Special Report on Climate Change and Land

www.ipcc.ch/report/SRCCL

IPCC SRCCL Key Findings on:

Land-Climate Interactions

Agricultural landscape between Ankara and Hattusha, Anatolia, Turkey (40° 00' N – 33° 35' E)
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Gensuo JIA,
IPCC Coordinating Lead Author / CAS

Beijing, China | November 8, 2019

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.

REPORT COVER IMAGE:
Agricultural landscape between Ankara and Hattusha, Anatolia, Turkey (40° 00' N – 33° 35' E)
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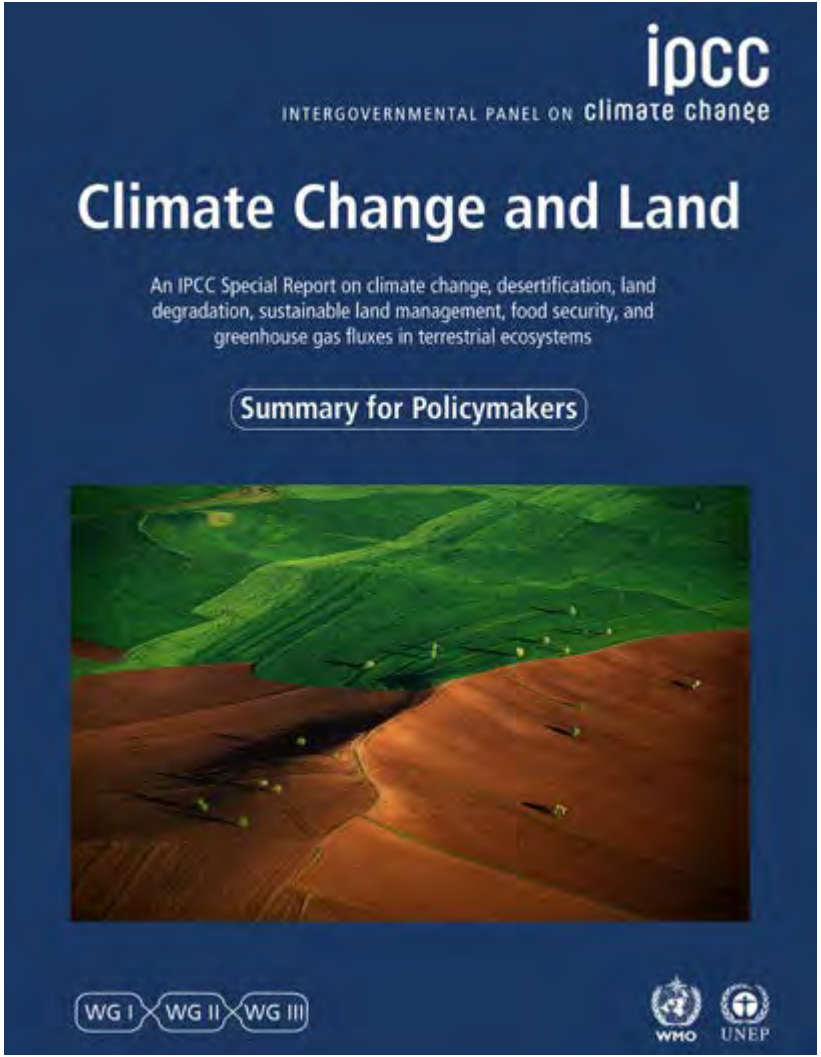
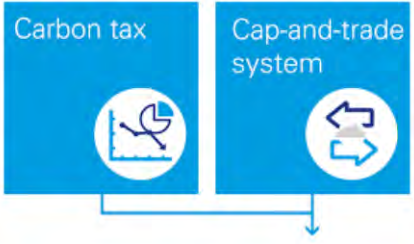


Amazon forest fire:
interactive changes of climate and ecosystems

Brazil

IPCC received many proposals for Special Reports

Cryosphere
Aviation & maritime
UNFCCC processes
Desertification
Human health
Antarctic
Interlinkages
Food security
Policy relevance
Land degradation
Scenarios
Extreme events
Regional consequences
AFOLU
Cities
Carbon pricing
Food & agriculture
1.5C
Information & Communication
Risk management
Security
Mountains



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INTERGOVERNMENTAL PANEL ON climate change

