

GEOGRAPHY BULLETIN

Edition 52, No 2, 2020

STAGE 5 SKILLS Stimulus Topics

Sustainable Biomes

Environmental change

Snapshot 1: Geomorphic processes
Snapshot 2: Landscape diversity and change
Snapshot 3: Meandering Rivers
Snapshot 4: Earthquakes
Canada 1: Major landforms, geomorphic processes & geomorphic hazards
Canada 2: Unique landforms & geomorphic processes
Canada 3: Landscape values & protection
STAGE 4: WATER IN THE WORLD
Snapshot: Water cycle processes & connections
Canada 4: Water resources & hazards
Canada 5: The Bow River
STAGE 4: Virtual Fieldwork
STAGE 4: Skills Stimulus
STAGE 5: Teacher Guide
STAGE 5: SUSTAINABLE BIOMES
Snapshot: Biomes & their productivity
Pollinators, bees & food
Grassland Biomes
STAGE 5: ENVIRONMENTAL CHANGE
Tundra Investigative Study
Sydney Harbour Estuary
STAGE 5: Virtual Fieldwork
STAGE 5: Skills Stimulus
CAREERS
Careers in Geography

Created by L Chaffer for GTANSW & ACT Edition 52, No 2, 2020



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Geography Teachers Association
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In this task you will ...

- Use inquiry skills to analyse and interpret geographical tools including photographs, infographics, diagrams and statistical tables.
- Apply your knowledge and understanding of challenges to global food production and environmental change to answer inquiry questions.

You will need

- A hard copy of Stage 5 Skills stimulus OR this PPT
- A copy of the Student Activity worksheets



Learning Intention

You are aiming to demonstrate:

- The use of geographical inquiry skills to
 - process geographical information (interpret and analyse)
 - communicate geographical information
- A knowledge and understanding of challenges to global food production including loss of pollinators, locusts and the physical environment.
- A knowledge and understanding of concepts related to biomes and environmental change and management including climate change, deforestation and sustainability.



Success criteria

At the end of this activity you will have:

- ♦ Applied geographical inquiry skills to interpret stimulus material including diagrams, maps and photographs (interpreting, analysing, applying and communicating)
- ♦ Demonstrated a knowledge and understanding of challenges to global food production.
- ♦ Demonstrated a knowledge and understanding of concepts related to environmental change.

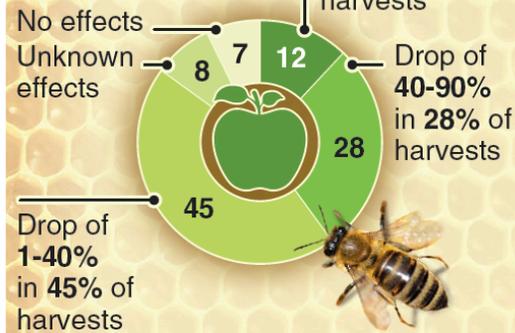
World Bee Day highlights pollinator plight

Bees, nature's greatest pollinators, are increasingly under threat from disease, parasites, habitat loss and agricultural pesticides

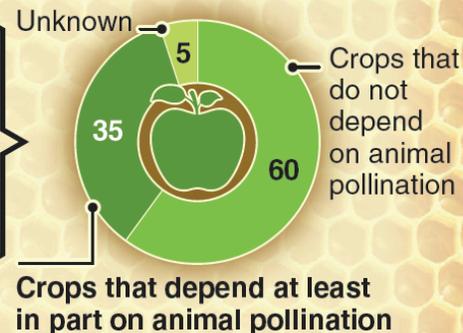
POLLINATORS OF LEADING GLOBAL CROPS (%)



