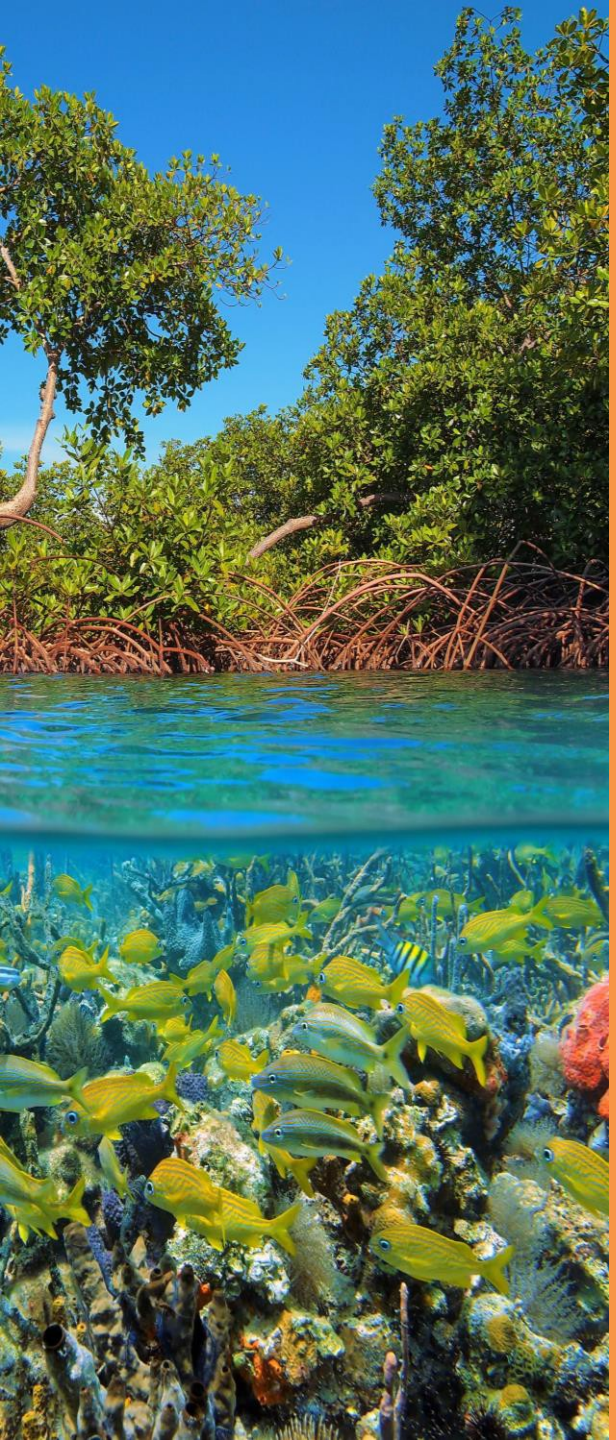
Food and Agriculture Organization of the United Nations

The International Treaty ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Eighth Session of the Governing Body (GB-8) of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture

ROBERT T. WATSON
Former Chair of the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services

FAO, Rome November 11, 2019



Agriculture and Biodiversity: what is happening, why should we care, and how should we respond and what is the influence of climate change

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The biosphere upon which humanity depends, has been deeply reconfigured by human activities

75%
of the land area has been significantly altered, negatively impacting the well-being of 3.2 billion people – much of the conversion is due to agriculture

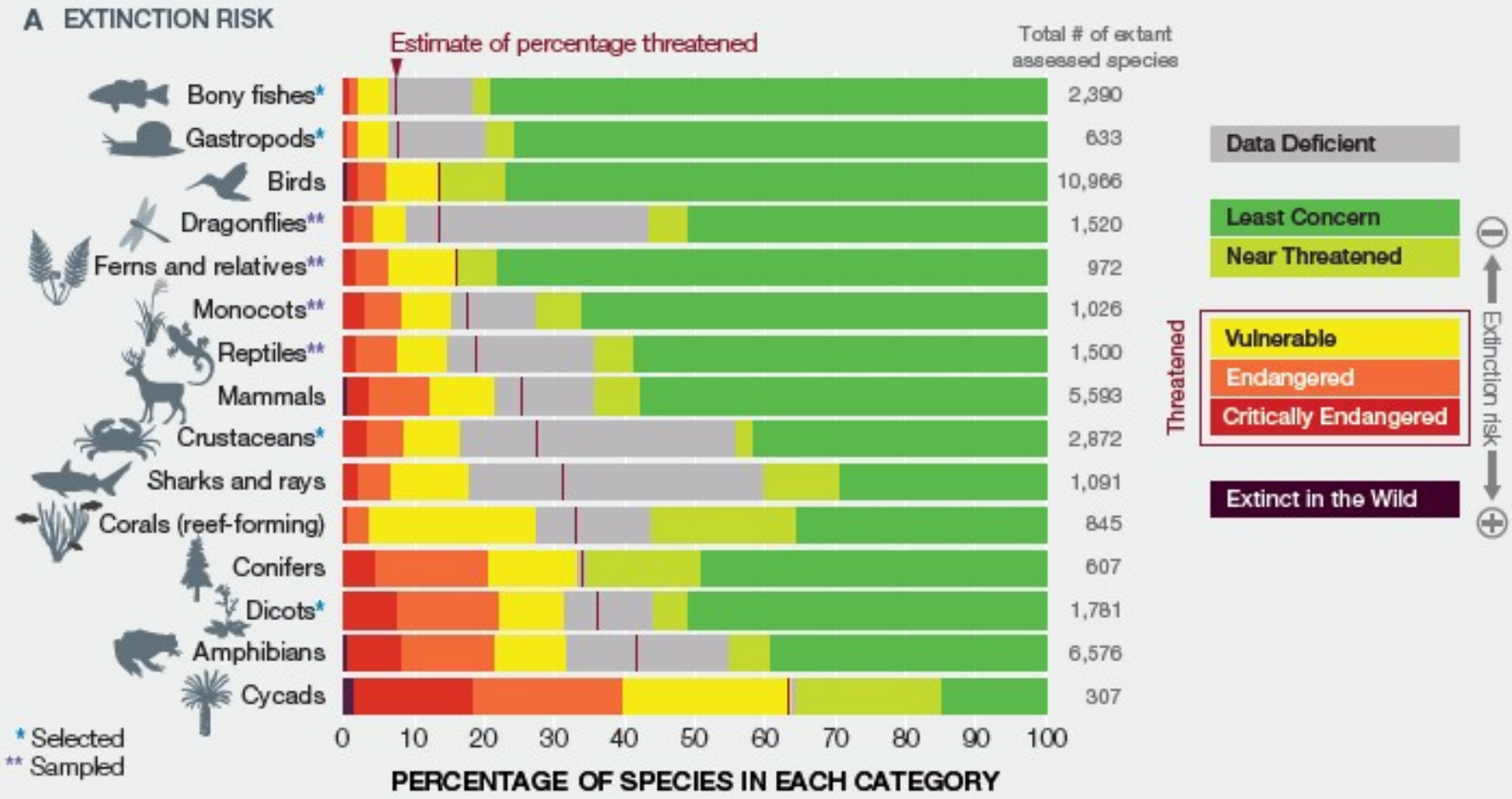
66%
of the ocean area is experiencing increasing cumulative impacts – warming, acidification, pollution, inc plastics

