**Supplement Information to article on: Generating a global gridded tillage dataset**

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**S1 Terms and definitions used**

**Arable cropland** is the land under temporary agricultural crops (multiple-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category (FAO, 2014).

**Conservation Agriculture (CA)** as reported by the FAO is a farming practice comprising minimum soil disturbance, the maintenance of a permanent vegetative cover of the soil (either by residue mulch layer and standing biomass) and diverse crop rotation (http://www.fao.org/conservation-agriculture/en/, accessed 08/31/2018). The no-tillage farm implements for seeding may range from disc like furrow openers but new developments of air-pressured seeding equipment embark even lesser soil disturbance. The use of no-tillage or minimum tillage practices (direct planting) mitigates some of the pressures on the soil and requires operational costs on farm. At the same time it enables the farmer for multiple cropping per year. Direct planting without proper soil cover may lead to increased herbicide requirements.

**Cropland** is considered as the sum of arable land cultivated with annual and perennial crops.

**Perennial cropland** is the land cultivated with long-term crops which do not have to be replanted for several years (such as cocoa and coffee); land under trees and shrubs producing flowers, such as roses and jasmine; and nurseries (except those for forest trees) (FAO, 2014).

**Tillage** is a means of soil management in order "To provide a favorable environment for crop growth and production, but still conserve soil and water resources" (FAO, 1984). The choice of tillage practice depends on soil, climatic, crop type, and socio-economic factors (Opara-Nadi, 1993). Conventional tillage practices are mostly perceived as the inversion and mixing of the soil layer with a plow after harvest in order to burry residues or for seedbed preparation. During the crop growing season cultivation as mechanical disturbance of the soil surface is practiced to loosen the soil, to work in fertilizer, or other soil amendments. Tillage has a high altering effect on soil aggregates, and increases the decomposition of soil organic matter through aeration and exposure to microbial oxidation. This effect is approved off in conventional tillage, as with increased turnover times of soil organic matter, nutrients become available for promoting crop growth.

Alternative tillage practices as reduced tillage or no-tillage are holding promising potential to improve the water content and aggregate stability of the soil, protect from erosion, and to increase the soil organic matter pools in the soil. Literature findings of comparative site studies show different outcomes on the effect of reduced tillage on soil organic matter stocks exhibiting the fact that the outcome varies in time and space, due to cropping intensity, crop type, climate regime, soil type, and depth (Pittelkow et al., 2015).

**Table S2** List of crop types as in SPAM2005 (IFPRI/IIASA, 2017b), with indication of crop type grouping to annual or perennial, and whether considered as suitable for CA in this study.

| Crop name long | Crop category | CA-suitability |
|---|---|---|
| **wheat** | annual | included |
| **rice** | annual | excluded |
| **maize** | annual | included |
| **barley** | annual | included |
| **rest** | annual | included |
| **other oil crops** | perennial | excluded |
| **tobacco** | annual | included |
| **teas** | perennial | excluded |
| **cocoa** | perennial | excluded |
| **robusta coffee** | perennial | excluded |
| **arabica coffee** | perennial | excluded |
| **other fibre crops** | perennial | excluded |
| **cotton** | annual | included |
| **sugarbeet** | annual | excluded |
| **sugarrcane** | perennial | excluded |
| **oilpalm** | perennial | excluded |
| **vegetables** | annual | included |
| **temperate fruit** | perennial | excluded |
| **tropical fruit** | perennial | excluded |
| **plantain** | perennial | excluded |
| **banana** | perennial | excluded |
| **coconut** | perennial | excluded |
| **groundnut** | annual | included |
| **other roots** | annual | excluded |
| **cassava** | annual | excluded |
| **yams** | annual | excluded |
| **sweet potato** | annual | excluded |
| **potato** | annual | excluded |
| **sesameseed** | annual | included |
| **rapeseed** | annual | included |
| **sunflower** | annual | included |
| **soybean** | annual | included |
| **other pulses** | annual | included |
| **lentil** | annual | included |
| **pigeon pea** | annual | included |
| **cow pea** | annual | included |
| **chick pea** | annual | included |
| **beans** | annual | included |
| **other cereals** | annual | included |
| **sorghum** | annual | included |
| **small millet** | annual | included |
| **pearl millet** | annual | included |

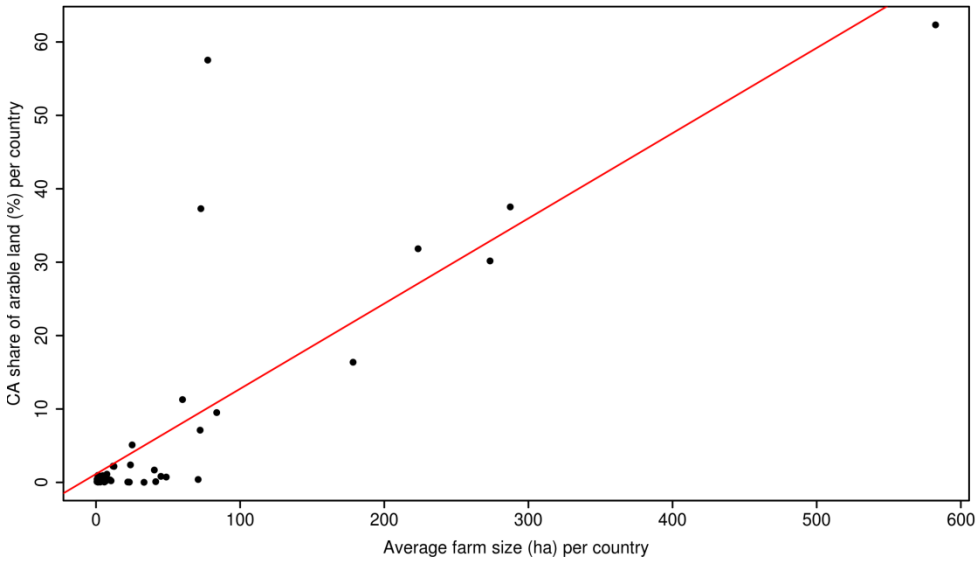

**Figure S3** Relation between national average farm size (Lowder et al., 2014) and share of Conservation Agricultural area (FAO, 2016) on arable land. Black dots denote country values and the red line is the fitted regression line with the resulting coefficient of determination of $r^2$=0.66 ($p < 0.001$, slope of 0.116, n=41 excluding Australia, because of its very large average farm size of 3243 ha $farm^{-1}$ but still with CA adoption share 20.4% of their arable land).

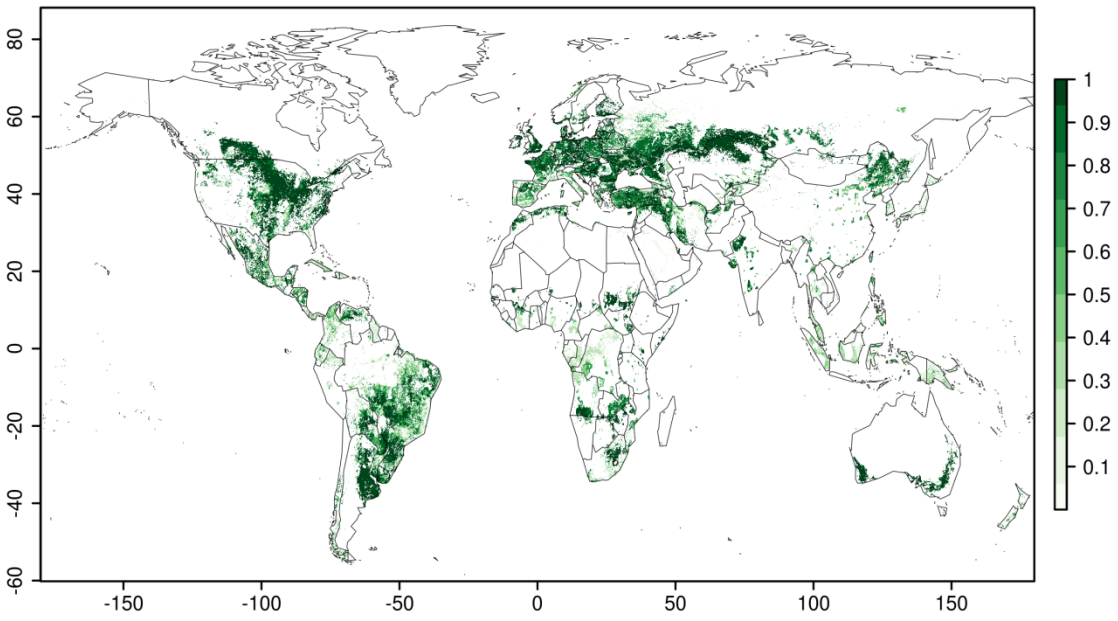


**Figure S4.1** Crop mix as ratio with values ranging between 0 and 1, of cropland area of 22 annual rainfed considered CA-suitable crop types to total sum of cropland per grid cell on CA-suitable area (based on IFPRI/IIASA (2017b)).

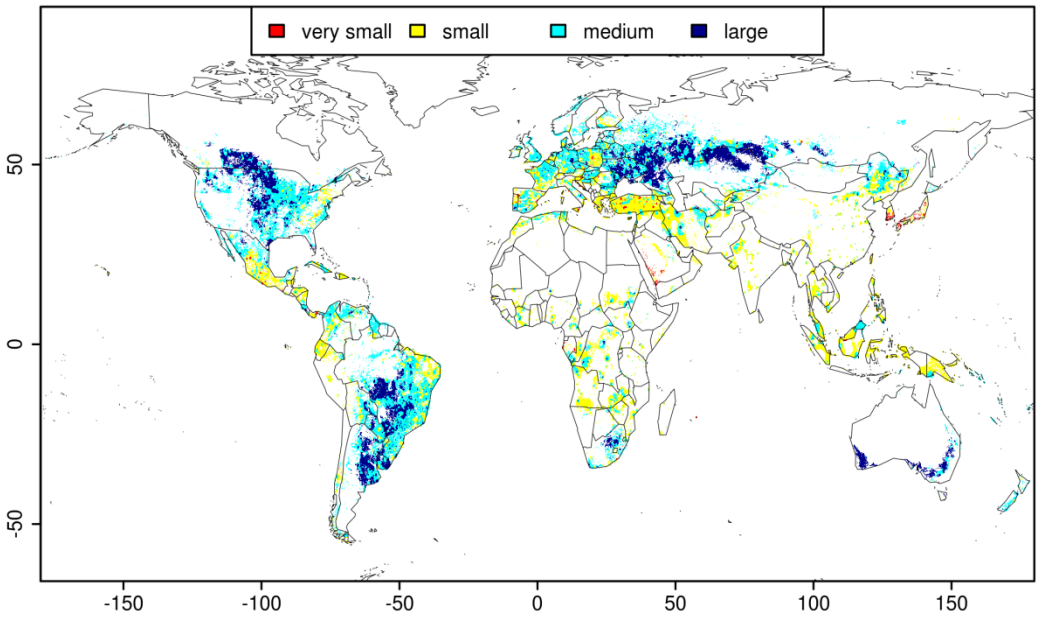

**Figure S4.2** Field size on CA-suitable area (classes: very small (<0.5 ha), small (0.5-2 ha), medium (2-100 ha), large (>100 ha) as in (Herrero et al., 2017)) based on Fritz et al. (2015); with own modifications).