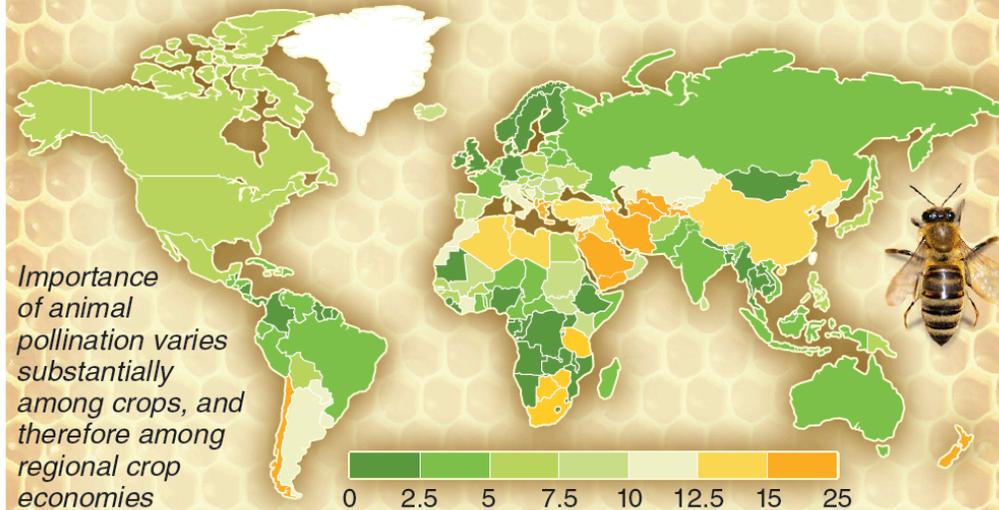
HOW LOSS OF POLLINATORS WOULD DECREASE GLOBAL CROP PRODUCTION (%)



GLOBAL CROP PRODUCTION (%)



EXPECTED AGRICULTURE LOSS IN ABSENCE OF ANIMAL POLLINATION (%)



*Include wasps, butterflies, moths, beetles, weevils, thrips, ants, midges, bats, birds, primates, marsupials, rodents and reptiles. Map data from 2012

Sources: United Nations, World Bee Day

Pictures: Associated Press

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CHALLENGES TO GLOBAL FOOD PRODUCTION

POLLINATORS

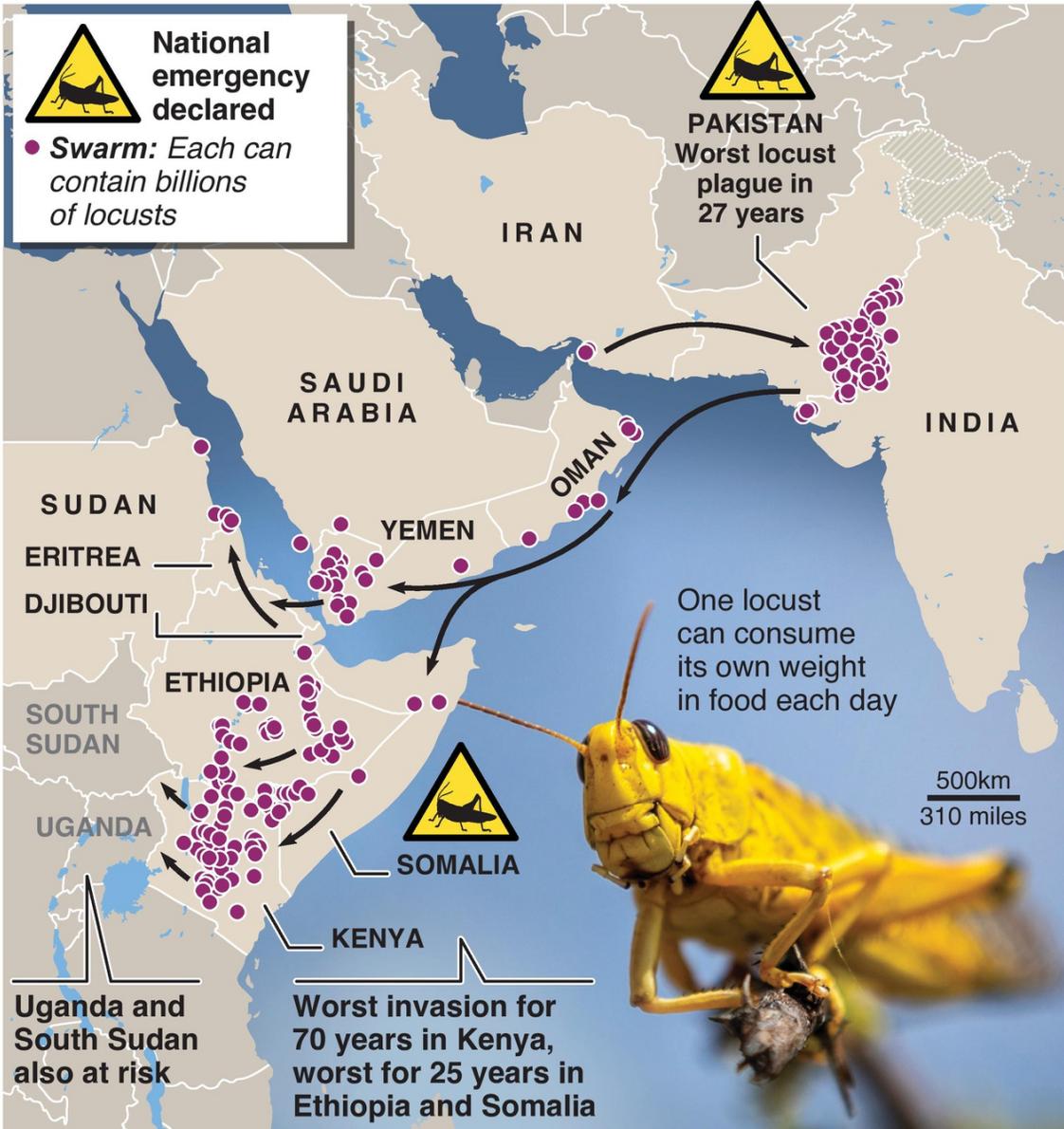
Bulletin Source A page 92
Activity page 70