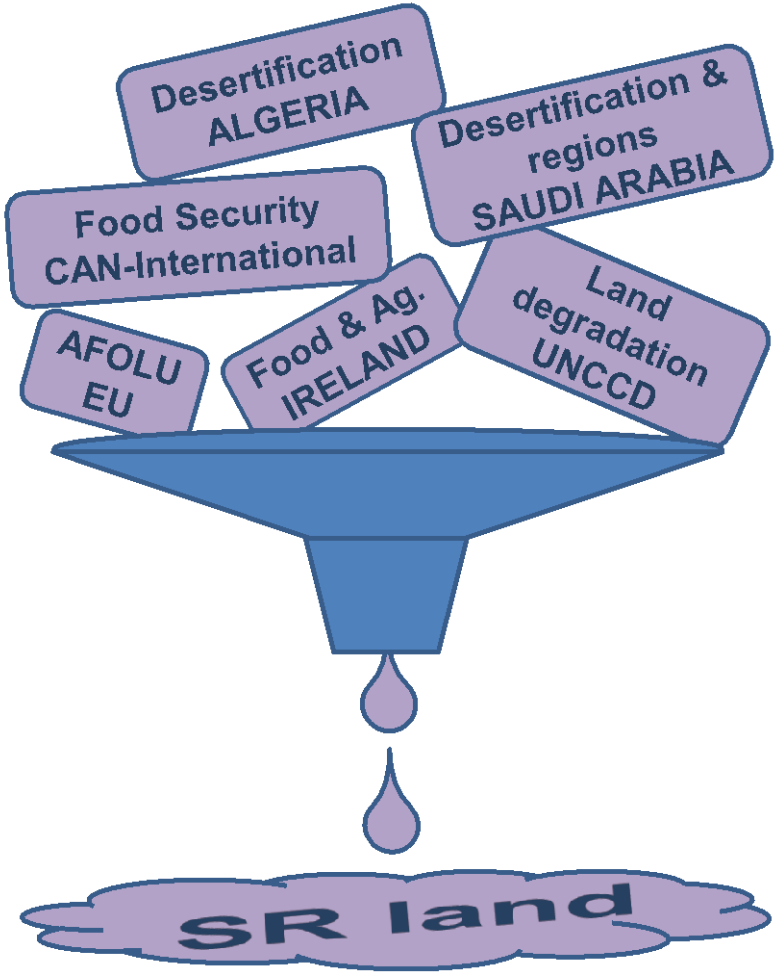
WMO UNEP

Ideas were clustered, and evaluated, using open and transparent criteria:

- Does the topic cross Working Groups?
- Were there gaps in AR5?
- Is the topic different from work ongoing?
- Is there new science?

The evaluation reports are all available online:
www.ipcc.ch/scripts/_session_template.php?page=_43ipcc.htm

This Special Report emerged from a cluster of six proposals



SRCCL SPM final approval | August 7, 2019

UN News:

SRCCL release

August 8, 2019

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音频站 订阅

【专题报道】应对气候变化，陆地资源既是挑战也是解决方案

联合国开发署乍得办事处图片/Jean Damascene Hakuzim | 荒漠化正威胁着乍得的一个村庄。 在过去的50年里，乍得湖流域面积从25,000平方公里缩小到2,000平方公里。

2019 年 8 月 8 日 | 气候变化

联合国政府间气候变化专门委员会（IPCC）今天在日内瓦发布题为《气候变化与陆地》的特别报告，指出人类活动和气候变化正在使陆地资源承受巨大的压力，加剧土地退化和荒漠化，影响粮食安全，而合理与可持续地使用土地，则有望在一定程度上缓和气候变化的影响，同时保护珍贵的土地和生态系统。联合国采访了报告的主要作者协调人之一，来自中科院大气物理研究所的研究员贾根锁。请听钱思文的

相关新闻

森林合作伙伴关系强调停止毁林对可持续发展至关重要

https://news.un.org/zh/story/2019/08/1039691

IPCC SRCCL (2019) – Joint WGI, II, III

Interactive changes of climate and land

Summary for Policy Makers

Chapter 1: Framing and Context

Chapter 2: Land-Climate Interactions

Chapter 3: Desertification

Chapter 4: Land Degradation

Chapter 5: Food Security

Chapter 6: Interlinkages between desertification, land degradation, food security and GHG fluxes: synergies, trade-offs and integrated response options