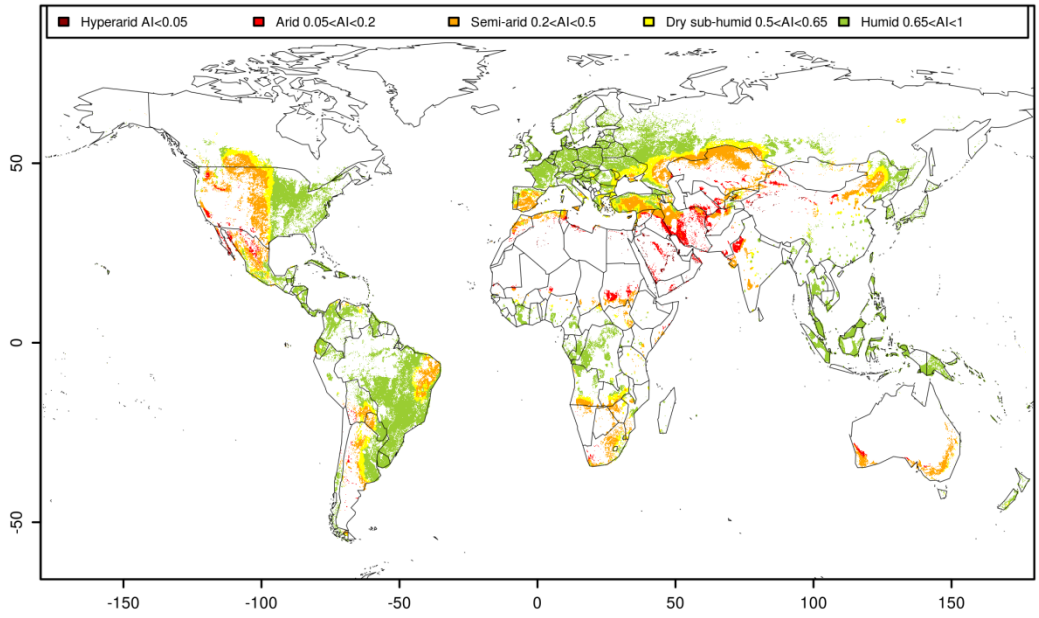


**Figure S4.3** Aridity index as ratio of average yearly precipitation divided by average yearly potential evapotranspiration on CA-suitable area (based on data by FAO (2015), with own modifications).

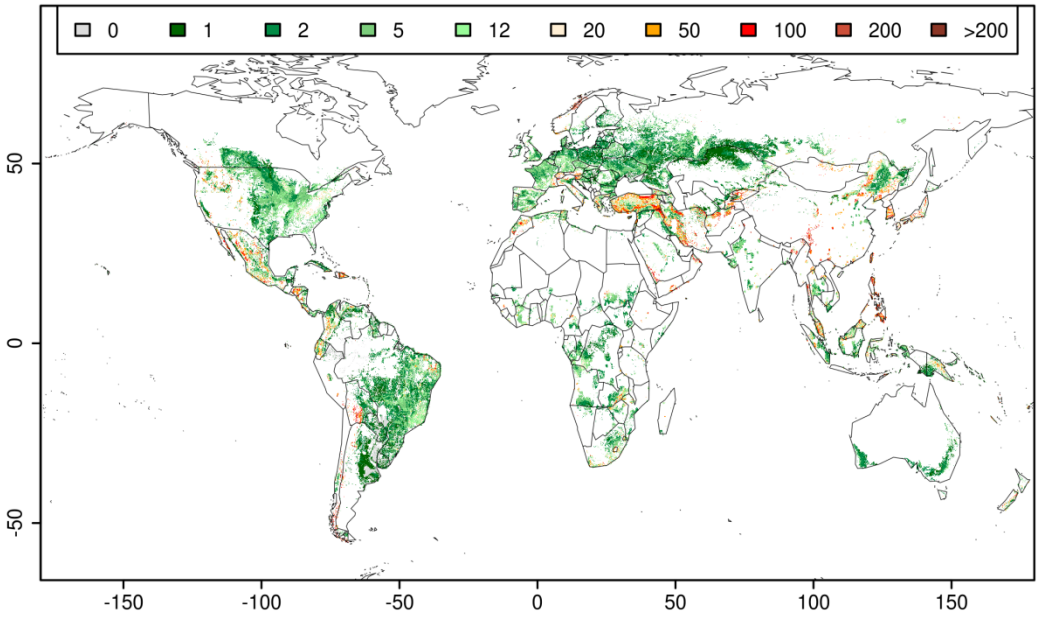


**Figure S4.4** Water erosion in t $ha^{-1}$ $year^{-1}$ on CA-suitable area (based on GLADIS by Nachtergaele et al. (2011); with own modifications).

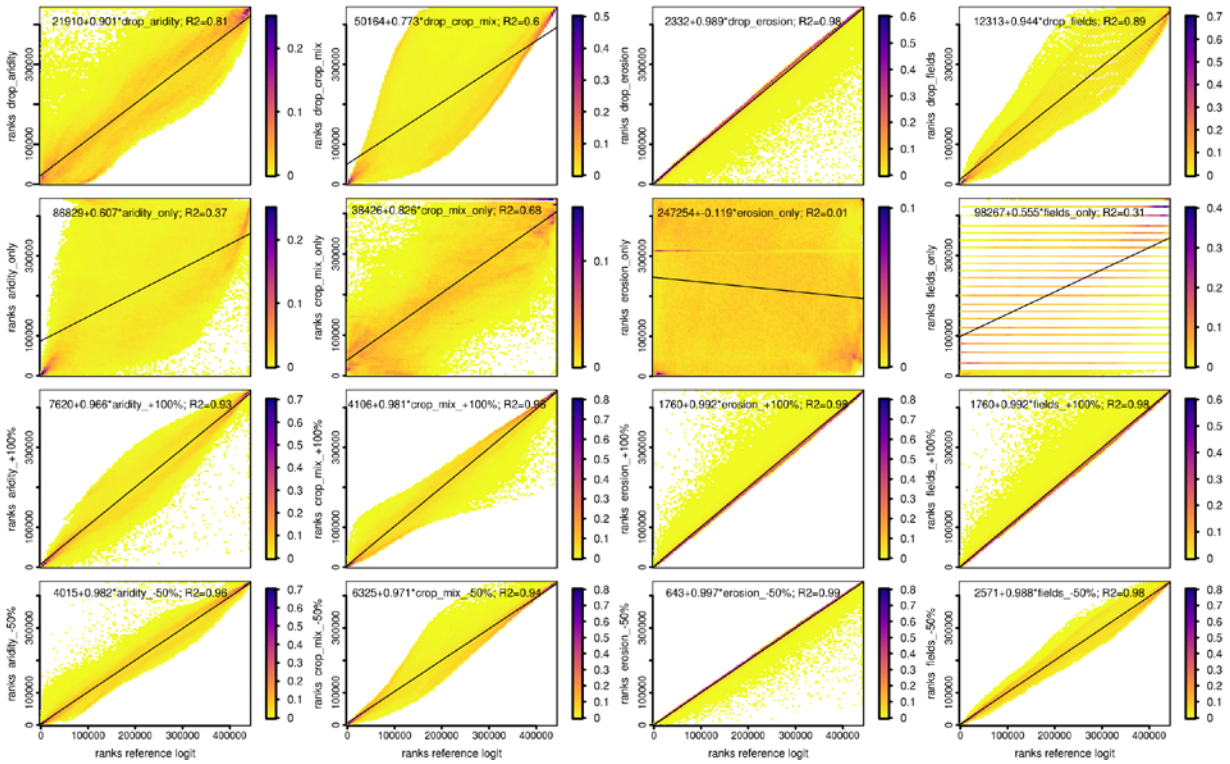


**Figure S5** Density scatterplot per sensitivity combinations of our logit model with the four input variables (from left-right: aridity, crop mix, erosion, fields) per grid cell, when (first row) dropping one variable, (second row) taking one variable only, (third row) adding 100 % to slope, and (forth row) taking 50 % off of the original slope of a variable (note for settings in line three and four, that the other three variable parameters remain unchanged respectively). The plots show that within the scope of our sensitivity analysis ranks of the alternative logit settings mostly show changed order close to the regression line (black line, $p < 0.001$ for all combinations). The darker color pattern within the density plots shows that more grid cells in the lower and upper end of the rank numbers have more different ranks than in the center.

**Table S6** Spearman rank correlation coefficient (r) of the reference logit model to each of sensitivity combination of variables and slopes in the logit model for each of the 54 CA area reporting countries. We aggregated values to country scale applying the accompanying grid cell allocation key by IFPRI/IIASA (2017a).

| Country | Variable | Correlation (r) reference to drop one variable | Correlation (r) reference to one variable only | Correlation (r) reference to modified slope of one variable by plus 100 % | Correlation (r) reference to modified slope of one variable by minus 50 % |
|---|---|---|---|---|---|
| **Argentina** | field size | 0.927 | 0.653 | 0.979 | 0.986 |
| | erosion | 0.990 | 0.085 | 0.991 | 0.996 |
| | aridity | 0.896 | 0.370 | 0.972 | 0.981 |
| | crop_mix | 0.609 | 0.735 | 0.986 | 0.980 |
| **Australia** | field size | 0.912 | 0.744 | 0.982 | 0.987 |
| | erosion | 0.999 | -0.064 | 0.998 | 1.000 |
| | aridity | 0.879 | 0.826 | 0.985 | 0.984 |
| | crop_mix | 0.958 | 0.781 | 0.995 | 0.996 |
| **Azerbaijan** | field size | 0.919 | 0.245 | 0.971 | 0.985 |
| | erosion | 0.993 | 0.415 | 0.995 | 0.998 |
| | aridity | 0.961 | -0.323 | 0.953 | 0.988 |
| | crop_mix | 0.101 | 0.883 | 0.982 | 0.951 |

