

Climate Change 2022

# Impacts, Adaptation and Vulnerability

Co-Chairs of IPCC Working Group II



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## Report by numbers



270 Authors



41 % Women / 59 % Men



More than  
34,000 scientific papers



67 Countries



675 Contributing authors

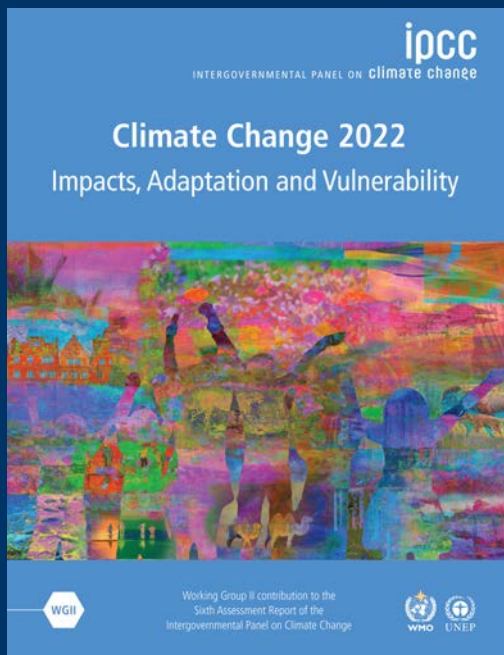


62,418  
Review comments



43 % Developing countries  
57 % Developed countries

**Growing scientific  
knowledge gives us our  
best understanding yet**



“ The scientific evidence is unequivocal: climate change is a threat to human well-being and the health of the planet.

Any further delay in concerted global action will miss the brief, rapidly closing window to secure a liveable future.

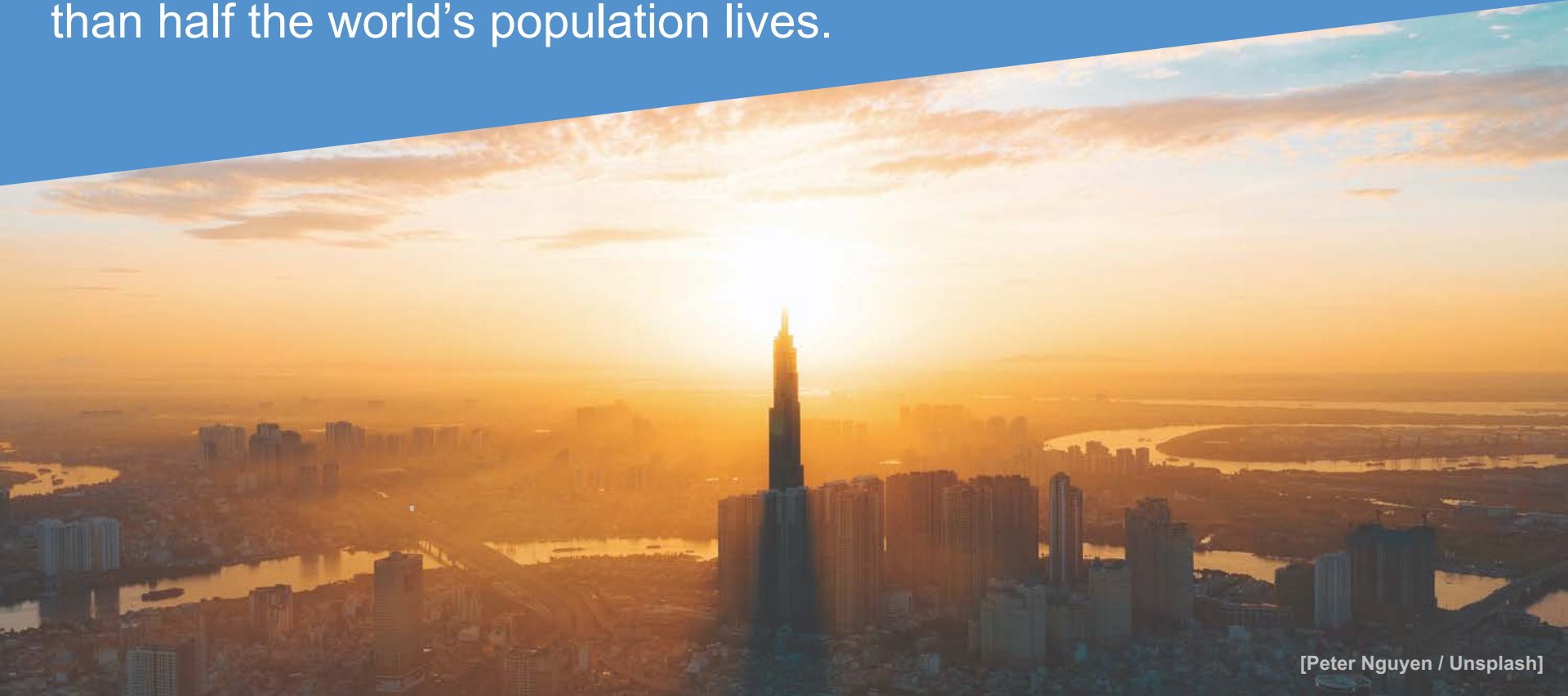
This report offers solutions to the world.