Chapter 7: Emergent risks, decision making and sustainable development

Case Studies, FAQs and Boxes

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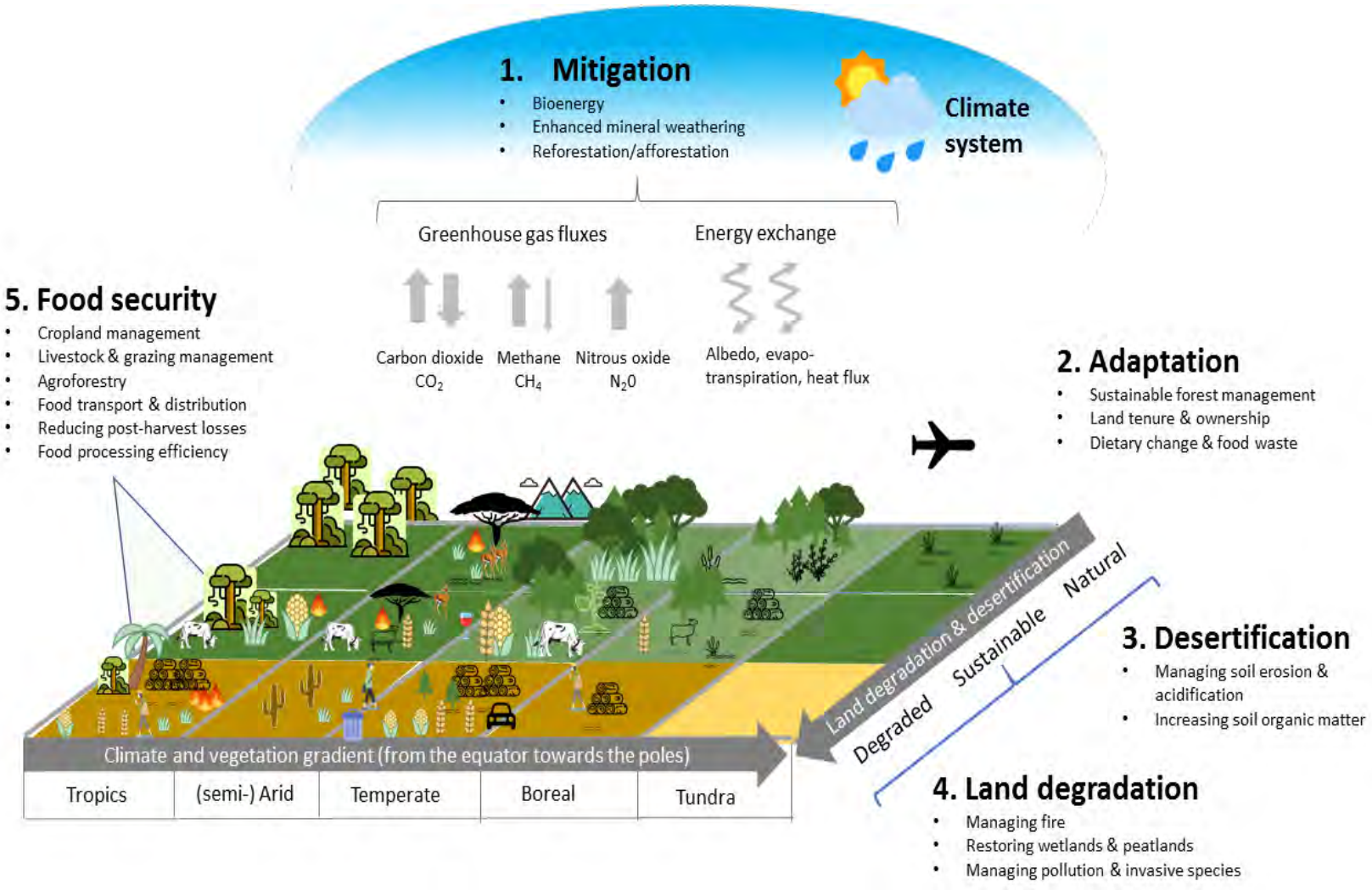
SRCCL Framing and Context



Land-climate interactions

- Climate change & variability → land use/cover, desertification, land degradation, food security
- Terrestrial GHG & non-GHG fluxes/stocks
- Land feedbacks and forcing on climate via multiple pathways
- Land-based adaptation and mitigation options → climate forcing
- Coupling and teleconnection

SRCCL Chapter 2 team

Land provides the basis for human livelihoods and well-being.