| Country | Variable | Correlation (r) reference to drop one variable | Correlation (r) reference to one variable only | Correlation (r) reference to modified slope of one variable by plus 100 % | Correlation (r) reference to modified slope of one variable by minus 50 % |
|---|---|---|---|---|---|
| **Belgium** | field size | 0.883 | 0.801 | 0.980 | 0.980 |
| | erosion | 0.998 | 0.394 | 0.998 | 0.999 |
| | aridity | 0.957 | -0.245 | 0.930 | 0.985 |
| | crop_mix | 0.613 | 0.868 | 0.973 | 0.961 |
| **Bolivia (Plurinational State of)** | field size | 0.905 | 0.509 | 0.972 | 0.982 |
| | erosion | 0.956 | 0.063 | 0.958 | 0.986 |
| | aridity | 0.962 | 0.740 | 0.981 | 0.992 |
| | crop_mix | 0.839 | 0.866 | 0.982 | 0.975 |
| **Brazil** | field size | 0.947 | 0.351 | 0.960 | 0.987 |
| | erosion | 0.998 | 0.018 | 0.999 | 1.000 |
| | aridity | 0.878 | 0.395 | 0.940 | 0.971 |
| | crop_mix | 0.614 | 0.870 | 0.978 | 0.961 |
| **Canada** | field size | 0.921 | 0.703 | 0.983 | 0.987 |
| | erosion | 0.994 | -0.148 | 0.993 | 0.997 |
| | aridity | 0.849 | 0.627 | 0.976 | 0.984 |
| | crop_mix | 0.772 | 0.595 | 0.985 | 0.981 |
| **Chile** | field size | 0.989 | 0.045 | 0.988 | 0.997 |
| | erosion | 0.896 | 0.076 | 0.957 | 0.979 |
| | aridity | 0.266 | 0.774 | 0.951 | 0.921 |
| | crop_mix | 0.884 | 0.243 | 0.952 | 0.972 |
| **China** | field size | 0.931 | 0.472 | 0.972 | 0.986 |
| | erosion | 0.963 | 0.123 | 0.971 | 0.990 |
| | aridity | 0.937 | 0.034 | 0.957 | 0.984 |
| | crop_mix | 0.414 | 0.860 | 0.974 | 0.947 |
| **Colombia** | field size | 0.977 | 0.285 | 0.981 | 0.994 |
| | erosion | 0.994 | 0.012 | 0.995 | 0.999 |
| | aridity | 0.655 | 0.835 | 0.969 | 0.956 |
| | crop_mix | 0.881 | 0.630 | 0.963 | 0.977 |
| **Democratic People's Republic of Korea** | field size | 0.990 | 0.305 | 0.996 | 0.996 |
| | erosion | 0.664 | 0.856 | 0.984 | 0.957 |
| | aridity | 0.929 | 0.025 | 0.919 | 0.985 |
| | crop_mix | 0.872 | 0.568 | 0.958 | 0.981 |
| **Finland** | field size | 0.488 | 0.778 | 0.968 | 0.939 |
| | erosion | 0.999 | -0.155 | 0.999 | 1.000 |
| | aridity | 0.907 | 0.464 | 0.952 | 0.978 |
| | crop_mix | 0.872 | 0.186 | 0.958 | 0.988 |
| **France** | field size | 0.872 | 0.696 | 0.973 | 0.979 |
| | erosion | 0.996 | -0.243 | 0.996 | 0.998 |
| | aridity | 0.904 | 0.136 | 0.950 | 0.980 |
| | crop_mix | 0.558 | 0.675 | 0.964 | 0.952 |
| **Germany** | field size | 0.890 | 0.770 | 0.973 | 0.978 |
| | erosion | 0.998 | -0.169 | 0.996 | 0.999 |
| | aridity | 0.889 | 0.692 | 0.969 | 0.981 |
| | crop_mix | 0.871 | 0.534 | 0.971 | 0.978 |
| **Ghana** | field size | 0.970 | 0.088 | 0.985 | 0.994 |
| | erosion | 0.995 | -0.140 | 0.996 | 0.998 |
| | aridity | 0.978 | 0.723 | 0.987 | 0.993 |
| | crop_mix | 0.654 | 0.968 | 0.993 | 0.989 |
| **Greece** | field size | 0.974 | 0.409 | 0.987 | 0.995 |
| | erosion | 0.991 | -0.022 | 0.994 | 0.998 |
| | aridity | 0.952 | 0.272 | 0.981 | 0.991 |
| | crop_mix | 0.486 | 0.909 | 0.989 | 0.982 |
| **Hungary** | field size | 0.466 | 0.883 | 0.975 | 0.936 |
| | erosion | 0.999 | 0.402 | 1.000 | 1.000 |
| | aridity | 0.947 | -0.008 | 0.945 | 0.986 |
| | crop_mix | 0.901 | 0.456 | 0.956 | 0.980 |
| **India** | field size | 0.979 | 0.350 | 0.990 | 0.996 |
| | erosion | 0.933 | 0.004 | 0.986 | 0.987 |
| | aridity | 0.906 | 0.608 | 0.979 | 0.987 |
| | crop_mix | 0.772 | 0.897 | 0.988 | 0.988 |
| **Iraq** | field size | 0.931 | 0.125 | 0.962 | 0.985 |

| Country | Variable | Correlation (r) reference to drop one variable | Correlation (r) reference to one variable only | Correlation (r) reference to modified slope of one variable by plus 100 % | Correlation (r) reference to modified slope of one variable by minus 50 % |
|---|---|---|---|---|---|
| | erosion | 0.883 | 0.532 | 0.957 | 0.969 |
| | aridity | 0.957 | -0.381 | 0.960 | 0.988 |
| | crop_mix | 0.224 | 0.838 | 0.971 | 0.955 |
| **Ireland** | field size | 0.916 | 0.286 | 0.936 | 0.977 |
| | erosion | 0.998 | -0.182 | 0.998 | 0.999 |
| | aridity | 0.284 | 0.895 | 0.972 | 0.930 |
| | crop_mix | 0.989 | 0.015 | 0.992 | 0.998 |
| **Italy** | field size | 0.889 | 0.506 | 0.967 | 0.980 |
| | erosion | 0.966 | 0.244 | 0.969 | 0.988 |
| | aridity | 0.758 | 0.399 | 0.894 | 0.927 |
| | crop_mix | 0.722 | 0.614 | 0.926 | 0.948 |
| **Kazakhstan** | field size | 0.716 | 0.815 | 0.980 | 0.967 |
| | erosion | 0.995 | -0.298 | 0.994 | 0.998 |
| | aridity | 0.944 | 0.129 | 0.965 | 0.987 |
| | crop_mix | 0.842 | 0.638 | 0.990 | 0.992 |
| **Kenya** | field size | 0.918 | 0.079 | 0.936 | 0.978 |
| | erosion | 0.961 | 0.332 | 0.991 | 0.994 |
| | aridity | 0.902 | 0.670 | 0.974 | 0.984 |
| | crop_mix | 0.739 | 0.822 | 0.982 | 0.974 |
| **Kyrgyzstan** | field size | 0.967 | 0.004 | 0.975 | 0.993 |
| | erosion | 0.806 | 0.757 | 0.975 | 0.971 |
| | aridity | 0.982 | -0.339 | 0.979 | 0.995 |
| | crop_mix | 0.566 | 0.807 | 0.968 | 0.959 |
| **Lebanon** | field size | 0.857 | 0.333 | 0.955 | 0.975 |
| | erosion | 0.978 | 0.338 | 0.989 | 0.993 |
| | aridity | 0.991 | -0.125 | 0.993 | 0.998 |
| | crop_mix | 0.419 | 0.813 | 0.971 | 0.960 |
| **Lesotho** | field size | 0.888 | -0.041 | 0.812 | 0.969 |
| | erosion | 0.891 | 0.290 | 0.960 | 0.974 |
| | aridity | 0.469 | 0.478 | 0.949 | 0.835 |
| | crop_mix | 0.766 | 0.335 | 0.942 | 0.957 |
| **Madagascar** | field size | 0.960 | 0.249 | 0.983 | 0.992 |
| | erosion | 0.995 | -0.013 | 0.984 | 0.998 |
| | aridity | 0.941 | 0.294 | 0.986 | 0.990 |
| | crop_mix | 0.387 | 0.885 | 0.983 | 0.972 |
| **Malawi** | field size | 0.804 | 0.737 | 0.950 | 0.976 |
| | erosion | 0.957 | -0.174 | 0.978 | 0.990 |
| | aridity | 0.962 | 0.664 | 0.972 | 0.990 |
| | crop_mix | 0.839 | 0.743 | 0.981 | 0.954 |
| **Mexico** | field size | 0.940 | 0.492 | 0.971 | 0.988 |
| | erosion | 0.988 | 0.280 | 0.990 | 0.997 |
| | aridity | 0.935 | 0.445 | 0.971 | 0.987 |
| | crop_mix | 0.626 | 0.788 | 0.968 | 0.946 |
| **Morocco** | field size | 0.931 | 0.291 | 0.970 | 0.984 |
| | erosion | 0.870 | 0.417 | 0.955 | 0.976 |
| | aridity | 0.962 | -0.242 | 0.970 | 0.990 |
| | crop_mix | 0.347 | 0.796 | 0.965 | 0.948 |
| **Mozambique** | field size | 0.907 | 0.107 | 0.934 | 0.976 |
| | erosion | 0.984 | 0.445 | 0.993 | 0.997 |
| | aridity | 0.920 | 0.248 | 0.944 | 0.981 |
| | crop_mix | 0.473 | 0.860 | 0.970 | 0.941 |
| **Namibia** | field size | 0.931 | -0.136 | 0.903 | 0.991 |
| | erosion | 0.996 | -0.017 | 0.998 | 0.999 |
| | aridity | 0.989 | 0.034 | 0.992 | 0.997 |
| | crop_mix | -0.077 | 0.914 | 0.992 | 0.898 |
| **Netherlands** | field size | 0.863 | 0.345 | 0.955 | 0.971 |
| | erosion | 1.000 | 0.059 | 1.000 | 1.000 |
| | aridity | 0.984 | 0.011 | 0.987 | 0.996 |
| | crop_mix | 0.466 | 0.901 | 0.981 | 0.973 |
| **New Zealand** | field size | 0.966 | 0.221 | 0.975 | 0.992 |
| | erosion | 0.952 | 0.147 | 0.974 | 0.985 |
| | aridity | 0.617 | 0.562 | 0.912 | 0.927 |
| | crop_mix | 0.641 | 0.537 | 0.924 | 0.924 |

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|---|---|---|---|---|---|
| **Paraguay** | field size | 0.896 | 0.617 | 0.978 | 0.983 |
| | erosion | 1.000 | 0.172 | 1.000 | 1.000 |
| | aridity | 0.752 | 0.467 | 0.894 | 0.951 |
| | crop_mix | 0.633 | 0.465 | 0.923 | 0.918 |
| **Portugal** | field size | 0.958 | 0.875 | 0.989 | 0.992 |
| | erosion | 0.999 | -0.265 | 0.999 | 1.000 |
| | aridity | 0.974 | 0.897 | 0.995 | 0.996 |
| | crop_mix | 0.956 | 0.896 | 0.992 | 0.993 |
| **Republic of Moldova** | field size | 0.871 | 0.468 | 0.958 | 0.975 |
| | erosion | 0.998 | 0.145 | 0.998 | 0.999 |
| | aridity | 0.993 | -0.089 | 0.993 | 0.998 |
| | crop_mix | 0.484 | 0.868 | 0.976 | 0.958 |
| **Russian Federation** | field size | 0.949 | 0.595 | 0.984 | 0.990 |
| | erosion | 0.999 | -0.303 | 0.999 | 1.000 |
| | aridity | 0.962 | 0.737 | 0.987 | 0.994 |
| | crop_mix | 0.794 | 0.887 | 0.990 | 0.985 |
| **Slovakia** | field size | 0.676 | 0.822 | 0.967 | 0.949 |
| | erosion | 0.998 | -0.226 | 0.998 | 0.999 |
| | aridity | 0.764 | 0.522 | 0.934 | 0.960 |
| | crop_mix | 0.922 | -0.181 | 0.961 | 0.980 |
| **South Africa** | field size | 0.947 | 0.693 | 0.984 | 0.991 |
| | erosion | 0.998 | -0.565 | 0.997 | 0.999 |
| | aridity | 0.978 | 0.219 | 0.987 | 0.995 |
| | crop_mix | 0.647 | 0.910 | 0.988 | 0.981 |
| **Spain** | field size | 0.920 | 0.525 | 0.960 | 0.982 |
| | erosion | 0.997 | -0.075 | 0.997 | 0.999 |
| | aridity | 0.954 | -0.029 | 0.967 | 0.989 |
| | crop_mix | 0.408 | 0.836 | 0.966 | 0.930 |
| **Switzerland** | field size | 0.959 | 0.330 | 0.980 | 0.991 |
| | erosion | 0.770 | 0.162 | 0.908 | 0.915 |
| | aridity | 0.798 | 0.154 | 0.831 | 0.915 |
| | crop_mix | 0.515 | 0.757 | 0.957 | 0.946 |
| **Syrian Arab Republic** | field size | 0.977 | 0.453 | 0.984 | 0.995 |
| | erosion | 0.997 | 0.019 | 0.997 | 0.999 |
| | aridity | 0.991 | 0.531 | 0.993 | 0.998 |
| | crop_mix | 0.650 | 0.958 | 0.993 | 0.981 |
| **Tunisia** | field size | 0.960 | 0.027 | 0.964 | 0.990 |
| | erosion | 0.994 | 0.132 | 0.994 | 0.998 |
| | aridity | 0.967 | 0.197 | 0.968 | 0.992 |
| | crop_mix | 0.221 | 0.956 | 0.989 | 0.964 |
| **Turkey** | field size | 0.896 | 0.348 | 0.958 | 0.978 |
| | erosion | 0.943 | 0.153 | 0.959 | 0.987 |
| | aridity | 0.929 | 0.308 | 0.961 | 0.983 |
| | crop_mix | 0.576 | 0.798 | 0.970 | 0.953 |
| **Ukraine** | field size | 0.881 | 0.587 | 0.975 | 0.983 |
| | erosion | 0.999 | 0.107 | 0.999 | 1.000 |
| | aridity | 0.925 | 0.514 | 0.975 | 0.987 |
| | crop_mix | 0.706 | 0.711 | 0.980 | 0.976 |
| **United Kingdom** | field size | 0.903 | 0.620 | 0.958 | 0.978 |
| | erosion | 0.996 | -0.252 | 0.996 | 0.999 |
| | aridity | 0.521 | 0.873 | 0.970 | 0.935 |
| | crop_mix | 0.976 | 0.051 | 0.978 | 0.993 |
| **United Republic of Tanzania** | field size | 0.966 | 0.217 | 0.975 | 0.992 |
| | erosion | 0.990 | 0.114 | 0.991 | 0.997 |
| | aridity | 0.970 | 0.475 | 0.984 | 0.993 |
| | crop_mix | 0.571 | 0.943 | 0.988 | 0.974 |
| **United States of America** | field size | 0.942 | 0.592 | 0.981 | 0.990 |
| | erosion | 0.995 | -0.073 | 0.997 | 0.999 |
| | aridity | 0.890 | 0.475 | 0.962 | 0.981 |
| | crop_mix | 0.599 | 0.552 | 0.965 | 0.947 |
| **Uruguay** | field size | 0.824 | 0.142 | 0.950 | 0.956 |
| | erosion | 1.000 | -0.291 | 1.000 | 1.000 |

