Cross-Chapter Paper 5: Mountains
Supplementary Material

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SMCCP5.1 Delineation of Mountain Regions, Population Numbers and Densities in 2015, and Their Projections to 2100.

Global mountain extents and population estimates according to various combinations of mountain delineations and gridded population datasets were derived via a spatial analysis that was implemented in the open-source software PostGIS. This approach enabled the necessary zonal statistics (i.e., areal extents of the various geometrical zones and their corresponding population sums) to be calculated in an efficient fashion.

Three commonly used mountain delineations – "K1" (Kapos et al., 2000), "K2" (Körner et al., 2011), and "K3" (Karagulle et al., 2017) – were obtained from the UGSG's Global Mountain Explorer v2.0[1]. Five population grids sources were employed, four of which – the Gridded Population of the World v4.11 (CIESIN, 2018)[2], GHS-POP (Florczyk et al., 2019), LandScan (Rose et al., 2020), and World Pop (Tatem, 2017)[3] – provide historical estimates (in this case for 2015), and one of which – the SSPs (Gao, 2020) – provides future projections at decadal intervals under five scenarios up to the year 2100. The spatial dataset representing the continental regions used in the analysis can be obtained from https://doi.org/10.6084/m9.figshare.16611739 (see also AR6 WGII Atlas). All area statistics were computed on the spheroid using the "geography" data type in PostGIS.

In this CCP, mountains are distinguished based on a combination of elevation, slope and local elevation range, using the K1 delineation of mountain regions (Kapos et al., 2000), minus Antarctica, Greenland and Svalbard, which are part of the assessment in CCP6 Polar Regions. This characterization is consistent with the mountain region extents used in the WGI report (see AR6 WGI Atlas). Combined with the 2015 population statistics available from the GPW v4.11 population grids (CIESIN, 2018), estimates for populations in mountain regions were derived (Table SMCCP5.1). For comparison, Table SMCCP5.2 reveals that estimates of the global mountain population vary considerably depending on input dataset combinations. Whilst this is largely a function of the choice of mountain delineation, the choice of gridded population dataset also has a discernible influence. Statistics relating to projected changes in population in CCP5 mountain regions, between 2015 and 2100 per IPCC WGII continental region and SSP, are presented in Table SMCCP5.3, while disaggregated statistics for population in the CCP5 mountain regions, between 2030 and 2100 per IPCC WGII continental region and SSP, are listed in SMCCP5.4.

Figure CCP5.1 a) shows the spatial distribution of population density and the population in mountain regions in 2015 aggregated per IPCC WGII Continental Regions, according to the K1 mountain delineation used in this CCP, and the Gridded Population of the World (v4.11) dataset (CIESIN, 2018) (see Tables SMCCP5.1-5.2). Figure CCP1.5 b), meanwhile, shows the projected future evolution of human populations in these same mountain regions, globally, according to the five alternative Shared Socioeconomic Pathways (SSPs) of Gao (2020) (see Tables SMCCP5.3-5.4).

Table SMCCP5.1: Mountain population estimates for 2015 according to the GPW v4.11 population grids (CIESIN, 2018) and the mountain extent delineations in the CCP Mountains based on Kapos (2000) ("K1"), presented in Figure CCP5.1 a).

IPCC Region	Total population	Total mountain population (K1)	Total mountain area (K1) [km^2]	Mean mountain population density (K1) [km^{-2}]	Proportion of population in mountains [%]
Africa	1,135,725,637	227,804,121	3,851,791	59.1	20.1
Asia	4,329,236,682	720,315,545	15,915,570	45.3	16.6
Australasia	25,332,636	533,142	379,626	1.4	2.1
Central and South America	462,618,762	138,261,907	3,581,164	38.6	29.9
Europe	778,521,501	115,851,128	2,272,365	51.0	14.9
North America	480,613,418	63,751,007	5,418,728	11.8	13.3
Small Islands	70,993,314	16,578,003	321,752	51.5	23.4

[1] Accessed from https://rmgsc.cr.usgs.gov/gme/
[2] Accessed from https://sedac.ciesin.columbia.edu/data/sets/browse
[3] The 100m resolution data was accessed from ftp://ftp.worldpop.org/GIS/Population/Global_2000_2020/

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Table SMCCP5.2: Comparison of 2015 population estimates in mountain regions in the CCP Mountains, according to various combinations of available population datasets and mountain delineations.

Population Data Source	Global population	Mountain Population		
		Kapos et al. (2000) (K1)	Körner et al. (2011) (K2)	Karagulle et al. (2017) (K3)
GPW v4.11	7,329,886,101	1,285,255,489	746,806,057	2,289,068,972
GHS-POP	7,349,323,942	1,019,033,666	344,370,651	2,091,200,860
LandScan	7,284,273,061	1,025,345,709	355,300,352	2,079,259,051
WorldPop	7,330,048,571	1098,621,501	498,107,371	2,150,488,502

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Table SMCCP5.3: Projected changes in population in mountain regions between 2015 and 2100 per IPCC WGII continental region and SSP presented in Figure CCP5.1 c) according to the mountain delineation in the CCP Mountains, based on Kapos et al (2000).

SSP	Africa	Asia	Australasia	Central and South America	Europe	North America	Small Islands
1	107,571,973	-242,813,434	768,769	-27,709,931	- 21,864,257	1,481,885	3,442,860
2	247,669,056	-39,672,332	799,800	16,549,341	- 3,319,602	18,972,817	14,428,853
3	492,860,214	369,312,026	161,430	116,645,357	18,321,332	44,835,727	34,972,666
4	415,817,525	-34,744,573	527,104	15,551,434	-27,053,252	-3,214,268	26,681,907
5	98,426,392	-247,621,276	1,637,941	-35,651,905	4,058,843	12,336,809	2,074,022

Table SMCCP5.4: Disaggregated statistics for population in mountain regions in the CCP Mountains, between 2030 and 2100 per IPCC WGII continental region and SSP presented in Figure CCP5.1 b).

SSP	Year	Africa	Asia	Australasia	Central and South America	Europe	North America	Small Islands	World
1	2030	288,726,367	783,807,409	1,118,980	144,678,296	124,144,042	75,303,568	21,785,393	1,439,564,056
	2040	318,981,364	771,929,243	1,206,709	148,351,270	124,294,589	77,210,171	23,086,924	1,465,060,271
	2050	341,072,043	743,016,992	1,285,852	148,349,408	123,166,329	77,590,782	23,727,783	1,458,209,189
	2060	354,393,248	701,254,504	1,351,225	145,219,146	120,426,567	76,800,473	23,806,372	1,423,251,535
	2070	359,975,768	651,421,238	1,389,281	139,749,147	115,884,447	75,318,966	23,458,421	1,367,197,269
	2080	358,095,918	596,668,260	1,395,061	132,220,185	109,744,134	73,194,906	22,695,211	1,294,013,674
	2090	349,574,614	538,042,668	1,361,285	122,508,465	102,282,099	69,863,376	21,535,169	1,205,167,675
	2100	335,376,094	477,502,111	1,301,911	110,551,976	93,984,309	65,232,892	20,020,863	1,103,970,156
2	2030	305,484,284	826,714,130	1,114,083	151,567,437	128,140,587	78,366,109	23,393,843	1,514,780,474
	2040	349,866,043	840,794,426	1,193,662	159,937,802	129,791,149	82,072,179	25,921,901	1,589,577,162
	2050	389,422,834	837,998,751	1,265,658	165,078,657	130,101,794	84,318,443	27,974,226	1,636,160,364
	2060	421,410,265	820,119,534	1,325,793	167,001,040	128,780,998	85,314,559	29,514,299	1,653,466,487
	2070	445,678,662	791,694,628	1,362,691	166,540,740	125,925,970	85,565,305	30,583,813	1,647,351,810
	2080	462,494,577	756,869,372	1,377,692	164,031,410	122,031,805	85,225,149	31,199,406	1,623,229,411
	2090	472,204,968	718,478,772	1,368,159	159,885,204	117,537,409	84,183,029	31,297,186	1,584,954,728
	2100	475,473,177	680,643,213	1,332,943	154,811,249	112,528,965	82,723,824	31,006,856	1,538,520,226
3	2030	323,787,156	869,722,357	1,004,379	161,469,632	129,626,665	80,795,115	25,334,342	1,591,739,646
	2040	386,263,563	914,377,448	1,002,595	178,021,963	131,444,007	86,478,774	29,515,218	1,727,103,570
	2050	451,162,807	951,049,446	983,682	193,428,765	132,372,719	91,262,691	33,724,397	1,853,984,506

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	2060	513,598,980	979,691,353	947,513	207,304,538	132,295,712	95,224,125	37,772,309	1,966,834,531
	2070	571,179,270	1,003,544,448	897,930	219,867,517	131,717,505	98,773,528	41,580,346	2,067,560,544
	2080	625,425,110	1,028,518,475	836,996	231,633,955	131,860,431	102,123,174	45,178,920	2,165,577,060
	2090	675,440,204	1,057,511,947	768,092	243,185,953	132,821,206	105,280,023	48,492,931	2,263,500,356
	2100	720,664,335	1,089,627,571	694,572	254,907,265	134,167,864	108,586,734	51,550,669	2,360,199,010
4	2030	316,342,164	805,380,890	1,088,016	150,985,342	125,310,158	75,224,272	24,077,193	1,498,408,035
	2040	372,427,325	809,365,905	1,145,887	158,865,116	124,681,941	76,709,038	27,366,531	1,570,561,743
	2050	429,076,932	801,372,463	1,187,374	163,542,655	122,239,093	76,384,331	30,575,437	1,624,378,285
	2060	481,870,315	782,872,026	1,210,758	165,126,870	117,843,832	74,673,864	33,556,747	1,657,154,412
	2070	529,041,091	757,988,063	1,209,776	164,338,058	111,706,567	72,137,662	36,307,904	1,672,729,122
	2080	572,158,812	731,778,816	1,183,202	161,742,383	104,527,553	68,868,831	38,884,003	1,679,143,599
	2090	610,404,287	706,876,701	1,133,315	158,007,296	96,859,493	64,929,467	41,200,741	1,679,411,300
	2100	643,621,646	685,570,971	1,060,246	153,813,341	88,796,600	60,536,739	43,259,910	1,676,659,454
5	2030	287,345,274	782,391,204	1,223,557	142,554,457	127,308,408	75,494,206	21,367,372	1,437,684,478
	2040	316,242,314	769,084,309	1,395,056	144,644,690	130,015,708	77,725,700	22,373,503	1,461,481,281
	2050	336,678,664	738,649,953	1,577,663	143,078,134	132,018,605	78,811,996	22,729,305	1,453,544,320
	2060	348,193,274	695,447,683	1,762,964	138,497,120	132,899,505	79,155,957	22,556,596	1,418,513,099
	2070	352,237,122	644,605,881	1,923,149	131,971,282	131,991,671	79,209,542	22,037,774	1,363,976,421
	2080	349,308,963	589,640,585	2,050,343	123,889,465	129,337,004	79,036,609	21,200,573	1,294,463,542
	2090	340,316,098	531,692,821	2,130,470	114,126,339	125,164,818	78,073,991	20,060,671	1,211,565,207
	2100	326,230,513	472,694,269	2,171,083	102,610,002	119,905,375	76,087,816	18,652,025	1,118,351,083

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SMCCP5.2 Traceable Evidence for the Detection and Attribution of Observed Impacts in Mountain Regions

SMCCP5.2.1 Assessment Method

The assessment method for the detection and attribution of observed impacts in mountain regions is conceptually broadly in line with Hansen et al. (2016). For each system and region peer-reviewed studies were identified that reported on observed changes in this system and region. Additional studies were identified, if available, on observations and trends of climate variables involved in the observed change of the impacted system.

In this assessment, Detection considers whether a natural or human system is changing beyond a baseline behaviour in the absence of climate change, and Attribution is the process of evaluating the contribution of one or more causal factors to the observed change, with anthropogenic climate change as one of these causal factors (Stone et al., 2013; Hansen and Cramer, 2015), Section 1.3.2 and Cross-Working Group Box ATTRIB in Chapter 1). The explicit distinction of different drivers contributing to or driving an observed change is often highly challenging because natural and especially human systems are highly complex and dynamic, and hence difficult to simulate in process models.

Based on this, a confidence level for the detection of the observed change in the system was assessed, evaluating the evidence of the observed change using several criteria (quality of study, consistency of results, time period of observation, agreement among different studies), in line with IPCC guidelines (see also Mach et al. (2017). Then the strength of the contribution of climate change to the observed change in the system was evaluated, considering a concept of multiple climatic and non-climatic causal factors (Section 1.3.2, Cross-Working Group Box ATTRIB in Chapter 1).

Also indicated in Figure CCP5.4 is a percentage of local community perception. This number represents the proportion of studies (references) for a given system and region that include or consider local knowledge for an observed impact. Referenced studies include different ways of considering and referring to local knowledge, for example knowledge from local communities obtained from surveys or interviews with local people. However, the way how local knowledge was considered is not distinguished in this assessment; it is only reported whether local is, or is not considered.

The number of references indicated for each system and region assessed refers to the total number of references that were considered to evaluate the respective impact. The assessment furthermore distinguishes between negative and positive impacts: Figure CCP5.4 reports on the percentage of references indicating negative impacts for a given system and region. The term ‘negative’ indicates a detrimental effect for humans (individuals, communities, society) related to the detected impact.

Finally, the attribution of the observed change in the system to anthropogenic climate change was assessed. In contrast to IPCC AR5 (Cramer et al., 2014) and some of the attribution of impacts done in this report, this assessment of climate change impacts in mountains evaluated the attribution specific to anthropogenic climate change. This was based on different lines of evidence and evaluation: first, the evaluation of the anthropogenic influence on observed climate trends relevant for each detected impact by reviewing existing literature and by taking into account well documented knowledge about climate trends.

A second important line of evidence was the application of an earlier algorithm (Hansen and Stone, 2016; Stone and Hansen, 2016) for the attribution of trends in near-surface air temperature and annual mean precipitation to anthropogenic forcing using a collection of available observational products and climate model simulations, evaluating the evidence and agreement between them to produce an assessment of the confidence in the attribution of at least a minor role of anthropogenic forcing. Thereby a linear regression of the observed regional time series against two signals was performed: one estimated from simulations of climate models driven by anthropogenic (e.g., greenhouse gas emissions) and natural (e.g., volcanic eruptions) drivers of climate change; and another signal estimated from simulations driven by the natural drivers only. Climate simulations were used from those submitted to the Detection and Attribution Model Intercomparison Project and a collection of global gridded observational products (Gillett et al., 2016). The regression is performed separately for each combination of observational product and climate model, with

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results combined into an overall confidence assessment that includes consideration of the quality of the data sets. The algorithm was applied for geographic areas of a scale of 0.5 and 2 million km^2, globally, and for the time period of 1961-2015. The final attribution assessment was the results of an expert assessment evaluating the abovementioned evidence.

SMCCP5.2.2 Traceable Evidence for Figure CCP 5.4

The following tables contain the traceable evidence for the assessment of the detection of observed impacts and their attribution to anthropogenic climate change across the global mountain regions. Tables SMCCP5.5 – SMCCP5.12 provide the traceable evidence for all the impacts detected and assessed, structured by systems and regions. The code given in the left column of the tables unambiguously identifies a specific impact which is the unit of analysis for this detection and attribution assessment. Table SMCCP5.13 is a synthesis table which contains all impacts for each system and region assessed with the summary statistics given at the end of each system/region. Table SMCCP5.14 is a summary table which builds on table SMCCP5.13 and provides the direct input for Figure CCP5.4.

Systems: Water (w), Cryosphere (c), Terrestrial Ecosystems (te), Agriculture and Livestock (a), Tourism (t), Migration (m), Health & Life (h), Disasters (d), Community change and cultural values (co).

Table SMCCP5.5: Water: River, lake, flood, drought (Code: W). Abbreviations in the table are: Local Community Perception (LCP), Confidence of detection (Conf. Det.), Contribution of climate change (Contr. C.C.), Confidence of attribution (Conf. Att.) and Negative or no negative impact (Neg / x). Confidences and contributions can be l=low, m=medium, h=high and vh=very high.

Code	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
W1		Africa	East Africa	Upper Blue Nile	h	l-m	m	x
W2		Africa	East Africa	Tanzania	m	l-m	l-m	neg
W3		Australasia	Australia	New South Wales, AU	m	h	m	neg
W4		Asia	South Asia	SW Ghats, India	l	m	l	neg
W5		Asia	Middle East	Zagros mtn, Iran	m	h	m	neg
W6		Europe	Alps	Italy	h	m	m	neg
W7		Asia	Central Asia	Tarim river, Tien Shan	h	h	m-h	x
W8		Asia	Central Asia	Tarim river, Tien Shan	l-m	m	m	x
W9		Asia	Central Asia	Tarim river, Tien Shan	m	h	m-h	x
W9		Asia	Central Asia	Tarim river, Tien Shan	m	l-m	l	neg
W10		NA	North America	Rockies, Canada	h	h	h	x
W11		CSA	Andes	Cord. Blanca, Peru	h	m-h	m-h	neg
W12		Asia	Middle East	Anatolia, Turkey	m-h	h	m-h	x
W13		Europe	Alps	Switzerland	h	h	h	x
W14		Europe	Scandinavia	Arctic Norway	m-h	m-h	m-h	x
W15		NA	North America	Rockies, Canada	m-h	m-h	m-h	neg
W16		NA	North America	Rockies, Canada	m-h	m	m-h	x
W17		Europe	Alps	Rhone, Po, Danube, Europe	h-vh	m-h	m-h	x
W17		Europe	Alps	Rhone, Po, Danube, Europe	h-vh	l-m	l	neg
W18		Europe	Alps	Europe	m	m	m	x
W19		Europe	Alps	Austria	m-h	m-h	m-h	x
W20	yes	Asia	Himalaya	Nepal, India	l-m	m	l-m	neg
W21		CSA	Andes	Argentina	m-h	m	l-m	x
W22		Asia	Himalaya	Nepal	m	m	l	neg
W23		Asia	Karakoram	Central and eastern Karakoram	m	m-h	m	x
W24		Asia	Himalaya	India	m	m	l-m	neg
W25		Asia	Himalaya	Upper Indus	m	h	m	neg
W26		Asia	Central Asia	Syr Darya, upper reaches	m	m-h	m-h	x
W26		Asia	Central Asia	Syr Darya, lower/middle reaches	m	l	l	neg
W27		NA	North America	Columbia river, south and central Canada	m	h	h	neg
W28		NA	North America	BC, Canada	m	m	m	x
W28		NA	North America	BC, Canada	l	m	m	neg

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Code	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
W29		Europe	Scandinavia	Northern Sweden	m-h	m-h	m-h	x
W30		Europe	Scandinavia	Northern Sweden	m-h	m-h	m-h	neg
W31		Asia	Karakoram	Upper Indus	m	m-h	m	x
W32		Asia	Karakoram	Upper Indus	m	m-h	m	neg
W33		CSA	Andes	Argentina, Chile	l	l	l	x
W34		Asia	Central Asia	Tien Shan	m	h	m-h	x
W35		Asia	Himalaya	Chota Shigri, India	m	m	m	x
W36		Asia	Central Asia	Tien Shan	m	m	m	x
W37		NA	North America	USA	m	m	m	x
W38		NA	North America	Western N. America	m	m	m	x
W39		Europe	Europe	Spain	m-h	h	m-h	x
W40		Asia	Central Asia	Upper Amu Darya r.	l-m	m	l-m	neg
W41		Asia	Central Asia	Aksu r.	m	m	m	x
W42		Europe	Europe	Eastern Carphathians	h	m-h	m-h	x
W43		Europe	MED	Ebro river, Pyrenees	h	m	m	neg
W44		Europe	CEU	Adige river, Italy	m	m	m	neg
W45		Australasia	Australia	Murrumbidgee river	m	h	m	neg

References in:
(Gallart and Llorens, 2004; Hemp, 2005; Stewart et al., 2005; Fowler and Archer, 2006; Masiokas et al., 2006; Grossmann, 2008; Pellicciotti et al., 2010; Zhang et al., 2010; Hänggi and Weingartner, 2011; López-Moreno et al., 2011; Masih et al., 2011; Tao et al., 2011; Baraer et al., 2012; Dahlke et al., 2012; Gebremicael et al., 2013; Kriegel et al., 2013; Bocchiola, 2014; Fleming and Dahlke, 2014; Morán-Tejeda et al., 2014; Reinfelds et al., 2014; Schauwecker et al., 2014; Bard et al., 2015; Duethmann et al., 2015; Kormann et al., 2015; Krysanova et al., 2015; Kundzewicz et al., 2015; Reggiani and Rientjes, 2015; Yucel et al., 2015; Zampieri et al., 2015; Buendia et al., 2016; Castino et al., 2016; Moyer et al., 2016; Rawat et al., 2016; Wang et al., 2016b; Bastakoti et al., 2017b; Brahney et al., 2017; Castino et al., 2017; Dudley et al., 2017; Engelhardt et al., 2017; O'Neil et al., 2017; Reggiani et al., 2017; Rood et al., 2017; Mekonnen et al., 2018; Shen et al., 2018; Sreelash et al., 2018; Mallucci et al., 2019; Mostowik et al., 2019; Said et al., 2019; Tuladhar et al., 2019; Zou et al., 2019; Rottler et al., 2020; Zhu et al., 2020)

Table SMCCP5.6: Cryosphere (Code: C). Abbreviations in the table are: Local Community Perception (LCP), Confidence of detection (Conf. Det.), Contribution of climate change (Contr. C.C.), Confidence of attribution (Conf. Att.) and Negative or no negative impact (Neg / x). Confidences and contributions can be l=low, m=medium, h=high and vh=very high.

Code	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
C9		Africa	Africa	East Africa	vh	m	l-m	neg
C6		Asia	Asia	Caucasus and middle East	vh	h	h	neg
C7		Asia	Asia	High mountain Asia	vh	m-h	m-h	neg
C12		Asia	Asia	Tien Shan	h	h	m-h	neg
C13		Asia	Asia	Tibet	h	h	m-h	neg
C14		Asia	Asia	Mongolia	h	h	m-h	neg
C8		Australasia	New Zealand	NZ Alps	vh	h	h	neg
C1		CSA	Andes	Southern Andes	vh	h	h	neg
C2		CSA	Andes	Tropical Andes	vh	h	h	neg
C4		Europe	Europe	Central Europe	vh	h	h	neg
C5		Europe	Scandinavia	Scandinavia	vh	h	h	neg
C10		Europe	Europe	Alps	h	h	h	neg
C11		Europe	Scandinavia	Scandinavia	h	h	m-h	neg
C3		NA	North America	West Canada, mainland USA	vh	h	h	neg

References in:
(Mölg et al., 2012; Cullen et al., 2013; Pepin et al., 2014; Prinz et al., 2016; Chen et al., 2018; Hock et al., 2019; Zemp et al., 2019)

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Table SMCCP5.7: Terrestrial ecosystems (Code: TE). Abbreviations in the table are: Local Community Perception (LCP), Confidence of detection (Conf. Det.), Contribution of climate change (Contr. C.C.), Confidence of attribution (Conf. Att.) and Negative or no negative impact (Neg / x). Confidences and contributions can be l=low, m=medium, h=high and vh=very high.

Code	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
TE9		Europe	Alps	French/Italian Alps	m-h	m	l-m	neg
TE16		Europe	Sierra Nevada	Spain	m	h	h	x
TE33		Asia	Qilian Mountains	China	m	m	m	x
TE43		Europe	French Alps	France	h	h	h	x
TE51		Europe	Carpathian mountains	Romania	l	m	m	x
TE52		Europe	Tatra mountains	Slovakia	m	l	l	neg
TE54		Asia	Altay prefecture	China	m	m	m	neg
TE63		Europe	Swiss Alps	Switzerland	m	h	h	x
TE68		NA	Sierra Nevada	California, USA	h	h	m	neg
TE75		CSA	Patagonia	South America	h	vh	h	neg
TE79	yes	Asia	Uttarakhand	India	h	m	l	neg
TE81		Europe	Parangalitsa forest reserve	Bulgaria	m	l	l	neg
TE82		global	Mediterranean forests	WNA (west north america), SWAF, SEAF, (south africa), MED, SWS, SAU	m	m	l	x
TE86		CSA	Tropical high-Andean Puna		m	m	l	neg
TE93		Asia	Pamir Alay & Tien Shan ranges	Uzbekistan & Kyrgyzstan	m	m	m	neg
TE97		NA	US Rocky Mountains	USA	h	m	m	neg
TE111	yes	Asia	Upper Kedarnath Valley of Garhwal	India	h	h	h	x
TE113		Europe	Central Pyrenees	Spain	m	l	l	x
TE117		Africa	Abune Josef mountain range	Ethiopia	m	l	l	neg
TE127		Asia	Ruoergai plateau	Tibet, China	h	m	m	neg

References in
(Jacob et al., 2015; Dhyani and Dhyani, 2016; Feurdean et al., 2016Fleischer, 2017 #1432; Gartzia et al., 2016; Panayotov et al., 2016; Seim et al., 2016; Zhang et al., 2016b; Carlson et al., 2017; Fu et al., 2017; Jochner et al., 2017; Lubetkin et al., 2017; Negi et al., 2017; Peñuelas et al., 2017; Rolando et al., 2017; Miserendino et al., 2018; Stevens-Rumann et al., 2018; Deléglise et al., 2019; Jiménez et al., 2019; Teng et al., 2020)

Table SMCCP5.8: Winter and summer tourism (Code: T). Abbreviations in the table are: Local Community Perception (LCP), Confidence of detection (Conf. Det.), Contribution of climate change (Contr. C.C.), Confidence of attribution (Conf. Att.) and Negative or no negative impact (Neg / x). Confidences and contributions can be l=low, m=medium, h=high and vh=very high.

Code	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
T1		NA	North America	New England USA	h	h	m-h	neg
T2		NA	North America	New Hampshire USA	h	h	m-h	neg
T3		NA	North America	Alaska	m	m	m	neg
T4		Europe	Scandinavia	Finland	m	m	m	neg
T5		NA	North America	western USA	h	h	h	neg

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T6		Europe	Europe	French Alps	h	h	h	neg
T7		Europe	Europe	Austria	h	h	h	neg
T8		Europe	Caucasus	Caucasus	m	m	l-m	neg
T9		CSA	Andes	Chacaltaya, Bolivia	vh	h	h	neg
T10		Asia	Asia	Yylong Snow mtn, China	h	h	h	neg
T11	yes	Europe	Alps	France, Austria	h	h	h	neg
T12		Europe	Alps	France, Switzerland	h	h	h	neg
T13	yes	Asia	Solokhumbu district	Nepal	m	m-h	m	neg
T14		Europe		Slovenia, Iceland, France	vh	vh	h	neg
T15		Europe		Norway	h	m-h	m-h	neg
T16		Africa	SSA	Lesotho	h	m-h	m	neg
T17		Asia	Albroz mountains	Iran	h	m-h	m	neg
T18		Europe	Alps	Austria	m-h	h	h	x
T19		Europe	Alps	Austria	m-h	m-h	m-h	x
T20		Australasia	Australian alps	Australia	m	m-h	m	neg

References in:
(Hamilton et al., 2003; Falk, 2010; Wang et al., 2010; Beaudin and Huang, 2014; Ghaderi et al., 2014; Sokratov et al., 2014; Falk and Vieru, 2016; Harris et al., 2016; Kaenzig et al., 2016; Pröbstl-Haider et al., 2016; Fyfe et al., 2017; Marty et al., 2017; Mourey and Ravanel, 2017; Beniston et al., 2018; Demiroglu et al., 2018; Hagenstad et al., 2018; Marke et al., 2018; Verfaillie et al., 2018; Mourey et al., 2019; Spandre et al., 2019; Faulon and Sacareau, 2020; Pröbstl-Haider et al., 2020; Salim and Ravanel, 2020; Triglav Čekada et al., 2020; Welling et al., 2020; Hoogendoorn et al., 2021)

Table SMCCP5.9: Disasters (Code: D). Abbreviations in the table are: Local Community Perception (LCP), Confidence of detection (Conf. Det.), Contribution of climate change (Contr. C.C.), Confidence of attribution (Conf. Att.) and Negative or no negative impact (Neg / x). Confidences and contributions can be l=low, m=medium, h=high and vh=very high.

Code	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
D1		Europe	Europe	Alps	h	h	h	neg
D2		Australasia	New Zealand	NZ Alps	m	m	m	neg
D3		Europe	Italy	Italy	l	vl	vl	x
D4		Asia	Himalaya	Bhutan, Nepal, India	h	l	vl	neg
D5		CSA	Andes	Peru	m	l	vl	neg
D6		Asia	Himalaya	Uttarakhand, India	m	m	l	neg
D7		Asia	Himalaya	Bhutan, Nepal, India	vh	h	h	neg
D8		Asia	Tibet	China	vh	h	h	neg
D9		Europe	Europe	Austria	h	h	h	neg
D10		Asia	Central Asia	Tajikistan, Kyrgyzstan, Kazakhstan, Uzbekistan	h	h	h	neg
D11		CSA	Andes	Peru	h	h	h	neg
D12		CSA	Andes	Patagonia	h	m	m	neg
D13		Asia	Himalaya	India, Nepal, Bhutan	l	l	l	neg
D14		NA	British Columbia	Canada	h	l	l	x
D15		CSA	Bolivian Andes	Bolivia	h	vh	h	neg
D16		NA	British Columbia	Canada	vl	l	l	neg
D17		CSA	Bolivian Altiplano	Bolivia	m	m	l	neg
D18		Europe	Alps	Switzerland	h	vh	h	neg
D19		NA	St. Elias mountains, Glacier Bay	Alaska/USA	m	l	l	neg
D20		Europe		Switzerland	h	m	m	neg
D21		Europe	European Alps	Italy, France, Austria, Switzerland	h	l-m	l	neg

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D22	Europe	European Alps	Italy, France, Austria, Switzerland	h	l	l	neg
D23	Europe	European Alps	Italy, France, Austria, Switzerland	h	l	l	x
D24	Europe	French Alps	France	m	m	m	x
D25	Europe	Tatra mountains	Poland	l	l	l	x
D26	Asia	Kullu, Western Himalaya	India	l	m	l	neg
D27	NA	Gulf of Alaska	USA	h	h	h	neg

References in:
(Geertsema et al., 2006; Petley et al., 2007; Stoffel et al., 2008; Allen et al., 2009; Petley, 2010; Stoffel, 2010; Allen et al., 2011; Gardelle et al., 2011; Ravanel and Deline, 2011; Fischer et al., 2012; Stoffel and Huggel, 2012; Allen and Huggel, 2013; Mergili et al., 2013; Wasson et al., 2013; Kundzewicz et al., 2014; McPhillips et al., 2014; Singh et al., 2014; Cox et al., 2015; Huggel et al., 2015; Vicente-Serrano et al., 2015; Zhang et al., 2015a; Cook et al., 2016; Gariano and Guzzetti, 2016; Paranunzio et al., 2016; Eckert et al., 2017; Gadek et al., 2017; Nie, 2017; Phillips et al., 2017; Ravanel et al., 2017; Ballesteros-Cánovas et al., 2018; Buckel et al., 2018; Coe et al., 2018; Froude and Petley, 2018; Giacona et al., 2018; Harrison et al., 2018; Kundzewicz et al., 2018; Paprotny et al., 2018; Stäubli et al., 2018; Wilson et al., 2018; Berghuijs et al., 2019; King et al., 2019; Veh et al., 2019; Bessette-Kirton and Coe, 2020; Emmer et al., 2020; Shugar et al., 2020; Walter et al., 2020; Chen et al., 2021; Field et al., 2021; Mölg et al., 2021; Strouth and McDougall, 2021; Zheng et al., 2021a; Zheng et al., 2021b)

Table SMCCP5.10: Local communities (Code: LC). This table has multiple systems. Abbreviations in the table are: System (Syst.), Local Community Perception (LCP), Confidence of detection (Conf. Det.), Contribution of climate change (Contr. C.C.), Confidence of attribution (Conf. Att.) and Negative or no negative impact (Neg / x). Confidences and contributions can be l=low, m=medium, h=high and vh=very high.

Code	Syst.	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
LC3	a	yes	Asia	Himalayas	Bhutan	h	m	l-m	neg
LC4	a	yes	Asia	Himalayas	India	h	m	m	neg
LC5	a	yes	Asia	Himalayas	Nepal	h	m	m	neg
LC6	a	yes	Asia	Himalayas	Nepal, India	vh	m	m-h	neg
LC7	a	yes	Asia	Tibet	China	h	m	m-h	neg
LC11	a	yes	Asia	Himalayas	India	vh	m	m	x
LC13	a	yes	Asia	Hindukush	Pakistan	vh	m	m	x
LC14	a	yes	Asia	Himalayas	Nepal	vh	m	m	x
LC15	a	yes	Asia	Tibet	China	vh	m	m	x
LC1	c	yes	Asia	Himalayas	Nepal, India	h	h	h	neg
LC6	co	yes	Asia	Himalayas	Nepal, India	vh	m	m-h	neg
LC8	co	yes	Asia	Himalayas	Nepal, India	h	m	m	neg
LC15	co	yes	Asia	Tibetan plateau	China	vh	m	m	x
LC3	d	yes	Asia	Himalayas	Bhutan	h	m	l-m	neg
LC4	d	yes	Asia	Himalayas	India	h	m	m	neg
LC5	d	yes	Asia	Himalayas	Nepal	h	m	m	neg
LC2	te	yes	Asia	Himalayas	Nepal, India	h	m	l-m	neg
LC1	w	yes	Asia	Himalayas	Nepal, India	h	m	l-m	neg
LC16	a	yes	CSA	Andes	Peru	h	m	m	x
LC106	a	yes	CSA	Andes	Ecuador, Cotacachi	h	m-h	m-h	x
LC108	a	yes	CSA	Andes	Colombia, Cauca	h	m	l-m	neg
LC109	a	yes	CSA	Andes	Colombia, Nariño	m-h	m	l-m	neg
LC104	c	yes	CSA	Andes	Peru, Colca	m	m	l-m	neg
LC9	co	yes	CSA	Andes	Bolivia	h	l	l-m	neg
LC10	co	yes	CSA	Andes	Peru	h	l	l-m	neg
LC12	co	yes	CSA	Andes	Colombia	h	l	l-m	neg
LC109	co	yes	CSA	Andes	Colombia, Nariño	m-h	m	l-m	neg
LC110	co	yes	CSA	Andes	Colombia, Ecuador	m-h	m	l-m	neg
LC105	te	yes	CSA	Andes	Bolivia, Sajama	h	m	l-m	neg
LC110	te	yes	CSA	Andes	Colombia, Ecuador	m-h	m	l-m	x
LC100	w	yes	CSA	Andes	Ecuador, Chimborazo	h	m	m	neg

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LC101	w	yes	CSA	Andes	Peru, Santa r.	m	h	m-h	neg
LC103	w	yes	CSA	Andes	Peru, Colca	m-h	l	l	neg
LC107	w	yes	CSA	Andes	Peru, Huancavelica	h	l-m	l-m	neg
LC108	w	yes	CSA	Andes	Colombia, Cauca	h	m	m	neg
LC109	w	yes	CSA	Andes	Colombia, Nariño	h	m	l-m	neg

References in:
(Puenayán Irua, 2011; Ramos García et al., 2011; Tupaz Pastás and Guzmán, 2011; Fabricant, 2013; Paerregaard, 2013; Klein et al., 2014; Namgay et al., 2014; Yeh et al., 2014; Feola, 2015; López-i-Gelats et al., 2015; Shijin and Dahe, 2015; Aryal et al., 2016; Gagné, 2016; Gentle and Thwaites, 2016; Sharma et al., 2016; Sharma and Shrestha, 2016; Skarbø and VanderMolen, 2016; Burman, 2017; Campbell, 2017; Feola, 2017; Gergan, 2017; Ingty, 2017; La Frenierre and Mark, 2017; Mark et al., 2017; Pandey et al., 2017a; Pandey et al., 2017b; Poudel and Duex, 2017; Raghuvanshi et al., 2017; Sayre et al., 2017; Yeh et al., 2017; Dalal et al., 2018; Dangi et al., 2018; Dendup, 2018; Dey et al., 2018; Dhungana et al., 2018; Hopping et al., 2018; Merrey et al., 2018; Nightingale, 2018; Paerregaard, 2018; Poudel, 2018; Suberi et al., 2018; Ullah et al., 2018; Wangchuk and Wangdi, 2018; Chakraborty et al., 2019; Ensor et al., 2019; Feroze et al., 2019; Hoy and Katel, 2019; Joshi et al., 2019; Khanal et al., 2019a; Meena et al., 2019; Shukla et al., 2019; Spies, 2019; Stensrud, 2019; Sujakhu et al., 2019; Yager et al., 2019; Chhogyel et al., 2020; Choden et al., 2020; Müller et al., 2020; Salick et al., 2020; Wang et al., 2021)

Table SMCCP5.11: Andes (Code: A). This table has multiple systems. Abbreviations in the table are: System (Syst.), Local Community Perception (LCP), Confidence of detection (Conf. Det.), Contribution of climate change (Contr. C.C.), Confidence of attribution (Conf. Att.) and Negative or no negative impact (Neg / x). Confidences and contributions can be l=low, m=medium, h=high and vh=very high.

Code	Syst.	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
A1	w		CSA	Andes	Chile	vh	h/h	m	neg
A2	w		CSA	Andes	West Patagonia	vh	h/h	m-h	neg
A3	w		CSA	Andes	Bolivia	h	h/m	m	neg
A4	te		CSA	Andes	Chile	vh	h	h	neg
A5	te		CSA	Andes	Chile	vh	m	l-m	neg
A5	h		CSA	Andes	Chile	vh	m	l-m	neg
A6	h		CSA	Andes	Chile	vh	h	m	neg
A7	w		CSA	Andes	All Andes, Chile	m	m	l-m	neg
A8	w		CSA	Andes	Argentina	m	m	(l-m)	neg
A8	d		CSA	Andes	Argentina	m	m	(l-m)	neg
A9	a		CSA	Andes	Peru	m	m/h	h	neg
A11	w		CSA	Andes	Ecuador	h	l-m	l-m	neg
A12	te		CSA	Andes	Colombia	h	h	h	x
A13	h		CSA	Andes	Colombia	h	h	h	neg
A14	c		CSA	Andes	Chile	h	h/h	h	neg
A15	c		CSA	Andes	Chile, Argentina	h	m	h	neg
A16	c		CSA	Andes	Peru	vh	h	h	neg
A17	t	yes	CSA	Andes	Bolivia	h	h	h	neg
A18	a	yes	CSA	Andes	Bolivia	h	h	l	neg
A19	c	yes	CSA	Andes	Peru	m-h	h	h	neg
A19	w	yes	CSA	Andes	Peru	m-h	h	h	neg
A20	m	yes	CSA	Andes	Bolivia	m	h	h	neg
A22	w	yes	CSA	Andes	Venezuela	m	h	m	neg
A22	w	yes	CSA	Andes	Colombia	m	h	m	neg
A23	w	yes	CSA	Andes	Peru	m	h	m	neg
A23	h	yes	CSA	Andes	Peru	m	h	m	neg
A23	a	yes	CSA	Andes	Peru	m	h	m	neg
A24	te	yes	CSA	Andes	Colombia	l	m	m	neg
A24	a	yes	CSA	Andes	Colombia	m	m	m	neg
A25	te		CSA	Andes	Peru	h	h	h	neg
A26	te		CSA	Andes	Argentina	h	l	l	neg
A28	te		CSA	Andes	Bolivia	h	m	m	x
A30	te		CSA	Andes	Argentina	m	m	(l)	neg
A31	a	yes	CSA	Andes	Peru	h	h	h	neg

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Code	Syst.	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
A31	h	yes	CSA	Andes	Peru	m	h	h	neg
A32	c		CSA	Andes	Colombia	vh	h	h	neg
A33	c		CSA	Andes	Peru	vh	h	h	neg
A34	c		CSA	Andes	Peru	vh	h	h	neg
A35	c		CSA	Andes	Argentina	vh	h	h	neg
A36	c		CSA	Andes	Colombia	h	h	h	neg
A37	c		CSA	Andes	Peru	h	h	h	neg
A37	c		CSA	Andes	Bolivia	h	h	h	neg
A38	c		CSA	Andes	Chile	h	h	h	neg
A39	c		CSA	Andes	Chile	h	h	h	neg
A40	c		CSA	Andes	Argentina	h	h	h	neg
A41	w		CSA	Andes	Colombia	m-h	h	h	neg
A42	w		CSA	Andes	Peru-Bolivia	m	h	h	neg
A43	w		CSA	Andes	Peru-Brazil	m	h	h	neg
A43	w		CSA	Andes	Argentina	m	h	h	neg
A44	w		CSA	Andes	Peru	m	h	h	neg
A45	d		CSA	Andes	Andes, Peru	m	m	m	neg
A46	te		CSA	Andes	Ecuador	vh	h	h	neg
A47	te		CSA	Andes	Peru	vh	h	h	x
A48	co		CSA	Andes	Peru	h	h	h	neg
A50	h		CSA	Andes	Colombia	m	l	l	neg
A51	w	yes	CSA	Andes	Bolivia	h	h	m	neg
A52	w	yes	CSA	Andes	Bolivia	h	h	l	neg
A53	w	yes	CSA	Andes	Chile	m	m	l	neg
A54	a	yes	CSA	Andes	Chile	h	m-h	m	neg
A55	te	yes	CSA	Andes	Chile	m	h	h	neg
A56	co	yes	CSA	Andes	Chile	m	m	m	neg
A57	c	yes	CSA	Andes	Peru	h	h	h	neg
A58	w	yes	CSA	Andes	Peru	m	m	l-m	neg
A59	a	yes	CSA	Andes	Peru	m	m	l	neg
A60	m	yes	CSA	Andes	Peru	h	m	m	neg
A61	m	yes	CSA	Andes	Peru	h	m	m	neg
A62	m	yes	CSA	Andes	Bolivia	m	m	m	neg
A63	c		CSA	Andes	Chile, Argentina	m	m-h	h	neg
A64	d		CSA	Andes	Peru	m	m	m	neg
A65	d		CSA	Andes	Peru	vh	h	h	neg
A66	d		CSA	Andes	Chile	m	m	h	neg
A67	d		CSA	Andes	Chile	m	m	m	neg
A69	t	yes	CSA	Andes	Peru	h	h	h	neg

References in:
(Hastenrath and Ames, 1995; Diaz and Graham, 1996; Halloy, 2002; Vuille et al., 2003; Bradley et al., 2006; Seimon et al., 2007; El Mujtar et al., 2011; Lavado Casimiro et al., 2012; Pabón-Caicedo, 2012; Seiler et al., 2013; Skansi et al., 2013; Carmona and Poveda, 2014; Eastin et al., 2014; Postigo, 2014; Schauwecker et al., 2014; Wrathall et al., 2014; Aubry-Wake et al., 2015; Drenkhan et al., 2015; Iribarren Anacona et al., 2015; Jacobi et al., 2015a; Jurt et al., 2015; Michelutti et al., 2015; Molina et al., 2015; Morueta-Holme et al., 2015; Pepin et al., 2015; Quintero-Herrera et al., 2015; Raoul, 2015; Vuille et al., 2015; Boisier et al., 2016; Brandt et al., 2016; Fierro et al., 2016; Kaenzig et al., 2016; Morán-Tejeda et al., 2016; Parraguez-Vergara et al., 2016; Dangles et al., 2017; Garreaud et al., 2017; Heikkinen, 2017; Mark et al., 2017; Polk et al., 2017; Ruiz et al., 2017; Santofimia et al., 2017; Satgé et al., 2017; Stiles and Rosselli, 2017; Barkhordarian et al., 2018; Chang Kee et al., 2018; de la Barrera et al., 2018; Harrison et al., 2018; Huss and Hock, 2018; Inaigem, 2018; Iribarren Anacona et al., 2018; Labaj et al., 2018; Malmros et al., 2018; Morán-Tejeda et al., 2018; Paerregaard, 2018; Rabatel et al., 2018; Saavedra et al., 2018; Stäubli et al., 2018; Vuille et al., 2018; Zimmer et al., 2018; Arriagada et al., 2019; Braun et al., 2019; Burger et al., 2019; Cordero et al., 2019; Córdova et al., 2019; Cuesta et al., 2019; Drenkhan et al., 2019; Dussaillant et al., 2019; Imfeld, 2019; Leroy, 2019; Rasmussen, 2019; Altea, 2020; Ayala et al., 2020; Emmer et al., 2020; Garreaud et al., 2020; Masiokas et al., 2020; Moret et al., 2020; Pabón-Caicedo et al., 2020; Stuart-Smith et al., 2021)

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Table SMCCP5.12: Africa (Code: AF). This table has multiples systems. Abbreviations in the table are: System (Syst.), Local Community Perception (LCP), Confidence of detection (Conf. Det.), Contribution of climate change (Contr. C.C.), Confidence of attribution (Conf. Att.) and Negative or no negative impact (Neg / x). Confidences and contributions can be l=low, m=medium, h=high and vh=very high.

Code	Syst.	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
AF2	te		Africa	SWAF	NW Namibia	m	l-m	l	neg
AF3	te		Africa	SWAF	Namibia	h	h	m-h	neg
AF10	te		Africa	SEAF	South Africa, Drakensberg, Namahadi Catchment	h	h	m-h	neg
AF47	a		Africa	CAF	Equatorial Guinea, Atom & Kukumankok	m	m	l	neg
AF48	a	yes	Africa	CAF	Cameroon, Bui Division	h	h	l-m	neg
AF49	w	yes	Africa	CAF	Cameroon, Bui Division	h	m-h	l	neg
AF50	a	yes	Africa	CAF	DRC, Bukavu area	m	m	l-m	neg
AF51	a	yes	Africa	CAF	DRC, Bukavu area	h	m	l	neg
AF52	w	yes	Africa	CAF	DRC, Bukavu area	h	m	l	neg
AF53	w	yes	Africa	CAF	DRC, Bukavu area	m	m	l	neg
AF54	a	yes	Africa	CAF	Cameroon, Northwest	h	m	l	neg
AF55	w	yes	Africa	CAF	DRC, Mt Kahuzi area	m	h	l-m	neg
AF57	d	yes	Africa	CAF	DRC, Mt Kahuzi area	m	m	l	neg
AF58	te	yes	Africa	CAF	DRC, Mt Kahuzi area	m	m	l	neg
AF59	a	yes	Africa	CAF	DRC, Mt Kahuzi area	h	m	l	neg
AF60	a	yes	Africa	CAF	DRC, Mt Kahuzi area	h	h	l-m	neg
AF61	a	yes	Africa	CAF	DRC, Mt Kahuzi area	h	l-m	l-m	neg
AF62	a	yes	Africa	CAF	DRC, Mt Kahuzi area	h	l-m	l-m	neg
AF63	a	yes	Africa	CAF	Cameroon, Mt Oku & Mt Mbam	h	h	l-m	neg
AF64	a	yes	Africa	CAF	Cameroon, Mt Oku & Mt Mbam	h	h	l-m	neg
AF65	a	yes	Africa	CAF	Cameroon, Mt Oku & Mt Mbam	h	m	l-m	neg
AF66	a		Africa	CAF	Cameroon, Northwest	h	h	l-m	neg
AF67	a	yes	Africa	CAF	Cameroon, Northwest	h	h	l-m	neg
AF68	a	yes	Africa	CAF	Nigeria, Riyom & Jos Plateau	h	h	l-m	neg
AF69	w	yes	Africa	CAF	Nigeria, Riyom & Jos Plateau	h	h	l-m	neg
AF70	a	yes	Africa	CAF	Cameroon, Southwest	h	m-h	l-m	neg
AF71	a	yes	Africa	CAF	Nigeria, Taraba state	h	h	l-m	neg
AF72	a	yes	Africa	CAF	Nigeria, Taraba state	m	h	l-m	neg
AF73	w	yes	Africa	CAF	Nigeria, Taraba state	m	h	l-m	neg
AF74	a	yes	Africa	CAF	Cameroon, Yaounde	m	h	l-m	neg
AF75	a	yes	Africa	CEAF	Uganda, Kibale NP	h	m-h	l	neg
AF76	a	yes	Africa	CEAF	Uganda, Kigezi highlands	h	h	l-m	neg
AF77	w	yes	Africa	CEAF	Uganda, Mt. Elgon area	h	h	l-m	neg
AF78	d	yes	Africa	CEAF	Uganda, Mt. Elgon area	h	h	l-m	neg
AF79	a	yes	Africa	CEAF	Uganda, Mt. Elgon area	h	m	l-m	neg
AF80	a	yes	Africa	CEAF	Uganda, Mt. Elgon area	h	m	l-m	neg
AF81	a	yes	Africa	CEAF	Uganda, Nakasongola district	h	m	l-m	neg
AF82	a	yes	Africa	CEAF	Uganda, Nakasongola district	h	m	l-m	neg
AF83	a	yes	Africa	CEAF	Uganda, Nakasongola district	h	m	l-m	neg
AF84	a	yes	Africa	CEAF	central Uganda	h	m	l	neg
AF85	a	yes	Africa	CEAF	Rwenzori Mts, Kazeze district, Uganda	h	h	m	neg
AF86	a	yes	Africa	CEAF	Rwenzori Mts, Kazeze district, Uganda	h	h	l-m	neg
AF87	te	yes	Africa	CEAF	Rwanda, Volcanoes NP	m	h	l	neg
AF88	a	yes	Africa	CEAF	Rwanda, Volcanoes NP	m	h	l-m	neg

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Code	Syst.	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
AF89	a	yes	Africa	WAF	Benin, Dassari	h	h	l-m	neg
AF90	w	yes	Africa	WAF	Benin, Dassari	h	h	l-m	neg
AF91	a	yes	Africa	WAF	Benin, Dassari	h	h	l-m	neg
AF92	a	yes	Africa	WAF	Guinea, Fouta Djallon	h	h	m-h	neg
AF93	w		Africa	WAF	Guinea, Fouta Djallon	h	h	l-m	x
AF94	a	yes	Africa	WAF	Sierra Leone, Kono district	h	h	l-m	neg
AF95	w	yes	Africa	WAF	Sierra Leone, Kono district	m	m	l-m	neg
AF97	a	yes	Africa	WAF	Northwest Benin	h	h	l-m	neg
AF98	c	yes	Africa	SEAF	Lesotho	h	h	m-h	neg
AF99	a	yes	Africa	SEAF	Madagascar	h	h	m	x
AF100	te	yes	Africa	SWAF/SEAF	Southern Africa	h	m	m	neg
AF101	te	yes	Africa	SWAF/SEAF	Southern Africa	h	m-h	m	neg
AF102	a	yes	Africa	SEAF/CEAF/ CAF	Drakensberg (South Africa), Mt Maloti (Lesotho), Chimanimani Mountains (Zimbabwe); Highlands of Kenya, Mount Elgon (Uganda); Mount Cameroon (Cameroon)	h	h	m-h	neg
AF103	te		Africa	SEAF	South Africa, Maloti-Drakensberg	h	l	l	x
AF106	te		Africa	SWAF	South Africa, Table mountains	m	m	l-m	neg
AF107	t		Africa	SEAF	Lesotho	h	h	m-h	neg
AF108	te		Africa	NEAF/(SEAF)	Mountains pan-tropical belt	m	h	m-h	neg
AF110	te		Africa	SWAF	South Africa, Table mountain NP	m	m	l	x
AF111	a		Africa	SEAF	Madagascar	h	h	m	neg
AF112	a	yes	Africa	NEAF	Kenya, Mt. Kenya region	m	m	m	neg
AF113	a	yes	Africa	NEAF	Kenya, Mt. Kenya region	m	m	m	neg
AF114	w	yes	Africa	NEAF	Kenya, Mt. Kenya region	m	m	l-m	neg
AF115	te		Africa	NEAF	Kenya, Mt. Kenya region	h	h	m	neg
AF116	a	yes	Africa	NEAF	Kenya, Mt. Kenya region	m	m	l	neg
AF117	a	yes	Africa	NEAF	Kenya, Mt. Kenya region	m	m	m	neg
AF118	c		Africa	NEAF	Kenya, Mt. Kenya	h	h	h	neg
AF119	a		Africa	NEAF	Kenya, Kakamega	m-h	h	m	neg
AF120	a		Africa	NEAF	Kenya, Kakamega	m-h	h	m	neg
AF121	a	yes	Africa	NEAF	Kenya, central Kenya	m	m-h	l-m	neg
AF122	a	yes	Africa	NEAF	Kenya, Kakamega	m	h	l	neg
AF123	a	yes	Africa	NEAF	Kenya, Nakuru	m	h	m	neg
AF124	a	yes	Africa	NEAF	Kenya, Mt Marsabit, Mt Kulal & Mt Nyiro	h	m	l-m	neg
AF125	w	yes	Africa	NEAF	Kenya, Mt Marsabit, Mt Kulal & Mt Nyiro	h	h	m	neg
AF126	a	yes	Africa	NEAF	Kenya, Mt Marsabit, Mt Kulal & Mt Nyiro	h	h	m	neg
AF127	a	yes	Africa	NEAF	Kenya, Mt Marsabit, Mt Kulal & Mt Nyiro	h	m	l-m	neg
AF128	a	yes	Africa	NEAF	Kenya, Mt Marsabit, Mt Kulal & Mt Nyiro	h	m-h	m	neg
AF129	m	yes	Africa	CEAF	Tanzania, North Pare highlands	h	m	l-m	neg
AF130	a	yes	Africa	CEAF	Tanzania, Mt. Kilimanjaro	m	m	l-m	neg
AF132	a	yes	Africa	CEAF	Tanzania, Udzungwa mountains	m	l	l	neg
AF134	h	yes	Africa	CEAF	Tanzania, Udzungwa mountains	m	l	l	neg
AF135	m	yes	Africa	CEAF	Uganda, Nakasongola district	h	l-m	l	neg
AF136	m	yes	Africa	CEAF	Tanzania, Ngorongoro area	h	l-m	l	neg

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Code	Syst.	LCP	IPCC Continental Region	Region	Location/ Country	Conf. Det.	Contr. C.C.	Conf. Att.	Neg / x
AF137	a	yes	Africa	CEAF	Tanzania, Ngorongoro area	h	l-m	l	neg
AF138	a	yes	Africa	CEAF	Tanzania, Ngorongoro area	h	l	l	neg

References in:
(Burke, 2004; Simmons et al., 2004; Bangura et al., 2012; Gerardeaux et al., 2012; Hartter et al., 2012; Paraiso et al., 2012; Mwakaje, 2013; OXFAM et al., 2013; Powell, 2013; Afifi et al., 2014; Bele et al., 2014; Hoang et al., 2014; Krishnaswamy et al., 2014; Leclerc et al., 2014; Onyekuru and Marchant, 2014; Wood and Mendelsohn, 2014; Carbutt and Edwards, 2015; Oruonye and Adebayo, 2015; Poulsen and Hoffman, 2015; Taylor et al., 2015; Tiyo et al., 2015; Bomuhangi et al., 2016; Mbue et al., 2016; Akwen, 2017; Asayehegn et al., 2017; Defang et al., 2017; Few et al., 2017; Grab et al., 2017; Twagiramarla et al., 2017; Zizinga et al., 2017; Callo-Concha, 2018; Chen et al., 2018; Chepkoech et al., 2018; Cuni-Sanchez et al., 2018; Goyol and Pathirage, 2018; Grab and Knigh, 2018; Kinoti et al., 2018; M'mboroki et al., 2018; Mukwada and Manatsa, 2018; Nematchoua et al., 2018; Prinz et al., 2018; Schumacher, 2018; Faye, 2019; Mulinde et al., 2019; Muntifering et al., 2019; Nsengiyumva, 2019; Tume et al., 2019; Leal Filho et al., 2020; Saalu et al., 2020; Batumike et al., 2021; Hoogendoorn et al., 2021; Tesfaye and Alemayehu, 2021; Wagner et al., 2021)

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Table SMCCP5.13: Synthesis table ordered by IPCC region and system. Abbreviations in the table are: System (Syst.), Local community perception taken into account (LCP), Confidence of detection (Conf. Det.), Contribution of climate change (Contr. C.C.), Confidence of attribution (Conf. Att.), Number of negative impacts (Nº of Neg. Im.) and Number of publications consulted (Nº Pub.). Index can be l=low, m=medium, h=high and vh=very high.