>85%
of wetland area has been lost

90%
of land is projected to be significantly altered, by 2050

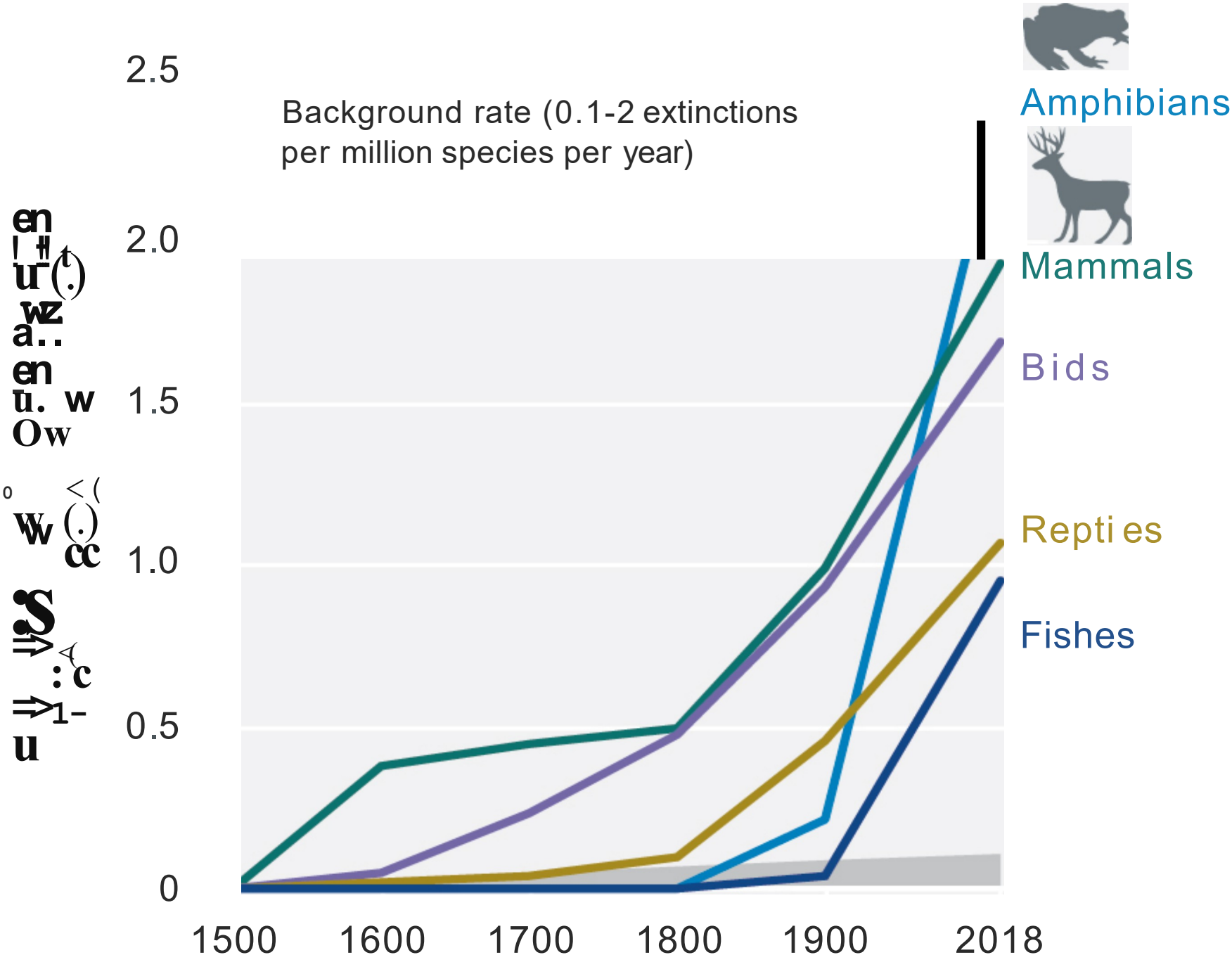
1 million
species (500,000 plants and animals and 500,000 insects) are at risk of extinction assuming a total of 8.1 million species (2.6 million plants and animal and 5 million insects)

More species of plants and animals are threatened with extinction now than at any other time in human history



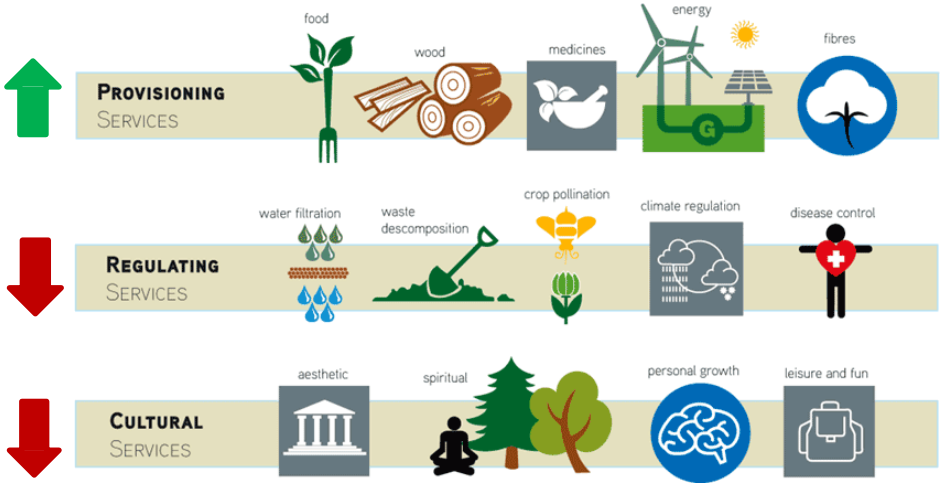
One million species are at risk of extinction, however, we are not in a 6th mass extinction