| Country | Variable | Correlation (r) reference to drop one variable | Correlation (r) reference to one variable only | Correlation (r) reference to modified slope of one variable by plus 100 % | Correlation (r) reference to modified slope of one variable by minus 50 % |
|---|---|---|---|---|---|
| | aridity | 0.976 | 0.223 | 0.973 | 0.993 |
| | crop_mix | 0.255 | 0.850 | 0.978 | 0.969 |
| **Uzbekistan** | field size | 0.762 | 0.483 | 0.939 | 0.966 |
| | erosion | 0.978 | 0.048 | 0.991 | 0.997 |
| | aridity | 0.933 | 0.119 | 0.952 | 0.984 |
| | crop_mix | 0.519 | 0.606 | 0.963 | 0.909 |
| **Venezuela (Bolivarian Republic of)** | field size | 0.954 | 0.420 | 0.976 | 0.990 |
| | erosion | 0.995 | -0.183 | 0.997 | 0.999 |
| | aridity | 0.928 | 0.325 | 0.971 | 0.987 |
| | crop_mix | 0.479 | 0.859 | 0.977 | 0.957 |
| **Zambia** | field size | 0.824 | 0.394 | 0.930 | 0.961 |
| | erosion | 0.950 | 0.388 | 0.981 | 0.990 |
| | aridity | 0.918 | 0.375 | 0.957 | 0.981 |
| | crop_mix | 0.694 | 0.721 | 0.961 | 0.962 |
| **Zimbabwe** | field size | 0.725 | 0.650 | 0.986 | 0.978 |
| | erosion | 0.958 | 0.085 | 0.969 | 0.988 |
| | aridity | 0.953 | 0.388 | 0.980 | 0.990 |
| | crop_mix | 0.753 | 0.557 | 0.993 | 0.996 |

The logit model sensitivity results show differing patterns for each of the countries, where cell ranks change due to differing slopes and variable combinations in the logit model equation. For the setting of dropping a variable, most correlation to the reference logit model is lowest for dropping crop-mix (see Namibia, Azerbaijan, Iraq correlation values respectively) and highest mostly for dropping erosion. For the sensitivity setting of taking one variable only into the logit model, more than half of the correlation coefficients to the reference logit model are lower than $r^2$=0.5. For 32 out of 216 total country-variable combinations, we even find negative correlations mostly occurring when taking erosion only into the logit model. For South Africa we find the overall lowest correlation coefficient when taking erosion only ($r^2$=-0.565) but relatively high correlation when dropping erosion ($r^2$=0.998). Changing the slope of the functions results in very low changes of the rank order of grid cells and corresponding CA-suitable area, as can be interpreted from the fact that even the lowest correlations coefficients of slope settings to the reference logit model remain above $r^2$= 0.812 when manipulating the slopes of the input variable functions by +100 % or -50 %.

**Table S7** Conservation Agriculture area (ha) for 54 reporting countries (FAO, 2016), as presented in this study and the difference (ha) between both values (note, that for New Zealand and North Korea not enough CA-suitable area could be detected in the SPAM2005 cropland data set, so instead of 23,000 ha for Korea only 2,477.4 ha, and for New Zealand only 78,517.8 ha instead of 162,000 ha could be downscaled. Deviation between reported and downscaled CA area of the further countries are caused by our downscale algorithm, which tries to minimize deviation from reported national CA area value by in- or excluding CA-suitable cropland area of a whole grid cell).

| Country | Year of considered national reported CA area value | National reported CA area (ha) | CA area downscaled (ha) | Difference CA area downscaled to reported no-tillage (ha) |
|---|---|---|---|---|
| **Argentina** | 2007 | 22,708,000 | 22,707,983.9 | -16.1 |
| **Australia** | 2005 | 9,000,000 | 9,001,831.6 | 1,831.6 |
| **Azerbaijan** | 2013 | 1,300 | 1,226.1 | -73.9 |
| **Belgium** | 2013 | 268 | 1,394.9 | 1,126.9 |

| Country | Year of considered national reported CA area value | National reported CA area (ha) | CA area downscaled (ha) | Difference CA area downscaled to reported no-tillage (ha) |
|---|---|---|---|---|
| **Bolivia (Plurinational State of)** | 2007 | 706,000 | 704,220.5 | -1,779.5 |
| **Brazil** | 2006 | 25,502,000 | 25,502,422.8 | 422.8 |
| **Canada** | 2006 | 13,479,000 | 13,480,492.2 | 1,492.2 |
| **Chile** | 2005 | 120,000 | 119,606.4 | -393.6 |
| **China** | 2005 | 100,000 | 99,410.1 | -589.9 |
| **Colombia** | 2005 | 102,000 | 102,119.1 | 119.1 |
| **Democratic People's Republic of Korea** | 2011 | 23,000 | 2,477.4 | -20,522.6 |
| **Finland** | 2011 | 160,000 | 160,095.3 | 95.3 |
| **France** | 2005 | 150,000 | 151,070.1 | 1,070.1 |
| **Germany** | 2013 | 200,000 | 199,047.9 | -952.1 |
| **Ghana** | 2008 | 30,000 | 30,172.2 | 172.2 |
| **Greece** | 2013 | 24,000 | 23,192.7 | -807.3 |
| **Hungary** | 2005 | 8,000 | 7,311.2 | -688.8 |
| **India** | 2013 | 1,500,000 | 1,498,119.0 | -1,881.0 |
| **Iraq** | 2012 | 15,000 | 14,984.2 | -15.8 |
| **Ireland** | 2005 | 100 | 1,843.8 | 1,743.8 |
| **Italy** | 2005 | 80,000 | 79,395.3 | -604.7 |
| **Kazakhstan** | 2007 | 600,000 | 599,783.5 | -216.5 |
| **Kenya** | 2004 | 15,000 | 16,523.6 | 1,523.6 |
| **Kyrgyzstan** | 2013 | 700 | 680.5 | -19.5 |
| **Lebanon** | 2011 | 1,200 | 1,035.4 | -164.6 |
| **Lesotho** | 2005 | 130 | 1,270.3 | 1,140.3 |
| **Madagascar** | 2011 | 6,000 | 6,018.9 | 18.9 |
| **Malawi** | 2011 | 16,000 | 12,985.7 | -3,014.3 |
| **Mexico** | 2007 | 22,800 | 22,816.2 | 16.2 |
| **Morocco** | 2008 | 4,000 | 3,937.9 | -62.1 |
| **Mozambique** | 2006 | 9,000 | 8,910.7 | -89.3 |
| **Namibia** | 2011 | 340 | 519.9 | 179.9 |
| **Netherlands** | 2011 | 500 | 38.4 | -461.6 |
| **New Zealand** | 2008 | 162,000 | 78,517.8 | -83,482.2 |
| **Paraguay** | 2007 | 2,094,000 | 2,093,456.2 | -543.8 |
| **Portugal** | 2006 | 25,000 | 24,526.3 | -473.7 |
| **Republic of Moldova** | 2011 | 40,000 | 41,735.0 | 1,735.0 |
| **Russian Federation** | 2011 | 4,500,000 | 4,499,515.5 | -484.5 |
| **Slovakia** | 2006 | 10,000 | 9,249.2 | -750.8 |
| **South Africa** | 2005 | 300,000 | 300,502.0 | 502.0 |
| **Spain** | 2005 | 300,000 | 300,810.9 | 810.9 |
| **Switzerland** | 2005 | 9,000 | 8,685.0 | -315.0 |
| **Syrian Arab Republic** | 2012 | 30,000 | 30,439.4 | 439.4 |
| **Tunisia** | 2007 | 6,000 | 6,169.7 | 169.7 |
| **Turkey** | 2013 | 45,000 | 44,938.2 | -61.8 |
| **Ukraine** | 2011 | 600,000 | 601,545.5 | 1,545.5 |
| **United Kingdom** | 2005 | 24,000 | 23,402.4 | -597.6 |
| **United Republic of Tanzania** | 2011 | 25,000 | 26,056.6 | 1,056.6 |
| **United States of America** | 2007 | 26,500,000 | 26,500,585.2 | 585.2 |
| **Uruguay** | 2007 | 553,900 | 553,884.5 | -15.5 |
| **Uzbekistan** | 2013 | 2,450 | 3,622.1 | 1,172.1 |
| **Venezuela (Bolivarian Republic of)** | 2005 | 300,000 | 300,737.1 | 737.1 |
| **Zambia** | 2002 | 40,000 | 39,958.6 | -41.4 |
| **Zimbabwe** | 2011 | 139,300 | 139,488.2 | 188.2 |
| **World** | | **110,289,988** | **110,190,763.2** | **-99,224.8** |

**Table S8** Area weighted means of aridity, field size, crop mix, and water erosion over tillage system areas generated in this study.

| Area type | Aridity index (P/PET) | Field size (10-40) | Crop mix (0-1) | Water erosion (t $ha^{-1}$ $year^{-1}$) |
|---|---|---|---|---|
| **Suitable CA area** | 0.734 | 31 | 0.87 | 10.8 |

| Area type | Aridity index (P/PET) | Field size (10-40) | Crop mix (0-1) | Water erosion (t $ha^{-1}$ $year^{-1}$) |
|---|---|---|---|---|
| **CA downscaled** | 0.675 | 36 | 0.96 | 5.2 |
| **Traditional annual tillage** | 0.823 | 15 | 0.00 | 35.2 |
| **Traditional rotational tillage** | 1.106 | 15 | 0.00 | 46.7 |
| **Rotational tillage** | 1.007 | 26 | 0.34 | 24.6 |
| **Reduced tillage** | 0.611 | 15 | 0.12 | 34.5 |
| **Conventional annual tillage** | 0.755 | 29 | 0.72 | 13.0 |
| **Potential suitable CA** | 0.733 | 31 | 0.87 | 10.8 |
| **Total cropland** | **0.806** | **23** | **0.41** | **23.1** |

In the Table S8 we show area weighted means of our four logit model input variables aridity, field size, crop mix, and water erosion aggregated over each of tillage system areas mapped in this study. For aridity reduced tillage is the only area with sub-humid conditions, i.e. with an average aridity below the threshold of 0.65. Traditional rotational and rotational tillage are on average more humid than the annually tilled areas. CA-suitable area is more humid than CA area. Regarding field size we find, that downscaled CA area has the largest field size contrary to both traditional tillage system areas showing the smallest ones. Crop mix is calculated for cells with at least one of the 22 CA-suitable annual crop type areas in grid cells reporting large fields in low-income or all field sizes in high-income countries, so that none was derived for traditional tillage system areas. The highest crop mix ratio is found for the actually downscaled CA area.