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Harvests threatened by locust swarms

Swarms of voracious locusts are rampaging through large parts of East Africa, the Middle East and southwestern Asia, devastating cropland and threatening the livelihoods of millions of people



Source: Food and Agriculture Organization (FAO)

Picture: Associated Press

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CHALLENGES TO GLOBAL FOOD PRODUCTION

LOCUSTS

Bulletin Source B page 92
Activity page 70



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CHALLENGES TO GLOBAL FOOD PRODUCTION

Physical environment

Refer to the following four slides (Bulletin Source C page 92) to complete the inquiry questions.

Activity page 71



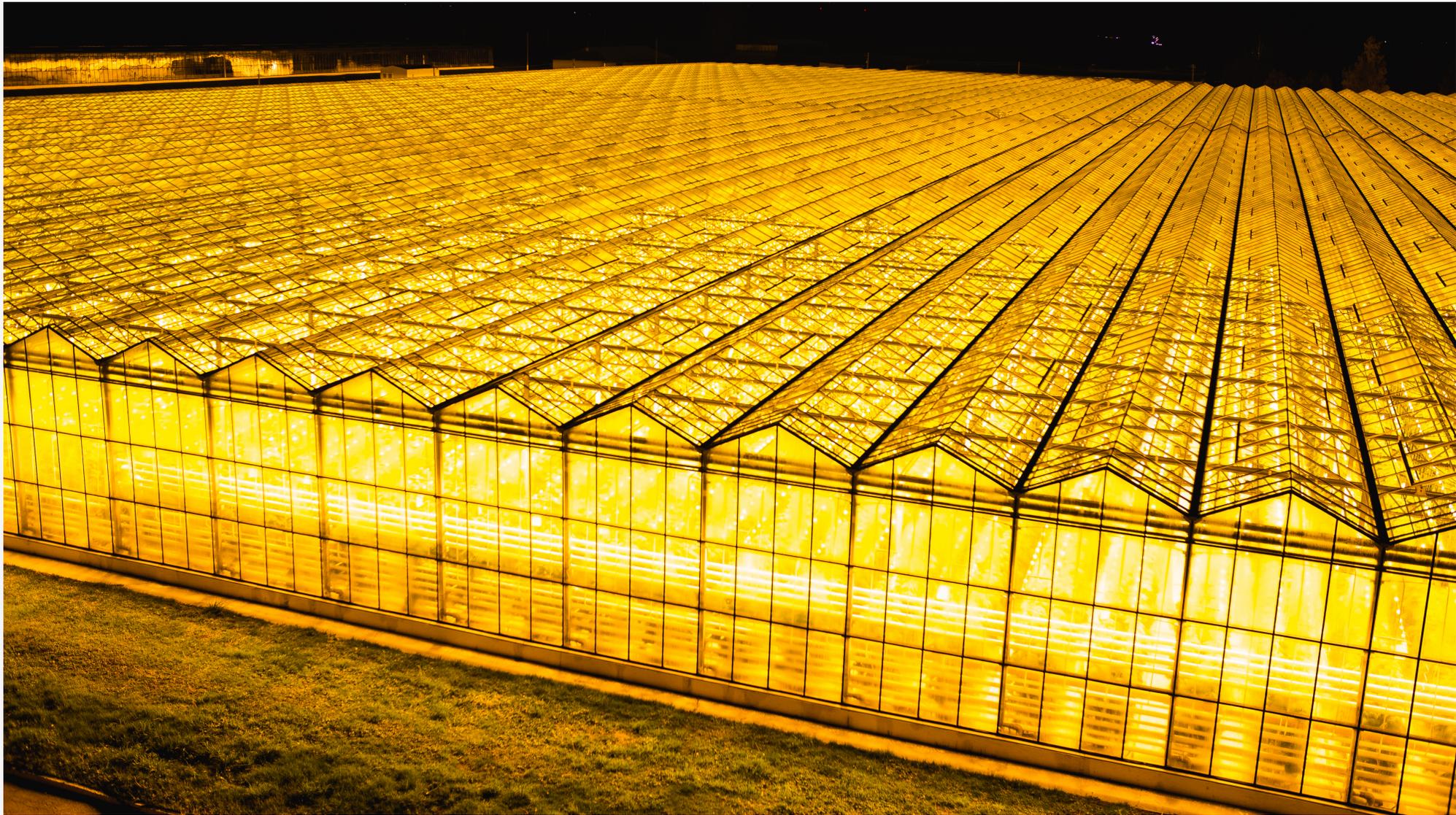
Green circles in the desert usually indicate tracts of agriculture supported by center-pivot irrigation. Egypt's Western Desert is dry and receives just centimeters of rainfall per year – often described as “hyperarid.” Greenery has been appearing in the area in recent decades. On February 26, 2017, Landsat 8 captured these naturalcolor images of one of Egypt's land reclamation projects aimed at making some desert areas suitable for agriculture.

