Climate Change and Land

An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems

Errata

(Version: 12-December-2019)

The following errata have been identified and approved in accordance with the IPCC protocol for addressing possible errors in IPCC assessment reports, synthesis reports and methodology reports as adopted by the Panel at the Thirty-Third Session (Abu Dhabi, 10-13 May 2011) and amended at the Thirty-Seventh Session (Batumi 14-18 October 2013). Errata identified following the approval and acceptance of the Special Report on Climate Change and Land (SRCCL) and prior to publication have been corrected in the final copyedited and laid out draft of the report.

Note that page and line numbers for the SPM are based on the numbering used in the revised final draft as distributed to Governments on 31st July 2019; page and line numbers for the underlying chapters are based on the numbering used in the final draft as distributed to Governments on 24th June 2019.

Chapter / section	Page/ line / item	Correction
1	2 / Executive Summary Chapter 1	Chapter 1, Executive summary. The sentence: "Food security is also negatively affected by food loss and waste (estimated as more than 30% of harvested materials) (high confidence)." Should be corrected to: "Food security is also negatively affected by food loss and waste (estimated as 25-30% of total food produced) (medium confidence)"
1	11 / Table 1.1.	Table 1.1. Figure in line "Used Forests: Planted Forests" Should be corrected from “19% “to “20%”

Chapter / section	Page/ line / item	Correction
2	Figure 2.12:	Chapter 2, on figure 2.12: the units on the Y-axis should be corrected from "N_2O " to "N_2O-N"
2	4 / Line 18	"Agriculture, Forestry and Other Land Use (AFOLU) is a significant net source of GHG emissions (high confidence), contributing to about 22% of anthropogenic emissions of carbon dioxide (CO_2)." Should be corrected to: "Agriculture, Forestry and Other Land Use (AFOLU) is a significant net source of GHG emissions (high confidence), contributing to about 23% of anthropogenic emissions of carbon dioxide (CO_2)."
2	Table 2.2	Table 2.2 should be updated to correctly match the SPM Table SPM1 Panel A
2	15 / Line 35	"the total increase in LSAT between the average…" should be corrected to "the total observed increase in LSAT…"
2	22	Fluxes attributed to AFOLU paragraph "14%" should be corrected to "13% "
2	21 / Table 2.2	Table 2.2: column B (agriculture), second row, 42 should be replaced with 43.; column B (agriculture), fourth row, 2 should be replaced with 2.5; Column E, row 2, should be replaced with 111 with 109; Column E, bottom row, 4.4 should be replaced with 4.5; Last column (A+G), 2.0 should be replaced with 3.7; Footnote 7 should be deleted
3	14 / Line 17-19	The sentence: "While large uncertainty exists concerning trends in droughts globally (AR5, 2.3), examining the drought data by Ziese et al. (2014) for drylands only reveals a large inter-annual variability combined with a trend toward increasing dryland area affected by droughts since 1950s (Figure 1.1)." Should be corrected to: "While large uncertainty exists concerning trends in droughts globally (AR5, 2.2), examining the drought data by Ziese et al. (2014) for drylands only reveals a large inter-annual variability combined with a trend toward increasing dryland area affected by droughts since 1950s (Figure 1.1). Thus, over the period 1961-2013, the annual area of drylands in drought has increased, on average by slightly more than 1% per year, with large inter-annual variability."