Regarding water erosion we find very low erosion levels under CA area which is either because we actually did hit the right cells where this practice is already protecting the soil or the largest fields with CA-suitable cropland area by natural condition are less eroded by water. For downscaled CA and area considered suitable for CA we calculated lower erosion levels than the T-value (12 t $ha^{-1}$ $year^{-1}$ as erosion loss tolerance level) defined by USDA (Montgomery, 2007). Even for conventional annual tillage area the average erosion level of 13 t $ha^{-1}$ $year^{-1}$ is only 1 t higher than the T-value. We find largest average water erosion levels for both types of traditionally tilled areas (in cells reporting small fields as dominant and in low income countries), which either might result from the climatic conditions in the tropics and sub-tropics with intensive rainfall events, increased slopes because of mountainous landscapes, deforestation or nutrient mining resulting in degradation of the soil asset. As well does reduced tillage area have a quite high average water erosion rate, as it is mainly distributed within a narrow band of the tropical climate zone, this may also be because of climate conditions, where elevated weathering of soils results in shallow soil depths. The averaged values of water erosion across the CA-suitable and potentially CA-suitable data are identical because of just very few difference of cells considered.

**Table S9** Sums of tillage systems areas per country (n=191) aggregated with grid cell allocation key for countries (IFPRI/IIASA, 2017a).

| Country name | Cropland sum (ha) (IFPRI/IIASA, 2017b) | Convent-ional annual tillage sum (ha) | CA sum (ha) | Reduced tillage sum (ha) | Rotational tillage sum (ha) | Traditional rotational sum (ha) | Traditional annual tillage sum (ha) | Potential CA-suitable area sum (ha) |
|---|---|---|---|---|---|---|---|---|
| **Afghanistan** | 2,893,168 | 1,212,248 | 0 | 0 | 33,615 | 103,990 | 1,543,314 | 607,032 |
| **°Aland Islands** | 1,358 | 1,197 | 0 | 0 | 161 | 0 | 0 | 834 |
| **Albania** | 291,790 | 2,639 | 0 | 0 | 536 | 76,980 | 211,635 | 2,358 |
| **Algeria** | 3,910,104 | 2,995,722 | 0 | 0 | 658,135 | 61,691 | 194,555 | 2,654,134 |
| **Andorra** | 1,308 | 576 | 0 | 0 | 732 | 0 | 0 | 332 |
| **Angola** | 2,913,481 | 1,048,640 | 0 | 0 | 61,372 | 73,042 | 1,730,427 | 629,558 |
| **Anguilla** | 983 | 315 | 0 | 0 | 668 | 0 | 0 | 195 |

| Country name | Cropland sum (ha) (IFPRI/IIASA, 2017b) | Convent-ional annual tillage sum (ha) | CA sum (ha) | Reduced tillage sum (ha) | Rotational tillage sum (ha) | Traditional rotational sum (ha) | Traditional annual tillage sum (ha) | Potential CA-suitable area sum (ha) |
|---|---|---|---|---|---|---|---|---|
| **Antigua & Barbuda** | 2,443 | 1,201 | 0 | 0 | 1,242 | 0 | 0 | 1,108 |
| **Argentina** | 24,805,774 | 1,131,884 | 22,707,984 | 0 | 965,906 | 0 | 0 | 23,122,035 |
| **Armenia** | 293,752 | 134,260 | 0 | 0 | 30,610 | 17,227 | 111,655 | 76,066 |
| **Australia** | 22,612,342 | 12,978,806 | 9,001,832 | 0 | 631,704 | 0 | 0 | 21,354,027 |
| **Austria** | 1,042,998 | 943,526 | 0 | 0 | 99,472 | 0 | 0 | 852,981 |
| **Azerbaijan** | 1,311,225 | 1,027,899 | 1,226 | 0 | 108,398 | 22,084 | 151,619 | 174,395 |
| **Bahrain** | 2,162 | 464 | 0 | 0 | 1,698 | 0 | 0 | 0 |
| **Bangladesh** | 9,055,004 | 634,711 | 0 | 0 | 102,509 | 898,640 | 7,419,144 | 151,364 |
| **Barbados** | 5,286 | 1,145 | 0 | 0 | 4,141 | 0 | 0 | 1,040 |
| **Belarus** | 3,323,924 | 3,089,338 | 0 | 0 | 230,514 | 262 | 3,810 | 2,516,091 |
| **Belgium** | 618,890 | 567,012 | 1,395 | 0 | 50,483 | 0 | 0 | 369,540 |
| **Belize** | 63,106 | 24,086 | 0 | 0 | 39,020 | 0 | 0 | 21,601 |
| **Benin** | 1,682,426 | 52,281 | 0 | 37,939 | 3,400 | 74,040 | 1,514,766 | 44,337 |
| **Bhutan** | 178,838 | 0 | 0 | 0 | 0 | 28,999 | 149,840 | 0 |
| **Bolivia** | 2,509,753 | 1,118,458 | 704,220 | 0 | 160,669 | 75,290 | 451,116 | 1,548,994 |
| **Bosnia & Herzegovina** | 570,569 | 250,357 | 0 | 0 | 53,357 | 40,520 | 226,334 | 231,696 |
| **Botswana** | 155,394 | 152,937 | 0 | 0 | 2,458 | 0 | 0 | 138,303 |
| **Brazil** | 61,611,357 | 22,393,853 | 25,502,423 | 0 | 11,950,945 | 202,824 | 1,561,313 | 42,060,902 |
| **Brunei** | 20,447 | 11,943 | 0 | 0 | 8,504 | 0 | 0 | 4,671 |
| **Bulgaria** | 2,688,312 | 2,399,837 | 0 | 0 | 194,513 | 19,486 | 74,476 | 2,291,090 |
| **Burkina Faso** | 5,185,141 | 355,542 | 0 | 170,415 | 5,662 | 48,175 | 4,605,348 | 397,098 |
| **Burundi** | 1,288,124 | 0 | 0 | 0 | 0 | 456,599 | 831,525 | 0 |
| **Cambodia** | 2,689,915 | 991,819 | 0 | 0 | 54,473 | 55,648 | 1,587,974 | 115,600 |
| **Cameroon** | 4,376,990 | 322,247 | 0 | 10,756 | 255,783 | 1,085,949 | 2,702,255 | 225,071 |
| **Canada** | 26,163,782 | 11,863,866 | 13,480,492 | 0 | 819,424 | 0 | 0 | 24,692,109 |
| **Cape Verde** | 46,547 | 0 | 0 | 0 | 0 | 3,869 | 42,678 | 0 |
| **Central African Republic** | 905,832 | 155,703 | 0 | 0 | 28,058 | 130,669 | 591,402 | 99,908 |
| **Chad** | 2,928,018 | 527,294 | 0 | 0 | 9,224 | 71,697 | 2,319,803 | 495,053 |
| **Chile** | 1,285,060 | 813,309 | 119,606 | 0 | 352,145 | 0 | 0 | 549,555 |
| **China** | 133,572,938 | 30,399,947 | 99,410 | 12,641 | 2,414,860 | 13,319,816 | 87,326,264 | 18,334,432 |
| **Colombia** | 4,000,966 | 1,609,574 | 102,119 | 0 | 1,773,768 | 387,127 | 128,378 | 884,970 |
| **Congo** | 291,675 | 153,668 | 0 | 0 | 57,132 | 21,858 | 59,016 | 65,179 |
| **Congo, DRC** | 5,936,464 | 1,619,460 | 0 | 0 | 295,611 | 525,651 | 3,495,741 | 770,820 |
| **Costa Rica** | 445,800 | 93,946 | 0 | 0 | 351,854 | 0 | 0 | 31,242 |
| **Cote d'Ivory** | 6,705,149 | 1,496,824 | 0 | 0 | 1,645,944 | 2,072,326 | 1,490,055 | 893,835 |
| **Croatia** | 851,839 | 759,067 | 0 | 0 | 92,772 | 0 | 0 | 703,411 |
| **Cuba** | 1,754,977 | 908,495 | 0 | 0 | 823,879 | 10,937 | 11,666 | 502,088 |
| **Cyprus** | 112,482 | 76,887 | 0 | 0 | 35,595 | 0 | 0 | 54,384 |
| **Czech Republic** | 2,267,484 | 2,167,335 | 0 | 0 | 100,150 | 0 | 0 | 2,060,000 |
| **Denmark** | 1,699,636 | 1,693,975 | 0 | 0 | 5,661 | 0 | 0 | 1,427,539 |
| **Djibouti** | 7,567 | 0 | 0 | 0 | 0 | 9 | 7,558 | 0 |
| **Dominica** | 10,737 | 3,757 | 0 | 0 | 6,981 | 0 | 0 | 888 |
| **Dominican Republic** | 828,753 | 310,361 | 0 | 0 | 484,434 | 21,618 | 12,339 | 77,400 |
| **Ecuador** | 2,459,072 | 1,044,677 | 0 | 0 | 1,089,337 | 159,198 | 165,860 | 497,601 |
| **Egypt** | 4,743,205 | 329,706 | 0 | 0 | 67,735 | 648,777 | 3,696,986 | 21,949 |
| **El Salvador** | 636,375 | 52,797 | 0 | 0 | 32,141 | 203,574 | 347,863 | 51,625 |
| **Equatorial Guinea** | 88,894 | 35,253 | 0 | 0 | 53,641 | 0 | 0 | 0 |
| **Eritrea** | 675,875 | 50,964 | 0 | 156,833 | 6,196 | 35,833 | 426,049 | 44,002 |
| **Estonia** | 368,788 | 356,050 | 0 | 0 | 12,738 | 0 | 0 | 340,829 |
| **Ethiopia** | 9,770,079 | 243,196 | 0 | 676,173 | 54,905 | 1,041,575 | 7,754,230 | 221,657 |
| **Fiji** | 149,165 | 26,207 | 0 | 0 | 122,958 | 0 | 0 | 4,695 |
| **Finland** | 1,297,922 | 1,131,247 | 160,095 | 0 | 6,580 | 0 | 0 | 1,225,684 |
| **France** | 13,443,542 | 12,071,656 | 151,070 | 0 | 1,220,816 | 0 | 0 | 10,440,638 |
| **French Guiana** | 14,571 | 12,426 | 0 | 0 | 2,145 | 0 | 0 | 691 |
| **Gabon** | 220,401 | 143,994 | 0 | 0 | 76,407 | 0 | 0 | 60,148 |
| **Georgia** | 581,921 | 420,946 | 0 | 0 | 130,977 | 6,856 | 23,142 | 216,182 |
| **Germany** | 9,317,298 | 8,917,047 | 199,048 | 0 | 201,203 | 0 | 0 | 8,228,651 |
| **Ghana** | 6,460,994 | 143,231 | 30,172 | 0 | 64,227 | 2,602,442 | 3,620,922 | 105,336 |
| **Greece** | 2,832,266 | 1,818,951 | 23,193 | 0 | 990,122 | 0 | 0 | 1,032,055 |

