

Reducing food waste could help mitigate climate change

04/07/2016 - About a tenth of overall global greenhouse-gas emissions from agriculture could be traced back to food waste by mid-century, a new study shows. A team from the Potsdam Institute for Climate Impact Research for the first time provides comprehensive food loss projections for countries around the world while also calculating the associated emissions. Currently, one third of global food production never finds its way onto our plates. This share will increase drastically, if emerging countries like China and India adopt Western nutrition lifestyles, the analyses shows. Reducing food waste would offer the chance to ensure food security, which is well known. Yet at the same time it could help mitigate dangerous climate change.



Reducing food waste can contribute to fighting hunger, but to some extent also prevent climate impacts. (Photo: Thinkstock)

“Reducing food waste can contribute to fighting hunger, but to some extent also prevent climate impacts like more intense weather extremes and sea-level rise,” lead author Ceren Hic says. Even though food availability on a global average has been higher than required in theory, some developing countries still have to fight undernourishment or hunger. “At the same time, agriculture is a major driver of climate change, accounting for more than 20 Percent of overall global greenhouse-gas emissions in 2010. Avoiding food loss and waste would therefore avoid unnecessary greenhouse-gas emissions and help mitigate climate change,” co-author Prajal Pradhan explains.

The researchers analyzed body types and food requirements for the past and different future scenarios, accounting for demographic changes as well as food demand and availability and associated emissions. They found that while the global average food demand per person remains almost constant, in the last five decades already food availability has rapidly increased. “More importantly, food availability and requirement ratio show a linear relationship with human development, indicating that richer countries consume more food than is healthy or simply waste it,” Pradhan adds. Consequently, greenhouse-gas emissions associated with food waste could increase tremendously from today 0.5 to 1.9-2.5 Gigatons of CO₂ equivalents per year by 2050, the study shows.

Emissions from agriculture will become more and more important

Due to an unbridled demographic growth and lifestyle changes, emissions from agriculture alone are expected to rise by up to 18 Gigatons of CO₂ equivalents by 2050, previous research already showed. “Thus, emissions related to discarded food are just the tip of the iceberg,” Prajal Pradhan explains. “However, it is quite astounding that up to 14 percent of overall agricultural emissions in 2050 could easily be avoided by a better management of food utilisation and distribution. Changing individual behavior could be one key towards mitigating the climate crisis.”

“Currently, 1.3 billion tons of food per year are discarded,” explains Jürgen Kropp, co-author and deputy chair of PIK research domain Climate Impacts and Vulnerabilities. While food losses occur mostly in developing countries due to less efficient agricultural infrastructures, food waste in contrast is common in rich countries. “As many emerging economies like China or India are projected to rapidly increase their food waste as a consequence of changing lifestyle, increasing welfare and dietary habits towards a larger share of animal-based products, this could over proportionally increase greenhouse-gas emissions associated with food waste – at the same time undermining efforts for an ambitious climate protection.”

How can the food supply chain be made smarter and more efficient, and are consumers to be convinced to reduce food waste? Issues like these require further research, but the study sheds light on the complex interplay of food security and climate change that will become even more important in a future that will have to feed around 10 billion people. “Avoiding food loss could pose a leverage to various challenges at once, reducing environmental impacts of agriculture, saving resources used in food production, and enhance local, regional, and global food security,” Kropp says.

Article: Hic, C., Pradhan, P., Rybski, D., Kropp, J.P. (2016): Food Surplus and Its Climate Burden. Environ. Sci. Technol. [DOI:

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A previous study on the subject: Pradhan, P., Reusser, D., Kropp, J.P. (2013): Embodied greenhouse gas emissions in diets. PlosOne 8(5): e62228. [DOI: 10.1371/journal.pone.0062228]