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Environmental impact of blue water use by adults aged 18-64 on the Island of Ireland

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Blue water is sourced from rivers, lakes, and reservoirs and is used for drinking water, growing crops, and food production[(1)]. Approximately 75% of blue water use (BWU) comes from food systems[(2)]. Dietary change is necessary to meet net zero BWU sustainability goals by 2050[(3)]. While there is some information on diet-associated BWU for the Republic of Ireland (ROI)[(4)], BWU across the Island of Ireland is unknown. This study aimed to quantify the environmental impact of BWU of daily diets across adults aged 18-64 on the Island of Ireland, to determine population characteristics, nutrient intakes and key food sources influencing emissions.

The Northern Ireland sub cohort of the UK National Dietary Nutrition Survey (2016-2019)[(5)]and the Irish National Adult Nutrition Survey (2008-2010)[(6)] were analysed. Information on food and nutrient intakes was extracted from four-day food diaries for a total of 1,484 adults aged 18-64 years. BWU values were assigned for each food[(7)] and the population was grouped into tertiles of low (T1), medium (T2), and high (T3) BWU. Differences in population characteristics, key nutrients (%TE or per 10MJ) and contributing food sources were examined across these tertiles. Statistical analysis was performed using chi-square and one-way ANOVA with covariates (age, BMI, Sex, Survey type and social class) and correcting for multiple comparisons as appropriate ($P<0.001$).

BWU for the Island of Ireland was 481.9 ± 440.4 L/day, 524.7 ± 448.0 L/day for Northern Ireland and 474.9 ± 438.6 L/day for the ROI and 100% of the population did not exceed the BWU planetary boundary of ≤786 L/day[(8)]. Males had a higher contribution to the total BWU than females on the Island of Ireland (513.3 ± 482.2 L/day vs 453.2 ± 385.8 L/day). 'Tea, coffee and water' (76%), 'rice and rice dishes' (4%) and 'fruit and fruit juice' (2.5%) were the greatest contributors to BWU. When tertile analysis was performed, BWU from 'tea, coffee and water' was significantly higher for T3 at 837 ± 468.8 L/day versus T1 (57 ± 50.9 L/Day), this was similar for 'rice and rice dishes', where BWU in T3 was 26.3 ± 44.0 L/Day versus T1 (13.3 ± 25.2 L/Day). When nutritional analysis was performed, differences ($P<0.001$) across tertiles of BWU were observed for energy (11% increase between tertile 1 and 3), magnesium (12% increase across tertiles) and potassium (8% increase across tertiles).

Overall, a shift to more sustainable diets is needed to prevent BWU boundaries being exceeded in the future. By filling a literature gap on the environmental impact of the Northern Irish diet, this study complements previous research on the ROI, offering a comprehensive view of the BWU footprint and providing a basis for the development of strategies to improve diet-related BWU on the Island of Ireland.

References

1. Rost S *et al.* (2008) 'Agricultural Green and blue water consumption and its influence on the Global Water System', *Water Resources Research* **44**(9). doi: 10.1029/2007wr006331.
2. de Fraiture C & Wichelns D (2010) *Agricultural Water Management* **97**(4), pp. 502–511. doi: 10.1016/j.agwat.2009.08.008.
3. Pye S *et al.* (2017) *Nature Energy* **2**(3). doi: 10.1038/nenergy.2017.24.
4. Kirwan LB *et al.* (2023) *Nutrients* **15**(4), p. 981. doi: 10.3390/nu15040981.
5. Public Health England (2020) *NDNS: results from years 9 to 11 (2016 to 2017 and 2018 to 2019)*. [online] GOV.UK. Available at: https://www.gov.uk/government/statistics/ndns- results-fromyears-9-to-11-2016-to-2017-and-2018-to-2019.
6. Irish Universities Nutrition Alliance (2011) The National Adult Nutrition Survey. http://www.iuna.net/.
7. Scheelbeek P *et al.* (2020), *BMJ Open* **10**(8). doi: 10.1136/bmjopen-2020-037554.
8. Chaudhary A & Krishna V (2021) *One Earth* **4**(4), pp. 531–544. doi: 10.1016/j.oneear.2021.03.006.