Supporting Information for

Environmental impacts of water use in global crop production: hotspots and trade-offs with land use

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Effective Precipitation ($P_{e,monthly}$). $P_{e,monthly}$ denotes the monthly precipitation amount actually available to crops, and is calculated from monthly precipitation data ($P_{monthly}$). We used $P_{monthly}$ data reported by the "CRU 2.0 TS" database [1] and applied two different approaches to calculate $P_{eff,monthly,i}$ that are suggested in CROPWAT [2]: (i) the default "USDA soil conservation" method ($P_{e,monthly,USDA}$) and (ii) the alternative FAO method ($P_{e,monthly,FAO}$):

$$P_{e,\,monthly,\,USDA} = \begin{cases} P_{monthly} \cdot \dfrac{(125 - 0.2 \cdot P_{monthly})}{125} & for\ P_{monthly} < 250\ mm \\ 0.1 \cdot P_{monthly} + 125 & for\ P_{monthly} > 250\ mm \end{cases} \quad \textbf{(S1)}$$

$$P_{e,\,monthly,\,FAO} = \begin{cases} 0 & for\ P_{monthly} < 16.\overline{6}\ mm \\ 0.6 \cdot P_{monthly} - 10 & for\ 16.\overline{6}\ mm < P_{monthly} < 70\ mm \\ 0.8 \cdot P_{monthly} - 24 & for\ P_{monthly} > 70\ mm \end{cases} \quad \textbf{(S2)}$$

Economic values of crops. We calculated the average value of each crop based on the producer prices in five countries (China, India, USA, Brazil and Indonesia) weighted by the country-specific production volume and used the average producer price as proxy for the global crop value. We refrained from using world market prices as we are interested in the value of the crops independent of whether they are traded as global commodities or traded only in local and regional markets.

For plantain, mixed grain, vetches and lupine no prices were available for the five major countries selected. Plantain economic value is calculated based on the top nine producer countries reporting producer prices (Uganda, Colombia, Nigeria, Ghana, Rwanda, Peru, Côte d'Ivoire, Cameroon and Democratic Republic of Congo). All producing countries reported in PRICESTAT [3] are used to calculate prices of mixed grain, vetches and lupine. The prices for papaya in Brazil did not seem realistic (ranging from 10 to 12'713 USD per tonne for the individual years 2000-2006) and therefore these values were excluded. As no prices were available for forage crops, we neglected them in this analysis.

Biomass vs. fossil fuels. Cotton competes with polyester in textile production. Assuming general equivalence in functionality, we approximate that 1kg of cotton textile replaces 1 kg of polyester [4]. Production of 1 kg of cotton textile consumes between 40.6 and 47.7 MJ fossil fuel (average: 44.2 MJ kg^{-1}) [4] whereas polyester textiles require approximately 82.2 MJ kg^{-1} (including energy in feedstock) for the entire production chain [4]. To produce 1 kg of cotton textile, 2.43 kg of seed cotton is required [5]. This results in a fossil fuel saving of 15.6 MJ kg^{-1}seed cotton (Table S2).Life-cycle fossil fuel savings of the major first-generation biofuels [6] compared to the fossil fuels they can replace are examined. We include energy losses in the production chain (Table S3) and compute the fossil fuel energy saving per mass of harvested feedstock (Table S4). Finally, we relate RED water and land stress caused by biomass production to the respective net fossil energy savings.

Spatial variability and national/global average values. Crop-production related values of total ($TW_{expected}$), blue ($BW_{expected}$), deficit blue ($BW_{deficit}$), RED and deficit RED ($RW_{deficit}$) water consumption, land occupation and land stress for all producing countries are derived by aggregating the respective values over all raster cells in each country, using total annual production of each crop i within each cell j ($CropP_{i,total,j}$; tonne) as a weighting factor. For global average values the same procedure is applied. Cross-boundary cells are assigned to the country with the highest share of area in that cell:

$$TW_{i,country} = \frac{1}{\sum_{j=1}^{n} CropP_{i,total,j}} \sum_{j=1}^{n} TW_{i,j} \cdot CropP_{i,total,j} \qquad \textbf{(S3)}$$

Calculating country average total water consumption values results in a loss of information about spatial variability of water use. Countries include often several climatic zones influencing evapotranspiration losses and water availability. We therefore calculated the production-weighted coefficient of variation (CV) of all RED water values within a country i (using grid cell results within each country), where CV is the ratio of standard deviation (δ) to the mean (μ):

$$\mathbf{CV_i = \delta_i / \mu_i} \qquad \textbf{(S4)}$$

CV_i of RED water consumption for the most relevant crops and the top producer countries are presented in Table S7. These country values are compared to the CV of global production for each crop, to assess whether the relative variability within a country is lower than for the global production: In many countries, the relative variability is larger, as shown in Table S7, and reveals the importance of more detailed regionalized analyses beyond country levels.