Code; Nº. of Codes	Syst.	LCP; Nº. of (yes)	IPCC Region	IPCC Sub-region/ Subregions	Location/ Country	Conf. Det. (index); mode	Conf. Det. (value); mean	Contr. C.C. (index); mode	Contr. C.C. (value); mean	Conf. Att. (index); mode	Conf. Att. (value); mean	Impact (neg/posit/ unclear); Nº of Neg. Im.	Nº Pub.
AF122	a	yes	Africa	NEAF	Kenya, Kakamega	m	3	h	5	l	1	negative	1
AF84	a	yes	Africa	CEAF	central Uganda	h	5	m	3	l	1	negative	1
AF47	a		Africa	CAF	Equatorial Guinea, Atom & Kukumankok	m	3	m	3	l	1	negative	1
AF116	a	yes	Africa	NEAF	Kenya, Mt. Kenya region	m	3	m	3	l	1	negative	1
AF75	a	yes	Africa	CEAF	Uganda, Kibale NP	h	5	m-h	4	l	1	negative	1
AF54	a	yes	Africa	CAF	Cameroon, Northwest	h	5	m	3	l	1	negative	1
AF68	a	yes	Africa	CAF	Nigeria, Riyom & Jos Plateau	h	5	h	5	l-m	2	negative	1
AF71	a	yes	Africa	CAF	Nigeria, Taraba state	h	5	h	5	l-m	2	negative	1
AF76	a	yes	Africa	CEAF	Uganda, Kigezi highlands	h	5	h	5	l-m	2	negative	1
AF86	a	yes	Africa	CEAF	Rwenzori Mts, Kazeze district, Uganda	h	5	h	5	l-m	2	negative	1
AF94	a	yes	Africa	WAF	Sierra Leone, Kono district	h	5	h	5	l-m	2	negative	1
AF97	a	yes	Africa	WAF	northwest Benin	h	5	h	5	l-m	2	negative	1
AF72	a	yes	Africa	CAF	Nigeria, Taraba state	m	3	h	5	l-m	2	negative	1
AF74	a	yes	Africa	CAF	Cameroon, Yaounde	m	3	h	5	l-m	2	negative	1
AF88	a	yes	Africa	CEAF	Rwanda, Volcanoes NP	m	3	h	5	l-m	2	negative	1
AF51	a	yes	Africa	CAF	DRC, Bukavu area	h	5	m	3	l	1	negative	1
AF59	a	yes	Africa	CAF	DRC, Mt Kahuzi area	h	5	m	3	l	1	negative	1
AF79	a	yes	Africa	CEAF	Uganda, Mt. Elgon area	h	5	m	3	l-m	2	negative	1
AF80	a	yes	Africa	CEAF	Uganda, Mt. Elgon area	h	5	m	3	l-m	2	negative	1
AF81	a	yes	Africa	CEAF	Uganda, Nakasongola district	h	5	m	3	l-m	2	negative	1
AF82	a	yes	Africa	CEAF	Uganda, Nakasongola district	h	5	m	3	l-m	2	negative	1
AF83	a	yes	Africa	CEAF	Uganda, Nakasongola district	h	5	m	3	l-m	2	negative	1
AF124	a	yes	Africa	NEAF	Kenya, Mt Marsabit, Mt Kulal, Mt Nyiro	h	5	m	3	l-m	2	negative	1
AF127	a	yes	Africa	NEAF	Kenya, Mt Marsabit, Mt Kulal, Mt Nyiro	h	5	m	3	l-m	2	negative	1
AF50	a	yes	Africa	CAF	DRC, Bukavu area	m	3	m	3	l-m	2	negative	1

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Code; Nº. of Codes	Syst.	LCP; Nº. of (yes)	IPCC Region	IPCC Sub-region/ Subregions	Location/ Country	Conf. Det. (index); mode	Conf. Det. (value); mean	Contr. C.C. (index); mode	Contr. C.C. (value); mean	Conf. Att. (index); mode	Conf. Att. (value); mean	Impact (neg/posit/ unclear); Nº of Neg. Im.	Nº Pub.
AF121	a	yes	Africa	NEAF	Kenya, central Kenya	m	3	m-h	4	l-m	2	negative	1
AF48	a	yes	Africa	CAF	Cameroon, Bui Division	h	5	h	5	l-m	2	negative	1
AF60	a	yes	Africa	CAF	DRC, Mt Kahuzi area	h	5	h	5	l-m	2	negative	1
AF63	a	yes	Africa	CAF	Cameroon, Mt Oku & Mt Mbam	h	5	h	5	l-m	2	negative	1
AF64	a	yes	Africa	CAF	Cameroon, Mt Oku & Mt Mbam	h	5	h	5	l-m	2	negative	1
AF66	a		Africa	CAF	Cameroon, Northwest	h	5	h	5	l-m	2	negative	1
AF67	a	yes	Africa	CAF	Cameroon, Northwest	h	5	h	5	l-m	2	negative	1
AF70	a	yes	Africa	CAF	Cameroon, Southwest	h	5	m-h	4	m	3	negative	1
AF85	a	yes	Africa	CEAF	Rwenzori Mts, Kazeze district, Uganda	h	5	h	5	m	3	negative	1
AF89	a	yes	Africa	WAF	Benin, Dassari	h	5	h	5	l-m	2	negative	1
AF91	a	yes	Africa	WAF	Benin, Dassari	h	5	h	5	l-m	2	negative	1
AF92	a	yes	Africa	WAF	Guinea, Fouta Djallon	h	5	h	5	m-h	4	negative	1
AF111	a		Africa	SEAF	Madagascar	h	5	h	5	m	3	negative	2
AF126	a	yes	Africa	NEAF	Kenya, Mt Marsabit, Mt Kulal & Mt Nyiro	h	5	h	5	m	3	negative	1
AF123	a	yes	Africa	NEAF	Kenya, Nakuru	m	3	h	5	m	3	negative	1
AF119	a		Africa	NEAF	Kenya, Kakamega	m-h	4	h	5	m	3	negative	1
AF120	a		Africa	NEAF	Kenya, Kakamega	m-h	4	h	5	m	3	negative	1
AF61	a	yes	Africa	CAF	DRC, Mt Kahuzi area	h	5	l-m	2	l-m	2	negative	1
AF62	a	yes	Africa	CAF	DRC, Mt Kahuzi area	h	5	l-m	2	l-m	2	negative	1
AF65	a	yes	Africa	CAF	Cameroon, Mt Oku & Mt Mbam	h	5	m	3	l-m	2	negative	1
AF112	a	yes	Africa	NEAF	Kenya, Mt. Kenya region	m	3	m	3	m	3	negative	1
AF113	a	yes	Africa	NEAF	Kenya, Mt. Kenya region	m	3	m	3	m	3	negative	1
AF117	a	yes	Africa	NEAF	Kenya, Mt. Kenya region	m	3	m	3	m	3	negative	1
AF99	a	yes	Africa	SEAF	Madagascar	h	5	h	5	m	3	positive	1
AF102	a	yes	Africa	SEAF/CEAF/CAF	African Mountains: Drakensberg (South Africa), Mt Maloti (Lesotho), and Chimanimani Mountains (Zimbabwe); the Highlands of Kenya,	h	5	h	5	m-h	4	negative	2

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Code; Nº. of Codes	Syst.	LCP; Nº. of (yes)	IPCC Region	IPCC Sub-region/ Subregions	Location/ Country	Conf. Det. (index); mode	Conf. Det. (value); mean	Contr. C.C. (index); mode	Contr. C.C. (value); mean	Conf. Att. (index); mode	Conf. Att. (value); mean	Impact (neg/posit/ unclear); Nº of Neg. Im.	Nº Pub.
					Mount Elgon (Uganda); and Mount Cameroon (Cameroon)								
AF128	a	yes	Africa	NEAF	Kenya, Mt Marsabit, Mt Kulal & Mt Nyiro	h	5	m-h	4	m	3	negative	1
AF130	a	yes	Africa	CEAF	Tanzania, Mt. Kilimanjaro	m	3	m	3	l-m	2	negative	1
AF132	a	yes	Africa	CEAF	Tanzania, Udzungwa mountains	m	3	l	1	l	1	negative	1
AF137	a	yes	Africa	CEAF	Tanzania, Ngorongoro area	h	5	l-m	2	l	1	negative	1
AF138	a	yes	Africa	CEAF	Tanzania, Ngorongoro area	h	5	l	1	l	1	negative	1
55	a	51	Africa	-	-	h	4.5	h	3.9	l-m	2.1	56	57
LC3	a	yes	Asia	Himalayas	Bhutan	h	5	m	3	l-m	2	negative	7
LC4	a	yes	Asia	Himalayas	India	h	5	m	3	m	3	negative	4
LC5	a	yes	Asia	Himalayas	Nepal	h	5	m	3	m	3	negative	3
LC11	a	yes	Asia	Himalayas	India	vh	6	m	3	m	3	unclear	3
LC13	a	yes	Asia	Hindukush	Pakistan	vh	6	m	3	m	3	unclear	2
LC14	a	yes	Asia	Himalayas	Nepal	vh	6	m	3	m	3	unclear	2
LC15	a	yes	Asia	Tibet	China	vh	6	m	3	m	3	unclear	2
LC7	a	yes	Asia	Tibet	China	h	5	m	3	m-h	4	negative	6
LC6	a	yes	Asia	Himalayas	Nepal, India	vh	6	m	3	m-h	4	negative	4
9	a	9	Asia	-	-	vh	5.6	m	3.0	m	3.1	5	33
A31	a	yes	CSA	Andes	Peru	h	5	h	5	h	5	negative	1
A9	a		CSA	Andes	Peru	m	3	m/h	4	h	5	negative	1
A59	a	yes	CSA	Andes	Peru	m	3	m	3	l	1	negative	1
LC108	a	yes	CSA	Andes	Cauca, Colombia	h	5	m	3	l-m	2	negative	1
LC109	a	yes	CSA	Andes	Narino, Colombia	m-h	4	m	3	l-m	2	negative	1
A23	a	yes	CSA	Andes	Peru	m	3	h	5	m	3	negative	1
LC16	a	yes	CSA	Andes	Peru	h	5	m	3	m	3	unclear	1
A24	a	yes	CSA	Andes	Colombia	m	3	m	3	m	3	negative	1
A54	a	yes	CSA	Andes	Chile	h	5	m-h	4	m	3	negative	1
LC106	a	yes	CSA	Andes	Ecuador, Cotacachi	h	5	m-h	4	m-h	4	Unclear	1

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Code; Nº. of Codes	Syst.	LCP; Nº. of (yes)	IPCC Region	IPCC Sub-region/ Subregions	Location/ Country	Conf. Det. (index); mode	Conf. Det. (value); mean	Contr. C.C. (index); mode	Contr. C.C. (value); mean	Conf. Att. (index); mode	Conf. Att. (value); mean	Impact (neg/posit/ unclear); Nº of Neg. Im.	Nº Pub.
A18	a	yes	CSA	Andes	Bolivia	h	5	h	5	l	1	negative	1
11	a	10	CSA	-	-	h	4.2	m	3.8	m	2.9	9	11
ECO9	a		Europe	Alps	French/Italian Alps	m-h	4	m	3	l-m	2	negative	1
1	a	0	Europe	-	-	m-h	4.0	m	3.0	l-m	2.0	1	1
76	**a**	**70**	**global**	**global**	**global**		**4.5**		**3.4**		**2.5**	**71**	**102**
AF118	c		Africa	NEAF	Kenya, Mt. Kenya	h	5	h	5	h	5	negative	2
C9	c		Africa	Africa	East Africa	vh	6	m	3	l-m	2	negative	5
AF98	c	yes	Africa	SEAF	Lesotho	h	5	h	5	m-h	4	negative	1
3	c	1	Africa	-	-	h	5.3	h	4.3		3.7	8	8
LC1	c	yes	Asia	Himalayas	Nepal, India	h	5	h	5	h	5	negative	5
D10	c		Asia	Central Asia	Tajikistan, Kyrgyzstan, Kazakhstan, Uzbekistan	h	5	h	5	h	5	negative	3
D7	c		Asia	Himalaya	Bhutan, Nepal, India	vh	6	h	5	h	5	negative	6
D8	c		Asia	Tibet	China	vh	6	h	5	h	5	negative	7
C6	c		Asia	Asia	Caucasus and middle East	vh	6	h	5	h	5	negative	2
C12	c		Asia	Asia	Tien Shan	h	5	h	5	m-h	4	negative	1
C13	c		Asia	Asia	Tibet	h	5	h	5	m-h	4	negative	1
C14	c		Asia	Asia	Mongolia	h	5	h	5	m-h	4	negative	1
C7	c		Asia	Asia	high mountain Asia	vh	6	m-h	4	m-h	4	negative	2
9	c	5	Asia	-	-	h	5.4	h	4.9	h	4.6	9	28
C8	c		Australia	New Zealand	NZ Alps	vh	6	h	5	h	5	negative	2
1	c	0	Australia	-	-	vh	6	h	5	h	5	1	2
A36	c		CSA	Andes	Colombia	h	5	h	5	h	5	negative	3
A37	c		CSA	Andes	Peru	h	5	h	5	h	5	negative	2
A37	c		CSA	Andes	Bolivia	h	5	h	5	h	5	negative	2
A38	c		CSA	Andes	Chile	h	5	h	5	h	5	negative	2
A39	c		CSA	Andes	Chile	h	5	h	5	h	5	negative	3

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Code; Nº. of Codes	Syst.	LCP; Nº. of (yes)	IPCC Region	IPCC Sub-region/ Subregions	Location/ Country	Conf. Det. (index); mode	Conf. Det. (value); mean	Contr. C.C. (index); mode	Contr. C.C. (value); mean	Conf. Att. (index); mode	Conf. Att. (value); mean	Impact (neg/posit/ unclear); Nº of Neg. Im.	Nº Pub.
A40	c		CSA	Andes	Argentina	h	5	h	5	h	5	negative	1
A57	c	yes	CSA	Andes	Peru	h	5	h	5	h	5	negative	1
D11	c		CSA	Andes	Peru	h	5	h	5	h	5	negative	2
A19	c	yes	CSA	Andes	Peru	m-h	4	h	5	h	5	negative	1
A16	c		CSA	Andes	Peru	vh	6	h	5	h	5	negative	2
A32	c		CSA	Andes	Colombia	vh	6	h	5	h	5	negative	1
A33	c		CSA	Andes	Peru	vh	6	h	5	h	5	negative	1
A34	c		CSA	Andes	Peru	vh	6	h	5	h	5	negative	1
A35	c		CSA	Andes	Argentina	vh	6	h	5	h	5	negative	1
C1	c		CSA	Andes	southern Andes	vh	6	h	5	h	5	negative	2
C2	c		CSA	Andes	tropical Andes	vh	6	h	5	h	5	negative	2
A14	c		CSA	Andes	Chile	h	5	h/h	5	h	5	negative	1
A15	c		CSA	Andes	Chile & Argentina	h	5	m	3	h	5	negative	1
LC104	c	yes	CSA	Andes	Peru, Colca	m	3	m	3	l-m	2	negative	1
D12	c		CSA	Andes	Patagonia	h	5	m	3	m	3	negative	2
A63	c		CSA	Andes	Chile, Argentina	m	3	m-h	4	h	5	negative	3
21	c	3	CSA	-	-	h	5.1	h	4.7	h	4.8	35	35
D9	c		Europe	Europe	Austria	h	5	h	5	h	5	negative	2
C10	c		Europe	Europe	Alps	h	5	h	5	h	5	negative	1
C4	c		Europe	Europe	Central Europe	vh	6	h	5	h	5	negative	2
C5	c		Europe	Scandinavia	Scandinavia	vh	6	h	5	h	5	negative	2
C11	c		Europe	Scandinavia	Scandinavia	h	5	h	5	m-h	4	negative	1
5	c	0	Europe	-	-	h	5.4	h	5.0	h	4.8	8	8
C3	c		NAM	North America	W Canada, mainland USA	vh	6	h	5	h	5	negative	2
1	c	0	NAM	-	-	vh	6.0	h	5.0	h	5.0	2	2
40	**c**	**9**	**global**	**global**	**global**		**5.5**		**4.8**		**4.6**	**63**	**83**
LC8	co	yes	Asia	Himalayas	Nepal, India	h	5	m	3	m	3	negative	5

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LC15	co	yes	Asia		China	vh	6	m	3	m	3	unclear	2
LC6	co	yes	Asia	Himalayas	Nepal, India	vh	6	m	3	m-h	4	negative	4
3	co	11	Asia	-	-	vh	5.7	m	3.0	m	3.3	9	11
A48	co		CSA	Andes	Peru	h	5	h	5	h	5	negative	3
LC9	co	yes	CSA	Andes	Bolivia	h	5	l	1	l-m	2	negative	2
LC10	co	yes	CSA	Andes	Peru	h	5	l	1	l-m	2	negative	2
LC12	co	yes	CSA	Andes	Colombia	h	5	l	1	l-m	2	negative	2
LC109	co	yes	CSA	Andes	Narino, Colombia	m-h	4	m	3	l-m	2	negative	1
LC110	co	yes	CSA	Andes	Pasto, Colombia & Ecuador	m-h	4	m	3	l-m	2	negative	1
A56	co	yes	CSA	Andes	Chile	m	3	m	3	m	3	negative	1
7	co	9	CSA	-	-	h	4.4	l	2.4	l-m	2.6	12	12
10	**co**	**20**	**global**	**global**	**global**		**5.0**		**2.7**		**3.0**	**21**	**23**
AF78	d	yes	Africa	CEAF	Uganda, Mt. Elgon area	h	5	h	5	l-m	2	negative	1
AF57	d	yes	Africa	CAF	DRC, Mt Kahuzi area	m	3	m	3	l	1	negative	1
2	d	2	Africa	-	-		4.0		4.0		1.5	2	2
D6	d		Asia	Himalaya	Uttarakhand, India	m	3	m	3	l	1	negative	2
LC3	d	yes	Asia	Himalayas	Bhutan	h	5	m	3	l-m	2	negative	7
LC4	d	yes	Asia	Himalayas	India	h	5	m	3	m	3	negative	4
LC5	d	yes	Asia	Himalayas	Nepal	h	5	m	3	m	3	negative	3
D4	d		Asia	Himalaya	Bhutan, Nepal, India	h	5	l	1	l	1	negative	5
D13	d		Asia	Himalaya	India, Nepal, Bhutan	l	1	l	1	l	1	negative	3
D26	d		Asia	Kullu, Western Himalaya	India	l	1	m	3	l	1	negative	1
7	d	14	Asia	-	-	5	3.6	3	2.4	1	1.7	25	25
D2	d		Australia	New Zealand	NZ Alps	m	3	m	3	m	3	negative	4
1	d	0	Australia	-	-	m	3	m	3	m	3	4	4
A8	d		CSA	Andes	Argentina	m	3	m	3	l-m	2	negative	1
A45	d		CSA	Andes	Peru and Andes	m	3	m	3	m	3	negative	1

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D5	d		CSA	Andes	Peru	m	3	l	1	vl	1	negative	3
A65	d		CSA	Andes	Peru	vh	6	h	5	h	5	negative	1
A66	d		CSA	Andes	Chile	m	3	m	3	h	5	negative	1
A67	d		CSA	Andes	Chile	m	3	m	3	m	3	negative	1
D15	d		CSA	Bolivian Andes	Bolivia	h	5	vh	6	h	5	negative	2
7	d	0	CSA	-	-	m	3.7	m	3.4	h	3.4	10	10
D1	d		Europe	Europe	Alps	h	5	h	5	h	5	negative	7
D3	d		Europe	Italy	Italy	l	1	l	1	l	1	positive	1
D18	d		Europe	Alps	Switzerland	h	5	vh	6	h	5	negative	2
D20	d		Europe		Switzerland	h	5	m	3	m	3	negative	3
D21	d		Europe	European Alps	Italy, France, Austria, Switzerland	h	5	l-m	2	l	1	negative	5
D22	d		Europe	European Alps	Italy, France, Austria, Switzerland	h	5	l	1	l	1	negative	4
D23	d		Europe	European Alps	Italy, France, Austria, Switzerland	h	5	l	1	l	1	positive	3
D24	d		Europe	French Alps	France	m	3	m	3	m	3	positive	2
D25	d		Europe	Tatra mountains	Poland	l	1	l	1	l	1	positive	1
9	d	0	Europe	-	-	h	3.9	l	2.6	l	2.3	21	28
D14	d		NAM	British Columbia	Canada	h	5	l	1	l	1	positive	1
D16	d		NAM	British Columbia	Canada	l	1	l	1	l	1	negative	1
D19	d		NAM	St. Elias mountains, Glacier Bay	Alaska/USA	m	3	l	1	l	1	negative	2
D27	d		NAM	Gulf of Alaska	USA	h	5	h	5	h	5	negative	2
4	d	0	NAM	-	-	h	3.5	l	2.0	l	2.0	5	6
30	**d**	**16**	**global**	**global**	**global**		**3.6**		**2.9**		**2.3**	**67**	**75**
AF134	h	yes	Africa	CEAF	Tanzania, Udzungwa mountains	m	3	l	1	l	1	negative	1

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1	h	1	Africa	-	-	m	3.0	l	1.0	l	1.0	1	1
A13	h		CSA	Andes	Colombia (Cali)	h	5	h	5	h	5	negative	1
A31	h	yes	CSA	Andes	Peru	m	3	h	5	h	5	negative	1
A50	h		CSA	Andes	Colombia	m	3	l	1	l	1	negative	1
A23	h	yes	CSA	Andes	Peru	m	3	h	5	m	3	negative	1
A6	h		CSA	Andes	Chile	vh	6	h	5	m	3	negative	1
A5	h		CSA	Andes	Chile	vh	6	m	3	l-m	2	negative	1
6	h	2	CSA	-	-	m	4.3	h	4.0	h	3.2	6	6
7	**h**	**3**	**global**	**global**	**global**		**3.7**		**2.5**		**2.1**	**7**	**7**
AF129	m	yes	Africa	CEAF	Tanzania, North Pare highlands	h	5	m	3	l-m	2	negative	1
AF135	m	yes	Africa	CEAF	Uganda, Nakasongola district	h	5	l-m	2	l	1	negative	1
AF136	m	yes	Africa	CEAF	Tanzania, Ngorongoro area	h	5	l-m	2	l	1	negative	1
3	m	3	Africa	-	-	h	5.0	l-m	2.3	l	1.3	3	3
A20	m	yes	CSA	Andes	Bolivia	m	3	h	5	h	5	negative	1
A60	m	yes	CSA	Andes	Peru	h	5	m	3	m	3	negative	1
A61	m	yes	CSA	Andes	Peru	h	5	m	3	m	3	negative	1
A62	m	yes	CSA	Andes	Bolivia	m	3	m	3	m	3	negative	1
4	m	4	CSA	-	-	m	4.0	m	3.5	m	3.5	4	4
7	**m**	**7**	**global**	**global**	**global**		**4.5**		**2.9**		**2.4**	**7**	**7**
AF107	t		Africa	SEAF	Lesotho	h	5	h	5	m-h	4	negative	1
1	t	0	Africa	-	-	h	5.0	h	5.0	m-h	4.0	1	1
T10	t		Asia	Asia	Yylong Snow mtn, China	h	5	h	5	h	5	negative	1
T13	t	yes	Asia	Solokhumbu district	Nepal	m	3	m-h	4	m	3	negative	1
T17	t		Asia	Albroz range	Iran	h	5	m-h	4	m	3	negative	1
3	t	1	Asia	-	-	h	4.3	m-h	4.3	m	3.7	3	3
T20	t		Australia	Australian alps	Australia	m	3	m-h	4	m	3	negative	1

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1	t	0	Australia	-	-	m	3	m-h	4	m	3	1	1
A17	t	yes	CSA	Andes	Bolivia	h	5	h	5	h	5	negative	1
T9	t		CSA	Andes	Chacaltaya, Bolivia	vh	6	h	5	h	5	negative	1
A69	t	yes	CSA	Andes	Peru	h	5	h	5	h	5	negative	1
3	t	2	CSA	-	-	h	5.3	h	5.0	h	5.0	3	3
T6	t		Europe	Europe	French Alps	h	5	h	5	h	5	negative	4
T7	t		Europe	Europe	Austria	h	5	h	5	h	5	negative	2
T8	t		Europe	Caucasus	Caucasus	m	3	m	3	l-m	2	negative	1
T4	t		Europe	Scandinavia	Finland	m	3	m	3	m	3	negative	1
T11	t	yes	Europe	Alps	France, Austria	h	5	h	5	h	5	negative	2
T12	t		Europe	Alps	France, Switzerland	h	5	h	5	h	5	negative	1
T14	t		Europe		Slovenia, Iceland, France	vh	6	vh	6	h	5	negative	3
T15	t		Europe		Norway	h	5	m-h	4	m-h	4	negative	1
T18	t		Europe	Alps	Austria	m-h	4	h	5	h	5	positive	1
T19	t		Europe	Alps	Austria	m-h	4	m-h	4	m-h	4	positive	1
10	t	2	Europe	-	-	h	4.5	h	4.5	h	4.3	15	17
T5	t		NAM	North America	western USA	h	5	h	5	h	5	negative	2
T3	t		NAM	North America	Alaska	m	3	m	3	m	3	negative	1
T1	t		NAM	North America	New England USA	h	5	h	5	m-h	4	negative	1
T2	t		NAM	North America	New Hampshire USA	h	5	h	5	m-h	4	negative	1
4	t	0	NAM	-	-	h	4.5	h	4.5	m-h	4.0	5	5
22	**t**	**5**	**global**	**global**	**global**		**4.4**		**4.6**		**4.0**	**28**	**30**
AF87	te	yes	Africa	CEAF	Rwanda, Volcanoes NP	m	3	h	5	l	1	negative	1
AF103	te		Africa	SEAF	South Africa, Maloti-Drakensberg	h	5	l	1	l	1	unclear	1
AF2	te		Africa	SWAF	NW Namibia	m	3	l-m	2	l	1	negative	1

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AF110	te		Africa	SWAF	South Africa, Table mountain NP	m	3	m	3	l	1	unclear	1
AF58	te	yes	Africa	CAF	DRC, Mt Kahuzi area	m	3	m	3	l	1	negative	1
AF115	te		Africa	NEAF	Kenya, Mt. Kenya region	h	5	h	5	m	3	negative	1
AF100	te	yes	Africa	SWAF/SEAF	Southern Africa	h	5	m	3	m	3	negative	1
AF106	te		Africa	SWAF	South Africa, Table mountains	m	3	m	3	l-m	2	negative	1
AF101	te	yes	Africa	SWAF/SEAF	Southern Africa	h	5	m-h	4	m	3	negative	1
AF3	te		Africa	SWAF	Namibia	h	5	h	5	m-h	4	negative	1
AF10	te		Africa	SEAF	South Africa, Drakensberg, Namahadi Catchment	h	5	h	5	m-h	4	negative	1
AF108	te		Africa	NEAF/(SEAF)	Mountains pan-tropical belt	m	3	h	5	m-h	4	negative	1
TE117	te		Africa	Abune Josef range	Ethiopia	m	3	l	1	l	1	negative	1
TE82	te		Africa	SWAF/SEAF	Mediterranean forests	m	3	m	3	l	1	unclear	1
14	te	4	Africa	-	-	m	3.9	m	3.4	l	2.1	11	14
LC2	te	yes	Asia	Himalayas	Nepal, India	h	5	m	3	l-m	2	negative	3
TE33	te		Asia	Quilian mountains	China	m	3	m	3	m	3	unclear	1
TE54	te		Asia	Altay prefecture	China	m	3	m	3	m	3	negative	1
TE79	te	yes	Asia	Uttarakhand	India	h	5	m	3	l	1	negative	1
TE93	te		Asia	Pamir Alay & Tien Shan ranges	Uzbekistan & Kyrgyzstan	m	3	m	3	m	3	negative	1
TE111	te	yes	Asia	Upper Kedarnath Valley	India	h	5	h	5	h	5	unclear	1
TE127	te		Asia	Ruoergai plateau	Tibet, China	h	5	m	3	m	3	negative	1
7	te	3	Asia	-	-	h	4.1	m	3.3	m	2.9	7	9
TE82	te		Australia	Mediterranean forests	SAU	m	3	m	3	l	1	x	1
1	te	0	Australia	-	-	m	3	m	3	l	1	0	1

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A30	te		CSA	Andes	Argentina	m	3	m	3	l	1	negative	1
A12	te		CSA	Andes	Colombia (Bogota)	h	5	h	5	h	5	unclear	1
A25	te		CSA	Andes	Peru	h	5	h	5	h	5	negative	1
A55	te	yes	CSA	Andes	Chile	m	3	h	5	h	5	negative	1
A4	te		CSA	Andes	Chile	vh	6	h	5	h	5	negative	1
A46	te		CSA	Andes	Ecuador	vh	6	h	5	h	5	negative	2
A47	te		CSA	Andes	Peru	vh	6	h	5	h	5	positive	1
A26	te		CSA	Andes	Argentina	h	5	l	1	l	1	negative	1
LC105	te	yes	CSA	Andes	Bolivia, Sajama	h	5	m	3	l-m	2	negative	1
LC110	te	yes	CSA	Andes	Pasto, Colombia & Ecuador	m-h	4	m	3	l-m	2	unclear	1
A28	te		CSA	Andes	Bolivia	h	5	m	3	m	3	positive	1
A24	te	yes	CSA	Andes	Colombia	l	1	m	3	m	3	negative	1
A5	te		CSA	Andes	Chile	vh	6	m	3	l-m	2	negative	1
TE75	te		CSA	Patagonia	south America	h	5	vh	6	h	5	negative	1
TE86	te		CSA	Tropical high-Andean Puna		m	3	m	3	l	1	negative	1
TE82	te		CSA	Mediterranean forests		m	3	m	3	l	1	unclear	1
16	te	4	CSA	-	-	h	4.4	m	3.8	h	3.2	12	17
TE16	te		Europe	Sierra Nevada	Spain	h	5	h	5	h	5	unclear	1
TE43	te		Europe	French Alps	France	h	5	h	5	h	5	unclear	1
TE51	te		Europe	Carpathian mountains	Romania	l	1	m	3	m	3	unclear	1
TE52	te		Europe	Tatra mountains	Slovakia	m	3	l	1	l	1	negative	1
TE63	te		Europe	Swiss Alps	Switzerland	m	3	h	5	h	5	unclear	1
TE81	te		Europe	Parangalitsa forest reserve	Bulgaria	m	3	l	1	l	1	negative	1
TE113	te		Europe	Central Pyrenees	Spain	m	3	l	1	l	1	unclear	1

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TE82	te		Europe	Mediterranean	global	m	3	m	3	l	1	unclear	1
8	te	0	Europe	-	-	m	3.3	h	3.0	l	2.8	2	8
TE68	te		NAM	Sierra Nevada	California, USA	h	5	h	5	m	3	negative	1
TE97	te		NAM	US Rocky Mountains	USA	h	5	m	3	m	3	negative	1
TE82	te		NAM	Mediterranean	global	m	3	m	3	l	1	unclear	1
3	te	0	NAM	-	-	h	4.3	m	3.7	m	2.3	2	3
49	**te**	**11**	**global**	**global**	**global**		**3.8**		**3.4**		**2.4**	**34**	**52**
W1	w		Africa	East Africa	upper blue nile	h	5	l-m	2	m	3	positive	2
AF69	w	yes	Africa	CAF	Nigeria, Riyom & Jos Plateau	h	5	h	5	l-m	2	negative	1
AF77	w	yes	Africa	CEAF	Uganda, Mt. Elgon area	h	5	h	5	l-m	2	negative	1
AF73	w	yes	Africa	CAF	Nigeria, Taraba state	m	3	h	5	l-m	2	negative	1
W2	w		Africa	East Africa	Tanzania	m	3	l-m	2	l-m	2	negative	3
AF52	w	yes	Africa	CAF	DRC, Bukavu area	h	5	m	3	l	1	negative	1
AF53	w	yes	Africa	CAF	DRC, Bukavu area	m	3	m	3	l	1	negative	1
AF95	w	yes	Africa	WAF	Sierra Leone, Kono district	m	3	m	3	l-m	2	negative	1
AF114	w	yes	Africa	NEAF	Kenya, Mt. Kenya region	m	3	m	3	l-m	2	negative	1
AF49	w	yes	Africa	CAF	Cameroon, Bui Division	h	5	m-h	4	l-m	2	negative	1
AF90	w	yes	Africa	WAF	Benin, Dassari	h	5	h	5	l-m	2	negative	1
AF93	w		Africa	WAF	Guinea, Fouta Djallon	h	5	h	5	l-m	2	unclear	1
AF125	w	yes	Africa	NEAF	Kenya, Mt Marsabit, Mt Kulal & Mt Nyiro	h	5	h	5	m	3	negative	1
AF55	w	yes	Africa	CAF	DRC, Mt Kahuzi area	m	3	h	5	l-m	2	negative	1
14	w	11	Africa	-	-	h	4.1	h	3.9	l-m	2.0	14	17
W26	w		Asia	Central Asia	Syr Darya, lower/middle reaches	m	3	l	1	l	1	negative	1
W9	w		Asia	Central Asia	Tarim river, Tien Shan	m	3	l-m	2	l	1	negative	1
W4	w		Asia	South Asia	SW Ghats, India	l	1	m	3	l	1	negative	1
W20	w	yes	Asia	Himalaya	Nepal, India	l-m	2	m	3	l-m	2	negative	1
W22	w		Asia	Himalaya	Nepal	m	3	m	3	l	1	negative	1

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LC1	w	yes	Asia	Himalayas	Nepal, India	h	5	m	3	l-m	2	negative	5
W40	w		Asia	Central Asia	Upper Amu Darya r.	l-m	2	m	3	l-m	2	negative	1
W24	w		Asia	Himalaya	India	m	3	m	3	l-m	2	negative	1
W5	w		Asia	Middle East	Zagros mtn, Iran	m	3	h	5	m	3	negative	1
W25	w		Asia	Himalaya	Upper Indus	m	3	h	5	m	3	negative	1
W12	w		Asia	Middle East	Anatolia, Turkey	m-h	4	h	5	m-h	4	unclear	1
W8	w		Asia	Central Asia	Tarim river, Tien Shan	l-m	2	m	3	m	3	positive	1
W35	w		Asia	Himalaya	Chota Shigri, India	m	3	m	3	m	3	positive	1
W36	w		Asia	Central Asia	Tien Shan	m	3	m	3	m	3	positive	1
W23	w		Asia	Karakoram	central and eastern Karakoram	m	3	m-h	4	m	3	unclear	1
W31	w		Asia	Karakoram	upper Indus	m	3	m-h	4	m	3	positive	1
W32	w		Asia	Karakoram	Upper Indus	m	3	m-h	4	m	3	negative	1
W7	w		Asia	Central Asia	Tarim river, Tien Shan	h	5	h	5	m-h	4	positive	1
W9	w		Asia	Central Asia	Tarim river, Tien Shan	m	3	h	5	m-h	4	positive	1
W34	w		Asia	Central Asia	Tien Shan	m	3	h	5	m-h	4	positive	1
W41	w		Asia	Central Asia	Aksu r.	m	3	m	3	m	3	positive	2
W26	w		Asia	Central Asia	Syr Darya, upper reaches	m	3	m-h	4	m-h	4	positive	1
22	w	6	Asia	-	-	m	3.0	m	3.6	m	2.7	15	27
W3	w		Australia	Australia	New South Wales, AU	m	3	h	5	m	3	negative	1
W45	w		Australia	SAU	Murrumbidgee river	m	3	h	5	m	3	negative	1
2	w	0	Australia	-	-	m	3.0	h	5.0	m	3.0	2	2
A8	w		CSA	Andes	Argentina	m	3	m	3	l-m	2	negative	1
A42	w		CSA	Andes	Peru-Bolivia	m	3	h	5	h	5	negative	2
A43	w		CSA	Andes	Peru-Brazil	m	3	h	5	h	5	negative	1
A43	w		CSA	Andes	Argentina	m	3	h	5	h	5	negative	1
A44	w		CSA	Andes	Peru	m	3	h	5	h	5	negative	1
A19	w	yes	CSA	Andes	Peru	m-h	4	h	5	h	5	negative	1

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Code; Nº. of Codes	Syst.	LCP; Nº. of (yes)	IPCC Region	IPCC Sub-region/ Subregions	Location/ Country	Conf. Det. (index); mode	Conf. Det. (value); mean	Contr. C.C. (index); mode	Contr. C.C. (value); mean	Conf. Att. (index); mode	Conf. Att. (value); mean	Impact (neg/posit/ unclear); Nº of Neg. Im.	Nº Pub.
A41	w		CSA	Andes	Colombia	m-h	4	h	5	h	5	negative	2
A52	w	yes	CSA	Andes	Bolivia	h	5	h	5	l	1	negative	1
W33	w		CSA	Andes	Argentina, Chile	l	1	l	1	l	1	positive	1
A53	w	yes	CSA	Andes	Chile	m	3	m	3	l	1	negative	1
LC103	w	yes	CSA	Andes	Peru, Colca	m-h	4	l	1	l	1	negative	1
A11	w		CSA	Andes	Ecuador	h	5	l-m	2	l-m	2	negative	1
LC107	w	yes	CSA	Andes	Huancavelica, Peru	h	5	l-m	2	l-m	2	negative	1
LC109	w	yes	CSA	Andes	Narino, Colombia	h	5	m	3	l-m	2	negative	1
A7	w		CSA	Andes	all Andes&Chile	m	3	m	3	l-m	2	negative	1
A58	w	yes	CSA	Andes	Peru	m	3	m	3	l-m	2	negative	1
W21	w		CSA	Andes	Argentina	m-h	4	m	3	l-m	2	positive	2
A51	w	yes	CSA	Andes	Bolivia	h	5	h	5	m	3	negative	1
A22	w	yes	CSA	Andes	Venezuela	m	3	h	5	m	3	negative	1
A22	w	yes	CSA	Andes	Colombia	m	3	h	5	m	3	negative	1
A23	w	yes	CSA	Andes	Peru	m	3	h	5	m	3	negative	1
A1	w		CSA	Andes	Chile	vh	6	h	5	m	3	negative	2
LC100	w	yes	CSA	Andes	Ecuador, Chimborazo	h	5	m	3	m	3	negative	1
LC108	w	yes	CSA	Andes	Cauca, Colombia	h	5	m	3	m	3	negative	1
W11	w		CSA	Andes	Cord. Blanca, Peru	h	5	m-h	4	m-h	4	negative	2
LC101	w	yes	CSA	Andes	Peru, Santa r.	m	3	h	5	m-h	4	negative	1
A2	w		CSA	Andes	W Patagonia	vh	6	h	5	m-h	4	negative	1
A3	w		CSA	Andes	Bolivia	h	5	m-h	4	m	3	negative	1
D17	w		CSA	Andes	Bolivian altiplano	m	3	m	3	l	1	negative	1
29	w	14	CSA	-	-	m	3.9	h	3.8	m	2.9	31	34
W13	w		Europe	Alps	Switzerland	h	5	h	5	h	5	unclear	1
W17	w		Europe	Alps	Rhone, Po, Danube, Europe	h-vh	6	l-m	2	l	1	negative	3
W44	w		Europe	Europe	Adiger., Italy	m	3	m	3	m	3	unclear	1

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Code; Nº. of Codes	Syst.	LCP; Nº. of (yes)	IPCC Region	IPCC Sub-region/ Subregions	Location/ Country	Conf. Det. (index); mode	Conf. Det. (value); mean	Contr. C.C. (index); mode	Contr. C.C. (value); mean	Conf. Att. (index); mode	Conf. Att. (value); mean	Impact (neg/posit/ unclear); Nº of Neg. Im.	Nº Pub.
W6	w		Europe	Alps	Italy (mostly)	h	5	m	3	m	3	negative	1
W43	w		Europe	Europe	Pyrenees, Ebro	h	5	m	3	m	3	negative	3
W18	w		Europe	Alps	Europe	m	3	m	3	m	3	positive	1
W42	w		Europe	Europe	eastern Carphathians	h	5	m-h	4	m-h	4	unclear	1
W14	w		Europe	Scandinavia	Arctic Norway	m-h	4	m-h	4	m-h	4	unclear	1
W39	w		Europe	Europe	Spain	m-h	4	h	5	m-h	4	unclear	1
W17	w		Europe	Alps	Rhone, Po, Danube, Europe	h-vh	6	m-h	4	m-h	4	unclear	3
W19	w		Europe	Alps	Austria	m-h	4	m-h	4	m-h	4	unclear	1
W29	w		Europe	Scandinavia	northern Sweden	m-h	4	m-h	4	m-h	4	positive	1
W30	w		Europe	Scandinavia	northern Sweden	m-h	4	m-h	4	m-h	4	negative	1
13	w	0	Europe	-	-	m-h	4.5	m-h	3.7	m-h	3.5	4	19
W10	w		NAM	North America	Rockies, Canada	h	5	h	5	h	5	unclear	1
W28	w		NAM	North America	BC, Canada	l	1	m	3	m	3	negative	1
W28	w		NAM	North America	BC, Canada	m	3	m	3	m	3	positive	1
W37	w		NAM	North America	USA	m	3	m	3	m	3	unclear	1
W38	w		NAM	North America	western N. America	m	3	m	3	m	3	unclear	1
W27	w		NAM	North America	Columbia river, south & central Canada	m	3	h	5	h	5	negative	1
W16	w		NAM	North America	Rockies, Canada	m-h	4	m	3	m-h	4	positive	1
W15	w		NAM	North America	Rockies, Canada	m-h	4	m-h	4	m-h	4	negative	1
8	w	0	NAM	-	-	m	3.3	m	3.6	m	3.8	3	8
88	**w**	**31**	**global**	**global**	**global**		**3.6**		**3.9**		**3.0**	**69**	**107**

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Table SMCCP5.14: Summary table ordered by region and system that support figure CCP5.4. Abbreviations in the table are: System (Syst.), Number of publications consulted (Nº Pub.), percentage of Local community perception taken into account (% LCP), Confidence of detection (Conf. Det.), Contribution of climate change (Contr. C.C.), Confidence of attribution (Conf. Att.) and percentage of impacts that are negative (% Neg. Im.). Confidences and contributions can be l=low, m=medium, h=high and vh=very high.

IPCC Continental Region	Syst.	Nº Pub.	% LCP	Conf. Det.	Contr. C.C.	Conf. Att.	% Neg. Im.
Africa	a	57	89%	h	m	m	98%
Africa	c	8	13%	h	h	m	100%
Africa	d	2	100%	h	h	l	100%
Africa	h	1	100%	m	l	l	100%
Africa	m	3	100%	h	m	l	100%
Africa	te	14	29%	m	m	m	79%
Africa	t	1	0%	h	h	h	100%
Africa	w	17	65%	h	m	m	82%
Asia	a	33	100%	vh	m	m	73%
Asia	c	28	18%	h	h	h	100%
Asia	co	11	100%	vh	m	m	82%
Asia	d	25	56%	m	m	l	100%
Asia	t	3	33%	h	h	m	100%
Asia	te	9	56%	h	m	m	78%
Asia	w	27	22%	m	m	m	56%
Australasia	c	2	0%	vh	h	h	100%
Australasia	d	4	0%	m	m	m	100%
Australasia	te	1	0%	m	m	l	0%
Australasia	w	2	0%	m	h	m	100%
Australasia	t	1	0%	m	h	m	100%
CSA	a	11	91%	h	m	m	82%
CSA	c	35	9%	h	h	h	100%
CSA	co	12	75%	h	m	m	100%
CSA	d	10	0%	m	m	m	100%
CSA	h	6	33%	h	h	m	100%
CSA	m	4	100%	h	m	m	100%
CSA	t	3	67%	h	h	h	100%
CSA	te	17	24%	h	m	m	71%
CSA	w	34	41%	m	m	m	91%
Europe	a	1	0%	h	m	m	100%
Europe	c	8	0%	h	h	h	100%
Europe	d	28	0%	m	m	m	75%
Europe	t	17	12%	h	h	h	88%
Europe	te	8	0%	m	m	m	25%
Europe	w	19	0%	h	m	m	42%
NAM	c	2	0%	vh	h	h	100%
NAM	d	6	0%	m	m	m	83%
NAM	t	5	0%	h	h	h	100%
NAM	te	3	0%	h	m	m	67%
NAM	w	8	0%	m	m	m	38%
Global	a	102	69%	h	m	m	70%
Global	c	83	11%	vh	h	h	76%
Global	co	23	87%	h	m	m	91%
Global	d	75	21%	m	m	m	89%
Global	h	7	43%	m	m	m	100%
Global	m	7	100%	h	m	m	100%
Global	t	30	17%	h	h	m	93%
Global	te	52	21%	m	m	m	65%
Global	w	107	29%	m	m	m	64%

SMCCP5.3 Analysis of Articles Reporting Adaptation in Mountain Regions Included in the Global Adaptation Mapping Initiative (GAMI) Dataset

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SMCCP5.3.1 Methods

For full re-analysis results see: (McDowell et al., 2021)

SMCCP5.3.1.1 Overview

The Global Adaptation Mapping Initiative (GAMI) was a collective global effort to systematically gather and synthesize literature on climate change adaptation. GAMI reviewed thousands of peer-reviewed articles in order to develop the first systematic global assessment of empirical evidence on adaptation progress. The initiative was developed to provide synthesis results to inform the Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report (AR6). More information about GAMI can be found here: https://globaladaptation.github.io/

We conducted a re-analysis of the full GAMI dataset to identify articles reporting adaptations to climate change in mountain regions, and to then re-recalculate results specific to adaptation in mountain regions, as described below.

SMCCP5.3.1.2 Document Identification

The identification of documents to be included for reanalysis followed a six-step process:

1. Open GAMI dataset containing all articles included in GAMI project
2. Identify documents flagged by the GAMI coding team as being focused on mountains (Q1.3) in the GAMI dataset. Automatically included these documents for reanalysis.
3. Identify documents reviewed in the McDowell et al. (2019) systematic review of adaptation in glaciated mountain regions in the GAMI dataset. Automatically included these documents for reanalysis.
4. Review remaining documents in the GAMI dataset individually to determine whether they provide information about adaptation associated with mountain areas (as defined by the Kapos et al. (2000) 'K1' criteria for mountains). Determine eligibility using the Global Mountain Explorer platform (https://rmgsc.cr.usgs.gov/gme/gme.shtml), where location searches and visual inspections can be undertaken to determine if reported studies are within K1 (select K1 layer, deselect all other layers). Include regional studies if at least 50% of the study region is within K1. Exclude national-scale and policy-focused studies with no obvious relevance to mountains. Note: documents did not have to be explicitly focused on mountains, they just have to report adaptations occurring within the K1 mountain area or explicitly associated with adjacent K1 terrain (e.g. adaptation to the downstream effects of glacio-hydrological change in a study site just outside of K1).
5. Construct a reference library that only contains documents reporting adaptations associated with K1 mountain areas.
6. Construct a dataset (Excel sheet) that only contains documents reporting adaptations associated with K1 mountain areas. Retain all original GAMI data that corresponds with the included articles.

SMCCP5.3.1.3 Data Re-Analysis

GAMI used a questionnaire to extract information about numerous variables related to adaptation from individual articles. Our reanalysis of the subsequent GAMI spreadsheet followed three steps:

1. Review, clean, and re-classify GAMI data for documents reporting adaptations associated with K1 mountain areas as necessary. Any changes to original data followed the reconciliation protocols used by GAMI, following instructions provided by the data reconciliation leader for GAMI.
2. Calculate summary statistics for each 'restricted choice' variable.
3. Write brief summaries for each 'restricted' and 'open' response variable.

SMCCP5.3.1.4 Caveats and Limitations

Broadly speaking the caveats and limitations that apply to the GAMI project also apply to this reanalysis. For example, adaptations reported in the peer-reviewed literature are an imperfect proxy for actual adaptation (i.e. what is reported in the literature does not capture the full reality of adaptation on-the-ground), the omission of grey literature leads to an underrepresentation of planned adaptations, and reviewer subjectivity

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can (and in our determination, does) influence coding and results. Moreover, GAMI only includes information about observed adaptation action; groundwork and planning activities are not reviewed.

In addition, the GAMI project uses 'articles' as unit of analysis not 'discrete adaptations'. Several discrete adaptations might be reported in an individual article; the GAMI data does not provide data at the level of individual adaptations. However, discrete adaptations were the unit of analysis for McDowell et al (2019) and, subsequently, the SROCC HMA chapter. The SROCC HMA findings and those from the GAMI reanalysis are therefore not be directly comparable.

We did not include a synthesis report for the IPCC 'Polar Regions' category (i.e. Greenland), but this has no impact on results, as no studies were reported for Greenland.

Counts used for results are based on the assumption that text in the GAMI data set matches that provided in the codebook and that spelling mistakes have been resolved by the GAMI team (e.g. COUNTIF function will not include variants or misspelled content). Various sensitivity checks were performed (e.g. 'and' vs. '&'; American vs. UK English spellings) with satisfactory results.

Coding consistency among GAMI coders was often imperfect, with relatively high inter-coder variation observed for several variables. Consistent with GAMI reconciliation protocols, inter-coder discrepancies were resolved in favour of affirmative responses or, in the case of 3 or more coders for an individual document, the most commonly reported response was selected.
Caveats related in article inclusion/exclusion

Multi-sited studies with only some study sites within K1 were excluded so as not to bias results with reporting based on non-mountain areas (= exclusion of some potentially relevant content).

Review studies summarizing a large number of articles were excluded unless they were explicitly focused on mountains (= exclusion of some potentially relevant content).

Some articles tagged by the GAMI as being related to mountains were borderline in terms of their relevant to mountains. These were kept for consistency with our inclusion criteria (See point 2 of STAGE 1) (inclusion of some potentially irrelevant content).

SMCCP5.3.2 GAMI Mountain Re-Analysis Global Synthesis and Regional Reports

See GAMI Codebook for definitions of all variables reported below

SMCCP5.3.2.1 Global

Globally, 423 articles report adaptation associated with K1 terrain.

~26% of all documents from GAMI (n = 1682) are associated with K1 terrain, although not necessarily framed as mountain-focused.

SMCCP5.3.2.1.1 Who is adapting?

What regions are adaptations reported in? Q 1.1.1

Region	Count	Percentage
North America	39	9
C. and S. America	46	11
Europe	26	6
Africa	157	37
Asia	167	39
Australasia	6	1
Small Islands	7	2
Global	3	1

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents. Specifically, 20 articles (5%) focused on 2 or more regions.*

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Synthesis Statement:
Adaptations were reported most frequently in Asia (39% of studies), closely followed by Africa (37% of studies). A distant third, the Central and South American region accounted for 11% of studies reporting adaptations. Few studies (6%) reported adaptations occurring in Europe. The proportion of studies sited in Africa was high, in part due to a prevalence of articles in this region in the GAMI Database and in part due to large areas of marginally or intermittently K1 terrain in Southern and Eastern Africa. The highest number of studies in Africa were sited in Ethiopia, where K1 terrain is particularly prevalent.

What countries are adaptations reported in? Q 1.1.1

Country	Count	Percentage
North America		
United States	23	5
Mexico	12	3
Canada	6	1
C. and S. America		
Peru	13	3
Colombia	8	2
Guatemala	8	2
Bolivia	6	1
Brazil	5	1
Chile	4	1
Ecuador	4	1
Honduras	4	1
Costa Rica	2	<1
El Salvador	2	<1
Nicaragua	2	<1
Argentina	1	<1
Asia		
Nepal	56	13
India	40	9
China	37	9
Pakistan	15	4
Iran	11	3
Bhutan	8	2
Mongolia	6	1
Vietnam	5	1
Indonesia	4	1
Bangladesh	2	<1
Kazakhstan	2	<1
Kyrgyzstan	2	<1
Sri Lanka	2	<1
Tajikistan	2	<1
Thailand	2	<1
Afghanistan	1	<1
Laos	1	<1
Lebanon	1	<1
Oman	1	<1
Philippines	1	<1
Turkey	1	<1
Turkmenistan	1	<1
Uzbekistan	1	<1
Australasia		
Australia	4	1
New Zealand	2	<1
Africa		
Ethiopia	46	11
Kenya	39	9
Tanzania	20	5
Uganda	15	4
South Africa	13	3
Cameroon	6	1
Zimbabwe	5	1
Malawi	4	1
Algeria	3	1
Morocco	2	<1
Niger	2	<1
Rwanda	2	<1
Benin	1	<1
Burkina Faso	1	<1
Central African Republic	1	<1
Congo	1	<1
Lesotho	1	<1
Libya	1	<1
Mali	1	<1
Nigeria	1	<1
Senegal	1	<1
Swaziland	1	<1
Tunisia	1	<1
Europe		
Norway	6	1
Switzerland	5	1
Austria	4	1
Spain	4	1
France	3	1
Italy	2	<1
Russia	2	<1
Finland	1	<1
Netherlands	1	<1
Poland	1	<1
Sweden	1	<1
Mediterranean (region)	1	<1
Small Islands		
Fiji	2	<1
Madagascar	2	<1
Puerto Rico	1	<1
Canary Islands (Spain)	1	<1
Caribbean (region)	1	<1
Global	3	1

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents. Some values above differ slightly from those reported in regional summaries; regional summaries did not count countries included in multi-regional studies.*

Synthesis Statement:

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Globally, the countries with the greatest number of studies reporting adaptation actions are (in descending order): Nepal (56), Ethiopia (46), India (40), Kenya (39), China (37), United States (23), Tanzania (20), Uganda (20), Pakistan (15), and Peru (15). Despite significant area of K1 coverage, few studies reported adaptation actions in Canada (6), Chile (4), Russia (2), New Zealand (2), and Turkey (1).

Which sectors/systems are involved in reported adaptations? Q 1.2

Sectors	Count	Percentage
Terrestrial & freshwater ecosystems	76	18
Ocean & coastal ecosystems	3	1
Water and sanitation	118	28
Food, fibre, and other ecosystem products	323	76
Cities, settlements, and key infrastructure	17	4
Health, well-being, and communities	112	26
Poverty, livelihoods, and sustainable development	234	55

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The sector/system most frequently identified as involved in reported adaptation actions was food, fibre, and other ecosystem products (76% of studies), followed by poverty, livelihood, and sustainable development (55% of studies). Approximately half as many studies reported involvement in water and sanitation (28% of studies), closely followed by health, well-being and communities (26% of studies). Few studies identified involvement in cities, settlements, and key infrastructure (4%).

These results are consistent across most regions, with the exception of Europe. Poverty, livelihoods, and sustainable development was not reported as a focus of any studies in Europe; water and sanitation was reported more frequently (46% of studies).