C EXTINCTION RATE



Nature, underpins and sustains human quality of life

While the provisioning services have largely increased, the regulating services and non-material services have decreased significantly



We have exploited the services that have market value, i.e., the production of food, fiber, energy and medicines, at the expense of the services that have no market prices but have economic and social value

The conversion and degradation of our ecosystems is adversely impacting human well-being, especially poor people in poor countries

Agricultural Trends

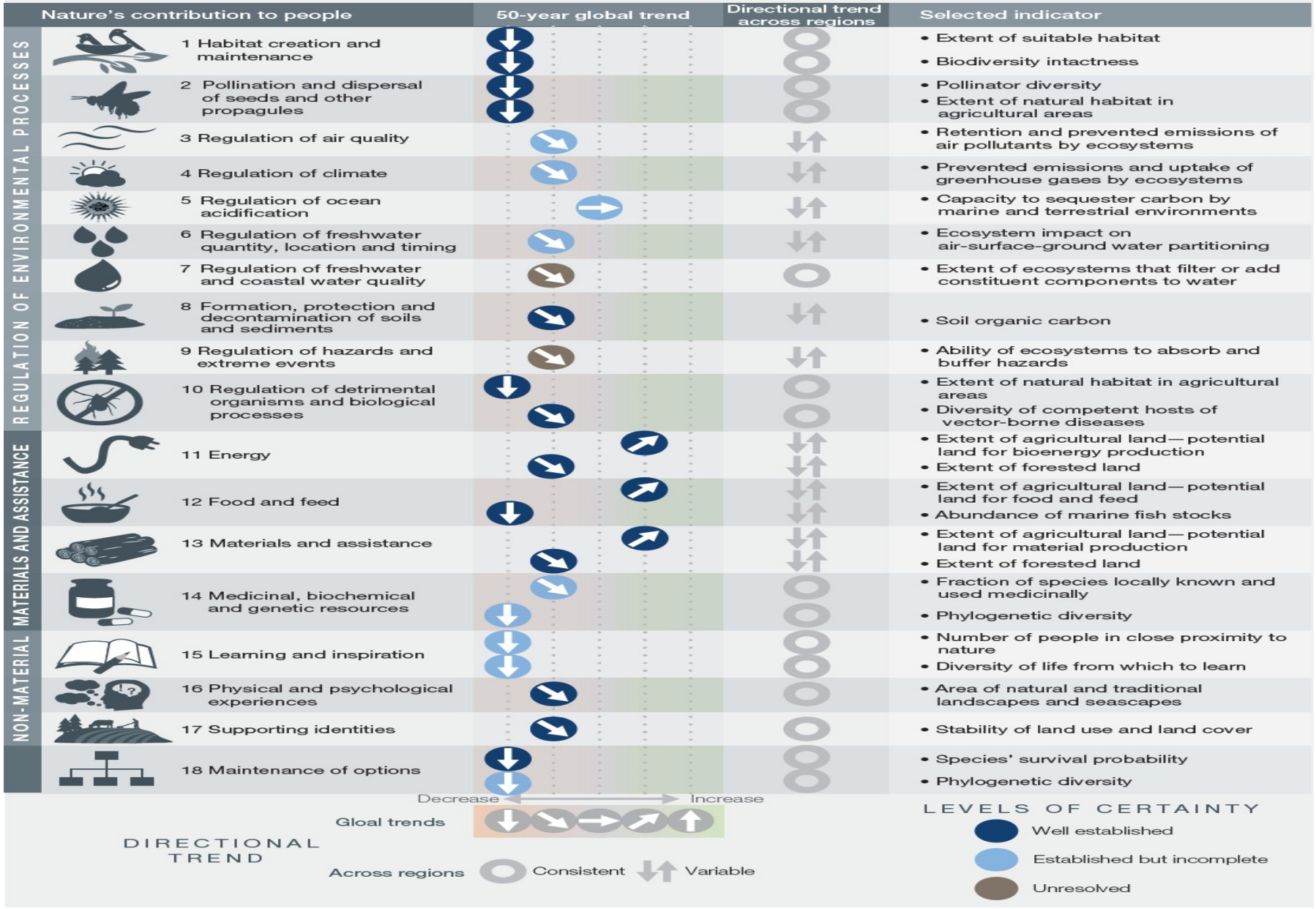
- Since 1970, trends in agricultural production, fish harvest, bioenergy production and harvest of materials have increased, but 14 of the 18 categories of contributions of nature that were assessed, mostly regulating and non-material contributions, have declined

- The value of agricultural crop production ($2.6 trillion in 2016) has increased approximately threefold since 1970, and raw timber harvest has increased by 45 per cent, reaching some 4 billion cubic meters in 2017, with the forestry industry providing about 13.2 million jobs

- However, indicators of regulating contributions, such as soil organic carbon and pollinator diversity, have declined, indicating that gains in material contributions are often not sustainable

- Currently, land degradation has reduced productivity in 23 per cent of the global terrestrial area, and between $235 billion and $577 billion in annual global crop output is at risk as a result of pollinator loss