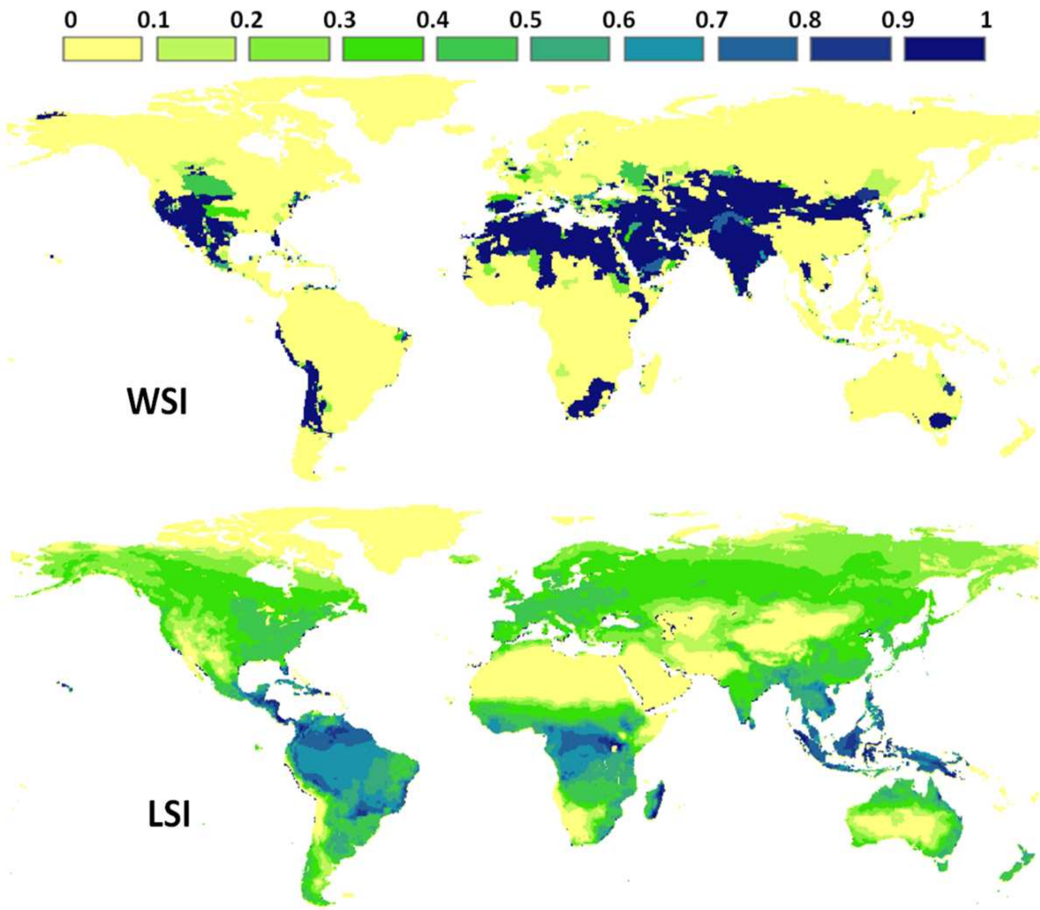

Figure S1. Global distribution of the water stress index (WSI; adopted from[7] and the land stress index (LSI).

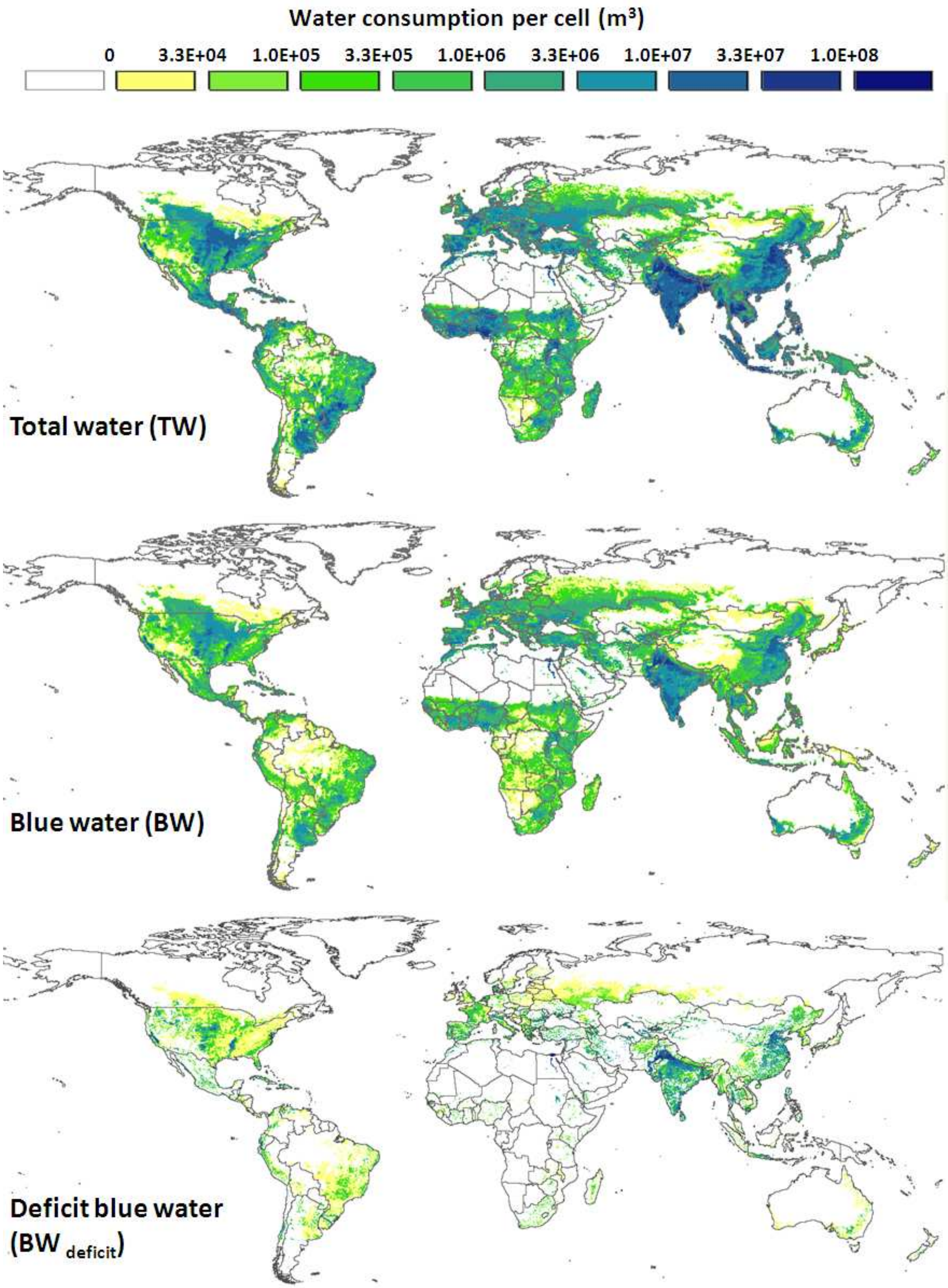

Figure S2. Total ($TW_{expected}$), blue ($BW_{expected}$) and deficit blue ($BW_{deficit}$) water consumption summarized for each cell.