- Warming over land has occurred at a faster rate than the global mean.
  - *–1.53° C Higher over 2006–2015.*
- Current use of land and loss of biodiversity are unprecedented in human history.
  - *–Climate change will add to these challenges.*
- Urgent action would buffer the negative impacts from over-exploitation of resources.
- Restricting warming to "well below 2° C" would greatly reduce the negative impacts of climate change on land.

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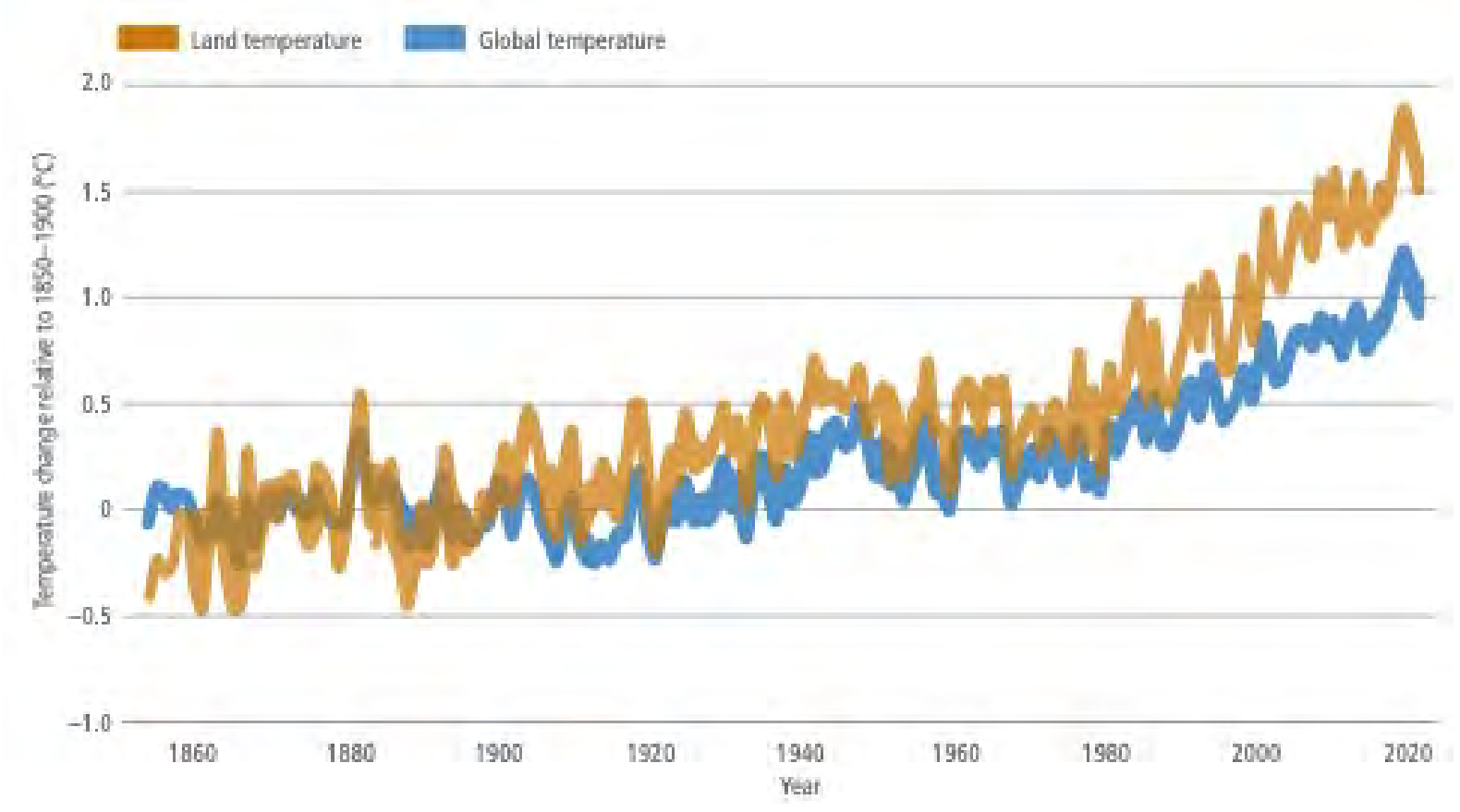
A. Climate change over land

Since pre-industrial time (1850-1900), surface air temperature has risen nearly twice as much over land than the global land-ocean mean surface temperature.