Global trends in nature's contributions to people since 1970

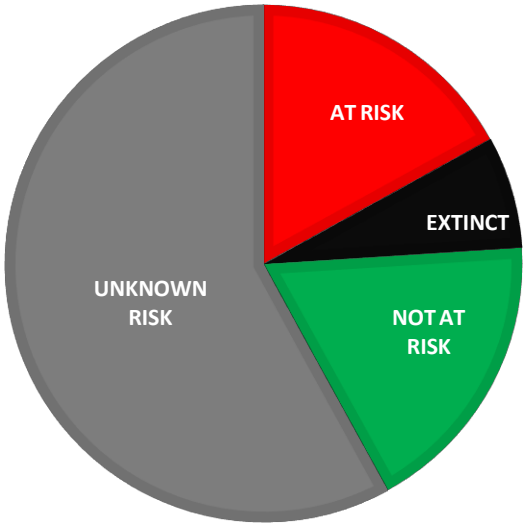


Biodiversity is particularly important for agriculture

- Globally, local varieties and breeds of domesticated plants and animals are disappearing
- Loss of genetic and species diversity (cultivated crops, crop wild relatives, and domesticated breeds) poses a serious risk to global food security by undermining the resilience of many agricultural systems to threats such as pests, pathogens and climate change
- Fewer varieties and breeds of plants and animals are being cultivated, raised, traded and maintained around the world, despite many local efforts, which include those by indigenous peoples and local communities
- By 2016, 559 of the 6,190 domesticated breeds of mammals used for food and agriculture had become extinct and at least 1,000 more are threatened
- Many crop wild relatives that are important for long-term food security lack effective protection, and the conservation status of wild relatives of domesticated mammals and birds is worsening

The number of local varieties and breeds of domesticated plants and animals has decreased sharply

Proportion of the world's mammal and bird breeds by risk status category



Photocredit Daniel M. Cáceres

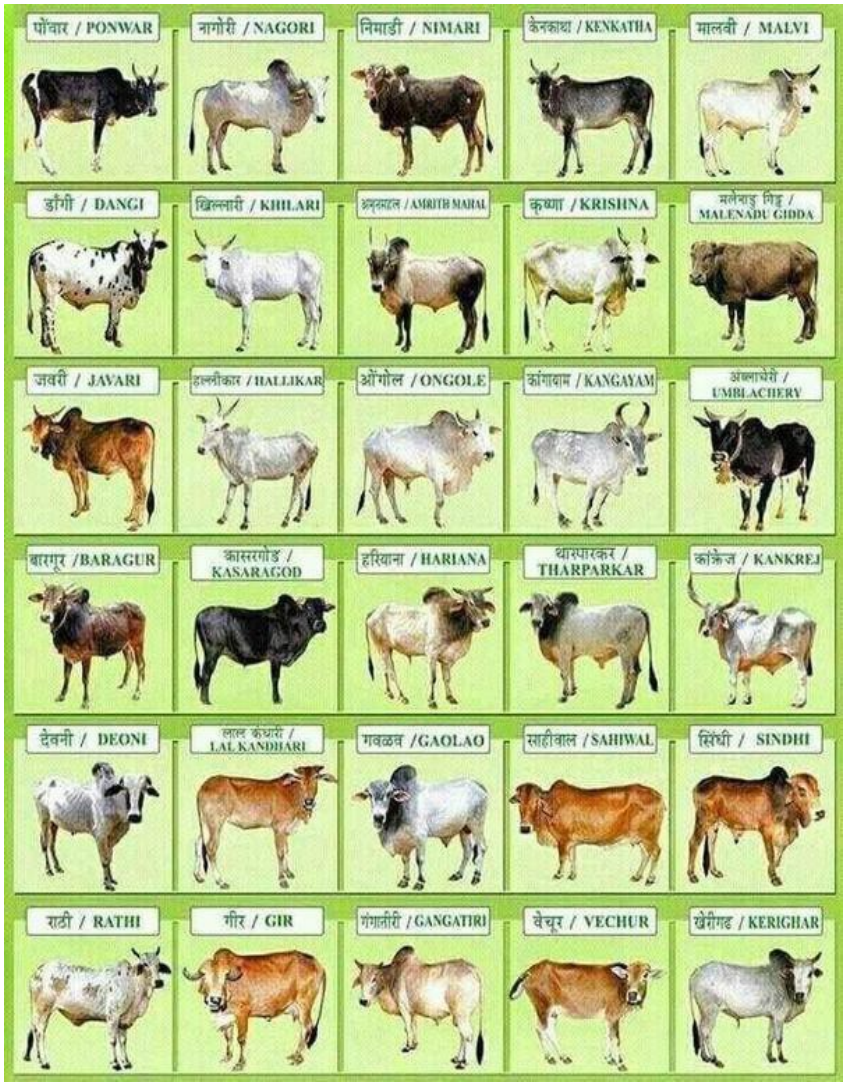
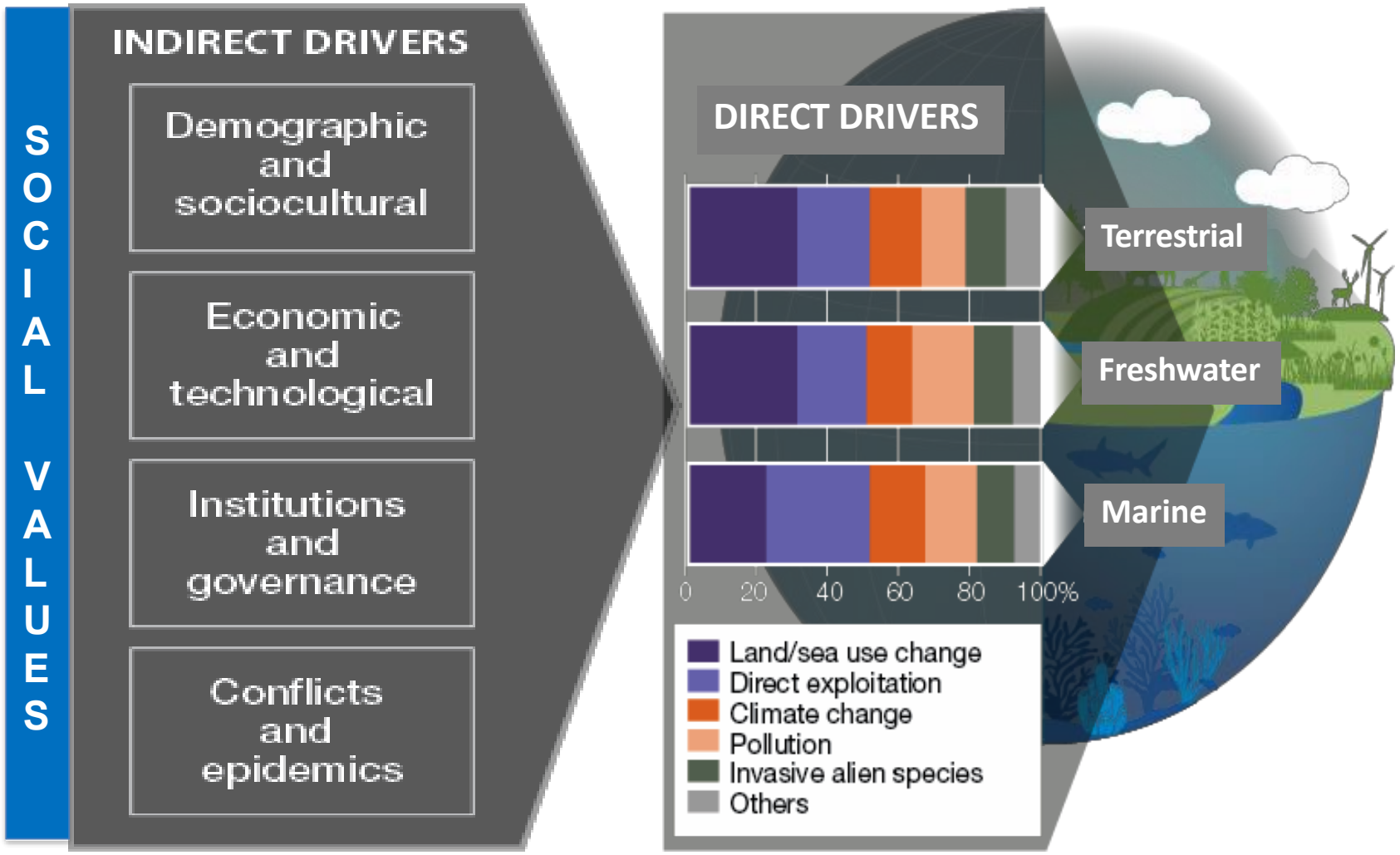