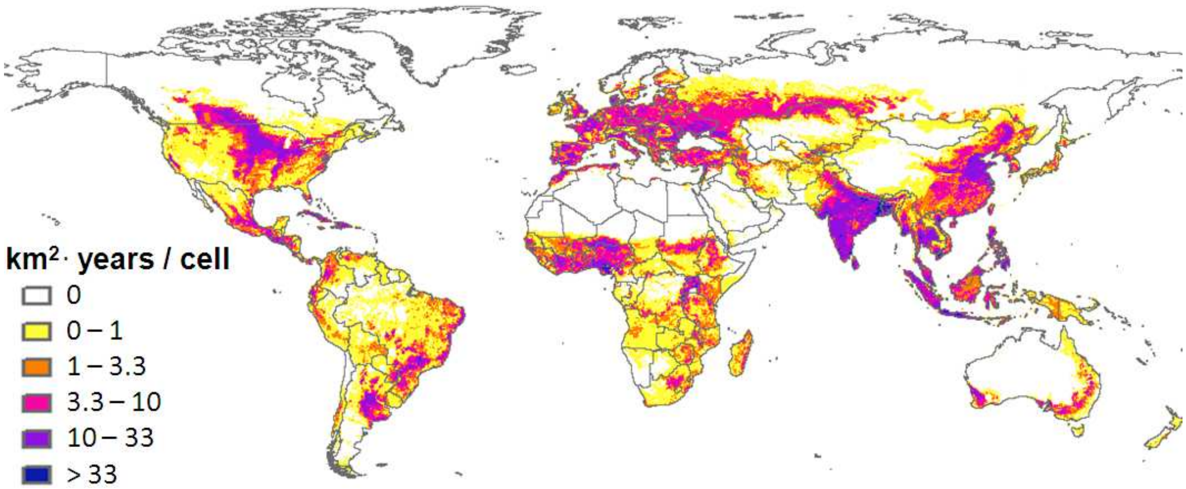

Figure S3. Aggregated RED land values for each grid cell caused by crop production of the 160 considered crops.

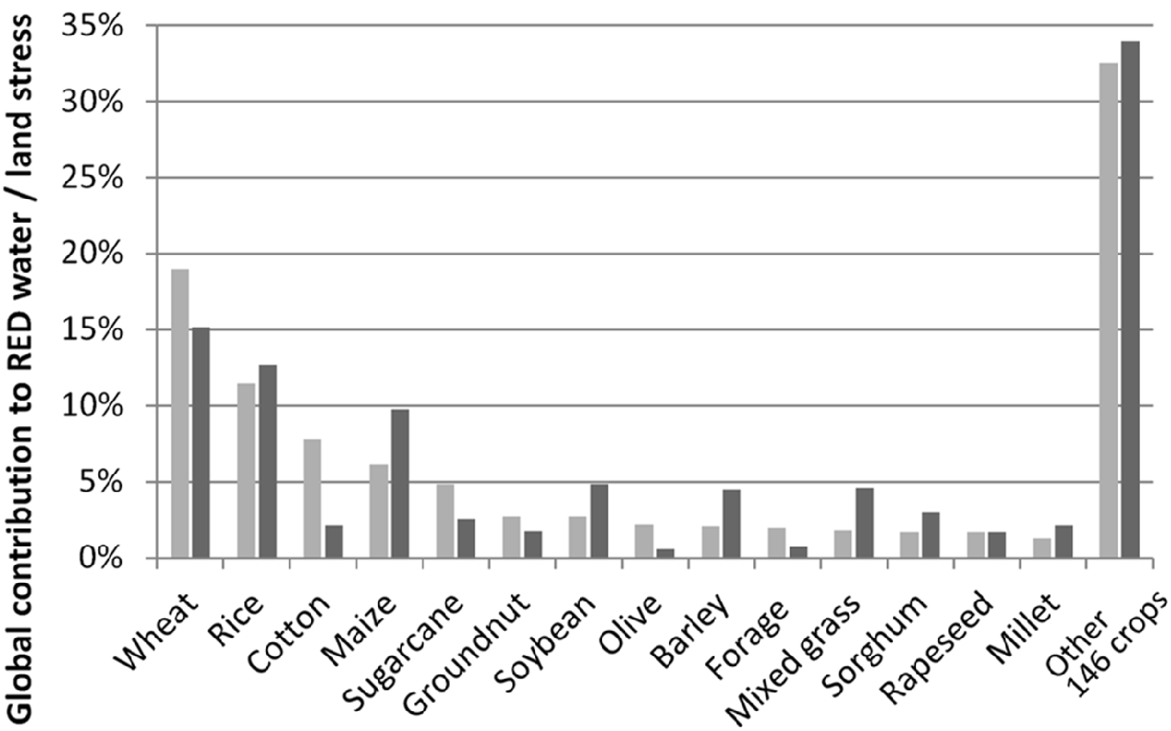

Figure S4. Shares of total global RED water (light gray) and land stress (dark gray) for cultivation of 160 crops (sorted by RED Water).