Chapter / section	Page/ line / item	Correction
3	80 / Line 34	"The Green Revolution that transformed irrigated agriculture in India had little effect on agricultural productivity in the rainfed and semi-arid regions, where land degradation and drought were serious concerns" Should be corrected to: "The second great challenge after the Green Revolution in India was the low productivity in the rain-fed and semi-arid regions where land degradation and drought were serious concerns".
3	81 / Lines 3-10	"Rigorous comparisons of catchments with and without IWM projects have shown no significant enhancement of biomass " Should be corrected to: "Comparisons of catchments with and without IWM projects using remotely sensed data have sometimes shown no significant enhancement of biomass in part due to methodological challenges of space for time comparisons "
3	81 / Line 24	"In summary, the overall poor performance of IWM projects have been linked to several factors" Should be corrected to: "In summary, the mixed performance of IWM projects have been linked to several factors"
3	81 / Line 38	"Successful adaptation of IWM would largely depend on…" Should be corrected to: "Successful adaptation of IWM to achieve land degradation neutrality would largely depend on …"
4	11 / Line 40	Missing definition should be added: "SFM can be considered a subset of SLM, that is, SLM applied to forest land. "
5	20 /Section 5.1.4.2	"Existing scenarios estimate the global area required for BECCS alone to help limit warming…," Should be corrected to: "Existing scenarios estimate the global area required for energy crops to help limit warming…"
5	83 / Section 5.6.1	"BECCS is not yet deployable at a scale…" Should be corrected to: "BECCS is not yet deployable at a significant scale…"
5	84 / Section 5.6.1	"There is however considerable uncertainty about the benefits" Should be corrected to: "There is however uncertainty about the benefits"

Chapter / section	Page/ line / item	Correction
5	39 / Chapter 5, Section 5.2.4.2	"stomata to be open for a shorter period for gas exchange" Should be corrected to: "stomata to partially close during gas exchange"
5	67 / Section 5.5.1	"1.5–4.0 $GtCO_2$-eq yr^{-1}" Should be corrected to "1.6–4.6 $GtCO_2$-eq yr^{-1}"
5	59 / Line 12-21.	142 ± 43 should be corrected to 142 ± 42; 8.0 ± 2.0, should be corrected to 8.3 ± 2.5
5	60	" may thus account for 25 - 30%" Should be corrected to "may account for 21 - 37% "
5	60	" 10 - 12%" should be corrected to "10 - 14% "; "8 - 10%, should be corrected to " 5 - 14% "; " 2.4," should be corrected to "2.6"
5	Table 5.4	Beyond farm gate row, 2.4-4.8b should be deleted - insert 2.6-5.2; Total row: 10.7 should be deleted and 10.8 inserted
5	60	"and (b) estimates from Fischedick et al. (2014) and Poore and Nemecek (2018)" should be deleted
5	59 / Line 12-21.	Delete 142 ± 43, Insert 142 ± 42; Delete 8.0 ± 2.0, Insert 8.3 ± 2.5
5	62 / Line 30	"...monogastric livestock (animals without ruminant digestion processes such as sheep, goats, pigs, and poultry)". Should be corrected to: "...monogastric livestock (animals without ruminant digestion processes such as pigs, and poultry)".
5	Section 5.4.5	"Based on information reported in the AR5 (Fischedick et al. 2014), we estimated their total contribution to be roughly 15% of total anthropogenic emissions (Table 5.4)." Should be corrected to: Based on information reported in the AR5 (Fischedick et al., 2014) and Poore and Nemecek (2018), we estimate their total contribution to be roughly 5-10% of total anthropogenic emissions (Table 5.4).

