Special Report on Climate Change and Land



Agricultural landscape between Ankara and Hattusha, Anatolia, Turkey (40°00' N – 33°35' E) ©Yann Arthus-Bertrand | www.yannarthusbertrand.org | www.goodplanet.org

SBSTA-IPCC special event on unpacking the new scientific knowledge and key findings in the IPCC Special Report on Climate Change and Land





INTERGOVERNMENTAL PANEL ON Climate change





Land is where we live

Land is under growing human pressure

Land is a part of the solution

Land can't do it all



d 45th Session of - 3 March 2017, Guadalajar

IPCC governments and observers made six proposals for land-related Special Reports at the start of the Sixth Assessment Cycle

- Climate change and desertification (Algeria)
- Desertification with regional aspects (Saudi Arabia)
- Land degradation an assessment of the interlinkages and integrated strategies for mitigation and adaptation (UNCCD)
- Agriculture, forestry and other land use (EU)
- Climate change, food and agriculture (Ireland)
- Food security and climate change (CAN International)

NTAL PANEL ON



- 3 March 2017, Guadalajar

In April 2016, the Panel decided on a single land-related report

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

Or, short titled,

"IPCC Special Report on Climate Change and Land (SRCCL)"





Recognising parallel efforts by other intergovernmental bodies, IPCC organised three web-based consultations *prior* to the scoping meeting

- IPBES (Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services)
- FAO (UN Food and Agriculture Organization)
- UNCCD (UN Convention to Combat Desertification)

Key message:

Maintain focus on land-climate nexus, don't duplicate



- 1: Framing and Context
- 2: Land-Climate Interactions
- 3: Desertification
- 4: Land Degradation
- 5: Food Security
- 6: Interlinkages between desertification, land degradation, food security and
- GHG fluxes: Synergies, trade-offs and Integrated Response Options
- 7: Risk management and decision making in relation to sustainable development

Report Structure



Section A: People, land and climate in a warming world
Section B: Adaptation and mitigation response options
Section C: Enabling response options
Section D: Action in the Near Term

SPM Structure



CLIMATE CHANGE AND LAND

An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. INTERGOVERNMENTAL PANEL ON CLIMATE CHARGE

Climate Change and Land

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

Summary for Policymakers



Agricultural landscape between Ankara and Hattusha, Anatolia, Turkey (40°00' N – 33°35' E) ©Yann Arthus-Bertrand | www.yannarthusbertrand.org | www.goodplanet.org Land is a critical resource – we rely on it for food, water, health and wellbeing – but it is already under growing human pressure. Climate change is adding to these pressures



Land is under growing human pressure with unprecedented rates of land and freshwater use

- Human activities directly affect more than 70% of the global, ice-free and surface
- People currently use 1/4 to 1/3 of land's potential net primary production for food, feed, timber and energy
- About 1/4 of the global ice-free land area is subject to human-induced degradation
- Since 1961, population growth and changes in per capita consumption of food, feed, fiber, timber and energy have caused unprecedented rates of land and freshwater use

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CHANGE in % rel. to 1961

- 1 Inorganic N fertiliser use
- 2 Cereal yields
- Irrigation water volume
- 4 Total number of ruminant livestock
- % 800 **Inorganic nitrogen** fertilizer use x 9 700 300 250 **Cereal yields x3** 200 150 rrigation x2 100 50 Ruminants x 1.5 0 -50 1961 1980 2000 2017

- Human activities directly affect more than 70% of the global, ice-free and surface
- People currently use ¼ to 1/3 of land's potential net primary production for food, fed, timber and energy
- About 1/4 of the global ice-free land area is subject to human-induced degradation
- Since 1961, population growth and changes in per capita consumption of food, feed, fiber, timber and energy have caused unprecedented rates of land and freshwater use

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Climate Change is adding to these pressures

Temperature change at the Earth's surface since 1850-1900





- Frequency, intensity and duration of heat waves
- Intensity of heavy rainfall events
- Frequency and intensity of drought (Mediterranean, West and NorthEast Asia, regions in South America and Africa)
- Shifts of climate zones affecting many plant and animal species

Vegetation greening area > browning area

Climate Change is adding to these pressures

Temperature change at the Earth's surface since 1850-1900



climate

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 Annual area of drylands in drought by 1% per year since 1961

Frequency and intensity of dust storms

Climate Change is adding to these pressures

Temperature change at the Earth's surface since 1850-1900





Climate change exacerbates land degradation, particularly in low-lying coastal areas, river deltas, drylands and in permafrost areas due to changes in rainfall intensity, heat and water stress, permafrost thaw, coastal erosion and sea level rise.