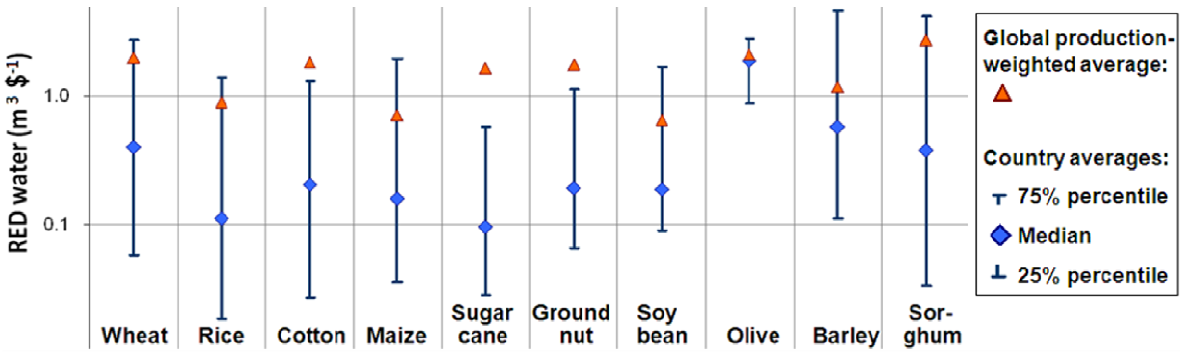

Figure S5. RED water consumption per US Dollar ($) producer price for the globally most relevant crops in terms of RED water.

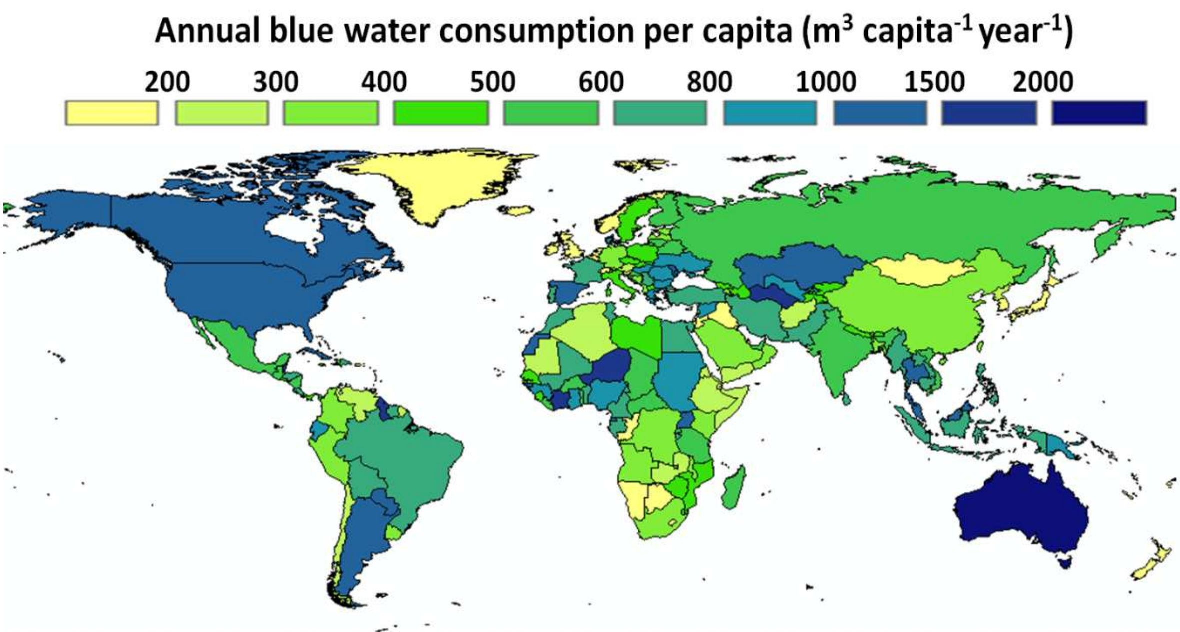

Figure S6. RED water consumption (m^3-equivalents) of total crop production per capita and year for each country.

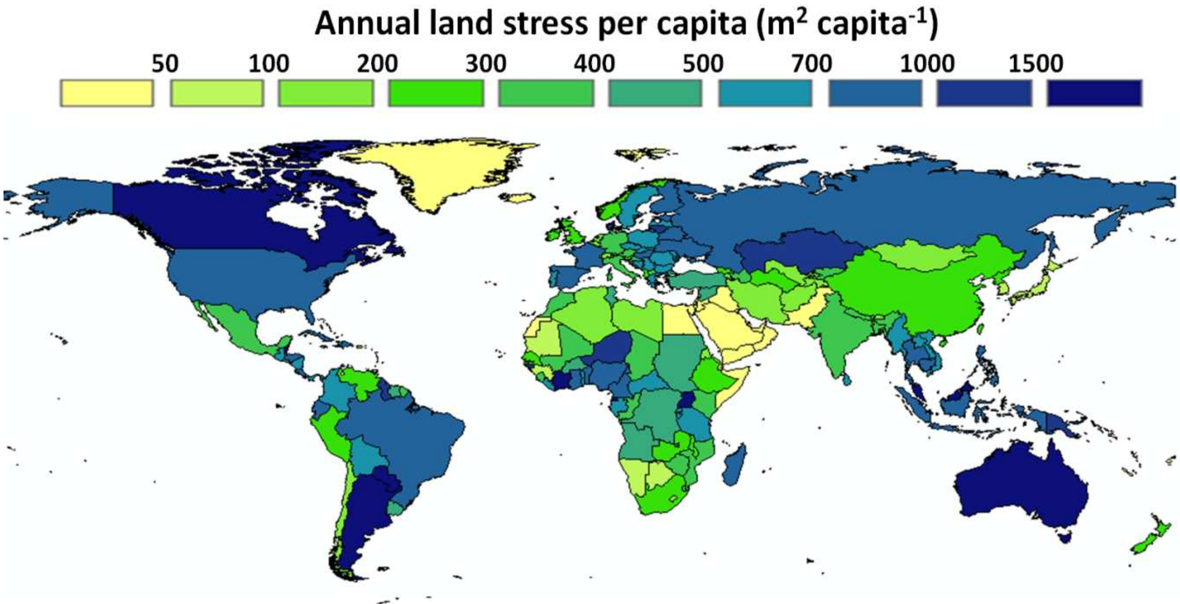

Figure S7. Land stress (m^2 yr-equivalents) of total crop production per capita and year for each country.

Table S1. List of the 160 crops which have been modeled in this paper. Together, they account for 99.96%* of the mass of total global crop production as reported by the production data from FAOSTAT [8].