The Netherlands is a small, densely populated country lacking the natural environments thought necessary for large-scale agriculture . Despite this, it ranks second highest in exports of food (by value), behind the United States, which is 270 times larger. The Dutch are the top exporters of potatoes and onions and second largest exporter of vegetables overall. More than a 30% of all global trade in vegetable seeds originates in the Netherlands.



Shutterstock

Source C page 92



Source C page 92

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THE AMAZON BASIN

'What we see in the Amazon over the past four decades is extraordinary change. We see major losses in both humid and dry forests; incredible expansions of pasture and agriculture; and clears shifts in land use driven by economic forces and the way land is managed. There is really nowhere else in the world that compares to the Amazon for the scale and scope of change.'

Matthew Hansen, University of Maryland (a remote sensing scientist specialising in mapping land cover and land use change)

SUSTAINABLE BIOMES
and
ENVIRONMENTAL
CHANGE

Bulletin Sources D, E and F page 93
Activity page 71 - 72

Source D

This map uses false-color satellite imagery to illustrate the varied landcover types in and around the Amazon Rainforest

-  Densely vegetated areas are typically **rainforest**
-  Water in **rivers, lakes, and reservoirs**
-  Land cleared for **pasture**
-  **Seasonally flooded savanna** and other wetlands
-  **Bare ground** in farmland, savannas, and grasslands
-  **Desert** areas with minimal vegetation
-  Evaporation can produce **salt flats** in dry areas



These Landsat mosaic images give a view of the Amazon Basin's land surfaces.