Climate Change is adding to these pressures

Temperature change at the Earth's surface since 1850-1900







The food system is under pressure and is vulnerable to climate change

- Per capita supply of food calories +1/3 since 1961
 Per capita consumption of vegetable oils and meat x2
- 821 million people still undernourished2 billion people now being overweight or obese
- •25 to 30 % of total food produced is lost or wasted

Climate change is already affecting food security

Yields of some crops in lower-latitude regions (ex. maize, wheat, barley)
 Animal growth rates and productivity in pastoral systems in Africa
 Yields of some crops (e.g. maize, wheat, sugar beet) in higher latitude regions

Agricultural pests and diseases and infestations





2007-2016:

13 % of CO₂ emissions → deforestation

44 % of CH₄ emissions **オ** ruminants, rice

 82% of nitrous oxide (N₂O) emissions
 nitrogen application, manure deposition Agriculture, Forestry and Other Land Use account for around 23% of total net anthropogenic greenhouse gas emissions

Food system (including pre and post-production activities) : 21-37% of total net anthropogenic greenhouse gas emissions

- Large regional differences
- Projected to increase driven by population and income growth, changes in consumption patterns

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climate

Food loss and waste :

8 - 10 % of global greenhouse gas emission

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The natural response of land to humaninduced environmental changes results in net removal of ~29 % of global anthropogenic CO₂ annual missions

- Future net increases in CO₂ emissions from vegetation and soils due to climate change are projected to counteract increased removals due to CO₂ fertilization and longer growing seasons. The balance between these processes is a key source uncertainty for determining the future of the land carbon sink.
- Projected thawing of permafrost is expected to increase the loss of soil carbon During the 21st century, vegetation growth in those areas may compensate in part for this loss.





Changes in land conditions, either from land-use or climate change, affect global and regional climate

- At the regional scale, changing land conditions can reduce or accentuate warming and affect the intensity, frequency and direction of extreme events
- Drier (wetter) soil conditions can increase (reduce) the severity of heat waves
- When forest cover increases in tropical regions, cooling results from enhanced evapotranspiration.



Climate change exacerbates existing risks to:

- Livelihoods
- Biodiversity
- human and ecosystem health
- Infrastructure
- food systems



Increasing impacts on land are projected under all future GHG emission scenarios.

- Some regions will face higher risks, while some regions will face risks previously not anticipated.
- With increasing warming, the frequency, intensity and duration of heat waves, droughts and rainfall are expected to increase in many regions.
- Climate zones are projected to further shift poleward in the middle and high latitudes.
- In high-latitude regions, warming is projected to increase disturbance in boreal forests, including drought, wildfire, and pest outbreaks.
- In **tropical regions**, under medium and high GHG emissions scenarios, warming is projected to result in the emergence of unprecedented climatic conditions by the mid to late 21st century.





Purple: Very high probability of severe impacts/ risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.

Red: Significant and widespread impacts/risks. Yellow: Impacts/risks are detectable and attributable to climate change with at least medium confidence. White: Impacts/risks are undetectable.







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SPM Figure 2 – A -1

The warming climate affects processes connected to desertification, land degradation, and food security, and increase their risks.



For the same level of warming, the level of risk depends on the choice of development



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For the same level of warming, the level of risk depends on the choice of development

In SSP 1 there is low population growth, reduced inequalities, low emission production systems, efficient use of land, increased capacity for adaptation.

In SSP3 there is increased population and demand, increasing inequality, multiple pressures on land, low capacity for adaptation.



Vulnerabilities

North America, South America, Mediterranean, southern Africa and central Asia may be increasingly affected by wildfire.

Asia and Africa are projected to have the highest number of people vulnerable to increased desertification. The tropics and subtropics are projected to be most vulnerable to crop yield decline. The level of risk posed by climate change depends both on the level of warming and on how population, consumption, production, technological development, and land management patterns evolve.



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The level of risk posed by climate change depends both on the level of warming and on how population, consumption, production, technological development, and land management patterns evolve.

- Pathways with increases in population and income result in increased demand for food, feed, and water in 2050 in all SSPs.
- Together with resource-intensive consumption and production, and limited technological improvements in agriculture yields this results in higher risks from water scarcity and food insecurity.
- These changes have implications for terrestrial GHG emissions, carbon sequestration potential, and biodiversity.



The level of risk posed by climate change depends both on the level of warming and on how population, consumption, production, technological development, and land management patterns evolve.

- Risks are higher in pathways with low adaptive capacity and other barriers to adaptation.
- Risks related to food security are greater in pathways with lower income, increased food demand, increased food prices resulting from e.g. competition for land, more limited trade.
- Urban expansion is projected to lead to conversion of cropland leading to losses in food production. This can result in additional risks to the food system.



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Climate Change and Land

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Summary for Policymakers



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66 Better land management can play its part in tackling climate change, but it can't do it all.



Land is simultaneously a source and a sink of CO2. It is a part of the problem and the solution!





1000

There are things we can do to both tackle land degradation and prevent or adapt to further climate change

Sustainable land management can help reduce and sometime reverse these adverse impacts.



Land Management Options

Restoration & Rehabilitation

Climate Change

Sustainable Land

Management

Sustainably

Managed Land

Unsustainable Land

Management

Degraded Land

Many land-related responses that contribute to climate change adaptation and mitigation can also combat desertification and land degradation and enhance food security



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The Food System



- 25-30% of food produced is lost or wasted.
- Almost half (41%) of human-caused methane emissions come from livestock.
- Reducing this loss or waste can help reduce greenhouse gas emissions and improve food security.
- Dietary changes can reduce pressure on land and reduce emissions.



We didn't classify response options by mitigation/ adaptation: many options have multiple benefits

Responses by broad type

- Land management
- Value chain management
- Risk management

Responses by magnitude of impact (technical potential)

- > 3 Gt CO₂eq yr⁻¹
- 0.3 3 Gt CO₂eq yr⁻¹
- < 0.3 Gt CO₂eq yr⁻¹

Responses by impact on land competition

- No or limited competition for land
- Those that rely on additional land use change



Potential global contribution of response options to mitigation, adaptation, combating desertification and land degradation, and enhancing food security

Panel A shows response options that can be implemented without or with limited competitions for lard, including some that have the potential to enduce the demand for land. Co-benells and advorse side effects are shown quantitatively based on the high and of the range of potentials assessed. Magnitudes of contributions are categorised using thresholds for positive or negative impacts. Letters within the cells indicate confidence in the magnitude of the impact relative to the thresholds used (see legend). Confidence in the direction of change is generally higher.

Res	ponse options based on land management	Milligation	Adaptation	Deservilloation	Land Degradation	Food Security	Cest
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	integrated loater interagement		4	4	145		
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	recovered and argumic carbon content	-					**
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5	Responsible & reduced conversion of pastanets			108			
Res	ponse options based on value chain managen	Daining.					
14	Beduced post furvest lasers						1-1
- 8	Detary change			2.43		4	
ā.	Reduced food wate (consumer or retailer)						-
12	Saturable associng				1	4	-
1	menowed heat processing and strating						-
15	improved amongs use it doot systems		6				-
Res	ponse options based on risk management						
	Livelihood diversification		4		14.5		-
1	Management of urban spread						-
	Rok sharing metaments	100 B					

Options aroun are those for which data are available to assess global potential for None or even limit challenges. The magnitudes are assessed independently for each option and are not addition.

		antigation accounting	Adaptation NEEss propin	Desertification Million inn*	Land Degradation IEE/ca ber*	Final hexattp Million proptic
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Confidence level industra confidence in the estimate of mapfields category H mph confidence M multi-multilines 1 Low confidence

Cost range See Intrinsic caption for cost ranges in this titles " or title for every High cost every High cost every High cost every Line cost every data Response options classified into 3 Broad Types: Land Management, Value Chain Management, Risk Management

28 different response options can be implemented with **limited or no competition** for land.

Almost all response options have a positive effect on mitigation, adaptation, desertification, land degradation and food security (2) (2)

Res	oonse options based on land management	Mitigation	Adaptation	Desertification	Land Degradation	Food Security	Cost
	Increased food productivity	L	M	L	М	H	
	Agro-forestry	М	М	M	М	L	0
a	Improved cropland management	М	L	L	L	Ĺ	
Agriculture	Improved livestock management	М	L	L	L	L	
	Agricultural diversification	L	L	Ĺ	M	t i	0
	Improved grazing land management	M	L	L	LL	Ľ,	-
	Integrated water management	L	L	L	L	L	00
	Reduced grassland conversion to cropland	1		L	L	- 4	0