Who is involved with reported adaptations (e.g. leading, financing, or enabling)? Q 2.1.1; 2.1.2; 2.1.3

Actors	Count	Percentage
Individuals or households	387	91
Local government	130	31
National government	118	28
Sub-national government	44	10
Civil society (sub-national or local)	124	29
Civil society (international, multinational, national)	54	13
Private sector - small- and medium-enterprises	38	9
Private sector - corporations	27	6
International or multinational governance	30	7
Other	49	12

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Individuals or households were involved in reported adaptations in 91% of studies reviewed. Local governments were involved in 31% of reported adaptations, while civil society actors at the sub-national or local scale were involved in 29% of reported adaptations. Involvement of larger scale civil society actors (international, multinational, national) was reported less frequently. Among responses coded as "other," the most common actors were smallholder farmers or farming groups (41 studies). Also mentioned frequently were pastoralists; Indigenous and Tribal communities, leaders, and governing institutions; community forest user groups and/or managing bodies; and research institutes or scientists. Organizations operating at a community level (e.g. farmers associations, women's groups) were the most commonly noted as implementing actors. Many of these were informal, for example kinship groups and social networks participating in cooperative adaptation efforts at the community scale.

Regional departures from global patterns: The regional analyses for Africa and Asia yielded similar results, with local governments and civil society actors approximately equally involved in adaptation efforts. In both Europe and Central and South America, civil society organizations (sub-national or local) were reported as involved actors more frequently than the global average (54% and 53% of studies, respectively). In both

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Europe and North America, individuals or households were reported as involved actors less frequently than in the global results.

What types of implementation tools are reported? Q 3.2.1

Synthesis Statement:
A wide range of types of implementation tools were reported, most commonly farming-related changes (e.g. resilient or drought-tolerant crop varieties, irrigation techniques, crop storage options, micro-loans or insurance schemes for livestock farmers). Also mentioned were infrastructure developments, Indigenous knowledge, community-based capacity building, and ecosystem-based adaptation. Implementation of adaptation actions was more frequently autonomous than formal or planned, with approximately two thirds of studies reporting some form of autonomous adaptation. This finding was particularly distinct in farming contexts, where smallholders implemented autonomous actions such as changing crop varieties or planting strategies as approaches to coping with rapid change. Livelihood diversification was the most common autonomous adaptation (see Question 3a for more detail). A smaller number of studies reported a combination of planned policy frameworks for adaptation at larger scale which were implemented locally or paired with autonomous adaptation efforts. Financial incentives were the most commonly reported formal/planned implementation tool in the global analysis.

Regional results suggest that the prevalence of autonomous implementation (particularly by smallholder farmers) is highest in Africa and Asia. Ecosystem-based adaptation was more frequently reported in Central and South America than any other region. Adaptation planning was frequently reported in both Asia and North America. North America was the only region in which more adaptation efforts were formal/planned than autonomous; this was also the only region which frequently reported adoption of informational tools (e.g. early warning systems).

Is there evidence about who financed reported adaptation actions? Q 4.2

Funding info	Count	Percentage
Yes	169	40
No	254	60

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.1.2 Evidence of equity in planning / targeting

How many articles address equity in adaptation planning? In adaptation targeting? Q 2.2.1; 2.3.1
- 220 articles (52%) included evidence that particularly vulnerable groups were included in adaptation planning
- 223 articles (53%) included evidence that particularly vulnerable groups were targeted in adaptations.

Who is addressed in the context of equity in reported adaptations? Q 2.2.1; 2.2.2; 2.2.3; 2.3.1; 2.3.2; 2.3.3

Equity planning	Count	Percentage	Equity targeting	Count	Percentage
Low-income	102	24	Low-income	125	30
Indigenous	59	14	Indigenous	46	11
Women	68	16	Women	55	13
Elderly	15	4	Elderly	13	3
Migrants	7	2	Migrants	8	2
Youth	10	2	Youth	11	3
Disability	0	0	Disability	0	0
Ethnic minorities	24	6	Ethnic minorities	22	5
Other	52	12	Other	47	11
Equity Not Addressed	203	48	Equity Not Addressed	200	47

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:

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Nearly half of the studies reviewed did not explicitly address equity in the context of reported adaptations. Among studies which did so, the greatest number of studies reported addressing equity for low-income individuals or populations — 24% of studies addressed equity planning and 30% addressed equity targeting for low-income groups. Women were the group next most commonly identified as a focus of equity planning (16% of studies) and equity targeting (13% of studies), followed by Indigenous Peoples Indigenous Peoples (equity planning: 14% of studies and equity targeting: 11% of studies). Few studies (2%) reported focusing on equity planning for youth (equity targeting: 3%). No studies reported a focus on disability in either equity planning or targeting. There were no significant discrepancies between equity planning and equity targeting foci among studies reporting on equity in adaptation actions.

Others (both equity planning and targeting): The Other most mentioned was farmers, particularly smallholder farmers. Also mentioned were widows, herders or pastoralists, rural or peasant communities, and members of lower castes.

In addition to a clear focus on equity for farming communities, the qualitative data indicated a focus on equity planning and targeting for resource-dependent groups. These included local water users, collectors of non-timber forest products, and nomadic pastoralists. Quotes selected by coders also suggest overlapping vulnerabilities of groups, e.g. studies which focus on intersections of gender and poverty, or rural livelihoods and poverty.

Regional results: Qualitative results from the Asia region reported more frequently on social status as a determinant of vulnerability, and indicated an emphasis on equity planning and targeting for marginalized socioeconomic groups. Studies in Central and South America reported a greater focus on equity planning and targeting for Indigenous Peoples, and much less on women, than the global results. Of all regions, a significantly higher proportion of studies sited in Africa indicated a focus on equity planning and targeting; studies sited in Europe and North America did so less frequently.

Note on coding: Other responses sometimes duplicated the closed-ended response options, e.g. the coder wrote “Indigenous” or “tribal” as Other instead of coding as Indigenous; or wrote “gender” instead of coding as Women.

Is there reference to contributions from Indigenous Knowledge in reported adaptations? Q 1.4

IK Contribution	Count	Percentage
Yes	144	34
No	279	66

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Is there reference to contributions from local knowledge in reported adaptations? Q 1.5

LK Contribution	Count	Percentage
Yes	148	35
No	275	65

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Are costs of adaptation considered? Q 4.3

Costs	Count	Percentage
Yes – Cost of response	119	28
Yes – Cost savings from response	44	10
No	267	63

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.1.3 What responses are documented?

What category of adaptation is reported? Q 3.1.1; 3.1.2

Response type	Count	Percentage
Technological/Infrastructural	258	61
Behavioural/Cultural	357	84
Institutional	157	37

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Ecosystem-based	272	64

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed, 84% reported adaptation responses that were behavioral/cultural. Ecosystem-based responses were reported in 64% of studies, while the third highest percentage of studies reported responses that were technological or infrastructural (61%). Fewer studies reported institutional responses, which is consistent with a higher proportion of autonomous adaptation efforts than formal or planned adaptation.

The qualitative analysis corroborated this finding, suggesting that systemic or institutional adaptation efforts are less frequently reported than autonomous adaptation occurring at the individual and household scale, particularly among farmers. In many cases, farmers engaged in a series of adaptation responses which were categorized as all three of the high count variables: behavioral/cultural (e.g. diversifying livelihoods), ecosystem-based (e.g. community forest management for agricultural inputs, or watershed management), and technological/infrastructural (e.g. use of novel irrigation techniques). Specifically, studies frequently reported efforts to increase the resilience of rural livelihoods to shocks and stressors such as droughts, floods, and other natural disasters.

The qualitative analysis revealed an emphasis on adapting through diversification — both of livelihoods (e.g. supplementing agriculture with wage labor activities) and within specific livelihood practices (e.g. crop diversification) as a risk mitigation strategy. Both traditional and novel practices were frequently reported as pathways to diversified livelihoods. In many cases diversification was also complemented by other risk-mitigation measures such as primarily locally supported or community-based insurance programmes. This finding was distinct in Africa and Asia specifically.

Other regional results: The prevalence of behavioral/cultural responses was highest in Asia (92%) and Small Island States (100%)*, and lowest in Europe (62%) and North America (70%). Results from Central and South America indicated a greater emphasis on ecosystem-based responses (87%), particularly through the adoption of agroforestry. Institutional responses were least commonly reported in Africa (29% of studies).

*Note that the sample size for Small Island States is small for determining patters of adaptation.

What hazards is the adaptation aimed at addressing? 3.3.1; 3.3.2; 3.3.3

Hazards	Count	Percentage
Extreme precipitation and inland flooding	157	37
Drought	292	69
General climate impacts	271	64
Sea level rise	9	2
Precipitation variability	243	57
Increased frequency and intensity of extreme heat	114	27
Rising ocean temperature and ocean acidification	1	0
Loss of arctic sea ice	5	1
Other	140	33

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
In the global analysis, 69% of studies reviewed reported adaptation to address drought, and 57% reported adaptation to address precipitation variability. The next most prevalent hazard addressed was general climate impacts (64% of studies). Extreme heat was reported in 37% of studies reviewed.

Other hazards listed included increased prevalence of pests and diseases, seasonal unpredictability of weather systems (e.g. rainfall variability, unseasonable frosts). Many studies reported adaptation addressing general climate impacts rather than specific hazards; qualitative results suggest that adaptation efforts frequently address multiple hazards simultaneously. Hazards were most frequently framed in terms of their risk to smallholder farmers' agricultural livelihoods; drought and changes to rainfall were frequently

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reported as hazards requiring adaptation. The qualitative results corroborated the quantitative finding on the prevalence of adaptation efforts targeting drought resilience.

Also frequently mentioned in reviewed studies were efforts to adapt to increasingly unpredictable seasons and increased prevalence of unseasonable weather events, such as erratic rainfall inconsistent with historical seasons. The qualitative results further indicated a concern with hazards caused not only by climate change, but exacerbated by other forms of ecosystem degradation (e.g. deforestation) and anthropogenic pressures (e.g. population growth, pollution). Changes in water supply quality and/or quantity were also frequently reported, both in farming and non-farming contexts.

Regional results: Studies in Central and South America reported the greatest focus on increased frequency and intensity of heat events (34%). Compared to other regions, studies sited in Europe and Asia more frequently mentioned mountain regions as specifically vulnerable to climate impacts.

What aspects of vulnerability is the adaptation aimed at addressing? 3.4.1; 3.4.2; 3.4.3

Exposure vulnerability	Count	Percentage
Clean water & sanitation	76	18
Sustainable cities & ecosystem services	55	13
Consumption & production	153	36
Health & wellbeing	84	20
Work and economic growth	111	26
Industry/innovation/technology	15	4
Poverty	199	47
Food security	317	75
Terrestrial & freshwater ecosystem services	81	19
Marine & coastal ecosystem services	5	1
Energy security	10	2
Education	23	5
Gender equality	31	7
Inequalities (other than gender)	20	5
Peace, justice, and strong institutions	10	2
Other	65	15

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed, 75% reported on adaptations aimed at addressing food security. 47% of studies reported addressing poverty, while the third highest percentage of studies reported addressing consumption and production (36%). Gender equality was reported as a focus in 7% of studies, while clean water and sanitation was reported in 18% of studies. Terrestrial and freshwater ecosystem services were reported as targeted vulnerabilities in 19% of studies reviewed.

The Other response most frequently reported was livelihood security. Other aspects of vulnerability reported included sites/practices of cultural or spiritual significance, water security, biodiversity loss, and land or tenure insecurity. Several studies also mentioned a nonspecific focus on targeting social vulnerability. Qualitative results confirmed a distinct emphasis on food security as the focal vulnerability targeted by adaptation efforts; this variable was reported as frequently overlapping with poverty. Gender was not a prevalent aspect of vulnerability addressed by adaptation efforts, nor was health and wellbeing (except in Europe) or peace, justice, and strong institutions.

Regional results: Studies reviewed in Africa reported a more significant focus on both poverty and gender than the global analysis, while the Central and South American region indicated less focus on these dimensions of vulnerability. Studies reviewed in Central and South America reported a greater emphasis on addressing terrestrial and freshwater ecosystem services than other regions. The European region showed a greater focus on education and health and wellbeing aspects of vulnerability than the global analysis, and none on gender or poverty.

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SMCCP5.3.2.1.4 What is the extent of adaptation-related responses?

What is the general stage of adaptation activities? 4.1; 4.1.2

Implementation stage	Count	Percentage
Vulnerability assessment and/or early planning	72	17
Adaptation planning & early implementation	149	35
Implementation expanding	94	22
Implementation widespread	53	13
Evidence of risk reduction associated with adaptation efforts	19	4

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
A majority of adaptation activities were in the adaptation planning and early implementation stage in this region (35%). 22% were identified as implementation expanding, while 17% were in the vulnerability assessment and/or early planning stage. Little evidence of risk reduction associated with adaptation efforts was reported (4%).

Qualitative results suggested that the stage of implementation is frequently unclear, particularly given the prevalence of autonomous adaptation at the household level. Results in this region confirmed the primarily informal, autonomous nature of adaptation efforts. Few adaptation efforts were formal/planned, so assessment of their progress was more difficult. The studies reviewed also noted considerable diversity between households with regard to the stage of implementation, within the same cases.

Particularly within the smallholder farming sector, some specific adaptations were reported as widespread in this region, including the diversification of crop varieties, multi- or inter-cropping, and changing seasonal practices to accommodate climatic shifts. Livelihood diversification was also reported to be widespread.

Regional results: Results in Asia and Africa appeared to be consistent, with the majority of adaptation activities in adaptation planning and early implementation, with a smaller proportion expanding. Quantitative results from North America, Central and South America showed the least evidence of widespread implementation; however, qualitative results in Central and South America indicated similar levels of widespread implementation of specific activities as in other regions, with some variability at the household level.

Coding note: Possible that coders treated 'Adaptation planning and early implementation' as a catch all in the absence of an 'Indeterminant 'option, thereby inflating counts for this response. Apparent autonomous adaptations are also often coded as 'Adaptation planning and early implementation'. Several responses note efforts to scale up and/or formalize adaptation strategies; in these cases, the planning stage would be separate from (and subsequent to) the early implementation stage.

What is the depth of change for reported adaptations? Q 4.4.1; 4.4.2

The depth of a response relates to the degree to which a change reflects something new, novel, and different from existing norms and practices.

Depth	Count	Percentage
Low (limited depth)	262	62
Medium	68	16
High	71	17

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
Globally, the majority of reported adaptations were characterized by low (limited) depth of change (62%). 17% were assessed as high, and 16% were assessed as medium.

In all regions, the majority of reported adaptations were described as extensions to or modifications of existing practices (business as usual), rather than systemic or structural changes. Significant barriers to structural change were identified, including entrenched power asymmetries, costs or capital requirements of adaptation, lack of coordinated planning, resistance to change among governing bodies, risk aversion, and

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lack of access to information. Reported adaptations were described as primarily short term and reactive to shocks and stressors (i.e. many being akin to coping). However, many studies indicated that low or moderate levels of change at the household level (e.g. extensions of traditional practice) may also be effective in enhancing adaptive capacity.

Several studies also noted that adaptations were not exclusively adopted in response to climate risks, but an array of pressures on (primarily) farming livelihoods which prompt households and individuals to modify their practices. Formal/planned adaptations were more frequently identified as of high depth than autonomous adaptations in most cases. These results appear consistent with the emphasis on livelihood diversification found in other sections. Rather than fundamentally altering practices, autonomous adaptations primarily occur by incremental and partial changes in order to maximize flexibility and livelihood options.

Regional results: North America, Central and South America indicate a lower proportion of studies characterized by low (limited) depth of change (47% in each region) than the global analysis. Results from Europe indicated the lowest proportion of studies reporting a high depth of change (8%). In Asia and Africa, qualitative results emphasized systemic and capacity-related barriers to higher depths of change, while results from Europe and North America indicated a higher prevalence of behavioral or attitude-related barriers.

What is the scope of change for reported adaptations? Q 4.5.1; 4.5.2

The scope of a response typically refers to the scale of change.

Scope	Count	Percentage
Low (limited scope)	296	70
Medium	44	10
High	60	14

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the global analysis, the majority of reported adaptations were characterized by low (limited scope) of change (70%). 14% were assessed as high, while 10% were assessed as medium.

Qualitative results supported the conclusion that most reported adaptations are small in the scope of change, implemented at individual, household, or community scale. Results overlapped with the reported prevalence of autonomous adaptation activities undertaken at the individual/household level. Responses to this question focused primarily on adoption of adaptation activities by specific actors. Some studies reported high rates of adoption and a broader scope of change; most reported significant variability in adoption among actors. Most also indicated limited integration across scales, and a lack of linkages between changes at the institutional scale and the community, household, or individual scale.

Regional results: Studies in Africa, Europe, and Central & South America most frequently reported a low scope of change (77%, 77%, and 76%, respectively), attributed to the autonomous and variable nature of adoption of adaptation activities. The highest proportion of studies reporting broader scale (high scope) of change were sited in North America (20%); this region indicated somewhat higher levels of integration across scales and coordinated and/or planned/formal adaptation programmes.

Coding note: In many cases, the scope of adaptation reported appeared to be based on the scale of research conducted (the unit of analysis being household/individual, village, region, etc), rather than the activity itself. Few studies indicated confidence in the broader generalizability of case study results.

What is the speed of change for reported adaptations? Q 4.6.1; 4.6.2

The speed of change refers to the dimension of time within which changes are happening.

Speed	Count	Percentage
Low (slow)	263	62
Medium	40	9
High	26	6

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

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Synthesis Statement:
The majority of reported adaptations were characterized by low (slow) speed of change (62%). 9% were assessed as medium, and 6% were assessed as medium. 23% of studies contained insufficient information to assess this variable.

Qualitative results supported the conclusion that most reported adaptations are slow and incremental (particularly in the farming sector). Many studies across all regions did not evaluate or describe the speed of change; however, several of these suggested that changes were likely incremental and reactive to specific climatic events/observed climate change impacts. Individual adaptation activities were frequently reported as occurring quickly but the overall speed of change was most frequently described as slow. Adaptation activities undertaken by private sector actors were more frequently reported as exhibiting high speed of change.

Qualitative results indicated an overlap with the depth and scale of reported responses; ad hoc, autonomous changes at the household level were frequently reported as low depth, low scale, and low speed.

Regional results: The prevalence of studies indicating low speed of change was higher in Asia (70%) than in Africa (55%). Results from Africa indicated longer time scales than the global analysis, most frequently in the 20-30 year range. Results from Central and South America suggest a high prevalence of more recent and higher speed of change (5-15 year implementation periods).

SMCCP5.3.2.1.5 Are adaptation-related responses reducing risk/vulnerability?

What is the stated (or implied/assumed) link to reduction in risk? Q 3.5.1; 3.5.2

Synthesis Statement:
In the global analysis, the most commonly reported link between adaptation-related responses and reduction in risk was improving financial security (specifically household income level and stability of income) as a result of livelihood diversification. Other commonly reported results were enhancing water and food security (the latter frequently as a function of increased income), increasing agricultural productivity, and minimizing hazard risk (most commonly to droughts, precipitation variability). Adaptation-related responses such as livestock compensation and insurance programmes were frequently reported to reduce risk of pastoralists to climate-related shocks.

Also mentioned were reductions in risk associated with ecosystem dependence, such as reducing soil erosion, mitigating land degradation, and protecting watersheds. Very few studies indicate reductions in risk associated with specific aspects of vulnerability (e.g. gender, ethnic identity, health). Some studies stated that there was no observed reduction in risk associated with adaptation-related responses. Some also indicated that maladaptation may pose additional risk, particularly when short-term responses to specific shocks prove maladaptive in the longer term.

Regional results: Studies reviewed in both Africa and Asia noted reduction in income variability as a common aspect of adaptation-related risk reduction, but results from Africa indicated more emphasis on reducing the risk of food security and alleviating poverty; results from Asia reported relatively more emphasis on water security and securing ecosystem services.

Is there any evidence (implicit or explicit) that responses are reducing risk or vulnerability? Q 5.1.1; 5.1.2

Reduced risk	Count	Percentage
Yes	290	69
No	133	31

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
Globally, 69% of the studies reviewed reported evidence (implicit or explicit) that responses were reducing risk or vulnerability, while 31% indicated no evidence to this effect.

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Qualitative results indicated significantly more uncertainty. Risk reduction was described in some studies but infrequently quantified or investigated in depth; many studies report likely, assumed, or partial reductions in risk. Several studies reported measurable reductions in farming-related risks (e.g. increased crop yields, mitigation of crop losses as a result of climate related hazards). A majority of studies, however, indicated that responses were insufficient to substantially reduce climate risk, or that there was insufficient evidence to determine if risk reduction was occurring. Most studies which evaluated formal/planned responses indicated that there was little to no reduction in risk.

Regional results: Results were largely consistent across regions. The analysis of the North American region reported the highest prevalence of studies which did not provide evidence for reduced risk. However, all regions indicated considerably more uncertainty in the qualitative results, with little empirical evidence of risk reduction demonstrated.

Do actors or institutions undertaking the response identify (implicitly or explicitly) indicators of success? Q 5.2.1; 5.2.2

Indicators	Count	Percentage
Yes	238	56
No	185	44

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the global analysis, 56% of the studies reviewed identified indicators of success, while 44% did not.

Among indicators of success identified, most commonly reported were crop yields (production), food security, and household income. Other financial indicators assessed included household savings, access to credit, and employment status. Frequently, studies reported using adoption rates or perceptions as proxy indicators for success. Multiple studies specifically evaluated responses using the Sustainable Livelihoods Framework (measuring different types of capital) as an indicator for success.

Regional results: Several studies sited in Africa reported identifying changes in gender roles and women's adoption of adaptation responses as an indicator of success; this was very infrequently mentioned in other regions. Results from Central and South America suggest a lower prevalence of studies identifying indicators for success than in other regions. Compared to other regions, ecological indicators were more commonly identified in studies sited in North America. Studies sited in the Australasian and North American regions less frequently reported the use of indicators than in other regions.

Do actors or institutions undertaking adaptation consider (implicitly or explicitly) risks or maladaptation associated with the adaptation? Q 5.3.1; 5.3.2

Maladaptation	Count	Percentage
Yes	161	38
No	262	62

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (62%), actors and institutions undertaking adaptation did not consider risks or maladaptation associated with the adaptation. Consideration maladaptation and risk was reported in 38% of studies.

The majority of studies did not report qualitative results for this variable. Among those which did, the types of maladaptation risk most commonly considered were farming changes poorly suited to local ecological and social conditions, adverse effects of land or water management on water quality and/or supply (e.g. introducing chemical inputs which result in land degradation or water contamination). Several studies indicated that adaptive responses could further entrench existing social vulnerabilities and marginalization (particularly for women). Also noted were risks associated with reactively adapting to one hazard and increasing the exposure risk to another (e.g. people migrating to flood risk areas). Some studies indicated

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that short term reactive responses (e.g. selling household assets), may have short term benefits but prove maladaptive in the long term.

Results for this variable were largely consistent across regions.

Do actors or institutions undertaking the response consider (implicitly or explicitly) co-benefits? Q5.4.1; 5.4.2

Co-benefits	Count	Percentage
Yes	146	35
No	277	65

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (65%), actors and institutions undertaking adaptation did not consider co-benefits associated with the adaptation. Consideration of co-benefits was reported in 35% of studies.

The majority of studies were not assessed qualitatively on this variable. Among those which were, the type of co-benefit most commonly considered was climate change mitigation, including carbon sequestration resulting from reforestation efforts. Other ecological co-benefits associated with adaptation reported frequently included biodiversity, soil and land quality, and water quality/supply. Social and economic co-benefits were also frequently identified, including women's empowerment, social cohesion, increased household income, and improvements in governance.

Regional results: Results from Asia indicate the most consideration of transforming gender roles as a co-benefit of adaptation. Studies sited in North America, Central and South America commonly reported co-benefits of ecosystem-based adaptation responses, particularly climate change mitigation and biodiversity. Studies sited in Africa indicated the most emphasis on household income and governance changes as co-benefits of adaptation efforts.

SMCCP5.3.2.1.6 What evidence is provided on the extent to which responses are challenging or exceeding adaptation limits?

Are constraints or limits to adaptation reported? Q 6.1; 6.2

Limits	Count	Percentage
Yes	349	83
No	74	7

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the global analysis, 83% of studies reviewed reported constraints or limits to adaptation, and 7% did not.

Globally, the most commonly reported limits to adaptation were related to economic factors (including lack of access to credit and markets, fixed livelihoods). Other limits frequently reported were associated with information, awareness, and technology (including limited availability of climate forecasts, erosion of existing skills and knowledge, and awareness of climate risk more broadly). Social and cultural limits were also frequently reported; among these, the most commonly identified constraints were related to social inequities, lack of trust and social cohesion, gender norms, and perceptions of conflict or scarcity.

The limits on governance, institutions, and policy reported most frequently included land tenure insecurity, poor integration of adaptation programmes across governing scales, and lack of decision-making power among vulnerable groups. Financial constraints identified included inadequate funding for government-implemented adaptation programmes. Physical limits commonly reported included farm size, water availability, and temperature change. Also noted – though infrequently in most regions – were human capital constraints (including labor supply, education).

The majority of studies reported more than one category of limits and constraints, and identified linkages between different types of constraints (e.g. social inequities perpetuated in the implementation of adaptation policies, lack of educational capacity limiting awareness of appropriate responses). Economic constraints

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were frequently reported as overlapping with social/cultural limits, and financial constraints were frequently linked to governance, institutions and policy.

Regional results: Studies in Africa, Asia, and Central & South America reported a greater prevalence of economic limits to adaptation compared to North America and Europe. Results from Europe reported the least consideration of constraints and limits to adaptation. Both physical constraints (in particular farm size and land availability) and biological constraints (including soil productivity, water availability) were most commonly reported in studies in Africa.

Are constraints or limits hard or soft? Q 6.3

Type of limit	Count	Percentage
Hard	23	5
Soft	208	49
Both	120	28
N/A	69	16

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the global analysis, 49% of constraints or limits were identified as soft, 5% were identified as hard, and 28% were identified as both. This variable was not applicable in 16% of studies.

There were limited qualitative responses to this question in most regions. In those which provided qualitative description, limits and constraints identified as soft were described as potentially resolvable with more information or investment, frequently related to governance, economics, and social/cultural constraints. Hard limits were more frequently described as being biophysical (related to natural capital), such as water supply and land scarcity. Some economic limits (including poverty, costs of livelihood diversification) and social/cultural limits (including gender inequality) were identified as hard in some studies and soft in others. Many studies identified both hard and soft limits to adaptation. Few studies describe only hard limits, although these were reported most frequently in the European region.

Are limits to adaptation being approached? Q 6.4.1; 6.4.2

Approaching limit?	Count	Percentage
Yes	155	37
No	159	38
N/A	103	24

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the global analysis, 37% of studies reviewed indicated that they were approaching limits to adaptation, while 38% indicated that they were not. This variable was not applicable in 24% of studies.

Coding note: The question GAMI coders were given for data entry makes it difficult to interpret these findings: "Is there evidence to indicate whether responses approach, challenge, or exceed constraints/limits?" Given this structure, it is difficult to determine whether an affirmative response means that the capacity to adapt further is being reached (first interpretation), that efforts are being undertaken to ameliorate limits (second interpretation), or that limits were already surpassed (third interpretation). Furthermore, qualitative content related to this question was relatively sparse, and did not provide a clear signal on how answers to this question should be interpreted.

SMCCP5.3.2.2 Africa

157 articles report adaptations associated with K1 terrain in Africa. However, 3 articles were multi-region studies. These multi-region articles have been removed from this synthesis report to ensure that results only reflect adaptation in the target region. Results below are based on 154 articles.

SMCCP5.3.2.2.1 Who is adapting?

What countries are adaptations reported in? Q 1.1.1

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Country	Count	Percentage
Ethiopia	46	30
Kenya	38	25
Tanzania	19	12
Uganda	14	9
South Africa	13	8
Cameroon	6	4
Zimbabwe	5	3
Malawi	4	3
Algeria	3	2
Morocco	2	1
Rwanda	2	1
Benin	1	1
Burkina Faso	1	1
Central African Republic	1	1
Democratic Republic of Congo	1	1
Lesotho	1	1
Libya	1	1
Mali	1	1
Niger	1	1
Nigeria	1	1
Senegal	1	1
Swaziland	1	1
Tunisia	1	1

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The countries with the greatest number of studies reporting adaptation actions in Africa are (in descending order): Ethiopia (46), Kenya (38), Tanzania (19), Uganda (14), and South Africa (13). Despite significant area of K1 coverage in these countries, few studies reported adaptation actions in Morocco (2), and none in Burundi (0).

Which sectors/systems are involved in reported adaptations? Q 1.2

Sectors	Count	Percentage
Terrestrial & freshwater ecosystems	21	14
Ocean & coastal ecosystems	0	0
Water and sanitation	33	21
Food, fibre, and other ecosystem products	117	76
Cities, settlements, and key infrastructure	3	2
Health, well-being, and communities	31	20
Poverty, livelihoods, and sustainable development	101	66

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The sector/system most frequently identified as involved in reported adaptation actions was food, fibre, and other ecosystem products (76% of studies), followed by poverty, livelihood, and sustainable development (66% of studies). Fewer studies reported involvement in water and sanitation (21% of studies), closely followed by health, well-being and communities (20% of studies). Few studies (2%) identified involvement in cities, settlements, and key infrastructure. These percentages are consistent with findings at the global scale.

Who is involved with reported adaptations (e.g. leading, financing, or enabling)? Q 2.1.1; 2.1.2; 2.1.3

Actors	Count	Percentage
Individuals or households	147	95
Local government	41	27
National government	37	24
Sub-national government	7	5
Civil society (sub-national or local)	36	23
Civil society (international, multinational, national)	21	14

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Private sector - small- and medium-enterprises	8	5
Private sector - corporations	11	7
International or multinational governance	13	8
Other	17	11

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Individuals or households were involved in reported adaptations in 95% of studies reviewed. Local governments were involved in 27% of reported adaptations, while national government was involved in 24% of reported adaptations. Among responses coded as "other," the most common actors were smallholder farmers or farming groups. Also mentioned frequently were pastoralists and local-scale institutions, such as women's groups and producer associations. NGOs — both local and national or international-scale — were commonly identified as an other actor, frequently acting in a supportive capacity for household-level adaptation efforts (primarily via funding and knowledge transfer activities). Household surveys were the source of data for the majority of studies in this region.

What types of implementation tools are reported? Q 3.2.1

Synthesis Statement:
Implementation of adaptation actions was found to be more autonomous than formal/planned. Most commonly reported implementation tools were adaptive farming practices (e.g. soil and water conservation, agroforestry, crop diversification, improved irrigation, or seasonal changes to planting timelines). Approximately two thirds of studies reported adaptations implemented autonomously by households or individuals. Livelihood diversification was frequently noted as an adaptation strategy, led either by households and individuals in direct response to climatic changes and/or disasters, or as part of an NGO or government adaptation programme. Livelihood changes reported included shifts to less climate-risky livelihood options (e.g. transitions away from pastoralism) and diversification of crops planted.

Also frequently mentioned were tools for mitigating financial risk (e.g. livestock insurance schemes), the application of traditional knowledge (in crop varieties, irrigation techniques, etc) and changes to local governance (e.g. formation of community-based cooperatives). Several studies reported acquisition of more land or more access to land (e.g. grazing rights) as an adaptation tool among pastoralists; other studies identify migration as an adaptation strategy.

Formal or planned implementation was less commonly reported. Capacity building and training, frequently led by NGOs, was noted in some studies. Policy mainstreaming or governmental policy interventions directed were less frequently mentioned.

Is there evidence about who financed reported adaptation actions? Q 4.2

Funding info	Count	Percentage
Yes	65	42
No	89	58

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.2.2 Evidence of equity in planning / targeting

How many articles address equity in adaptation planning? In adaptation targeting? Q 2.2.1; 2.3.1
- 88 articles (57%) included evidence that particularly vulnerable groups were included in adaptation planning
- 101 articles (66%) included evidence that particularly vulnerable groups were targeted in adaptations.

Who is addressed in the context of equity in reported adaptations? Q 2.2.1; 2.2.2; 2.2.3; 2.3.1; 2.3.2; 2.3.3

Equity planning	Count	Percentage	Equity targeting	Count	Percentage
Low-income	46	30	Low-income	61	40
Indigenous	16	10	Indigenous	10	6

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Women	35	23	Women	31	20
Elderly	4	3	Elderly	7	5
Migrants	3	2	Migrants	4	3
Youth	6	4	Youth	2	1
Disability	0	0	Disability	0	0
Ethnic minorities	7	5	Ethnic minorities	6	4
Other	16	10	Other	20	13
Equity Not Addressed	66	43	Equity Not Addressed	53	34

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Of the reviewed studies sited in Africa, 43% did not explicitly address equity planning in the context of reported adaptations; 34% did not address equity targeting. Among studies which did so, the greatest number of studies reported addressing equity for low-income individuals or populations — 30% of studies addressed equity planning and 40% addressed equity targeting for low-income groups. Women were the group next most commonly identified as a focus of equity planning (23% of studies) and equity targeting (20% of studies), followed by Indigenous Peoples (equity planning: 10% of studies and equity targeting: 6% of studies). Few studies (4%) reported focusing on equity planning for youth (equity targeting: 1%). No studies reported a focus on disability in either equity planning or targeting. There were no significant discrepancies between equity planning and equity targeting foci among studies reporting on equity in adaptation actions. The other group most frequently mentioned (in both equity planning and targeting categories) was smallholder farmers. Others mentioned also included pastoralists and socially disadvantaged groups (e.g. those living in informal settlements, widows), and rural or isolated communities. Elderly, youth, and Indigenous Peoples were mentioned occasionally.

The qualitative data also indicate an emphasis on equity for low-income households and communities, particularly equity targeting (via pro-poor policies, etc) due to their acute vulnerability to climatic shocks and stressors associated with climate change. Women in agricultural (particularly those also experiencing poverty) and women-headed households were also noted frequently as a focus of equity targeting; marital status of women was a sub-category of equity targeting. The specific vulnerabilities of women-headed households (including social marginalization, lower household income, etc) were mentioned frequently in this region. Land tenure insecurity was also identified as a source of vulnerability in several studies.

Is there reference to contributions from Indigenous Knowledge in reported adaptations? Q 1.4

IK Contribution	Count	Percentage
Yes	55	36
No	99	64

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Is there reference to contributions from local knowledge in reported adaptations? Q 1.5

LK Contribution	Count	Percentage
Yes	56	36
No	98	64

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Are costs of adaptation considered? Q 4.3

Costs	Count	Percentage
Yes – Cost of response	40	26
Yes – Cost savings from response	19	12
No	99	64

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.2.3 What responses are documented?

What category of adaptation is reported? Q 3.1.1; 3.1.2

Response type	Count	Percentage

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Technological/Infrastructural	84	55
Behavioural/Cultural	124	81
Institutional	45	29
Ecosystem-based	104	68

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, 81% reported adaptation responses that were behavioral/cultural. Ecosystem-based responses were reported in 68% of studies, while the third highest percentage of studies reported responses that were technological or infrastructural (55%). Fewer studies reported institutional responses, which is consistent with a higher proportion of autonomous adaptation efforts than formal or planned adaptation.

The qualitative analysis corroborated this finding, suggesting that systemic or institutional adaptation efforts were less frequently reported than autonomous adaptation occurring at the individual and household scale, particularly among farmers. A wide variety of agricultural adaptations were reported, including changes to crop and livestock varieties, tillage and irrigation practices, soil and water conservation and management (sometimes referred to as Climate-Smart agriculture). Changes to financial decision-making (e.g. selling livestock, saving income) were also frequently reported.

In most cases, farmers engaged in multiple types of adaptation responses simultaneously: behavioral/cultural (e.g. planting cash crops, temporary or permanent migration, saving income), ecosystem-based (e.g. watershed management, afforestation, focus on maintenance of ecosystem services), and technological/infrastructural (e.g. use of novel irrigation techniques). Specifically, studies frequently reported efforts to increase the resilience of rural livelihoods to shocks and stressors such as droughts, floods, and other natural disasters. Formal/planned implementation occasionally supported technological/infrastructural responses, but was otherwise infrequently reported in this region. Among these, changes to governance practices were reported most commonly as occurring within local governing institutions.

What hazards is the adaptation aimed at addressing? 3.3.1; 3.3.2; 3.3.3

Hazards	Count	Percentage
Extreme precipitation and inland flooding	53	34
Drought	118	77
General climate impacts	90	58
Sea level rise	0	0
Precipitation variability	96	62
Increased frequency and intensity of extreme heat	39	25
Rising ocean temperature and ocean acidification	0	0
Loss of arctic sea ice	0	0
Other	27	18

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
In this region, 77% of studies reviewed reported adaptation to address drought. The next most prevalent hazard addressed was precipitation variability (62% of studies), followed by general climate impacts (58%). Extreme heat was reported in 25% of studies reviewed.

Other hazards listed included increased prevalence of crop pests, strong winds, seasonal unpredictability of weather systems (e.g. rainfall variability), and the effects of climatic hazards exacerbated by other stressors, such as ecosystem degradation (e.g. soil erosion and declining soil productivity, deforestation and land degradation).

Hazards were frequently framed in terms of their risk to smallholder farmers' agricultural livelihoods; drought and changes to rainfall were frequently reported as hazards requiring adaptation. The qualitative

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results corroborated the quantitative finding on the prevalence of adaptation efforts targeting drought resilience. Specifically, several studies mentioned conversion of ecosystems to more arid conditions (progressive growth of aridity; desertification) as a significant climate hazard. High temperatures were frequently reported in the qualitative responses, though only 25% of studies were coded as interested in extreme temperatures.

The qualitative results indicated a concern with hazards caused not only by climate change, but also exacerbated by other forms of ecosystem degradation (e.g. deforestation) and anthropogenic pressures (e.g. population growth). Changes in water supply quality and/or quantity were also frequently reported, both in farming and non-farming contexts. Responses indicate a significant reliance on rainfall for crop irrigation in the region. An emphasis on crop pests and disease as a climate-associated hazard was also apparent in this region.

Also mentioned in several studies were efforts to adapt to increasingly unpredictable seasons and increased prevalence of unseasonable weather events. Several studies noted that while rainfall might be consistent with historical norms, changes to the seasonal distribution of precipitation had negative impacts on farmers in particular, often necessitating adaptation via shifted irrigation practices, or migration to more suitable regions.

What aspects of vulnerability is the adaptation aimed at addressing? 3.4.1; 3.4.2; 3.4.3

Exposure vulnerability	Count	Percentage
Clean water & sanitation	22	14
Sustainable cities & ecosystem services	10	6
Consumption & production	43	28
Health & wellbeing	23	15
Work and economic growth	32	21
Industry/innovation/technology	2	1
Poverty	95	62
Food security	134	87
Terrestrial & freshwater ecosystem services	20	13
Marine & coastal ecosystem services	1	1
Energy security	2	1
Education	9	6
Gender equality	17	11
Inequalities (other than gender)	6	4
Peace, justice, and strong institutions	6	4
Other	22	14

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, 87% reported on adaptations aimed at addressing food security. 62% of studies reported addressing poverty, while the third highest percentage of studies reported addressing consumption and production (28%). Gender equality was reported as a focus in 11% of studies, while clean water and sanitation was reported in 14% of studies. Terrestrial and freshwater ecosystem services were reported as targeted vulnerabilities in 13% of studies reviewed.

The Other response most frequently reported was livelihood security, followed by land security and disaster risk reduction. Several studies also mentioned a nonspecific focus on targeting social vulnerability.

Qualitative results confirmed a distinct emphasis on food security and poverty as the focal vulnerabilities targeted by adaptation efforts; these were frequently listed as overlapping dimensions of vulnerability, specifically among smallholder farmers. Several studies also aimed to address the specific vulnerability of female-headed households. With the exception of gender-specific vulnerabilities, qualitative results indicate that the majority of studies did not specifically aim to address most of the vulnerabilities identified as variables in this question. There was infrequent mention of ecosystem services as an aim of adaptation efforts.

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SMCCP5.3.2.2.4 What is the extent of adaptation-related responses?

What is the general stage of adaptation activities? 4.1; 4.1.2

Implementation stage	Count	Percentage
Vulnerability assessment and/or early planning	28	18
Adaptation planning & early implementation	54	35
Implementation expanding	31	20
Implementation widespread	22	14
Evidence of risk reduction associated with adaptation efforts	6	4

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
A majority of adaptation activities were in the adaptation planning and early implementation stage in this region (35%). 20% were identified as implementation expanding, while 18% were in the vulnerability assessment and/or early planning stage.

Qualitative results suggest that the stage of implementation is frequently unclear, particularly given the prevalence of autonomous adaptation at the household level. Result in this region confirm the primarily informal, autonomous nature of adaptation efforts. Few adaptation efforts are formal/planned, so assessment of their progress is more difficult. The studies reviewed also noted considerable diversity between households with regard to the stage of implementation, within the same cases.

Particularly within the smallholder farming sector, some specific adaptations were reported as widespread in this region, including the diversification of crop varieties, multi- or inter-cropping, and changing seasonal practices to accommodate climatic shifts. Livelihood diversification was also reported to be widespread.

Note: Several responses note efforts to scale up and/or formalize adaptation strategies; in these cases, the planning stage would be separate from (and subsequent to) the early implementation stage.

What is the depth of change for reported adaptations? Q 4.4.1; 4.4.2
The depth of a response relates to the degree to which a change reflects something new, novel, and different from existing norms and practices.

Depth	Count	Percentage
Low (limited depth)	101	66
Medium	22	14
High	27	18

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited) depth of change (66%). 18% were assessed as high, and 14% were assessed as medium.

Most reported adaptations were described as modifications of existing practices, rather than systemic or structural changes. Significant barriers to structural change (e.g. governing structures, major infrastructure) were identified, including entrenched power asymmetries (e.g. gender norms), costs or capital requirements of adaptation, low rates of literacy and access to information, resistance to change among governing bodies, risk aversion, lack of planning or shared vision. Several studies also mentioned that adaptation activities entailed trade-offs and costs, which were sometimes considerable; financial barriers were frequently mentioned as prohibitive. Reported adaptations were described as primarily short term and reactive to shocks and stressors (i.e. many being akin to coping).

However, examples of transformative change in this region were also reported: "farmers are engaged in novelty production; that is, they are generating something new: new practices, new insights, new artefacts and innovative social or institutional arrangements." Multiple studies in this region indicated that addressing vulnerabilities within climate adaptation would require transformative changes in governance, and addressing social inequities. However, several studies also noted that low or moderate levels of change at the household level may also be effective in enhancing adaptive capacity.

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Several studies also noted that these changes are not exclusively in response to climate risks, but an array of pressures on (primarily) farming livelihoods which prompt households and individuals to modify their practices. Studies which reported high levels of adaptation were primarily limited in scope (see question 4c), at the village scale. Adaptations identified as characterized by high depth of change also include major infrastructure projects (e.g. dams).

What is the scope of change for reported adaptations? Q 4.5.1; 4.5.2

The scope of a response typically refers to the scale of change.

Scope	Count	Percentage
Low (limited scope)	118	77
Medium	14	9
High	15	10

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited scope) of change (77%). 10% were assessed as high, while 9% were assessed as medium.
Qualitative results supported the conclusion that most reported adaptations are small in the scope of change, implemented at individual, household, or community scale. Responses to this question focused primarily on adoption of adaptation activities by specific actors. Some studies reported high rates of adoption and a broader scope of change; most reported significant variability in adoption among actors. In this region, variability was frequently attributed to livelihoods and specific aspects of vulnerability (e.g. gender). Frequently, the scale of change was identified as low for studies which reported adaptation occurring only within specific livelihoods (e.g. smallholder farming). The autonomous nature of adaptation efforts was frequently identified as the reason for reporting limited scope. Studies which reported on activities implemented by civil society actors or government programmes were more likely to report a higher scope of change.

Coding note: In many cases, the scope of adaptation reported appeared to be based on the scale of research conducted (the unit of analysis being household/individual, village, region, etc), rather than the activity itself.

What is the speed of change for reported adaptations? Q 4.6.1; 4.6.2

The speed of change refers to the dimension of time within which changes are happening.

Speed	Count	Percentage
Low (slow)	85	55
Medium	19	12
High	12	8

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (slow) speed of change (55%). 8% were assessed as high, while 12% were assessed as medium. 25% of studies contained insufficient information to assess this variable.

Qualitative results supported the conclusion that most reported adaptations were slow and incremental. Many studies did not evaluate or describe the speed of change, or indicated uncertainty about the speed of change. Several of these also suggested that changes were likely incremental and reactive to specific climatic events/observed climate change impacts. In this region individual adaptation activities were frequently reported as occurring quickly, but the overall speed of change was most often described as slow, occurring over two to three decades. Some studies in this region indicated that economic adaptation responses (e.g. selling assets) were implemented quickly, while adjustments to farming practices occurred slowly and incrementally.

Qualitative results indicate an overlap with the depth and scale of reported responses; ad hoc, autonomous changes at the household level were frequently reported as low depth, low scale, and low speed.

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SMCCP5.3.2.2.5 Are adaptation-related responses reducing risk/vulnerability?

What is the stated (or implied/assumed) link to reduction in risk? Q 3.5.1; 3.5.2

Synthesis Statement:
In this region, the most commonly reported links between adaptation-related responses and reduction in risk were improving financial security (specifically household income level and stability of income; poverty alleviation) through livelihood diversification and food security, through improved agricultural productivity. Other commonly reported results were enhancing water security and minimizing hazard risk (most commonly to droughts, precipitation variability). Several studies in this region noted that institutional change (e.g. formation of cooperatives, stronger local governance) supported risk reduction broadly by building decision-making capacity at local scales.
A few studies also mentioned reductions in risk associated with ecosystem dependence, such as reducing soil erosion and protecting watersheds (increasing ecosystem resilience). In several studies, adaptation-related responses were also reported to reduce the perception of risk among smallholder farmers. A few studies also mentioned reduced disease and other health risks.
A majority of studies either assumed reductions in risk or stated but did not empirically demonstrate these reductions. Very few studies indicated reductions in risk associated with specific aspects of vulnerability (e.g. gender, ethnic identity). Several studies also indicated that short-term reductions in risk may not result in long-term reductions as new shocks and stresses emerge.

Is there any evidence (implicit or explicit) that responses are reducing risk or vulnerability? Q 5.1.1; 5.1.2

Reduced risk	Count	Percentage
Yes	107	69
No	47	31

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 69% of the studies reviewed reported evidence (implicit or explicit) that responses were reducing risk or vulnerability, while 31% indicated no evidence to this effect.
Qualitative results indicated significantly more uncertainty. Risk reduction was described in some studies but infrequently quantified or investigated in depth; many studies reported likely, assumed, or partial reductions in risk. Several studies reported measurable reductions in smallholder farming-related risks (e.g. increased crop yields due to crop diversification, improved irrigation) and improved resilience of ecosystem services to shocks. Some improvements in food security were also demonstrated. A majority of studies, however, indicated that responses were insufficient to substantially reduce climate risk. Some studies suggested that reactive responses may lead to maladaptation in the longer term.

Do actors or institutions undertaking the response identify (implicitly or explicitly) indicators of success? Q 5.2.1; 5.2.2

Indicators	Count	Percentage
Yes	92	60
No	62	40

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 60% of the studies reviewed identified indicators of success, while 40% did not.
The qualitative results indicated less prevalence of studies which identified indicators of success. Among indicators identified, most commonly reported was crop yields (agricultural production), followed by food security. Also mentioned were household income, diversity of income sources, soil fertility, and the percentage of households adopting adaptation responses. Several studies reported identifying changes in gender roles and women's adoption of adaptation responses as an indicator of success. Different forms of capital (e.g. social, financial) were somewhat frequently identified as indicators of success. Financial indicators assessed included household savings, access to credit, and employment status.

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Do actors or institutions undertaking adaptation consider (implicitly or explicitly) risks or maladaptation associated with the adaptation? Q 5.3.1; 5.3.2

Maladaptation	Count	Percentage
Yes	51	33
No	104	67

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (67%), actors and institutions undertaking adaptation did not consider risks or maladaptation associated with the adaptation. Maladaptation and risk consideration were reported in 33% of studies.

The majority of studies did not report qualitative results for this variable. Among those which did, the types of maladaptation risk most commonly considered were changes to farming practices resulting in adverse social impacts ("negative consequences for the local socio-economic fabric"), and reduced migration exacerbating pastoralist vulnerability. Some studies reported that adaptive responses by one group may impoverish or marginalize another, particularly in formal/planned adaptation efforts which are inequitably implemented: "Most adaptations simply reproduce unsustainable patterns of social vulnerability rooted in unequal access to land and other resource entitlements."

Other risks noted included increased degradation of resources and ecosystem services as a result of diversification activities (e.g. non-timber forest product harvesting), increased labor burdens on women and reduced adaptive capacity of female-headed households. Some studies indicated that short term reactive responses (e.g. selling household assets), delivered short term benefits but may prove maladaptive in the long term.

Do actors or institutions undertaking the response consider (implicitly or explicitly) co-benefits? Q 5.4.1; 5.4.2

Co-benefits	Count	Percentage
Yes	59	38
No	95	62

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (62%), actors and institutions undertaking adaptation did not consider co-benefits associated with the adaptation. Consideration of co-benefits was reported in 38% of studies. The majority of studies were not assessed qualitatively on this variable. Among those which did, in this region the types of co-benefits most commonly considered were associated with livelihoods, crop yields, and poverty alleviation. Other social co-benefits identified included enhanced social cohesion, gender-role shifts (gender equality), preservation of traditional practices/cultures, and improvements in governance. Also mentioned were climate change mitigation co-benefits, such as carbon sequestration (reforestation, soil carbon), and improvements in food security as a result of farming resilience. Of the various adaptation responses reported, forestry and agroforestry projects were most frequently reported to demonstrate co-benefits.

SMCCP5.3.2.2.6 What evidence is provided on the extent to which responses are challenging or exceeding adaptation limits?

Are constraints or limits to adaptation reported? Q 6.1; 6.2

Limits	Count	Percentage
Yes	124	81
No	30	19

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 81% of studies reviewed reported constraints or limits to adaptation, and 19% did not. The most commonly reported limits to adaptation were related to economic factors (including fixed livelihoods, and lack of access to credit, markets, and agricultural inputs). Next most frequently reported

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were social and cultural limits (including women's access to capital and gender norms, risk averse behavior among farmers, trust and social cohesion, and cultural expectations for family size). Limits associated with information, awareness, and technology were the third most frequently reported (including limited access to climate forecasting, lack of technical skills to implement new technologies, erosion of traditional skills and knowledge, and awareness of climate risk more broadly).

Limits on governance, institutions, and policy were reported fourth most frequently (most commonly including limits related to land tenure security and inadequate water governance), followed by financial constraints (including lack of funding for adaptation efforts at the household scale, limited municipal funding). The physical limits reported most frequently were farm size and land availability, in addition to crop storage constraints. Biological limits reported included soil productivity, water availability, and the frequency of climate shocks (e.g. droughts). Also noted were human capital constraints (including availability of labor, education).

Are constraints or limits hard or soft? Q 6.3

Type of limit	Count	Percentage
Hard	4	3
Soft	79	51
Both	44	29
N/A	27	18

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 51% of constraints or limits were identified as soft, 3% were identified as hard, and 29% were identified as both. This variable was not applicable in 18% of studies.

There were limited qualitative responses to this question. In those which provided qualitative description, the majority of limits and constraints were identified as soft; these were described as potentially resolvable with more information or investment, primarily related to governance and economics. Hard limits were more frequently described as being biophysical (related to natural capital), such as water supply and land scarcity (frequently identified). Some economic limits (including costs of livelihood diversification, systemic poverty) and governance, institutional, and policy limits (including laws) were identified as hard in some studies and soft in others. Frequently, studies identified both hard and soft limits.

Are limits to adaptation being approached? Q 6.4.1; 6.4.2

Approaching limit?	Count	Percentage
Yes	55	36
No	58	38
N/A	40	26

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 36% of studies reviewed indicated that they were approaching limits to adaptation, while 38% indicated that they were not. This variable was not applicable in 26% of studies.

Coding note: The question GAMI coders were given for data entry makes it difficult to interpret these findings: "Is there evidence to indicate whether responses approach, challenge, or exceed constraints/limits?" Given this structure, it is difficult to determine whether an affirmative response means that the capacity to adapt further is being reached (first interpretation), that efforts are being undertaken to ameliorate limits (second interpretation), or that limits were already surpassed (third interpretation). Furthermore, qualitative content related to this question was relatively sparse, and did not provide a clear signal on how answers to this question should be interpreted.

SMCCP5.3.2.3 Asia

166 articles report adaptations associated with K1 terrain in Asia. However, 7 articles were multi-region studies. These multi-region articles have been removed from this synthesis report to ensure that results only reflect adaptation in the target region. Results below are based on 159 articles.

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SMCCP5.3.2.3.1 Who is adapting?

What countries are adaptations reported in? Q 1.1.1

Country	Count	Percentage
Nepal	52	33
China	35	22
India	35	22
Pakistan	13	8
Iran	10	6
Bhutan	7	4
Mongolia	6	4
Vietnam	5	3
Indonesia	4	3
Bangladesh	2	1
Sri Lanka	2	1
Thailand	2	1
Afghanistan	1	1
Kazakhstan	1	1
Kyrgyzstan	1	1
Laos	1	1
Lebanon	1	1
Oman	1	1
Philippines	1	1
Tajikistan	1	1
Turkey	1	1

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The countries with the greatest number of studies reporting adaptation actions in Asia are (in descending order): Nepal (52), India (35), China (35), Pakistan (13), and Iran (10). Despite significant area of K1 coverage, few studies reported adaptation actions in Russia (2), Afghanistan (1), Tajikistan (1), Turkey (1), or Japan (0).

Which sectors/systems are involved in reported adaptations? Q 1.2

Sectors	Count	Percentage
Terrestrial & freshwater ecosystems	22	14
Ocean & coastal ecosystems	0	0
Water and sanitation	38	24
Food, fibre, and other ecosystem products	137	86
Cities, settlements, and key infrastructure	4	3
Health, well-being, and communities	52	33
Poverty, livelihoods, and sustainable development	96	60

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The sector/system most frequently identified as involved in reported adaptation actions was food, fibre, and other ecosystem products (86% of studies), followed by poverty, livelihood, and sustainable development (60% of studies). Approximately half as many studies reported involvement in water and sanitation (33% of studies). Few studies identified involvement in cities, settlements, and key infrastructure (3%). These percentages are consistent with findings at the global scale.

Who is involved with reported adaptations (e.g. leading, financing, or enabling)? Q 2.1.1; 2.1.2; 2.1.3

Actors	Count	Percentage
Individuals or households	151	95
Local government	43	27
National government	39	25
Sub-national government	10	6

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Civil society (sub-national or local)	36	23
Civil society (international, multinational, national)	13	8
Private sector - small- and medium-enterprises	9	6
Private sector - corporations	4	3
International or multinational governance	7	4
Other	11	7

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Individuals or households were involved in reported adaptations in 95% of studies reviewed. Local governments were involved in 27% of reported adaptations, while national government was involved in 25% of reported adaptations. Among responses coded as "other," the most common actors were smallholder farmers or farming groups, followed by herders or pastoralists. Also mentioned frequently were community forest users and managers (and other community-based natural resource management organizations. In a few instances, NGOs were identified as acting in a supportive capacity for household-level adaptation. Household surveys were the source of data for the majority of studies in this region.