Image: https://www.quora.com/What-is-the-breed-name-of-the-Indian-Desi-cow

Direct drivers of change have accelerated during the past 50 years to levels unprecedented in human history



Underpinning the proximate causes of deterioration in nature are the root causes, or indirect drivers of change.

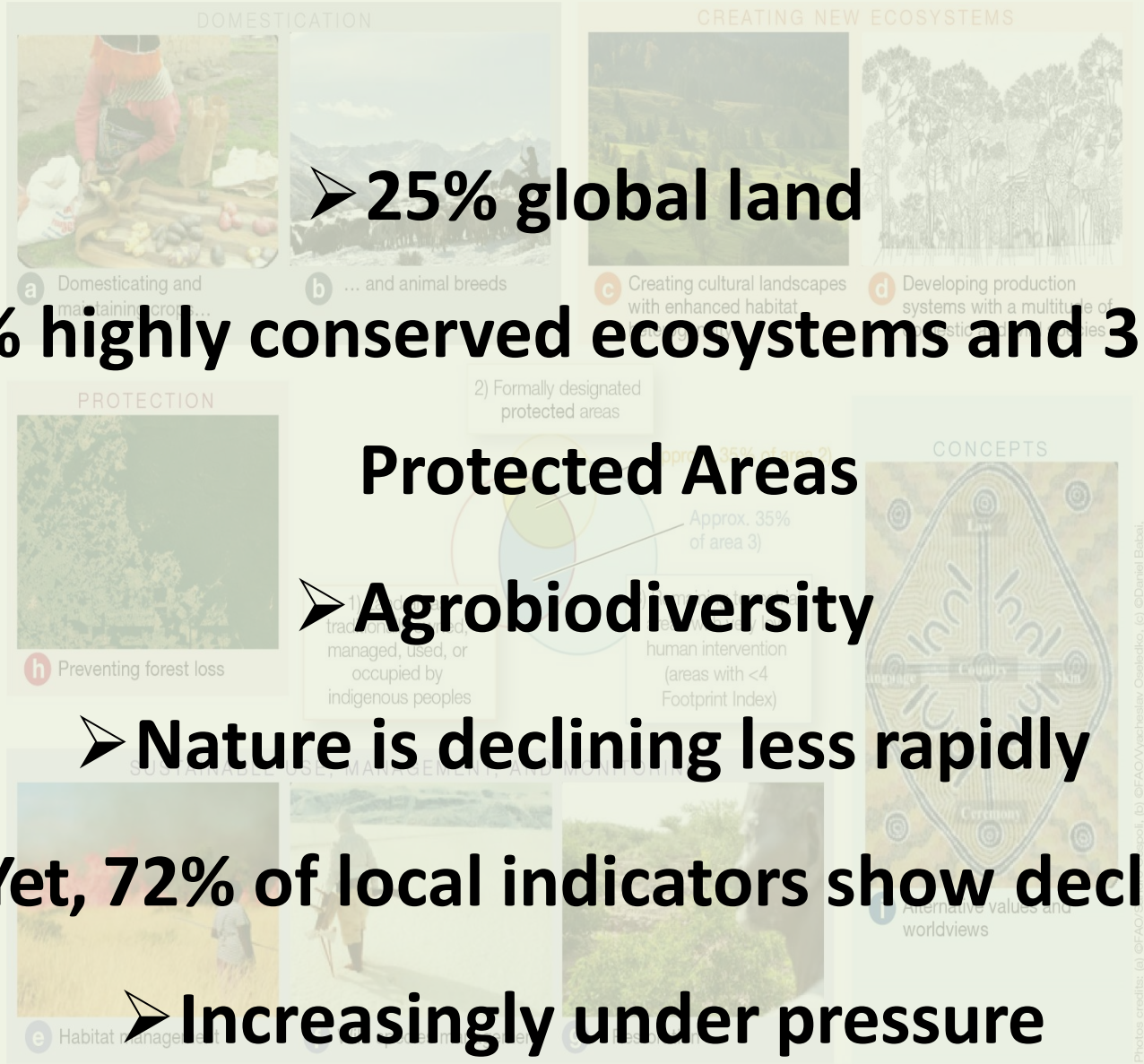
Climate Change and Loss of Biodiversity

- Climate change has not been the dominant driver of biodiversity loss to date, but is projected to become as important or more important than the other direct drivers in the coming decades