Global warming  
has caused dangerous and  
widespread disruption in nature...

...and climate change is affecting the lives of billions of people, despite efforts to adapt.



Impacts are magnified in cities where more than half the world's population lives.

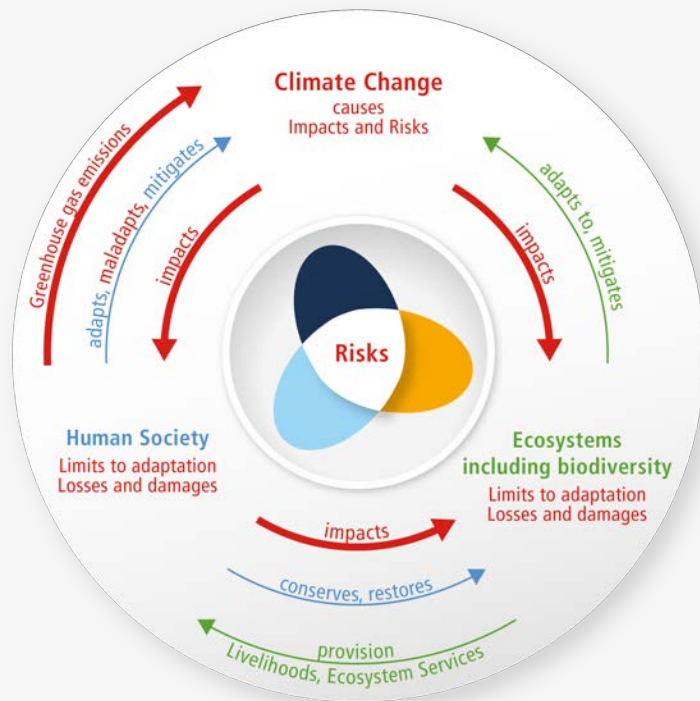


# Simultaneous extreme events compound risks

Multiple extreme events that compound the risks are more difficult to manage



## New understanding of interconnections



The risk propeller shows that risk emerges from the overlap of:

- Climate hazard(s)
  - Vulnerability
  - Exposure
- ...of human systems, ecosystems and their biodiversity





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Climate change combines with  
unsustainable use of natural resources,  
habitat destruction, growing urbanization and inequity.

3.3 – 3.6 billion people live in hotspots of high vulnerability to climate change.