| Country name | Cropland sum (ha) (IFPRI/IIASA, 2017b) | Conventional annual tillage sum (ha) | CA sum (ha) | Reduced tillage sum (ha) | Rotational tillage sum (ha) | Traditional rotational sum (ha) | Traditional annual tillage sum (ha) | Potential CA-suitable area sum (ha) |
|---|---|---|---|---|---|---|---|---|
| Grenada | 9,409 | 4,156 | 0 | 0 | 5,254 | 0 | 0 | 3,465 |
| Guadeloupe | 17,126 | 3,112 | 0 | 0 | 14,015 | 0 | 0 | 2,448 |
| Guatemala | 1,972,072 | 249,726 | 0 | 3,449 | 307,364 | 378,155 | 1,033,377 | 198,075 |
| Guinea | 2,933,309 | 228,793 | 0 | 11,236 | 32,673 | 671,920 | 1,988,687 | 135,725 |
| Guinea-Bissau | 336,513 | 1,389 | 0 | 19,134 | 78 | 32,482 | 283,430 | 2,424 |
| Guyana | 199,019 | 124,598 | 0 | 0 | 74,421 | 0 | 0 | 12,544 |
| Haiti | 1,070,191 | 147,913 | 0 | 0 | 64,709 | 196,435 | 661,133 | 108,091 |
| Honduras | 1,010,627 | 381,241 | 0 | 0 | 337,891 | 126,551 | 164,944 | 340,195 |
| Hungary | 4,062,199 | 3,838,279 | 7,311 | 0 | 216,609 | 0 | 0 | 3,647,136 |
| India | 155,866,184 | 18,102,668 | 1,498,119 | 10,734,671 | 1,113,583 | 12,669,225 | 111,747,918 | 16,146,538 |
| Indonesia | 27,084,234 | 5,614,847 | 0 | 0 | 4,843,061 | 5,137,300 | 11,489,026 | 3,231,713 |
| Iran | 13,603,984 | 9,124,671 | 0 | 0 | 1,321,102 | 299,066 | 2,859,145 | 4,874,002 |
| Iraq | 3,813,712 | 2,960,858 | 14,984 | 0 | 191,244 | 30,882 | 615,744 | 1,554,557 |
| Ireland | 335,786 | 331,585 | 1,844 | 0 | 2,357 | 0 | 0 | 298,448 |
| Israel | 314,180 | 210,814 | 0 | 0 | 103,367 | 0 | 0 | 101,943 |
| Italy | 5,397,759 | 3,498,563 | 79,395 | 0 | 1,819,800 | 0 | 0 | 2,721,406 |
| Jamaica | 144,784 | 342 | 0 | 0 | 2,816 | 114,042 | 27,583 | 211 |
| Japan | 2,808,286 | 2,513,427 | 0 | 0 | 294,859 | 0 | 0 | 484,917 |
| Jordan | 166,148 | 19,395 | 0 | 0 | 11,155 | 64,541 | 71,056 | 7,017 |
| Kazakhstan | 14,867,733 | 14,004,640 | 599,784 | 0 | 263,309 | 0 | 0 | 13,479,683 |
| Kenya | 4,476,597 | 942,633 | 16,524 | 0 | 171,580 | 509,285 | 2,836,574 | 892,987 |
| Kiribati | 27,165 | 1,850 | 0 | 0 | 25,315 | 0 | 0 | 688 |
| Kosovo | 5,739 | 13 | 0 | 0 | 24 | 810 | 4,892 | 8 |
| Kuwait | 7,004 | 4,809 | 0 | 0 | 2,195 | 0 | 0 | 3,790 |
| Kyrgyzstan | 854,847 | 730,136 | 681 | 0 | 73,604 | 7,554 | 42,872 | 110,102 |
| Laos | 1,233,350 | 180,620 | 0 | 0 | 20,084 | 106,859 | 925,787 | 28,631 |
| Latvia | 712,603 | 691,226 | 0 | 0 | 21,377 | 0 | 0 | 627,393 |
| Lebanon | 250,522 | 133,506 | 1,035 | 0 | 115,981 | 0 | 0 | 61,942 |
| Lesotho | 224,476 | 193,325 | 1,270 | 0 | 3,389 | 230 | 26,262 | 187,460 |
| Liberia | 495,947 | 159,946 | 0 | 0 | 33,523 | 79,725 | 222,752 | 87,676 |
| Libya | 700,509 | 448,161 | 0 | 0 | 252,348 | 0 | 0 | 244,253 |
| Liechtenstein | 474 | 474 | 0 | 0 | 0 | 0 | 0 | 474 |
| Lithuania | 1,225,634 | 1,187,195 | 0 | 0 | 38,439 | 0 | 0 | 1,091,446 |
| Luxembourg | 45,051 | 41,444 | 0 | 0 | 3,606 | 0 | 0 | 40,672 |
| Macedonia | 360,922 | 93,892 | 0 | 0 | 14,133 | 44,171 | 208,726 | 73,854 |
| Madagascar | 2,926,327 | 43,386 | 6,019 | 0 | 5,145 | 476,189 | 2,395,589 | 10,526 |
| Malawi | 3,451,987 | 576,341 | 12,986 | 0 | 28,332 | 119,284 | 2,715,045 | 515,945 |
| Malaysia | 5,783,929 | 1,817,302 | 0 | 0 | 3,966,627 | 0 | 0 | 1,288,955 |
| Maldives | 6,132 | 0 | 0 | 0 | 0 | 4,488 | 1,644 | 0 |
| Mali | 4,742,810 | 633,221 | 0 | 118,770 | 24,145 | 111,622 | 3,855,051 | 597,246 |
| Malta | 6,722 | 5,421 | 0 | 0 | 1,301 | 0 | 0 | 3,613 |
| Martinique | 19,089 | 3,744 | 0 | 0 | 15,345 | 0 | 0 | 3,114 |
| Mauritania | 379,158 | 58,197 | 0 | 0 | 4,675 | 17,293 | 298,993 | 43,774 |
| Mauritius | 74,120 | 3,859 | 0 | 0 | 70,262 | 0 | 0 | 3,416 |
| Mexico | 14,534,890 | 11,178,320 | 22,816 | 563,439 | 2,770,315 | 0 | 0 | 8,242,268 |
| Moldova, Republic of | 1,740,139 | 1,449,363 | 41,735 | 0 | 234,239 | 5,515 | 9,286 | 1,388,810 |
| Mongolia | 163,063 | 152,523 | 0 | 0 | 402 | 0 | 10,138 | 117,627 |
| Montenegro | 11,339 | 0 | 0 | 0 | 25 | 5,996 | 5,318 | 0 |
| Montserrat | 251 | 191 | 0 | 0 | 59 | 0 | 0 | 169 |
| Morocco | 7,231,614 | 4,133,451 | 3,938 | 0 | 505,796 | 318,277 | 2,270,152 | 3,676,248 |
| Mozambique | 5,519,406 | 839,012 | 8,911 | 0 | 88,884 | 351,375 | 4,231,223 | 685,494 |
| Myanmar | 10,287,601 | 676,920 | 0 | 0 | 40,900 | 623,735 | 8,946,045 | 270,576 |
| Namibia | 359,678 | 320,902 | 520 | 0 | 5,883 | 1,036 | 31,337 | 290,369 |
| Nepal | 4,704,580 | 235,490 | 0 | 0 | 26,507 | 429,921 | 4,012,661 | 72,783 |
| Netherlands | 651,182 | 618,189 | 38 | 0 | 32,955 | 0 | 0 | 283,111 |
| New Caledonia | 11,717 | 7,010 | 0 | 0 | 4,707 | 0 | 0 | 3,988 |
| New Zealand | 226,437 | 90,439 | 78,518 | 0 | 57,480 | 0 | 0 | 78,518 |
| Nicaragua | 987,838 | 517,871 | 0 | 0 | 128,673 | 78,419 | 262,876 | 429,443 |
| Niger | 7,347,885 | 591,883 | 0 | 0 | 3,790 | 61,520 | 6,690,693 | 590,958 |

| Country name | Cropland sum (ha) (IFPRI/IIASA, 2017b) | Conventional annual tillage sum (ha) | CA sum (ha) | Reduced tillage sum (ha) | Rotational tillage sum (ha) | Traditional rotational sum (ha) | Traditional annual tillage sum (ha) | Potential CA-suitable area sum (ha) |
|---|---|---|---|---|---|---|---|---|
| **Nigeria** | 41,058,632 | 2,764,141 | 0 | 2,279,621 | 826,209 | 5,093,508 | 30,095,154 | 1,353,745 |
| **North Korea** | 2,588,917 | 31,250 | 2,477 | 0 | 1,333 | 202,544 | 2,351,312 | 2,477 |
| **Norway** | 352,646 | 348,037 | 0 | 0 | 4,610 | 0 | 0 | 288,746 |
| **Oman** | 44,337 | 12,908 | 0 | 0 | 31,429 | 0 | 0 | 2,353 |
| **Pakistan** | 20,196,854 | 1,076,625 | 0 | 0 | 138,523 | 1,529,650 | 17,452,056 | 377,329 |
| **Palestinian Territory, Occupied** | 8,532 | 0 | 0 | 0 | 0 | 3,245 | 5,286 | 0 |
| **Panama** | 331,258 | 210,066 | 0 | 0 | 121,193 | 0 | 0 | 84,011 |
| **Papua New Guinea** | 918,212 | 269,237 | 0 | 0 | 633,322 | 11,023 | 4,630 | 74,186 |
| **Paraguay** | 3,944,167 | 1,614,153 | 2,093,456 | 0 | 194,815 | 1,722 | 40,019 | 3,468,684 |
| **Peru** | 2,786,660 | 156,613 | 0 | 0 | 127,294 | 643,621 | 1,859,131 | 60,461 |
| **Philippines** | 10,563,543 | 3,575,056 | 0 | 0 | 2,892,624 | 2,035,024 | 2,060,838 | 2,216,857 |
| **Poland** | 10,330,422 | 9,915,701 | 0 | 0 | 414,721 | 0 | 0 | 8,996,963 |
| **Portugal** | 1,449,787 | 671,982 | 24,526 | 0 | 753,279 | 0 | 0 | 340,045 |
| **Puerto Rico** | 34,817 | 3,997 | 0 | 0 | 30,820 | 0 | 0 | 2,897 |
| **Qatar** | 5,085 | 3,082 | 0 | 0 | 2,002 | 0 | 0 | 2,419 |
| **Romania** | 7,811,137 | 7,394,592 | 0 | 0 | 416,546 | 0 | 0 | 6,638,090 |
| **Russia** | 54,979,458 | 49,361,485 | 4,499,515 | 0 | 1,118,458 | 0 | 0 | 48,405,157 |
| **Rwanda** | 1,212,830 | 20,562 | 0 | 0 | 24,796 | 284,730 | 882,741 | 19,866 |
| **San Marino** | 1,335 | 1,101 | 0 | 0 | 233 | 0 | 0 | 1,001 |
| **Sao Tome & Principe** | 35,507 | 0 | 0 | 0 | 0 | 29,801 | 5,707 | 0 |
| **Saudi Arabia** | 982,205 | 734,173 | 0 | 46 | 247,986 | 0 | 0 | 115,376 |
| **Senegal** | 2,337,118 | 190,609 | 0 | 3,997 | 6,330 | 52,935 | 2,083,246 | 160,816 |
| **Serbia** | 976,734 | 591,650 | 0 | 0 | 56,764 | 66,006 | 262,313 | 553,976 |
| **Seychelles** | 3,444 | 2,199 | 0 | 0 | 1,244 | 0 | 0 | 2,184 |
| **Sierra Leone** | 1,395,955 | 94,967 | 0 | 0 | 3,244 | 120,757 | 1,176,987 | 19,699 |
| **Slovakia** | 1,196,730 | 1,142,927 | 9,249 | 0 | 44,553 | 0 | 0 | 1,078,865 |
| **Slovenia** | 141,185 | 117,703 | 0 | 0 | 23,482 | 0 | 0 | 103,571 |
| **Solomon Is.** | 83,616 | 16,967 | 0 | 0 | 66,649 | 0 | 0 | 4,047 |
| **Somalia** | 838,483 | 489,835 | 0 | 0 | 17,755 | 17,160 | 313,734 | 432,535 |
| **South Africa** | 5,584,085 | 4,639,695 | 300,502 | 0 | 643,887 | 0 | 0 | 4,437,432 |
| **South Korea** | 1,482,062 | 1,266,551 | 0 | 0 | 215,511 | 0 | 0 | 348,782 |
| **Spain** | 13,200,977 | 8,611,740 | 300,811 | 0 | 4,288,426 | 0 | 0 | 6,958,445 |
| **Sri Lanka** | 1,879,842 | 58,607 | 0 | 0 | 42,359 | 698,674 | 1,080,202 | 37,580 |
| **St. Kitts & Nevis** | 1,760 | 320 | 0 | 0 | 1,440 | 0 | 0 | 186 |
| **St. Lucia** | 8,710 | 1,762 | 0 | 0 | 6,949 | 0 | 0 | 807 |
| **St. Vincent & the Grenadines** | 9,177 | 3,192 | 0 | 0 | 5,985 | 0 | 0 | 1,473 |
| **Sudan** | 12,511,984 | 6,415,030 | 0 | 605,333 | 171,776 | 191,342 | 5,128,504 | 6,417,646 |
| **Suriname** | 54,514 | 47,218 | 0 | 0 | 7,296 | 0 | 0 | 1,308 |
| **Swaziland** | 146,082 | 74,881 | 0 | 0 | 63,427 | 705 | 7,069 | 62,855 |
| **Sweden** | 1,225,542 | 1,217,478 | 0 | 0 | 8,064 | 0 | 0 | 1,132,186 |
| **Switzerland** | 232,178 | 202,500 | 8,685 | 0 | 20,994 | 0 | 0 | 169,378 |
| **Syria** | 4,464,986 | 3,038,858 | 30,439 | 0 | 600,124 | 133,990 | 661,573 | 2,181,983 |
| **Taiwan** | 489,974 | 312,062 | 0 | 0 | 177,912 | 0 | 0 | 194,335 |
| **Tajikistan** | 868,671 | 597,938 | 0 | 0 | 84,266 | 19,197 | 167,270 | 190,151 |
| **Tanzania** | 11,315,414 | 1,109,069 | 26,057 | 0 | 143,902 | 1,638,573 | 8,397,812 | 815,815 |
| **Thailand** | 16,805,742 | 7,417,265 | 0 | 0 | 1,783,676 | 1,124,812 | 6,479,990 | 1,693,709 |
| **The Gambia** | 269,834 | 41,193 | 0 | 0 | 538 | 3,360 | 224,743 | 37,991 |
| **Timor-Leste** | 146,508 | 67,828 | 0 | 0 | 35,123 | 7,698 | 35,858 | 31,172 |
| **Togo** | 1,465,625 | 24,265 | 0 | 2,480 | 4,848 | 131,809 | 1,302,223 | 19,926 |
| **Trinidad & Tobago** | 48,309 | 7,796 | 0 | 0 | 40,513 | 0 | 0 | 4,916 |
| **Tunisia** | 3,711,623 | 1,738,745 | 6,170 | 0 | 1,389,985 | 426,296 | 150,427 | 1,407,957 |
| **Turkey** | 20,442,299 | 18,374,298 | 44,938 | 0 | 2,023,063 | 0 | 0 | 15,868,088 |
| **Turkmenistan** | 1,738,945 | 1,659,322 | 0 | 0 | 64,245 | 1,786 | 13,592 | 116,048 |
| **Uganda** | 4,340,854 | 243,111 | 0 | 0 | 244,288 | 1,106,762 | 2,746,692 | 188,359 |