- Meeting the Paris climate agreement targets is crucial to limit the loss of biodiversity. However, the current pledges are totally inadequate, global temperatures could reach the 1.5^{o}C aspirational target by the early-mid 2030s, the 2^{o}C target by 2050-2070, and without additional actions we are on pathway to 3-4^{o}C

- Nature-based solutions can offer cost-effective mitigation and adaptation opportunities – however, trade-offs exist, especially with large-scale monoculture bioenergy and afforestation

Contributions of Indigenous Peoples and Local Communities: knowledge, innovations, practices, and institutions



- 25% global land
- 35% highly conserved ecosystems and 35% of Protected Areas
- Agrobiodiversity
- Nature is declining less rapidly
- Yet, 72% of local indicators show decline
- Increasingly under pressure

Aichi Biodiversity Targets

Sustainable Development Goals

Progress towards the Aichi Biodiversity Targets

Goal	Target (abbreviated)	Progress towards elements of each target			
		Poor	Moderate	Good	Unknown
Drivers	1 Awareness		~ ~		
	2 Planning & accounting	✗	~ ~		
	3 Incentives	✗ ✗			
	4 Production & consumption	✗ ✗			
Pressures	5 Habitat loss	✗ ✗			
	6 Fisheries	✗ ✗			?
	7 Agriculture & forestry	✗ ✗	~		
	8 Pollution	✗ ✗			
	9 Invasive alien species	✗ ✗		✓	?
	10 Coral reefs etc	✗ ✗			
Status	11 Protected & conserved areas		~ ~ ~ ~	✓ ✓	
	12 Extinctions prevented	✗ ✗			
	13 Genetic diversity		~ ~ ~ ~		?
Benefits	14 Ecosystem services	✗			?
	15 Ecosystem restoration				? ?
	16 Access & benefit sharing		~	✓	
Implementation	17 Strategies & action plans		~ ~	✓	
	18 Indigenous & local knowledge		~		? ?
	19 Biodiversity science		~		?
	20 Financial resources		~		

While progress looks good for target 11 (protected areas) it hides the fact that important biodiversity is not within the current protected area system, many of the protected areas are not well managed, and the design of the protected areas does not take the implications of climate change into account

Societal Implications of Climate Change and Loss of Biodiversity

While each of these issues is an environmental issue, they are also

Development issues affecting poverty, food and energy security and human health

Economic issues - Climate change incurs significant economic costs. Biodiversity usually has no market price but has economic and social value

Security issues - these issues can lead to local conflict

Equity/ethical issues - industrialized countries have largely caused the problems - developing countries and poor people are most

Moral issues - we humans have no right to destroy the environment

These issues are both inter-and intra-generational and in each case the problem gets more serious over time

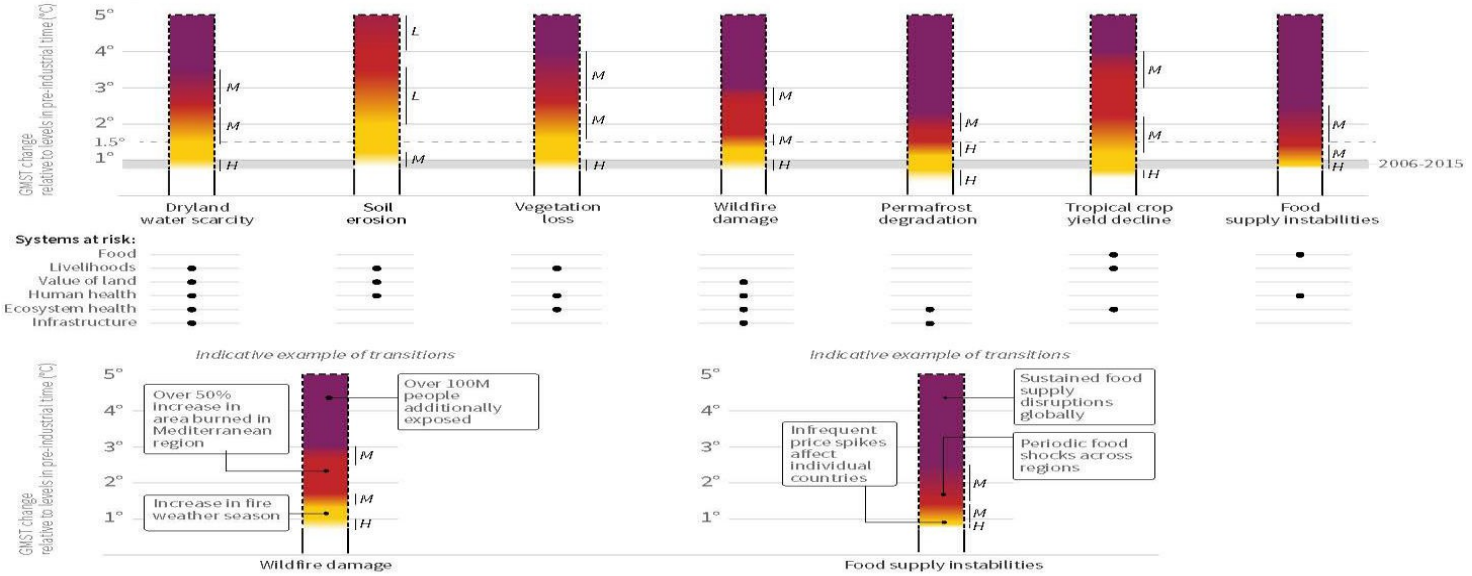
Progress towards the UN Sustainable Development Goals

Selected Sustainable Development Goals	Recent status and trends in aspects of nature and nature's contributions to people that support progress towards target *			Uncertain relationship
	Poor/Declining support	Partial support	Unknown	
1 NO POVERTY — No poverty	↓ ↓			U U
2 ZERO HUNGER — Zero hunger	↓	→ → →		
3 GOOD HEALTH AND WELL-BEIN — Good health and well-being			? ?	U U
6 CLEAN WATER AND SANITATIO — Clean water and sanitation	↓ ↓ ↓	→		
11 SUSTAINABLE C AND COMMUNIT — Sustainable cities and communities	↓ ↓ ↓ ↓	→		
13 CLIMATE ACTION — Climate action	↓	→	? ? ?	
14 LIFE BELOW WATER — Life below water	↓ ↓ ↓ ↓	→ → →		
15 LIFE ON LAND — Life on land	↓ ↓ ↓ ↓ ↓ ↓	→ → → → →		