Abaca	Cherry	Green corn	Oilseed nes†	Sorghum
Agave	Chestnut	Green onion	Okra	Sorghum (forage)
Alfalalfa	Chickpea	Green pea	Olive	Sour cherry
Almond	Chilies etc.	Groundnut	Onion	Soybean
Anise etc	Cinnamon	Hazelnut	Orange	Spice nes†
Apple	Citrus nes†	Hemp	Papaya	Spinach
Apricot	Clove	Hop	Pea	Stone fruit nes†
Areca	Clover	Jute	Peach etc	Strawberry
Artichoke	Cocoa	Jute like fiber	Pear	String bean
Asparagus	Coconut	Kapok seed	Pepper	Sugar beet
Avocado	Coffee	Kiwi	Pigeon pea	Sugarcane
Bambara	Cotton	Kola nut	Pimento	Sugar nes†
Banana	Cowpea	Legumes nes†	Pineapple	Sunflower
Barley	Cranberry	Lemon/lime	Pistachio	Swede (forage)
Bean	Cucumber etc	Lentil	Plantain	Sweet potato
Beet (forage)	Currant	Lettuce	Plum	Tang etc
Berry nes†	Date	Linseed	Poppy	Taro
Blueberry	Eggplant	Lupin	Potato	Tea
Broad bean	Fibre nes†	Maize	Pulse nes†	Tobacco
Buckwheat	Fig	Maize (forage)	Pumpkin etc	Tomato
Cabbage	Flax	Mango	Quinoa	Triticale
Cabbage (forage)	Fonio	Melon etc	Ramie	Tropical fruit nes†
Canary seed	Forage nes†	Melon seed	Rapeseed	turnip (forage)
Carob	Fruit nes†	Millet	Raspberry	Vanilla
Carrot	Garlic	Mixed grain	Rice	Vegetable nes†
Carrot (forage)	Ginger	Mixed grass	Root nes†	Vegetable (forage)
Cashew	Gooseberry	Mustard	Rubber	Vetch
Cashew apple	Grape	Nutmeg	Rye	Walnut
Cassava	Grapefruit etc	Nut nes†	rye (forage)	Watermelon
Castor	Grass nes†	Oats	Safflower	Wheat
Cauliflower	Green bean	Oil palm	Sesame	Yam
Cereal nes†	Green broad bean	Oilseed (forage)	Sisal	Yautia

* Not considered are Jojoba, Leeks, and Tea nes (not else specified),due to lack of regionalized production data, as well as Brazil nuts, Chickory, Gums, Hempseed, Karite, Mate, Mushroom, Peppermint, Persimmon, Popcorn, Pyrethrum, Quince, and Tung, due to lack of plant specific K_c-values.

† Note that the term "nes" stands for "not else specified," which means that statistics do not specifically describe the product within a product group.

Table S2: Fossil fuel saving of cotton textiles compared to polyester textiles, the global average water consumption ($TW_{expected}$, $BW_{expected}$ and RED water) of seed cotton and the resulting RED water per unit of saved fossil energy.

Fossil resource savings per cotton fabric	cotton fabric per seed cotton	**fossil resource savings per kg seed cotton**	$TW_{expected}$ per kg seed cotton	$BW_{expected}$ per kg seed cotton	RED water per kg seed cotton	RED water per fossil resource saving
($MJ\ kg^{-1}$)	($kg\ kg^{-1}$)	**($MJ\ kg^{-1}$)**	($m^3\ Mg^{-1}$)	($m^3\ Mg^{-1}$)	($m^3\ Mg^{-1}$)	**($m^3\ GJ^{-1}$)**
38	**0.41***	**15.6**	3408	1698	1314	84.3

** based on [5] including economic allocation among co-products*

Table S3. Energy content, fossil fuel consumption (considering the life cycle until the final production) and resulting fossil fuel consumption per energy content of biofuels and conventional fossil fuels

Feedstock	**Origin**	**Fuel**	**Energy content of fuel ***	**Life cycle fossil energy demand †**	**Fossil energy / energy content of fuel**
			($MJ\ kg^{-1}$)	**($MJ\ kg^{-1}$)**	**($MJ\ MJ^{-1}$)**
Maize	US	Ethanol 99.7%	26.8	21.2	0.79
Sugarcane	Brazil	Ethanol 99.7%	26.8	3.46	0.13
Palm oil	Malaysia	Methylester	37.2	10.8	0.29
Soybean	US	Methylester	37.2	11.3	0.30
Rapeseed	Switzerland	Methylester	37.2	17.4	0.47
Crude oil	global mix	Gasoline (Petrol)	42.5	55.9	1.32
Crude oil	global mix	Diesel	42.8	53.4	1.25

** net calorific value; from EMPA report [6].*

† net calorific value; Life cycle fossil fuel demand from the ecoinvent database v2.01 [9], at final fuel production facility. Includes feedstock in the case of crude oil.

Table S4. Fossil fuel saving of biofuels compared to conventional fuels and RED water per unit of saved fossil energy.

Feedstock	Origin	Fossil fuel saving per energy content*	Energy yield (energy content of the crop)	**Net fossil fuel saving per kg crop**	$TW_{expected}$ per kg crop	$BW_{expected}$ per kg crop	RED water per kg crop	**RED water per fossil fuel saving**
		($MJ\ MJ^{-1}$)	($MJ\ kg^{-1}$)	**($MJ\ kg^{-1}$)**	($m^3\ Mg^{-1}$)	($m^3\ Mg^{-1}$)	($m^3\ Mg^{-1}$)	**($m^3\ GJ^{-1}$)**
Maize	US	0.52	7.81†	**4.10**	537.8	202.4	42.4	**10.4**
	global mix				*862.9§*	*239.1§*	*89.5§*	***21.8§***
Sugarcane	Brazil	1.19	1.70†	**2.02**	136.6	35.4	1.08	**0.5**
	global mix				*171.3§*	*61.6§*	*34.1§*	***16.9§***
Palm oil	Malaysia	0.96	11.02‡	**10.55**	678.2	14.3	0.6	**0.1**
	global mix				*946.7§*	*103.7§*	*3.6§*	***0.4§***
Soybean	US	0.94	7.40†	**6.98**	2046.2	793.7	84.5	**12.7**
	global mix				*1744.9§*	*688.1§*	*143.5§*	***20.4§***
Rapeseed	Switzerland	0.78	14.31†	**11.16**	1213.7	108.6	9.5	**0.9**
	global mix				*1252.8§*	*648.2§*	*401.3§*	***36.0§***

***** fuel saving compared to gasoline for maize and sugarcane; compared to diesel for palm oil, soybean and rapeseed (data in Table S3).***

† net calorific value ; energy contained in the final fuel per kg of harvested crop, based on data from the EMPA report [6].