| Country name | Cropland sum (ha) (IFPRI/IIASA, 2017b) | Convent-ional annual tillage sum (ha) | CA sum (ha) | Reduced tillage sum (ha) | Rotational tillage sum (ha) | Traditional rotational sum (ha) | Traditional annual tillage sum (ha) | Potential CA-suitable area sum (ha) |
|---|---|---|---|---|---|---|---|---|
| **Ukraine** | 22,060,633 | 20,718,918 | 601,546 | 0 | 470,506 | 5,464 | 264,200 | 18,786,399 |
| **United Arab Emirates** | 193,576 | 11,512 | 0 | 0 | 182,064 | 0 | 0 | 8 |
| **United Kingdom** | 4,169,981 | 4,076,105 | 23,402 | 0 | 70,474 | 0 | 0 | 3,784,941 |
| **United States** | 95,538,859 | 66,989,782 | 26,500,585 | 0 | 2,048,492 | 0 | 0 | 79,266,304 |
| **Uruguay** | 1,023,188 | 425,311 | 553,885 | 0 | 43,992 | 0 | 0 | 745,542 |
| **Uzbekistan** | 3,735,379 | 3,266,007 | 3,622 | 0 | 304,143 | 6,313 | 155,293 | 543,879 |
| **Vanuatu** | 102,636 | 9,871 | 0 | 0 | 92,765 | 0 | 0 | 4,504 |
| **Venezuela** | 2,033,693 | 1,091,242 | 300,737 | 933 | 640,781 | 0 | 0 | 972,324 |
| **Vietnam** | 8,561,132 | 2,401,596 | 0 | 0 | 362,702 | 1,128,646 | 4,668,188 | 195,843 |
| **Yemen** | 1,045,215 | 18,953 | 0 | 0 | 6,467 | 116,219 | 903,575 | 10,761 |
| **Zambia** | 1,389,887 | 650,637 | 39,959 | 0 | 33,517 | 18,227 | 647,548 | 552,852 |
| **Zimbabwe** | 3,036,713 | 937,401 | 139,488 | 0 | 33,059 | 86,785 | 1,839,980 | 1,018,050 |

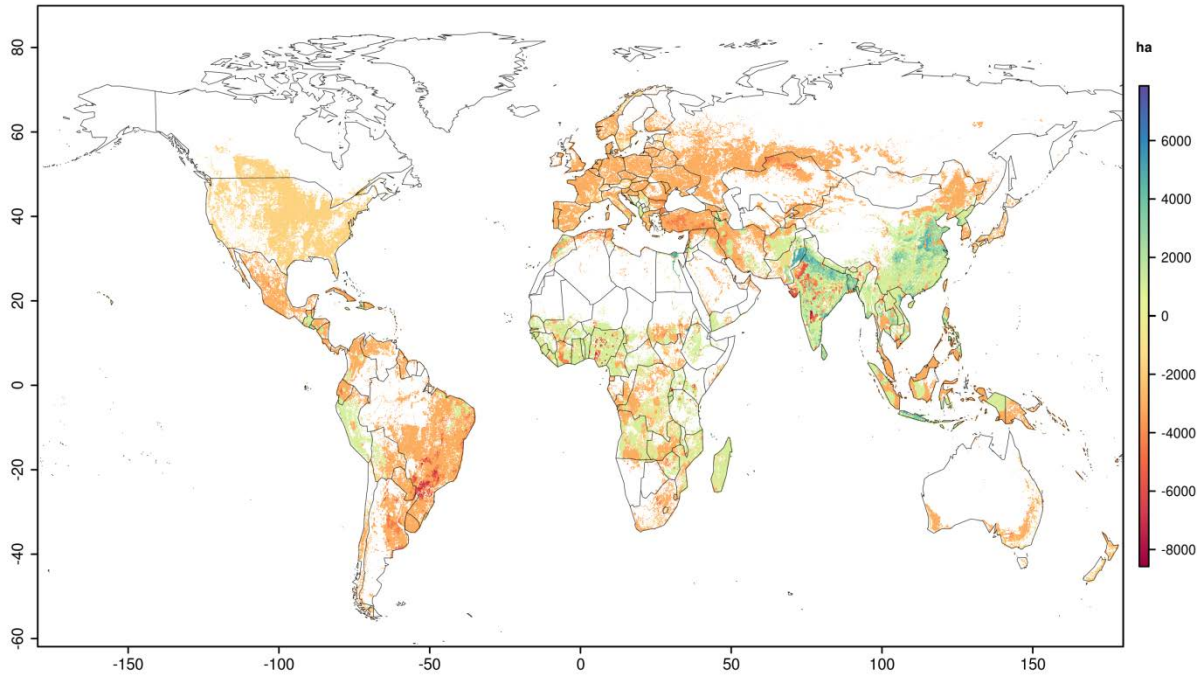


**Figure S10** Area difference (ha) map of the calculated sum of our mapped traditional annual and traditional rotational tillage system area and the sum of SPAM2005 cropland under low input and subsistence farming. Red colors indicated less cropland in our traditional tillage data set, mostly found in high income countries – larger discrepancy depicted in the South of Brazil. Blue colors show more area in our traditional tillage data set in large parts of India, and South-East Asia.

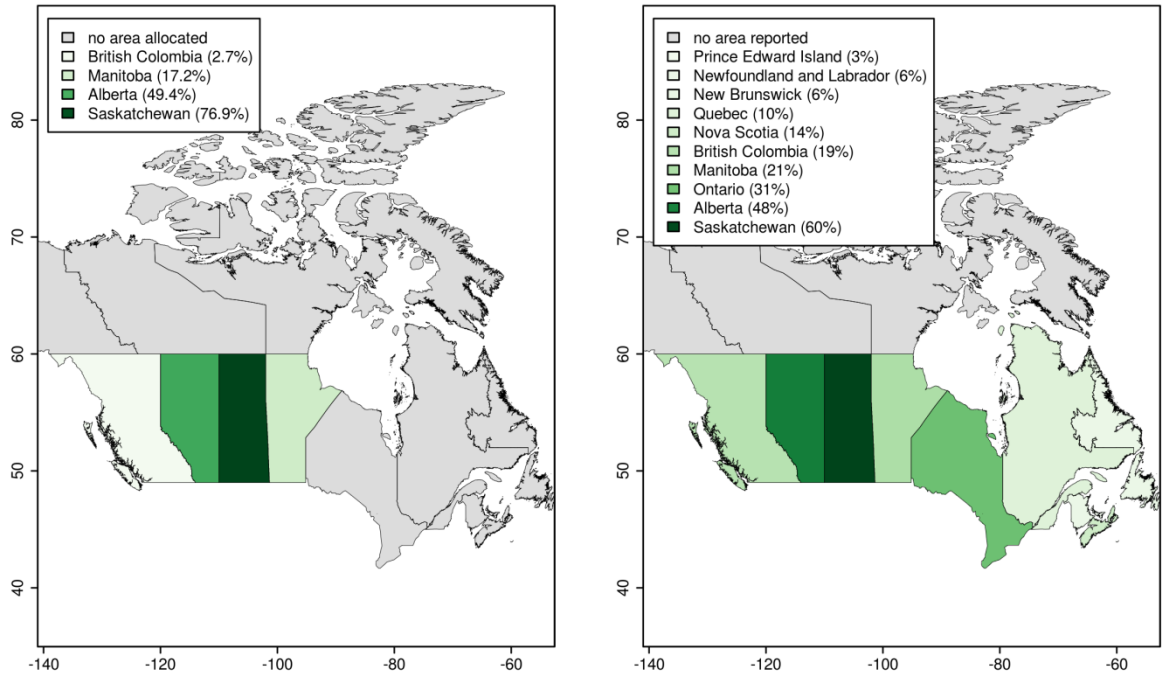


**Figure S11.1.1** We aggregated mapped Conservation Agricultural area to state or provincial scale using the GADM-1 data (Global Administrative Areas, 2015) The map (left) shows our downscaled CA area share (%) on cropland as reported by SPAM2005 per Canadian province and territory. The other map (right) shows reported provincial no-tillage shares on cropland (%) (map right) by Statistics Canada (2007).