Chapter / section	Page/ line / item	Correction
5	Executive Summary	"Increasing temperatures are affecting agricultural productivity in higher latitudes, raising yields of some crops (maize, cotton, wheat, sugar beets), while yields of others (maize, wheat, barley) are declining in lower-latitude regions." Should be corrected to: "Studies that separate out climate change from other factors affecting crop yields have shown that yields of some crops (e.g., maize and wheat) in many lower-latitude regions have been affected negatively by observed climate changes, while in many higher-latitude regions, yields of some crops (e.g., maize, wheat, and sugar beets) have been affected positively over recent decades. Warming compounded by drying has caused large negative effects on yields in parts of the Mediterranean"
6	20	SSP2 row of Table "high" should be corrected to "medium"
6	Table 6.49	Confidence for bioenergy and BECCS row should be corrected to “low”
6	Table 6.41	Bioenergy and BECCS confidence statement should be changed to "low" to match SPM figure 3
6	Table 6.33	Bioenergy and BECCS confidence statement should be changed to "low" to match SPM figure 3
6	Table 6.49	Bioenergy and BECCS confidence statement should be changed to "low" to match SPM figure 3 and add in Chapter 7; Chapter 7 SPM reference to citation column.
6	Table 6.54	Mitigation magnitude should be changed to large (and coloured dark blue) to match SPM Figure 3
6	Table 6.2	"More than doubles" should be corrected to: "High water stress: global water withdrawals nearly doubles from the baseline in 2071-2100, with ~5.54 billion people living in water stressed areas (Hanasaki et al. 2013)"
6	Table 6.53	"For adaptation, numbers are set relative to the about 5 million lives lost per year attributable to climate change and 100 million lives predicted to be lost between 2010 and 2030" Should be corrected to: "For adaptation, numbers are set relative to the about 5 million lives lost per year attributable to climate change and a carbon-based economy, with 0.4 million per year attributable directly to climate change. This amounts to 100 million lives predicted to be lost between 2010 and 2030 due to climate change and a carbon-based economy"
7	Table 7.1	"farmer suicide" should be corrected to "farmer distress"

Chapter / section	Page/ line / item	Correction
7	92 / case study	"Hydrologic and ecological connectivity have been impacted, especially for endemic fish communities and fragmented forests in the Himalayas and Western Ghats biodiversity hotspots in India, and regions in China, and Central America" should be corrected to "Hydrologic and ecological connectivity have been impacted, especially for endemic fish communities and forests in some sites of significant biodiversity values"
7	92 / case study	"Some regions" has been corrected to "In some sites, local communities have opposed SHPs..."
7	Page 7 Line 11 / Executive Summary	"Participation of people in land and climate decision making.." confidence level should be corrected to medium confidence
7	Page 5 Line 2 / Executive Summary	"Land-based adaptation and mitigation responses..." confidence level should be corrected to medium confidence
7	Page 5 Line 5 / Executive Summary	"6 Mkm^2 " should be corrected to "4 Mkm^2"
7	P47 Line 1-5	"Australia's Emissions Reduction Fund, and the preceding Carbon Farming Initiative, are an example of a baseline-and-credit scheme, which set an emissions intensity baseline and creates credits for activities that generate emissions below the baseline, effectively a subsidy (Freebairn 2016). Should be corrected to: "Australia's Emissions Reduction Fund, and the preceding Carbon Farming Initiative, are an example of a baseline-and-credit scheme, which creates credits for activities that generate emissions below a baseline..."

Chapter / section	Page/ line / item	Correction
7	Page 92 / Case Study	Paragraph originally: Large scale solar farms that involve large land resources are being installed at a rapid rate. In India, semi-arid and arid regions are targeted for wind and solar farms. India's renewable energy targets are often sited in semi-arid areas which includes the last remaining habitats of the highly endangered Great Indian Bustard (Ardeotis nigriceps). Installing solar and wind farms linked to lethal power transmission lines cause mortality of a species whose global population is now reduced to about 150 (Collar et al. 2015). The loss of habitat over the decades has been largely due to agricultural intensification driven by irrigation and bad management in designated reserves (Collar et al. 2015; Ledec, George C.; Rapp, Kennan W.; Aiello 2011) but intrusion of power lines in its last remaining refuges is a major worry for its future persistence (Government of India 2012). In many regions around the world, wind-turbines and solar farms pose a threat to many other species especially predatory birds and insectivorous bats (medium evidence, medium agreement) (Thaker, M, Zambre, A. Bhosale 2018) and disrupt habitat connectivity (Northrup and Wittemyer 2013). Should be corrected to: Semi-arid and arid regions are often found suitable for wind and solar farms which may impact endemic biodiversity and endangered species (Collar et al. 2015, Thaker, M, Zambre, A. Bhosale 2018). The loss of habitat for these species over the decades has been largely due to agricultural intensification driven by irrigation and bad management in designated reserves (Collar et al. 2015; Ledec, George C.; Rapp, Kennan W.; Aiello 2011) but intrusion of power lines is a major worry for highly endangered species such as the Great Indian Bustard (Great Indian Bustard (Ardeotis nigriceps) and conservation and mitigation efforts are being planned to address such concerns (Government of India 2012). In many regions around the world, wind-turbines and solar farms pose a threat to many other species especially predatory birds and insectivorous bats (medium evidence, medium agreement) (Thaker, M, Zambre, A. Bhosale 2018) and disrupt habitat connectivity (Northrup and Wittemyer 2013).