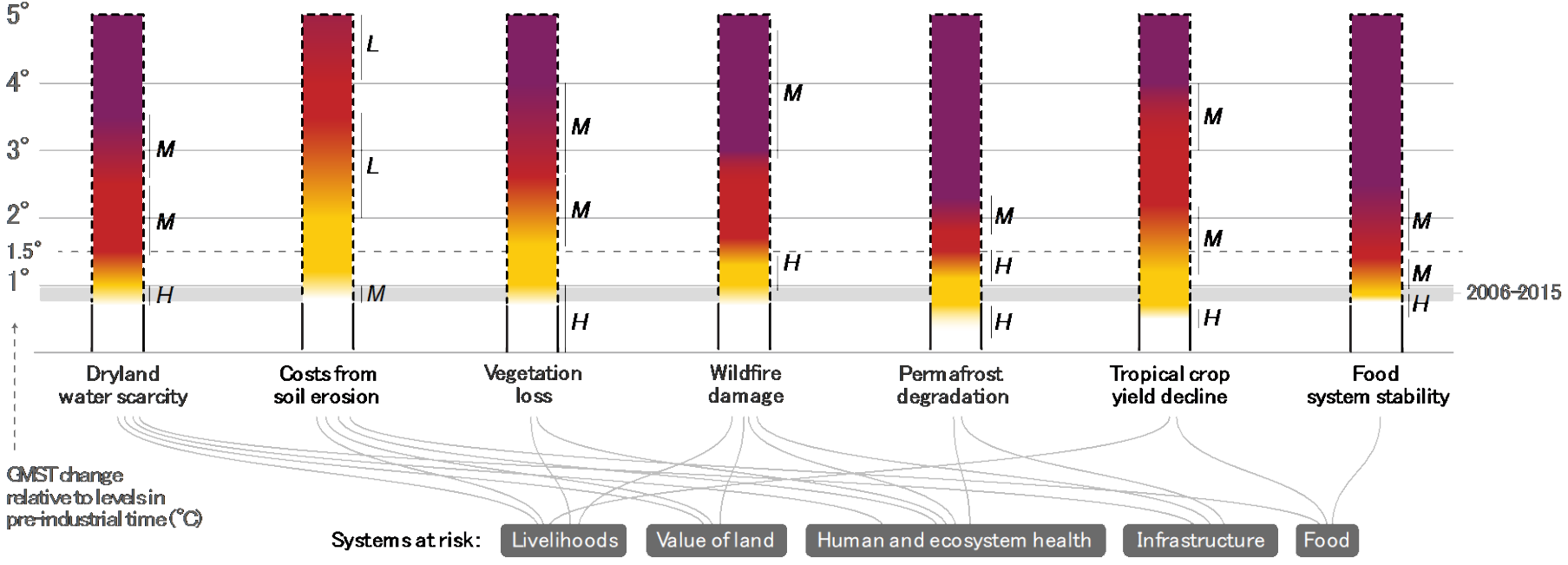
Cross-Chapter Box 4, Figure 1 | Change in annual mean surface air temperature resulting from urbanisation (°C). The colour and size of the circles refer to the magnitude of the change. (This map has been compiled using the following studies: Kim et al. (2016), Sun et al. (2016), Chen et al. (2016a), Founda et al. (2015), Rafael et al. (2017), Hinkel and Nelson (2007), Chrysanthou et al. (2014), Dou et al. (2014), Zhou et al. (2016), (2017), Polydoros et al. (2018), Li et al. (2018a), Bader et al. (2018), Alizadeh-Choobari et al. (2016), Fujibe (2009), Lokoshchenko (2017), Torres-Valcárcel et al. (2015), Doan et al. (2016), Elagib (2011), Liao et al. (2017)).

Emissions and Land

- Gross emissions from AFOLU make up **1/3 of total global emissions**.
- Land accounts for **44% of net anthropogenic methane** emissions.
- **50% of the nitrogen applied** to agricultural land is **not taken up** by the crop, resulting in nitrous oxide emissions.
- Grazing lands are responsible for more than one-third of total anthropogenic nitrous oxide emissions and one-half of agricultural emissions.

Risks from potential impacts of global mean temperature rise on elements of the land system

Increases in global mean surface temperature (GMST), relative to pre-industrial levels, affect processes involved in desertification (water scarcity), land degradation (soil erosion, vegetation loss, fire, permafrost thaw) and food security (crop yield and food system stability). These drive risks to food systems, livelihoods, infrastructure, the value of land and human and ecosystem health. Changes in one process (e.g. fire or water scarcity) may result in compound risks. Risks are location-specific and differ by region.