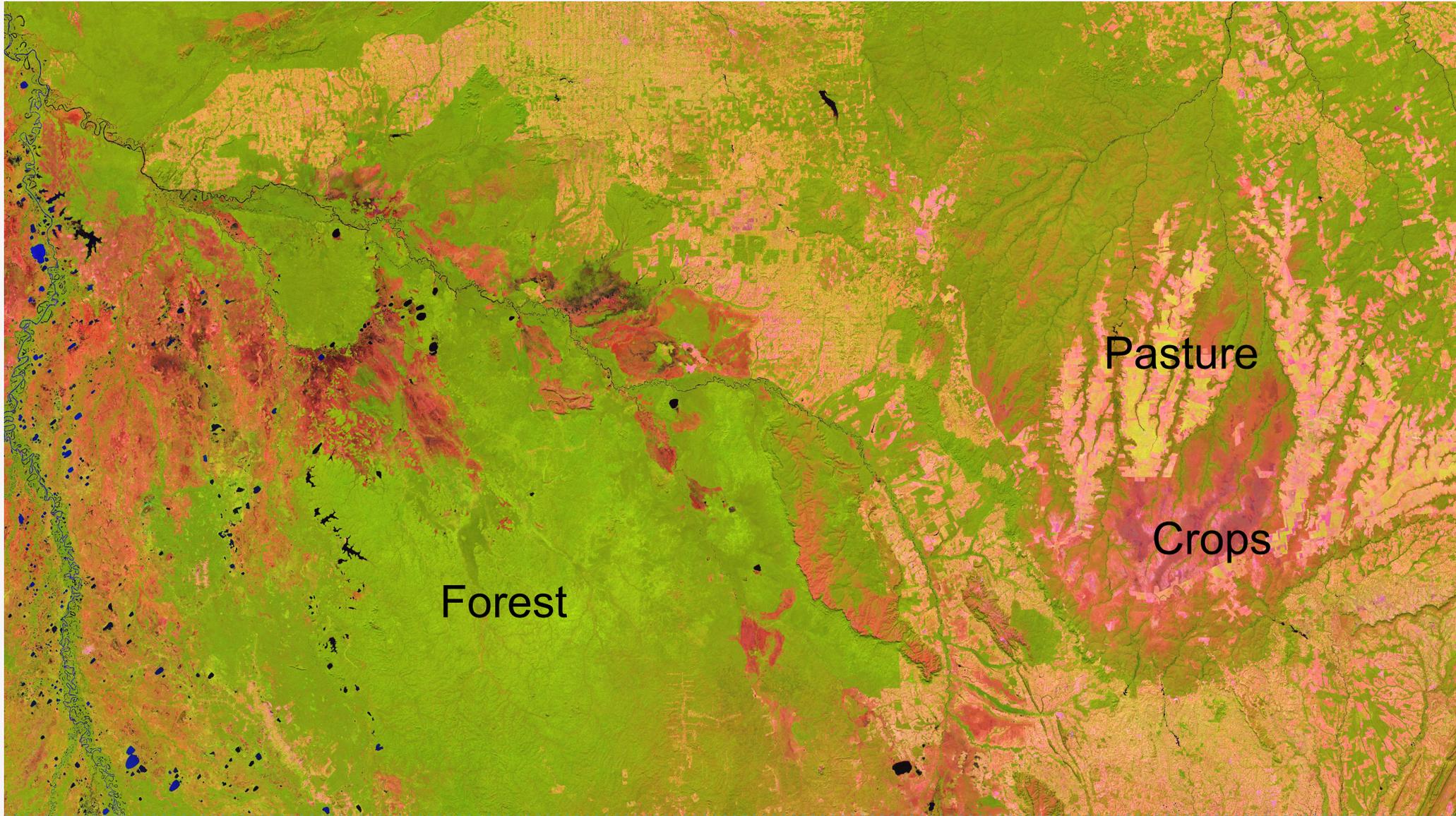
The **darkest green** areas is forest, mostly tropical rainforest that is not severely changed or degraded by human activity.

Lighter green areas are mainly tropical savanna. These woodland-grassland regions may have widely spaced trees without a closed canopy .

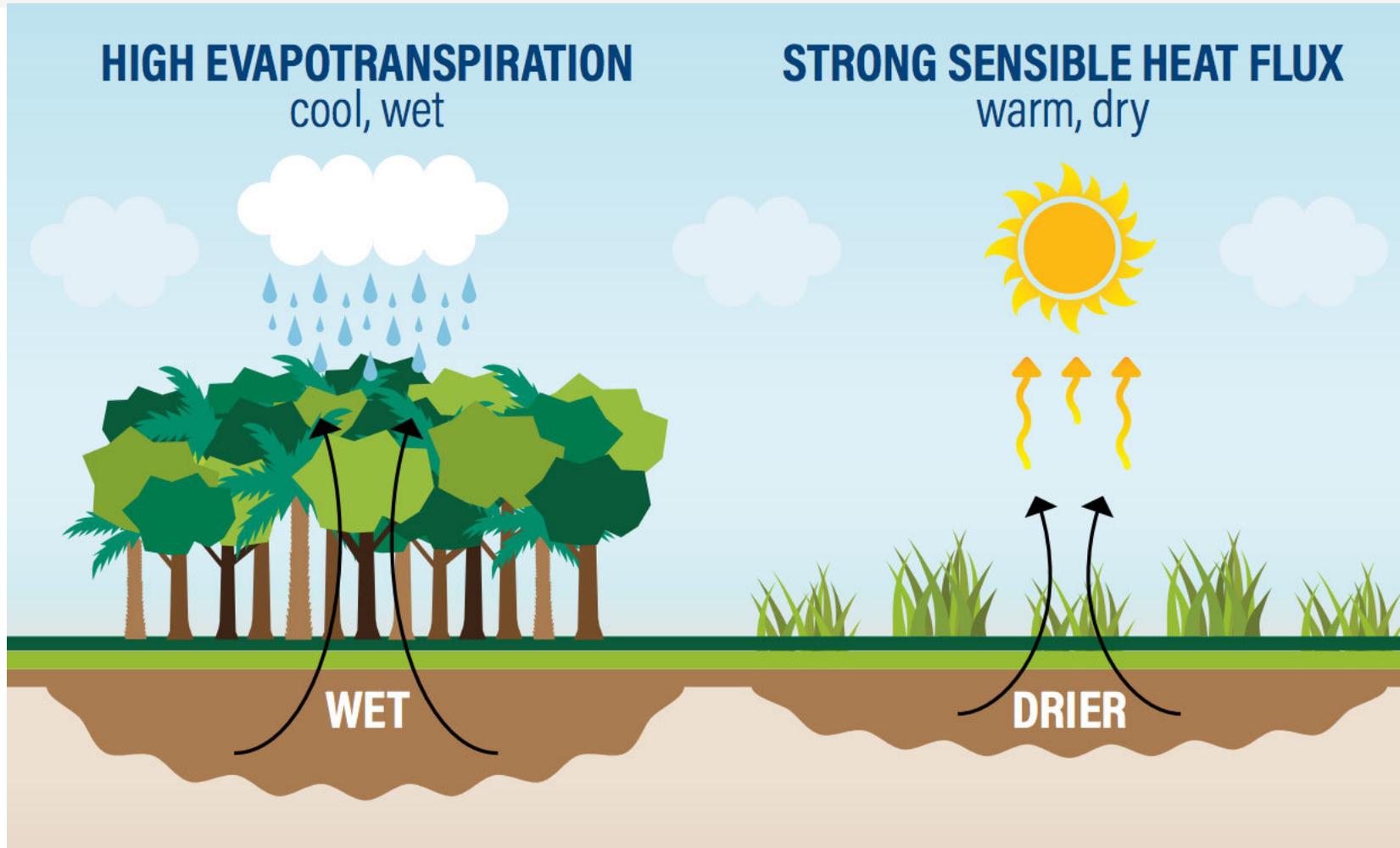
Areas affected by human activity also stand out.