Chapter / section	Page/ line / item	Correction
7	Page 92	Paragraph originally: “Additionally, conversion of rivers into waterways has been touted as a fuel-efficient (low carbon emitting) and environment-friendly alternative to surface land transport (IWAI 2016; Dharmadhikary, S., and Sandbhor 2017). India’s National Waterways (funded partly by a USD 375 million loan from the World Bank) seeks to cut transportation time and costs and reduce carbon emissions from road transport (Admin 2017). However, given the low water levels in India’s rivers in the dry-season (due to upstream demands and abstraction) the programme relies on large scale dredging to maintain deep channels. Evidence from elsewhere suggests that dredging could severely impact the water quality, human health and habitat of fish species (Junior et al. 2012; Martins et al. 2012), disrupt artisanal fisheries and potentially cause severe threat to the endangered Ganges River Dolphin (Platanista gangetica), India’s National Aquatic Animal (Kelkar 2016). The most severe impact of dredging and vessel traffic on this unique species is the disruption through under-water noise of the acoustic signals that the endangered and naturally blind animal relies on for navigation, foraging and communication (low evidence, medium agreement) (Dey Mayukh 2018). Off-shore renewable energy projects in coastal zones have been known to have similar impacts on marine fauna (Gill 2005).” Should be corrected to: “Additionally, conversion of rivers into waterways has emerged as a fuel-efficient (low carbon emitting) and environment-friendly alternative to surface land transport (IWAI 2016; Dharmadhikary, S., and Sandbhor 2017). India’s National Waterways seeks to cut transportation time and costs and reduce carbon emissions from road transport (Admin 2017). There is some evidence that dredging and under-water noise could impact the water quality, human health and habitat of fish species (Junior et al. 2012; Martins et al. 2012), disrupt artisanal fisheries and potentially impact species that rely on echo-location (low evidence, medium agreement) (Dey Mayukh 2018). Off-shore renewable energy projects in coastal zones have been known to have similar impacts on marine fauna (Gill 2005). The Government of India has decided to support studies of the impact of waterways on the endangered Gangetic dolphin in order in order to plan mitigation measures”

Chapter / section	Page/ line / item	Correction
SPM	A2.8	In many lower-latitude regions, yields of some crops (e.g., maize and wheat) have declined, while in many higher-latitude regions, yields of some crops (e.g., maize, wheat and sugar beets) have increased over recent decades (high confidence)." However, the statement that "In many lower-latitude regions, yields of some crops (e.g., maize and wheat) have declined" Should be corrected to: "Studies that separate out climate change from other factors affecting crop yields have shown that yields of some crops (e.g., maize and wheat) in many lower-latitude regions have been affected negatively by observed climate changes, while in many higher-latitude regions, yields of some crops (e.g., maize, wheat, and sugar beets) have been affected positively over recent decades (high confidence). "
SPM	Figure SPM3 - Panel B Biochar description	"High level: Impacts on adaptation, desertification, land degradation and food security are maximum potential impacts assuming implementation of afforestation at a scale of 6.6 $GtCO_2yr^{-1}$ removal {6.4.1.1.3}. Dedicated energy crops required for feedstock production could occupy 0.4–2.6 Mkm^2 of land, equivalent to around 20% of the global cropland area, which could potentially have a large effect on food security for up to 100 million people {6.4.5.1.3}." Should be corrected to: "High level: Impacts on adaptation, desertification, land degradation and food security are maximum potential impacts assuming implementation of biochar at a scale of 6.6 $GtCO_2$ yr^{-1} removal {6.4.1.1.3}. Dedicated biomass crops required for feedstock production could occupy 0.4–2.6 Mkm^2 of land, equivalent to around 20% of the global cropland area, which could potentially have a large effect on food security for up to 100 million people {6.4.5.1.3}."