What types of implementation tools are reported? Q 3.2.1

Synthesis Statement:
Implementation of adaptation actions was found to be more autonomous than formal/planned. Most commonly reported implementation tools were adaptive farming practices (e.g. changing crop varieties, water conservation practices, seasonal changes to planting timelines,). Approximately two thirds of studies reported adaptations implemented autonomously by households or individuals. Livelihood diversification was frequently noted as an adaptation strategy, led primarily by households and individuals. Livelihood changes reported included shifts to less climate-risky livelihood options (e.g. transitions away from pastoralism), planting of cash crops, and shifts to non-farming labor.

Coordinated village and community-level planning was commonly identified as an implementation tool in this region. Also frequently mentioned were tools for mitigating financial risk (e.g. livestock insurance schemes), the application of traditional knowledge (in crop varieties, irrigation techniques, etc) and changes to local governance (including the establishment of cooperatives, changes to property rights).

Formal or planned implementation was less commonly reported overall; studies which reported governmental policy implementation frequently also reported autonomous adaptation occurring simultaneously. The most common formal implementation tool reported was financial support for adaptation efforts (e.g. compensation schemes for livestock loss or subsidies/incentives for climate adaptation actions).

Is there evidence about who financed reported adaptation actions? Q 4.2

Funding info	Count	Percentage
Yes	57	36
No	102	64

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.3.2 Evidence of equity in planning / targeting

How many articles address equity in adaptation planning? In adaptation targeting? Q 2.2.1; 2.3.1
- 84 articles (53%) included evidence that particularly vulnerable groups were included in adaptation planning
- 75 articles (47%) included evidence that particularly vulnerable groups were targeted in adaptations.

Who is addressed in the context of equity in reported adaptations? Q 2.2.1; 2.2.2; 2.2.3; 2.3.1; 2.3.2; 2.3.3

Equity planning	Count	Percentage	Equity targeting	Count	Percentage
Low-income	33	21	Low-income	40	25
Indigenous	18	11	Indigenous	16	10
Women	24	15	Women	16	10

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Elderly	9	6	Elderly	3	2
Migrants	1	1	Migrants	2	1
Youth	3	2	Youth	7	4
Disability	0	0	Disability	0	0
Ethnic minorities	15	9	Ethnic minorities	14	9
Other	26	16	Other	18	11
Equity Not Addressed	75	47	Equity Not Addressed	84	53

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Approximately half of the reviewed studies sited in Asia did not explicitly address equity planning in the context of reported adaptations. Among studies which did so, the greatest number of studies reported addressing equity for low-income individuals or populations — 21% of studies addressed equity planning and 25% addressed equity targeting for low-income groups. Women were the group next most commonly identified as a focus of equity planning (15% of studies) and equity targeting (10% of studies), closely followed by Indigenous Peoples (equity planning: 11% of studies and equity targeting: 10% of studies). Few studies (2%) reported focusing on equity planning for youth (equity targeting: 4%). No studies reported a focus on disability in either equity planning or targeting. There were no significant discrepancies between equity planning and equity targeting foci among studies reporting on equity in adaptation actions.

The other group most frequently mentioned (in both equity planning and targeting categories) was farmers. Others mentioned also included herders, members of ethnic minority groups, resource users (e.g. water users), and members of disadvantaged social groups (e.g. members of the Dalit caste in India and Nepal). Mountain communities were specifically identified in two studies. Youth and children were mentioned infrequently.

The qualitative data indicate an emphasis on equity targeting and planning for groups whose livelihoods render them vulnerable to climatic changes. These included farmers, individuals or households who experience social marginalization and/or economic vulnerability, and resource-dependent groups such as local water users and nomadic pastoralists.

Intra-household vulnerabilities were also identified in several studies (e.g. individuals engaged in resource collection were listed as requiring specific equity planning and targeting, most frequently women). Women (gender) emerged as a focus of equity planning carried out by community-based institutions and co-operatives; several studies indicated that women were not only particularly vulnerable but also bore primary responsibility for adaptation in this context.

Qualitative results also indicated that household or community remoteness was a dimension of equity planning and targeting. Quotes selected by coders suggest overlapping vulnerabilities of groups (e.g. studies which focus on intersections of gender and poverty, or rural livelihoods and poverty).

Is there reference to contributions from Indigenous Knowledge in reported adaptations? Q 1.4

IK Contribution	Count	Percentage
Yes	54	34
No	105	66

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Is there reference to contributions from local knowledge in reported adaptations? Q 1.5

LK Contribution	Count	Percentage
Yes	56	35
No	103	65

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Are costs of adaptation considered? Q 4.3

Costs	Count	Percentage
Yes – Cost of response	48	30
Yes – Cost savings from response	13	8

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No	101	64

If sub-100% total, some documents did not contain sufficient information to assess this variable.

SMCCP5.3.2.3.3 What responses are documented?

What category of adaptation is reported? Q 3.1.1; 3.1.2

Response type	Count	Percentage
Technological/Infrastructural	109	69
Behavioural/Cultural	147	92
Institutional	61	38
Ecosystem-based	90	57

Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:
Among studies reviewed in this region, 92% reported adaptation responses that were behavioral/cultural. Technological/infrastructural adaptations were reported in 69% of studies, while the third highest percentage of studies reported ecosystem-based responses (57%). Fewer studies reported institutional responses, which is consistent with a higher proportion of autonomous adaptation efforts than formal or planned adaptation.

The qualitative analysis corroborated this finding, suggesting that systemic or institutional adaptation efforts were less frequently reported than autonomous adaptation occurring at the individual and household scale, particularly among farmers. A wide variety of agricultural adaptations were reported in all categories, including changes to crop and livestock varieties, tillage and irrigation practices, soil and water conservation and management (sometimes referred to as Climate-Smart agriculture).

Among behavioral/cultural adaptations, forms of livelihood diversification were reported very commonly. Migration (including adjusted patterns and locations) and changes to financial decision-making (e.g. selling livestock, saving income) were also frequently reported. Within the category of technical/infrastructural responses, several studies reported that less capital-intensive technological changes (e.g. changing varieties of crops) were more prevalent than capital-intensive infrastructure changes. Institutional changes reported included changes to water and land management regimes. Formal/planned institutional responses were very infrequently reported.

In most cases, farmers engaged in multiple types of adaptation responses simultaneously: behavioral/cultural (e.g. planting cash crops, temporary or permanent migration, saving income), ecosystem-based (e.g. community forest management for agricultural inputs, watershed management, focus on maintenance of ecosystem services), and technological/infrastructural (e.g. use of novel irrigation techniques). Specifically, studies frequently reported efforts to increase the resilience of rural livelihoods to shocks and stressors such as droughts, floods, and other natural disasters.

What hazards is the adaptation aimed at addressing? 3.3.1; 3.3.2; 3.3.3

Hazards	Count	Percentage
Extreme precipitation and inland flooding	53	33
Drought	111	70
General climate impacts	111	70
Sea level rise	3	2
Precipitation variability	87	55
Increased frequency and intensity of extreme heat	44	28
Rising ocean temperature and ocean acidification	0	0
Loss of arctic sea ice	1	1
Other	54	34

Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:

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In this region, 70% of studies reviewed reported adaptation to address drought, and 70% reported general climate impacts. The next most prevalent hazard addressed was precipitation variability (55% of studies).

Other hazards listed included increased prevalence of pests and diseases, landslides, seasonal unpredictability of weather systems (e.g. monsoons in this region), temperature extremes (including severe cold events) glacial mass variability, and the effects of climatic hazards exacerbated by other stressors, such as ecosystem degradation (e.g. soil erosion, deforestation).

Qualitative results indicated a concern with hazards caused not only by climate change, but also exacerbated by other forms of ecosystem degradation (e.g. deforestation) and anthropogenic pressures (e.g. pollution). Hazards were frequently framed in terms of their risk to smallholder farmers' agricultural livelihoods; drought and changes to rainfall were frequently reported as hazards requiring adaptation. Changes in water supply quality and/or quantity were frequently reported, both in farming and non-farming contexts.

Also mentioned in several studies were efforts to adapt to increasingly unpredictable seasons and increased prevalence of unseasonable weather events. For example, while rainfall might be consistent with historical norms, changes to the seasonal distribution of rain events ("the increasingly erratic nature of rainfall") negatively impacted farmers in particular, often necessitating adaptation via shifted irrigation practices. Many studies suggested that mountain communities face elevated levels of risk associated with these hazards, due to livelihood vulnerability and greater severity of climate impacts. Heavy snowfall and unusually harsh winter conditions were noted as particularly affecting high altitude mountain communities.

What aspects of vulnerability is the adaptation aimed at addressing? 3.4.1; 3.4.2; 3.4.3

Exposure vulnerability	Count	Percentage
Clean water & sanitation	32	20
Sustainable cities & ecosystem services	19	12
Consumption & production	67	42
Health & wellbeing	34	21
Work and economic growth	46	29
Industry/innovation/technology	5	3
Poverty	72	45
Food security	122	77
Terrestrial & freshwater ecosystem services	20	13
Marine & coastal ecosystem services	1	1
Energy security	4	3
Education	10	6
Gender equality	11	7
Inequalities (other than gender)	10	6
Peace, justice, and strong institutions	1	1
Other	30	19

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, 77% reported on adaptations aimed at addressing food security. 45% of studies reported addressing poverty, while the third highest percentage of studies reported addressing consumption and production (42%). Gender equality was reported as a focus in 11% of studies, while clean water and sanitation was reported in 7% of studies. Terrestrial and freshwater ecosystem services were reported as targeted vulnerabilities in 13% of studies reviewed.

Other responses included socio-political conflict, displacement and land insecurity, water insecurity, traditional ways of life, and natural resources management.

Qualitative results confirmed a distinct emphasis on food security as the focal vulnerability targeted by adaptation efforts. Water insecurity was also frequently reported. While quantitative results did not indicate a significant emphasis on health and wellbeing, vulnerability to disease is frequently reported in the qualitative results. There was infrequent mention of ecosystem services as an aim of adaptation efforts. However,

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vulnerability associated with resource dependence and resource-dependent livelihoods (e.g. pastoralism) was frequently reported as a target of adaptation efforts.

SMCCP5.3.2.3.4 What is the extent of adaptation-related responses?

What is the general stage of adaptation activities? 4.1; 4.1.2

Implementation stage	Count	Percentage
Vulnerability assessment and/or early planning	24	15
Adaptation planning & early implementation	55	35
Implementation expanding	36	23
Implementation widespread	25	16
Evidence of risk reduction associated with adaptation efforts	7	4

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
A majority of adaptation activities were in the adaptation planning and early implementation stage in this region (35%). 23% were identified as implementation expanding, while 16% were widespread. 15% were in the vulnerability assessment and/or early planning stage.

Qualitative results suggested that the stage of implementation was frequently unclear, particularly given the prevalence of autonomous adaptation at the household level. The studies reviewed also noted considerable diversity between households with regard to the stage of implementation, within the same cases. A majority of studies reported that at most households had undertaken at least some adaptation efforts (particularly in farming practices), but few had implemented all potential options.

Few adaptation efforts were formal/planned, so assessment of their progress was more difficult. Among formal/planned adaptation activities reported, assessment of actual implementation was reported to be challenging and variable; the majority appeared to be incipient.

Although quantitative results suggested that few adaptation activities were widespread, qualitative results suggested that though ad-hoc, some specific farming adaptations were widespread in this region. These included the diversification of crop varieties, multi- or inter-cropping, and changing seasonal practices to accommodate climatic shifts. Livelihood diversification was also reported to be widespread, specifically shifts away from solely livestock-based livelihoods.

Note: Several responses noted efforts to scale up and/or formalize adaptation strategies; in these cases, the planning stage would be separate from (and subsequent to) the early implementation stage.

What is the depth of change for reported adaptations? Q 4.4.1; 4.4.2
The depth of a response relates to the degree to which a change reflects something new, novel, and different from existing norms and practices.

Depth	Count	Percentage
Low (limited depth)	104	65
Medium	24	15
High	25	16

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited) depth of change (65%). 16% were assessed as high, and 15% were assessed as medium.

Most reported adaptations are described as modifications of existing practices, rather than systemic or structural change. Significant barriers to structural change (e.g. governing structures, major infrastructure) were identified, including entrenched power asymmetries, costs or capital requirements of adaptation, lack of coordinated planning, resistance to change among governing bodies, risk aversion, and lack of access to information. Reported adaptations were described as primarily short term and reactive to shocks and stressors (i.e. many being akin to coping). Some adaptation activities (specifically agroforestry, forest

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management, and some farming activities) were also based on traditional practices, and thus were not typically characterized by high levels of change.

Several studies also noted that these changes are not exclusively in response to climate risks, but an array of pressures on (primarily) farming livelihoods which prompt households and individuals to modify their practices. Studies which reported high levels of adaptation were primarily limited in scope (see question 4c), at the village scale.

What is the scope of change for reported adaptations? Q 4.5.1; 4.5.2

The scope of a response typically refers to the scale of change.

Scope	Count	Percentage
Low (limited scope)	108	68
Medium	20	13
High	25	16

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited scope) of change (68%). 16% were assessed as high, while 13% were assessed as medium.

Qualitative results supported the conclusion that most reported adaptations are small in the scope of change, implemented at individual, household, or community scale. Responses to this question focused primarily on adoption of adaptation activities by specific actors. Some studies reported high rates of adoption and a broader scope of change; most reported significant variability in adoption among actors. In this region, variability was frequently attributed to specific vulnerabilities and power relations. Most studies also indicated limited integration across scales, and a lack of linkages between changes at the institutional scale and the community, household, or individual scale.

Coding note: In many cases, the scope of adaptation reported appeared to be based on the scale of research conducted (the unit of analysis being household/individual, village, region, etc), rather than the activity itself.

What is the speed of change for reported adaptations? Q 4.6.1; 4.6.2

The speed of change refers to the dimension of time within which changes are happening.

Speed	Count	Percentage
Low (slow)	112	70
Medium	11	7
High	5	3

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (slow) speed of change (70%). 7% were assessed as high, while 3% were assessed as medium. 20% of studies contained insufficient information to assess this variable.
Qualitative results supported the conclusion that most reported adaptations are slow and incremental. Many studies did not evaluate or describe the speed of change; however, several of these also suggested that changes were likely incremental and reactive to specific climatic events/observed climate change impacts. Individual adaptation activities were reported as occurring quickly but the overall speed of change was most frequently described as slow. Some studies in this region indicated changes occurring incrementally through multiple generations, with seasonal adaption activities contributing to a longer-term trend of adaptive changes.

Qualitative results indicated an overlap with the depth and scale of reported responses; ad hoc, autonomous changes at the household level were frequently reported as low depth, low scale, and low speed.

SMCCP5.3.2.3.5 Are adaptation-related responses reducing risk/vulnerability?

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What is the stated (or implied/assumed) link to reduction in risk? Q 3.5.1; 3.5.2

Synthesis Statement:
In this region, the most commonly reported link between adaptation-related responses and reduction in risk was improving financial security (specifically household income level and stability of income) as a result of livelihood diversification. Other commonly reported results were enhancing water and food security (the latter frequently as a function of increased income), increasing agricultural productivity, and minimizing hazard risk (most commonly to droughts, precipitation variability). Adaptation-related responses such as livestock compensation and insurance programmes were frequently reported to reduce risk of pastoralists to climate-related shocks.

Also mentioned were reductions in risk associated with ecosystem dependence, such as reducing soil erosion, mitigating land degradation, and ensuring future resource availability (including water, fodder, forest products — commonly from community forests). A majority of studies either assumed reductions in risk or stated but do not empirically demonstrate these reductions. Very few studies indicated reductions in risk associated with specific aspects of vulnerability (e.g. gender, ethnic identity, health). Some studies stated that there was no observed reduction in risk associated with adaptation-related responses. Several also indicated that maladaptation may pose additional risk, particularly when short-term responses to specific shocks prove maladaptive in the longer term.

Is there any evidence (implicit or explicit) that responses are reducing risk or vulnerability? Q 5.1.1; 5.1.2

Reduced risk	Count	Percentage
Yes	113	71
No	46	29

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 71% of the studies reviewed reported evidence (implicit or explicit) that responses were reducing risk or vulnerability, while 29% indicated no evidence to this effect.

Qualitative results indicate significantly more uncertainty. Risk reduction was described in some studies but infrequently quantified or investigated in depth; many studies report likely, assumed, or partial reductions in risk. Several studies reported measurable reductions in farming-related risks (e.g. increased crop yields, mitigation of crop losses as a result of climate related hazards). A majority of studies, however, indicated that responses were insufficient to substantially reduce climate risk. Most studies which evaluated formal/planned responses indicated that there was little to no reduction in risk.

Do actors or institutions undertaking the response identify (implicitly or explicitly) indicators of success? Q 5.2.1; 5.2.2

Indicators	Count	Percentage
Yes	97	61
No	62	39

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 61% of the studies reviewed identified indicators of success, while 39% did not.
The qualitative results indicated less prevalence of studies which identified indicators of success. Among indicators identified, most commonly reported was change in household income, followed by crop yields (production). Also mentioned were good governance (including institutional checks and balances), food security, improvements in livestock survival rates, irrigation water use efficiency, and the percentage of households adopting adaptation responses. Several studies also used perceptions of success as a proxy indicator; a few others identified social capital and collective action as indicators to assess adaptive capacity within communities. A few studies also reported evaluating success based on a reduction of migration behaviours, considered to indicate better livelihood security and a transition away from vulnerable pastoral livelihoods.

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Do actors or institutions undertaking adaptation consider (implicitly or explicitly) risks or maladaptation associated with the adaptation? Q 5.3.1; 5.3.2

Maladaptation	Count	Percentage
Yes	65	41
No	94	59

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (59%), actors and institutions undertaking adaptation did not consider risks or maladaptation associated with the adaptation. Maladaptation and risk consideration was reported in 41% of studies.
The majority of studies did not report qualitative results for this variable. Among those which did, the types of maladaptation risk most commonly considered were farming changes poorly suited to local ecological and social conditions (e.g. adoption of high yield varieties resulting in the loss of traditional crops), trade-offs associated with reductions in migration, and adverse effects of water management on water quality and/or supply (e.g. introducing chemical inputs which result in land degradation or water contamination).

Several studies also indicated that adaptive responses could further entrench existing social vulnerabilities and marginalization (particularly for women); similarly, increased labor burdens were identified frequently as a consequence of adaptive responses in farming contexts. Also noted were risks associated with reactively adapting to one hazard and increasing the exposure risk to another (e.g. people migrating to flood risk areas).

Do actors or institutions undertaking the response consider (implicitly or explicitly) co-benefits? Q 5.4.1; 5.4.2

Co-benefits	Count	Percentage
Yes	47	30
No	112	70

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (70%), actors and institutions undertaking adaptation did not consider co-benefits associated with the adaptation. Consideration of co-benefits was reported in 30% of studies.

The majority of studies were not assessed qualitatively on this variable. Among those which were, in this region the types of co-benefits most commonly considered were women's empowerment and gender-role transformations. Other social co-benefits identified included enhanced social cohesion, collective action, and improvements in governance. Also mentioned were climate change mitigation co-benefits, such as carbon sequestration resulting from reforestation efforts (specifically in community forests), and economic benefits (e.g. from improved crop yields).

SMCCP5.3.2.3.6 What evidence is provided on the extent to which responses are challenging or exceeding adaptation limits?

Are constraints or limits to adaptation reported? Q 6.1; 6.2

Limits	Count	Percentage
Yes	134	84
No	25	16

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 84% of studies reviewed reported constraints or limits to adaptation, and 16% did not.
The most commonly reported limits to adaptation were related to economic factors (including lack of access to credit, and inability of poor farmers to engage in adaptive responses). Next most frequently reported were limits associated with information, awareness, and technology (including limited access to knowledge about responses options, lack of technical skills to implement new technologies, and awareness of climate risk more broadly). Social and cultural limits were the third most frequently reported; among these, the most

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frequently identified constraints were related to power imbalances and the role of social-political forces which limit the effectiveness of interventions (including caste and gender).

Limits on governance, institutions, and policy were reported fourth most frequently (including poor integration of adaptation programmes across governing scales, lack of decision-making power among vulnerable groups), followed by financial (including lack of funding for adaptation efforts at the household scale). Physical and biological limits were reported infrequently, but the latter most commonly included water availability and temperature change. Also noted were human capital constraints (including labor supply, education).

Are constraints or limits hard or soft? Q 6.3

Type of limit	Count	Percentage
Hard	10	6
Soft	78	49
Both	45	28
N/A	25	16

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 49% of constraints or limits were identified as soft, 6% were identified as hard, and 28% were identified as both. This variable was not applicable in 16% of studies.
Limits and constraints identified as soft were described as potentially resolvable with more information or investment, related to governance and economics. Hard limits were more frequently described as being biophysical, such as water supply and land scarcity. Some economic limits (including poverty) and social/cultural limits (including gender inequality) were identified as hard in some studies and soft in others. Most studies identified both hard and soft limits.

Are limits to adaptation being approached? Q 6.4.1; 6.4.2

Approaching limit?	Count	Percentage
Yes	65	41
No	53	33
N/A	39	25

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 41% of studies reviewed indicated that they were approaching limits to adaptation, while 33% indicated that they were not. This variable was not applicable in 25% of studies.
Coding note: The question GAMI coders were given for data entry makes it difficult to interpret these findings: "Is there evidence to indicate whether responses approach, challenge, or exceed constraints/limits?" Given this structure, it is difficult to determine whether an affirmative response means that the capacity to adapt further is being reached (first interpretation), that efforts are being undertaken to ameliorate limits (second interpretation), or that limits were already surpassed (third interpretation). Furthermore, qualitative content related to this question was relatively sparse, and did not provide a clear signal on how answers to this question should be interpreted.

SMCCP5.3.2.4 Australasia

6 articles report adaptations associated with K1 terrain in Australasia. However, 1 article was a multi-region study. This multi-region article has been removed from this synthesis report to ensure that results only reflect adaptation in the target region. Results below are based on 5 articles.

SMCCP5.3.2.4.1 Who is adapting?

What countries are adaptations reported in? Q 1.1.1

Country	Count	Percentage
Australia	4	80
New Zealand	1	20

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Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:
The countries with the greatest number of studies reporting adaptation actions in Australasia are (in descending order): Australia (4), New Zealand (1).

Note: Due to the small sample size in this region, statistical comparisons with global scale results yield inconsistencies which may or may not be significant.

Which sectors/systems are involved in reported adaptations? Q 1.2

Sectors	Count	Percentage
Terrestrial & freshwater ecosystems	1	20
Ocean & coastal ecosystems	0	0
Water and sanitation	2	40
Food, fibre, and other ecosystem products	0	0
Cities, settlements, and key infrastructure	0	0
Health, well-being, and communities	2	40
Poverty, livelihoods, and sustainable development	1	20

Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:
The sector/systems most frequently identified as involved in reported adaptation actions were health, well-being and communities (40%) and water and sanitation (40%).

Who is involved with reported adaptations (e.g. leading, financing, or enabling)? Q 2.1.1; 2.1.2; 2.1.3

Actors	Count	Percentage
Individuals or households	2	40
Local government	2	40
National government	2	40
Sub-national government	2	40
Civil society (sub-national or local)	2	40
Civil society (international, multinational, national)	0	0
Private sector - small- and medium-enterprises	3	60
Private sector - corporations	3	60
International or multinational governance	0	0
Other	0	0

Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:
Private sector – small- and medium- enterprises, and private sector – corporations, were each identified as actors involved with reported adaptations in 60% of studies. One response was coded as other, which identified a researcher as an additional actor. The qualitative results indicates that two of the studies are concerned with private sector actors in the tourism industry. Household surveys were the source of data for the majority of studies in this region.

What types of implementation tools are reported? Q 3.2.1

Synthesis Statement:
The type of implementation tool most frequently reported in this region was autonomous adaptation by businesses, specifically changes to management and practices in the tourism industry. Diversification of tourism offerings was noted in three studies, while two reported water conservation or recycling as an implementation tool. Sustainable forestry was also mentioned. No formal or planned adaptation by government actors was mentioned.

Is there evidence about who financed reported adaptation actions? Q 4.2

Funding info	Count	Percentage

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Yes	1	20
No	4	80

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.4.2 Evidence of equity in planning / targeting

How many articles address equity in adaptation planning? In adaptation targeting? Q 2.2.1; 2.3.1

- 2 articles (40 %) included evidence that particularly vulnerable groups were included in adaptation planning
- 2 articles (40%) included evidence that particularly vulnerable groups were targeted in adaptations.

Who is addressed in the context of equity in reported adaptations? Q 2.2.1; 2.2.2; 2.2.3; 2.3.1; 2.3.2; 2.3.3

Equity planning	Count	Percentage	Equity targeting	Count	Percentage
Low-income	0	0	Low-income	0	0
Indigenous	0	0	Indigenous	0	0
Women	0	0	Women	0	0
Elderly	0	0	Elderly	0	0
Migrants	0	0	Migrants	0	0
Youth	0	0	Youth	0	0
Disability	0	0	Disability	0	0
Ethnic minorities	0	0	Ethnic minorities	0	0
Other	2	40	Other	2	40
Equity Not Addressed	3	60	Equity Not Addressed	3	60

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The majority of studies reviewed in this region did not explicitly address equity planning or targeting (60%) in the context of reported adaptations. Two studies reported addressing equity, one for irrigators and one for stakeholders associated with a National Park.

Is there reference to contributions from Indigenous Knowledge in reported adaptations? Q 1.4

IK Contribution	Count	Percentage
Yes	0	0
No	5	100

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Is there reference to contributions from local knowledge in reported adaptations? Q 1.5

LK Contribution	Count	Percentage
Yes	0	0
No	5	100

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Are costs of adaptation considered? Q 4.3

Costs	Count	Percentage
Yes – Cost of response	2	40
Yes – Cost savings from response	0	0
No	3	60

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.4.3 What responses are documented?

What category of adaptation is reported? Q 3.1.1; 3.1.2

Response type	Count	Percentage
Technological/Infrastructural	3	60
Behavioural/Cultural	4	80

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Institutional	2	40
Ecosystem-based	2	40

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, 80% reported adaptation responses that were ecosystem-based. Technological/infrastructural responses were documented in 60% of studies.

Qualitative results suggested that a majority of actors engaged in multiple types of adaptation responses simultaneously, and emphasized maximizing economic flexibility.

What hazards is the adaptation aimed at addressing? 3.3.1; 3.3.2; 3.3.3

Hazards	Count	Percentage
Extreme precipitation and inland flooding	1	20
Drought	0	0
General climate impacts	2	40
Sea level rise	0	0
Precipitation variability	2	40
Increased frequency and intensity of extreme heat	2	40
Rising ocean temperature and ocean acidification	0	0
Loss of arctic sea ice	0	0
Other	3	60

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
In this region, 60% of studies reviewed reported adaptation to address other impacts of climate change, including landslides and loss of snowpack. General climate impacts, precipitation variability, and increased frequency and intensity of extreme heat were each reported in 40% of cases. Qualitative results indicated that increased prevalence of natural disasters (e.g. storms, wildfires) and decreased ecosystem resilience were hazards targeted by adaptation efforts.

What aspects of vulnerability is the adaptation aimed at addressing? 3.4.1; 3.4.2; 3.4.3

Exposure vulnerability	Count	Percentage
Clean water & sanitation	0	0
Sustainable cities & ecosystem services	1	20
Consumption & production	0	0
Health & wellbeing	1	20
Work and economic growth	2	40
Industry/innovation/technology	2	40
Poverty	0	0
Food security	1	20
Terrestrial & freshwater ecosystem services	2	40
Marine & coastal ecosystem services	0	0
Energy security	0	0
Education	0	0
Gender equality	0	0
Inequalities (other than gender)	0	0
Peace, justice, and strong institutions	0	0
Other	0	0

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, adaptations aimed at addressing terrestrial and freshwater ecosystem services, work and economic growth, industry/innovation/technology were each reported in 40% of cases. No other responses were recorded. Qualitative results described adaptations aimed at addressing the

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vulnerability of the ski industry to changes in snowpack, and the vulnerability of forest-based ecosystem services.

SMCCP5.3.2.4.4 What is the extent of adaptation-related responses?

What is the general stage of adaptation activities? 4.1; 4.1.2

Implementation stage	Count	Percentage
Vulnerability assessment and/or early planning	0	0
Adaptation planning & early implementation	2	40
Implementation expanding	1	20
Implementation widespread	2	40
Evidence of risk reduction associated with adaptation efforts	0	0

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 40% of adaptation activities were in the adaptation planning and early implementation stage, and 40% were considered widespread. 20% were considered in the expanding stage of implementation.

Qualitative results indicated more widespread implementation than the quantitative results suggest. All of the studies reviewed in this region reported well-established adaptation activities (in the forestry and ski industry sectors) occurring in the case study regions.

What is the depth of change for reported adaptations? Q 4.4.1; 4.4.2
The depth of a response relates to the degree to which a change reflects something new, novel, and different from existing norms and practices.

Depth	Count	Percentage
Low (limited depth)	4	80
Medium	1	20
High	0	0

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited) depth of change (80%). 20% were assessed as medium, and none were assessed as high.

Most reported adaptations were described as very minor modifications of existing practices or institutions in order to mitigate immediate economic risk. These adaptations were primarily described as reactive, not novel.

What is the scope of change for reported adaptations? Q 4.5.1; 4.5.2
The scope of a response typically refers to the scale of change.

Scope	Count	Percentage
Low (limited scope)	2	40
Medium	1	20
High	1	20

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited scope) of change (40%). 20% were assessed as high, and 20% were assessed as medium.
Qualitative results supported the conclusion that most reported adaptations are small in the scope of change (e.g. autonomous adaptations by specific economic sectors, namely tourism and forestry). A majority of studies reported on low (limited scope) changes, implemented via local initiatives.
Coding note: In many cases, the scope of adaptation reported appeared to be based on the scale of research conducted (the unit of analysis being household/individual, village, region, etc), rather than the activity itself.

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What is the speed of change for reported adaptations? Q 4.6.1; 4.6.2

The speed of change refers to the dimension of time within which changes are happening.

Speed	Count	Percentage
Low (slow)	2	40
Medium	1	20
High	1	20

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (slow) speed of change (40%). 20% were assessed as high, and 20% were assessed as medium.
Qualitative results indicated that all studies were described as incremental, but two were categorized as slow while one was categorized as fast (a private sector adaptation in the tourism industry), and one as medium. Several studies described uncertainty about this variable.

SMCCP5.3.2.4.5 Are adaptation-related responses reducing risk/vulnerability?

What is the stated (or implied/assumed) link to reduction in risk? Q 3.5.1; 3.5.2

Synthesis Statement:
In this region, the most commonly reported link between adaptation-related responses and reduction in risk was minimizing hazard/disaster risk (in addition to financial risks associated with climate-related hazards); several studies specifically noted reductions in risks of fire danger.

Is there any evidence (implicit or explicit) that responses are reducing risk or vulnerability? Q 5.1.1; 5.1.2

Reduced risk	Count	Percentage
Yes	3	60
No	2	40

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 60% of the studies reviewed reported evidence (implicit or explicit) that responses were reducing risk or vulnerability, while 40% indicated no evidence to this effect. One study noted reduction in economic risk associated with adaptation responses in the tourism sector. The majority of studies did not report sufficient qualitative results to assess this variable.

Do actors or institutions undertaking the response identify (implicitly or explicitly) indicators of success? Q 5.2.1; 5.2.2

Indicators	Count	Percentage
Yes	1	20
No	4	80

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 20% of the studies reviewed identified indicators of success, while 80% did not. Only one study in this region reported qualitative results; it noted that perceptions and environmental values were linked to evaluating success in adaptive water conservation.

Do actors or institutions undertaking adaptation consider (implicitly or explicitly) risks or maladaptation associated with the adaptation? Q 5.3.1; 5.3.2

Maladaptation s	Count	Percentage
Yes	1	20
No	4	80

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:

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In the majority of studies reviewed (80%), actors and institutions undertaking adaptation did not consider risks or maladaptation associated with the adaptation. Only one study (20%) in this region reported qualitative results; it noted that short term coping strategies (in this case, making snow for the skiing industry) risked be untenable and a poor investment in the longer term.

Do actors or institutions undertaking the response consider (implicitly or explicitly) co-benefits? Q5.4.1; 5.4.2

Co-benefits	Count	Percentage
Yes	1	20
No	4	80

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (80%), actors and institutions undertaking adaptation did not consider co-benefits associated with the adaptation. Consideration of co-benefits was reported in 20% of studies. Only one study (20%) in this region reported qualitative results; it identified new business opportunities as a potential co-benefit.

SMCCP5.3.2.4.6 What evidence is provided on the extent to which responses are challenging or exceeding adaptation limits?

Are constraints or limits to adaptation reported? Q 6.1; 6.2

Limits	Count	Percentage
Yes	4	80
No	1	20

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 80% of studies reviewed reported constraints or limits to adaptation, and 20% did not. The most commonly reported limits to adaptation were biological (including temperature and ecological health). Also reported were constraints related to technology, economics, and finance.

Are constraints or limits hard or soft? Q 6.3

Type of limit	Count	Percentage
Hard	0	0
Soft	1	20
Both	3	60
N/A	1	20

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 20% of constraints or limits were identified as soft, none were identified as hard, and 60% were identified as both. This variable was not applicable in 20% of studies. There were no qualitative results reported in this region.

Are limits to adaptation being approached? Q 6.4.1; 6.4.2

Approaching limit?	Count	Percentage
Yes	65	41
No	53	33
N/A	39	25

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 40% of studies reviewed indicated that they were approaching limits to adaptation. This variable was not applicable in 60% of studies.

Coding note: The question GAMI coders were given for data entry makes it difficult to interpret these findings: “Is there evidence to indicate whether responses approach, challenge, or exceed constraints/limits?”

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Given this structure, it is difficult to determine whether an affirmative response means that the capacity to adapt further is being reached (first interpretation), that efforts are being undertaken to ameliorate limits (second interpretation), or that limits were already surpassed (third interpretation). Furthermore, qualitative content related to this question was relatively sparse, and did not provide a clear signal on how answers to this question should be interpreted.

SMCCP5.3.2.5 Central and South America

46 articles report adaptations associated with K1 terrain in Central and South America. However, 8 articles were multi-region studies. These multi-region articles have been removed from this synthesis report to ensure that results only reflect adaptation in the target region. Results below are based on 38 articles.

SMCCP5.3.2.5.1 Who is adapting?

What countries are adaptations reported in? Q 1.1.1

Country	Count	Percentage
Peru	9	24
Colombia	7	18
Guatemala	7	18
Bolivia	5	13
Brazil	4	11
Ecuador	3	8
Honduras	3	8
Nicaragua	2	5
Chile	1	3
Costa Rica	1	3
El Salvador	1	3

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The countries with the greatest number of studies reporting adaptation actions in Central and South America are (in descending order): Peru (9), Colombia (7), Guatemala (7), Bolivia (5), and Brazil (4). One study reported adaptation in Chile, while no studies reported adaptation in Argentina.

Which sectors/systems are involved in reported adaptations? Q 1.2

Sectors	Count	Percentage
Terrestrial & freshwater ecosystems	5	13
Ocean & coastal ecosystems	0	0
Water and sanitation	9	24
Food, fibre, and other ecosystem products	32	84
Cities, settlements, and key infrastructure	3	8
Health, well-being, and communities	4	11
Poverty, livelihoods, and sustainable development	16	42

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The sector/system most frequently identified as involved in reported adaptation actions was food, fibre, and other ecosystem products (84% of studies), followed by poverty, livelihood, and sustainable development (42% of studies). Water and sanitation was reported in 24% of studies. Few studies identified involvement in cities, settlements, and key infrastructure (8%). These percentages are consistent with findings at the global scale.

Who is involved with reported adaptations (e.g. leading, financing, or enabling)? Q 2.1.1; 2.1.2; 2.1.3

Actors	Count	Percentage
Individuals or households	35	92
Local government	11	29
National government	8	21

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Sub-national government	5	13
Civil society (sub-national or local)	20	53
Civil society (international, multinational, national)	7	18
Private sector - small- and medium-enterprises	4	11
Private sector - corporations	0	0
International or multinational governance	3	8
Other	6	16

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Individuals or households were involved in reported adaptations in 92% of studies reviewed. Civil society actors at the sub-national or local scale were involved in 53% of reported adaptations, followed by local government actors (29%). Others mentioned included farmers, policymakers, academic institutions, and local organizations (e.g. farmers' associations, water user associations and coffee cooperatives). Qualitative results also indicated that local scale civil society actors were frequently involved with reported adaptations.

What types of implementation tools are reported? Q 3.2.1

Synthesis Statement:
The most common implementation tools reported were agroforestry and changes to farming practices (e.g. adoption of novel irrigation techniques, crop variety diversification). Ecosystem-based adaptation was also frequently reported, including reforestation and restoration projects, watershed protection, and "changes in ecosystem structures to enhance resilience." Approximately half of the implementation tools were identified as autonomous, rather than formal/planned implementation. Autonomous implementation was reported as primarily driven by farmers and farming communities. The most frequently reported formal/planned implementation tool was fiscal incentives for adaptation, followed by education and awareness programs. One study also reported relocation of vulnerable communities to reduce disaster risk.

Is there evidence about who financed reported adaptation actions? Q 4.2

Funding info	Count	Percentage
Yes	19	50
No	19	50

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.5.2 Evidence of equity in planning / targeting

How many articles address equity in adaptation planning? In adaptation targeting? Q 2.2.1; 2.3.1
- 19 articles (50%) included evidence that particularly vulnerable groups were included in adaptation planning
- 19 articles (50%) included evidence that particularly vulnerable groups were targeted in adaptations.

Who is addressed in the context of equity in reported adaptations? Q 2.2.1; 2.2.2; 2.2.3; 2.3.1; 2.3.2; 2.3.3

Equity planning	Count	Percentage	Equity targeting	Count	Percentage
Low-income	11	29	Low-income	10	26
Indigenous	10	26	Indigenous	8	21
Women	2	5	Women	1	3
Elderly	0	0	Elderly	0	0
Migrants	0	0	Migrants	0	0
Youth	0	0	Youth	1	3
Disability	0	0	Disability	0	0
Ethnic minorities	1	3	Ethnic minorities	1	3
Other	5	13	Other	4	11
Equity Not Addressed	19	50	Equity Not Addressed	19	50

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

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Synthesis Statement:
Half of the studies reviewed sited in Central and South America did not explicitly address equity planning in the context of reported adaptations. Among studies which did so, the greatest number of studies reported addressing equity for low-income individuals or populations — 29% of studies addressed equity planning and 26% addressed equity targeting for low-income groups. Indigenous Peoples were the group next most commonly identified as a focus of equity planning (26% of studies) and equity targeting (21% of studies). Few studies (2%) reported focusing on equity planning (5%) or equity targeting (3%) for women, particularly compared with the global results. There were no significant discrepancies between equity planning and equity targeting foci among studies reporting on equity in adaptation actions.

Others mentioned (both equity planning and targeting) included smallholder farmers, peasant communities, and rural populations. The qualitative results for this region indicated that equity planning processes were largely participatory, with targeted groups (particularly Indigenous Peoples) taking an active role. Qualitative results also confirmed the quantitative finding that there was a significant focus on Indigenous Peoples at large; particularly Indigenous smallholder farmers. Urban poverty was also targeted in several studies.

Is there reference to contributions from Indigenous Knowledge in reported adaptations? Q 1.4

IK Contribution	Count	Percentage
Yes	16	42
No	22	58

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Is there reference to contributions from local knowledge in reported adaptations? Q 1.5

LK Contribution	Count	Percentage
Yes	17	45
No	21	55

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Are costs of adaptation considered? Q 4.3

Costs	Count	Percentage
Yes – Cost of response	11	29
Yes – Cost savings from response	4	11
No	22	58

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.5.3 What responses are documented?

What category of adaptation is reported? Q 3.1.1; 3.1.2

Response type	Count	Percentage
Technological/Infrastructural	21	55
Behavioural/Cultural	30	79
Institutional	13	34
Ecosystem-based	33	87

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, 87% reported adaptation responses that were ecosystem-based. Behavioural/cultural adaptations were reported in 79% of studies, while the third highest percentage of studies reported responses that were behavioural/cultural (55%). Fewer studies reported institutional responses, which is consistent with a higher proportion of autonomous adaptation efforts than formal or planned adaptation.

The qualitative analysis corroborated this finding, suggesting that systemic or institutional adaptation efforts are less frequently reported than autonomous adaptation occurring at the individual, household, and community scale, particularly among farmers and rural communities. A wide variety of agricultural

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adaptations were reported in all categories, including changes to crop and livestock varieties, tillage and irrigation practices, soil and water conservation and management.

Results from this region indicated more implementation of ecosystem-based responses (e.g. watershed management, reforestation) than the global analysis. The adoption of agroforestry was the most commonly reported, which included both behavioural/cultural changes and technological/infrastructural changes. diversification and changes to financial decision-making were also frequently reported. Several studies also reported land purchasing as a risk mitigation strategy. Formal/planned institutional responses were infrequently reported.

What hazards is the adaptation aimed at addressing? 3.3.1; 3.3.2; 3.3.3

Hazards	Count	Percentage
Extreme precipitation and inland flooding	15	39
Drought	25	66
General climate impacts	22	58
Sea level rise	0	0
Precipitation variability	25	66
Increased frequency and intensity of extreme heat	13	34
Rising ocean temperature and ocean acidification	0	0
Loss of arctic sea ice	0	0
Other	25	66

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
In this region, 66% of studies reviewed reported adaptation to address drought, and 66% reported adaptation to address precipitation variability. The next most prevalent hazard addressed was general climate impacts (58% of studies). Extreme heat was reported in 34% of studies reviewed.

The other hazard listed most frequently was increased prevalence of pests and diseases. Other hazards noted were seasonal unpredictability of weather systems (e.g. rainfall variability), changes to glacial extent, landslides, and the effects of climatic hazards exacerbated by other stressors, such as ecosystem degradation (e.g. soil erosion and declining soil productivity, deforestation and land degradation).

Hazards were frequently framed in terms of their risk to smallholder farmers' agricultural livelihoods; drought and changes to rainfall were frequently reported as hazards requiring adaptation. The qualitative results indicated a concern with hazards caused not only by climate change, but also exacerbated by other forms of ecosystem degradation (e.g. deforestation) and anthropogenic pressures (e.g. population growth, land-use changes). Changes in water supply quality and/or quantity were also frequently reported, both in farming and non-farming contexts; this hazard was attributed in several studies to both climate change and other factors, such as land-use changes and poor water management. An emphasis on crop pests and disease as a climate-associated hazard was also apparent in this region.

What aspects of vulnerability is the adaptation aimed at addressing? 3.4.1; 3.4.2; 3.4.3

Exposure vulnerability	Count	Percentage
Clean water & sanitation	6	16
Sustainable cities & ecosystem services	4	11
Consumption & production	19	50
Health & wellbeing	6	16
Work and economic growth	12	32
Industry/innovation/technology	1	3
Poverty	15	39
Food security	29	76
Terrestrial & freshwater ecosystem services	12	32
Marine & coastal ecosystem services	0	0
Energy security	2	5
Education	0	0
Gender equality	1	3

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Inequalities (other than gender)	3	8
Peace, justice, and strong institutions	3	8
Other	9	24

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, 76% reported on adaptations aimed at addressing food security. 50% of studies reported addressing consumption and production, while the third highest percentage of studies reported addressing poverty (39%). Gender equality was reported as a focus in 3% of studies, while clean water and sanitation was reported in 16% of studies. Terrestrial and freshwater ecosystem services were reported as targeted vulnerabilities in 32% of studies reviewed.

Other responses included biodiversity loss (loss of native species), seasonal hunger, farming livelihoods, and governance systems.

Qualitative results confirmed a distinct emphasis on food security as the focal vulnerability targeted by adaptation efforts. The vulnerability of ecosystem services (terrestrial and freshwater), most frequently biodiversity and water supply/water quality, was frequently noted in qualitative results. Several studies identified a focus on overlapping vulnerabilities associated with food security and health and wellbeing. Traditional livelihoods and practices – in addition to being identified as adaptation strategies — were mentioned as aspects of vulnerability addressed by adaptation efforts in several cases.

SMCCP5.3.2.5.4 What is the extent of adaptation-related responses?

What is the general stage of adaptation activities? 4.1; 4.1.2

Implementation stage	Count	Percentage
Vulnerability assessment and/or early planning	4	11
Adaptation planning & early implementation	17	45
Implementation expanding	12	32
Implementation widespread	0	0
Evidence of risk reduction associated with adaptation efforts	3	8

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
A majority of adaptation activities were in the adaptation planning and early implementation stage in this region (45%). 32% were identified as implementation expanding, while 11% were in the vulnerability assessment and/or early planning stage. None were identified as widespread.

Qualitative results suggested that the stage of implementation is frequently unclear, particularly given the prevalence of autonomous adaptation at the household level. Several studies noted the difficulty of assessing progress towards implementation of activities undertaken ad hoc at the household level.

The studies reviewed also noted considerable diversity between households with regard to the stage of implementation, within the same cases and regions. What is the threshold for "widespread" here? The qualitative responses seemed inconsistent in this case with the statistics above. Adaptation activities which involved novel technologies or practices reported less progress towards implementation than those based on traditional practices.

What is the depth of change for reported adaptations? Q 4.4.1; 4.4.2
The depth of a response relates to the degree to which a change reflects something new, novel, and different from existing norms and practices.

Depth	Count	Percentage
Low (limited depth)	18	47
Medium	9	24
High	8	21

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

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Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited) depth of change (47%). 21% were assessed as high, and 24% were assessed as medium.

Most reported adaptations were described as modifications of existing practices, rather than systemic or structural change. Significant barriers to structural change were identified, including costs or capital requirements of adaptation, lack of coordinated planning, resistance to change among governing bodies, and household risk aversion. Reported adaptations were described as primarily short term (small, incremental, reversible) and reactive to shocks and stressors (i.e. many being akin to coping); these reflected "no real difference in the underlying values, assumptions, and norms."

Some adaptation activities (in this region most commonly agroforestry, in addition to forest management and some farming activities) were reported as based on traditional practices with inherent adaptive capacity, and coders indicated that adaptation may be effective at low or medium levels of change. Several studies reported high depth of change in one aspect (e.g. crop diversification) with low (limited) institutional or political change associated. Examples of activities characterized by high depth of change included the establishment of protected areas and new community-based governing bodies (e.g. cooperatives).

What is the scope of change for reported adaptations? Q 4.5.1; 4.5.2
The scope of a response typically refers to the scale of change.

Scope	Count	Percentage
Low (limited scope)	29	76
Medium	4	11
High	4	11

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited scope) of change (76%). 11% were assessed as high, while 11% were assessed as medium.

Qualitative results supported the conclusion that most reported adaptations are small in the scope of change, implemented at individual, household, or community scale. Responses to this question focused primarily on adoption of adaptation activities by specific actors. Some studies reported high rates of adoption and a broader scope of change, particularly in broader ecosystem-based adaptation efforts (e.g. watershed conservation projects) which were integrated with larger governing bodies or initiatives. Most studies reported significant variability in adoption among actors. In this region, variability was frequently attributed to livelihood differences, with resource-dependent smallholders adapting most commonly.

Coding note: In many cases, the scope of adaptation reported appeared to be based on the scale of research conducted (the unit of analysis being household/individual, village, region, etc), rather than the activity itself.

What is the speed of change for reported adaptations? Q 4.6.1; 4.6.2
The speed of change refers to the dimension of time within which changes are happening.

Speed	Count	Percentage
Low (slow)	22	58
Medium	5	13
High	3	8

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (slow) speed of change (58%). 13% were assessed as medium, while 8% were assessed as high. 8% of studies contained insufficient information to assess this variable.

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Qualitative results supported the conclusion that most reported adaptations are slow and incremental. Many studies did not evaluate or describe the speed of change, or indicated uncertainty about the speed of change. Several of these also suggested that changes were likely incremental and reactive to specific climatic events/observed climate change impacts. In this region individual adaptation activities were frequently reported as occurring quickly, but the overall speed of change was most often described as medium-slow, occurring over 5-15 year time scales. Adaptation activities described as changing more quickly frequently involved planning and institutional support (e.g. establishment of protected areas).

Qualitative results indicated an overlap with the depth and scale of reported responses; ad hoc, autonomous changes at the household level were frequently reported as low depth, low scale, and low speed.

SMCCP5.3.2.5.5 Are adaptation-related responses reducing risk/vulnerability?

What is the stated (or implied/assumed) link to reduction in risk? Q 3.5.1; 3.5.2

Synthesis Statement:
In this region, the most commonly reported links between adaptation-related responses and reduction in risk were enhancing ecosystem resilience (reducing soil erosion, improving forest condition, watershed protection) and reducing crop losses (and as a result reducing risk due to food insecurity), through improved agricultural productivity and crop diversification. Other commonly reported links were enhancing water security, improving household incomes (mitigating financial risk), and minimizing hazard risk (most commonly to droughts, precipitation variability, landslides). Several studies also noted a reduction in risk associated with disease, both for humans and livestock.

A majority of studies either assumed or stated reductions in risk but did not empirically demonstrate these reductions. Very few studies indicated reductions in risk associated with specific aspects of vulnerability (e.g. gender, ethnic identity).

Is there any evidence (implicit or explicit) that responses are reducing risk or vulnerability? Q 5.1.1; 5.1.2

Reduced risk	Count	Percentage
Yes	25	66
No	13	34

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 66% of the studies reviewed reported evidence (implicit or explicit) that responses were reducing risk or vulnerability, while 34% indicated no evidence to this effect.

Qualitative results indicated significantly more uncertainty. Risk reduction was described in some studies but infrequently quantified or investigated in depth; many studies report likely, assumed, potential, or partial reductions in risk. Several studies reported improved resilience of ecosystem services to shocks, as a result of agroforestry responses, and others reported general reductions in risk associated with climate-related hazards. Some corresponding improvements in food security were also demonstrated. A majority of studies identified as reducing risk were more broadly focused on resilience, rather than specific aspects of risk reduction.

Do actors or institutions undertaking the response identify (implicitly or explicitly) indicators of success? Q 5.2.1; 5.2.2

Indicators	Count	Percentage
Yes	20	53
No	18	47

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 53% of the studies reviewed identified indicators of success, while 47% did not.

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The qualitative results indicated less prevalence of studies which identified indicators of success. Among indicators identified, most commonly reported were measures of economic security at the household level (e.g. income, access to credit). Also mentioned were crop yields (and agricultural productivity more broadly), use of traditional knowledge systems (including native seed varieties, application of traditional practices), overall soil health, and the use of agricultural inputs.

Do actors or institutions undertaking adaptation consider (implicitly or explicitly) risks or maladaptation associated with the adaptation? Q 5.3.1; 5.3.2

Maladaptation	Count	Percentage
Yes	17	45
No	21	55

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (55%), actors and institutions undertaking adaptation did not consider risks or maladaptation associated with the adaptation. Maladaptation and risk consideration was reported in 45% of studies.

No qualitative results on this variable were reported for approximately half of the studies. Among those which did, the types of maladaptation risk most commonly considered were farming changes poorly suited to local ecological and social conditions (e.g. adoption of high yield varieties resulting in the loss of traditional crops), and adverse effects of farming inputs on water and soil quality condition (e.g. introducing chemical inputs which result in land degradation or water contamination).

Do actors or institutions undertaking the response consider (implicitly or explicitly) co-benefits? Q5.4.1; 5.4.2

Co-benefits	Count	Percentage
Yes	15	39
No	23	61

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (61%), actors and institutions undertaking adaptation did not consider co-benefits associated with the adaptation. Consideration of co-benefits was reported in 39% of studies.
In this region the types of co-benefits most commonly considered were mitigative, specifically carbon sequestration as a result of ecosystem-based adaptation responses, including agroforestry and reforestation/afforestation efforts. Biodiversity protection was also frequently reported as a co-benefit of these adaptation activities. Others mentioned include improvements in food security, water quality and supply, household income, and good governance. Of the various adaptation responses reported, forestry and agroforestry projects were most frequently reported to demonstrate co-benefits.

SMCCP5.3.2.5.6 What evidence is provided on the extent to which responses are challenging or exceeding adaptation limits?

Are constraints or limits to adaptation reported? Q 6.1; 6.2

Limits	Count	Percentage
Yes	33	87
No	5	13

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 87% of studies reviewed reported constraints or limits to adaptation, and 13% did not.

The most commonly reported limits to adaptation were related to governance, institutions, and policy (including most frequently land tenure insecurity, followed by law enforcement, lack of regulations, and lack of integration of policies across scales). Next most frequently reported were social and cultural limits (including perceptions of conflict over land and resources, erosion of traditional knowledge, and inequality – – this was identified as a cross-cutting issue in several studies). Financial limits were the third most

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frequently reported (including limited funding for government-run adaptation programmes), followed by economic factors (including lack of access to markets and fixed livelihoods).

The physical limits reported most frequently were farm size and land availability, in addition to the topography and climate of particular plots of land. Biological limits reported included soil productivity, water availability, and the temperature. Also noted were human capital constraints (including health).

Are constraints or limits hard or soft? Q 6.3

Type of limit	Count	Percentage
Hard	3	8
Soft	19	50
Both	10	26
N/A	5	13

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 50% of constraints or limits were identified as soft, 8% were identified as hard, and 26% were identified as both. This variable was not applicable in 13% of studies.

The majority of limits and constraints were identified as soft; these were described as potentially resolvable with efforts to address perceptions and awareness, primarily related to social/cultural constraints. Hard limits were more frequently described as being biophysical (related to natural capital), such as water availability and topography. Some economic and financial constraints (including costs of infrastructure development, funding for programmes) and governance, institutional, and policy limits (including laws) were identified as hard in some studies and soft in others. Frequently, studies identified both hard and soft limits.

Are limits to adaptation being approached? Q 6.4.1; 6.4.2

Approaching limit?	Count	Percentage
Yes	11	29
No	19	50
N/A	7	18

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 29% of studies reviewed indicated that they were approaching limits to adaptation, while 50% indicated that they were not. This variable was not applicable in 18% of studies.

Coding note: The question GAMI coders were given for data entry makes it difficult to interpret these findings: "Is there evidence to indicate whether responses approach, challenge, or exceed constraints/limits?" Given this structure, it is difficult to determine whether an affirmative response means that the capacity to adapt further is being reached (first interpretation), that efforts are being undertaken to ameliorate limits (second interpretation), or that limits were already surpassed (third interpretation). Furthermore, qualitative content related to this question was relatively sparse, and did not provide a clear signal on how answers to this question should be interpreted.

SMCCP5.3.2.6 Europe

27 articles report adaptations associated with K1 terrain in Europe. However, 14 articles were multi-region studies. These multi-region articles have been removed from this synthesis report to ensure that results only reflect adaptation in the target region. Results below are based on 13 articles.

SMCCP5.3.2.6.1 Who is adapting?

What countries are adaptations reported in? Q 1.1.1

Country	Count	Percentage
Norway	5	38
Austria	3	23
Switzerland	2	15

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Mediterranean (region)	1	8
Russia	1	8
Spain	1	8
Sweden	1	8

*Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:
The countries with the greatest number of studies reporting adaptation actions in Europe are (in descending order): Norway (5), Austria (3), Switzerland (2), Russia (1) and Spain (1). One study also reported adaptations in the Mediterranean region.