- Forest areas converted to pasture generally appear **yellow**.
- Savanna converted to cropland is generally **pink**, especially if fields are fallow or have exposed soil.

Deforestation threatens biodiversity, reduces atmospheric carbon absorption, increases damage from natural disasters such as fire, and disrupts the functioning of the water cycle.



Source E



Source F

e360 Yale Edu

<https://e360.yale.edu/features/how-deforestation-affectingglobal-water-cycles-climate-change>

Arctic reindeer population decimated

The population of wild reindeer, also known as caribou, has crashed by more than half in the last two decades, according to a new report

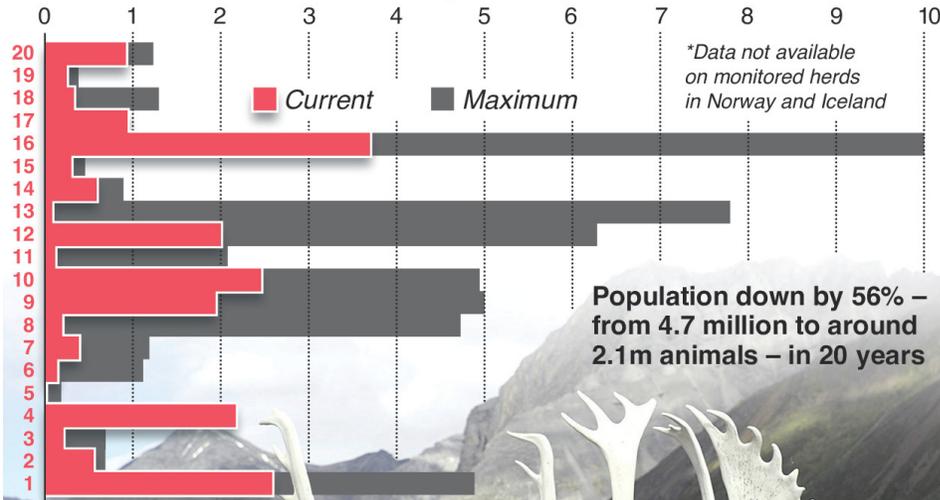
REINDEER/CARIBOU (20 monitored herds shown)

ENVIRONMENT



- Changing weather and vegetation making Arctic less hospitable, with some herds down by more than **90%**
- Warming climate causing taller plants to dominate tundra and engulf ground level lichen that caribou eat
- Rain falling on snowy ground can form frozen icy layers over grazing tundra – caribou cannot push noses through

ESTIMATED POPULATION BY HERD* (100,000s)