‡ net calorific value; energy contained in the final fuel per kg of harvested crop, calculated based on ecoinvent v2.01 (7) and data from the EMPA report [6].

§ calculated based on energy data for specified countries combined with global average virtual water content.

Table S5. Global sums of $TW_{expected}$, $BW_{expected}$ and RED Water of crop production for the mean, minimum (deficit) and maximum (theoretical/CROPWAT) values of the 4 different calculation methods described above.

	Global water consumption (m^3)		
	Mean	**Maximum (theoretical)**	**Minimum (deficit)**
$TW_{expected}$	5.52E+12	6.72E+12	4.18E+12
$BW_{expected}$	1.77E+12	3.32E+12	6.01E+11
RED Water	8.73E+11	1.41E+12	4.44E+11
	Global land use (km^2*year)		
Occupation	9.74E+06		
Land stress	3.78E+06		

Table S6. Land stress, RED Water and RED $water_{deficit}$ (based on $BW_{deficit}$), Land occupation, $BW_{expected}$ and $BW_{deficit}$ for each crop and each country are provided as separate XLS-tables (DatasetS1).

Description	**Worksheet**
Land stress	Land_stress (m2 yr Mg-1)
RED water	RED water (m3 Mg-1)
RED $water_{deficit}$ (based on $BW_{deficit}$)	RED water_deficit (m3 Mg-1)
Land occupation	Land_occupation (m2 yr Mg-1)
$BW_{expected}$	BW_expected (m3 Mg-1)
$BW_{deficit}$	BW_deficit (m3 Mg-1)

Table S7. Production-weighted global average land stress and total ($TW_{expected}$), blue ($BW_{expected}$), deficit blue ($BW_{deficit}$), RED and deficit RED ($RW_{deficit}$) water values for each crop.

	Land stress (m^2 yr Mg^{-1})	$TW_{expected}$ (m^3 Mg^{-1})	$BW_{expected}$ (m^3 Mg^{-1})	$BW_{deficit}$ (m^3 Mg^{-1})	RED Water (m^3 Mg^{-1})	$RW_{deficit}$ (m^3 Mg^{-1})
Wheat	1'018	1'164	517	202	292.8	168.7
Rice	822	1'735	294	155	170.7	101.2
Barley	1'272	959	375	63	137.6	39.7
Maize	619	863	239	69	89.5	44.7
Rye	1'345	299	89	18	28.2	11.0
Oats	1'661	993	390	36	78.4	15.8
Millet	3'206	4'254	741	114	447.2	96.9
Sorghum	2'060	2'618	553	157	275.0	101.8
Buckwheat	1'884	2'231	797	132	262.3	81.2
Quinoa	3'853	2'497	744	202	329.0	173.0
Fonio	3'781	4'716	349	14	226.6	10.4
Triticale	680	268	54	5	17.3	3.1
Canary seed	3'717	3'431	1'489	27	255.0	9.3
Mixed grain	903	975	304	13	37.5	4.8
Cereal nes	2'585	2'907	497	37	159.3	23.0
Potato	157	231	94	27	36.3	16.5
Sweet potatoe	159	220	78	18	27.0	10.0
Cassava	425	546	50	6	8.0	2.5
Yautia	574	894	123	32	34.6	12.6
Taro	786	1'194	106	7	7.7	4.9
Yam	200	310	49	1	1.6	0.1
Root nes	299	349	147	22	53.2	15.3
Sugar cane	79	171	62	28	34.1	22.6
Sugar beet	80	97	48	16	21.0	10.4
Sugar nes	605	888	250	90	38.7	19.5
Bean	3'195	4'213	793	214	445.3	165.6
Broad bean	1'198	1'805	880	375	576.3	328.7
Pea	1'329	1'507	575	85	170.4	51.2
Chick pea	2'654	3'244	820	333	666.6	289.8
Cow pea	7'694	9'215	983	15	228.7	6.7
Pigeon pea	3'374	4'601	280	50	171.4	45.6
Lentil	3'916	5'821	2'762	753	2'138.4	697.6
Bambara	2'573	1'915	1'605	31	79.1	7.9
Vetch	2'063	2'746	1'637	341	881.3	247.1
Lupin	1'861	1'306	2'417	78	245.5	56.8
Pulse nes	3'118	3'292	2'427	700	1'370.5	558.9
Cashew	9'001	17'586	6'254	967	2'698.2	739.0
Chestnut	1'593	3'417	1'285	392	617.6	221.7
Almond	3'076	7'574	5'030	2'348	4'069.1	2'093.9
Walnut	1'511	4'266	2'650	1'549	2'113.6	1'395.3
Pistachio	1'079	9'706	8'603	4'523	7'510.9	4'039.8
Kola nut	9'221	19'340	5'915	80	671.5	16.3
Hazelnut	2'045	5'033	3'031	902	2'022.9	615.1