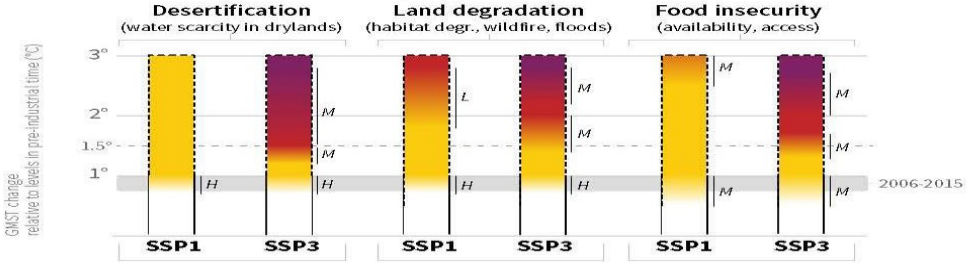
* There were no targets that were scored as good/positive status and trends

A. Risks to humans and ecosystems from changes in land-based processes as a result of climate change

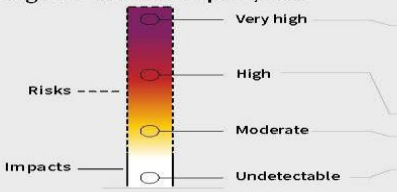
Increases in global mean surface temperature (GMST), relative to pre-industrial levels, affect processes involved in **desertification** (water scarcity), **land degradation** (soil erosion, vegetation loss, wildfire, permafrost thaw) and **food security** (crop yield and food supply instabilities).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



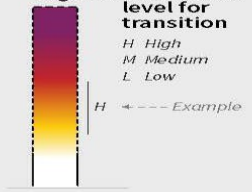
B. Different socioeconomic pathways affect levels of climate related risks



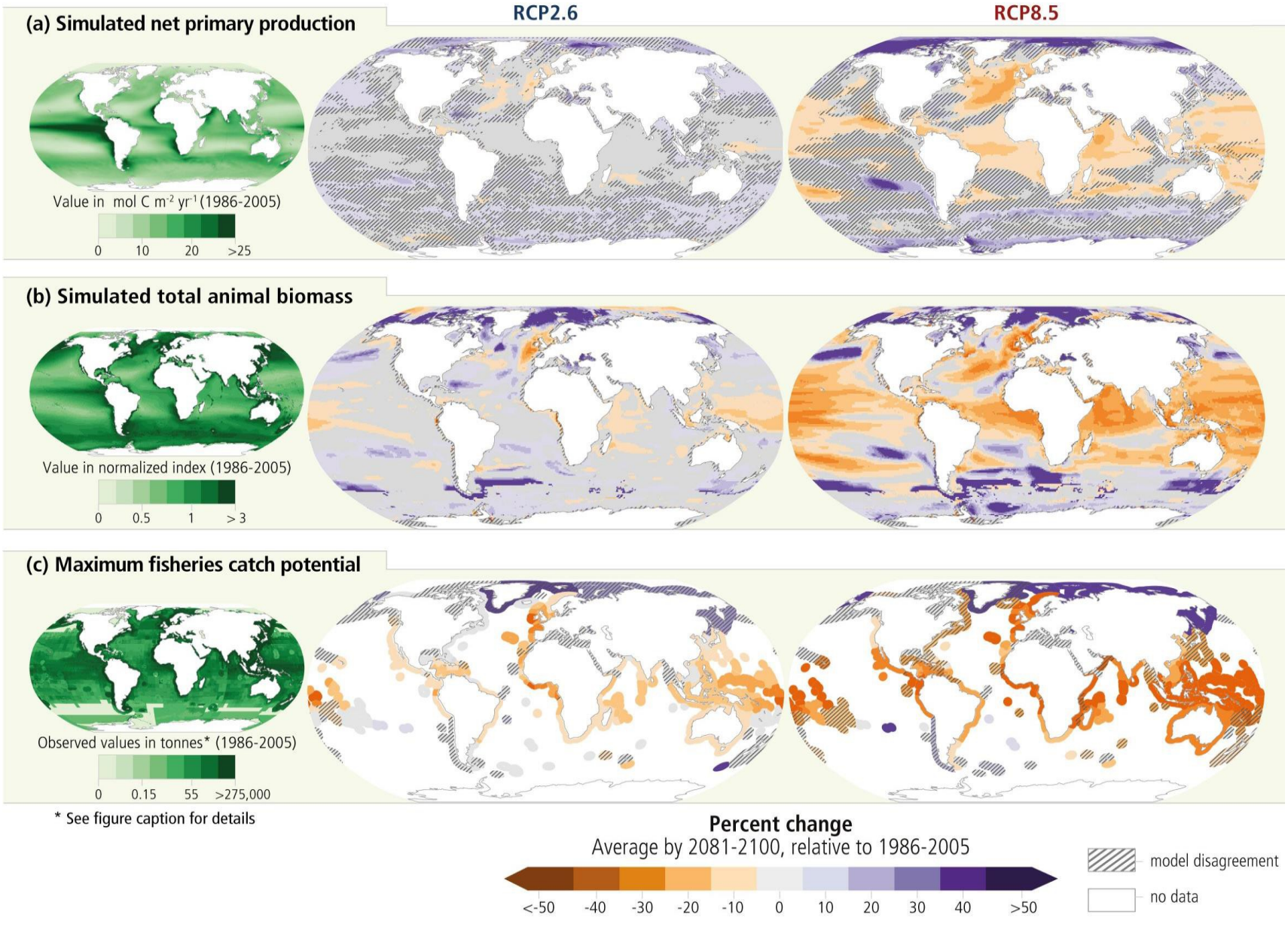
Socio-economic choices can reduce or exacerbate climate related risks as well as influence the rate of temperature increase. The **SSP1** pathway illustrates a world with low population growth, high income and reduced inequalities, food produced in low GHG emission systems, effective land use regulation and high adaptive capacity. The **SSP3** pathway has the opposite trends. Risks are lower in SSP1 compared with SSP3 given the same level of GMST increase.