Chapter / section	Page/ line / item	Correction
SPM	Page 29 / Figure SPM3 - Panel B Biochar description	“High level: Impacts on adaptation, desertification, land degradation and food security are maximum potential impacts assuming implementation of afforestation at a scale of 6.6 GtCO_ yr-1 removal {6.4.1.1.3}. Dedicated energy crops required for feedstock production could occupy 0.4–2.6 Mkm_ of land, equivalent to around 20% of the global cropland area, which could potentially have a large effect on food security for up to 100 million people {6.4.5.1.3}. “ Should be corrected to: “High level: Impacts on adaptation, desertification, land degradation and food security are maximum potential impacts assuming implementation of biochar at a scale of 6.6 $GtCO_2yr^{-1}$ removal {6.4.1.1.3}. Dedicated biomass crops required for feedstock production could occupy 0.4–2.6 Mkm^2 of land, equivalent to around 20% of the global cropland area, which could potentially have a large effect on food security for up to 100 million people {6.4.5.1.3}.”

Table SPM 1 Panel 1 & 2

In the table below red highlights the text which is incorrect. Yellow highlights the corrected text.

Table SPM 1 Panel 1 & 2 (subject to copy editing and trickle backs) as approved:

Table SPM1. Net anthropogenic emissions due to Agriculture, Forestry, and other Land Use (AFOLU) and non-AFOLU (Panel 1) and global food systems (average for 2007-2016)[1] (Panel 2). Positive value represents emissions; negative value represents removals.

		Direct Anthropogenic							
		Net anthropogenic emissions due to Agriculture, Forestry, and Other Land Use (AFOLU)			Non-AFOLU anthropogenic GHG emissions[6]	Total net anthropogenic emissions (AFOLU + non-AFOLU) by gas	AFOLU as a % of total net anthropogenic emissions, by gas	Natural response of land to human-induced environmental change[7]	Net land – atmosphere flux from all lands
Panel 1: Contribution of AFOLU									
		FOLU	Agriculture	Total					
		A	B	C = B + A	D	E = C + D	F = (C/E)*100	G	A + G
CO_2[2]	Gt CO_2 y^{-1}	5.2 ± 2.6	--[11]	5.2 ± 2.6	33.9 ± 1.8	**39.1 ± 3.2**	~13%	-11.2 ± 2.6	-6.0 ± 2.0
CH_4[3,8]	Mt CH_4 y^{-1}	19 ± 6	142 ± 43	162 ± 48.6	201 ± 100	363 ± 111			
	Gt CO_2e y^{-1}	0.5 ± 0.2	4.0 ± 1.2	4.5 ± 1.4	5.6 ± 2.8	**10.1 ± 3.1**	~44%		
N_2O[3,8]	Mt N_2O y^{-1}	0.3 ± 0.1	8 ±2	8.3 ± 2.5	2.0 ± 1.0	10.4 ± 2.7			
	Gt CO_2e y^{-1}	0.09 ± 0.03	2.2 ± 0.7	2.3 ± 0.7	0.5 ± 0.3	**2.8 ± 0.7**	~82%		
Total (GHG)	Gt CO_2e y^{-1}	**5.8 ± 2.6**	**6.2 ± 1.4**	12.0 ± 3.0	**40.0 ± 3.4**	**52.0 ± 4.5**	**~23%**		
Panel 2: Contribution of global food system									
		Land-use change	Agriculture		Non-AFOLU[5] other sectors pre- to post-production	Total global food system emissions			
CO_2[4] Land-use change	Gt CO_2 y^{-1}	4.9 ± 2.5							
CH_4[3,8,9] Agriculture	Gt CO_2e y^{-1}		4.0 ± 1.2						
N_2O[3,8,9] Agriculture	Gt CO_2e y^{-1}		2.2 ± 0.7						
CO_2 other sectors	Gt CO_2 y^{-1}				2.4 – 4.8				
Total (CO_2e)[10]	Gt CO_2e y^{-1}	**4.9 ± 2.5**	**6.2 ± 1.4**		2.4 – 4.8	10.7 – 19.1			