Areca	4'732	9'621	2'732	904	1'596.4	516.8
Nut nes	4'782	9'413	2'545	614	1'035.9	400.2
Soybean	1'117	1'745	688	128	143.5	60.4
Groundnut	2'086	2'364	1'478	310	750.3	235.1
Coconut	1'415	2'709	507	144	202.8	76.8
Oil palm	538	947	104	6	3.6	1.2
Olive	1'616	3'271	1'806	572	1'442.8	471.6
Castor	3'920	10'773	6'200	2'249	5'310.1	2'124.8
Sunflower	2'415	2'726	1'262	218	407.1	108.8
Rapeseed	1'781	1'253	648	250	401.3	211.6
Safflower	4'163	4'986	3'681	1'096	2'843.2	964.1
Sesame	5'664	7'802	1'261	436	635.4	295.2
Mustard	2'356	1'929	550	27	115.1	5.2
Poppy	4'844	2'084	229	23	150.5	20.2
Melon seed	3'551	4'644	1'041	20	318.7	10.5
Kapok seed	8'243	15'409	2'434	752	484.0	247.8
Cotton	1'580	3'408	1'698	906	1'314.2	789.1
Linseed	4'124	4'890	1'270	200	373.1	144.8
Oilseed nes	6'165	6'206	3'512	664	1'761.5	523.7
Cabbage (forage)	69	84	22	4	3.0	0.3
Artichoke	322	689	347	159	210.1	113.3
Asparagus	840	1'715	468	234	287.1	174.4
Lettuce	80	97	43	23	29.2	18.7
Spinach	91	124	49	23	27.6	16.7
Tomato	79	153	88	52	65.2	47.3
Cauliflower	89	129	54	30	38.8	25.2
Pumpkin etc.	172	226	66	29	45.0	24.5
Cucumber etc.	127	202	64	27	39.7	21.3
Eggplant	129	177	80	39	40.0	24.5
Chillie etc.	173	254	84	28	38.1	19.2
Green onion	116	160	37	11	18.1	6.3
Onion	187	309	159	67	102.8	51.8
Garlic	275	431	180	90	111.5	69.2
Green bean	229	324	122	55	76.7	40.6
Green pea	233	304	161	64	94.1	49.0
Green broad bean	630	683	314	67	150.8	31.4
String bean	220	326	118	35	28.0	12.5
Carrot	121	127	69	34	46.1	29.6
Okra	317	293	213	45	113.0	40.9
Green corn	316	521	141	53	42.0	23.1
Carob	2'125	4'899	3'046	915	1'981.0	605.3
Vegetable nes	169	226	90	30	43.9	20.5
Banana	372	807	245	67	84.4	39.1
Plantain	1'087	2'033	649	40	30.4	9.6
Orange	272	443	148	64	92.5	53.6
Tang etc.	313	551	184	79	121.7	64.8
Lemon & lime	263	518	236	122	166.3	100.5

Grapefruit etc.	229	370	100	44	72.0	36.9
Citrus nes	874	1'604	619	32	220.7	25.2
Apple	323	691	333	154	237.6	128.7
Pear	346	759	340	172	251.5	141.9
Apricot	431	1'115	697	310	549.2	270.4
Sour cherry	964	1'336	495	79	118.4	36.2
Cherry	644	1'295	718	292	425.8	200.4
Peach etc.	340	782	342	186	243.9	155.7
Plum	949	1'896	617	281	362.8	216.2
Stone fruit nes	425	1'708	1'263	578	1'077.5	497.8
Strawberry	443	376	100	36	44.0	29.9
Raspberry	897	771	258	28	30.9	4.5
Gooseberry	668	463	95	6	16.6	1.7
Currant	515	413	130	11	16.9	2.2
Blueberry	1'045	704	78	4	2.2	0.3
Cranberry	658	425	115	3	5.1	0.1
Berry nes	280	412	221	104	163.8	78.3
grape	379	592	363	161	246.2	127.2
Water melon	79	136	55	26	36.7	21.8
Melon etc.	97	146	78	38	56.5	32.8
Fig	1'127	2'555	1'518	681	1'141.2	584.0
Mango	624	1'645	741	328	532.0	273.0
Avocado	641	1'130	416	157	198.0	110.1
Pineapple	306	248	48	8	13.1	3.0
Date	156	1'902	1'672	794	1'522.7	743.2
Cashew apple	2'230	3566	753	55	60.7	3.5
Kiwi	209	369	189	108	113.9	80.6
Papaya	325	567	165	25	65.0	13.8
Tropical nes	699	1'549	474	196	273.2	136.0
Fruit nes	652	1'430	532	206	347	168.6
Maize (forage)	111	132	61	14	16.6	8.1
Sorghum (forage)	126	105	53	9	19.9	5.7
Rye forage	69	101	48	10	11.3	2.3
Grass nes	154	140	101	17	29.8	8.7
Clover	41	150	139	132	132.8	130.1
Alfalalfa	115	150	62	16	16.8	6.8
Oilseed (forage)	162	164	50	3	4.8	0.3
Legume nes	99	136	53	14	13.6	4.2
Cabbage	127	195	63	26	34.3	20.2
Mixed grass	231	139	48	11	20.6	7.8
Turnip (forage)	104	120	21	3	2.9	0.2
Beet (forage)	25	26	8	1	1.0	0.2
Carrot (forage)	232	158	12	0	0.8	0.0
Swede (forage)	64	60	10	1	0.4	0.0
Forage nes	109	164	87	35	72.3	33.1
Vegetables (forage)	64	74	37	13	19.4	11.7
Coffee	9'810	16'375	3'763	497	472.4	116.1

