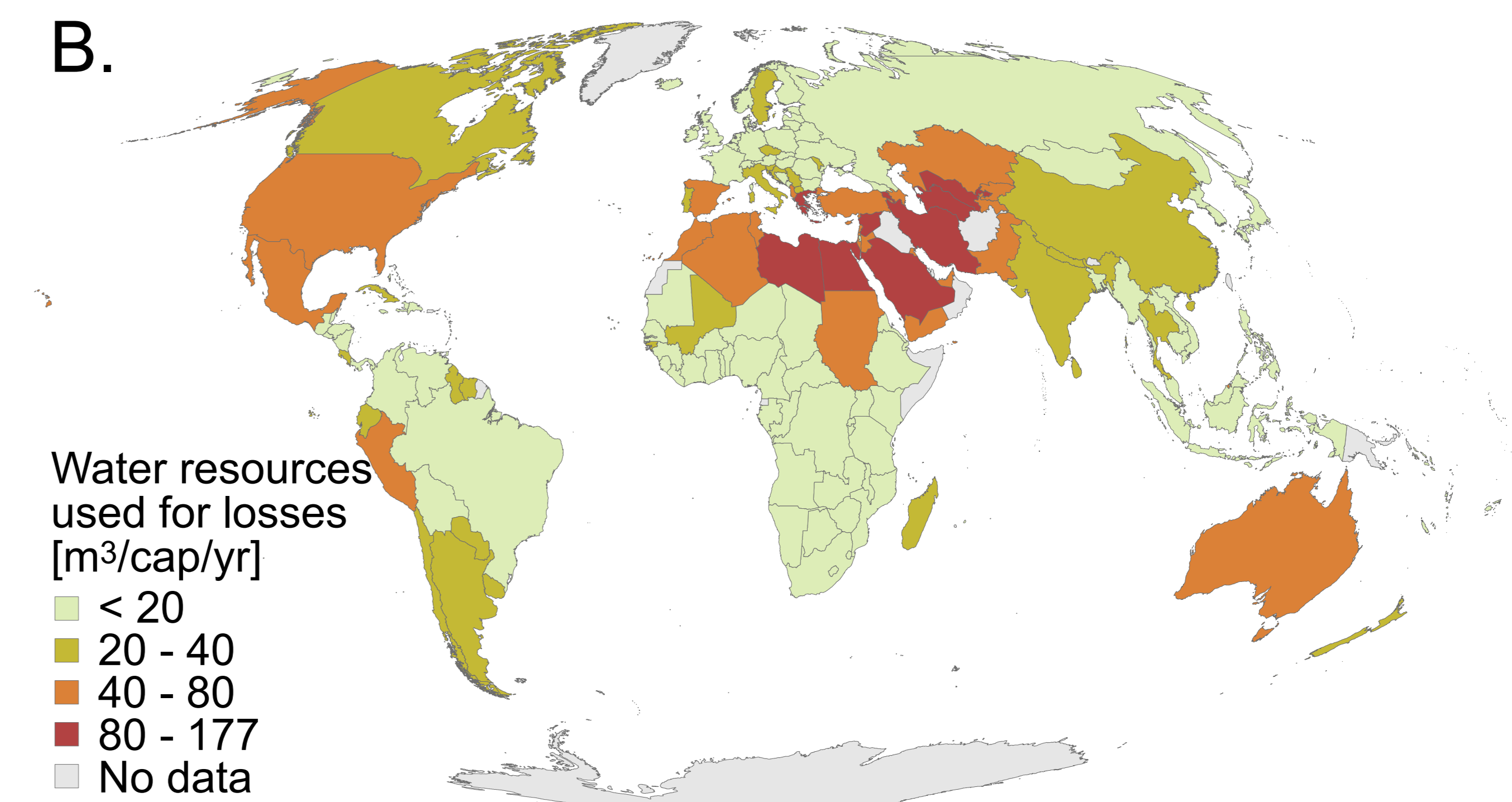
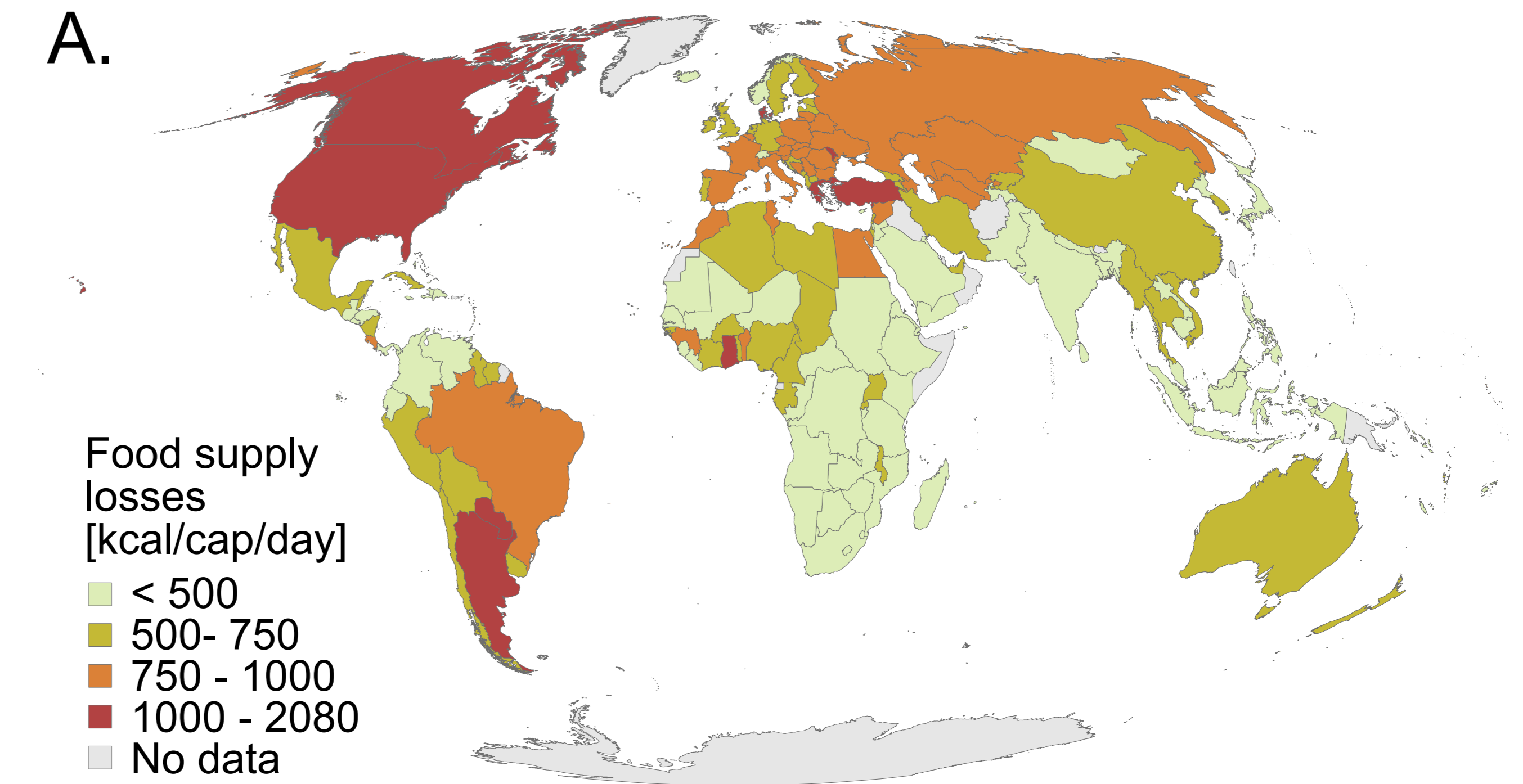
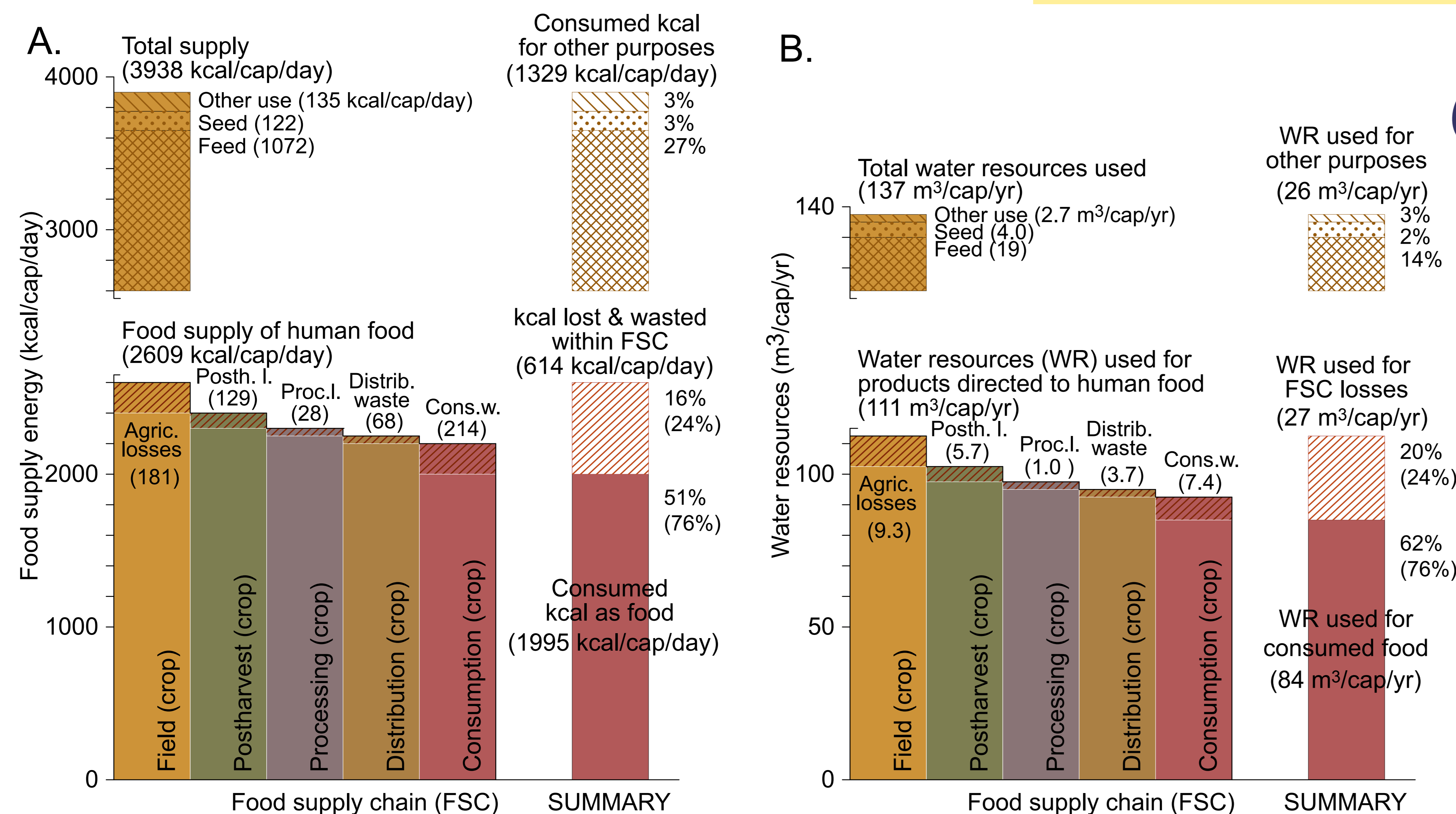


Figure 2: Country results of A: Food supply losses and waste; and B: Per capita water resources used for FSC losses.



“ Around 1/4 of the food supply of produced food, and used water resources, are lost in the food supply chain

Figure 1: Division of the produced and lost food supply, and water resources used for production and FSC (food supply chain) losses averaged over the years 2005-2007; A: food supply (kcal/cap/day); B: water resources (WR; m<sup>3</sup>/cap/yr). The losses and waste are calculated in our analyses only for the fraction intended to human food.

“ One billion extra people could be fed if food crop losses could be halved

## References

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2. FAO 2011 FAOSTAT - *FAO database for food and agriculture*.
3. Gustavsson J, et al 2011 Global food losses and food waste: extent, causes and prevention. *Report for FAO*
4. Mekonnen M M and Hoekstra A Y 2011 The green, blue and grey water footprint of crops and derived crop products *Hydrology and Earth System Sciences* 15 1577-600

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