Table SPM 1 Panel 1 & 2 corrected:

Table SPM1. Net anthropogenic emissions due to Agriculture, Forestry, and other Land Use (AFOLU) and non-AFOLU (Panel 1) and global food systems (average for 2007-2016)[1] (Panel 2). Positive value represents emissions; negative value represents removals.

		Direct Anthropogenic							
Gas	Units	Net anthropogenic emissions due to Agriculture, Forestry, and Other Land Use (AFOLU)			Non-AFOLU anthropogenic GHG emissions[6]	Total net anthropogenic emissions (AFOLU + non-AFOLU) by gas	AFOLU as a % of total net anthropogenic emissions, by gas	Natural response of land to human-induced environmental change[7]	Net land – atmosphere flux from all lands
Panel 1: Contribution of AFOLU									
		FOLU	**Agriculture**	**Total**					
		A	**B**	**C = A + B**	**D**	**E = C + D**	**F = (C/E) *100**	**G**	**A + G**
CO_2[2]	Gt CO_2 y^{-1}	5.2 ± 2.6	No data[11]	5.2 ± 2.6	33.9 ± 1.8	**39.1 ± 3.2**	13%	-11.2 ± 2.6	-6.0 ± 3.7
CH_4[3,8]	Mt CH_4 y^{-1}	19.2 ± 5.8	142 ± 42	161 ± 43	201 ± 101	362 ± 109			
	Gt CO_2e y^{-1}	0.5 ± 0.2	4.0 ± 1.2	4.5 ± 1.2	5.6 ± 2.8	**10.1 ± 3.1**	44%		
N_2O[3,8]	Mt N_2O y^{-1}	0.3 ± 0.1	8.3 ± 2.5	8.7 ± 2.5	2.0 ± 1.0	10.6 ± 2.7			
	Gt CO_2e y^{-1}	0.09 ± 0.03	2.2 ± 0.7	2.3 ± 0.7	0.5 ± 0.3	**2.8 ± 0.7**	81%		
Total (GHG)	**Gt CO_2e y^{-1}**	**5.8 ± 2.6**	**6.2 ± 1.4**	12.0 ± 2.9	**40.0 ± 3.4**	**52.0 ± 4.5**	**23%**		
Panel 2: Contribution of global food system									
		Land-use change	Agriculture		Non-AFOLU[5] other sectors pre- to postproduction	Total global food system emissions			
CO_2 (land-use and land-use change)[4]	Gt CO_2e y^{-1}	4.9 ± 2.5							
CH_4 Agriculture[3,8,9]	Gt CO_2e y^{-1}		4.0 ± 1.2						
N_2O Agriculture[3,8,9]	Gt CO_2e y^{-1}		2.2 ± 0.7						
CO_2 (other sectors)[5]	Gt CO_2e y^{-1}				2.6 – 5.2				
Total[10]	Gt CO_2e y^{-1}	**4.9 ± 2.5**	**6.2 ± 1.4**		2.6 – 5.2	10.8 – 19.1			