Most land-based response options have a positive effect and co-benefits

Res	oonse options based on land management	Mitigation	Adaptation	Desertification	Land Degradation	Food Security	Cost
ests	Forest management	1	L L	L	L	- K	
For	Reduced deforestation and forest degradation	I	()L	L	L	L	00
	Increased soil organic carbon content	ł	t L	М	М	Ĺ	00
oils	Reduced soil erosion	** [4	M	М	4	
S	Reduced soil salinization	S	4	L	L	L	
	Reduced soil compaction		L		L L	L	0
st	Fire management		/ M	M	М	L4	0
/sten	Reduced landslides and natural hazards	1	L	L	L	Ľ	
ecos)	Reduced pollution including acidification	+> J	/ M	L	L	L	
ther	Restoration & reduced conversion of coastal wetlands		I L	М	М	←→ L	
õ	Restoration & reduced conversion of peatlands	MitigationAdaptationDesertificationLand M L L L H L L L H L M M $\leftrightarrow L$ L M M $$ L $$ M M M L L L M M M L M	M	- <u>L</u>	0		
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All supply/demand and risk management based response options have a positive effect and many co-benefits

		Mitigation	Adaptation	Desertification	Land Degradation	Food Security	Cost
Res	ponse options based on value chain manage	ement					
p	Reduced post-harvest losses	н	M.	 -	- L		
man	Dietary change	н		. L	н	н	
De	Reduced food waste (consumer or retailer)	н	<u> </u>	4	м	м	—
>	Sustainable sourcing		Ł		L L	L	
Iddu	Improved food processing and retailing	L	(L)				
s	Improved energy use in food systems	1	- E (· · · · · · · ·			
Res	ponse options based on risk management						
	Livelihood diversification		L	19	L	L	
Risk	Management of urban sprawl	[]		L	М	1	
	Risk sharing instruments	++ L	4		++ L	L	00



Potential global contribution of response options to mitigation, adaptation, combating desertification and land degradation, and enhancing food security

Panel 8 shows response options that rely on additional land-use change and could have implications across three or more land dialanges under different implomentation controls. For each option, the first row they lived implementation is shows a quantitative assessment just in Panel AJ of implications for global implementation at scilate defibering COV remevals of more than 3 GrOUy relasing the magnitude thresholds shown in Panel A. The red flatched cells indicate an increasing pressure but anquantified impact. For each option, the second new (best practice implementation) it isolar adjusted an increasing pressure but anquantified impact. For each option, the second new (best practice implementation) it invites qualifative estimates of impact. If implemented using best practices in appropriately managed landscape systems that allow for efficient and sustainable resource use and supported by appropriate genomance mechanisms. In these qualitative assessments, priors indicates a politive impact, gray indicates an eactor interaction.



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Reforestation and forest restoration

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SPM Figure 3B

We looked closely at four land-based response options involving land use change with high **mitigation** potential.

Their potential impacts on adaptation, desertification, land degradation and food security were assessed.







Best practice: The sign and magnitude of the effects of bioenergy and BECCS depends on the scale of deployment, the type of bioenergy feedstock, which other response options are included, and where bioenergy is grown (including prior land use and indirect land use change emissions). For example, limiting bioenergy production to marginal lands or abandoned cropland would have negligible effects on biodiversity, food security, and potentially co-benefits for land degradation; however, the benefits for mitigation could also be smaller. {Table 6.58}





Reforestation and forest restoration



Best practice: There are co-benefits of reforestation and forest restoration in previously forested areas, assuming small scale deployment using native species and involving local stakeholders to provide a safety net for food security. Examples of sustainable implementation include, but are not limited to, reducing illegal logging and halting illegal forest loss in protected areas, reforesting and restoring forests in degraded and desertified lands {Box6.1C; Table 6.6}.





Afforestation



Best practice: Afforestation is used to prevent desertification and to tackle land degradation. Forested land also offers benefits in terms of food supply, especially when forest is established on degraded land, mangroves, and other land that cannot be used for agriculture. For example, food from forests represents a safety-net during times of food and income insecurity {6.4.5.1.2}.



Biochar addition to soil



Best practice: When applied to land, biochar could provide moderate benefits for food security by improving yields by 25% in the tropics, but with more limited impacts in temperate regions, or through improved water holding capacity and nutrient use efficiency. Abandoned cropland could be used to supply biomass for biochar, thus avoiding competition with food production; 5-9 Mkm² of land is estimated to be available for biomass production without compromising food security and biodiversity, considering marginal and degraded land and land released by pasture intensification {6.4.5.1.3}.