**Table S11.1.2** Aggregated downscaled CA and reported reference (Statistics Canada, 2007) no-tillage CA area values (ha) and shares (%) on cropland for Canadian provinces and territories.

| | Aggregated SPAM2005 cropland | Downscaled CA area (ha) | Downscaled CA area share on cropland (%) | Reference cropland (ha) | Reference no-tillage area share (%) |
|---|---|---|---|---|---|
| **Alberta** | 6,417,937 | 3,171,536 | 49.4 | 7,578,201 | 48 |
| **British Columbia** | 107,153 | 2,892 | 2.7 | 198,472 | 19 |
| **Manitoba** | 3,238,176 | 556,295 | 17.2 | 3,890,618 | 21 |
| **New Brunswick** | 61,362 | 0 | 0 | 65,731 | 6 |
| **Newfoundland and Labrador** | 1,228 | 0 | 0 | 2,381 | 6 |
| **Northwest Territories** | 0 | 0 | 0 | 0 | 0 |
| **Nova Scotia** | 28,013 | 0 | 0 | 26,656 | 14 |
| **Nunavut** | 0 | 0 | 0 | 0 | 0 |
| **Ontario** | 2,387,635 | 0 | 0 | 2,699,477 | 31 |
| **Prince Edward Island** | 96,878 | 0 | 0 | 109,972 | 3 |
| **Quebec** | 969,467 | 0 | 0 | 1,129,051 | 10 |
| **Saskatchewan** | 12,470,787 | 9,593,268 | 76.9 | 13,348,192 | 60 |
| **Yukon** | 0 | 0 | 0 | 0 | 0 |
| **Canada** | **25,778,636** | **13,323,991** | **51.7** | **29,048,751** | **46** |

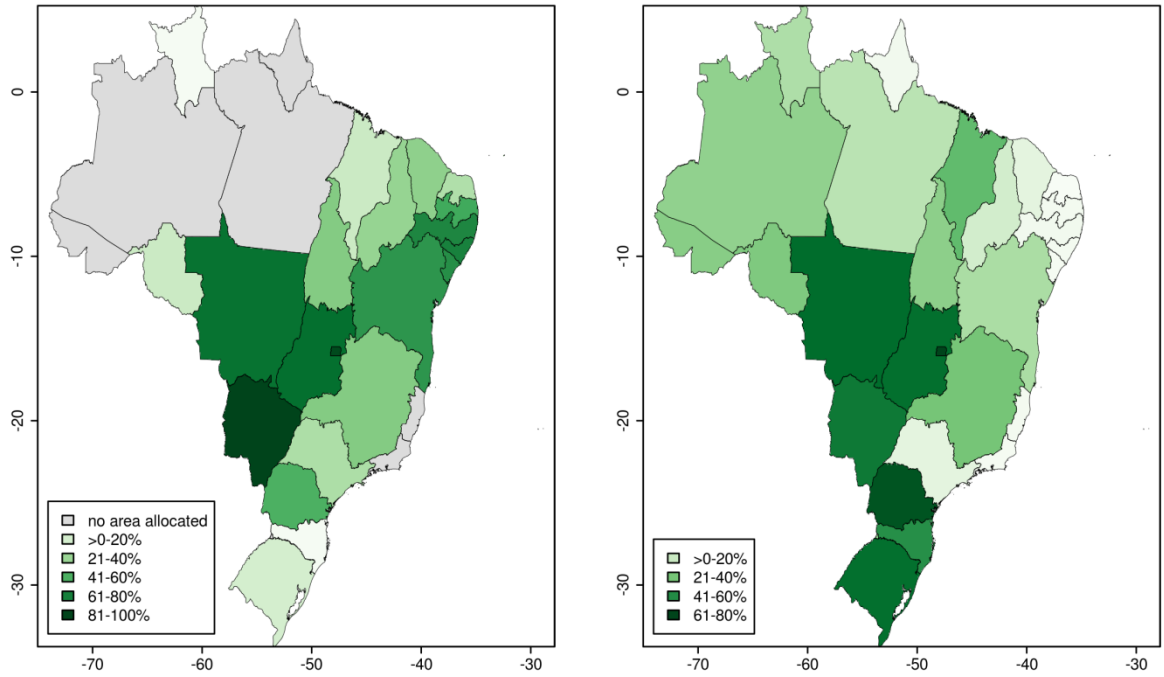


**Figure S11.2.1** Aggregating tillage area for Brazilian states the map (left) shows our downscaled CA area share on annuals cropland area as reported by SPAM2005 (%) and the other map (right) based on no-tillage share on annuals cropland (%) reported in the 2006 Agricultural Census by the Brazilian Institute of Geography and Statistics (IBGE) (Fuentes Llanillo et al., 2013).

**Table S11.2.2** Aggregated downscaled CA and reported reference (Fuentes Llanillo et al., 2013) no-tillage area values (ha) and shares (%) on annuals cropland for Brazilian states.

| | Aggregated SPAM2005 annuals cropland (ha) | Downscaled CA area (ha) | Downscaled CA area share on annuals cropland (%) | Reference annuals cropland (ha) | Reference no-tillage area share (%) |
|---|---|---|---|---|---|
| **Acre** | 111,817 | 0 | 0 | 5,851 | 34.7 |
| **Alagoas** | 212,323 | 157,622 | 74.2 | 16,105 | 3.0 |
| **Amapa** | 11,759 | 0 | 0 | 249 | 3.9 |
| **Amazonas** | 141,728 | 0 | 0 | 9,928 | 32.7 |
| **Bahia** | 2,568,485 | 1,709,754 | 66.6 | 636,251 | 26.7 |
| **Ceara** | 1,371,639 | 554,984 | 40.5 | 64,282 | 11.1 |
| **Distrito Federal** | 131,150 | 120,515 | 91.9 | 67,186 | 77.2 |
| **Espirito Santo** | 104,104 | 0 | 0 | 3,219 | 2.6 |
| **Goias** | 4,111,381 | 3,297,180 | 80.2 | 1,916,092 | 66.5 |
| **Maranhao** | 1,680,653 | 373,012 | 22.2 | 298,166 | 42.1 |
| **Mato Grosso Do Sul** | 3,022,259 | 2,823,677 | 93.4 | 1,253,132 | 68.0 |
| **Mato Grosso** | 7,971,442 | 6,349,708 | 79.7 | 3,287,213 | 63.7 |
| **Minas Gerais** | 2,749,020 | 1,174,419 | 42.7 | 927,971 | 39.0 |
| **Para** | 1,021,156 | 41 | 0 | 47,749 | 22.8 |
| **Paraiba** | 412,069 | 241,600 | 58.6 | 8,870 | 2.9 |
| **Parana** | 9,001,146 | 5,068,658 | 56.3 | 3,707,074 | 73.7 |
| **Pernambuco** | 636,175 | 456,434 | 71.7 | 33,343 | 3.8 |
| **Piaui** | 993,995 | 378,647 | 38.1 | 109,112 | 16.4 |
| **Rio De Janeiro** | 43,688 | 0 | 0 | 3,526 | 2.3 |
| **Rio Grande Do Norte** | 108,350 | 33,728 | 31.1 | 2,747 | 1.1 |
| **Rio Grande Do Sul** | 7,651,637 | 1,419,462 | 18.6 | 4,085,316 | 66.3 |
| **Rondonia** | 399,341 | 88,148 | 22.1 | 41,924 | 36.7 |

| | | | | | |
|---|---|---|---|---|---|
| **Roraima** | 54,492 | 1,173 | 2.2 | 7,687 | 26.5 |
| **Santa Catarina** | 1,570,858 | 35,578 | 2.3 | 757,879 | 56.5 |
| **Sao Paulo** | 2,463,353 | 770,673 | 31.3 | 471,779 | 11.0 |
| **Sergipe** | 232,946 | 160,438 | 68.9 | 1,848 | 1.6 |
| **Tocantins** | 672,742 | 286,606 | 42.6 | 107,274 | 33.4 |
| **Brazil** | **49,449,708** | **25,502,057** | **51.6** | **17,871,773** | **48.8** |

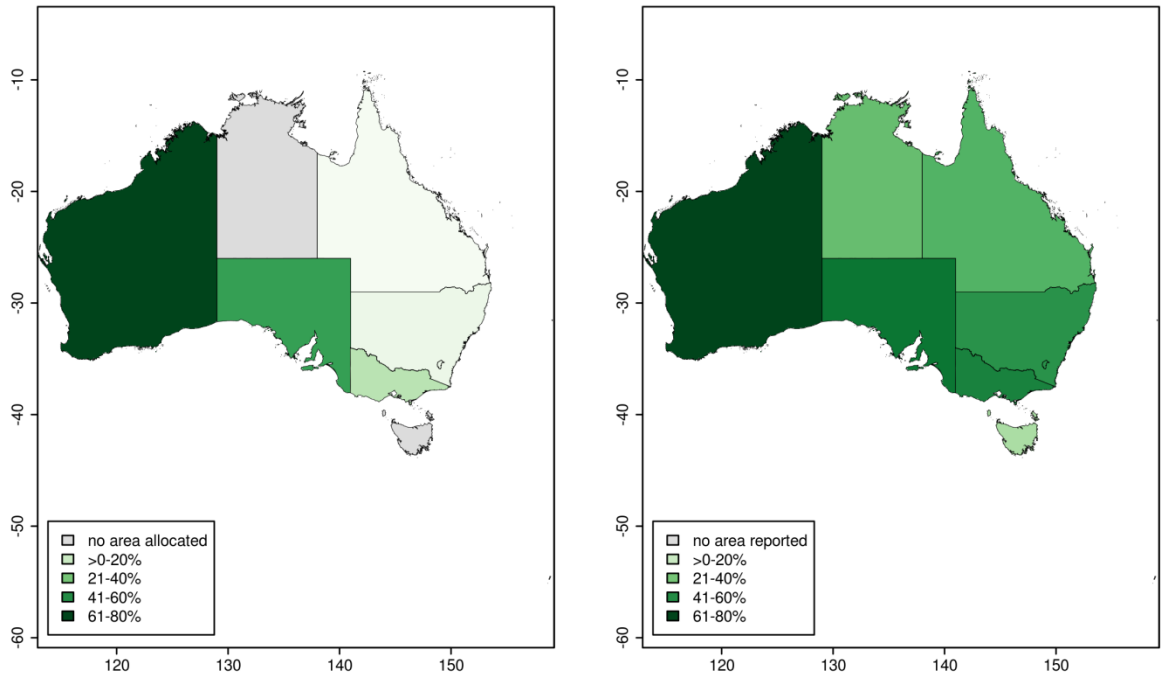


**Figure S11.3.1** For the Australian states and territories the map (left) shows our downscaled CA area share on cropland area as reported by SPAM2005 (%) and map (right) of reported no-tillage share on land prepared for crops and pastures as collected in the 2007–08 Agricultural Resource Management Survey (ARMS) conducted and published by the Australian Bureau of Statistics (2009).

**Table S11.3.2** Aggregated downscaled CA and reported reference (Australian Bureau of Statistics, 2009) no-tillage area values (ha) and shares (%) on cropland per Australian state and territory.

| State | Aggregated SPAM2005 cropland (ha) | Downscaled CA area (ha) | Downscaled CA area share (%) | Reference cropland and pasture (ha) | Reference no-tillage area (ha) | Reference no-tillage area share (%) |
|---|---|---|---|---|---|---|
| **New South Wales & Australian Capital Territory** | 6,419,577 | 435,988 | 6.8 | 7,788,900 | 4,460,800 | 57.3 |
| **Northern Territory** | 3,494 | 0 | 0 | 18,700 | 8,000 | 42.8 |
| **Queensland** | 1,575,507 | 28,508 | 1.8 | 2,697,800 | 1,257,600 | 46.6 |
| **South Australia** | 3,806,388 | 2,009,952 | 52.8 | 4,346,200 | 2,890,200 | 66.5 |
| **Tasmania** | 41,913 | 0 | 0 | 94,700 | 26,500 | 28.0 |
| **Victoria** | 3,361,635 | 777,625 | 23.1 | 4,019,800 | 2,523,300 | 62.8 |
| **Western Australia** | 7,381,934 | 5,739,452 | 77.7 | 7,969,100 | 6,313,700 | 79.2 |
| **Australia** | **22,590,448** | **8,991,525** | **39.8** | **26,935,200** | **17,480,300** | **64.9** |

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