Which sectors/systems are involved in reported adaptations? Q 1.2

Sectors	Count	Percentage
Terrestrial & freshwater ecosystems	4	31
Ocean & coastal ecosystems	0	0
Water and sanitation	6	46
Food, fibre, and other ecosystem products	7	54
Cities, settlements, and key infrastructure	1	8
Health, well-being, and communities	5	38
Poverty, livelihoods, and sustainable development	0	0

*Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:
The sector/system most frequently identified as involved in reported adaptation actions was food, fibre, and other ecosystem products (54% of studies), followed by water and sanitation (46% of studies), and health, well-being and communities (38% of studies). Few studies identified involvement in cities, settlements, and key infrastructure (8%). Poverty, livelihoods, and sustainable development is not reported as involved in any studies in Europe, which is inconsistent with global results (which report 55% of studies involved).

Who is involved with reported adaptations (e.g. leading, financing, or enabling)? Q 2.1.1; 2.1.2; 2.1.3

Actors	Count	Percentage
Individuals or households	9	69
Local government	4	31
National government	4	31
Sub-national government	3	23
Civil society (sub-national or local)	7	54
Civil society (international, multinational, national)	2	15
Private sector - small- and medium-enterprises	5	38
Private sector - corporations	1	8
International or multinational governance	2	15
Other	5	38

*Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:
Individuals or households were involved in reported adaptations in 69% of studies reviewed. Civil society actors at the sub-national or local scale were involved in 54% of reported adaptations, followed by private sector – small- and medium-enterprises (38%). Other actors reported were forest managers and decision makers, researchers or scientists, and herding communities.

What types of implementation tools are reported? Q 3.2.1

Synthesis Statement:
Implementation of adaptation actions was more frequently reported to be autonomous (primarily by businesses and communities) than formal/planned, though autonomous adaptation efforts were frequently paired with or supported by policy tools in this region. Implementation tools identified included adjustment of farming techniques, informal social support schemes, the development of compensation schemes, and risk

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management. Policy tools identified included expansion of protected area networks, and increased disaster response capacity.

Is there evidence about who financed reported adaptation actions? Q 4.2

Funding info	Count	Percentage
Yes	3	23
No	10	77

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.6.2 Evidence of equity in planning / targeting

How many articles address equity in adaptation planning? In adaptation targeting? Q 2.2.1; 2.3.1
- 5 articles (38%) included evidence that particularly vulnerable groups were included in adaptation planning
- 4 articles (31%) included evidence that particularly vulnerable groups were targeted in adaptations.

Who is addressed in the context of equity in reported adaptations? Q 2.2.1; 2.2.2; 2.2.3; 2.3.1; 2.3.2; 2.3.3

Equity planning	Count	Percentage	Equity targeting	Count	Percentage
Low-income	0	0	Low-income	0	0
Indigenous	2	15	Indigenous	2	15
Women	1	8	Women	1	8
Elderly	1	8	Elderly	1	8
Migrants	1	8	Migrants	0	0
Youth	1	8	Youth	1	8
Disability	0	0	Disability	0	0
Ethnic minorities	0	0	Ethnic minorities	1	8
Other	1	8	Other	0	0
Equity Not Addressed	8	62	Equity Not Addressed	9	69

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The majority of studies reviewed in this region did not explicitly address equity planning (62%) or targeting (69%) in the context of reported adaptations. Two studies (15%) reported addressing equity for Indigenous Peoples. Others mentioned were farming women (equity planning), and socio-economic factors in general. Few qualitative results were reported in this region, due to the limited focus on equity.

Is there reference to contributions from Indigenous Knowledge in reported adaptations? Q 1.4

IK Contribution	Count	Percentage
Yes	2	15
No	11	85

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Is there reference to contributions from local knowledge in reported adaptations? Q 1.5

LK Contribution	Count	Percentage
Yes	2	15
No	11	85

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Are costs of adaptation considered? Q 4.3

Costs	Count	Percentage
Yes – Cost of response	2	15
Yes – Cost savings from response	1	8
No	11	85

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.6.3 What responses are documented?

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What category of adaptation is reported? Q 3.1.1; 3.1.2

Response type	Count	Percentage
Technological/Infrastructural	8	62
Behavioural/Cultural	11	85
Institutional	8	62
Ecosystem-based	8	62

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, 85% reported adaptation responses that were ecosystem-based. The other three variables were each reported in 62% of studies.

Qualitative results suggested that in most cases, actors engaged in multiple types of adaptation responses simultaneously, and emphasized maximizing economic flexibility. Behavioral/cultural responses reported included programmes to raise education/awareness.

What hazards is the adaptation aimed at addressing? 3.3.1; 3.3.2; 3.3.3

Hazards	Count	Percentage
Extreme precipitation and inland flooding	7	54
Drought	5	38
General climate impacts	9	69
Sea level rise	2	15
Precipitation variability	6	46
Increased frequency and intensity of extreme heat	3	23
Rising ocean temperature and ocean acidification	1	8
Loss of arctic sea ice	2	15
Other	6	46

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
In this region, 69% of studies reviewed reported adaptation to address general climate impacts. Extreme precipitation and inland flooding was mentioned in 54% of studies, while 46% of studies identified precipitation variability as the target hazard. 46% of studies also reported on other hazards, including changes to snow cover (both loss of snowpack, avalanches) and fires.

Qualitative results also indicated that changes to snow cover is a primary concern. Invasive species are also reported as a hazard targeted by adaptation efforts, particularly in the forestry sector. Several studies suggested that mountain regions face elevated levels of risk associated with these hazards, due to greater severity of climate impacts.

What aspects of vulnerability is the adaptation aimed at addressing? 3.4.1; 3.4.2; 3.4.3

Exposure vulnerability	Count	Percentage
Clean water & sanitation	1	8
Sustainable cities & ecosystem services	4	31
Consumption & production	5	38
Health & wellbeing	7	54
Work and economic growth	4	31
Industry/innovation/technology	2	15
Poverty	0	0
Food security	5	38
Terrestrial & freshwater ecosystem services	5	38
Marine & coastal ecosystem services	0	0
Energy security	0	0
Education	3	23
Gender equality	0	0

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Inequalities (other than gender)	1	8
Peace, justice, and strong institutions	0	0
Other	2	15

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, 54% reported on adaptations aimed at addressing health and wellbeing. Consumption and production, food security, and terrestrial and freshwater ecosystem services were each addressed by 38% of studies. Education was addressed in 23% of studies. Neither poverty nor gender were identified as an aspect of vulnerability addressed in any studies reviewed in this region.

Other responses included livelihoods, business interests and cultural significance. The vulnerability of existing infrastructure was specifically noted in several studies, including ski tourism infrastructure and residential housing. In several studies, ecosystem services provided by forests were specifically identified as aspects of vulnerability targeted by adaptation efforts.

SMCCP5.3.2.6.4 What is the extent of adaptation-related responses?

What is the general stage of adaptation activities? 4.1; 4.1.2

Implementation stage	Count	Percentage
Vulnerability assessment and/or early planning	3	23
Adaptation planning & early implementation	3	23
Implementation expanding	4	31
Implementation widespread	1	8
Evidence of risk reduction associated with adaptation efforts	1	8

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
A majority of adaptation activities were in the expanding stage of implementation (31%). 23% were identified as in the vulnerability assessment and/or early planning stage, and 23% were identified as in the adaptation planning and early implementation stage.

Qualitative results indicated limited planning of adaptation activities. Several studies reported that private sector actors (e.g. tourism companies) were undertaking widespread adaptation activities, but otherwise adaptation activities were primarily ad hoc and/or implicit, with little planning. Infrastructure-based projects were noted as an exception to this in multiple studies.

What is the depth of change for reported adaptations? Q 4.4.1; 4.4.2
The depth of a response relates to the degree to which a change reflects something new, novel, and different from existing norms and practices.

Depth	Count	Percentage
Low (limited depth)	9	69
Medium	2	15
High	1	8

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited) depth of change (69%). 15% were assessed as medium, and 8% were assessed as high.
Most reported adaptations were described as very minor modifications of existing practices or institutions in order to mitigate immediate economic risk. These adaptations were frequently described as reactive, not novel. Several studies also noted that these changes are not exclusively in response to climate risks, but an array of pressures on economic security which prompt households and individuals to modify their practices.

What is the scope of change for reported adaptations? Q 4.5.1; 4.5.2
The scope of a response typically refers to the scale of change.

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Scope	Count	Percentage
Low (limited scope)	10	77
Medium	0	0
High	3	23

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited scope) of change (77%). 23% were assessed as high, while none were assessed as medium. Qualitative results supported the conclusion that most reported adaptations are small in the scope of change (e.g. autonomous adaptations by specific economic sectors). A majority of studies reported on low (limited scope) changes, implemented via local initiatives.

Coding note: In many cases, the scope of adaptation reported appeared to be based on the scale of research conducted (the unit of analysis being household/individual, village, region, etc), rather than the activity itself.

What is the speed of change for reported adaptations? Q 4.6.1; 4.6.2
The speed of change refers to the dimension of time within which changes are happening.

Speed	Count	Percentage
Low (slow)	11	85
Medium	0	0
High	1	8

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (slow) speed of change (85%). 8% were assessed as high, and none were assessed as medium. 7% of studies contained insufficient information to assess this variable.

Qualitative results supported the conclusion that most reported adaptations are slow and incremental. Frequently, studies did not evaluate or describe the speed of change; several studies identified as reporting slow change also indicated uncertainty about this variable.

SMCCP5.3.2.6.5 Are adaptation-related responses reducing risk/vulnerability?

What is the stated (or implied/assumed) link to reduction in risk? Q 3.5.1; 3.5.2

Synthesis Statement:
In this region, the most commonly reported link between adaptation-related responses and reduction in risk was minimizing hazard/disaster risk (in addition to financial risks associated with climate-related hazards, including fire, drought, flooding, and avalanches). Other reported links included enhancing ecosystem resilience (specifically related to forest health).

A majority of studies either assumed reductions in risk or stated but did not empirically demonstrate these reductions.

Is there any evidence (implicit or explicit) that responses are reducing risk or vulnerability? Q 5.1.1; 5.1.2

Reduced risk	Count	Percentage
Yes	9	69
No	4	31

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 69% of the studies reviewed reported evidence (implicit or explicit) that responses were reducing risk or vulnerability, while 31% indicated no evidence to this effect.

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Qualitative results indicated less evidence of risk reduction. Risk reduction (most frequently with regard to climate-related hazards, and associated economic damages), was described in some studies but infrequently quantified or investigated in depth. Some studies indicated that longer-term evaluation would be required to assess evidence of risk reduction.

Do actors or institutions undertaking the response identify (implicitly or explicitly) indicators of success? Q 5.2.1; 5.2.2

Indicators	Count	Percentage
Yes	4	31
No	9	69

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 31% of the studies reviewed identified indicators of success, while 69% did not.
The majority of studies coded in this region did not report qualitative results for this variable. Among those which did, the indicators most frequently reported were related to forest health (e.g. stand diversity, forest cover).

Do actors or institutions undertaking adaptation consider (implicitly or explicitly) risks or maladaptation associated with the adaptation? Q 5.3.1; 5.3.2

Maladaptation	Count	Percentage
Yes	5	38
No	8	62

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (62%), actors and institutions undertaking adaptation did not consider risks or maladaptation associated with the adaptation. Maladaptation and risk consideration was reported in 38% of studies.

Qualitative results were not reported for the majority of the studies reviewed in this region. Risks and maladaptation considered included the loss of local cultural traditions and associated sustainability as a result of adoption of new agricultural practices.

Do actors or institutions undertaking the response consider (implicitly or explicitly) co-benefits? Q5.4.1; 5.4.2

Co-benefits	Count	Percentage
Yes	9	69
No	4	31

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (69%), actors and institutions undertaking adaptation did not consider co-benefits associated with the adaptation. Consideration of co-benefits was reported in 31% of studies.
In this region the types of co-benefits most commonly considered was were income generation, increased forest cover and associated climate change mitigation co-benefits. Several studies also noted consideration of co-benefits in human and social capital, and general human wellbeing.

SMCCP5.3.2.6.6 What evidence is provided on the extent to which responses are challenging or exceeding adaptation limits?

Are constraints or limits to adaptation reported? Q 6.1; 6.2

Limits	Count	Percentage
Yes	10	77
No	3	23

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

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Synthesis Statement:
In this region, 77% of studies reviewed reported constraints or limits to adaptation, and 23% did not.

In this region, the most commonly reported limits were related to governance, institutions, & policy (including the politicization of climate change, and lack of innovation in governing frameworks). Next most frequently reported were biological limits (including temperature and water availability), followed by social/cultural factors (including risk perceptions, others unspecified). Economic constraints were not identified in this region.

Are constraints or limits hard or soft? Q 6.3

Type of limit	Count	Percentage
Hard	2	15
Soft	6	46
Both	3	23
N/A	2	15

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 46% of constraints or limits were identified as soft, 15% were identified as hard, and 23% were identified as both. This variable was not applicable in 15% of studies. There were few qualitative results reported in this region, but education was identified as a soft limit.

Are limits to adaptation being approached? Q 6.4.1; 6.4.2

Approaching limit?	Count	Percentage
Yes	8	62
No	3	23
N/A	1	8

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 62% of studies reviewed indicated that they were approaching limits to adaptation, while 23% indicated that they were not. This variable was not applicable in 8% of studies.

Coding note: The question GAMI coders were given for data entry makes it difficult to interpret these findings: "Is there evidence to indicate whether responses approach, challenge, or exceed constraints/limits?" Given this structure, it is difficult to determine whether an affirmative response means that the capacity to adapt further is being reached (first interpretation), that efforts are being undertaken to ameliorate limits (second interpretation), or that limits were already surpassed (third interpretation). Furthermore, qualitative content related to this question was relatively sparse, and did not provide a clear signal on how answers to this question should be interpreted.

SMCCP5.3.2.7 North America

39 articles report adaptations associated with K1 terrain in North America. However, 9 articles were multi-region studies. These multi-region articles have been removed from this synthesis report to ensure that results only reflect adaptation in the target region. Results below are based on 30 articles.

SMCCP5.3.2.7.1 Who is adapting?

What countries are adaptations reported in? Q 1.1.1

Country	Count	Percentage
United States	18	60
Mexico	8	27
Canada	4	13

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:

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The countries with the greatest number of studies reporting adaptation actions in North America are (in descending order): United States (18), Mexico (8) and Canada (4).

Which sectors/systems are involved in reported adaptations? Q 1.2

Sectors	Count	Percentage
Terrestrial & freshwater ecosystems	16	53
Ocean & coastal ecosystems	1	3
Water and sanitation	18	60
Food, fibre, and other ecosystem products	16	53
Cities, settlements, and key infrastructure	3	10
Health, well-being, and communities	10	33
Poverty, livelihoods, and sustainable development	9	30

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The sector/system most frequently identified as involved in reported adaptation actions was water and sanitation (60% of studies), followed by food, fibre, and other ecosystem products (53% of studies) and terrestrial and freshwater ecosystems (53% of studies). Compared to findings at the global scale, poverty, livelihoods, and sustainable development is underrepresented (55% of studies in the global dataset), while water and sanitation was twice as commonly reported by percentage (28% of studies in the global dataset).

Who is involved with reported adaptations (e.g. leading, financing, or enabling)? Q 2.1.1; 2.1.2; 2.1.3

Actors	Count	Percentage
Individuals or households	21	70
Local government	16	53
National government	15	50
Sub-national government	12	40
Civil society (sub-national or local)	10	33
Civil society (international, multinational, national)	5	17
Private sector - small- and medium-enterprises	5	17
Private sector - corporations	3	10
International or multinational governance	0	0
Other	5	17

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Individuals or households were involved in reported adaptations in 70% of studies reviewed. Local governments were involved in 53% of reported adaptations, followed by national governments (50% of studies). Other actors reported included tribal governments or leaders, farmers, resource managers (e.g. water or forest managers), and academics/researchers. The prevalent role of government actors was corroborated in the qualitative results, with a majority of studies identifying one or several relevant institutions as key actors in implementing or planning adaptation actions.

What types of implementation tools are reported? Q 3.2.1

Synthesis Statement:
Implementation tools reported included planning and capacity building efforts (e.g. community-based planning workshops), investments in infrastructure, changes in land use patterns, and changes in technology use in agricultural systems. More of the implementation reported was formal/planned than autonomous; this is inconsistent with global findings. Among formal implementation tools, most frequently reported were adaptation planning efforts and infrastructure development. Also identified frequently were informational tools (e.g. early warning systems, monitoring and forecasting tools. Ecosystem restoration was identified as an implementation tool in several studies.

Is there evidence about who financed reported adaptation actions? Q 4.2

Funding info	Count	Percentage
Yes	8	27

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No	22	73

If sub-100% total, some documents did not contain sufficient information to assess this variable.

SMCCP5.3.2.7.2 Evidence of equity in planning / targeting

How many articles address equity in adaptation planning? In adaptation targeting? Q 2.2.1; 2.3.1

- 10 articles (33%) included evidence that particularly vulnerable groups were included in adaptation planning
- 11 articles (37%) included evidence that particularly vulnerable groups were targeted in adaptations.

Who is addressed in the context of equity in reported adaptations? Q 2.2.1; 2.2.2; 2.2.3; 2.3.1; 2.3.2; 2.3.3

Equity planning	Count	Percentage	Equity targeting	Count	Percentage
Low-income	3	10	Low-income	6	20
Indigenous	7	23	Indigenous	5	17
Women	1	3	Women	2	7
Elderly	0	0	Elderly	1	3
Migrants	0	0	Migrants	0	0
Youth	0	0	Youth	0	0
Disability	0	0	Disability	0	0
Ethnic minorities	1	3	Ethnic minorities	0	0
Other	0	0	Other	1	3
Equity Not Addressed	20	67	Equity Not Addressed	19	63

Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:
The majority of studies reviewed in this region did not explicitly address equity planning (67%) or targeting (63%) in the context of reported adaptations. Among studies which did so, the greatest number of studies reported addressing equity for Indigenous Peoples — 23% of studies addressed equity planning and 17% addressed equity targeting for low-income groups. No other group was frequently indicated in this region.

Others mentioned included farmers, private forest owners, and low-income rural communities. Qualitative results confirm that the majority of studies addressing equity do so for/with Indigenous Peoples. Several studies also addressed specific vulnerabilities of forest users, including Indigenous forest users. In addition to addressing low-income groups, one study reported on dimensions of social marginalization, including illiteracy.

Is there reference to contributions from Indigenous Knowledge in reported adaptations? Q 1.4

IK Contribution	Count	Percentage
Yes	8	27
No	22	73

If sub-100% total, some documents did not contain sufficient information to assess this variable.

Is there reference to contributions from local knowledge in reported adaptations? Q 1.5

LK Contribution	Count	Percentage
Yes	8	27
No	22	73

If sub-100% total, some documents did not contain sufficient information to assess this variable.

Are costs of adaptation considered? Q 4.3

Costs	Count	Percentage
Yes – Cost of response	7	23
Yes – Cost savings from response	1	3
No	20	67

If sub-100% total, some documents did not contain sufficient information to assess this variable.

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SMCCP5.3.2.7.3 What responses are documented?

What category of adaptation is reported? Q 3.1.1; 3.1.2

Response type	Count	Percentage
Technological/Infrastructural	15	50
Behavioural/Cultural	21	70
Institutional	17	57
Ecosystem-based	21	70

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, 70% reported adaptation responses that were ecosystem-based, and 70% reported behavioural/cultural adaptations. The third highest percentage of studies reported responses that were institutional (57%). Technological/infrastructural responses were reported in 50% of studies.

The majority of adaptation responses reported were autonomous rather than formal or planned, and were carried out by farmers, private landowners, or lands/resources managers. In most cases, actors engaged in multiple types of adaptation responses simultaneously: behavioural/cultural (e.g. planting cash crops), ecosystem-based (e.g. riparian buffers, soil conservation practices), and technological/infrastructural (e.g. installation of flood barriers). An emphasis on diversification of income sources in order to maximize economic flexibility was commonly reported at the household level and among private companies engaging in adaptation efforts. Compared to the global average, this region demonstrated greater implementation of ecosystem-based responses, and somewhat less behavioural/cultural adaptation responses.

What hazards is the adaptation aimed at addressing? 3.3.1; 3.3.2; 3.3.3

Hazards	Count	Percentage
Extreme precipitation and inland flooding	11	37
Drought	19	63
General climate impacts	21	70
Sea level rise	1	3
Precipitation variability	16	53
Increased frequency and intensity of extreme heat	9	30
Rising ocean temperature and ocean acidification	0	0
Loss of arctic sea ice	1	3
Other	14	47

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
In this region, 70% of studies reviewed reported adaptation to address general climate impacts, and 63% reported adaptation to address drought. The next most prevalent hazard addressed was precipitation variability (53% of studies). Extreme heat was reported in 30% of studies reviewed.
The other hazard listed most frequently was increased prevalence of pests (invasive species) and diseases. Other hazards noted were wildfires, hurricanes, severe wind events, increased frequency of cold spells, and permafrost degradation.

Drought and precipitation variability was frequently reported in terms of risk to smallholder farmers' agricultural livelihoods. Pests and diseases were reported most frequently as affecting the forestry sector (pine beetles as an invasive species), in addition to some farming impacts Changes in water supply quality and/or quantity were also frequently reported, both in farming and non-farming contexts.

What aspects of vulnerability is the adaptation aimed at addressing? 3.4.1; 3.4.2; 3.4.3

Exposure vulnerability	Count	Percentage
Clean water & sanitation	6	20
Sustainable cities & ecosystem services	10	33
Consumption & production	10	33

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Health & wellbeing	6	20
Work and economic growth	10	33
Industry/innovation/technology	3	10
Poverty	6	20
Food security	14	47
Terrestrial & freshwater ecosystem services	14	47
Marine & coastal ecosystem services	1	3
Energy security	0	0
Education	1	3
Gender equality	2	7
Inequalities (other than gender)	0	0
Peace, justice, and strong institutions	0	0
Other	0	0

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, 47% reported on adaptations aimed at addressing food security, and 47% were aimed at terrestrial and freshwater ecosystem services. Sustainable cities & ecosystem services, consumption & production, and work & economic growth were each addressed by 33% of studies. Poverty was addressed in 20% of studies, and gender equality was addressed in 7% of studies.

Other responses included general socio-economic status and remoteness from markets. Livelihood-specific vulnerabilities (e.g. resource dependence and lack of livelihood diversification) were identified specifically as aspects of vulnerability addressed by adaptation efforts. Multiple studies also noted the vulnerability of "intangible values," sites or practices of specific cultural and spiritual significance which are vulnerable to climate change.

SMCCP5.3.2.7.4 What is the extent of adaptation-related responses?

What is the general stage of adaptation activities? 4.1; 4.1.2

Implementation stage	Count	Percentage
Vulnerability assessment and/or early planning	9	30
Adaptation planning & early implementation	12	40
Implementation expanding	6	20
Implementation widespread	0	0
Evidence of risk reduction associated with adaptation efforts	1	3

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
A majority of adaptation activities were in the adaptation planning and early implementation stage in this region (40%). 30% were identified as in the vulnerability assessment and/or early planning stage, while 20% were identified as expanding. None were identified as widespread.

Qualitative results suggested that the stage of implementation is frequently unclear, particularly given the prevalence of autonomous adaptation at the household level. The studies reviewed noted considerable diversity between households with regard to the stage of implementation, within the same cases and regions. While the quantitative results indicated no widespread implementation, qualitative results indicated that a few studies did report widespread adaptation activities; at least two studies described several decades of region-wide adaptation efforts, and several others reported that most households in the study region engaged in at least some adaptation.

What is the depth of change for reported adaptations? Q 4.4.1; 4.4.2
The depth of a response relates to the degree to which a change reflects something new, novel, and different from existing norms and practices.

Depth	Count	Percentage
Low (limited depth)	14	47

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Medium	6	20
High	6	20

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited) depth of change (47%). 20% were assessed as high, and 20% were assessed as medium.

Most reported adaptations were described as modifications of existing practices or institutions (particularly at the individual, household, or private enterprise scale), rather than systemic or structural changes. Some barriers to structural change were identified, lack of change in perspectives, lack of coordinated planning, resistance to change among governing bodies, and lack of awareness and access to information. However, a higher proportion of studies reported high depth of change in perspectives, awareness, and attitudes in this region than in the global analysis.

What is the scope of change for reported adaptations? Q 4.5.1; 4.5.2

The scope of a response typically refers to the scale of change.

Scope	Count	Percentage
Low (limited scope)	18	60
Medium	1	3
High	6	20

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited scope) of change (60%). 20% were assessed as high, while 3% were assessed as medium.
Qualitative results supported the conclusion that most reported adaptations are small in the scope of change (e.g. pilot studies, autonomous adaptations by households/individuals). A few studies indicated broad scope of change; these described adaptation activities being implemented through coordinated programmes which involved multiple scales a range of actors. Most studies reported local scale (limited scope) changes.

Coding note: In many cases, the scope of adaptation reported appeared to be based on the scale of research conducted (the unit of analysis being household/individual, village, region, etc), rather than the activity itself.

What is the speed of change for reported adaptations? Q 4.6.1; 4.6.2

The speed of change refers to the dimension of time within which changes are happening.

Speed	Count	Percentage
Low (slow)	21	70
Medium	3	10
High	2	7

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (slow) speed of change (70%). 10% were assessed as medium, while 7% were assessed as high. 13% of studies contained insufficient information to assess this variable.

Qualitative results supported the conclusion that most reported adaptations are slow and incremental. Some studies did not evaluate or describe the speed of change, or indicated uncertainty about the speed of change. Adaptation activities described as changing more quickly frequently involved private sector actors (e.g. tourism businesses, private landholders).

SMCCP5.3.2.7.5 Are adaptation-related responses reducing risk/vulnerability?

What is the stated (or implied/assumed) link to reduction in risk? Q 3.5.1; 3.5.2

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Synthesis Statement:
In this region, the most commonly reported link between adaptation-related responses and reduction in risk was minimizing hazard/disaster risk (in addition to financial risks associated with climate-related hazards; hazards most frequently noted were droughts, fire, and flooding). Other commonly reported links included enhancing ecosystem resilience, agricultural productivity (including through crop diversification), and food security.

A majority of studies either assumed reductions in risk or stated but did not empirically demonstrate these reductions.

Is there any evidence (implicit or explicit) that responses are reducing risk or vulnerability? Q 5.1.1; 5.1.2

Reduced risk	Count	Percentage
Yes	17	57
No	13	43

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 57% of the studies reviewed reported evidence (implicit or explicit) that responses were reducing risk or vulnerability, while 43% indicated no evidence to this effect.

Qualitative results indicate less evidence of risk reduction. Risk reduction (most frequently with regard to economic impact from climate-related hazards), was described in some studies but infrequently quantified or investigated in depth. Some studies indicated that longer-term evaluation would be required to assess evidence of risk reduction.

Do actors or institutions undertaking the response identify (implicitly or explicitly) indicators of success? Q 5.2.1; 5.2.2

Indicators	Count	Percentage
Yes	11	37
No	19	63

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 37% of the studies reviewed identified indicators of success, while 63% did not.

The majority of studies coded in this region did not report qualitative results for this variable. Among those which did, the qualitative results indicate less prevalence of studies which identified indicators of success. Indicators reported included income and employment rates, forest health (e.g. plant species richness, growth and regeneration rates), livestock health. Compared to other regions, ecological indicators were more commonly identified in studies sited in North America.

Do actors or institutions undertaking adaptation consider (implicitly or explicitly) risks or maladaptation associated with the adaptation? Q 5.3.1; 5.3.2

Maladaptation	Count	Percentage
Yes	12	40
No	18	60

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (60%), actors and institutions undertaking adaptation did not consider risks or maladaptation associated with the adaptation. Maladaptation and risk consideration was reported in 40% of studies.

No qualitative results on this variable were reported for approximately half of the studies. Among those which did, the types of maladaptation risk most commonly considered trade-offs between financial and

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environmental resilience, and adverse effects of private land management decisions (e.g. grazing intensification) on water, soil, and land condition on a broader scale.

Do actors or institutions undertaking the response consider (implicitly or explicitly) co-benefits? Q5.4.1; 5.4.2

Co-benefits	Count	Percentage
Yes	9	30
No	21	70

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (70%), actors and institutions undertaking adaptation did not consider co-benefits associated with the adaptation. Consideration of co-benefits was reported in 30% of studies.

In this region the type of co-benefit most commonly considered was biodiversity, followed by other ecological improvements (e.g. protection of wildlife and wildlife habitat, soil or land quality). Also noted were behavioural changes which contributed to climate change mitigation (emissions reduction), and co-benefits for socioeconomic status of adopting actors.

SMCCP5.3.2.7.6 What evidence is provided on the extent to which responses are challenging or exceeding adaptation limits?

Are constraints or limits to adaptation reported? Q 6.1; 6.2

Limits	Count	Percentage
Yes	23	77
No	7	23

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 77% of studies reviewed reported constraints or limits to adaptation, and 23% did not.

The most commonly reported limits to adaptation were related to social/cultural factors (including beliefs about climate change, conflicts over resources, low levels of social trust, and gender roles) and governance, institutions, & policy (including power imbalances in decision-making, land tenure, barriers to collective action, and inadequate water governance). Financial limits were the third most frequently reported (including limited funding for government-run adaptation programmes), followed by limits and constraints associated with human capital (including labor markets) and information, awareness, and technology (including lack of communication between implementing actors, lack of clarity of information about climate change, access to technologies, and research gaps).

Biological limits reported included water availability and temperature. Economic and physical limits were reported infrequently.

Are constraints or limits hard or soft? Q 6.3

Type of limit	Count	Percentage
Hard	2	7
Soft	12	40
Both	10	33
N/A	6	20

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 40% of constraints or limits were identified as soft, 7% were identified as hard, and 33% were identified as both. This variable was not applicable in 20% of studies.

The majority of limits and constraints were identified as soft; these were described as potentially resolvable with efforts to address perceptions and awareness, primarily related to social/cultural constraints (including gender roles, social cohesion and trust). Some economic and financial limits (including funding constraints)

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and governance, institutional, and policy limits (including laws) were identified as hard in some studies and soft in others.

Are limits to adaptation being approached? Q 6.4.1; 6.4.2

Approaching limit?	Count	Percentage
Yes	10	33
No	13	43
N/A	7	23

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 33% of studies reviewed indicated that they were approaching limits to adaptation, while 43% indicated that they were not. This variable was not applicable in 23% of studies.

Coding note: The question GAMI coders were given for data entry makes it difficult to interpret these findings: "Is there evidence to indicate whether responses approach, challenge, or exceed constraints/limits?" Given this structure, it is difficult to determine whether an affirmative response means that the capacity to adapt further is being reached (first interpretation), that efforts are being undertaken to ameliorate limits (second interpretation), or that limits were already surpassed (third interpretation). Furthermore, qualitative content related to this question was relatively sparse, and did not provide a clear signal on how answers to this question should be interpreted.

SMCCP5.3.2.8 Small Islands

7 articles report adaptations associated with K1 terrain in Small Islands. However, 3 articles were multi-region studies. These multi-region articles have been removed from this synthesis report to ensure that results only reflect adaptation in the target region. Results below are based on 4 articles.

SMCCP5.3.2.8.1 Who is adapting?

What countries are adaptations reported in? Q 1.1.1

Country	Count	Percentage
Madagascar	2	50
Puerto Rico	1	25
Caribbean (region)	1	25

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
The countries with the greatest number of studies reporting adaptation actions in Small Islands are (in descending order): Madagascar (2), and Puerto Rico (1). One study also reported adaptations in the Caribbean region.

Note: Though Madagascar is commonly considered to be an African country, we assume based on the GAMI coding that these regions are consistent with the IPCC continental scale classifications.

Which sectors/systems are involved in reported adaptations? Q 1.2

Sectors	Count	Percentage
Terrestrial & freshwater ecosystems	0	0
Ocean & coastal ecosystems	1	25
Water and sanitation	1	25
Food, fibre, and other ecosystem products	4	100
Cities, settlements, and key infrastructure	0	0
Health, well-being, and communities	1	25
Poverty, livelihoods, and sustainable development	2	50

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:

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The sector/systems most frequently identified as involved in reported adaptation actions were food, fibre, and other ecosystem products (100%), followed by poverty, livelihoods, and sustainable development (50%).

Who is involved with reported adaptations (e.g. leading, financing, or enabling)? Q 2.1.1; 2.1.2; 2.1.3

Actors	Count	Percentage
Individuals or households	4	100
Local government	1	25
National government	2	50
Sub-national government	0	0
Civil society (sub-national or local)	1	25
Civil society (international, multinational, national)	0	0
Private sector - small- and medium-enterprises	0	0
Private sector - corporations	1	25
International or multinational governance	1	25
Other	1	25

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Individuals or households were involved in reported adaptations in 100% of studies reviewed. National governments were involved in 50% of reported adaptations. Other actors reported were farmers, regional institutions, and banks.

What types of implementation tools are reported? Q 3.2.1

Synthesis Statement:
Implementation tools reported included drought-related adaptation practices, changes to farming practices (e.g. mulching, replanting crops, food storage), and development of disaster resilient infrastructure. Two studies reported autonomous implementation, and two reported on formal implementation via policy changes (e.g. incentives for drought-related conservation practices).

Is there evidence about who financed reported adaptation actions? Q 4.2

Funding info	Count	Percentage
Yes	4	100
No	0	0

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

SMCCP5.3.2.8.2 Evidence of equity in planning / targeting

How many articles address equity in adaptation planning? In adaptation targeting? Q 2.2.1; 2.3.1
- 1 articles (25%) included evidence that particularly vulnerable groups were included in adaptation planning
- 1 articles (25%) included evidence that particularly vulnerable groups were targeted in adaptations.

Who is addressed in the context of equity in reported adaptations? Q 2.2.1; 2.2.2; 2.2.3; 2.3.1; 2.3.2; 2.3.3

Equity planning	Count	Percentage	Equity targeting	Count	Percentage
Low-income	1	25	Low-income	0	0
Indigenous	0	0	Indigenous	0	0
Women	1	25	Women	1	25
Elderly	0	0	Elderly	0	0
Migrants	0	0	Migrants	0	0
Youth	0	0	Youth	0	0
Disability	0	0	Disability	0	0
Ethnic minorities	0	0	Ethnic minorities	0	0
Other	0	0	Other	0	0
Equity Not Addressed	3	75	Equity Not Addressed	3	75

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Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:
The majority of studies reviewed in this region did not explicitly address equity planning or targeting (75%) in the context of reported adaptations. One study (25%) reported addressing equity planning for women, and one reported addressing equity planning for low income groups. The former was interested in how men and women adapted in response to cyclones.

Is there reference to contributions from Indigenous Knowledge in reported adaptations? Q 1.4

IK Contribution	Count	Percentage
Yes	2	50
No	2	50

If sub-100% total, some documents did not contain sufficient information to assess this variable.

Is there reference to contributions from local knowledge in reported adaptations? Q 1.5

LK Contribution	Count	Percentage
Yes	2	50
No	2	50

If sub-100% total, some documents did not contain sufficient information to assess this variable.

Are costs of adaptation considered? Q 4.3

Costs	Count	Percentage
Yes – Cost of response	3	75
Yes – Cost savings from response	2	50
No	20	67

If sub-100% total, some documents did not contain sufficient information to assess this variable.

SMCCP5.3.2.8.3 What responses are documented?

What category of adaptation is reported? Q 3.1.1; 3.1.2

Response type	Count	Percentage
Technological/Infrastructural	2	50
Behavioural/Cultural	4	100
Institutional	1	25
Ecosystem-based	4	100

Response totals for this question can exceed 100% because multiple options could be selected for individual documents.

Synthesis Statement:
Among studies reviewed in this region, all reported adaptation behavioral/cultural and ecosystem-based responses. Technological/infrastructural responses were documented in 50% of studies.

Qualitative results suggested that a majority of actors engaged in multiple types of adaptation responses simultaneously, and emphasized enhancing ecosystem resilience to climate-related shocks and stressors. Multiple studies described implementing agroforestry practices which incorporated several types of responses.

What hazards is the adaptation aimed at addressing? 3.3.1; 3.3.2; 3.3.3

Hazards	Count	Percentage
Extreme precipitation and inland flooding	4	100
Drought	2	50
General climate impacts	3	75
Sea level rise	1	25
Precipitation variability	2	50
Increased frequency and intensity of extreme heat	0	0
Rising ocean temperature and ocean acidification	0	0
Loss of arctic sea ice	0	0

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Other	1	25

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
In this region, 100% of studies reviewed reported adaptation to address extreme precipitation and inland flooding. Also reported were general climate impacts (75%), precipitation variability (50%), and drought (50%). Qualitative results indicated that increased prevalence of natural disasters (e.g. cyclones, hurricanes, floods) was the primary hazard targeted by adaptation efforts.

What aspects of vulnerability is the adaptation aimed at addressing? 3.4.1; 3.4.2; 3.4.3

Exposure vulnerability	Count	Percentage
Clean water & sanitation	1	25
Sustainable cities & ecosystem services	0	0
Consumption & production	2	50
Health & wellbeing	1	25
Work and economic growth	0	0
Industry/innovation/technology	0	0
Poverty	3	75
Food security	3	75
Terrestrial & freshwater ecosystem services	0	0
Marine & coastal ecosystem services	1	25
Energy security	0	0
Education	0	0
Gender equality	0	0
Inequalities (other than gender)	0	0
Peace, justice, and strong institutions	0	0
Other	0	0

**Response totals for this question can exceed 100% because multiple options could be selected for individual documents.*

Synthesis Statement:
Among studies reviewed in this region, adaptations aimed at addressing poverty and food security were each reported in 75% of cases. Qualitative results described adaptations aimed at addressing the vulnerability of individuals experiencing poverty, particularly their vulnerability to disasters and farming-related losses. Critical infrastructure (e.g. roads, bridges) was also identified as an aspect of vulnerability targeted by adaptation efforts.

SMCCP5.3.2.8.4 What is the extent of adaptation-related responses?

What is the general stage of adaptation activities? 4.1; 4.1.2

Implementation stage	Count	Percentage
Vulnerability assessment and/or early planning	1	25
Adaptation planning & early implementation	2	50
Implementation expanding	0	0
Implementation widespread	0	0
Evidence of risk reduction associated with adaptation efforts	0	0

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 50% of adaptation activities were in the adaptation planning and early implementation stage, and 25% were involved in vulnerability assessment and/or early planning.

Qualitative results also indicated that the majority of responses were in the planning stages, particularly for disaster response, with none indicating widespread implementation.

What is the depth of change for reported adaptations? Q 4.4.1; 4.4.2

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The depth of a response relates to the degree to which a change reflects something new, novel, and different from existing norms and practices.

Depth	Count	Percentage
Low (limited depth)	2	50
Medium	0	0
High	1	25

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited) depth of change (50%). 25% were assessed as high, and none were assessed as medium.

One study reported a high depth of change following the implementation of a flood resilience programme. Two other studies indicated low depth of change, one due to lack of behavioural change and another due to the spontaneous nature of adaptation activities.

What is the scope of change for reported adaptations? Q 4.5.1; 4.5.2

The scope of a response typically refers to the scale of change.

Scope	Count	Percentage
Low (limited scope)	2	50
Medium	0	0
High	1	25

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, the majority of reported adaptations were characterized by low (limited scope) of change (50%). 25% were assessed as high, and none were assessed as medium.

Qualitative results supported the conclusion that a majority of reported adaptations are small in the scope of change and limited to specific communities implementing local initiatives. One study reported on adaptation responses across an entire island, and was coded as reflecting a high scale of change.

What is the speed of change for reported adaptations? Q 4.6.1; 4.6.2

The speed of change refers to the dimension of time within which changes are happening.

Speed	Count	Percentage
Low (slow)	0	0
Medium	0	0
High	1	25

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, only one study provided sufficient information to assess this variable, and was assessed as describing a high speed of change (25%). All other studies described uncertainty about this variable. Qualitative results suggest a prevalence of incremental change.

SMCCP5.3.2.8.5 Are adaptation-related responses reducing risk/vulnerability?

What is the stated (or implied/assumed) link to reduction in risk? Q 3.5.1; 3.5.2

Synthesis Statement:
In this region, the most commonly reported link between adaptation-related responses and reduction in risk was minimizing hazard/disaster risk (primarily flooding, sea level rise). Other links reported were enhancing ecosystem resilience (reducing soil erosion, watershed protection).

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Is there any evidence (implicit or explicit) that responses are reducing risk or vulnerability? Q 5.1.1; 5.1.2

Reduced risk	Count	Percentage
Yes	3	75
No	1	25

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 75% of the studies reviewed reported evidence (implicit or explicit) that responses were reducing risk or vulnerability, while 25% indicated no evidence to this effect. Qualitative results indicated more uncertainty, and assumed, rather than demonstrated reductions in risk. The majority of studies reported on risks associated with climate-related hazards (e.g. cyclones).

Do actors or institutions undertaking the response identify (implicitly or explicitly) indicators of success? Q 5.2.1; 5.2.2

Indicators	Count	Percentage
Yes	3	75
No	1	25

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 75% of the studies reviewed identified indicators of success, while 25% did not. Indicators reported included perceptions of yield increase among farmers, and a variety of indicators of drought impact (including measures of soil moisture, vegetation health, and crop moisture).

Do actors or institutions undertaking adaptation consider (implicitly or explicitly) risks or maladaptation associated with the adaptation? Q 5.3.1; 5.3.2

Maladaptation	Count	Percentage
Yes	2	50
No	2	50

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, half of the studies reviewed reported consideration of risks and maladaptation associated with the adaptation, and half did not. Qualitative results indicated that actors were cognizant of maladaptation risks, but did not describe these in detail.

Do actors or institutions undertaking the response consider (implicitly or explicitly) co-benefits? Q5.4.1; 5.4.2

Co-benefits	Count	Percentage
Yes	1	25
No	3	75

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In the majority of studies reviewed (75%), actors and institutions undertaking adaptation did not consider co-benefits associated with the adaptation. Consideration of co-benefits was reported in 25% of studies. Only one study in this region reported qualitative results; it identified diversification of livelihood options as a potential co-benefit.

SMCCP5.3.2.8.6 What evidence is provided on the extent to which responses are challenging or exceeding adaptation limits?

Are constraints or limits to adaptation reported? Q 6.1; 6.2

Limits	Count	Percentage
Yes	4	100
No	0	0

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

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Synthesis Statement:
In this region, 100% of studies reviewed reported constraints or limits to adaptation. Reported limits to adaptation were related to governance, institutions, and policy (including land tenure insecurity), information, awareness, and technology (prevalence of misinformation), and social/cultural factors (including mistrust of governing bodies, social capital). Also reported were economic constraints (including access to credit) and inadequate technical and financial resources for disaster relief.

Are constraints or limits hard or soft? Q 6.3

Type of limit	Count	Percentage
Hard	0	0
Soft	2	50
Both	1	25
N/A	0	0

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 50% of constraints or limits were identified as soft, none were identified as hard, and 25% were identified as both. There were no qualitative results reported in this region.

Are limits to adaptation being approached? Q 6.4.1; 6.4.2

Approaching limit?	Count	Percentage
Yes	1	25
No	3	75
N/A	0	0

**If sub-100% total, some documents did not contain sufficient information to assess this variable.*

Synthesis Statement:
In this region, 25% of studies reviewed indicated that they were approaching limits to adaptation. This variable was not applicable in 75% of studies.

Coding note: The question GAMI coders were given for data entry makes it difficult to interpret these findings: "Is there evidence to indicate whether responses approach, challenge, or exceed constraints/limits?" Given this structure, it is difficult to determine whether an affirmative response means that the capacity to adapt further is being reached (first interpretation), that efforts are being undertaken to ameliorate limits (second interpretation), or that limits were already surpassed (third interpretation). Furthermore, qualitative content related to this question was relatively sparse, and did not provide a clear signal on how answers to this question should be interpreted.

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SMCCP5.3.3 Summary of Articles Reporting on Adaptation in Mountain Regions

Table SMCCP5.15: List of articles assessed reporting on adaptation in mountain regions

IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Global	Adapting water and sanitation technologies in response to climate-related hazards	Water & sanitation	Drought; Extreme precipitation and inland flooding; Precipitation variability; Sea level rise	Technological/infrastructural	Shallow	None	No	Luh et al. (2017)
Global	Diversification in the farming sector to address food insecurity at the household level	Food fibre & other ecosystem products	Precipitation variability; Drought; Extreme precipitation and inland flooding; General climate impacts	Behavioural/cultural	Shallow	None	Yes	Waha et al. (2018)
Global	Livelihood diversification among pastoral communities in the Hindu Kush Himalaya	Food fibre & other ecosystem products	General climate impacts	Behavioural/cultural	Moderate	None	Yes	Wu et al. (2014)
Asia	Development projects and autonomous responses (migration, farming) as adaptation strategies among rural communities	Food fibre & other ecosystem products; Poverty livelihoods & sustainable development	Drought; General climate impacts; Precipitation variability	Institutional; Behavioural/cultural; Ecosystem-based	Shallow	Ethnic minorities; low-income groups	Yes	Adam et al. (2018)
Asia	Agricultural adaptations to secure rural livelihoods in response to drought	Food fibre & other ecosystem products	Drought; General climate impacts; Precipitation variability	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Moderate	Low-income groups	Yes	Adhikari (2018)
Asia	Collaborative and landscape-level adaptation strategies (e.g. ecosystem-based	Food fibre & other ecosystem products; Terrestrial &	General climate impacts	Behavioural/cultural; Ecosystem-based;	Significant	None	No	Adhikari et al. (2018a)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	adaptation) in a rural mountain region	freshwater ecosystems; Poverty livelihoods & sustainable development; Health, well-being & communities		Technological/infrastructural				
Asia	Adoption of rainwater harvest technology in response to precipitation variability, and associated impacts on farming income	Food fibre & other ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	Precipitation variability; Drought	Technological/infrastructural; Behavioural/cultural	Significant	Youth; Women	Yes	Adhikari et al. (2018b)
Asia	Adaptations to increase water use efficiency, social and ecological implications for water management	Water & sanitation	Drought	Institutional; Behavioural/cultural; Technological/infrastructural	Significant	None	Yes	Al-Kalbani et al. (2016)
Asia	Transhumant livelihood responses to low temperatures and livestock fodder availability	Food fibre & other ecosystem products; Poverty livelihoods & sustainable development; Terrestrial & freshwater ecosystems	Increased frequency and intensity of extreme heat; Precipitation variability; Extreme precipitation and inland flooding; General climate impacts	Ecosystem-based; Behavioural/cultural; Institutional	Significant	None	Yes	Aryal et al. (2014)
Asia	Farming adaptations in response to drought (crop diversification, water management, and financial responses)	Water & sanitation; Food fibre & other ecosystem products; Poverty livelihoods &	Drought; General climate impacts	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	None	Yes	Ashraf and Routray (2013)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
		sustainable development						
Asia	Socio-psychological aspects of adaptation behaviours among wheat growers	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Precipitation variability; General climate impacts; Increased frequency and intensity of extreme heat	Institutional; Behavioural/cultural; Ecosystem-based	Moderate	Youth; Women	Yes	Azadi et al. (2019)
Asia	Changes to water management models in response to climate-related water scarcity in Central Asia	Water & sanitation	Drought; General climate impacts	Technological/infrastructural; Institutional; Behavioural/cultural	Shallow	Low-income groups	Yes	Barrett et al. (2017)
Asia	Household level adaptation of agricultural practices in response to climate change in the Himalayas	Food fibre & ecosystem products	Drought; Extreme precipitation and inland flooding; Precipitation variability	Technological/infrastructural; Institutional; Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	Bastakoti et al. (2017a)
Asia	Coping strategies in response to water insecurity and emerging climate variability in a dry, semi-humid rural region	Health, well-being & communities	Drought; General climate impacts	Behavioural/cultural; Ecosystem-based; Institutional; Technological/infrastructural	Shallow	Low-income groups; Indigenous; Elderly; Women	Yes	Basu et al. (2015)
Asia	Stakeholder perceptions regarding climate adaptation in the livestock sector in Central Asia	Terrestrial & freshwater ecosystems; Food fibre & ecosystem products	Drought; Precipitation variability; General climate impacts	No data	No data	No data	No	Batbaatar et al. (2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Management of agro-biodiversity using Indigenous knowledge as an adaptation strategy to climate change in a Himalayan farming context	Food fibre & ecosystem products	General climate impacts; Precipitation variability	Behavioural/cultural	Moderate	None	Yes	Baul and McDonald (2014)
Asia	Determinants of autonomous adaptation choices among farmers in different agro-climatic zones	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding; Precipitation variability; Drought; General climate impacts	Behavioural/cultural; Ecosystem-based; Institutional; Technological/infrastructural	Shallow	None	Yes	Begum and Mahanta (2017)
Asia	Emerging agricultural innovations as a response to climate change in South Asia	Food fibre & ecosystem products; Health, well-being & communities	General climate impacts; Drought; Precipitation variability; Increased frequency and intensity of extreme heat; Extreme precipitation and inland flooding	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Significant	Women	Yes	Bhatta et al. (2017)
Asia	Autonomous adaptation strategies employed by local peoples in the Himalayas in response to climate impacts on ecosystem services.	Food fibre & ecosystem products	Increased frequency and intensity of extreme heat; General climate impacts; Drought; Precipitation variability	Ecosystem-based; Behavioural/cultural	Shallow	None	Yes	Bhatta et al. (2015)
Asia	Response strategies adopted by rural farmers for managing agrobiodiversity amid climatic and socio-economic changes (focus on gender relations)	Poverty livelihoods & sustainable development; Terrestrial & freshwater ecosystems; Food fibre & ecosystem products; Health,	Precipitation variability; Drought	Behavioural/cultural; Ecosystem-based; Institutional; Technological/infrastructural	Significant	Low-income groups; Ethnic minorities; Women	Yes	Bhattarai et al. (2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
		well-being & communities						
Asia	Application of multi-stakeholder knowledge of tea production practices to climate adaptation planning	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	General climate impacts; Drought; Precipitation variability; Increased frequency and intensity of extreme heat	Institutional; Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Significant	None	Yes	Biggs et al. (2018)
Asia	Autonomous agricultural adaptations in response to increased temperatures and unpredictable precipitation in the Himalaya	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; Drought; Extreme precipitation and inland flooding; Increased frequency and intensity of extreme heat;	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	None	Yes	Biggs et al. (2013)
Asia	Influence of livestock insurance on the household resilience of livestock herders to climate change	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Precipitation variability; Extreme precipitation and inland flooding; Increased frequency and intensity of extreme heat	Institutional	Significant	None	Yes	Biglari et al. (2019)
Asia	Household-level adaptation to climate-caused economic and ecological variability through diversification and livestock management	Poverty livelihoods & sustainable development; Health, well-being & communities; Terrestrial & freshwater ecosystems; Food fibre & ecosystem products	Drought; Increased frequency and intensity of extreme heat; General climate impacts	Behavioural/cultural	Shallow	None	Yes	Brown et al. (2013)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Social ecological factors contributing to adaptation decision-making among smallholders (maize adoption and drip irrigation)	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities; Terrestrial & freshwater ecosystems	General climate impacts; Increased frequency and intensity of extreme heat; Precipitation variability; Drought; Extreme precipitation and inland flooding	Technological/infrastructural; Ecosystem-based; Behavioural/cultural	Significant	No data	Yes	Burnham and Ma (2017)
Asia	Factors influencing perceptions of self-efficacy in terms of climate change adaptation among smallholder farmers.	Food fibre & ecosystem products	Drought; Precipitation variability	Technological/infrastructural	No data	None	Yes	Burnham and Ma (2018)
Asia	Farming adaptations and associated constraints for small ruminant producers	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Increased frequency and intensity of extreme heat; Precipitation variability	Behavioural/cultural	Shallow	None	Yes	Chedid et al. (2018)
Asia	Coffee growers' adaptive strategies and vulnerability in South Asia (agronomic management interventions, crop diversification	Food fibre & ecosystem products	Drought; Precipitation variability; Increased frequency and intensity of extreme heat; General climate impacts	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Chengappa et al. (2017)
Asia	Farmers' responses to climatic limitations using innovative agricultural practices	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; General climate impacts; Drought	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	None	No	Chhetri et al. (2013)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Rainfall-related risks and opportunities for farming; application of cropping strategies to enhance water and soil conservation	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding; Drought; General climate impacts	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Moderate	Low-income groups	Yes	Cornish et al. (2015)
Asia	Local perceptions of impacts of environmental change in two mountain regions (agricultural diversification, soil management, afforestation)	Health, well-being & communities; Food fibre & ecosystem products	General climate impacts; Loss of Arctic Sea ice; Precipitation variability	Ecosystem-based	Shallow	Indigenous; low-income groups; Ethnic minorities	Yes	Dangi et al. (2018)
Asia	Impacts of extreme weather variability for livelihoods and food security, and coping mechanisms employed by mountain farmers	Poverty livelihoods & sustainable development; Food fibre & ecosystem products; Health, well-being & communities	Drought; Precipitation variability; General climate impacts	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	Ethnic minorities; low-income groups	Yes	Delisle and Turner (2016)
Asia	Adaptive water saving behaviours adopted by youth in a drought prone region	Water & sanitation; Poverty livelihoods & sustainable development	Drought	Behavioural/cultural	Shallow	None	Yes	Deng et al. (2017)
Asia	Combining local perceptions and scientific data on climate change variability to prioritize adaptation for resilience in the Himalaya	Food fibre & ecosystem products; Water & sanitation	Drought; Extreme precipitation and inland flooding; General climate impacts	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Shallow	Elderly;	No	Devkota et al. (2017)
Asia	Indigenous forest-fringe farmers' perceptions of and adaptive responses to climate	Food fibre & ecosystem products; Health, well-being & communities;	Drought; Precipitation variability; General climate impacts; Increased frequency and	Ecosystem-based; Behavioural/cultural;	Shallow	Low-income groups; Indigenous	Yes	Dey et al. (2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	change in the eastern Himalaya.	Terrestrial & freshwater ecosystems; Poverty livelihoods & sustainable development	intensity of extreme heat; Extreme precipitation and inland flooding	Institutional; Technological/infrastructural				
Asia	Summary of human-natural system balance in pastoralism management in the Himalaya	Food fibre & ecosystem products	General climate impacts	Institutional; Behavioural/cultural	Moderate	None	No	Dong et al. (2016)
Asia	Livestock farmers' adoption of adaptation measures and coping strategies (changes to grazing and forage management), and driving factors	Food fibre & ecosystem products	Drought; Precipitation variability	Behavioural/cultural	Shallow	None	Yes	Dorji et al. (2016)
Asia	Lived experiences of climate change among rural communities, focused on household reproduction and changing rural political economies	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability	Behavioural/cultural; Institutional	Shallow	None	Yes	Ensor et al. (2019)
Asia	Adaptation strategies implemented by farmers in Sri Lanka (cropping, irrigation, land management, income diversification, rituals)	Food fibre & ecosystem products	Drought; Precipitation variability;	Technological/infrastructural; Behavioural/cultural	Shallow	None	Yes	Esham and Garforth (2013)
Asia	Crop insurance as a risk management strategy for	Food fibre & ecosystem products; Poverty livelihoods &	Extreme precipitation and inland flooding	Institutional	Shallow	None	No	Fahad et al. (2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	farmers affected by flood events	sustainable development; Health, well-being & communities						
Asia	Role of community-based natural resource management in herders' responses to an extreme cold event in Central Asia	Health, well-being & communities; Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; General climate impacts	Institutional; Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Significant	Low-income groups	Yes	Fernández-Giménez et al. (2015)
Asia	Household experiences of and adaptive responses to resource scarcity	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding	Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Forsyth and Evans (2013)
Asia	Communities' awareness of and coping strategies for environmental and climate change-induced health issues	Health, well-being & communities	Sea level rise; Extreme precipitation and inland flooding; General climate impacts	Institutional; Behavioural/cultural; Ecosystem-based	Significant	Youth	Yes	Furu and Van (2013)
Asia	Access to resources (income, education) as a determinant of rural household adaptation strategies	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Precipitation variability; General climate impacts; Drought	Behavioural/cultural; Technological/infrastructural; Institutional	Shallow	Low-income groups; Indigenous	Yes	Gentle et al. (2018)
Asia	Ski businesses' adaptive responses to impacts of climate change	Poverty livelihoods & sustainable development	General climate impacts	Behavioural/cultural	Shallow	None	Yes	Ghaderi et al.)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Environmental and social (gendered) dimensions of of labor migration as an coping strategy for environmental shocks	Poverty livelihoods & sustainable development	General climate impacts	Behavioural/cultural	Shallow	Women; Migrants	Yes	Gioli et al. (2014a)
Asia	Mountain communities' perceptions of and adaptations to environmental change	Poverty livelihoods & sustainable development; Health, well-being & communities	Extreme precipitation and inland flooding; General climate impacts; Precipitation variability	Behavioural/cultural	Shallow	Women	Yes	Gioli et al. (2014b)
Asia	Climate change adaptation benefits of microhydro plants in rural Himalaya	Poverty livelihoods & sustainable development	General climate impacts	Technological/infrastructural	Significant	Youth; Women	No	Gippner et al. (2013)
Asia	Role of social capital in individual farmers' adoption of technology as an adaptation strategy	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems; Water & sanitation; Health, well-being & communities; Poverty livelihoods & sustainable development	Drought; Precipitation variability; Extreme precipitation and inland flooding	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Significant	Ethnic minorities; low-income groups	Yes	Gong et al. (2018)
Asia	Community-based grazing quota systems to build resilience in response to economic, policy, and climatic changes	Health, well-being & communities	Drought; General climate impacts;	Institutional; Behavioural/cultural	Significant	Low-income groups	Yes	Gongbuzeren et al. (2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Adaptation options adopted by tea estate managers (perennial cropping system) in South Asia	Food fibre & ecosystem products	Drought; Extreme precipitation and inland flooding; Precipitation variability; General climate impacts	Ecosystem-based; Technological/infrastructural; Institutional; Behavioural/cultural	Moderate	None	Yes	Gunathilaka et al. (2018)
Asia	Alternative livelihood activities adopted in highland farming communities in response to climate-driven risks of rice shortage	Food fibre & ecosystem products	General climate impacts	Behavioural/cultural; Institutional	Significant	Ethnic minorities	Yes	Hirota (2018)
Asia	Irrigation water use efficiency in small-scale tea production	Food fibre & ecosystem products	Drought	Institutional; Behavioural/cultural	Shallow	None	Yes	Hong and Yabe (2017)
Asia	Farmers' perceptions of and adaptations to drought, and influence of access to early warning information	Food fibre & ecosystem products	Drought	Technological/infrastructural; Behavioural/cultural	Shallow	Youth; Elderly	Yes	Hou et al. (2017)
Asia	Farming adaptations to climate change impacts (cropping, land management) on regional food production in the Hindu-Kush Himalaya	Terrestrial & freshwater ecosystems; Food fibre & ecosystem products	General climate impacts; Precipitation variability; Drought	Institutional; Behavioural/cultural; Technological/infrastructural	No data	Low-income groups	Yes	Hussain et al. (2016)
Asia	Household experiences of changing crop yields, and responses for building agricultural resilience to climate change	Food fibre & ecosystem products	Drought; Extreme precipitation and inland flooding	Technological/infrastructural; Behavioural/cultural	Shallow	Low-income groups	Yes	Hussain et al. (2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Household-level adaptations to climate change in the Western Himalaya	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; Increased frequency and intensity of extreme heat; Precipitation variability; General climate impacts	Technological/infrastructural; Behavioural/cultural	Shallow	Indigenous; low-income groups	Yes	Hussain et al. (2019)
Asia	Indigenous adaptation practices (Traditional Ecological Knowledge, governance) in two high alpine communities in the Himalaya	Health, well-being & communities; Poverty livelihoods & sustainable development	Precipitation variability; General climate impacts	Behavioural/cultural; Institutional	Shallow	Indigenous	Yes	Ingty (2017)
Asia	Impact of agriculture-related external support on farmers' adaptation to climate change in a highland region of Central Asia	Food fibre & ecosystem products	Drought; Increased frequency and intensity of extreme heat; Extreme precipitation and inland flooding; General climate impacts;	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	None	Yes	Jawid and Khadjavi (2019)
Asia	Determinants of adaptive behaviour (changing practices, adoption of technologies) among mountain farming communities in the Himalaya	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability; Drought	Behavioural/cultural; Technological/infrastructural	Shallow	Low-income groups	Yes	Joshi et al. (2017)
Asia	Herders' perceptions of and adaption strategies to climate change in high altitude arid and semi-arid rangeland ecosystems	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Precipitation variability; Increased frequency and intensity of extreme heat; General climate impacts	Behavioural/cultural; Ecosystem-based; Technological/in	Shallow	Migrants; Ethnic minorities	Yes	Joshi et al. (2013)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
				frastructural; Institutional				
Asia	Yield impacts of climate change responses adopted by smallholder farmers	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Increased frequency and intensity of extreme heat; Drought; Precipitation variability	Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Karapinar and Özertan (2020)
Asia	Impacts of climate change and adaptation responses on crop yields, water requirements, and welfare of farm families	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	Precipitation variability; General climate impacts; Drought	Institutional; Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Significant	Low-income groups	Yes	Karimi et al. (2018)
Asia	Rural farmers' autonomous adaptation strategies in a dryland region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; Drought; General climate impacts; Extreme precipitation and inland flooding	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	None	Yes	Kattumuri et al. (2017)
Asia	Impacts of and responses to stages of drought among farmers, (changes to cultivation area, irrigation infrastructure, and water resource use)	Poverty livelihoods & sustainable development	Drought	Technological/infrastructural; Ecosystem-based; Behavioural/cultural	Shallow	Low-income groups	Yes	Keshavarz and Karami (2014)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Farming adaptations in response to drought and climate variability (agronomic management, income diversification, water use)	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Drought; Precipitation variability	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Keshavarz and Karami (2014)
Asia	Drivers of livelihood vulnerability to drought among farming households, and impact of vulnerability on adaptive capacity	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	Drought; General climate impacts	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Keshavarz et al. (2017)
Asia	Factors influencing farmers' decision-making in adoption of adaptation strategies and impacts on farm yields	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding; Precipitation variability; Drought; General climate impacts	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	None	Yes	Khanal et al. (2018b)
Asia	Influence of smallholder farmers' membership in community-based organizations on decisions to adopt adaptive behaviours	Health, well-being & communities; Food fibre & ecosystem products	Drought; Extreme precipitation and inland flooding	Behavioural/cultural; Technological/infrastructural	Moderate	None	No	Khanal and Wilson (2019)
Asia	Factors affecting autonomous adaptation practices among rice farmers, and impacts on rice productivity	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; General climate impacts; Increased frequency and intensity of extreme heat;	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	Khanal et al. (2019b)
Asia	Technical efficiency of smallholder farmers and	Food fibre & ecosystem products	Drought; Extreme precipitation and inland flooding; General	Technological/infrastructural; Ecosystem-	Moderate	None	No	Khanal et al. (2018b)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	adoption of adaptation practices		climate impacts; Precipitation variability	based; Behavioural/cultural; Institutional				
Asia	Adaptation responses in smallholder farms in Nepal and effect on food productivity	Food fibre & ecosystem products	General climate impacts; Drought; Extreme precipitation and inland flooding	Technological/infrastructural; Behavioural/cultural	Shallow	None	Yes	Khanal et al. (2018a)
Asia	Use of an adaptation index to assess determinants of and barriers to adaptation-related responses among smallholder farmers	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding; Precipitation variability; Drought; Increased frequency and intensity of extreme heat	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	None	Yes	Khanal and Wilson (2019)
Asia	Adaptation practices of potato farmers in South Asia and influence of constraints on adoption	Food fibre & ecosystem products; Health, well-being & communities	General climate impacts	Ecosystem-based; Behavioural/cultural; Technological/infrastructural; Institutional	Shallow	No data	Yes	Kharumnuid et al. (2018)
Asia	Socio-cultural implications of climate-related change on traditional livelihoods in a remote mountain region	Food fibre & ecosystem products; Water & sanitation; Poverty livelihoods & sustainable development; Terrestrial & freshwater ecosystems	Precipitation variability	Behavioural/cultural	Shallow	Indigenous	No	Konchar et al. (2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Costs of farmers' adaptations to changes in water availability	Food fibre & ecosystem products; Water & sanitation; Poverty livelihoods & sustainable development; Terrestrial & freshwater ecosystems	Precipitation variability; General climate impacts	Technological/infrastructural; Behavioural/cultural; Institutional; Ecosystem-based	Shallow	None	Yes	Kusters and Wangdi (2013)
Asia	Farmers' perceptions of climate change impacts on agricultural productivity, and adaptive measures adopted in response	Food fibre & ecosystem products	General climate impacts; Precipitation variability; Drought; Increased frequency and intensity of extreme heat; Extreme precipitation and inland flooding	Ecosystem-based	Shallow	None	Yes	Li et al. (2013a)
Asia	Institutional frameworks for supporting local communities to cope with climate-changed induced drought	Poverty livelihoods & sustainable development; Health, well-being & communities	Drought	Institutional; Technological/infrastructural; Ecosystem-based; Behavioural/cultural	Shallow	None	Yes	Li et al. (2013b)
Asia	Farmers' perceptions of warm-drought in an ecologically fragile transition zone, effects on agricultural production and adaptation responses	Food fibre & ecosystem products	Drought; General climate impacts	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	None	Yes	Li et al. (2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Participatory investigation of herders' climate adaptation strategies and associated long-term benefits for grassland management.	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	Drought; Precipitation variability; General climate impacts	Institutional; Behavioural/cultural	Moderate	None	No	Li et al. (2017a)
Asia	Role of community assets (social capital, access to public services) in responding to impacts of drought on grain production	Food fibre & ecosystem products	Drought	Institutional; Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Li et al. (2017b)
Asia	Effects of a state-led sedenterization process on pastoralist adaptation practices	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	Drought; General climate impacts	Behavioural/cultural; Ecosystem-based; Institutional	Shallow	Low-income groups	Yes	Liao and Fei (2017)
Asia	Environmental displacement of farmers; migration as an adaptation strategy in response to degradation of farmland	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	No data	Behavioural/cultural	Shallow	None	Yes	Liu et al. (2018)
Asia	Factors influencing adaptation measures adopted by hill farming communities, and limiting factors hampering adaptive capacity	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts	Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Loria and Bhardwaj)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Mountain communities' perceptions of change and associated livelihood impacts, use of Indigenous and Local Knowledges to mitigate climate risk	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	General climate impacts; Precipitation variability	Ecosystem-based; Behavioural/cultural	Shallow	Women; Ethnic minorities	Yes	Ukamaka and Eberechukwu (2018)
Asia	Effectiveness and challenges in the use of indigenous climate change adaptation measures by bee farmers in a West African region	Food fibre & ecosystem products; Health, well-being & communities	Drought; Extreme precipitation and inland flooding; Precipitation variability	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	Low-income groups	Yes	Macchi et al. (2015)
Asia	Classification of farm households' varying levels of resilience to water scarcity in arid and semi-arid regions	Water & sanitation; Health, well-being & communities; Food fibre & ecosystem products	General climate impacts	Institutional; Technological/infrastructural; Behavioural/cultural	Moderate	None	No	Maleksaeidi et al. (2016)
Asia	Indigenous communities' perceptions of climate change impacts and adaptation strategies adopted by mountain farmers in the Western Himalaya	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems	Precipitation variability; Increased frequency and intensity of extreme heat; Drought; General climate impacts	Ecosystem-based; Technological/infrastructural; Institutional; Behavioural/cultural	Shallow	None	Yes	Meena et al. (2019)
Asia	Local perceptions of climate change impacts on livelihoods; threats and opportunities for adaptation in a high mountain region	Food fibre & ecosystem products	General climate impacts	Behavioural/cultural	Shallow	None	Yes	Merrey et al. (2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Evaluation of climate intervention policies and programmes in a South Asian region, their limitations in accounting for impacts of social stratification	Poverty livelihoods & sustainable development; Health, well-being & communities	Drought; Extreme precipitation and inland flooding; General climate impacts	Technological/infrastructural; Behavioural/cultural; Institutional	Shallow	Low-income groups; Women	Yes	Mili et al. (2016)
Asia	Financial coping responses of rural farming households to agricultural income shocks and losses.	Food fibre & ecosystem products	General climate impacts; Increased frequency and intensity of extreme heat	Behavioural/cultural; Institutional	Shallow	Low-income groups	Yes	Møller et al. (2019)
Asia	Determinants of farmers' decisions on coping strategies employed in response to climatic variability	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding; Drought; Precipitation variability; General climate impacts	Institutional; Behavioural/cultural	Shallow	None	Yes	Mutaqin (2019)
Asia	The role of a civil society organization in enhancing climate resilience and securing carbon stocks in a village setting	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	Drought; General climate impacts	Technological/infrastructural; Ecosystem-based; Institutional	Significant	Indigenous	Yes	Muttaqin et al. (2019)
Asia	Local communities' perceptions of climate change and its impact on agriculture; influence of awareness on adaptive behaviour	Food fibre & ecosystem products	General climate impacts; Precipitation variability; Extreme precipitation and inland flooding; Drought	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	None	Yes	Nasir et al. (2018)
Asia	Indigenous knowledge of local people, perceptions and adaptation responses to	Food fibre & ecosystem products	General climate impacts; Precipitation variability; Extreme	Technological/infrastructural;	Shallow	None	No	Negi et al. (2017)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	climate change in western Himalaya		precipitation and inland flooding	Behavioural/cultural				
Asia	Occurrence and impacts of hydro-meteorological disasters on people's livelihoods, coping strategies for resilience of disaster-prone regions	Terrestrial & freshwater ecosystems; Water & sanitation; Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Extreme precipitation and inland flooding; Drought	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	None	Yes	Nizami et al. (2019)
Asia	The role of local society-environment interactions (social institutions and social capital) in determining adaptive capacity	Food fibre & ecosystem products; Water & sanitation; Terrestrial & freshwater ecosystems; Health, well-being & communities	General climate impacts	Ecosystem-based; Institutional; Behavioural/cultural	Shallow	Women; Youth	Yes	Padigala (2015)
Asia	Farm-level adaptation strategies for improving rice farm income in river basins, perceptions of climate change	Food fibre & ecosystem products; Health, well-being & communities; Terrestrial & freshwater ecosystems; Poverty livelihoods & sustainable development	Drought; General climate impacts; Increased frequency and intensity of extreme heat	Behavioural/cultural; Technological/infrastructural	Shallow	No data	Yes	Palanisami et al. (2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Variation in responses to climate change in Himalayan foothills (modifying cultivation strategies, water conservation) and information-related barriers	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Precipitation variability; Increased frequency and intensity of extreme heat	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Moderate	None	Yes	Pandey et al. (2018)
Asia	The role of community forests in the Himalaya for increasing livelihoods and adaptive capacity, climate mitigation	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems; Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; Increased frequency and intensity of extreme heat; Precipitation variability; General climate impacts	Ecosystem-based; Institutional; Technological/infrastructural; Behavioural/cultural	Shallow	Low-income groups; Ethnic minorities	Yes	Pandey et al. (2016)
Asia	Mountain communities' perceptions of climate variability impacts and responses to overcome associated stresses	Food fibre & ecosystem products; Water & sanitation; Poverty livelihoods & sustainable development	Precipitation variability; Drought; General climate impacts; Increased frequency and intensity of extreme heat; Extreme precipitation and inland flooding	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	Women	Yes	Pandit et al. (2016)
Asia	Factors influencing adaptation practices in a highly marginalized Himalayan Indigenous community	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	Extreme precipitation and inland flooding; Precipitation variability	Technological/infrastructural; Behavioural/cultural	Shallow	Indigenous	Yes	Piya et al. (2013)
Asia	Factors associated with farm level variability in livestock-	Terrestrial & freshwater ecosystems; Water &	Increased frequency and intensity of extreme heat; Drought; General	Behavioural/cultural; Ecosystem-based;	Moderate	Low-income groups	Yes	Poudel (2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	related agricultural adaptations	sanitation; Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	climate impacts; Precipitation variability	Technological/infrastructural				
Asia	Farmers' perceptions of declining availability of/access to water and resulting changes to management practices In a mid-hill region	Food fibre & ecosystem products; Water & sanitation; Cities settlements & key infrastructure	Drought; Extreme precipitation and inland flooding	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Moderate	None	Yes	Poudel and Duex)
Asia	Household perceptions about impacts of climate change on food security, autonomous adaptations in a mountainous region	Food fibre & ecosystem products	General climate impacts; Precipitation variability; Increased frequency and intensity of extreme heat	Behavioural/cultural; Technological/infrastructural	Shallow	Youth	No	Poudel et al. (2017)
Asia	Autonomous adaptation strategies and perceptions of climate change among farmers in a Himalayan region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability; Increased frequency and intensity of extreme heat	Behavioural/cultural; Ecosystem-based	Shallow	Low-income groups	Yes	Pradhan et al. (2015)
Asia	Climate-induced migration as an adaptation response in a remote Himalayan region	Health, well-being & communities	Drought; Precipitation variability;	Behavioural/cultural; Institutional	Shallow	None	Yes	Prasain (2018)
Asia	Farmers' vulnerability to precipitation changes and adaptation-related responses (income diversification, asset	Food fibre & ecosystem products	Extreme precipitation and inland flooding; Precipitation variability; Drought	Behavioural/cultural; Technological/in	Shallow	None	Yes	Pulhin et al. (2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	disposal, water management, religious response)			frastructural; Institutional				
Asia	Climate change risk mitigation strategies adopted by Himalayan farmers and impacts on household income, poverty levels, and wheat yield	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; Drought; Extreme precipitation and inland flooding	Behavioural/cultural; Ecosystem-based	Shallow	None	No	Rahut and Ali (2017)
Asia	Cost-benefit analysis of climate resilient agricultural practices in a Himalayan region	Food fibre & ecosystem products	General climate impacts; Precipitation variability; Drought	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Significant	None	Yes	Rai et al. (2018)
Asia	Comparing responses to water scarcity, climate adaptive and equitable water management practices in two hill towns	Water & sanitation	Drought	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	Low-income groups	Yes	Rai et al. (2019)
Asia	Feminist intersectional approach to understanding climate change adaptation and gender issues	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	General climate impacts; Drought; Extreme precipitation and inland flooding	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	Women	Yes	Ravera et al. (2016)
Asia	Gendered implications of biodiversity-oriented adaptation-related responses	Poverty livelihoods & sustainable development; Food fibre & ecosystem	General climate impacts; Extreme precipitation and inland	Ecosystem-based; Institutional;	Shallow	None	Yes	Ravera et al. (2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	to climate change among female farmers	products; Health, well-being & communities	flooding; Precipitation variability; Drought	Behavioural/cultural				
Asia	Factors and challenges affecting adaptation across a mountainous Himalayan region	Poverty livelihoods & sustainable development	Precipitation variability; Drought; Extreme precipitation and inland flooding; Increased frequency and intensity of extreme heat	Technological/infrastructural; Behavioural/cultural	Significant	None	Yes	Regmi et al. (2015)
Asia	Relationship between farmers' perceptions of water scarcity and responses	Food fibre & ecosystem products; Water & sanitation; Health, well-being & communities	Extreme precipitation and inland flooding; Drought	Technological/infrastructural; Ecosystem-based; Behavioural/cultural	Shallow	None	No	Rezaei et al. (2017)
Asia	Traditional agricultural knowledge as an adaptation strategy for ensuring food security despite water-related hazards (droughts, floods) and climatic variability in South Asia	Water & sanitation; Food fibre & ecosystem products; Terrestrial & freshwater ecosystems	Drought; Extreme precipitation and inland flooding; General climate impacts	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	None	Yes	Rivera-Ferre et al. (2016)
Asia	Determinants of climate change and adaptation-related responses by cereal growing farmers in the Eastern Himalaya	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; Drought	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	Women	Yes	Rymbai and Sheikh (2018)
Asia	Nomadic knowledge of climate change held by local people residing in central Asian rangelands	Food fibre & ecosystem products; Health, well-being & communities	Increased frequency and intensity of extreme heat; Drought; Precipitation variability;	Behavioural/cultural; Technological/infrastructural	Significant	Indigenous	No	Saboohi et al. (2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	The impacts of local knowledge and perceptions of climate change on household/community level responses	Health, well-being & communities; Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Water & sanitation	Extreme precipitation and inland flooding; Precipitation variability; Increased frequency and intensity of extreme heat; Drought; General climate impacts;	Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Sada et al. (2014)
Asia	Prospects for ecosystem-based adaptation based on diverse forest-people interactions in Himalayan community forestry	Food fibre & ecosystem products	General climate impacts	Behavioural/cultural; Ecosystem-based	Moderate	None	Yes	Sapkota et al. (2019)
Asia	Social determinants of adaptation actions (relocation, occupational change, agricultural practices) in the Himalayas	Poverty livelihoods & sustainable development; Food fibre & ecosystem products; Water & sanitation; Health, well-being & communities	Precipitation variability; Drought; General climate impacts	Ecosystem-based; Institutional; Technological/infrastructural; Behavioural/cultural	Shallow	Low-income groups; Indigenous	Yes	Sapkota et al. (2016)
Asia	Potential of Indigenous Knowledge for climate adaptation in Himalayan arid ecosystems	Health, well-being & communities; Terrestrial & freshwater ecosystems; Food fibre & ecosystem products	General climate impacts; Precipitation variability; Drought	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	No data	No	Sarkar et al. (2015)
Asia	Adaptation and coping strategies to strengthen water security in the Himalaya, including autonomous	Water & sanitation; Cities settlements & key infrastructure; Food fibre &	Drought; General climate impacts	Ecosystem-based; Technological/infrastructural;	Shallow	Indigenous; low-income groups	Yes	Sen and Kansal (2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	responses and planned interventions	ecosystem products; Health, well-being & communities; Terrestrial & freshwater ecosystems; Cities settlements & key infrastructure		Institutional; Behavioural/cultural				
Asia	Adoption and efficacy of various household strategies for coping with floods	Water & sanitation; Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding	Technological/infrastructural; Behavioural/cultural	Shallow	Low-income groups	Yes	Shah et al. (2017)
Asia	Adaptive responses among pastoralists in a high mountain plateau region in the Himalaya	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; General climate impacts; Increased frequency and intensity of extreme heat	Technological/infrastructural; Ecosystem-based; Behavioural/cultural	Shallow	None	Yes	Sharif (2019)
Asia	Influence of climate change on the viability of cardamom farming, Indigenous and Local Knowledges informing adaptation responses	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability;	Behavioural/cultural; Institutional; Technological/infrastructural; Ecosystem-based	Shallow	None	No	Sharma et al. (2016)
Asia	Failure of institutional adaptation projects implemented by international NGOs in a Himalayan region	Poverty livelihoods & sustainable development	General climate impacts	Behavioural/cultural; Institutional	Shallow	None	Yes	Sherpa (2015)
Asia	Farmers' adaptations to water scarcity induced by climate change and urbanization	Terrestrial & freshwater ecosystems; Food	Precipitation variability	Behavioural/cultural; Technological/in	Moderate	No data	Yes	Shrestha et al. (2018)

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		fibre & ecosystem products; Poverty livelihoods & sustainable development		frastructural; Institutional				
Asia	Farmers' perceptions of climate change and adaptation measures undertaken by two ethnic communities in Southeast Asia	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Precipitation variability; Extreme precipitation and inland flooding; General climate impacts; Increased frequency and intensity of extreme heat	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	Ethnic minorities	Yes	Shrestha et al. (2017)
Asia	Successful local adaptive measures to improve food security among subsistence farming households	Poverty livelihoods & sustainable development; Food fibre & ecosystem products; Health, well-being & communities	Drought; Extreme precipitation and inland flooding; Precipitation variability; Increased frequency and intensity of extreme heat; General climate impacts	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	Low-income groups	Yes	Shrestha and Nepal (2016)
Asia	Indigenous perceptions of climate change-related issues and adoption of local adaptation strategies	Health, well-being & communities	General climate impacts; Precipitation variability	Behavioural/cultural	Significant	Indigenous	Yes	Shukla et al. (2016)
Asia	Influence of gender and wealth on farmers' perceptions of and adaptation to climate variability in the Eastern Himalaya	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; Drought; Extreme precipitation and inland flooding; General climate impacts; Increased frequency and intensity of extreme heat	Behavioural/cultural; Technological/infrastructural	Shallow	Women; low-income groups; Ethnic minorities	Yes	Singh et al. (2017)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Impact of government interventions (land conversion programmes) on agricultural practices	Food fibre & ecosystem products	General climate impacts	Ecosystem-based; Technological/infrastructural	Moderate	None	Yes	Sjögersten et al. (2013)
Asia	Use of Indigenous Knowledge, discretely and combiend with scientific knowledge, to inform climate adaptation decisions	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	Drought; Extreme precipitation and inland flooding; General climate impacts; Increased frequency and intensity of extreme heat	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	Ethnic minorities; Indigenous	Yes	Son et al. (2019)
Asia	Relevance of gender in responses to climate change in a mountainous region of the Eastern Himalaya	Water & sanitation; Food fibre & ecosystem products	Drought; General climate impacts	Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Su et al. (2017)
Asia	Effects (and co-benefits) of climate-smart agriculture practices	Food fibre & ecosystem products	General climate impacts; Drought	Technological/infrastructural; Behavioural/cultural	Significant	Low-income groups; Indigenous	No	Subedi et al. (2019)
Asia	Implications of people's use of forest resources and experiences of climate change for adaptation practices in a mountainous region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability; Drought	Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Suberi et al. (2018)
Asia	Use of artificial glacier technology to reduce smallholder farmers' risk from climate change impacts and enhance resilience to livelihood stresses	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Precipitation variability	Technological/infrastructural; Ecosystem-based	Moderate	Indigenous; low-income groups	No	Sudan and McKay (2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Use of dynamic modelling to predict farmers' adoption of adaptive practices to enhance farming productivity	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; Increased frequency and intensity of extreme heat	Behavioural/cultural	Shallow	None	No	Sugihardjo et al. (2018)
Asia	Farmers' perceptions of and adaptations to climate change	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Increased frequency and intensity of extreme heat; General climate impacts; Extreme precipitation and inland flooding; Precipitation variability	Behavioural/cultural; Ecosystem-based	Shallow	No data	Yes	Sujakhu et al. (2016)
Asia	Factors responsible for degradation of communal land and adaptability of local management mechanisms for resource conservation	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	General climate impacts; Precipitation variability;	Ecosystem-based; Behavioural/cultural	Shallow	None	Yes	Tabassum et al. (2014)
Asia	Factors affecting maize farmers' household level adaptations to drought	Food fibre & ecosystem products	Drought	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	Low-income groups; Women; Ethnic minorities	Yes	Uy et al. (2015)
Asia	Autonomous adaptations and governing strategies applied by farming households in response to drought in the Eastern Himalaya	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Water & sanitation; Health,	Drought; General climate impacts	Behavioural/cultural; Technological/infrastructural; Institutional	Moderate	None	Yes	van Dijk and Li (2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
		well-being & communities						
Asia	Adaptation strategies of migratory herders in alpine grasslands	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability;	Behavioural/cultural; Ecosystem-based; Technological/infrastructural; Institutional	Moderate	None	Yes	Wang et al. (2016a)
Asia	Perceptions of climate impacts and adaptation actions of households in a Himalayan plateau region	Poverty livelihoods & sustainable development	No data	Ecosystem-based; Institutional; Behavioural/cultural	Shallow	None	Yes	Qin et al. (2017)
Asia	Climate vulnerability in terms of agriculture, review of national-scale policies to address climate change in South Asia	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Sea level rise; Extreme precipitation and inland flooding; Precipitation variability; Increased frequency and intensity of extreme heat	Institutional; Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Moderate	None	Yes	Wang et al. (2017)
Asia	Dynamics of Himalayan pastoral systems influenced by climate and global changes using a commons framework	Health, well-being & communities	Increased frequency and intensity of extreme heat; General climate impacts	Behavioural/cultural; Institutional	Shallow	None	Yes	Wang et al. (2014)
Asia		Food fibre & ecosystem products; Health, well-being &	Extreme precipitation and inland flooding;	Behavioural/cultural; Institutional	Significant	No data	Yes	Wang and Qin (2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
		communities; Poverty livelihoods & sustainable development	Drought; General climate impacts					
Asia	Improved livestock genetics as a climate-smart option to address food security in Central Asia	Food fibre & ecosystem products	General climate impacts; Drought; Increased frequency and intensity of extreme heat	Ecosystem-based; Behavioural/cultural; Institutional; Technological/infrastructural	Moderate	Low-income groups	No	Wilkes et al. (2017)
Asia	Challenges facing rangeland management systems, herders' perceptions of recent trends and adaptation responses	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	General climate impacts; Increased frequency and intensity of extreme heat; Precipitation variability; Drought	Technological/infrastructural; Institutional; Behavioural/cultural	Shallow	None	Yes	Wu et al. (2015)
Asia	Climate risks experienced by mountain societies in Central Asia, and adaptation responses	Cities settlements & key infrastructure; Poverty livelihoods & sustainable development; Water & sanitation; Food fibre & ecosystem products	General climate impacts; Drought; Extreme precipitation and inland flooding; Precipitation variability	Ecosystem-based; Institutional; Behavioural/cultural; Technological/infrastructural	Moderate	No data	Yes	Xenarios et al. (2019)
Asia	Strategies to increase ecosystem and livelihood resilience to future change by improving linkages between conservation action and local adaptation efforts	Health, well-being & communities; Terrestrial & freshwater ecosystems; Food fibre & ecosystem products; Poverty	Precipitation variability; Increased frequency and intensity of extreme heat	Institutional; Technological/infrastructural	No data	Low-income groups	Yes	Xu and Grumbine (2014)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
		livelihoods & sustainable development; Water & sanitation						
Asia	Range of farmers' adaptation choices in response to drought and tourism development	Poverty livelihoods & sustainable development; Food fibre & ecosystem products; Health, well-being & communities; Cities settlements & key infrastructure	Drought	Ecosystem-based; Behavioural/cultural; Institutional; Technological/infrastructural	Shallow	Low-income groups	Yes	Yang et al. (2016)
Asia	Smallholder farmers' perceptions of climate change and adaptations to agricultural activities	Food fibre & ecosystem products	Drought; Precipitation variability; General climate impacts	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Yu et al. (2014)
Asia	Farmers' knowledge of climate change and adoption of adaptation strategies	Food fibre & ecosystem products	General climate impacts	Behavioural/cultural	Shallow	None	No	Yuliati and Primasari (2018)
Asia	Farmers' perceptions, beliefs, adaptation strategies, and barriers associated with climate change, determinants of adaptation choices	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; General climate impacts;	Technological/infrastructural; Behavioural/cultural	No data	None	Yes	Zhai et al. (2018)
Asia	Mechanisms for adapting to economic and environmental changes	Food fibre & ecosystem products	Drought; Increased frequency and intensity of extreme heat	Ecosystem-based; Technological/infrastructural	Significant	None	Yes	Zhang et al. (2015b)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Traditional food knowledge applied as a strategy to safeguard food security during drought, influence on policymaking	Food fibre & ecosystem products	Drought	Behavioural/cultural; Ecosystem-based	Moderate	None	Yes	Zhang et al. (2016a)
Asia	Farmers' responses to climate-induced drought and community-level water management strategies; public-private partnerships as mechanisms to build mountain farmers' resilience to drought	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Drought	Institutional; Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Significant	Low-income groups	Yes	Zhang et al. (2018)
Asia	Sustainable livelihood approach to examine smallholder farmers' risk perceptions and risk management strategies	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts;	Behavioural/cultural	Shallow	Ethnic minorities	Yes	Zhang et al. (2019a)
Asia	Adaptation demands of different regions and different livelihood strategies among farmers, factors affecting adaptation demands	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts	Ecosystem-based; Behavioural/cultural	No data	Low-income groups	No	Zhang et al. (2019b)
Asia	Rural households' perceptions of and responses to hailstorms and drought	Poverty livelihoods & sustainable development; Food fibre & ecosystem products; Health, well-being & communities	Drought	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	Low-income groups	Yes	Zheng and Byg (2014)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Asia	Factors influencing proactive autonomous adaptation actions by rural households, determinants include climate risk perceptions and households' assessments of their adaptive capacity	Food fibre & ecosystem products	Drought; General climate impacts	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Moderate	None	Yes	Zheng and Dallimer (2016)
Asia; Africa	Assessment of agriculture information needs with respect to climate risk management among smallholder farmers	Food fibre & ecosystem products	General climate impacts; Drought; Extreme precipitation and inland flooding	Behavioural/cultural; Institutional; Technological/infrastructural	Shallow	None	Yes	Ranjbar et al. (2019)
Asia; Europe	Impact of a government-led watershed adaptation and development plan in a rural region	Water & sanitation; Poverty livelihoods & sustainable development	Precipitation variability; Sea level rise; General climate impacts; Loss of Arctic Sea ice; Drought; Extreme precipitation and inland flooding	Institutional; Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Significant	Low-income groups; Women	Yes	Khan and Omprakash (2015)
Australia	Responses to changing climatic conditions among stakeholders in the tourism sector to maintain economic viability	No data	Extreme precipitation and inland flooding	Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Hughey and Becken (2014)
Australia	Management actions to support climate adaptation implemented in the context of sustainable forest management	Terrestrial & freshwater ecosystems	Increased frequency and intensity of extreme heat; Precipitation variability	Ecosystem-based	Shallow	None	No	Keenan and Nitschke (2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Australia	Proposed adaptation strategies in the Australian Alps	Health, well-being & communities; Poverty livelihoods & sustainable development	Increased frequency and intensity of extreme heat; Precipitation variability; General climate impacts	Institutional; Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	No data	Yes	Morrison and Pickering (2013a)
Australia	Perceptions of ski resort representatives about climate impacts on the tourism industry, and associated adaptation strategies	Health, well-being & communities	No data	Technological/infrastructural; Behavioural/cultural; Institutional	Moderate	None	Yes	Morrison and Pickering (2013b)
Australia	Relationship between ground water irrigators' interpretations of climate changne risks and implementationn of adaptive water conservation practices	Water & sanitation	General climate impacts	Behavioural/cultural	Shallow	No data	Yes	Sanderson and Curtis (2016)
Central & South America	Agro-ecological strategies (physical, social, and organizational) to increase the social resilience of farmers to respond to climate variability	Food fibre & ecosystem products	Drought	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Moderate	No data	Yes	Acevedo-Osorio et al. (2017)
Central & South America	Agroecological transitions in cultivated mountain environments for agricultural adaptation to climate shocks	Food fibre & ecosystem products	Extreme precipitation and inland flooding; General climate impacts	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	Antonio et al. (2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Central & South America	Factors influencing disaster risk perception and corresponding response measures (relocation, reforestation, capacity building)	Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding; Precipitation variability	Technological/infrastructural; Institutional; Ecosystem-based; Behavioural/cultural	Shallow	Low-income groups	Yes	Ardaya et al. (2017)
Central & South America	Atrategies adopted by coffee producers in Central America to cope with droughts and crop losses due to coffee leaf rust	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	Drought; Precipitation variability	Institutional; Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	Bacon et al. (2017)
Central & South America	Local people's perceptions of climate change and adaptations in the rural Andes (reforestation, infrastructure, cropping changes)	Food fibre & ecosystem products; Health, well-being & communities	General climate impacts; Precipitation variability; Extreme precipitation and inland flooding; Drought	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	None	Yes	Barrucand et al. (2017)
Central & South America	Sustainable agriculture techniques applied in response to climate change and socio-economic stresses, conservation of ecosystem services	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding; Drought; Precipitation variability	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	Low-income groups; Ethnic minorities; Indigenous	No	Borsdorf et al. (2013)
Central & South America	Ecosystem-based solutions for climate adaptation among smallholder grain farmers in Central America	Food fibre & ecosystem products	Drought; Precipitation variability; Extreme precipitation and inland flooding;	Ecosystem-based	Moderate	None	Yes	Chain-Guadarrama et al. (2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Central & South America	Comparison of climate chagne vulnerabilities in agroforestry and conventional farming systems in a South American region	Food fibre & ecosystem products	Increased frequency and intensity of extreme heat; Drought	Ecosystem-based	Significant	Indigenous	Yes	Córdova et al. (2019)
Central & South America	Vulnerability assessment of traditional agriculturalists to climate variability; traditional and novel practices as adaptation strategies to cope with crop losses due to climate shocks	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought	Behavioural/cultural; Ecosystem-based	Moderate	Indigenous	Yes	de la Riva et al. (2013)
Central & South America	Impact of climate awareness on farmers' adaptation decisions in Central America and range of adaptive responses	Food fibre & ecosystem products	General climate impacts; Increased frequency and intensity of extreme heat; Precipitation variability; Extreme precipitation and inland flooding	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Moderate	None	Yes	de Sousa et al. (2018)
Central & South America	Comparing roles of international conservation projects and local organizations in increasing community resilience to climate change	Terrestrial & freshwater ecosystems; Food fibre & ecosystem products	General climate impacts; Extreme precipitation and inland flooding; Precipitation variability; Drought	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Moderate	None	Yes	Doughty (2016)
Central & South America	Perceptions of livelihood diversification as a strategy to cope with disturbances among smallholder coffee farmers in Central America	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts	Behavioural/cultural; Institutional; Technological/infrastructural	Shallow	Low-income groups; Indigenous;	Yes	Gerlicz et al. (2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Central & South America	Community-based adaptation involving micro-watershed management and conservation of local maize varieties in a post-conflict Central American region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities; Terrestrial & freshwater ecosystems	General climate impacts; Drought	Ecosystem-based; Institutional; Technological/infrastructural; Behavioural/cultural	Moderate	Indigenous; low-income groups	No	Hellin et al. (2018)
Central & South America	Smallholder farmers' coping strategies for precipitation variability in the Andes	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Precipitation variability	Ecosystem-based; Behavioural/cultural	Shallow	None	Yes	Herrador-Valencia and Paredes (2016)
Central & South America	Challenges and opportunities for agroforestry initiatives as a strategy for improving food and income security, ecosystem services, biodiversity, and adaptation to climate impacts	Food fibre & ecosystem products	Drought; Precipitation variability; Increased frequency and intensity of extreme heat; Extreme precipitation and inland flooding; General climate impacts	Ecosystem-based	Moderate	None	Yes	Jacobi (2016)
Central & South America	Cocoa farmers' responses to climate change, including agroforestry afforestation, and engagement with certification programmes	Food fibre & ecosystem products	General climate impacts	Ecosystem-based	Moderate	None	No	Jacobi et al. (2015b)
Central & South America	Use of the sustainable livelihoods framework to assess influence of livelihood assets, risk perception, and shocks on smallholder coffee	Food fibre & ecosystem products	General climate impacts; Precipitation variability; Drought; General climate impacts; Extreme	Ecosystem-based; Technological/infrastructural;	Shallow	None	Yes	Jezeer et al. (2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	farmers' decision to adopt agroforestry		precipitation and inland flooding	Behavioural/cultural				
Central & South America	Highland farmers' adaptive responses to climate-related shocks and precipitation variability	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; Drought	Ecosystem-based; Behavioural/cultural	Significant	No data	No	Lennox and Gowdy (2014)
Central & South America	Implementation of adaptation responses to drought in a Southern Andean region	Cities settlements & key infrastructure; Water & sanitation; Food fibre & ecosystem products; Cities settlements & key infrastructure	Drought	Technological/infrastructural; Behavioural/cultural; Institutional	No data	None	Yes	Lillo-Ortega et al. (2019)
Central & South America	Watershed protection compensation programmes implemented collaboratively in two urban contexts	Terrestrial & freshwater ecosystems; Cities settlements & key infrastructure; Water & sanitation; Cities settlements & key infrastructure	Precipitation variability	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Significant	None	Yes	Lindsay (2018)
Central & South America	Adaptation strategies adopted by Andean pastoralists in response to climatic and non-climatic changes	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; General climate impacts; Extreme precipitation and inland flooding; Precipitation variability; Increased frequency and intensity of extreme heat	Behavioural/cultural; Technological/infrastructural; Institutional	Shallow	None	Yes	López-i-Gelats et al. (2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Central & South America	Role of diversification of crop varieties in farmers' adaptation to climate change in an Andean region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Increased frequency and intensity of extreme heat; Precipitation variability; Drought; General climate impacts	Ecosystem-based; Behavioural/cultural	Significant	Indigenous	Yes	Meldrum et al. (2018)
Central & South America	Strategies employed by Andean communities and water user associations to adapt to shifting water availability, key determinants of adaptation	Water & sanitation; Terrestrial & freshwater ecosystems	Drought; Precipitation variability	Institutional; Technological/infrastructural; Ecosystem-based; Behavioural/cultural	Shallow	Low-income groups	Yes	Murtinho et al. (2013)
Central & South America	Role of external funding in supporting rural water organizations' adaptation to change	Water & sanitation	Precipitation variability	Institutional; Technological/infrastructural; Ecosystem-based	No data	None	Yes	Murtinho (2016)
Central & South America	Local perceptions of climate risk and responses in an Andean region	Food fibre & ecosystem products	General climate impacts; Precipitation variability	Institutional; Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	Low-income groups	Yes	(Postigo, 2014)
Central & South America	Potential of microfinance institutions for supporting ecosystem-based adaptation to climate change	Poverty livelihoods & sustainable development	General climate impacts	Technological/infrastructural; Ecosystem-based; Institutional	No data	Low-income groups	Yes	(Rondón-Krummheuer et al., 2015)
Central & South America	Cost benefit analysis of potential climate-smart	Food fibre & ecosystem products	General climate impacts; Increased frequency and intensity	Institutional; Behavioural/cultural; Ecosystem-	Shallow	Low-income groups	Yes	(Sain et al., 2017)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	agriculture options in a Central American region		of extreme heat; Drought	based; Technological/infrastructural				
Central & South America	Potential of urban ecosystem-based measures for reducing landslide risk in an urban context, challenges to implementation	Cities settlements & key infrastructure; Poverty livelihoods & sustainable development; Water & sanitation; Cities settlements & key infrastructure	Extreme precipitation and inland flooding; Precipitation variability	Ecosystem-based; Technological/infrastructural	Shallow	Low-income groups	Yes	(Sandholz et al., 2018)
Central & South America	Indigenous potato farmers' use of traditional knowledge and science in adaptation to climate change through crop variety selection	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	Increased frequency and intensity of extreme heat; General climate impacts; Precipitation variability	Behavioural/cultural; Ecosystem-based; Institutional	Significant	Indigenous	Yes	(Sayre et al., 2017)
Central & South America	Potential benefits of agroforestry systems for improving climate resilience of rural livelihoods in Central America	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought	Ecosystem-based	Shallow	Youth; Women	Yes	(Sibelet et al., 2019)
Central & South America	Changes in the elevation of maize cultivation on a volcano in a South American highlands region	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems	General climate impacts; Precipitation variability; Increased frequency and intensity of extreme heat	Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	(Skarbø and VanderMolen, 2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Central & South America	Participatory water management and policy as a tool for facilitating knowledge of and adaptation to climate impacts on individuals and communities	Water & sanitation; Food fibre & ecosystem products	Extreme precipitation and inland flooding; Drought; General climate impacts	Behavioural/cultural	Significant	Indigenous	Yes	(Stensrud, 2016)
Central & South America	Climate-related risks and responses of farmers in four Andean communities with distinct agro-ecosystems over the past 20 years	Food fibre & ecosystem products	Increased frequency and intensity of extreme heat; Extreme precipitation and inland flooding; Precipitation variability; General climate impacts; Drought	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	None	Yes	(Taboada et al., 2017)
Central & South America	Adaptation responses of coffee farmers in a central Andean region	Food fibre & ecosystem products	General climate impacts; Drought; Precipitation variability; Extreme precipitation and inland flooding; Increased frequency and intensity of extreme heat	Behavioural/cultural; Ecosystem-based; Technological/infrastructural; Institutional	Shallow	None	Yes	(Turbay et al., 2015)
Central & South America	Use of landraces as a mechanism for climate adaptation among smallholder farmers in two agroecosystems	Food fibre & ecosystem products	General climate impacts; Drought; Extreme precipitation and inland flooding; Precipitation variability; Increased frequency and intensity of extreme heat	Behavioural/cultural	Significant	None	Yes	Vasconcelos et al. (2013)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Central & South America	Adaptation efforts of small-scale coffee farming systems in vulnerable agricultural landscapes in Central America	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability; Increased frequency and intensity of extreme heat; Drought	Behavioural/cultural; Ecosystem-based	Moderate	Low-income groups	Yes	(Viguera et al., 2019)
Central & South America	Coffee farmers' diversified planting of tree species as a buffer against temperature increases and rainfall variability	Food fibre & ecosystem products	Increased frequency and intensity of extreme heat; Precipitation variability	Ecosystem-based; Behavioural/cultural	Shallow	None	No	(Viguera et al., 2019)
Central & South America	Smallholder coffee farmers' varietal adaptations to a climate-induced leaf rust outbreak	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; General climate impacts	Behavioural/cultural; Ecosystem-based	Significant	No data	Yes	(Ward et al., 2017)
Central & South America; Asia; Europe	Systematic review of literature on climate adaptation in glaciated mountain regions across the world	Health, well-being & communities; Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding	Institutional; Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Moderate	Elderly; low-income groups; Indigenous; Women	Yes	(McDowell et al., 2014)
Central & South America; Asia; Europe	Climate-related risks for communities affected by mountain cryosphere changes, and adaptation actions at multiple scales	Food fibre & ecosystem products; Water & sanitation; Health, well-being & communities; Cities settlements & key infrastructure; Terrestrial & freshwater ecosystems; Poverty	General climate impacts; Precipitation variability; Drought; Extreme precipitation and inland flooding	Institutional; Technological/infrastructural; Behavioural/cultural	Moderate	Migrants; low-income groups	Yes	(Rasul et al., 2020)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
		livelihoods & sustainable development						
Central & South America; Europe	Adaptive actions in water governance in the Alps and Andes	Water & sanitation; Terrestrial & freshwater ecosystems	Drought; Precipitation variability	Institutional; Technological/infrastructural	No data	None	Yes	(Hill, 2013)
Europe	Adjustment in farming techniques in response to various changes in a Northern European Mountain community	Food fibre & ecosystem products; Health, well-being & communities	General climate impacts; Precipitation variability; Extreme precipitation and inland flooding; Drought	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	None	No	(Daugstad, 2019)
Europe	Climate change awareness, perceptions, and behaviour in the summer ski tourism sector and its vulnerability to climate impacts	Terrestrial & freshwater ecosystems	Sea level rise; Rising ocean temperature and ocean acidification; Loss of Arctic Sea ice; General climate impacts	Technological/infrastructural; Institutional; Behavioural/cultural	Shallow	None	No	(Demiroglu et al., 2018)
Europe	Local "bottom-up" adaptation actions in the Tyrolean Mountain agricultural system, triggered by climatic and non-climatic drivers	Food fibre & ecosystem products	Increased frequency and intensity of extreme heat; Drought; Precipitation variability; Extreme precipitation and inland flooding; General climate impacts	Behavioural/cultural; Institutional; Ecosystem-based; Technological/infrastructural	Moderate	Women	Yes	(Grüneis et al., 2018)
Europe	Forest decision-makers' perceptions of and responses to changing climatic conditions in a Northern European region	Food fibre & ecosystem products	No data	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	None	Yes	(Heltorp et al., 2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Europe	Perceptions of and responses to avalanche risk and infrastructure disruption; implications for lives, livelihoods, and adaptive capacity	Cities settlements & key infrastructure; Health, well-being & communities	No data	Behavioural/cultural; Technological/infrastructural; Institutional	Shallow	Elderly; Youth	Yes	(Hovelsrud et al., 2018)
Europe	Collaborative implementation of sustainability principles in climate adaptation policies in four case studies in the Alps	Water & sanitation	Extreme precipitation and inland flooding; General climate impacts; Precipitation variability	Technological/infrastructural; Institutional	Shallow	None	Yes	(Ingold and Balsiger, 2015)
Europe	Effects of experimental tree thinning as an adaption strategy for reducing stress in drought-sensitive trees and improving resilience to climate shocks	Terrestrial & freshwater ecosystems	Drought; Precipitation variability; General climate impacts	Ecosystem-based; Institutional	No data	None	Yes	(Lechuga et al., 2017)
Europe	Forest managers' and researchers' perceptions of the importance of different adaptation options for responding to forest fires	Terrestrial & freshwater ecosystems; Food fibre & ecosystem products	Increased frequency and intensity of extreme heat; Drought;	Ecosystem-based; Behavioural/cultural; Technological/infrastructural; Institutional	Moderate	None	Yes	(Raftoyannis et al., 2014)
Europe	Local knowledge applied to complement normative and technological risk management practices to improve resilience of climate-affected communities in an Alpine region	Food fibre & ecosystem products; Health, well-being & communities	General climate impacts; Extreme precipitation and inland flooding	Ecosystem-based; Behavioural/cultural; Institutional	Shallow	None	Yes	(Reichel and Frömming, 2014)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Europe	Reindeer herders' changing practices to improve livelihood flexibility and pasture access in response to climate change impacts	Food fibre & ecosystem products	General climate impacts	Behavioural/cultural; Ecosystem-based; Institutional	Shallow	Indigenous	No	(Risvoll and Hovelsrud, 2016)
Europe	Role of trust in shaping citizens' perceptions and actions related to flood risk mitigation	Water & sanitation	Extreme precipitation and inland flooding	Behavioural/cultural	Shallow	None	Yes	(Seebauer and Babcicky, 2018)
Europe	Pastoral adaptation through grassland resource use and associated changes to human-environment interactions and Indigenous practices	Food fibre & ecosystem products; Health, well-being & communities	Loss of Arctic Sea ice; Extreme precipitation and inland flooding; General climate impacts; Precipitation variability	Behavioural/cultural	Shallow	Indigenous; Ethnic minorities	Yes	(Takakura, 2016)
Europe	Engagement of households in natural hazard management; household adaptations to impacts of global change in an Alpine region	Terrestrial & freshwater ecosystems; Health, well-being & communities	Drought; General climate impacts; Increased frequency and intensity of extreme heat; Extreme precipitation and inland flooding; Precipitation variability	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Significant	None	Yes	(Thaler and Seebauer, 2019)
Islands	Geographic extent and contributions of agricultural conservation practices for drought risk mitigation, incentivized by a government support framework	Food fibre & ecosystem products	Drought; Extreme precipitation and inland flooding	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Significant	None	Yes	(Álvarez-Berríos et al., 2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Islands	Assessment of Conservation Agriculture as a strategy for alleviating impacts of climate variations; farmers' perceptions	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Precipitation variability; Extreme precipitation and inland flooding; General climate impacts	Ecosystem-based; Behavioural/cultural	Shallow	None	Yes	(Penot et al., 2018)
Islands	Disaster preparation and coping strategies for cyclone impacts among smallholder farmers	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Extreme precipitation and inland flooding; General climate impacts	Ecosystem-based; Behavioural/cultural	Shallow	Women	Yes	(Rakotobe et al., 2016)
Islands	Assessment of adaptation planning in the Caribbean region	Ocean & coastal ecosystems; Water & sanitation; Food fibre & ecosystem products; Health, well-being & communities	Extreme precipitation and inland flooding; Precipitation variability; Drought; Sea level rise; General climate impacts	Institutional; Behavioural/cultural; Ecosystem-based; Technological/infrastructural	No data	None	Yes	(Thomas et al., 2019)
Islands; Europe	Responses of wine growers to rising temperatures and changing weather patterns in an island context	Food fibre & ecosystem products	General climate impacts	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	(Alonso and Liu, 2013)
Islands; Europe	Access to livelihood assets as a determinant of rural farming communities' adaptations to climate-related and socioeconomic change	Poverty livelihoods & sustainable development; Health, well-being & communities	Extreme precipitation and inland flooding	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	Low-income groups;	Yes	(Currenti et al., 2019)
Africa	Improved soil management practices as an adaptive	Food fibre & ecosystem products;	Drought	Technological/infrastructural; Ecosystem-based	Shallow	None	No	(Abi et al., 2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	response to climate change in an East African region	Health, well-being & communities						
Africa	Agricultural adaptations (calendar, cultivation techniques) to improve corn production in family farms	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; General climate impacts; Increased frequency and intensity of extreme heat; Precipitation variability	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	Low-income groups	Yes	(Aimé et al., 2016)
Africa	Role of trees in diversifying rural livelihoods as an adaptation response to local environmental change	Terrestrial & freshwater ecosystems; Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts	Ecosystem-based; Behavioural/cultural	Significant	Low-income groups	Yes	(Alemayehu and Bewket, 2018)
Africa	Coping and adaptation strategies among smallholder farmers to mitigate the impacts of climate change and variability in an East African highland region	Terrestrial & freshwater ecosystems	Precipitation variability; Drought	Behavioural/cultural	Moderate	None	Yes	(Alemayehu and Bewket, 2017)
Africa	Role of agroforestry in climate-smart agriculture interventions to enhance agricultural yields among smallholder farmers	Food fibre & ecosystem products	Drought; Precipitation variability	Ecosystem-based; Technological/infrastructural	Shallow	None	Yes	(Amadu et al., 2020)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Index-based livestock insurance as a means of financial support to low-income herders in the event of drought-induced livestock mortality	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Increased frequency and intensity of extreme heat; General climate impacts	Behavioural/cultural; Institutional; Technological/infrastructural; Ecosystem-based	Significant	Low-income groups	Yes	(Amare et al., 2019)
Africa	Factors affecting smallholder farmers' adoption of adaptation options in an East African region	Food fibre & ecosystem products	General climate impacts; Precipitation variability; Drought	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Shallow	No data	Yes	(Amare and Simane, 2017)
Africa	Barriers to on-farm adoption of adaptive crop management measures	Food fibre & ecosystem products	General climate impacts	Behavioural/cultural	Shallow	None	Yes	(Amare et al., 2018)
Africa	Pastoral responses and gendered adaptations to land enclosure and fragmentation in an East African region	Poverty livelihoods & sustainable development	Drought; General climate impacts	Behavioural/cultural	Shallow	Women	Yes	(Archambault, 2016)
Africa	Determinants of adaptation choices and their marginal effect of farmers based on farming practices, climate change awareness, and income	Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; Precipitation variability	Behavioural/cultural	Shallow	None	Yes	(Asayehegn et al., 2017)
Africa	Adaptation measures employed by smallholder farmers practicing rainfed agriculture and determinants for adoption	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; Drought; General climate impacts;	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	Low-income groups	Yes	(Asfaw et al., 2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Effect of farmers' climate perceptions on autonomous adaptation in an East African watershed	Terrestrial & freshwater ecosystems; Health, well-being & communities; Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Drought; Precipitation variability; Increased frequency and intensity of extreme heat	Behavioural/cultural; Ecosystem-based; Institutional; Technological/infrastructural	Shallow	None	Yes	(Asrat and Simane, 2018)
Africa	Adaptation options adopted by small scale farmers in a West African region, and plausible policy implications	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Drought; Increased frequency and intensity of extreme heat; Precipitation variability	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Shallow	Low-income groups	Yes	(Awazi et al., 2019)
Africa	Indigenous knowledge, perceptions, and adaptation strategies for agro-pastoral households in a rural West African region	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems	General climate impacts	Institutional; Behavioural/cultural	Shallow	Indigenous; low-income groups	Yes	(Azibo and Kimengsi, 2015)
Africa	Saffron producers' adoption of coping strategies in response to climate impacts in a North African region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	Increased frequency and intensity of extreme heat; Precipitation variability; General climate impacts; Extreme precipitation and inland flooding	Behavioural/cultural; Technological/infrastructural; Institutional	Shallow	Elderly; Women; Youth	No	(Aziz and Sadok, 2015)
Africa	Participatory selection of tree fodder in Indigenous silvo-pasture systems in East Africa	Food fibre & ecosystem products	Drought; Extreme precipitation and inland flooding; General climate impacts	Ecosystem-based	Significant	None	No	(Balehegn et al., 2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Determinants of coping strategies to flooding, influence of social and human capital on household decisions	Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding	Behavioural/cultural	Shallow	Low-income groups	Yes	(Balgah et al., 2019)
Africa	Household socio-economic determinants of climate change adaptation and their policy implications in a West African context	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Precipitation variability; General climate impacts; Increased frequency and intensity of extreme heat; Extreme precipitation and inland flooding	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	Women	Yes	(Bate et al., 2019)
Africa	Maize-dependent smallholders' adaptations to climate change in an East African country	Food fibre & ecosystem products	Drought; Precipitation variability	Technological/infrastructural; Ecosystem-based	Shallow	None	No	(Bedeke et al., 2019)
Africa	Application of an Agricultural Adaptation and Perception model (APP) to identify determinants of adaptation (farmer perceptions, etc)	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; General climate impacts	Technological/infrastructural; Ecosystem-based	Shallow	Migrants	Yes	(Below et al., 2015)
Africa	Pastoralists' perceptions of climate change, livelihood diversification as an adaptive response	Food fibre & ecosystem products	Precipitation variability; Increased frequency and intensity of extreme heat; Drought	Behavioural/cultural; Ecosystem-based	Significant	No data	Yes	(Berhanu and Beyene, 2015)
Africa	Agricultural, economic, and social adaptation strategies among households in two flood- and drought- prone communities in East Africa	Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding	Technological/infrastructural; Behavioural/cultural; Ecosystem-	Shallow	None	Yes	(Berman et al., 2015)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
				based; Institutional				
Africa	Farmer reflexivity in adaptive responses to precipitation variability	Poverty livelihoods & sustainable development	Precipitation variability; Drought; General climate impacts	Behavioural/cultural; Institutional; Ecosystem-based; Technological/infrastructural	Shallow	Women; low-income groups	Yes	(Bhatasara, 2017)
Africa	An Indigenous pastoralist community's interaction with and adaptation to a changing landscape over time using traditional knowledge	Poverty livelihoods & sustainable development	Precipitation variability; Drought	Ecosystem-based; Behavioural/cultural	Significant	Ethnic minorities	Yes	(Biagetti, 2017)
Africa; Asia	Priorities and goals presented in national adaptation planning documents across semi-arid regions of Africa, Asia, Latin America, and the Caribbean	Poverty livelihoods & sustainable development; Health, well-being & communities; Water & sanitation; Food fibre & ecosystem products; Ocean & coastal ecosystems; Terrestrial & freshwater ecosystems	General climate impacts; Drought	Institutional; Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	Low-income groups	Yes	(Bizikova et al., 2015)
Africa	Large scale survey of farmers in an East African country to identify adaptation strategies, determinants of their	Food fibre & ecosystem products; Health, well-being & communities; Poverty	Drought; General climate impacts	Ecosystem-based; Institutional;	Shallow	Low-income groups	Yes	(Brüssow et al., 2017)

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	adoption, and impacts on food security	livelihoods & sustainable development		Technological/infrastructural				
Africa	Changing cultural narratives of livelihoods and environment following a severe flood event in a dryland East African region	Poverty livelihoods & sustainable development; Food fibre & ecosystem products; Water & sanitation	Drought; Increased frequency and intensity of extreme heat	Behavioural/cultural; Ecosystem-based	Significant	None	Yes	(Carabine et al., 2014)
Africa	Development of women's adaptive capacity using a credit plus initiative; gender-specific challenges in relation to climate change	Poverty livelihoods & sustainable development; Health, well-being & communities	Drought; Extreme precipitation and inland flooding	Institutional	Significant	Women	Yes	(Caretta, 2014)
Africa	Factors influencing the adoption of land management practices associated with a World Bank-financed project on' climate-smart' agriculture	Food fibre & ecosystem products	No data	Ecosystem-based; Behavioural/cultural	Shallow	None	No	(Cavanagh et al., 2017)
Africa	Effects of farmer trainings in soil and water conservation on practices, livelihoods, and land-use intensity in an East African highland region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; General climate impacts	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	Women	Yes	(Chesterman et al., 2019)
Africa	Smallholder farmers' adaptation to climate variability through land use management	Food fibre & ecosystem products	General climate impacts; Precipitation variability	Behavioural/cultural; Technological/infrastructural	Shallow	Low-income groups	Yes	(Cholo et al., 2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Participatory approach to understanding vulnerability of rural subsistence farmers to climate risk in an East African context	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability	Institutional; Behavioural/cultural	Significant	Low-income groups;	Yes	(Clay and King, 2019)
Africa		Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Drought; Precipitation variability; Extreme precipitation and inland flooding; General climate impacts	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	Women	Yes	(Cooper and Wheeler, 2017)
Africa	Climate change perceptions and adaptation strategies used by pastoralist communities in East African mountain communities	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; General climate impacts; Drought	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Moderate	Ethnic minorities; low-income groups	Yes	(Cuni-Sanchez et al., 2018)
Africa	Social and private profitability of two alternative state-supported tree-based adaptation techniques in traditional barley cropping/rangeland systems in North Africa	Poverty livelihoods & sustainable development	Drought	Ecosystem-based; Behavioural/cultural	Shallow	None	Yes	(Daly-Hassen et al., 2019)
Africa	Impacts of inter-annual rainfall variability on agro-pastoralist communities and strategies for improving resilience in a North African context	Terrestrial & freshwater ecosystems; Poverty livelihoods & sustainable development	Increased frequency and intensity of extreme heat; Precipitation variability; Extreme precipitation and inland flooding	Behavioural/cultural; Ecosystem-based	Moderate	None	Yes	(Daoudi et al., 2013)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Use of scenarios to anticipate households' decisions regarding livelihood activities in response to future climate change in Southern Africa	Health, well-being & communities; Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Extreme precipitation and inland flooding; Precipitation variability; Drought	Behavioural/cultural	Moderate	None	No	(Dassanayake et al., 2018)
Africa	Adaptation strategies to climate change among crop farmers; socio-economic characteristics of adopters	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; Precipitation variability; Increased frequency and intensity of extreme heat; General climate impacts	Ecosystem-based; Behavioural/cultural	Shallow	Women; low-income groups	Yes	(Dembele et al., 2019)
Africa	Linking climate data on rainfall with farmers' perceptions of impacts and associated coping strategies in an East African context	Food fibre & ecosystem products	Drought; General climate impacts; Precipitation variability;	Behavioural/cultural; Ecosystem-based	Shallow	No data	Yes	(Diem et al., 2017)
Africa	Geopolitical approach to identifying links between rural development policies and climate change in the Atlas Mountains	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems; Water & sanitation	Precipitation variability; General climate impacts	Institutional; Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	(El Jihad, 2016)
Africa	Determinants of responses to climate change impacts on livestock (feed scarcity, heat stress, water shortages, pasture shortages)	Terrestrial & freshwater ecosystems; Food fibre & ecosystem products; Poverty livelihoods &	Increased frequency and intensity of extreme heat; Precipitation variability; Drought; Extreme precipitation and inland flooding; General climate impacts	Behavioural/cultural	Shallow	None	Yes	(Feleke et al., 2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
		sustainable development						
Africa	Climate-smart adaptation methods in a rural East African region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; General climate impacts; Precipitation variability	Behavioural/cultural; Technological/infrastructural	Significant	Low-income groups	Yes	(Fentie and Beyene, 2019)
Africa	Prospects for widespread adoption of drought-tolerant maize varieties as an adaptation strategy for smallholder farmers	Food fibre & ecosystem products	Drought; Precipitation variability	Technological/infrastructural; Behavioural/cultural; Ecosystem-based; Institutional	Shallow	Elderly	Yes	(Fisher and Snapp, 2014)
Africa	Participatory watershed management in response to watershed degradation and erosion in an East African region	Terrestrial & freshwater ecosystems; Food fibre & ecosystem products	Drought; Extreme precipitation and inland flooding; Precipitation variability	Institutional; Ecosystem-based	Shallow	Low-income groups; Indigenous	Yes	(Gebretsadik, 2014)
Africa	Efficiency and effectiveness of clay pots as compared to furrow irrigation	Food fibre & ecosystem products	Drought	Technological/infrastructural	Shallow	None	Yes	(Gebru et al., 2017)
Africa	Traditional agroforestry practices and farm households' knowledge of tree management in diverse agroecology	Food fibre & ecosystem products; Health, well-being & communities; Water & sanitation; Poverty livelihoods & sustainable development	General climate impacts; Drought	Ecosystem-based; Technological/infrastructural	Shallow	None	Yes	(Gebru et al., 2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Gendered nature of climate change impacts and adaptations; variation among male- and female-headed households	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	General climate impacts	Institutional; Behavioural/cultural; Ecosystem-based	Moderate	Women	Yes	(Gorettie et al., 2019)
Africa	Recommendations for coffee farmers to improve climate adaptation through selection of tree species based on provision of ecosystem services; role of gender in adaptation	Food fibre & ecosystem products	Drought; Increased frequency and intensity of extreme heat	Ecosystem-based	Shallow	Low-income groups	No	(Gram et al., 2018)
Africa	Coping mechanisms for livestock management in response to climate variability in an East African context	Food fibre & ecosystem products	Drought; Precipitation variability	Behavioural/cultural	Significant	None	Yes	(Hailegiorgis et al., 2018)
Africa	Efficacy of pastoralist sedentarization as an adaptive response to climate change	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability; Extreme precipitation and inland flooding	Behavioural/cultural	Significant	None	Yes	(Haji and Legesse, 2017)
Africa	Impacts of multiple climate stressors on urban poor communities and individual behavioural responses	Cities settlements & key infrastructure	Extreme precipitation and inland flooding; General climate impacts; Drought; Increased frequency and intensity of extreme heat	Behavioural/cultural	Shallow	Low-income groups	Yes	(Hlahla and Hill, 2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Measures to institutionalise climate responses in three non-metropolitan municipalities	Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; General climate impacts; Increased frequency and intensity of extreme heat	Institutional; Behavioural/cultural	Shallow	None	Yes	(Hlahla et al., 2019)
Africa	Key determinants of responses to precipitation variability	Poverty livelihoods & sustainable development	Drought; Precipitation variability; Increased frequency and intensity of extreme heat	Technological/infrastructural; Ecosystem-based	Moderate	Women; low-income groups	Yes	(Holler, 2014)
Africa	Adaptation strategies (irrigation and new crop varieties) to floods, droughts and winds in Southern Africa	Terrestrial & freshwater ecosystems; Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; General climate impacts	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	No data	Low-income groups	Yes	(Joshua et al., 2016)
Africa	Smallholder farmers' perceptions of climate change and variability compared with observed meteorological data; farm level adaptations	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Increased frequency and intensity of extreme heat; Drought; Precipitation variability; General climate impacts	Behavioural/cultural; Technological/infrastructural	Moderate	None	No	(Kahsay et al., 2019)
Africa	Sustainability of various institutions (formal and informal) under changing climate focusing on irrigation institutions in a rural region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts	Institutional; Technological/infrastructural	Shallow	Indigenous; Women	No	(Kajembe et al., 2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Influence of changes in land use and patterns in soil transfers on natural resources, local adaptation strategies	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Precipitation variability	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	Women	Yes	(Karimoune et al., 2016)
Africa	Autonomous responses adopted by farmers to reduce food security risk to drought	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems; Health, well-being & communities; Water & sanitation; Poverty livelihoods & sustainable development	Drought; Precipitation variability; Extreme precipitation and inland flooding; General climate impacts	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	Low-income groups	Yes	(Kassian et al., 2017)
Africa	Farmer perceptions on current climate variability and long-term changes, current adaptive strategies, and potential barriers for further adaptation	Food fibre & ecosystem products	Precipitation variability; Drought; Increased frequency and intensity of extreme heat	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	No data	Yes	(Kassie et al., 2013)
Africa	Changes in management of group ranches motivated in part by climate change	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	Drought; Increased frequency and intensity of extreme heat; Precipitation variability	Ecosystem-based; Institutional; Technological/infrastructural	Significant	None	Yes	(Kibet et al., 2016)
Africa	Summary of field trials using a range of conservation	Food fibre & ecosystem products; Terrestrial &	Drought; Precipitation variability	Ecosystem-based;	Moderate	Low-income groups	Yes	(Kimaro et al., 2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	agriculture responses to alter resilience	freshwater ecosystems		Technological/infrastructural				
Africa	Adoption of beekeeping as a response to threatened food security in an East African region	Food fibre & ecosystem products	Precipitation variability; General climate impacts; Increased frequency and intensity of extreme heat	Ecosystem-based; Behavioural/cultural	Shallow	None	Yes	(Kimaro et al., 2013)
Africa	Potential of terraces to support farmers' resilience to climate risks	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Precipitation variability	Behavioural/cultural; Ecosystem-based	Shallow	No data	Yes	(Kosmowski, 2018)
Africa	Herders' feeding strategies and perspectives on coping with feed scarcity driven by climate change and urbanization	Terrestrial & freshwater ecosystems; Food fibre & ecosystem products	General climate impacts	Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	(Koura et al., 2015)
Africa	Drivers of water shortages and adaptation strategies to climate change and variability in an East African river basin	Food fibre & ecosystem products; Water & sanitation	Precipitation variability	Behavioural/cultural; Institutional; Ecosystem-based; Technological/infrastructural	Shallow	Women;	Yes	(Lalika et al., 2015)
Africa	Perceptions of climate change and coping strategies among pastoralist communities	Food fibre & ecosystem products	Drought; General climate impacts; Precipitation variability	Behavioural/cultural	Shallow	Ethnic minorities; Migrants	Yes	(Leal Filho et al., 2017)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	East African potato farmers' use of irrigation and intercropping as a climate change adaptation strategy	Food fibre & ecosystem products	Drought; General climate impacts	Technological/infrastructural; Ecosystem-based; Behavioural/cultural	Shallow	None	No	Lemessa et al. (2019)
Africa	Drivers and dynamics of livelihood and landscape change over a 30-year period in two sites in the communal drylands in Southern Africa	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Drought; Precipitation variability; Increased frequency and intensity of extreme heat; General climate impacts	Ecosystem-based; Technological/infrastructural; Behavioural/cultural; Institutional	Shallow	Women; low-income groups	Yes	Masunungure and Shackleton (2018)
Africa	Crop diversification as a coping strategy for climate change impacts in East Africa	Food fibre & ecosystem products	Precipitation variability	Behavioural/cultural; Institutional; Technological/infrastructural	Shallow	None	Yes	McCord et al. (2015)
Africa	Livestock farmers' perceptions of drought, its socioeconomic impacts, and their adaptation strategies in an East African region	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	Drought; General climate impacts	Behavioural/cultural; Institutional	Shallow	Low-income groups	No	Menghistu et al. (2018)
Africa	Institutional interplay between a planned intervention and autonomous response efforts of farmers in an East African region	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Drought; General climate impacts; Precipitation variability	Institutional; Behavioural/cultural; Ecosystem-based	Significant	Low-income groups; Women	Yes	Mersha and van Laerhoven (2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Differences in adaptation of male and female headed households in two drought-prone rural communities in East Africa	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Drought; Precipitation variability; General climate impacts	Behavioural/cultural; Institutional; Ecosystem-based	Shallow	Women	Yes	Mersha and Van Laerhoven (2016)
Africa	Use of sand dams as a potential adaptation measure for increasing availability of surface water resources in Southern Africa	Water & sanitation	Drought; Extreme precipitation and inland flooding; General climate impacts	Technological/infrastructural; Ecosystem-based; Institutional	Significant	Low-income groups	No	Mhlanga (2014)
Africa	Climate change perception and adaptation responses (income diversification, changing agro-ecological practices) among farmers in an East African region	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems	General climate impacts; Precipitation variability	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	None	No	Mihiretu et al. (2019)
Africa	Comparison of smallholder farmers' perceptions of climate change with collected meteorological data across seven agro-ecological zones of East Africa	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability; Extreme precipitation and inland flooding	Ecosystem-based; Behavioural/cultural	Shallow	Low-income groups	No	Mkonda et al. (2018)
Africa	Household observation of changes in temperature and rainfall, and adaptive responses (crop and land management, livelihood diversification)	Food fibre & ecosystem products	Drought; Precipitation variability; Increased frequency and intensity of extreme heat	Ecosystem-based; Technological/infrastructural	Shallow	None	Yes	Moroda et al. (2018)
Africa	Climate change adaptive capacity of smallholder farmers and socioeconomic	Poverty livelihoods & sustainable development; Food	Precipitation variability; Drought	Behavioural/cultural; Technological/in	No data	Low-income groups	Yes	Mpandeli (2014)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	factors associated with farmer vulnerability	fibre & ecosystem products		frastructural; Institutional				
Africa	Farmers' perceptions of climate change, climate-related risks, and adaptation strategies for managing risk associated with impacts on crop and livestock production	Poverty livelihoods & sustainable development	Precipitation variability; Drought; General climate impacts	Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Mubiru et al. (2018)
Africa	Indigenous adaptation measures and Indigenous Knowledge Systems applied in response to climate change in a rural Southern African region	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	Precipitation variability; Drought; Increased frequency and intensity of extreme heat; General climate impacts	Behavioural/cultural; Ecosystem-based	Shallow	Elderly; Indigenous	No	Mugambiwa (2018)
Africa	Uptake of adaptation strategies among smallholder farmers and limitations to adoption	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; General climate impacts	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	Mugi-Ngenga et al. (2016)
Africa	Small-scale farmers' responses to climate-induced drought in two cases with contrasting environmental and human features	Poverty livelihoods & sustainable development; Food fibre & ecosystem products; Water & sanitation	Drought; Extreme precipitation and inland flooding	Technological/infrastructural; Behavioural/cultural	Shallow	Low-income groups	Yes	Muita et al. (2016)
Africa	Influence of insecure housing on autonomous adaptation at the household level in an	Poverty livelihoods & sustainable development; Water & sanitation	Extreme precipitation and inland flooding	Technological/infrastructural; Behavioural/cultural; Institutional	Significant	Low-income groups	Yes	Mulligan et al. (2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	informal settlement in East Africa							
Africa	Efficacy of interventions aimed at building pastoralists' resilience to climate change-related shocks; factors affecting household resilience	Poverty livelihoods & sustainable development	Drought; Precipitation variability	Ecosystem-based; Behavioural/cultural	Shallow	Low-income groups	Yes	Muricho et al. (2019)
Africa	Vulnerability levels (particularly among women and children) and coping strategies of pastoralist communities in East Africa	Poverty livelihoods & sustainable development; Health, well-being & communities	General climate impacts; Precipitation variability; Drought	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	None	Yes	Muriithi et al. (2017)
Africa	Factors affecting farmers' utilization of rainwater harvesting and saving technologies in response to climate risks	Food fibre & ecosystem products; Water & sanitation; Health, well-being & communities; Poverty livelihoods & sustainable development	Drought; Precipitation variability	Technological/infrastructural; Behavioural/cultural; Institutional	Moderate	Low-income groups	Yes	Muriu-Ng'ang'a et al. (2017)
Africa	The roles of local government and households in flood response in a Southern African region	Water & sanitation; Cities settlements & key infrastructure	Extreme precipitation and inland flooding	Technological/infrastructural; Behavioural/cultural; Institutional	Shallow	Low-income groups;	Yes	Musyoki et al. (2016)
Africa	Associations between smallholder farmer perceptions of climate change and household adaptation strategies adopted	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Precipitation variability; General climate impacts	Ecosystem-based; Technological/infrastructural;	Significant	No data	Yes	Mutandwa et al. (2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
				Behavioural/cultural				
Africa	Impacts of early alert and community involvement in disaster risk reduction in an East African region	Poverty livelihoods & sustainable development; Food fibre & ecosystem products; Water & sanitation	Drought; Extreme precipitation and inland flooding;	Technological/infrastructural; Ecosystem-based; Institutional; Behavioural/cultural	Moderate	Low-income groups	Yes	Nahayo et al. (2017)
Africa	Adaptations to seasonal variability in precipitation, including timing of planting choices, migration, and adoption of agricultural innovations	Poverty livelihoods & sustainable development	Precipitation variability; Drought; Extreme precipitation and inland flooding; General climate impacts	Ecosystem-based	Shallow	Migrants	Yes	Ng'ang'a et al. (2016a)
Africa	Effects of natural environment and market accessibility on coping and adaptation strategies of pastoralists	Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding	Behavioural/cultural	Moderate	Low-income groups	Yes	Ng'ang'a et al. (2016b)
Africa	Adoption of adaptation practices among pastoralists and agro-pastoralists; influence of access to effective local institutions	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; Precipitation variability	Ecosystem-based; Institutional; Behavioural/cultural	Moderate	Indigenous	No	Ng'ang'a et al. (2016c)
Africa	Gendered adoption of adaptation actions within households; drivers of adoption of climate-smart agriculture	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health,	Drought; Extreme precipitation and inland flooding; Precipitation variability; General climate impacts	Technological/infrastructural; Ecosystem-based; Institutional;	Shallow	Low-income groups; Women	Yes	Ngigi et al. (2017)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
		well-being & communities		Behavioural/cultural				
Africa	Community-based adaptation strategies for coping with droughts and floods in small watersheds	Food fibre & ecosystem products; Water & sanitation; Poverty livelihoods & sustainable development	Drought; General climate impacts; Extreme precipitation and inland flooding	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Moderate	Low-income groups	Yes	Nguimalet (2018)
Africa	Potential for promoting sorghum crop as a climate change adaptation strategy	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Drought; General climate impacts; Precipitation variability	Technological/infrastructural; Ecosystem-based	Shallow	None	Yes	Njeru Njeru et al. (2015)
Africa	Pastoralist adaptation strategies and need for improved weather/climate information to guide decision-making	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems; Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; Precipitation variability; General climate impacts	Behavioural/cultural; Technological/infrastructural; Institutional	Shallow	Indigenous; Women; Migrants	Yes	Nkuba et al. (2019)
Africa	Stocktaking of agroforestry practices in relation to climate perceptions in an East African region	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems; Health, well-being & communities	General climate impacts	Ecosystem-based; Behavioural/cultural	Shallow	None	Yes	Nyaruai (2009)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Farmer adoption of climate-smart agricultural practices and innovation after exposure to Farms of the Future Approach	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Terrestrial & freshwater ecosystems	Precipitation variability; General climate impacts; Increased frequency and intensity of extreme heat; Drought; Extreme precipitation and inland flooding	Behavioural/cultural; Ecosystem-based; Technological/infrastructural; Institutional	Moderate	Women; low-income groups;	Yes	Nyasimi et al. (2017)
Africa	Agroforestry practices (agrosilvicultural, silvopastoral, and agrosilvopastoral) among smallholder farmers	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	Precipitation variability; Increased frequency and intensity of extreme heat; General climate impacts; Drought	Ecosystem-based; Behavioural/cultural	Moderate	None	No	Nyong et al. (2020)
Africa	Adaptive responses to historical climate extremes (drought, heavy rain events); role of a highland cooperative local development institution in supporting adaptive efforts	Poverty livelihoods & sustainable development	Drought	Ecosystem-based; Technological/infrastructural; Institutional	Significant	Ethnic minorities; Women	No	Oettle and Koelle (2016)
Africa	Coping strategies (rainwater harvesting, tree planting) used by forest-based rural communities in response to climate variability and other changes	Poverty livelihoods & sustainable development; Food fibre & ecosystem products; Health, well-being & communities	Precipitation variability; Drought; Extreme precipitation and inland flooding; Increased frequency and intensity of extreme heat	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	Low-income groups	Yes	Ofoegbu et al. (2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Agro-weather tools employed in climate smart agriculture, and impacts of their use on adaptive capacity of farming communities	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Drought; Increased frequency and intensity of extreme heat; Precipitation variability	Technological/infrastructural; Behavioural/cultural; Institutional; Ecosystem-based	Significant	Women; low-income groups	Yes	Oladele et al. (2019)
Africa	Role of collective action in enhancing local adaptation to climate variability	Poverty livelihoods & sustainable development	General climate impacts; Drought; Precipitation variability	Ecosystem-based; Behavioural/cultural	Shallow	None	No	Ombogoh et al. (2018)
Africa	Drought characteristics and varied responses to drought stressors employed by East African pastoralists; limits to adaptation	Food fibre & ecosystem products	Drought; Precipitation variability; General climate impacts; Increased frequency and intensity of extreme heat	Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Moderate	Low-income groups; Ethnic minorities; Migrants	Yes	Opiyo et al. (2015)
Africa	Factors affecting the climate change adaptive capacity in a rural East African region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; Drought	Behavioural/cultural	Shallow	Ethnic minorities; Migrants	Yes	Opiyo et al. (2016)
Africa	Role of Indigenous Knowledge in climate adaptation in a Southern African highland region	Poverty livelihoods & sustainable development	General climate impacts; Drought; Extreme precipitation and inland flooding; Precipitation variability	Behavioural/cultural; Ecosystem-based	Shallow	Elderly	Yes	Palframan (2015)
Africa	Perceptions of effects of flood and drought on natural resource based livelihoods in an arid East African region; integration of perceptions	Food fibre & ecosystem products	Drought; Extreme precipitation and inland flooding; General climate impacts	Behavioural/cultural; Ecosystem-based	Moderate	Low-income groups	Yes	Quandt and Kimathi (2017)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	into larger scale adaptation initiatives							
Africa	Agroforestry as an adaptive response to build livelihood resilience	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems; Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding	Ecosystem-based; Behavioural/cultural	Shallow	None	No	Quandt et al. (2017)
Africa	Development of livelihood resilience through agroforestry and associated co-benefits (financial capital, improved quality of life, conservation) in a semi-arid region	Health, well-being & communities; Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Drought	Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	Quandt et al. (2019)
Africa	Coffee farmers' adoption of ecosystem-based adaptation in response to high temperatures and longer dry seasons; benefits of intercropping as a sustainable intensification option	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Increased frequency and intensity of extreme heat; Precipitation variability; Extreme precipitation and inland flooding	Ecosystem-based	Moderate	Low-income groups	Yes	Rahn et al. (2018)
Africa	Indigenous knowledge and perceptions of climate change; development of adaptation processes to assist vulnerable rural communities	Food fibre & ecosystem products	Increased frequency and intensity of extreme heat; Precipitation variability; Drought	Behavioural/cultural	No data	None	No	Rankoana (2016b)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Rituals used by rural women as a response to rainfall scarcity; Indigenous coping structures to reduce vulnerability	Food fibre & ecosystem products	Precipitation variability	Behavioural/cultural	Shallow	Women; Indigenous	No	Rankoana (2016a)
Africa	Farming communities' responses to precipitation variability and drought with rainwater harvesting and conservation techniques	Terrestrial & freshwater ecosystems; Water & sanitation; Food fibre & ecosystem products	Drought; Precipitation variability	Ecosystem-based; Technological/infrastructural; Institutional	Significant	Low-income groups	Yes	Recha et al. (2015)
Africa	Efficacy of a knowledge co-production process for reducing disaster risk and guide adaptation efforts	Health, well-being & communities	Drought; Extreme precipitation and inland flooding;	Institutional; Ecosystem-based	Significant	None	Yes	Reyers et al. (2015)
Africa	Annual rainfall time series (1970 - 2011) as a proxy for climate trends and effects of rainfall on farming in a North African region	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Drought; Increased frequency and intensity of extreme heat; Precipitation variability	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Significant	Low-income groups; Migrants	No	Rouabhi et al. (2019)
Africa	Different typologies and agricultural changes caused by climatic constraints experienced in recent decades in a North African region	Poverty livelihoods & sustainable development	Precipitation variability; General climate impacts	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	Elderly	Yes	Rouabhi et al. (2016)
Africa	Communities' coping responses for climate variation, influences of vulnerability and role of	Poverty livelihoods & sustainable development; Health,	Drought	Behavioural/cultural	Significant	Women; Youth	Yes	Rovin et al. (2013)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	family planning as an adaptive strategy to increase resilience	well-being & communities						
Africa	Effect of adoption of soil conservation practices on farmers' technical efficiency and productivity	Food fibre & ecosystem products	General climate impacts; Drought	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	Low-income groups	No	Salat and Swallow (2018)
Africa	Socio-economic factors influencing agro-pastoral communities in response to climate change	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Increased frequency and intensity of extreme heat; Precipitation variability; Drought	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	Women	Yes	Sangeda et al. (2013)
Africa	Water consumption and competition in three agroforestry coffee cultivation systems	Food fibre & ecosystem products	Increased frequency and intensity of extreme heat; Precipitation variability	Ecosystem-based	Shallow	None	Yes	Sarmiento-Soler et al. (2019)
Africa	Farmers' adaptation strategies and attitudes towards risk management practices; determinants of adaptation	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Increased frequency and intensity of extreme heat; General climate impacts; Precipitation variability; Extreme precipitation and inland flooding;	Technological/infrastructural; Ecosystem-based; Behavioural/cultural	Shallow	Low-income groups	Yes	Shikuku et al. (2017)
Africa	Farming households' anxieties about climate change, vulnerability to climate change and food	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; Precipitation variability; Increased	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	Low-income groups	Yes	Shisanya and Mafongoya (2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	insecurity, and potential adaptation options		frequency and intensity of extreme heat					
Africa	Effects of climate variability and factors determining Indigenous climate adaptation strategies among smallholder farmers	Food fibre & ecosystem products	Increased frequency and intensity of extreme heat; Precipitation variability; Drought	Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Shumetie and Alemayehu (2017)
Africa	Contributions of a community-based watershed development program in reducing farmers' vulnerability to climate impacts in an East African highland region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Drought; Extreme precipitation and inland flooding; Precipitation variability	Institutional; Ecosystem-based	Moderate	Low-income groups	Yes	Siraw et al. (2018)
Africa	Framings and priorities of adaptation in an East African country's climate policy and implications for the role of local institutions and rural people in adaptation	Health, well-being & communities; Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Drought; General climate impacts; Extreme precipitation and inland flooding	Ecosystem-based; Technological/infrastructural; Behavioural/cultural; Institutional	Significant	Low-income groups; Ethnic minorities	Yes	Smucker et al. (2015)
Africa	Influence of social differences and inequalities on climate change adaptation among smallholder farmers	Food fibre & ecosystem products; Health, well-being & communities; Poverty livelihoods & sustainable development	Drought; Precipitation variability; General climate impacts; Extreme precipitation and inland flooding	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	Women; low-income groups	Yes	Stefanovic et al. (2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Voluntary adoption of agricultural land management practices to reduce hazard exposure	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems	General climate impacts; Drought; Extreme precipitation and inland flooding	Institutional; Ecosystem-based; Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Sullivan-Wiley and Short Gianotti (2018)
Africa	Local climate change adaptation and coping mechanisms in livestock feeding systems in an East African region	Food fibre & ecosystem products	General climate impacts; Drought	Behavioural/cultural	Shallow	None	No	Syomiti et al.)
Africa	Context-specific dimensions of socio-ecological vulnerability for smallholder farmers, including access to water resources, agricultural knowledge, and inequalities among farmers	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought	Behavioural/cultural; Technological/infrastructural	Shallow	None	Yes	Teller (2016)
Africa	Smallholder farmers' perceptions of climate change, access to information; factors and barriers influencing adaptation strategies	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts;	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Moderate	Low-income groups	Yes	Tessema et al. (2013)
Africa	Determinants of non-technological adaptation responses, influence of farming experience versus financial resources and education	Food fibre & ecosystem products	General climate impacts	Technological/infrastructural; Behavioural/cultural	Shallow	None	Yes	Tessema et al. (2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Climate adaptations adopted by rural households in an East African region	Terrestrial & freshwater ecosystems; Food fibre & ecosystem products	Precipitation variability	Technological/infrastructural; Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	Tessema et al. (2019a)
Africa	Perceptions and adoption of crop switching to reduce damage from climate change	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts	Behavioural/cultural	Shallow	None	Yes	Tessema et al. (2019b)
Africa	Financial adaptation behaviour of maize-legume farm households facing climate shocks in a rural East African region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; Precipitation variability	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	Women; low-income groups	Yes	Tongruksawattana and Wainaina (2019)
Africa	Relationship between rainfall data and household self-reported harvest shocks and local (spatial) variability of harvest shocks and coping strategies	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Precipitation variability	Behavioural/cultural; Ecosystem-based; Institutional	Shallow	None	No	Trærup (2012)
Africa	Influence of livelihoods and household characteristics on relationships between perceptions of drought and food insecurity and corresponding coping responses	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Drought; General climate impacts	Behavioural/cultural	Shallow	Low-income groups	Yes	Twongyirwe et al. (2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Variation in adoption of different adaptive strategies (livelihood diversification) among households due to gender and marital status	Poverty livelihoods & sustainable development	Drought; Precipitation variability; Extreme precipitation and inland flooding; Increased frequency and intensity of extreme heat	Behavioural/cultural	Shallow	Women	Yes	Van Aelst and Holvoet (2016)
Africa	Factors influencing the adoption of household and individual level adaptation practices among small-scale farmers	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; General climate impacts; Drought	Technological/infrastructural; Behavioural/cultural; Ecosystem-based; Institutional	Shallow	Women	Yes	Van Aelst and Holvoet (2018)
Africa	Contributions of state and private actors to improved flood risk management in a medium-scale West African city	Cities settlements & key infrastructure	Extreme precipitation and inland flooding; General climate impacts	Institutional	Significant	Low-income groups	Yes	Vedeld et al. (2016)
Africa	Community-based adaptation and challenges for water resources management in an East African highlands region	Water & sanitation	Precipitation variability	Ecosystem-based; Behavioural/cultural	Shallow	No data	No	Velempini et al. (2018)
Africa	Adoption of camel-rearing as a means of adapting to climate change	Poverty livelihoods & sustainable development	Drought	Behavioural/cultural	Moderate	Indigenous	Yes	Volpato and King (2019)
Africa	Pastoralists' use of camels in cattle-dominated herds as an adaptive strategy to mitigate food insecurity and cope with frequent droughts	Food fibre & ecosystem products; Health, well-being & communities	Drought; General climate impacts; Increased frequency and intensity of extreme heat; Precipitation variability	Behavioural/cultural; Ecosystem-based	Significant	No data	No	Wako et al. (2017)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Gender and wealth constraints to adaptive practices (autonomous responses) among pastoralists in an East African region	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	General climate impacts; Precipitation variability; Increased frequency and intensity of extreme heat; Drought	Behavioural/cultural; Institutional; Technological/infrastructural	Shallow	Women; low-income groups	Yes	Wangui and Smucker (2018)
Africa	Role of local rural organizations in framing responses to climate variability and change	Health, well-being & communities; Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts	Behavioural/cultural; Institutional; Ecosystem-based; Technological/infrastructural	Shallow	Low-income groups	Yes	Washington-Ottombre and Pijanowski (2013)
Africa	Farmers' preferences for, and barriers to, adopting climate-smart agricultural practices	Poverty livelihoods & sustainable development	Precipitation variability; Drought; Extreme precipitation and inland flooding; General climate impacts	Technological/infrastructural; Institutional; Ecosystem-based	Shallow	Women	Yes	Wassie and Pauline (2018)
Africa	Determinants of choice and the effect of climate-smart agricultural practices on household food security among smallholder farmers	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability; Extreme precipitation and inland flooding	Technological/infrastructural; Ecosystem-based; Behavioural/cultural	Shallow	Women; low-income groups	Yes	Wekesa et al. (2018)
Africa	Inefficacy of an institutional social protection programme for income diversification, including unintended negative impacts on natural resource use	Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability; Drought	Behavioural/cultural; Institutional	Moderate	Low-income groups	No	Weldegebriel and Prowse (2013)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Smallholder farmers' perceptions of climate variability and diversification options pursued both within and outside agriculture	Food fibre & ecosystem products	Drought; General climate impacts; Precipitation variability	Ecosystem-based; Technological/infrastructural	Shallow	None	No	Weldegebriel and Prowse (2017)
Africa	Influence of normative practices and ideas of identity on changes in social and biophysical contexts and adaptation-relevant responses	Health, well-being & communities; Poverty livelihoods & sustainable development	Drought	Behavioural/cultural	No data	Ethnic minorities; Indigenous	Yes	Wernersson (2018)
Africa	Impact and drivers of adoption of landscape restoration and water harvesting as a strategy to enhance resilience to climate/rainfall variability, assessment of planned interventions	Terrestrial & freshwater ecosystems; Water & sanitation	Extreme precipitation and inland flooding; Drought; General climate impacts	Ecosystem-based; Technological/infrastructural; Institutional	Significant	No data	Yes	Woldearegay et al. (2018)
Africa	Barriers to a range of adaptation strategies adopted by farming communities (livelihood diversification, altered agricultural practices, water management)	Poverty livelihoods & sustainable development	Drought; Precipitation variability; Extreme precipitation and inland flooding	Technological/infrastructural; Behavioural/cultural	Shallow	None	Yes	Yohannes et al. (2020)
Africa	Socio-psychological factors which contribute to agroforestry managers adopting sustainable agriculture practices	Food fibre & ecosystem products	Drought	Ecosystem-based	Shallow	Low-income groups	Yes	Zeweld et al. (2018)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa	Enabling conditions for collaborative governance to facilitate local adaptation action	Health, well-being & communities; Water & sanitation	Drought; Extreme precipitation and inland flooding; General climate impacts	Institutional; Behavioural/cultural	Significant	Indigenous	Yes	Ziervogel et al. (2019)
Africa	Adaptation practices adopted by farmers in an East African region to cope with climate change impacts using available on-farm technologies	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Precipitation variability; General climate impacts; Increased frequency and intensity of extreme heat; Extreme precipitation and inland flooding; Drought	Behavioural/cultural; Technological/infrastructural	Shallow	Elderly	Yes	Zizinga et al. (2017)
Africa	Assessment of local communities' vulnerability and climate adaptation strategies using participatory action research	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	Drought; Precipitation variability; General climate impacts	Behavioural/cultural; Ecosystem-based	Shallow	Low-income groups; Elderly	Yes	Bele et al. (2014)
North America	Barriers to both intentional and incidental climate-adaptive forest management practices	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems	General climate impacts; Drought	Ecosystem-based; Behavioural/cultural; Institutional	Significant	Low-income groups	Yes	Boag et al. (2018)
North America	Grassroots adaptive responses of smallholder farmers in light of gendered vulnerabilities to climate change and water scarcity	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities; Water & sanitation	Drought; General climate impacts	Ecosystem-based; Behavioural/cultural	Shallow	Women	Yes	Buechler (2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
North America	Perceptions of change in meteorological conditions, climate change, and primary coping strategies in five municipalities with a shared Indigenous identity	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	Precipitation variability;	Ecosystem-based	Shallow	Indigenous	Yes	Gonzalez Martínez et al. (2017)
North America	Role of farmer groups and neoliberal policy reforms in livelihood adaptation of smallholder maize farmers	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	No data	Ecosystem-based; Institutional; Behavioural/cultural	No data	Low-income groups	Yes	Groenewald and Niehof (2015)
North America	Roles of human behavioural, institutional, and technical factors in shaping responses to federal adaptation directives at sub-regional scales; managers' perceptions and opinions of climate adaptation	Terrestrial & freshwater ecosystems	General climate impacts	Ecosystem-based; Institutional; Behavioural/cultural	Shallow	None	Yes	Hagerman (2016)
North America	Vulnerability of forest resources to climate change and potential adaptation strategies in forest management	Terrestrial & freshwater ecosystems	Drought; General climate impacts; Increased frequency and intensity of extreme heat	Ecosystem-based	Moderate	None	Yes	Halofsky et al. (2016)
North America	Systematic review of government-led climate change adaptation policies and initiatives at federal,	Ocean & coastal ecosystems; Poverty livelihoods & sustainable development;	Loss of Arctic Sea ice; General climate impacts; Precipitation variability; Extreme	Institutional; Technological/infrastructural; Behavioural/cult	Moderate	Indigenous; Elderly	Yes	Labbé et al. (2017)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	territorial, and community levels	Terrestrial & freshwater ecosystems; Health, well-being & communities	precipitation and inland flooding; Sea level rise	ural; Ecosystem-based				
North America	Perceptions of stakeholders involved with a Rocky Mountain River watershed on shifting runoff cycles, their effects on social-ecological system, and corresponding adaptation strategies	Terrestrial & freshwater ecosystems	Drought; General climate impacts; Precipitation variability	Ecosystem-based; Behavioural/cultural	Significant	None	Yes	Lamborn and Smith (2019)
North America	Local development organizations and their contribution to climate change adaptation strategies; perspectives of women members	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Health, well-being & communities	Drought; Precipitation variability; General climate impacts	Institutional; Behavioural/cultural	Moderate	Women; Indigenous	Yes	Lookabaugh (2017)
North America	Household adaptive strategies in response to imposed caribou hunting limits	Poverty livelihoods & sustainable development; Food fibre & ecosystem products	General climate impacts	Behavioural/cultural; Technological/infrastructural	Significant	Low-income groups; Indigenous	No	Martin (2015)
North America	Influence of local context on drought management responses implemented by resource managers	Terrestrial & freshwater ecosystems; Health, well-being & communities	Drought; General climate impacts	Ecosystem-based; Institutional; Technological/infrastructural; Behavioural/cultural	Moderate	Indigenous	No	McNeeley et al. (2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
North America	Interactions between public (civil society) and private (individual) flood hazard mitigation efforts in a watershed	Terrestrial & freshwater ecosystems; Cities settlements & key infrastructure; Health, well-being & communities	Extreme precipitation and inland flooding; Precipitation variability; General climate impacts	Behavioural/cultural; Ecosystem-based; Institutional; Technological/infrastructural	Significant	None	Yes	Milman and Warner (2016)
North America	Adaptation of maize production systems by rural communities	Food fibre & ecosystem products	Drought; Precipitation variability; Increased frequency and intensity of extreme heat	Behavioural/cultural	No data	Low-income groups	No	Munguía-Aldama et al. (2015)
North America	Implementation of the Adaptive Silviculture for Climate Change project in two study sties, contributions of a collaborative science-management partnership	Terrestrial & freshwater ecosystems	Drought; General climate impacts; Precipitation variability;	Ecosystem-based; Institutional	Significant	None	Yes	Nagel et al. (2017)
North America	Promise and efficacy of ecosystem-based adaptation interventions applied in two field sites	Terrestrial & freshwater ecosystems; Poverty livelihoods & sustainable development	Extreme precipitation and inland flooding; General climate impacts; Drought	Ecosystem-based; Behavioural/cultural; Institutional	Shallow	Women	Yes	Newsham et al. (2018)
North America	Individual actions (behavioural and psychological adaptations) taken by forest managers and users in response to forest dieback	Food fibre & ecosystem products; Terrestrial & freshwater ecosystems; Health, well-being & communities	General climate impacts	Behavioural/cultural; Ecosystem-based	Shallow	None	Yes	Oakes et al. (2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
North America	Processes of implementation of adaptation strategies	Terrestrial & freshwater ecosystems	Extreme precipitation and inland flooding; Precipitation variability; Increased frequency and intensity of extreme heat; General climate impacts;	Ecosystem-based; Institutional; Technological/infrastructural	Shallow	None	Yes	Picketts (2015)
North America	Process of producing a local climate adaptation plan for a small North American city	Cities settlements & key infrastructure	Precipitation variability; Extreme precipitation and inland flooding; Drought	Institutional	No data	None	No	Picketts et al. (2013)
North America	Adaptation to climate change among ski resort companies relative to the intensity of environmental adversity they face	Food fibre & ecosystem products	Precipitation variability; Increased frequency and intensity of extreme heat; General climate impacts	Institutional	No data	None	Yes	Rivera and Clement (2019)
North America	Livestock farmers' perceptions of and adaptations to current climate conditions	Food fibre & ecosystem products	Precipitation variability; Drought; Increased frequency and intensity of extreme heat; Extreme precipitation and inland flooding	Technological/infrastructural; Ecosystem-based	Shallow	Low-income groups	Yes	Rodas-Trejo et al. (2017)
North America	Skiers' willingness to change travel behaviour in response to climate change-induced lack of snow	Health, well-being & communities	Increased frequency and intensity of extreme heat; General climate impacts	Behavioural/cultural	Shallow	None	No	Rutty et al. (2015)
North America	Farmers' perceptions of climate-related economic and ecological risks, and their adaptation responses,	Food fibre & ecosystem products	Extreme precipitation and inland flooding; Precipitation variability; Increased frequency and intensity of extreme	Institutional; Behavioural/cultural; Technological/infrastructural	Moderate	None	Yes	Schattman et al. (2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
	following a severe tropical storm event		heat; General climate impacts					
North America	Farmers' perceptions and awareness of climate change and opinions on best climate response measures	Food fibre & ecosystem products; Health, well-being & communities	General climate impacts; Drought; Extreme precipitation and inland flooding	Behavioural/cultural; Technological/infrastructural; Ecosystem-based	Shallow	None	No	Schattman et al. (2018)
North America	Determinants of adaptation practices adopted by smallholder coffee producers at household and community levels	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	Increased frequency and intensity of extreme heat; Drought; Extreme precipitation and inland flooding;	Behavioural/cultural; Ecosystem-based; Technological/infrastructural	Shallow	None	Yes	Shinbrot et al. (2019)
North America	Findings of a collaborative modeling research programme focused on a river system	Water & sanitation; Terrestrial & freshwater ecosystems	Drought; Precipitation variability; Extreme precipitation and inland flooding	Institutional; Technological/infrastructural	Moderate	None	Yes	Sterle et al. (2019)
North America	Drought adaptation in snow-fed inland river systems; changes in adaptation strategies and barriers encountered by local water managers	Terrestrial & freshwater ecosystems; Water & sanitation; Food fibre & ecosystem products; Cities settlements & key infrastructure	Drought; Increased frequency and intensity of extreme heat; Precipitation variability	Institutional; Behavioural/cultural; Technological/infrastructural	Significant	None	Yes	Sterle and Singletary (2017)
North America	Quantification of how firms respond to ecological uncertainty in the ski resort industry, including adaptation-related responses	Water & sanitation; Terrestrial & freshwater ecosystems	Precipitation variability; Drought; General climate impacts	Ecosystem-based; Behavioural/cultural; Institutional; Technological/infrastructural	Shallow	None	Yes	Tashman and Rivera (2016)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
North America	Farmers' use of climate information services in contexts of extreme and unprecedented climatic events	Terrestrial & freshwater ecosystems; Water & sanitation; Food fibre & ecosystem products	Drought	Technological/infrastructural; Ecosystem-based	Shallow	None	Yes	VanderMolen and Horangic (2018)
North America	Three case studies of trout stream adaptation (habitat restoration) due to climate change-induced degradation	Terrestrial & freshwater ecosystems	General climate impacts; Extreme precipitation and inland flooding; Drought	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	None	No	Williams et al. (2015)
North America	Ranchers' responses to ongoing drought and relationship between ranchers' climate change beliefs and drought adaptation	Food fibre & ecosystem products; Poverty livelihoods & sustainable development; Water & sanitation	Drought; Precipitation variability; General climate impacts	Behavioural/cultural; Technological/infrastructural; Ecosystem-based; Institutional	Shallow	Low-income groups	Yes	Yung et al. (2015)
North America; Asia; Europe	Effectiveness of voluntary programmes for achieving building retrofits	Cities settlements & key infrastructure; Terrestrial & freshwater ecosystems; Cities settlements & key infrastructure	General climate impacts	Technological/infrastructural; Behavioural/cultural	Significant	None	Yes	van der Heijden (2015)
North America; Australia; Central & South America; Asia;	Review of global literature on adaptation in glaciated mountain regions	Terrestrial & freshwater ecosystems	General climate impacts	Behavioural/cultural; Institutional; Technological/infrastructural	No data	Low-income groups; Indigenous; Women; Migrants;	No	McDowell et al. (2019)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
Africa; Europe								
North America; Central & South America	Adaptation strategies and responses in two different countries, focused on rural communities with and without institutional oversight	Food fibre & ecosystem products; Water & sanitation; Health, well-being & communities; Poverty livelihoods & sustainable development	Drought; Precipitation variability; Extreme precipitation and inland flooding; General climate impacts	Ecosystem-based; Institutional	Shallow	Indigenous	Yes	Campos et al. (2013)
North America; Central & South America	Autonomous strategies employed by Central American farmers in response to stressors including climate variability	Poverty livelihoods & sustainable development	Drought; Extreme precipitation and inland flooding; General climate impacts; Increased frequency and intensity of extreme heat	Behavioural/cultural	Shallow	None	No	Eakin et al. (2014)
North America; Central & South America; Europe	People's perceptions of climate change and adaptation to glacier retreat in three different countries	Food fibre & ecosystem products; Water & sanitation; Health, well-being & communities	Drought; Extreme precipitation and inland flooding	Technological/infrastructural	No data	Indigenous; low-income groups	Yes	Orlove et al. (2019)
North America; Europe	Farmers' perceptions of climate change; influence of cultural setting for determining management practices and adaptive capacity	Food fibre & ecosystem products; Poverty livelihoods & sustainable development	General climate impacts; Precipitation variability; Increased frequency and intensity of extreme heat; Drought; Extreme precipitation and inland flooding;	Technological/infrastructural; Ecosystem-based; Behavioural/cultural; Institutional	Shallow	None	Yes	Campos et al. (2014)

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IPCC Continental Region	Article Summary	Sector	Climatic Stimuli	Response Type	Depth of Adaptation [a]	Equity Targeting	Limits Identified	Citation
North America; Europe	Storm water management practices in two urban areas, focusing on the integration of green and blue infrastructure for river restoration	Cities settlements & key infrastructure; Water & sanitation; Terrestrial & freshwater ecosystems	Extreme precipitation and inland flooding; Precipitation variability; Increased frequency and intensity of extreme heat	Technological/infrastructural; Ecosystem-based; Behavioural/cultural	Significant	Low-income groups	Yes	Perini and Sabbion (2016)
North America; Europe	Mechanisms for assisted migration as an adaptation tool in the forestry sectors of two countries	Poverty livelihoods & sustainable development; Terrestrial & freshwater ecosystems	Drought; Extreme precipitation and inland flooding; Increased frequency and intensity of extreme heat; Precipitation variability	Ecosystem-based; Technological/infrastructural; Behavioural/cultural	Shallow	None	Yes	Sansilvestri et al. (2016)
North America; Islands; Central & South America; Asia; Europe	Effects of local participation in policy and planning on the efficacy of climate change adaptive responses	Food fibre & ecosystem products; Health, well-being & communities	General climate impacts	Ecosystem-based; Behavioural/cultural; Technological/infrastructural; Institutional	Moderate	Indigenous	Yes	Huntington et al. (2020)

a. The depth of a response relates to the degree to which a change reflects something new, novel, and different from existing norms and practices.

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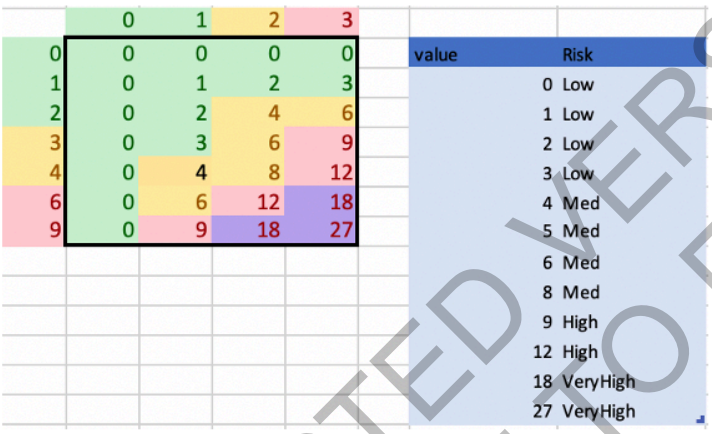
SMCCP5.4 List of Articles Assessed for the Assessment of Key Risks in Mountain Regions

The body of evidence assessed to support the key risks in Section CCP5.3.2 is listed in Tables SMCCP5.18 to SMCCP5.21. For KR1 (People and infrastructures at risks from landslides and floods), Figure CCP5.5 shows the level of risk accrual for different IPCC climate reference regions at three warming levels. For KR2 (Risks to livelihoods and the economy from changing water resources), Figure CCP5.6 shows the level of risk accrual for different IPCC reference regions for a given warming range. The assessment underpinning both figures is based on a similar approach. A selection of publications under KR1 and KR2 in Table SMCCP5.18 and SMCCP5.19 are entered in an excel database (one database for each key risk). The selection is limited to publications for which warming level(s) and risk accrual can be assessed. Each paper is entered in a second sheet and the following information are extracted: IPCC continental region, IPCC reference region, Climate Scenarios, Time period, Global Warming Level, Climate Impact Drivers, Magnitude, Vulnerability and Exposure. Each paper can have multiple entries. Per entry, the magnitude of the climate impact driver, vulnerability and exposure are reported as 1=low, 2=medium, 3=high based on evidence from each paper complemented by expert judgement of the author team. The risk is then calculated either 1) linearly, where risk = (climate impact driver) x (exposure) x (vulnerability), 2) extracted directly from the paper providing it can be inferred from the paper whether risks are low, medium, high, very high; 3) assigned based exclusively on expert judgement if not enough information is available to apply method 1) or 2). Risk indexes are then assigned from the numeric values shown in Figure SMCCP5.1.



	0	1	2	3
0	0	0	0	0
1	0	1	2	3
2	0	2	4	6
3	0	3	6	9
4	0	4	8	12
6	0	6	12	18
9	0	9	18	27

value	Risk
0	Low
1	Low
2	Low
3	Low
4	Med
5	Med
6	Med
8	Med
9	High
12	High
18	VeryHigh
27	VeryHigh

Figure SMCCP5.1: Risk index and corresponding level of risk.

The risk levels are then normalised and assigned a value between 0-1, assuming low = 0-0.25, moderate = 0.26-0.5, high = 0.51-0.75, very high = 0.76-1. Levels are then averaged across multiple papers per each IPCC subregion (for the same warming level or warming range). In a second stage, additional aspects are considered when assessing a risk level for a particular sub-region based on the body of evidence and the expert judgement of the lead author team. These include the key risk criteria detailed in Chapter 16, namely:

1. The nature of adverse consequences for systems: magnitude, irreversibility, potential for thresholds/tipping points
2. Uncertainty in the adverse consequences (e.g. likelihood of serious consequences)
3. The timing of the risk (e.g. persistence, rate of change in risk)
4. The ability to respond to the risk

and criteria for the definition of risk accrual in the burning embers (see Chapter 16). Some caveats of the assessment include a) the use of global studies for certain regions and level of warmings which, in absence of finer resolved regional studies, do not allow to precisely resolve impacts and risks in mountain regions; b) several papers reported results in form of maps and graphics and the author team assessed the risks visually if quantitative data were not available through the publication. These limitations are supplemented by expert opinions whenever possible of the LA and CA teams and are reflected in the reference region confidence level.

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Table SMCCP5.16: Data used to generate Figure CCP5.5. The risk levels in Figures CCP5.5 and CCP5.6 are calculated by further disaggregating the data per RCPs, and time period (with corresponding level of global warming from pre-industrial) and assumptions on hazards (H), exposure (E) and vulnerability (V) level. Levels are between 0 and 1 and corresponds to low (0-0.25), medium (0.25-0.50), high (0.50-0.75) and very high (0.75-1). The risk is calculated either as H x E x V or manually based on assumptions in the paper or expert judgement of the author team. The data are further disaggregated per IPCC climate reference region (see AR6 WGI Atlas) and IPCC continental regions (e.g. Africa, Asia, Australasia, Central South America, Europe and North America). For a given region and reference, multiple entries imply different assumptions in terms of future vulnerability and exposure which are averaged out in the final regional risk level. This is because for many regions there is only little evidence to distinguish across different exposure and vulnerability level given that several studies assessed here are global. Conclusion on the final averaged risk level are also complemented by expert opinion of the lead and contributing authors.

Global warming levels	IPCC Continental Region	IPCC Reference Region	Risk index	Risk level	Risk level (normalised)	Sub-region averaged risk level	References
GWL = 1.5°C GWL band = 1.3°C - 1.7°C	Africa	CEAF	3	1	0.25	0.38	(Hirabayashi et al., 2013) (Hirabayashi et al., 2021) (Zheng et al., 2021a) (Merz et al., 2021) (Motschmann et al., 2020) (Schlögl and Matulla, 2018) (Beniston and Stoffel, 2016)
	Africa	CEAF	6	2	0.5	0.38	
	Africa	NEAF	3	1	0.25	0.38	
	Africa	NEAF	6	2	0.5	0.38	
	Asia	EAS	6	2	0.5	0.63	
	Asia	EAS	9	3	0.75	0.63	
	Asia	SAS	6	2	0.5	0.67	
	Asia	SAS	9	3	0.75	0.67	
	Asia	SAS	12	3	0.75	0.67	
	Asia	TIB	6	2	0.5	0.50	
	Asia	WCA	6	2	0.5	0.50	
	Australasia	SAU	6	2	0.5	0.50	
	Australasia	NZ	6	2	0.5	0.50	
	Central South America	NWS	4	2	0.5	0.50	
	Central South America	NWS	6	2	0.5	0.50	
	Central South America	NWS	8	2	0.5	0.50	
	Europe	WCE	8	2	0.5	0.50	
	Europe	WCE	4	2	0.5	0.50	
	North America	WNA	4	2	0.5	0.50	
	North America	NWN	4	2	0.5	0.50	
GWL = 2°C - 2.5°C	Africa	NEAF	12	3	0.75	0.75	(Arnell and Gosling, 2016) (Hirabayashi et al., 2013) (Hirabayashi et al., 2021) (Merz et al., 2021) (Wang et al., 2020) (Reyer et al., 2017) (Motschmann et al., 2020) (Sezen et al., 2020)
	Africa	SWAF	12	3	0.75	0.75	
	Africa	CEAF	6	2	0.5	0.50	
	Asia	EAS	12	3	0.75	0.88	
	Asia	EAS	18	4	1	0.88	
	Asia	SAS	12	3	0.75	0.88	
	Asia	SAS	18	4	1	0.88	
	Asia	TIB	18	4	1	1.00	
	Asia	WCA	12	3	0.75	0.75	
	Australasia	SAU	6	2	0.5	0.50	
	Australasia	NZ	6	2	0.5	0.50	
	Central South America	NWS	8	2	0.5	0.58	
	Central South America	NWS	12	3	0.75	0.58	

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Global warming levels	IPCC Continental Region	IPCC Reference Region	Risk index	Risk level	Risk level (normalised)	Sub-region averaged risk level	References
	Central South America	NWS	6	2	0.5	0.58	
	Europe	WCE	2	1	0.25	0.38	
	Europe	WCE	6	2	0.5	0.38	
	North America	NWN	6	2	0.5	0.50	
	North America	WNA	6	2	0.5	0.50	
GWL = 4°C	Africa	CEAF	6	2	0.5	0.625	(Hirabayashi et al., 2013) (Hirabayashi et al., 2021) (Kirschbaum et al., 2020) (Allen et al., 2016) (Zheng et al., 2021a) (Keller et al., 2019) (Beniston and Stoffel, 2016) (Musselman et al., 2018)
	Africa	CEAF	9	3	0.75	0.625	
	Africa	NEAF	6	2	0.5	0.625	
	Africa	NEAF	9	3	0.75	0.625	
	Asia	EAS	9	3	0.75	0.88	
	Asia	EAS	18	4	1	0.88	
	Asia	SAS	12	3	0.75	0.86	
	Asia	SAS	12	3	0.75	0.86	
	Asia	SAS	27	4	1	0.86	
	Asia	SAS	18	4	1	0.86	
	Asia	SAS	12	3	0.75	0.86	
	Asia	SAS	9	3	0.75	0.86	
	Asia	SAS	18	4	1	0.86	
	Asia	SAS	12	3	0.75	0.86	
	Asia	SAS	18	4	1	0.86	
	Asia	TIB	12	3	0.75	0.79	
	Asia	TIB	12	3	0.75	0.79	
	Asia	TIB	27	4	1	0.79	
	Asia	TIB	18	4	1	0.79	
	Asia	TIB	12	3	0.75	0.79	
	Asia	TIB	6	2	0.5	0.79	
	Asia	WCA	12	3	0.75	0.75	
	Central South America	NWS	6	2	0.5	0.63	
	Central South America	NWS	9	3	0.75	0.63	
	Europe	WCE	6	2	0.5	0.50	
	Europe	WCE	12	3	0.75	0.50	
	Europe	WCE	1	1	0.25	0.50	
	North America	WNA	6	2	0.5	0.5	
	North America	NWN	6	2	0.5	0.5	

Table SMCCP5.17: Data used to generate Figure CCP5.6. The risk levels in Figures CCP5.5 and CCP5.6 are calculated by further disaggregating the data per RCPs, and time period (with corresponding level of global warming from pre-industrial) and assumptions on hazards (H), exposure (E) and vulnerability (V) level. Levels are between 0 and 1 and corresponds to low (0-0.25), medium (0.25-0.50), high (0.50-0.75) and very high (0.75-1). The risk is calculated either as H x E x V or manually based on assumptions in the paper or expert judgement of the author team. The data are further disaggregated per IPCC climate reference region (see AR6 WGI Atlas) and IPCC continental regions (e.g. Africa, Asia, Australasia, Central South America, Europe and North America). For a given region and reference, multiple entries imply different assumptions in terms of future vulnerability and exposure which are averaged out in the final regional risk level. This is because there is for many regions only little evidence to distinguish across different exposure and vulnerability level given that several studies assessed here are global. Conclusions on the final averaged risk level are also complemented by expert opinion of the lead and contributing authors.

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IPCC Continental Region	IPCC Reference Region	Risk index	Risk level	Risk level (normalised)	Sub-region averaged risk level	References
Africa	CAF	2	1	0.25	0.25	(Immerzeel et al., 2020) (Viviroli et al., 2020) (Munia et al., 2020) (Strasser et al., 2019) (Fuhrer et al., 2014) (Drenkhan et al., 2018) (Drenkhan et al., 2019) (Reyer et al., 2017) (Huang et al., 2021)
Africa	NEAF	2	1	0.25	0.42	
Africa	NEAF	6	2	0.5	0.42	
Africa	SAH	1	1	0.25	0.25	
Africa	SAH	2	1	0.25	0.25	
Africa	SAH	2	1	0.25	0.25	
Africa	SEAF	2	1	0.25	0.41	
Africa	SEAF	6	2	0.5	0.41	
Africa	SWAF	2	1	0.25	0.41	
Africa	SWAF	6	2	0.5	0.41	
Africa	WAF	2	1	0.25	0.41	
Africa	WAF	6	2	0.5	0.41	
Asia	ARP	8	2	0.5	0.58	
Asia	ARP	12	3	0.75	0.58	
Asia	EAS	8	2	0.5	0.66	
Asia	EAS	18	4	1	0.66	
Asia	ESB	4	2	0.5	0.58	
Asia	ESB	12	3	0.75	0.58	
Asia	ESB	8	2	0.5	0.58	
Asia	SAE	4	2	0.5	0.50	
Asia	SAE	6	2	0.5	0.50	
Asia	SAE	8	2	0.5	0.50	
Asia	SAS	18	4	1	0.95	
Asia	SAS	9	3	0.75	0.95	
Asia	SAS	27	4	1	0.95	
Asia	TIB	18	4	1	0.75	
Asia	TIB	8	2	0.5	0.75	
Asia	WCA	18	4	1	0.70	
Asia	WCA	9	3	0.75	0.70	
Asia	WCA	8	2	0.5	0.70	
Asia	WCA	12	3	0.75	0.70	
Australia	SAU	4	2	0.5	0.50	
Central South America	NES	1	1	0.25	0.41	
Central South America	NES	6	2	0.5	0.41	
Central South America	NES	4	2	0.5	0.41	
Central South America	NWS	18	3	0.75	0.72	
Central South America	NWS	27	3	0.75	0.72	
Central South America	NWS	4	2	0.5	0.72	
Central South America	NWS	18	3	0.75	0.72	
Central South America	NWS	8	2	0.5	0.72	
Central South America	SES	1	1	0.25	0.41	

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IPCC Continental Region	IPCC Reference Region	Risk index	Risk level	Risk level (normalised)	Sub-region averaged risk level	References
Central South America	SES	6	2	0.5	0.41	
Central South America	SES	4	2	0.5	0.41	
Central South America	SWS	18	4	1	0.56	
Central South America	SWS	1	1	0.25	0.56	
Central South America	SWS	6	2	0.5	0.56	
Central South America	SWS	4	2	0.5	0.56	
Europe	CEU	2	1	0.25	0.30	
Europe	CEU	8	2	0.5	0.30	
Europe	CEU	18	3	0.75	0.75	
Europe	CEU	9	3	0.75	0.75	
Europe	CEU	12	3	0.75	0.75	
Europe	CEU	2	1	0.25	0.30	
Europe	EEU	2	1	0.25	0.25	
Europe	MED	8	2	0.5	0.44	
Europe	MED	1	1	0.25	0.44	
Europe	MED	6	2	0.5	0.44	
Europe	MED	4	2	0.5	0.44	
North America	CNA	2	1	0.25	0.25	
North America	NCA	4	2	0.5	0.50	
North America	NCA	6	2	0.5	0.50	
North America	NWN	8	2	0.5	0.31	
North America	NWN	2	1	0.25	0.31	
North America	WNA	8	2	0.5	0.50	
North America	WNA	4	2	0.5	0.50	

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Table SMCCP5.18: Evidence and literature to support the key risk narratives in Section CCP5.3.2. KR1*: People and infrastructures at risks from landslides and floods*

Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
(Kirschbaum et al., 2020)	High Mountain Asia	Increase of 30-70% potential landslide activity in the transition zone between the Himalayas and the Tibetan plateau near the China Nepal border	RCP8.5	2061-2100	SSP1, SSP2, SSP3, SSP4, SSP5	SSP1, SSP2, SSP3, SSP4, SSP5	NA	Percentage of population impacted by landslide activity	Majority of the population will experience increased exposure, 10-13% of the population will be impacted by >20% increase in landslide activity
(Tezuka et al., 2014)	Japan	not specified	SRES B1, A2, A1B	2050	NA	NA	NA	economic losses (on agricultural land, residential areas, traffic zones and golf courses) in USD	Loss of >1200 billion USD for Q100 event; damage of a present day Q50 event will equal the damage of a Q30 event in 2050; greatest potential economic losses under B1, then A2 and then A1B; nearly linear relationship between increase in extreme rainfall and increase in potential economic loss
(Schlögl and Matulla, 2018)	Central Europe	2021-2050: overall increase of landslides; strong increase in the Vosges, Black Forest, Swabian Jura, Jura Mountain Northern Limestone Alps, Alpine foreland in Austria and Bavaria, Bohemian Forest; even more	SRES A1B	2021-2050, 2071-2100	NA	higher vulnerability at higher elevation because of a decrease in redundant structural elements (i.e. only one access road to remote villages)	NA	Trans-European transport networks affected by increased landslide activity	Most trans-european transport networks (in AT, BE, CZ, FR, DE, LI, LU, NL and CH) are likely to be affected by increased landslide activity; in particular affected: Rhine-Danube corridor, Scandinavian Mediterranean corridor, Rhine-Alpine corridor, North Sea-Mediterranean corridor, North Sea-Baltic corridor.

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
		pronounced increase for 2071-2100							
(Das et al., 2013)	USA (California, Sierra Nevada)	larger flood magnitudes by the end of 2100; Q50 flood magnitude increases by 30-90% in the Northern and by 50-100% in the Southern Sierra	SRES A2 and B1	2001-2049 and 2051-2099	NA	dense communities and infrastructure	future possibilities: structural: e.g. flood reserve volume in key reservoirs	Events that exceed the security threshold of present-day infrastructure	flood magnitudes larger than present day Q50 events will exceed infrastructure security threshold, with infrastructure being affected more regularly than in Q50 events in future
(Stäubli et al., 2018)	Global	increase in frequency for HKH, Andes and African mountains; no trend in the Alps and Central Asia; floods and mass movement disasters are most frequent and imply the highest relative threat for mountain people	NA	1985-2014	NA	NA	NA	number of deaths and of affected people	increasing number of affected people but stable number of fatalities
(Keller et al., 2019)	Central Europe (Switzerland, Emme river)	NA	RCP8.5 (used for RCM scaling)	2070-2099	NA	NA	NA	Mio. CHF flood loss	The damage & restoration cost is projected to decrease for the smallest estimate and increase 7-fold for the highest estimates. The max. flood loss is estimated to be 240 Mio. CHF for seasonal and WG scaling, and 370 Mio CHF for RCM scaling. Overall uncertainty amounts to 670 Mio. CHF for Q100
(Felder et al., 2018)	Central Europe	NA	continuing as from 1979-2013	1979-2013	NA	NA	Flood defences with capacity	Bio. CHF flood loss from buildings	several scenario extreme events led to flow discharges higher than capacity and flood

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
	(Switzerland, Aare river)						for Q80-Q100 events		losses in the range of 0.1-3 bio. CHF
(Hirabayashi et al., 2013)	Global	frequency of occurrence increases across large areas of South Asia, Southeast Asia, Northeast Eurasia, eastern and low-latitude Africa and South America (42% of the cells); and decreases in northern and eastern Europe, Anatolia, Central Asia, central North America and sourthern South America (18% of the cells)	RCP2.6, RCP4.5, RCP6.0 & RCP8.5	2071-2100	NA	NA	NA	exposure of people	flood exposure increases by 4-14% depending on rcp (exposure of people) 27 mio. people with 2°C increase and 62.93 mio. people with 4.6°C increase
(Alfieri et al., 2015)	Europe (EU-28 countries with Norway and the Republic of Macedonia but without Malta and Cyprus)	frequency of flood peaks with high return period is projected to increase in most of Europe, even in regions where the overall frequency of severe discharge peaks is projected to decrease	RCP8.5	2006-2100 with segments 2006-2035, 2036-2065 and 2066-2095 corresponding to 2020, 2050 and 2080	SSP5 and SSP3	NA	present day flood protection (e.g. dams and reservoirs)	people affected and damage in billion Euro	average annual people affected by 2050: 500'000-640'000 people (+131% to +196%); by 2080: 540'000-950'000 people (+150% to +340%); average annual damage by 2050: 20-40 billion Euro (+277% to +655%); by 2080: 30-100 billion Euro (+466% to +1787%)
(Gariano et al., 2015)	Europe (Italy, Calabria)	less cumulated event rainfall was necessary to trigger landslides in the recent period (1981–2010) than in	no projections for the future	1921-2010 with 30 year segments of 1921-1950, 1951-1980	statistical data from national Censuses; exposure has increased	NA	NA	change in impact and risk for population	higher exposure in the recent period; Impact on population increased in an area hosting 18.5% of the population and decreased in an area hosting

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
		the preceding period (1951–1980).		and 1981-2010					20.8% of the population.; Risk to population increased for 24% of the population and decreased for 19.1% of the population; 42.5% of the regional population experienced increased impact or risk and 47.5% decreased impact or risk
(Haque et al., 2016)	Europe	increase in fatal landslides, mainly consistent with increases in extreme rainfall events; significant upward trend especially in the last 5 years in Austria, Italy and Turkey	no projections for the future	1995-2014	most of the places in some Central European and Mediterranean countries (CH, AT, SL, IT, ES, Bosnia, FYROM, and Eastern Turkey) have highly exposed populations	NA	role of risk mitigation unknown; potential: many countries already have or prepare inventory maps, susceptibility maps conclusions	casualties and economic loss	average casualties per year: 108 +/- 82; total annual economic loss in Europe: 4.7 billion Euros (only private insurance companies, no public sector costs); it is likely that economic losses will continue to grow
(Hattermann et al., 2014)	Central Europe (Germany)	Flood hazard increases for most scenarios. Relatively strong flood increase until the end of this century for A1B and B1. Considerable decrease of the return interval of Q50 floods can be expected until the end of this century (REMO A1B:	SRES A1B, B1 and A2	2011-2040, 2041-2070, 2071-2100	not specified; no change considered for modelling	not specified; no change considered for modelling	not considered	economic loss from damage on buildings and small enterprises (according to insurance)	Flood losses are likely to increase significantly under climate change in Germany. The annual flood damages in Germany (almost 500 mio. Euro for reference period 1961-2000) are expected to double on average until the end of 21 century. CCLM A1B: 3fold increase for 2071-2100 and 2fold increase for 2011-2040.

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
		17years, CCLM A1B1: 19 years).							
(Hattermann et al., 2016)	Central Europe (Germany)	Tendency stays the same as in the original study	SRES A1B, RCP4.5 and RCP8.5	unchanged	unchanged	unchanged	unchanged	unchanged	Increase of +300% for RCP8.5 by the end of the century; increase of +200% for ENSEMBLES scenario
(Arnell and Gosling, 2016)	Global	Increases in flood magnitude across humid tropical Africa, south and east Asia, much of South Am., and in high latitude Asia and North Am. Decreases in flood magnitude around the Mediterranean, in south west Africa, Central Am., Central Europe and the European parts of Russia. E.g. with the HadCM3 climate model pattern the current Q100 flood would occur twice as often across 40 % of the world and over 60 % of south east Asia, central Africa, eastern Europe and Canada.	SRES A1B, B1 and A2	2050	NA	NA	assumption that there is no protection against flooding	people that experience change of exposure	The range across all 21 climate models under A1B in 2050 in estimated numbers of people exposed to a doubling of flood frequency is 31–449 million people, or a change in risk of -9 % to +376 %. For HadCM3 in 2050 the people exposed to a doubling in flood frequency will be 323 million for B1, 450 million for A1B and 570 million for A2. Only 75 million people will experience a decrease in flood frequency. The global flood risk increases by 122 % under B1 and by 187 % under A1B.
(Gariano and Guzzetti, 2016)	Global	Expected increase of shallow landslides with increase in rainstorms	NA	NA	NA	NA	Several measures are suggested including a	People at risk	Increase in the number of people exposed to landslide risk where the rainfall events

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
							mix of hard and soft measures		increase (specifically to mountain)
(Allen et al., 2016)	India	Far reaching outburst floods and increase of flood hazard level and 7-fold increase in frequency. Lakes expand and form closer towards steep heatwalls and from this points impacts of falling ice and rock might trigger outburst events. Increase in the level of flood hazard from high to very high.	deglaciated scenarios	NA	Exposure as the presence of people and infrastructure, livelihoods etc. Lower exposure & vulnerability towards the mountain regions in the north with higher pockets within. Current level for the future	Social vulnerability index. Lower exposure and vulnerability towards the mountain regions in the north with higher pockets within. Current level for the future	Low regret, measures in areas already affected, such as raising awareness, developing disaster response strategies; consider long planning horizons in infrastructure development (in the case of emerging or new threats).	People and infrastructures at risks from GLOFs	3-fold increase in the downstream area that can be potentially affected by the hazards which may affect agricultural activities and essential transportation links. Slight increase in risk levels to inhabitants and to infrastructures
(Sezen et al., 2020)	Central Europe	Rain-on-snow floods decrease of seasonality at higher altitudes, increase in flood frequency, increase in flood magnitude for most severe events	RCP4.5	2011-2040, 2041-2070, 2071-2100; reference period: 1981-2010	NA	NA	NA	NA	There is not clear estimation of the risks associated to hazard changes. Conclusions a re mainly based on changes in the hazard
(Zheng et al., 2021a)	Hindu Kush-Himalayas,	13'000 new glacial lake, combined area	RCP2.6, RCP4.5,	2050, 2100	No change from current level	No change from current level	NA	People and infrastructures	1.7 to 2.5 increase in risk values between present and

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
	Tibetan Plateau and surrounding (Third Pole)	of 1510 km2 and combined volume of 50km3 leading to threefold increase in GLOF hazard. Increase in frequency more significant than magnitude.	RCP8.5 and ice-free scenario					at risks from GLOFs	future risk to settlements and infrastructures with the highest risk in the Karakorum, then Pamir, western and central Himalaya, which translates in greater risk for Indus, Tarim, Amu Darya and Ganges river basins. Indus river basins will be the most dangerous basins (high risk). Amplification of risks to transboundary settlements.
(Beniston and Stoffel, 2016)	Central Europe (Alps)	ROS events could increase by close to 50% with temperatures 2–4 °C warmer than today, before declining when temperatures go beyond 4 °C.	RCP2.6 scenario by 2050 and a RCP8.5 scenario by 2100	from mid to end of century	NA	NA	NA	People and infrastructures at risks	The risk to people and infrastructures from ROS is already high now and can increase before declining for higher warming (> 4°C)
(Motschmann et al., 2020)	Andes, Peru, Cordillera Blanca	21 (25) lakes could form under the RCP2.6 (RCP8.5) scenario, 6 of which are a result of further growth of existing lakes and 15 are new lakes.	RCP2.6 and RCP8.5	2050	The extent of potentially affected areas is not expected to change, but people will be at risk from more lakes. An increase in population and industrial and agricultural activities, especially considering the increased amount of water stored in lakes, would	An increase in population and industrial and agricultural activities, especially considering the increased amount of water stored in lakes, would significantly influence the exposure and possibly vulnerability of a GLOF.	NA	People and infrastructure at risk	For the future the number of lakes susceptible to outburst increases from five lakes in the present to three additional lakes in the future scenarios for Huaraz. Carhuaz, which currently is at risk from three lakes, is influenced by three additional lakes in RCP2.6 and another three lakes in RCP8.5. Caraz is currently exposed to an outburst of one lake, but in the future another newly forming lake in RCP2.6 would add to the risk.

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
					significantly influence the exposure and possibly vulnerability of a GLOF.				
(Reyer et al., 2017)	Central Asia	Changes in precipitation regimes. Increase in GLOF potential and increase in the size and number of moraine dammed lakes	2°C GWL	Not specified	Not specified	Not specified	Not specified	People and infrastructure at risks due to floods and landslides	Increased risk for important road transport networks from floods and landslides. However this is a review with results based on previously published literature.
(Musselman et al., 2018)	North America	Rain on snow events with flood potential becoming more frequent at higher elevation	RCP8.5	2071-2100	Not specified	Not specified	Flood control and reservoir management s accounting for future runoff regime changes	Flood risk	20-200% increase in flood risk in the Sierra Nevada, Colorado river and Canadian Rocky Mountains. This analysis focuses mainly on hazard conditions. However, reference is made to potential threats for metropolitan regions
(Merz et al., 2021)	Global	River floods	1.5°C, 2°C and 3°C GWL	2030, 2055	SSP5	SSP5		Population affected globally and direct economic damage	Risks extrapolated from global regions to mountains based on expert opinion and mainly looking at findings in Figures 7a and 7b.
(Wang et al., 2020)	China	Floods drive by precipitation extremes	1.5°C, 2°C	1950-2095	SSP1, SSP2, SSP3	SSP1, SSP2, SSP3		Percentage of the population and land area exposed to five days precipitation extremes.	Increase in exposure of both population and land to extreme precipitation between 20%–43% in Western arid (semiarid) zone and Qinghai Tibet Plateau.

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
								Highest sensitivity is found in the Tibetan Plateau.	

Table SMCCP5.19: Evidence and literature to support the key risk narratives in Section CCP5.3.2. KR2: *Risks to livelihoods and the economy from changing water resources.*

Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
(Mishra et al., 2020)	High Mountain Asia (Karakoram: Hunza sub-basin; Central Himalayan region: Trishuli sub-basin)	Increase in river flow at Trishuli (Nepal) and decrease in Naltar (Karakoram); reduction of winter low-flow period because of earlier spring melt and later accumulation of snowpack; reduced summer river flow; overall expected effect: longer high-flow season but with lower streamflow intensity	RCP4.5 and RCP8.5	2020-2099	Water based economies support the livelihoods of millions of people; Projected increase in electricity demand of 8.34% by 2017. Supply increases less.	NA	NA	change in hydropower production	Hydropower plants in both regions are expected to benefit from increased flow during the peak-water period. High summertime inflow volatility is not expected to impact power production because the lowest historical summertime flow rates far exceed the turbine flow rate maximums; power production in storage-type power plants of similar capacity in Trishuli (Nepal) would increase by 15% and the climate change impacts are negligible
(Immerzeel et al., 2020)	Global	NA	RCP4.5	2000-2050	SSP2; more than 250 million people live in water towers and more than 1.6 billion people live in areas receiving	Present: Very high vulnerability of the Indus: projected 50% increase of the population by 2050; projected 8x increase	integrated in terms of government effectiveness in the calculation	water tower index (WTI): ranges from 0-1 the higher the more important	The upper Indus basin (WTI = 1) is the most critical water tower globally (densely populated, intensively irrigated). It is unlikely that the Indus can sustain this

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
					water from water towers, which is about 22% of the global population	of the GDP; projected 1.9°C increase of the average annual temperature; projected 0.2% increase of the average annual precipitation. Nearly all important WTUs in Asia are also highly vulnerable. In South America, the vulnerability is less than for Asia, and the drivers are variable (precipitation decrease, population growth, economic growth). In North America, the vulnerabilities are related to population growth and temperature increase.	of vulnerability		pressure. In North America, the Fraser (WTI = 0.62) and Columbia (WTI = 0.58) river basins are the most critical WTUs. In South America, the Cordillera Principal, the Cordillera Patagónica Sur and the Patagonian Andes are key WTUs. In Europe, the Alps are the most relevant water-supplying mountain range, meeting the demands of the Rhône (WTI = 0.45), Po (WTI = 0.39) and Rhine (WTI = 0.32) basins.
(Strasser et al., 2019)	Central Europe (Austria: Brixental in Tyrol)	Only considering CC: reduction of streamflow by -25% (A1B) and -69% (RCP8.5) by the end of 21st century. Including land use change: reduction of streamflow by -35% (A1B) and -77% (RCP8.5) by the end of 21st century.	A1B & RCP8.5	2020-2100	NA	Storylines of land use. A adapted (low), B economic exploitation and abandonment (high) and C (withdrawal and abandonment) (med to high)	ecological adaptation assumed for one of the three storylines	NA	Less water is available for anthropogenic demands such as hydropower generation, irrigation or other uses. This leads to massive consequences for the economic and life conditions.

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
(Biemans et al., 2019)	South-Asia (Indo-Gangetic plain)	peak discharge is expected to shift by up to one month earlier	no future projections	NA	48 million people living in the Indus, Ganges and Brahmaputra mountains and 129 million people living downstream substantially depend on snow and glacier melt for their livelihoods. The food produced by meltwater is equivalent to caloric intake of 38 million people.	High vulnerability due to big water availability mismatch over time and space: 70% of precipitation falls between June-September.	NA	NA	Meltwater is essential for agriculture and of high importance also for energy production, drinking water in urban areas, and industry.
(Fuhrer et al., 2014)	European Alps (Switzerland: Rhone catchment)	declining trend in water budget with large interannual variability, mean increase in seasonal irrigation water requirement (by 4-16%), increase in cattle water consumption	A1B	1951-2050	high exposure as the area suffers from a rain-shadow effect during summer, and irrigation is important in agriculture	high as mountain agriculture is already not competitive with agriculture in lowland areas	NA	change in agricultural sustainability	Higher water demand may exceed the supply during springtime and summer (especially in more elevated locations with livestock production) Increasing expenses of higher requirements for irrigation water.
(Hoy and Katel, 2019)	Himalaya (Bhutan)	Annual precipitation increase of 20-25%. Seasonal precipitation increase in monsoonal months and decrease in the dry winter season.	A1B	1980-2069	High exposure > 60% of the Bhutanese population are subsistence farmers dependent on natural resources. Water is the major Bhutanese	NA	none assumed; potential: (a) the acquisition of new meteorological equipment for	loss of livelihoods and loss for local economy	Affected: Energy and hydropower sectors, as well as domestic water production and irrigation requirements for agriculture. Declining crop yields due to water sources falling dry result in food scarcity and declining incomes with negative effects on

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
					economic resource. 45% of Bhutan's GDP comes from hydropower. Water demand is expected to rise in future. Bhutan's river system is fed by snow melt and glaciers.		monitoring, (b) educating university students in climatology and its applications (c) building up home-grown expertise and research in situ		human health and life expectancy.
(Halofsky et al., 2017)	USA (Rocky Mountains)	In the 2080s the median flow date is expected to be over 20 days earlier, and summer flows are projected to decline by 20-40% in most locations in the Rocky Mountains. Altered timing and quantity of summer flow are expected to cause shortages of surface water in locations where demand is high in the summer months. Discharge from natural springs and seeps may be reduced, and drought and flood events may increase.	RCP4.5 & RCP8.5	up to 2100	high; increasing population already stresses limited water resources	high? Rates of return on livestock in the West ar already very low (2%). Rangeland managers have limited financial resources and limited options to diversify livelihoods.	adaptation: none assumed; Potential: livelihood diversificatio n (e.g. recreation), increasing implementati on of current practices that improve watershed function (e.g. restoring and protecting riparian systems and wetlands), reducing water use and	change in economic profitability	Decreased water supply and increased drought and flood events will affect water quantity and quality and water for livestock. Reduction in downstream domestic water yields. Increased treatment costs and greater dependence on groundwater intakes of municipal systems. Livestock operations may be rendered unprofitable.

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
							increasing efficiency		
(McDowell and Hess, 2012)	Andes (Bolivia: Palca)	water shortages, delayed rainy season with less precipitation overall & reductions in stream flow. Mururata glacier is likely to disappear before 2040.	NA	NA	high: smallholder agriculture is the primary source of income (70%). Complete dependence on glacier water for agriculture.	high: historically marginalized (Aymara communities), institutional failure to provide access to physical capital, 80% live in extreme poverty, land scarcity, lack of knowledge	none assumed; low potential: abandon or reduce highland production and focus on irrigated cash crops	loss of livelihoods	water shortages have begun to compromise agricultural production, loss of subsistence food source, loss of livelihoods is expected
(Bekchanov and Lamers, 2016)	Central Asia (Uzbekistan)	reduction in downstream water supply by at least 10% (-20%) by 2050 (based on literature)	NA	2050	high: Irrigated agriculture plays a pivotal role for the livelihoods of the majority of the population of Uzbekistan (60% of 31.5 mio.) and is the major source of income for the local economy.	high: especially in downstream regions with heavy reliance on irrigated agricultural production	none assumed; potential: low, groundwater use (limited because expensive and energy-intensive), reservoirs (may reduce downstream irrigation water availability), improving irrigation efficiencies	loss of employment, loss of national income	reduction of irrigated areas by 241'000-374'000 ha (6.3-9.7%), increase in unemployment by 712'000-868'000 people (7.9-9.6%), loss of national income of 461-588 mio USD (3.6-4.3%)
(Gaudard et al., 2013)	Central Europe (Swiss Alps,	18% water inflow by 2091-2100 (based on Gabbi et al. 2012)	A1B (based on Gabbi et al. 2012)	2091-2100, reference	NA	NA	assumed: optimization of hydraulic	loss of revenue	Production will grow by 4% for the period 2041–2050 and

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
	Rhone river: Mauvoisin)			period 2001-2010			head and optimization of the turbine schedule with respect to the prices		decline by 16 % for the period 2091–2100 in all scenarios.
(Tiwari and Joshi, 2015)	Himalaya (India, Uttarakhand, Ramgad catchment)	52% annual rainwater decrease; 34% decrease in annual rainy days, depletion of water resources in the region,	no future projections	2001-2013	high: subsistence agriculture is the main source of rural livelihoods; 22'085 inhabitants in 2013	high: marginalisation, dependency on natural resources, poverty, food insecurity, poor community health; especially high for women, as men often out-migrate	adaptation potential: medium, usage of highly productive and agriculturally prosperous valleys and mid-slopes, varying agro-climatic zones from valleys to higher elevations, diversification of agriculture, concentration on tourism	NA	83% of the villages face great water scarcity. Irrigated area has declined 14-30% and irrigated agriculture has decreased 25%. Decrease in per capita food productivity has led to annual food deficits of 67%. Reduction in consumption of essential food commodities (e.g. rice, sugar) by 30-45%. Reduction of livelihood opportunities by 34%.
(Viviroli et al., 2020)	Global	2.5-fold increase in lowland water consumption between 1961 and 2050 (SSP2–RCP6.0)	RCP4.5 and RCP6.0	1961-2050	SSP1, SSP2, SSP3	depending on sector; lowland water resources have become increasingly dependent on mountain areas; mountain areas could	none made; potential: distribution of mountain surpluses only among the lowland	change of dependence on mountain runoff; change in percentage of areas equipped for	critical dependence on mountain runoff: 1960: 0.2 billion (7%) , 2050: 1.5 billion people (24% of world's lowland population); dependence of essential mountain runoff contribution:

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
						become even more important to support food production in the future, especially in regions like India, Egypt and southern Africa	areas that show a deficit (balancing out implies highly targeted, widespread transfers that would probably require considerable discharge capacity)	irrigation that are located in regions depending on essential runoff contributions;	1960s: 0.6 billion (23%), 2000s: 1.8 billion (39%), 2040s: 2.3-2.7 billion (39-40%); dependence on essential but insufficient contribution: 2040s: 1.3-1.6 billion (22-24%); important agricultural areas equipped for irrigation: 2001-2010: 68% located in regions that depend on essential runoff contributions from the mountains, 34% with low blue water sustainability, 2041-2050: 56% located in regions depending on mountain runoff and unsustainably using blue water (e.g. 86% for North Dry hydrobelt);
(Drenkhan et al., 2018)	Andes, Perú, Vilcanota-Urubamba basin	glacier: 1988-2016: -20.5% volume, -37.3% area; 2031-2060: -40.7% (RCP2.6) & -44.9% (RCP8.5) area; 2070-2100: -41.4% (RCP2.6) & -92.7% (RCP8.5) area lake: 1988-2016: +9.7% volume, +15.5% area, +18.3% number by 2100: +3.2% (RCP2.6) & +6% (RCP8.5) area; +4.6% or 0.032 km3	RCP2.6 and RCP8.5	current: 1988-2016; future: 2050 and 2100	838500 people inhabiting the basin	high vulnerability of people in this rural region due to traditional livelihoods, low socioeconomic and high poverty levels (written in the paper)	NA	loss of potable water	loss of 1.499 km3 potable water corresponds to ~37 years of Cuzco's water supply. Implications for future 2100: potential water release from glaciers correspond to a volume of ~30 years (RCP2.6: 2.820 km3) or 58 years (RCP8.5: 5.492 km3) to satisfy Cusco's water supply (1% annual pop. growth; 1,033,181 inhabitants in 2100; unchanged water demand). Potential increase in lake water volume of 0.062 km3 for 1988–2016 and additional 0.032 km3 (RCP2.6) or 0.041

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
		(RCP2.6) & +5.9% or0.041 km3 (RCP8.5) volume							km3 (RCP8.5) until 2100 do not at all outweigh the potential loss of fresh water from glacier melt runoff.
(Drenkhan et al., 2019)	Andes, Perú, Vilcanota-Urubamba basin	glacier: 1988-2016: reduction of glacier water volume of 20.5% from 8.122 km3 (7.310 km3) to 6.457 km3 (5.811 km3) 2031-2060: area reduction of 40.7% (RCP2.6) and 44.9% (RCP8.5) 2070-2100: area reduction of 41.4% (RCP2.6) and 92.7%(RCP8.5) lake: 1988-2016: increase of 9.7% from 0.637 km3 to 0.699 km3 by 2050: volume increase of 0.032 km3 (4.6%) and 0.037 km3 (5.3%) by 2100: volume increase of 0.032 km3 (4.6%) and 0.041 km3 (5.9%)	RCP2.6 and RCP8.5	current: 1988-2016; future: 2050 and 2100	high as there is also precipitation decrease, water-intense agriculture is expanding (beside other due to export-crop markets) leading to a doubling of irrigated areas, and urbanization and population is growing; census 2017: 838500 people inhabiting the basin	higher vulnerability than Peruvian average; 44.5% inhabitants without access to public drinking water network; considerable water leakages in the water provision system	none assumed; potential: low-medium; big projects have low social acceptance and lead to strong social conflicts. Decentralised options could be more effective and at least compensate for a certain fraction of glacier water. Increase in efficiency in water distribution and irrigation systems needed. coordination within and	change in streamflow	2-11% (7-14%) reduction of river discharge until 2050 (2100). Hotspots: 02-PT: 12'500 highly exposed inhabitants, strong vulnerabilities, substantial glacier contribution to river streamflow (JJA: 19.9%, DJF: 4.7%) 04-AST & 05-RH: a few hundred people, medium vulnerability; water shortages of several months represent a clear risk for hydropower production. high glacier contribution to streamflow (JJA: 14.9% and 12.7%, DJF: 7.0% and 3.9%, respectively) is crucial, particularly for dry-season water supply.

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
							between stakeholders essential (need for transparency, trust, information exchange, joint workshops etc.)		
(Wijngaard et al., 2018)	South-Asia (Indus, Ganges, and Brahmaputra)	Surface water availability projected to increase for both RCPs (stronger in RCP8.5) with the exception of Indus Basin that shows an opposite trend	RCP4.5 RCP8.5	1981-2010 vs. 2011-2100	SSP1, SSP3	SSP1, SSP3	NA	Annual blue water gap	Climate change only will mitigate the water gap whereas climate change + socio-economic development enhance the water gap. The overall unmet demand is 83 km3/year, 35km3/year in the Indus and Ganges respectively in the ref scenarios. There is no gap in the Bramaputra. By end of century: RCP45-SSP1 = water gap decrease of 21% and RCP85-SSP3 = water gap increase of 7% for Indus basin; RCP45-SSP1 = water gap decrease of 23%; RCP85-SSP3 = water gap increase of 14%
(Motschmann et al., 2020)	Andes, Perú, Cordillera Blanca, Quillcay catchment	Glacier shrinkage will lead to negative water balance during future dry seasons. From 2012 to the end	RCP2.6 and RCP8.5	Hydrological model: 1980-2015 vs. 2050; ice loss: 2012	high; In addition to livestock and commercial and manual labour, revenues in the	NA	NA	change in water availability	risks of declines in crop productivity, basic household food security, and greater uncertainty about agricultural cycles. Decreasing water

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
		of the 21st century the total annual water supply of 262 Mm3 will decrease by 22 Mm3 to 77 Mm3 due to glacier retreat. monthly loss in water balance (including extraction by mines and environmental base flow) rises substantially and fluctuates between -8% and -96% for RCP2.6 and between -27% and -336% for RCP8.5.		vs. end of 21st century	Quillcay catchment are mainly based on agriculture				availability may lead to monetary agricultural losses of 18 M USD (220 M USD) for wheat or 50 M USD (617 M USD) for potato production in RCP2.6 (RCP8.5).
(Munia et al., 2020)	Global	Changes in local run off and natural inflows	RCP2.6 and RCP6.0	Mid century	SSS1, SSP3	SSP1, SSP3	NA	Water stress	Population under water stress increase by 50% under SSP1-RCP2.6 and double under RCP6.0-SSP3. Stress level increase everywhere under SSP3-RCP6.0 except in some basins in Northern Africa. Moderate to chronic stress relevant to mountain regions are observed in part of High Mountain Asia, for example Central Asia.

Table SMCCP5.20: Evidence and literature to support the key risk narratives in Section CCP5.3.2. KR3: *Risks of ecosystem change and species extinction.*

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
(Morueta-Holme et al., 2015)	Andes, Ecuador, Chimborazo	> 400 m elevation glacier retreat	no projections	1802-2013	high: presence of high-elevation endemic species with no scope to disperse to higher altitudes or latitudes	high: human-dispersed species shifting upward from elevations <3800 m strengthens concerns that the immigration of widespread generalist species may come at the cost of high-elevation endemic species	NA	change of species distribution and increase in elevation limits of plants	observed/expected shift rate ratio of for glacier retreat and vegetation response of 1.6 for overall vegetation; upward shift of the upper vegetation limit (seed plants) of >500m; upward shift of gentianes and pajonal vegetation zones and expansion of pajonal-type vegetation also at lower elevations; average upward shift in upper range limits of individual taxa of 675m at species level and 565m at genus level (32m and 27m per decade)
(Kidane et al., 2019)	Africa, Ethiopia, Bale Mountains	NA	temperature increase of 2°C, 3°C and 4°C for the 21st century based on optimistic to pessimistic scenarios from the IPCC	21st century, not specified	high: no spacious high summits that provide space for upward shift of species; many endemic species; Bale Mountains represent one of the 34 biodiversity hotspots and are listed by UNESCO as tentative world heritage site and biosphere reserve	NA	none made; low potential: conservation management strategies not only within the areas of the national park but also in a buffer zone surrounding the park. Acknowledgement of local people and their socio-economic	potential endemic species altitudinal range shift	Climate change endangers a significant part of the unique Afroalpine flora and intensified land use activities may further exacerbate the situation. Estimated altitudinal range shifts cause the potential local extinction of 8.7% of all endemic species at 2°C temperature increase and of about 36% at 3-4°C temperature increase.

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
							situation. Addressing of intensified grazing, large-scale land grabbing and agricultural expansion		
(Dulle et al., 2016)	Africa, Tanzania, Mt. Kilimanjaro	2.6°C increase in mean minimum temperature	no projections	1991-2011	low: survey was carried out between 1900 and 2600 m asl which means that the observed species can potentially disperse to another 3000 m of higher altitudes on Mt. Kilimanjaro.	high: tropical montane species tend to have narrow thermal tolerances and are therefore expected to be particularly vulnerable to climate change	none made	change in abundance of understorey bird species	Overall increase of 13% in mean abundance, and especially for generalists. Abundance changes of up to >100% on the southern slope at high elevation. Abundance at lower elevation remained relatively stable. Forest specialists and insectivores remained stable. Mean species abundance increased regardless of species temperature preferences.
(Shrestha and Shrestha, 2019)	Nepal	not specified for the past	RCP 6.0 for 2050; projected average temperature increase of 1.3°C by mid-(2046–2065) and 2.2°C by late 21st century (2081–2100)	reference period for current time: 1970-2000; future period 2050; survey period: 2013-2018	high: estimated cost of US$ 1.4 billion due to biological invasions to Nepal's agriculture sector	high: Nepal is ranked amount the most vulnerable countries to biological invasions and climate change in the world	none made; medium potential: monitoring and management of IAPs; early detection and preventive actions should focus on the	change in extent and intensity of climatically suitable regions for IAPs	For the future scenario, climatically suitable regions for 75% of IAPs will expand in contrast to a contraction of the climatically suitable regions for the remaining 25% of the IAPs. The niche extent and invasion hotspots will expand by 2% and 5%. There will be an expansion towards high-elevation mountainous regions (with greater change above 2000 m asl).

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
							mountainous areas of the country		
(Kissel et al., 2019)	U.S. Pacific Northwest	NA	NA	NA	NA	NA	NA	NA	62% chance of extinction of Cascades from by the 2080s because of compounding negative effects on early and late life history stages. By the 2080s, our models predict that larval mortality will increase by 17%, and adult survival will decrease by 7%
(Albrich et al., 2020)	European Alps, Austria, Tyrol, Stubai valley	not specified for the past	GCM-RCM combination of HadGEM2-ES and CLMcom-CCLM4-8-17 for RCP8.5 by the end of the 21st century	reference period for current time: 1961-2014	NA	high: life in mountains is strongly temperature limited which puts mountain ecosystems at particular risk of severe climate change impacts	NA	change in forest size structure and species composition	Without the buffering effect of topographic complexity, critical transitions occurred even at +1°C and +2°C. Beyond a warming of 2.3°C critical transitions of forest composition and size structure occurred in all simulated scenarios. Hysteresis can be expected in driver-state relationships, with forest size structure and species composition differing between warming and cooling trajectories. However, even under the most extreme climate forcings, no more than 2% of the current forest area would transition to non-forest.
(Moret et al., 2016)	Andes, Ecuador, Pichincha volcano	air temperature increased by 0.68°C since 1939 (literature)	literature: projected temperature increase of	comparison of survey periods in 1880,	high: limited elevation for upward dispersal	high: low dispersal ability of wingless beetles; high	NA	change in high-altitude Carabidae beetle	The most specialised stenotopic species experienced an important upslope shift (ca. 300m) between 1880 and

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
			4°C at the highest elevations by the end of the 21st century	1985/86 and 2013/15		vulnerability of stenotopic organisms		community distribution	1985. For at least one stenotopic and wing-less species this resulted in an area reduction of more than 90%. 1985/86-2013/14: 100m upward shift of the lower limit of the superparamo ground beetle community. Among more generalist species, a wide spectrun of upward shift rates was recorded between 1985/86 and 2013/14, presumably as a result of differences in ecological and climatic tolerance at species lebel. Local extinctions are likely to occur during the coming century in 4 mountains that peak below 5000m and possess small suitable habitats in their summit areas.
(Avalos and Hernández, 2015)	Andes, center of Bolivia to southeastern Peru, Yungas ecoregion	not specified for the past	A2 and A1B	projected for 2080-2099	high: high number of endemic birds	high: species already threatened by deforestation, roads, mining activities, fires and hydrocarbon projects	NA	change of the distribution of the restricted range species	The great majority of species studied (91%) may suffer a reduction in their geographic range. The average geographic range reduction (63%) is not far from the projections for range-restricted birds of the northern Andes in Colombia for 2050 (33–43%). Most species with small range sizes may be very threatened. The probability of suitable conditions for almost every bird species are projected to decrease in protected areas

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									under 2 dispersal conditions, reducing to 10% of the geographic range of at least 10 species, and making them prone to be total gap species (= no protection in their ranges).

Table SMCCP5.21: Evidence and literature to support the key risk narratives in Section CCP5.3.2. KR4*: Risk of intangible losses and loss of cultural values.*

Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
(Jurt et al., 2015)	Central Europe (Italian Alps: Trafoi, Stilfs, Sulden)	NA	continuing as currently	NA	exposure of the whole community	community's vulnerability is exacerbated by their wish for independency from the Italian government and their dependency on tourism as their main economic and community activity	low (strategies to rely less on glaciers, e.g. heating not based on hydropower)	loss of identity, culture, well-being and self-reliance	1200 people in 3 villages at loss of identity, culture and self-reliance. Shrinking glaciers cause the loss of sense of community through shared memories, and history as the glaciers were part of the stage of the first World War. Sadness caused by the loss of what feels like "home". Loss of felt independence, as glaciers are a stance of separation from the Italian government. Loss of well-being due to uncertainty and fear of the future.
(Jurt et al., 2015)	Andes (Peru, Cordillera Blanca: Siete Imperios)	NA	continuing as currently	NA	exposure of the whole community	main economic activity is subsistence agropastoralism; community's belief	no adaptation assumptions; low	loss of identity, culture and self-reliance	800 inhabitants of Siete Imperios at risk of losing their traditions and rituals including glaciers, increasingly being

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Reference	Geographic region	Hazard consequences	Climate scenario(s) and/or global warming level(s)	Time period	Socio-economic or ecological conditions supporting exposure level	Socio-economic or ecological conditions supporting vulnerability level	Adaptation assumptions	Risk metric	Risk consequence, quantitative or qualitative
						that glaciers are the source of all water in Peru; management of glacier water canals as an important community activity, that will get lost if the glaciers disappear	potential: glacier stories and legends strengthen intergenerational ties, memories from the past may help keep the community together.		involved in water conflicts, and feeling concerned about the future.
(Jurt et al., 2015)	North America (USA, North Cascades: Glacier, Concrete)	NA	continuing as currently	NA	exposure of the whole community	vulnerability is exacerbated by the fact that the main economic activity is recreation and tourism and the lacking information about current CC processes and impacts on the environment	medium potential: focus on summer tourism, transformation of identity	loss of traditions and self-reliance	1300 people at risk of loss of traditions and self-reliance due to glacier shrinkage; nostalgia because ice skating is no longer possible on the rivers
(Diemberger et al., 2015)	Himalaya (Tibet Autonomous Region, Peoples Republic of China)	NA	NA	NA	NA	Hazard vulnerability is exacerbated by the dependency on pastoralism, herding and high-altitude farming as main economic activity. Risk vulnerability is exacerbated by the strong cultural beliefs and perception of mountains and	present: low responsive capacity due to limited mobility, decreased availability of human labor caused by changes in socio-political	loss of peace of mind and well-being	perception of climatic hazard events as a reaction to bad "moral climate" (i.e.meteorological events are tightly linked to human morality and fortune) causes distress and loss of peace of mind and well-being

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						glaciers as deities and sacred	structures (migration to urban centers, fragmentation and privatization of land); low potential: rituals and religious predictions		
(Vander Naald, 2020)	North America (USA, Alaska: Juneau)	NA	a) continuing as currently b) limited GHG reduction c) extensive global GHG reduction	2015-2075	NA	Mendenhall glacier is one of the main attractivities in and around Juneau	present and potential: none mentioned	loss of recreational ecosystem service of glaciers	loss of the recreational activity of glacier-viewing; drop in visitations to Mendenhall glacier visitor centre (at present 600'000 per year)
(Bosson et al., 2019)	global	NA	RCP2.6, RCP4.5, RCP8.5	2017-2100	NA	NA	present: classification of World Heritage sites as "in danger"; potential: not specified, but low	loss of World Heritage (Outstanding Universal Value)	loss of 33-60% World Heritage glacier ice and complete glacier extinction in 8-20 of 46 World Heritage sites; causing the loss of integrity and value of many World Heritage sites
(Vuille et al., 2018)	tropical Andes	NA	RCP4.5 and RCP8.5	21st century	NA	multiple stressors increase vulnerability; limited infrastructure and lack of access to financial and technological resources exacerbate	medium potential: low-regret and robust measures due to lacking data;	loss of glaciers and their hydrological contributions; inner tropical sites will be most affected	increasing conflicts about water demand, decrease of glacier tourism, increase of hiking tourism in some region due to better accessibility without glaciers, significant emotional impacts, reduction

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						vulnerability. E.g. inefficient or deficient water channel and irrigation structures	bottom-up participatory approaches; current example: diversification of tourism (e.g. shift from skiing and hiking to cave paintings and dinosaur footprints; CC observation sites and museums)	with e.g. Antizana glacier that will be lost by the end of the century	of traditional rituals (to protect the glaciers),
(Demiroglu et al., 2018)	Europe (Norway)	NA	not specified	21st century	50-65 days of less snow, more crevasses, rockfalls, and permafrost melt	NA	medium (snow making, snow farming, shading, covering of glaciers, indoor skiing, moving higher, diversification...)	loss of well-being	loss of one of the most popular recreational summer activities in the three most popular summer ski areas in Norway
(Cunsolo Willox et al., 2013)	North America (Canada,	NA	NA	NA	Activities that define Inuit culture, identity and	Inuits are a ethnic minority, 40% of Rigolet's inhabitants	low (teaching of transitioning	loss of well-being	strong emotional responses to loss of access to land and activities that define Inuit

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	Nunatisavut: Rigolet)				spirituality rely on the presence of stable, thick, and extensive ice and snow conditions throughout 7-8 months of the year.	are <25 years old, economic and financial stability is strongly based on activities related to the land and climate	skills, strengthening of mental health services)		culture, identity and spirituality. The 259 inhabitants of Rigolet are at risk. Increase in violence, conflict, suicide, drug abuse, and mental health problems
(Kervyn et al., 2015)	Equatorial africa (Uganda and Cameroon)	NA	NA	NA	NA	strong dependency on agricultural land on hillslopes; high population density and uncontrolled urban sprawl, deforestation and forest clearing for agriculture and construction	high (engineering measures, land use planning, risk zone mapping, displacement, afforestation, diversification of livelihood base)	loss of livelihood and well-being, loss of sites with high ecological, cultural and aesthetic value; loss of lives (> 500 in Uganda 2010-2012, dozens in Cameroon)	stigmatization of households affected by landslides due to cultural interpretation that landslides are the consequence of misbehaviour, psychological consequences like fear during rainy season and frustration, also loss of fertile soil and productivity and thus tha base of livelihoods
(Quijano Vodniza and García García, 2018)	Andes (Colombia, Pasto)	NA	NA	NA	all communities	the indigenous Quillacinga communities are an ethnic minority; they are strongly connected with their land, mother earth and the cosmos	NA	loss of cultural identity, disintegration of community, loss of well-being	loss of the sacred link to the territory; discrimination of indigenous people who move to the cities as they can't grow their traditional crops anymore; climate change is interpreted as a break with the cosmos caused by a violation of the natural relations between the human being and the cosmos
(Sherry et al., 2018)	Himalaya (Nepal,	NA	NA	NA	High: strong place attachment leads people to come	deep attachment to irreplaceable physical, social and	lowering of the Tsho Rolpa by	loss of cultural identity, loss of sense of	loss of a landscape that constitutes a symbolic home (emotional place attachment)

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	Dolakha District)				back to the valley despite natural hazard risks; Tsho Rolpa is one of the most potentially dangerous glacier lakes in the Himalaya with an impact on areas up to 100km downstream	cultural dimensions of their valley; lacking basic provisions (education, medical care etc.); remoteness of the valley; belief that sentiment environment and deities protect them from natural disaster; GLOF is not taken that seriously anymore due to media exaggerating the threat, false alarms etc.	3.5m in the 1990s, but not considered sufficient; EWS, but only functioned for a short time, lacking follow up and communication; place attachment and sense of community can facilitate actions for disaster risk reduction	community and loss of well-being	is the source of self-understanding and well-being for around 450 people; the Rowaling valley is the source of great pride and has a cultural, historical and symbolic meaning that defines the community --> strong emotional place attachment
(Motschmann et al., 2020)	Andes, Peru, Cordillera Blanca	predicted glacier area for the end of the 21st century: 260km2 (RCP2.6) to 7km2 (RCP8.5)	RCP2.6 and RCP8.5	present vs. end of 21st century	Close proximity of people to the mountains and glaciers. Peaks are visible from almost everywhere, and in many regions people have close ties with mountains and glaciers.	see exposure: probably high	NA	people's perception of glacier retreat and water scarcity	Climate and cryosphere change impacts can lead to specific changes in people's cultural understanding of the environment. Ice loss and the concern about the mountains' fate could create impacts on identity, spirituality, lifestyle, tradition, recreation, tourism, livelihoods, income, social relations and political conflicts and may cause cultural loss and damage.

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