

Reporting Summary

Nature Research wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Research policies, see [Authors & Referees](#) and the [Editorial Policy Checklist](#).

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a Confirmed

- ☐ ☒ The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement
- ☐ ☒ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
- ☐ ☒ The statistical test(s) used AND whether they are one- or two-sided
Only common tests should be described solely by name; describe more complex techniques in the Methods section.
- ☐ ☒ A description of all covariates tested
- ☐ ☒ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
- ☐ ☒ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
- ☒ ☐ For null hypothesis testing, the test statistic (e.g. F , t , r) with confidence intervals, effect sizes, degrees of freedom and P value noted
Give P values as exact values whenever suitable.
- ☒ ☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
- ☒ ☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
- ☒ ☐ Estimates of effect sizes (e.g. Cohen's d , Pearson's r), indicating how they were calculated

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection

Covidence and Microsoft Excel softwares were used for data collection and storage, respectively.

Data analysis

Python and R were use for all analyses.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors/reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Research [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A list of figures that have associated raw data
- A description of any restrictions on data availability

All data generated or analysed during this study are included in this published article (and its supplementary information files).

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

- ☐ Life sciences ☐ Behavioural & social sciences ☒ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see [nature.com/documents/nr-reporting-summary-flat.pdf](https://www.nature.com/documents/nr-reporting-summary-flat.pdf)

Ecological, evolutionary & environmental sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	This study was comprised of three analyses. The first analysis overlaid several global spatial datasets to identify where small-scale farmers lived in water scarce regions. The second analysis identified the percentage of area covered by irrigation on small-scale farms compared to non-small-scale farms in water scarce and non-water scarce areas. The third analysis was systematic review to identify the available evidence for solutions for small-scale farmers to adapt to water scarcity.
Research sample	The first two analyses were not samples, but global estimates using available spatial datasets that contained full spatial extents of all agricultural area globally. The systematic review sampled 26 academic and grey literature databases for all available evidence. The systematic review was partially automated by supervised machine learning.
Sampling strategy	The systematic review's abstract screening phase was automated by supervised machine learning. 1500 abstracts were chosen at random from the 18,000+ articles returned from the 26 academic and grey literature databases. These 1500 abstracts were manually classified by the author team to be included in our study. Each abstract was classified by two reviewers. A third reviewer decided any disagreement between the two reviewers. The 1500 articles were then used as the training/testing data for a machine learning classification model. K-folds cross validation was used (k=10) for validation, where folds were created by random sampling.
Data collection	A set of boolean terms were created to query 26 academic and grey literature databases. These boolean terms are provided in the in our a priori protocol available at Open Science Framework (https://doi.org/10.17605/OSF.IO/EFK7B).
Timing and spatial scale	The spatial analyses were bounded between 1996 and 2005 due to the spatial datasets we relied upon. The systematic review was performed in June 2019 and included any articles prior.
Data exclusions	No data was excluded.
Reproducibility	All code and compiled data are available in the supplemental material provided. Additionally, we wrote an a priori systematic review protocol available at Open Science Framework (https://doi.org/10.17605/OSF.IO/EFK7B) to assist in reproducibility.
Randomization	See sampling strategy section for details of random sampling.
Blinding	Blinding was not relevant to our spatial analysis since we relied on previously created datasets. For the systematic reviews, only titles and abstracts were screened by reviewers.
Did the study involve field work?	☐ Yes ☒ No

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology
☒	☐ Animals and other organisms
☒	☐ Human research participants
☒	☐ Clinical data

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging