Special Report on Climate Change and Land

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Agricultural landscape between Ankara and Hattusha, Anatolia, Turkey (40°00' N – 33°35' E)
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Land is where we live

- Land is under growing human pressure
- Land is a part of the solution
- Land can’t do it all
Response options
from SPM fig 3 A
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 competition for land, including some that have the potential to reduce the demand for land. Co-benefits and adverse side effects are shown qualitatively based on the high end of the range of potential contributions. Magnitudes of contributions are categorized using the same scale as 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.

Response options based on land management

- Increased food productivity
- Ageed forestry
- Improved cropland management
- Improved livestock management
- Agricultural diversification
- Integrated water management
- Reduced grassland conversion to cropland
- Forest management
- Reduced deforestation and forest degradation
- Increased soil organic carbon content
- Reduced soil erosion
- Reduced soil salinization
- Reduced soil compaction
- Fire management
- Reduced landfills and natural hazards
- Reduced pollution including acidification
- Reduced or reversed conversion of coastal wetlands
- Indigenous and local knowledge

Response options based on value chain management

- Reduced post-harvest losses
- Decreased food waste (consumer or retailer)
- Sustainable sourcing
- Improved food processing and packaging
- Improved energy use in food systems

Response options based on risk management

- Livelihood diversification
- Management of urban sprawl
- Risk-shielding instruments

Key for criteria used to define magnitude of impact of each integrated response option

- Large
- Moderate
- Small
- Negligible
- Variable

Confidence level indicates confidence in the estimates of magnitude of impact.

- High confidence
- Medium confidence
- Low confidence

Cost range indicates the cost per $100 USD for different thresholds (see legend).
Lots of options have positive impacts (blue) across all of climate change mitigation and adaptation, delivering food security and tackling land degradation and desertification.
**Bioenergy and BECCS**

**High level:** Impacts on adaptation, desertification, land degradation and food security are maximum potential impacts, assuming carbon dioxide removal by BECCS at a scale of 11.3 GtCO₂ yr⁻¹ in 2050, and noting that bioenergy without CCS can also achieve emissions reductions of up to several GtCO₂ yr⁻¹ when it is a low carbon energy source (2.7.1.5; 6.4.1.1.5). Studies linking bioenergy to food security estimate an increase in the population at risk of hunger to up to 150 million people at this level of implementation (6.4.5.1.5). The red hatched cells for desertification and land degradation indicate that while up to 15 million km² of additional land is required in 2100 in 2°C scenarios which will increase pressure for desertification and land degradation, the actual area affected by this additional pressure is not easily quantified (6.4.3.1.5; 6.4.4.1.5).

**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)
Interlinkages

• Response options are interlinked. Some have co-benefits or are more effective when paired. Others may conflict.

• Some response options are less feasible than others.

• Coordinated action is required to enable responses.

• Delayed action will mean more of a need to respond to land challenges but less potential for land-based responses (due to climate change and other pressures).

• Early action has challenges related to technology, upscaling and barriers.

• Some responses don’t address underlying drivers.
Risk Management

• Changes in global temperature have impacts on land and can result in **compound risks** to food systems, human and ecosystem health, livelihoods, the viability of infrastructure, and the value of land. These vary by region.

• Risks related to land degradation, desertification and food security increase with temperature and **can reverse development gains** in some pathways.

• Land-based responses can have **adverse side-effects**.

• Policies that address poverty, degradation & emissions can achieve climate resilient sustainable development.

• Delaying mitigation in other sectors and shifting the burden to the land sector, increases risks, including adverse effects on food security & ecosystem services.
The big picture

• The potential for mitigating climate can only be realised if agricultural emissions are included in mainstream climate policy.

• Acting early will avert or minimise risks, reduce losses and generate returns on investment.

• Measuring progress towards goals is important to decision-making, adaptive governance & policy success.

• A flexible, adaptive, iterative approach is needed for the complexity of land and climate interactions and food security.
• **Bioenergy and BECCS** are scale dependant but have large mitigation potential.

• **Monoculture crops** can increase land competition and have affects on food security, degradation etc.

• Response options are **interlinked**. Some have co-benefits or are more **effective when paired**. Others may conflict.

• **Delayed action** will mean more of a need to respond to land challenges but less potential for land-based responses.

• The potential for mitigating climate can only be realised if **agricultural emissions** are included in mainstream climate policy.

• **Involving people** in land and climate decision making advances synergies and overcomes barriers to adaptation and mitigation. This includes empowering women and including indigenous and local knowledge.

• **Knowledge gaps** exist and there are social challenges too.
Science policy - Context

- A mix of policies exist that can encourage sustainable land management based on regional context.
- Regulation (e.g. land use zoning, land sparing and land sharing approaches)
- Land tenure could foster acceptance of sustainable land management
- Voluntary (change in diet, cropping patterns, standards and certification, awareness generation, citizen science, indigenous knowledge, collective action)
- Persuasive (e.g. payments for ecosystem services)
- Risk sharing mechanisms (e.g. insurance)