Land and Climate Interactions

- Greening trends have increased by 22-33% over the last 2-3 decades.
- The frequency and intensity of some extreme events have increased due to global warming. They will continue to increase under medium and high emission scenarios.
  - *This will impact ecosystems, food security and land processes (e.g. greenhouse s gas fluxes).*

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Feedbacks to the climate system

- Changes in land conditions from human use or climate change **in turn affect regional and global climate**.
- Changes in land conditions modulate the likelihood, intensity and duration of many extreme events.
- Regional climate change can be dampened or enhanced by changes in local land cover and land use.
- Future increases in climate change and urbanisation will enhance warming in cities and their surroundings.

IPCC Uncertainty: feedback of forest conversion

There are various views in mid-latitudes regions:

- Afforestation induce warming (most climate model studies, e.g., Bonan 1997, 1999; Bounoua et al. 2002; Betts 2001; Davin 2010, few observation studies: Bonan 2001).

- Afforestation induce cooling (most field and satellite observations e.g., Juang et al., 2007; Montenegro et al, 2009; Wickham et al. 2013 and a few climate models e.g., Marshall et al. 2004; Jackson et al., 2005; Ma et al. 2013).

- Afforestation induce negligible climate effect (Arora et al., 2011).

- Afforestation induce mix climate effect (recent satellite observation e.g., Peng et al., 2014; Li et al., 2015 and recent climate modelling e.g., Ma et al 2013, Patrick 2016, Li et al. 2016)

