Half of twenty-first century global irrigation expansion has been in water-stressed regions

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The expansion of irrigated agriculture has increased global agricultural production, but has led to widespread pressure on freshwater resources. Ensuring that increases in irrigated production occur only where water is relatively abundant is a key objective of sustainable agriculture, and knowledge of the evolution of irrigated land is important for measuring progress towards water sustainability. Yet a spatially detailed understanding of the evolution of the global area equipped for irrigation (AEI) is lacking. This study shows that AEI increased by 11% between 2000 (297 Mha) and 2015 (330 Mha), with areas of substantial expansion, such as northwest India and northeast China, and areas of decline, such as Russia. Combining these results with information on green (i.e. rainfall) and blue (i.e. surface and groundwater) water stress, the study also examined the extent to which irrigation has expanded unsustainably in regions already facing water stress. As a result, more than half (52%) of the irrigation expansion has taken place in areas that were already water-stressed in the year 2000, with India alone accounting for 36% of global unsustainable expansion. These findings provide new insights into the evolving patterns of global irrigation with important implications for global water sustainability and food security.

Piyush Mehta, Stefan Siebert, Matti Kummu, Qinyu Deng, Tariq Ali, Landon Marston, Wei Xie & Kyle Frankel Davis - Â Nature WaterÂ Â