Population down by 56% – from 4.7 million to around 2.1m animals – in 20 years



Sources: NOAA Arctic Program, BBC

Picture: Associated Press

© GRAPHIC NEWS

ENVIRONMENTAL CHANGE

Bulletin Source F page 94

Activity page 72

Source F

Russia's "Kingdom of Winter" is thawing

As the Arctic, including much of Siberia, warms twice as fast as the rest of the world, the permafrost – permanently frozen ground – is thawing, putting cities, oil pipelines and other infrastructure at risk

Extent of permafrost (% of area)

- Continuous (90-100%)
- Discontinuous (50-90%)
- Subsea permafrost
- Sporadic (10-50%)
- Isolated patches (0-10%)

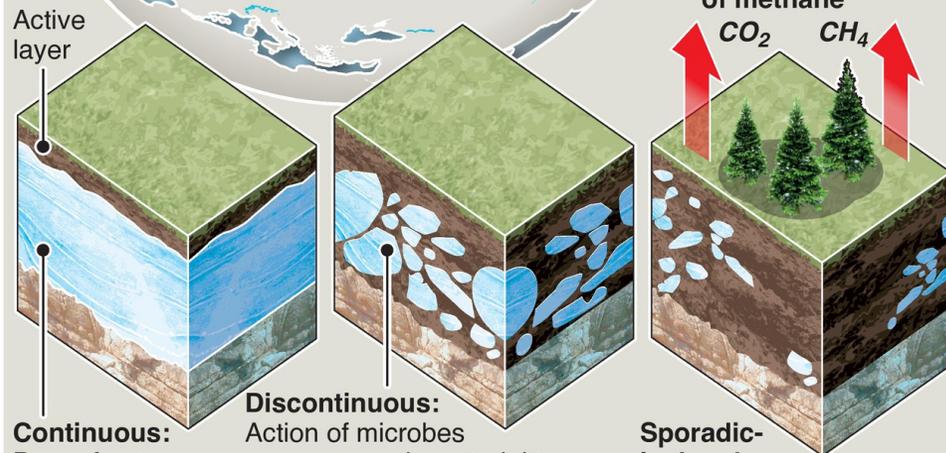


Permafrost: Formed 11,700 years ago – covers almost 65% of Russia. 80% of Russia's gas production is in Arctic

Srednekolymsk: Summer above Arctic Circle is now four weeks longer than in 1980

Permafrost warmed by 3°C during 20th century

Russian permafrost contains estimated 70 billion tonnes of methane



Continuous: Permafrost contains plant and animal remains

Discontinuous: Action of microbes causes organic material to decompose into carbon dioxide (CO₂) and methane (CH₄)