Co-benefits

- Response options are site and regionally specific
- Activities that combat desertification can contribute to adaptation with mitigation co-benefits and can halt biodiversity loss
- Solutions that help adapt to and mitigate climate change while contributing to combating desertification include water harvesting and micro-irrigation, using drought-resilient ecologically appropriate plants, and agroforestry
- Avoiding, reducing and reversing land degradation in rangelands, croplands and forests can help to eradicate poverty and ensure food security





Combatting Degradation and Desertification

- Reducing deforestation and forest degradation lowers GHG emissions and can contribute to adaptation goals
- Sustainable land management can prevent, reduce and in some cases reverse land degradation.
- Climate change can lead to land degradation, even with the implementation of measures intended to avoid, reduce or reverse land degradation
- Technological solutions are available to avoid, reduce and reverse desertification while also contributing to climate change mitigation and adaptation.
- Investment in sustainable land management and land restoration in drylands has positive economic returns.
- Indigenous and local knowledge can often enhance resilience to climate change and combat desertification.
- Preventing desertification is preferable to restoration of degraded land.

INTERGOVERNMENTAL PANEL ON CLIMATE CHANP



Response options throughout the food system can be deployed and scaled up to advance adaptation and mitigation

- The total technical mitigation potential from crop and livestock activities, and agroforestry is estimated as 2.3-9.6 GtCO2e.yr-1 by 2050.
- The total technical mitigation potential of dietary changes is estimated as 0.7-8 GtCO2e.yr-1 by 2050.
- Diversification in the food system can reduce risks from climate change.





Dietary Choices

- Balanced diets, featuring plant-based foods, produced in resilient, sustainable and low-GHG emission systems, present major opportunities for adaptation and mitigation while generating significant co-benefits in terms of human health.
- Transitions towards low-GHG emission diets may be influenced by local production practices, technical and financial barriers and associated livelihoods and cultural habits.





Food loss and waste

- Global food loss and waste accounts for 8-10% of total anthropogenic GHG emissions. 25-30% of food produced is lost or wasted. Causes of food loss and waste differ substantially between developed and developing countries, as well as between regions.
- Reduction of **food loss** and **waste** can lower GHG emissions and contribute to adaptation through reduction in the land area needed for food production.
- **Technical options** such as improved harvesting techniques, on-farm storage, infrastructure, transport, packaging, retail and education can reduce food loss and waste across the supply chain.



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Summary for Policymakers



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66 Enabling Response Options and Near-term Action





Appropriate design of policies, institutions and governance systems at **all scales** can contribute to land-related adaptation and mitigation while facilitating the pursuit of **climate-adaptive development pathways**.

Mutually supportive climate and land policies have the potential to save resources, amplify social resilience, support ecological restoration, and foster engagement and collaboration between multiple stakeholders.

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food & land policy



- Policies that operate across the food system, including those that reduce food loss and waste and influence dietary choices, enable more sustainable land-use management, enhanced food security and low emissions trajectories.
- Such policies can contribute to climate change adaptation and mitigation, reduce land degradation, desertification and poverty as well as improve public health.
- The adoption of sustainable land management and poverty eradication can be enabled by:
 - improving access to markets
 - securing land tenure
 - factoring environmental costs into food
 - making payments for ecosystem services
 - enhancing local and community collective action





- Acknowledging co-benefits and trade-offs when designing land and food policies can overcome barriers to implementation.
- Strengthened multilevel, hybrid and cross-sectoral governance, as well as policies developed and adopted in an iterative, coherent, adaptive and flexible manner can maximise co-benefits and minimise trade-offs
- This is because land management decisions are made from farm level to national scales, and both climate and land policies often range across multiple sectors, departments and agencies.
- Integration across sectors and scales increases the chance of maximising co-benefits and minimising tradeoffs.





- The effectiveness of decision-making and governance is enhanced by the involvement of local stakeholders in the selection, evaluation, implementation and monitoring of policy instruments for land based climate change adaptation and mitigation.
- This applies particularly to those most vulnerable to climate change, including indigenous peoples and local communities, women, and the poor and marginalised.



A. Pathways linking socioeconomic development, mitigation responses and land

Socioeconomic development and land management influence the evolution of the land system including the relative amount of land allocated to CROPLAND, PASTURE, BUDENERGY CROPLAND, FOREST, and HATURAL LAND. The lines show the median across Integrated Assessment Models (IAMS) for three alternative shared socioeconomic pathways (SSP1, SSP2 and SSP5 at RCP1.9); shaded areas show the range across models. Note that pathways illustrate the effects of climate change mitigation but not those of climate change impacts or adaptation.

C. Resource intensive (SSPS)

Resource-intensive production and

technological solutions including

substantial bioenergy and BECCS.

consumption patterns, results in high

baseline emissions. Mitigation focuses on

Intensification and competing land uses

contribute to declines in agricultural land.

A. Sustainability-focused (SSP1)

Sustainability in land management, agricultural intensification, production and consumption patterns result in reduced need for agricultural land, despite increases in per capita food consumption. This land can instead be used for reforestation, afforestation, and bioenergy.

8. Middle of the road (SSP2)

Societal as well as technological development follows historical patterns. Increased demand for land mitigation options such as bioenergy, reduced deforestation or afforestation decreases availability of agricultural land for food, feed and fibre.



STRUCTURE MINISTERIO CREMENCY CREMENCY MANAGER MANAGER LAND.

We looked at the influences/change to land cover due to different landmanagement approaches over time.

Three pathways were looked at.

All were for global warming of 1.5 degrees (RCP1.9).



B. Land use and land cover change in the SSPs

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¹⁴December 2018 and Annual Concerned Annual attraction Concerned And Interpreted And Strength Concerned Annual Concerned

SPM Figure 4 B

We then looked at 5 different **pathways** (including SSP1, SSP2 and SSP5).

For each pathway we analysed the change in amount of land cover for each type of land from a 2010 baseline for both 2050 to 2100.

This was completed for global warming scenarios of **1.5 degrees** (RCP1.9), **2 degrees** (RCP2.6), and **3 degrees** (RCP4.5).



Change in Natural Land from 2010 Mkm² Change in Bioenergy Cropland from 2010 Mkm²

Change in Cropland from 2010 Mkm²

Change in Forest from 2010 Mkm² Change in Pasture from 2010 Mkm² SPM Figure 4 B

The types of land included...





A more sustainable pathway means less need bioenergy cropland in 2100 and a more gradual increase in forest land.

A. Sustainability-focused (SSP1)

Sustainability in land management, agricultural intensification, production and consumption patterns result in reduced need for agricultural land, despite increases in per capita food consumption. This land can instead be used for reforestation, afforestation, and bioenergy.



CROPLAND PASTURE BIOENERGY CROPLAND BFOREST ANATURAL LAND

B. Middle of the road (SSP2)

Societal as well as technological development follows historical patterns. Increased demand for land mitigation options such as bioenergy, reduced deforestation or afforestation decreases availability of agricultural land for food, feed and fibre.







A resource intensive pathway means a more dramatic increase in bioenergy cropland by 2050.

B. Middle of the road (SSP2)

Societal as well as technological development follows historical patterns. Increased demand for land mitigation options such as bioenergy, reduced deforestation or afforestation decreases availability of agricultural land for food, feed and fibre.



SCROPLAND PASTURE BIDENERGY CROPLAND FOREST BINATURAL LAND

C. Resource intensive (SSP5)

Resource-intensive production and consumption patterns, results in high baseline emissions. Mitigation focuses on technological solutions including substantial bioenergy and BECCS. Intensification and competing land uses contribute to declines in agricultural land.







Near-term Action

Actions can be taken in the near-term, based on **existing knowledge**, to address desertification, land degradation and food security while supporting longer-term responses that enable adaptation and mitigation to climate change.

These include actions to:

- build individual and institutional capacity
- accelerate knowledge transfer
- enhance technology transfer and deployment
- enable financial mechanisms
- implement early warning systems
- undertake risk management
- address gaps in implementation and upscaling
- Near-term action to address adaptation and mitigation, desertification, land degradation and food security can bring social, ecological, economic and development co-benefits.
- Co-benefits can contribute to **poverty eradication** and more **resilient livelihoods** for those who are **vulnerable**.





Rapid reductions in anthropogenic GHG emissions across all sectors following ambitious mitigation pathways reduce negative impacts of climate change on land ecosystems and food systems.

Delaying climate mitigation and adaptation responses across sectors would lead to increasingly negative impacts on land and reduce the prospect of sustainable development.



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Land could feed the world in a changing climate and provide biomass for renewable energy, but it can't do it all. It would require early, far-reaching action across several fronts.



INTERGOVERNMENTAL PANEL ON CLIMATE CHARGE

Climate Change and Land

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

Summary for Policymakers



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