

# Science for Environment Policy

## A change in diet and reduction in food waste can help achieve sustainable land use

**The land use** associated with food imports to Germany outweighs that of exported food, leaving the country with a 'land debt', new research suggests. However, reducing the amount of animal products in the diet and minimising food waste could enable the country to achieve a positive land balance, the researchers conclude.

**Many countries in Europe** rely on [agricultural](#) imports from other, often less-developed, countries. This has raised concerns over the social and environmental impacts of this trade and its overall [sustainability](#). Ultimately, to achieve sustainable development, our consumption cannot exceed our resources.

In this study, researchers examined the amount of land required to meet the nutritional needs of the population of Germany and suggested methods to reduce this land use. They used data from a 2006 National Nutrition survey to measure how much food is consumed in Germany, and focused on 42 types of food and animal feed, including dairy products, meat, eggs, fish and vegetables. To assess the land required to produce these products, and whether this [land use](#) was within Germany or in other countries, they analysed data from the German government and the Food and Agriculture Organization of the UN.

The results showed that the current diet for the population as a whole requires 194 600 km<sup>2</sup> of land per year, and 69% of this is accounted for by the consumption of animal products, such as meat or dairy products. Overall, 58 200 km<sup>2</sup> of the land used is 'imported', i.e. the area of land in other countries that is used to produce imported food, and 21 600 km<sup>2</sup> was 'exported'. Therefore, the balance between imported and exported land leads to a net import of 36 600 km<sup>2</sup> of land in a single year.

The researchers calculated that, to balance imports and exports, land use would need to fall to 152 100 km<sup>2</sup>, from 2 365 m<sup>2</sup>p<sup>-1</sup>a<sup>-1</sup> (square metres per person per year) to 1 848 m<sup>2</sup>p<sup>-1</sup>a<sup>-1</sup>. This could be achieved by changing to a vegetarian or vegan diet as these were both particularly effective at reducing the need for land and would result in a positive land balance (i.e. less land imported than exported). However, following the D-A-CH diet (the official nutrition recommendations for Germany, Austria and Switzerland) would not be enough to balance the trade of land.

It is important to know whether such a shift in an entire nation's diet is realistic. To investigate this, the researchers explored whether diets have changed since the 1980s, by analysing data from 1985-1989. This showed that, by 2006, land demand fell by 14%, mainly as a result of reduced meat consumption. Land demand would need to fall by a further 22% to reach a balance, however, these results suggest that a large shift in a nation's diet has already occurred and is therefore feasible in the future.

The researchers also examined the diets of different groups of the population, finding that changing the diets of younger and middle aged men would bring the greatest land-savings. In fact, the average diet of men requires approximately twice as much land as that of women.

The researchers also investigated whether reducing food wastage would be enough to balance land use. They show that eliminating avoidable waste (i.e. excluding waste, such as bones, that cannot be eaten) at the industry, retail, catering and household levels would result in a positive land balance for vegan, vegetarian, healthy reduced-meat and D-A-CH diets. However, even eliminating waste would not be enough reduce land use for a positive land balance under the average 2006 diet.



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