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.



Projected changes, impacts and risks for ocean ecosystems as a result of climate 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 competition for land, including some that have the potential to reduce the demand for land. Co-benefits and adverse side effects are shown quantitatively based on the high end 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.

	Response options based on land management	Mitigation	Adaptation	Desertification	Land Degradation	Food Security	Cost
Agriculture	Increased food productivity	L	M	L	M	H	
	Agro-forestry	M	M	M	M	L	●
	Improved cropland management	M	L	L	L	L	●●
	Improved livestock management	M	L	L	L	L	●●●
	Agricultural diversification	L	L	L	M	L	●
	Improved grazing land management	M	L	L	L	L	
	Integrated water management	L	L	L	L	L	●●
	Reduced grassland conversion to cropland	L		L	L	- L	●
Forests	Forest management	M	L	L	L	L	●●
	Reduced deforestation and forest degradation	H	L	L	L	L	●●
Soils	Increased soil organic carbon content	H	L	M	M	L	●●
	Reduced soil erosion	↔ L	L	M	M	L	●●
	Reduced soil salinization		L	L	L	L	●●
	Reduced soil compaction		L		L	L	●
Other ecosystems	Fire management	M	M	M	M	L	●
	Reduced landslides and natural hazards	L	L	L	L	L	
	Reduced pollution including acidification	↔ M	M	L	L	L	
	Restoration & reduced conversion of coastal wetlands	M	L	M	M	↔ L	
	Restoration & reduced conversion of peatlands	M		na	M	- L	●
	Response options based on value chain management						
Demand	Reduced post-harvest losses	H	M	L	L	H	
	Dietary change	H		L	H	H	
	Reduced food waste (consumer or retailer)	H		L	M	M	
Supply	Sustainable sourcing		L		L	L	
	Improved food processing and retailing	L	L			L	
	Improved energy use in food systems	L	L			L	
	Response options based on risk management						
Risk	Livelihood diversification		L		L	L	
	Management of urban sprawl		L	L	M	L	
	Risk sharing instruments	↔ L	L		↔ L	L	●●

Options shown are those for which data are available to assess global potential for three or more land challenges.
The magnitudes are assessed independently for each option and are not additive.

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

		Mitigation *Gt CO_2-eq yr^{-1}*	Adaptation *Million people*	Desertification *Million km^2*	Land Degradation *Million km^2*	Food Security *Million people*
Positive	Large	More than 3	Positive for more than 25	Positive for more than 3	Positive for more than 3	Positive for more than 100
	Moderate	0.3 to 3	1 to 25	0.5 to 3	0.5 to 3	1 to 100
	Small	Less than 0.3	Less than 1	Less than 0.5	Less than 0.5	Less than 1
	Negligible	No effect	No effect	No effect	No effect	No effect
Negative	Small	Less than -0.3	Less than 1	Less than 0.5	Less than 0.5	Less than 1
	Moderate	-0.3 to -3	1 to 25	0.5 to 3	0.5 to 3	1 to 100
	Large	More than -3	Negative for more than 25	Negative for more than 3	Negative for more than 3	Negative for more than 100

↔ Variable: Can be positive or negative — no data — na not applicable

Confidence level

Indicates confidence in the estimate of magnitude category.

H High confidence
M Medium confidence
L Low confidence

Cost range

See technical caption for cost ranges in US$ tCO_2e^{-1} or US$ ha^{-1}.

●●● High cost
●● Medium cost
● Low cost
— no data

Options for the futures we want

Need for rapid implementation of existing instruments and bold decisions for transformative change

Knowledge and tools available, they simply need better deployment and implementation

Many societal responses and successful examples of rapid transformative change are already happening in many sectors, but just not at the scale needed to match that of the crisis.

Dolpo woman sheperd in high pasture and agriculture areas in Nepal . Photocredit Yildiz Aumeeruddy-Thomas

Cross-Sectoral, Integrated Management at Multiple Levels

→ Food production and conservation goals: complementary and interdependent (e.g., use agro-ecological practices, reduce food waste)

→Sustainable fisheries: integrated management on land, in freshwater and oceans

→ Land-based climate change mitigation: attention to trade-offs (especially with large-scale afforestation and bioenergy)

→Nature-based solutions in cities: crucial for global sustainability

Feeding Humanity and Enhancing the Conservation and Sustainable Use of Nature

We need sustainable and adaptable agriculture, aquaculture and livestock systems in the context of climate change and an increasing population and a wealthier population

- **Multi-functional landscape planning and cross-sectoral integrated management**
- **Precision agriculture**
- **Integrated pest and nutrient management**
- **Agroecological practices**
- **Organic farming**
- **Soil and water conservation practices**
  - **Low –no-till agriculture**
  - **water harvesting, precision irrigation**
- **Agroforestry**
- **Silvo-pastoral systems**
- **Improved animal welfare**

Sustainable food production from the oceans requires sustainable ecosystem approaches to fisheries management

- **Rebuild over-fished stocks**
- **Reduce pollution, including plastics**

Feeding Humanity and Enhancing the Conservation and Sustainable Use of Nature

Ensuring the adaptive capacity of agricultural production requires conserving and safeguarding the diversity of genes, varieties, cultivars, breeds, landraces and species

- **Select and breed new varieties that are needed to adapt to environmental change, especially climate change (e.g., heat, drought and salinity tolerance, and pest and pathogen resistance)**

Reduce food waste in both developed and developing countries

Promote healthy diets

Eliminate distorting agricultural and fishing subsidies and provide incentives for sustainable production (e.g., payment for ecosystem services)

In Conclusion

- Trends worrying (loss of species, degradation of ecosystems, loss of ecosystem services) and business-as-usual is clearly unsustainable

- A call for action – transformational change:
  - Tackle the direct and indirect drivers of biodiversity loss
  - Address climate change and loss of biodiversity together
  - Replicate and scale successful policies and projects
  - Coordinate and integrate cross sectoral actions
  - Evolve economic and financial systems
    - Eliminate harmful agriculture, energy and transportation subsidies
    - Incorporate natural capital into decision-making
    - Provide incentives to stimulate sustainable production and consumption
    - Embrace circular economy

- Ensure inclusive governance structures (inc Governments, private sector, civil society and IPLCs)