Sporadic-isolated: CO₂ and CH₄ released into atmosphere

ENVIRONMENTAL CHANGE

Bulletin Source G page 94

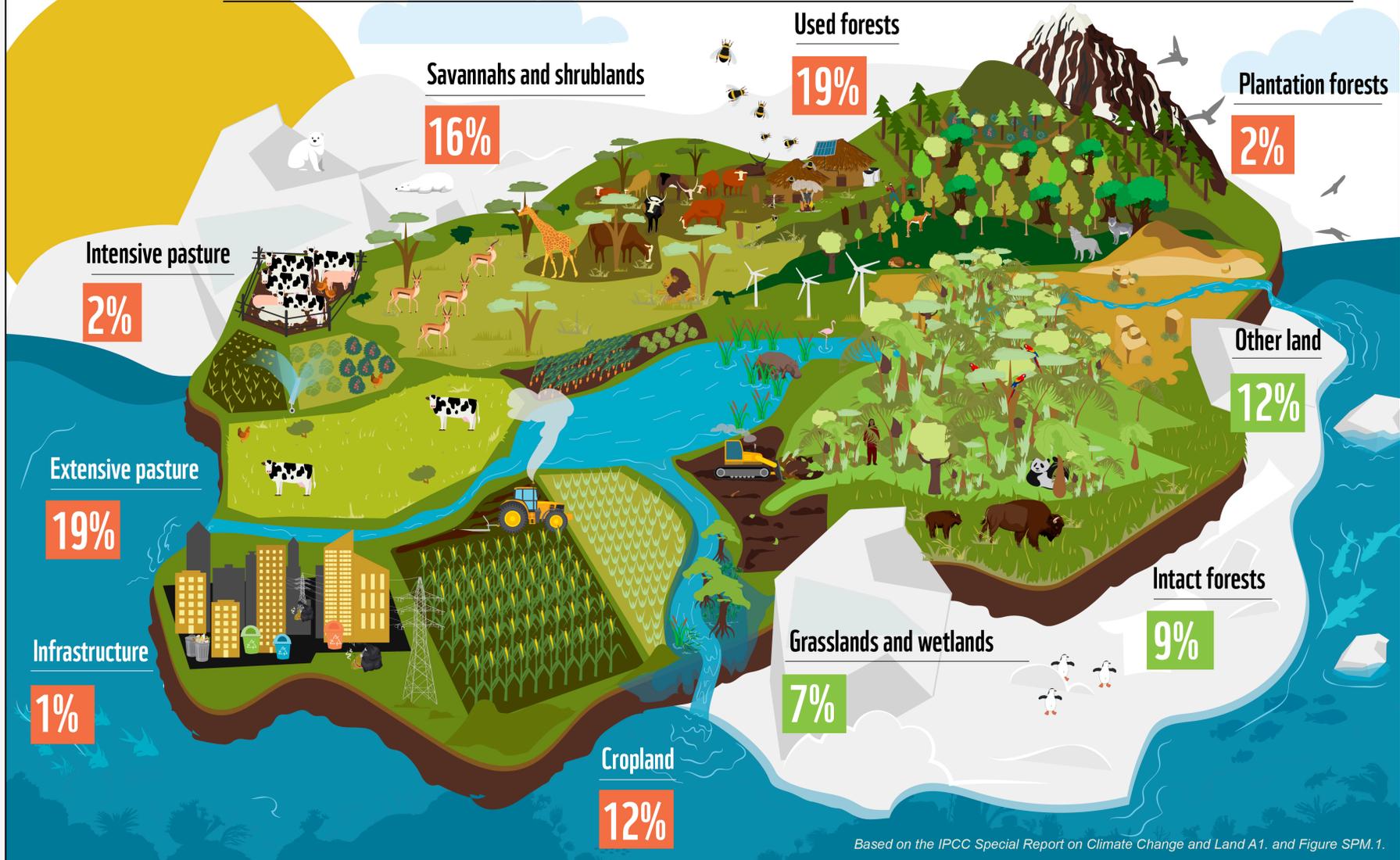
Activity page 72

Source G



HUMANS USE A LOT OF LAND

Human use directly affects around **72%** of the 130 Mkm² global, ice-free land surface, leaving just **28% unused**



Based on the IPCC Special Report on Climate Change and Land A1, and Figure SPM.1.

Bulletin Source H
page 94

Activity pages 73-74

SOURCE:
https://wwf.panda.org/our_work/climate_and_energy/ipcc_land/

You can also find a link to the IPCC Land and Climate Change report using this link





LAND AND CLIMATE CHANGE

Land systems drive climate change

*To stop **climate change** we must cut greenhouse gas emissions and use **land** to draw down carbon dioxide from the atmosphere*

*The **food system** produces around a quarter of global greenhouse gas emissions. Solutions include better farming practices, halting deforestation, healthier diets and stopping wasting food*

*We must also **stop using fossil fuels** and move to renewable energy sources*

Climate change adds stress to land systems and so worsens existing risks – such as to land degradation and food security

Bulletin Source I
page 95

Activity page 74

SOURCE:

https://wwf.panda.org/our_work/climate_and_energy/ipcc_land/

You can also find a link to the IPCC Land and Climate Change report using this link



SUSTAINABLE LAND MANAGEMENT

Better land use can contribute to several societal challenges such as climate mitigation and resilience, sustainable and secure food systems and biodiversity conservation. *Sustainable Consumption* actions can also take pressure off land and so positively impact the societal challenges.

Zero Deforestation and Conversion

Integrated Water Management

Reduced Food Loss and Waste

Sustainable Forest and Grasslands Management

Better Livestock Management

Diet Shift

Agroforestry

Better Cropland Management

Better Urban Planning

Forest and Ecosystem Restoration

Zero Grassland Conversion

Agricultural Diversification

Coastal Wetlands Restoration

Increased Soil Carbon

Each of the above actions positively impact the majority of the societal challenges below.



CLIMATE MITIGATION



CLIMATE ADAPTATION



LAND DEGRADATION & DESERTIFICATION



BIODIVERSITY CONSERVATION



FOOD SECURITY

Bulletin Source J
page 95

Activity page 74-75

SOURCE:

https://wwf.panda.org/our_work/climate_and_energy/ipcc_land/

You can also find a link to the IPCC Land and Climate Change report using this link