Cocoa	12'188	22'112	5'316	301	203.8	59.9
Tea	3'557	9'187	3'740	1'434	2'278.6	1'064.2
Hop	1'597	2'667	1'445	843	68.9	25.7
Pepper	4'426	5'781	2'111	602	979.2	276.4
Pimento	3'768	10'705	5'484	2'211	4'007.2	1'890.5
Vanilla	82'809	136'150	30'865	3'733	714.8	123.4
Cinnamon	12'701	23'457	3'183	1'146	869.9	442.3
Clove	34'449	59'701	6'079	1'303	729.7	377.2
Nutmeg	16'799	36'864	13'715	5'546	8'998.5	4'723.9
Anise etc.	4'645	5'212	3'467	1'521	3'035.4	1'409.8
Ginger	1'660	2'905	365	123	255.1	119.6
Spice nes	2'287	4'387	1'463	644	1'403.8	626.7
Flax	3'351	3'202	1'077	290	373.9	242.5
Hemp	1'818	2'651	538	267	386.3	199.8
Jute	1'778	2'653	320	145	274.5	129.2
Jute-like fiber	2'624	4'144	1'178	521	807.8	347.2
Ramie	2'039	4'133	1'503	597	754.2	397.2
Sisal	6'351	7'810	2'558	161	313	67.4
Agave	6'136	6'515	996	143	125.7	24.2
Abaca	9'435	19'067	2'929	909	459.6	199.2
Fibre nes	8'588	9'917	5'637	296	1'454.2	58.6
Tobacco	1'214	2'089	679	206	302.6	120.6
Rubber	7'003	13'151	2'128	606	540.9	227.0

Table S8. Coefficient of variation (CV) of RED water in countries with high agricultural output and for the global production, based on production-weighted cell values for crops with high global water consumption. Country-level CV values larger than CV-values of the global production are marked in orange color.

	Wheat	rice	barley	maize	sorghum	potato	sugarcane	soybean	groundnut	coconut	olive	sunflower	rapeseed	cotton	apple	grape	mango
Argentina	3.7	6.0	2.2	4.3	3.2	2.8	0.9	2.9	4.9	-	4.2	4.8	0.6	4.3	1.4	0.5	0.0
Australia	1.7	0.4	1.8	1.0	1.6	2.0	1.6	1.4	2.1	-	-	1.0	1.2	3.0	1.5	1.2	1.5
Brazil	1.2	7.6	1.3	10	11	0.8	5.3	1.7	5.8	3.4	-	6.0	-	10	1.3	1.7	3.3
Canada	2.1	-	2.3	0.8	-	2.5	-	0.2	-	-	-	5.0	2.9	-	0.7	0.5	-
China	0.9	2.5	1.0	1.4	1.5	1.9	2.7	1.7	1.2	2.6	-	1.0	2.2	1.2	0.8	1.0	1.5
Egypt	0.3	0.1	0.4	0.3	0.2	0.2	0.2	0.2	0.3	-	0.5	0.3	-	0.3	0.3	0.2	0.2
France	1.2	2.9	1.1	1.7	1.6	0.9	-	2.6	-	-	3.4	2.5	1.1	-	1.8	3.0	-
Germany	0.5	-	0.5	0.6	0.2	0.6	-	0.3	-	-	-	0.5	0.6	-	0.6	0.4	-
India	0.6	0.9	0.7	1.4	1.9	0.9	0.8	0.5	0.6	0.8	-	0.7	0.5	0.5	0.8	0.4	0.5
Indonesia	-	3.4	-	3.3	-	2.0	4.6	1.4	4.2	4.4	-	-	-	-	-	-	4.1
Iran	0.6	0.6	0.8	0.8	-	0.6	0.5	0.5	-	-	0.5	1.2	-	0.4	0.5	0.6	-
Italy	2.0	2.3	2.5	3.3	1.9	1.5	-	0.6	-	-	0.9	2.3	2.5	-	2.0	2.1	-
Japan	3.0	2.3	2.7	-	-	3.2	1.2	2.7	1.6	-	-	-	-	-	2.7	3.7	-
Mexico	0.7	2.4	1.7	2.2	1.7	1.0	2.3	2.1	1.6	2.9	0.6	0.3	-	1.0	1.4	0.6	2.0

Myanmar	2.5	2.8	2.4	3.3	-	0.8	0.8	1.1	0.8	0.8	-	1.1	0.8	0.8	0.4	-	0.6
Nigeria	0.6	3.2	-	3.2	2.0	2.8	1.9	4.5	1.4	0.4	-	-	-	2.2	-	-	2.1
Pakistan	0.6	0.7	1.1	0.9	0.7	0.6	0.6	-	0.7	-	-	1.2	0.6	0.5	0.8	-	0.7
Philippines	-	6.8	-	6.5	-	0.9	2.1	2.5	2.6	2.9	-	-	-	1.3	-	-	2.9
Russia	1.4	2.6	1.8	1.7	0.5	2.1	-	1.7	-	-	-	1.0	2.9	2.9	2.1	1.8	-
South Africa	1.4	-	0.7	0.9	0.7	0.7	2.2	1.0	0.5	-	-	0.9	-	0.7	1.3	0.6	0.2
Spain	1.2	0.5	1.3	0.9	-	1.2	-	0.4	-	-	0.5	0.9	0.7	0.3	0.7	0.6	-
Thailand	5.4	1.2	-	1.9	3.5	0.6	1.4	0.7	1.0	1.4	-	1.5	-	1.1	-	-	1.4
Turkey	0.9	0.9	0.8	0.9	1.1	0.8	-	0.3	0.5	-	0.7	0.9	0.0	0.4	0.8	0.8	-
Ukraine	2.0	2.0	2.4	2.1	0.0	2.3	-	2.0	-	-	-	2.1	2.7	-	1.9	1.8	-
UK	1.4	-	1.8	-	-	1.6	-	-	-	-	-	-	1.5	-	1.5	-	-
USA	2.5	1.5	2.3	2.5	1.5	2.3	1.0	2.7	1.9	-	0.3	1.8	1.8	1.3	3.0	0.5	0.1
Viet Nam	1.5	2.1	2.5	5.8	-	2.4	1.4	2.5	2.0	1.6	-	-	0.8	2.8	0.0	-	1.5
Global Production	**1.1**	**1.6**	**2.4**	**2.0**	**2.4**	**1.5**	**1.2**	**2.1**	**1.2**	**1.7**	**0.7**	**1.8**	**1.3**	**0.8**	**1.1**	**0.8**	**0.7**

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