Dryland dynamics

Climate + Landuse

→

Vegetation/cover change

→

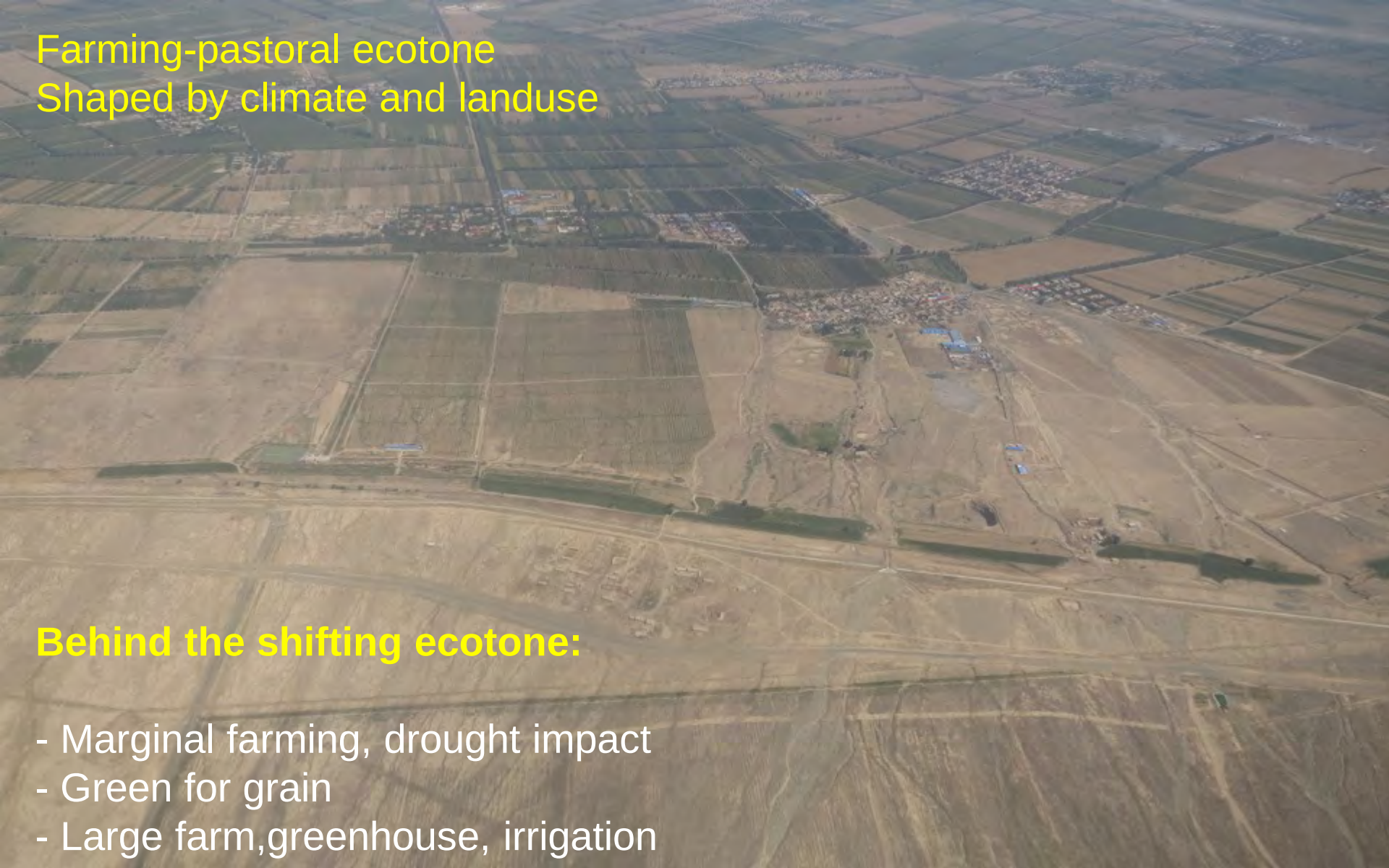
NPP, albedo, ET

Wildfire

Pest/disease

→ Canopy dieback

→ NPP, albedo, ET



Farming-pastoral ecotone
Shaped by climate and landuse

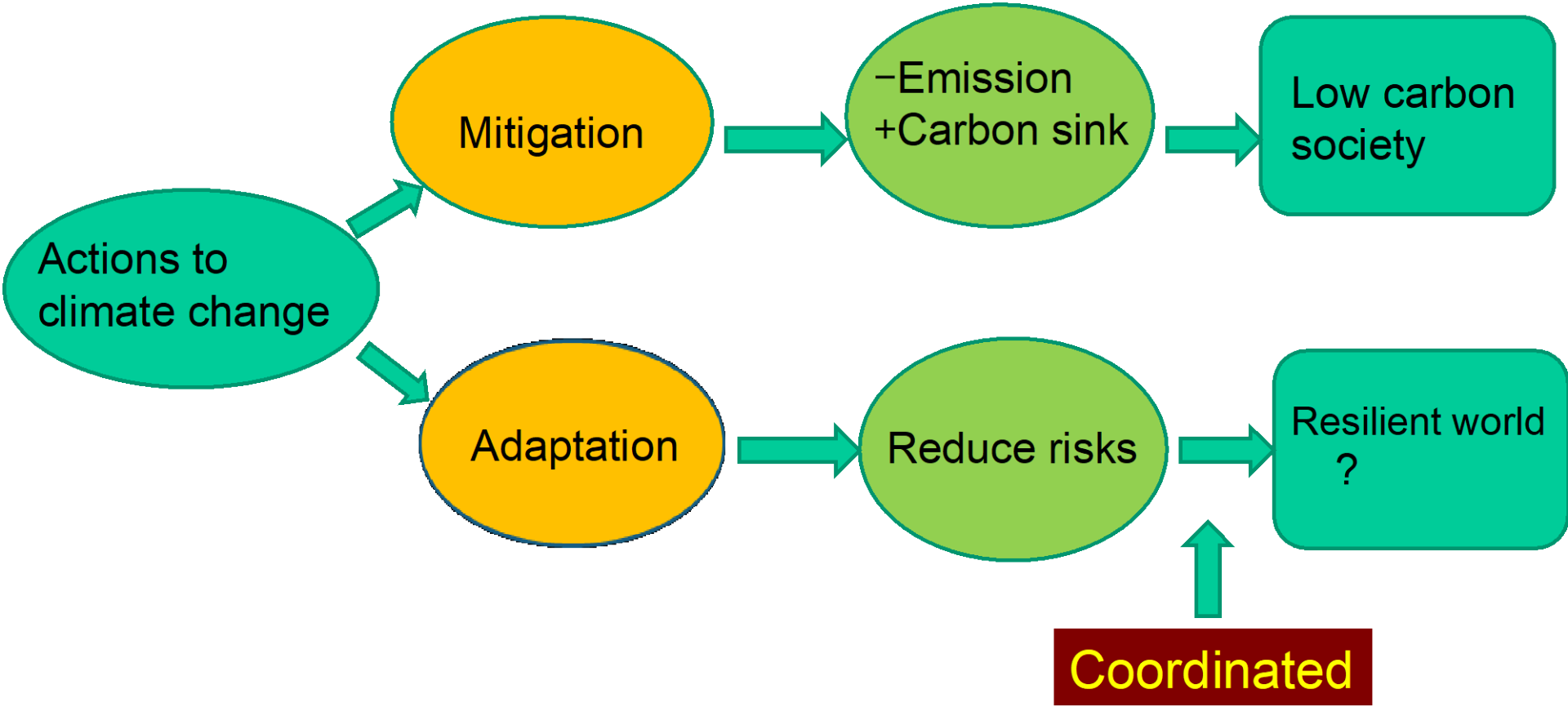
Behind the shifting ecotone:

- Marginal farming, drought impact
- Green for grain
- Large farm,greenhouse, irrigation

Coordinated adaptation

Different sectors and subregions are encouraged to work together to develop coordinated and integrated adaptation strategies at regional and global scales plan with Earth system approach, in order to achieve optimal effects for sustainable development. Key elements:

- Cross and integrate sectors –
- Beyond administrative boundaries –
- Short-term vs. long-term -

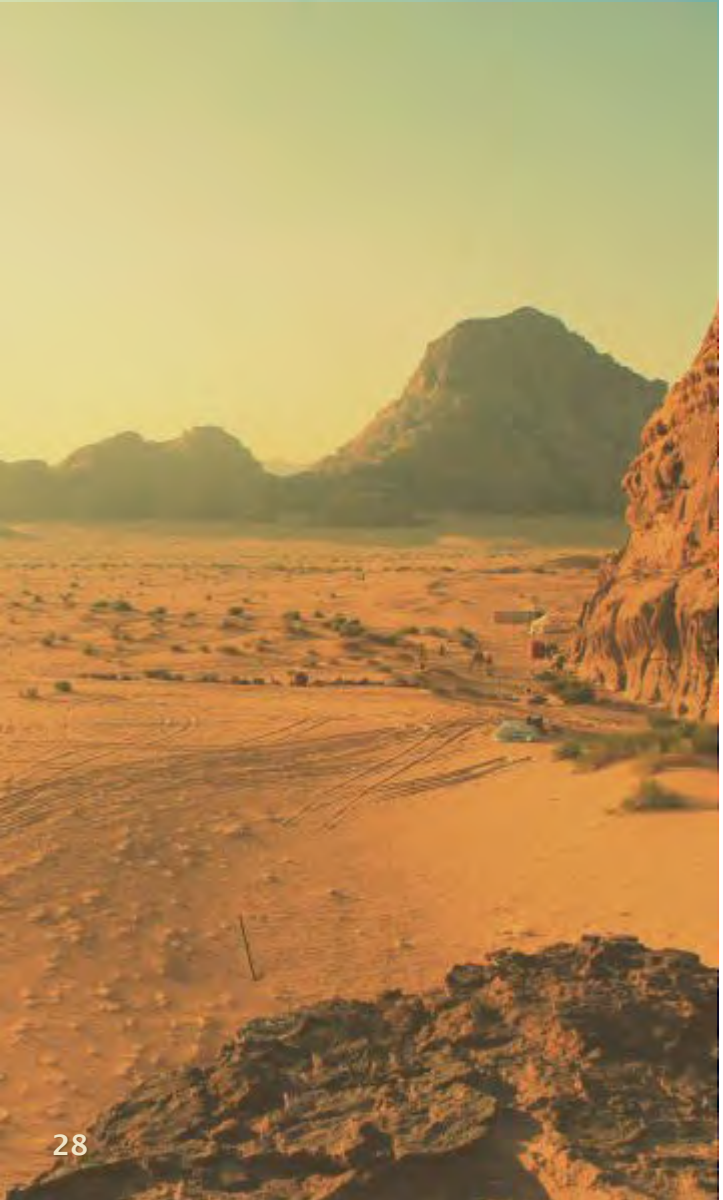

Actions to climate change
Mitigation
−Emission
+Carbon sink
Low carbon society
Adaptation
Reduce risks
Resilient world
?
Coordinated

What is sustainable land management?

“the stewardship and use of land resources, including soils, water, animals and plants, to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions”

“

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



The big picture

- The potential for mitigating climate can only be realised if **agricultural emissions** are **included in mainstream climate policy**.
- There is enough knowledge to **take action now**.
- Many of sustainable land management actions **make strong economic sense**.
- **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.

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Thank You

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