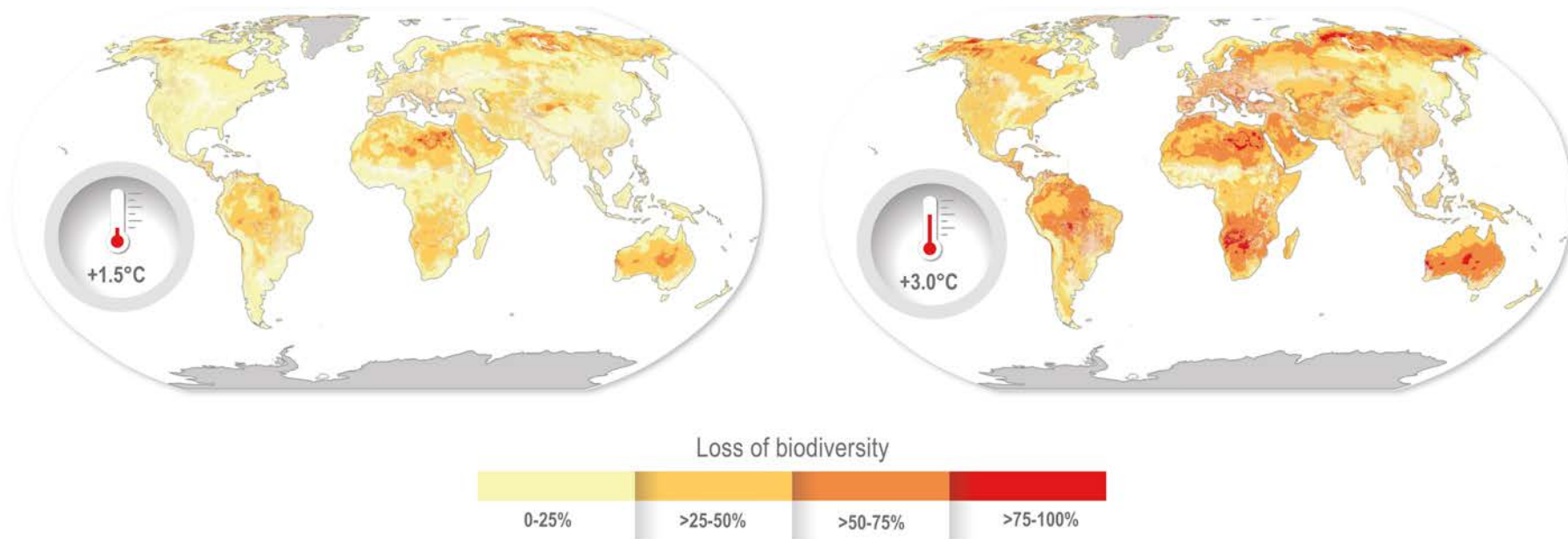
## Overlapping challenges

- Limited access to water, sanitation and health services
- Climate-sensitive livelihoods
- High levels of poverty
- Weak leadership
- Lack of funding
- Lack of accountability and trust in government

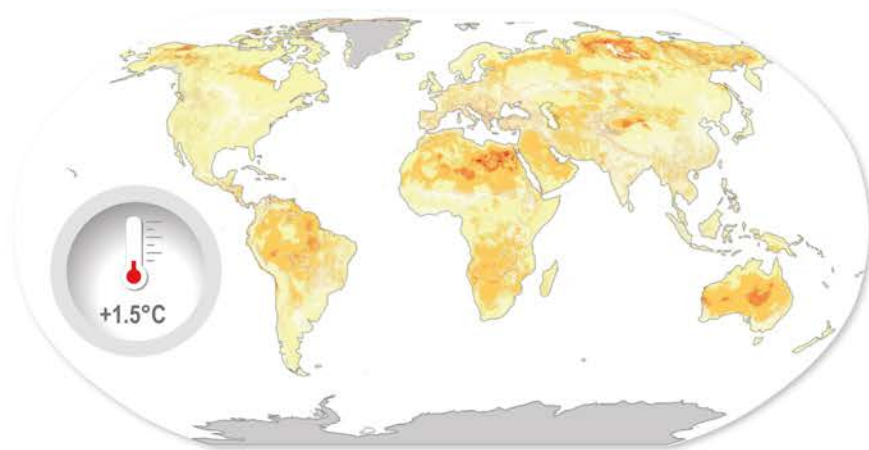


Every small increase in warming  
will result in increased risks.

## Biodiversity loss at different warming levels



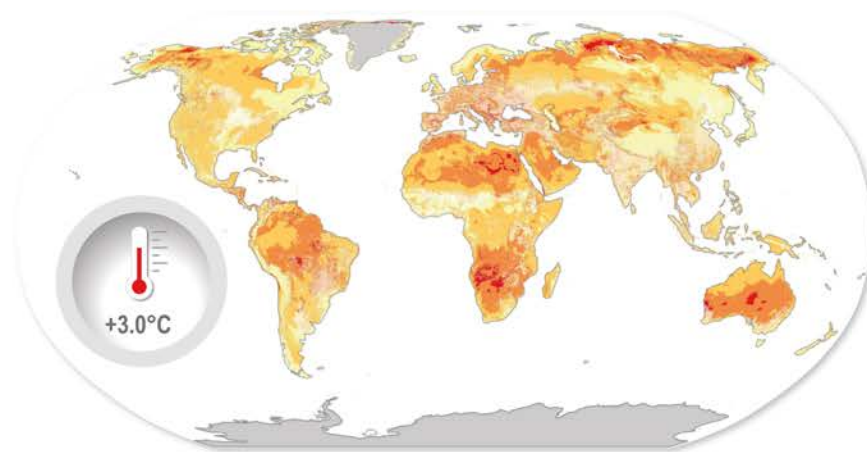
## Biodiversity loss at different warming levels



Loss of biodiversity



## Biodiversity loss at different warming levels



Loss of biodiversity



## Nature's crucial services at risk in a warming world



**Pollination**



**Coastal protection**



**Tourism / recreation**



**Food source**



**Health**



**Water filtration**



**Clean air**



**Climate regulation**

## Future global climate risks



### Heat stress

Exposure to heat waves will continue to increase with additional warming.



### Water scarcity

At 2°C, regions relying on snowmelt could experience 20% decline in water availability for agriculture after 2050.



### Food security

Climate change will increasingly undermine food security.



### Flood risk

About a billion people in low-lying cities by the sea and on Small Islands at risk from sea level rise by mid-century.



Action on adaptation has increased but progress is uneven and we are not adapting fast enough.

“ There are increasing gaps  
between adaptation action taken  
and what’s needed.

These gaps are largest among  
lower income populations.

They are expected to grow.



There are options we can take  
to reduce the risks to people and nature.

Nature offers significant  
untapped potential.





## Water management

### Options on farms:

- Irrigation
- Rainwater storage, water-saving tech
- Moisture conservation in soils

*Economic and ecological benefits; reduced vulnerability*

### Wider options:

- Securing drinking water
- Flood and drought risk management
- Working with nature, land-use planning

Effectiveness declines with increased warming

## Improving food security

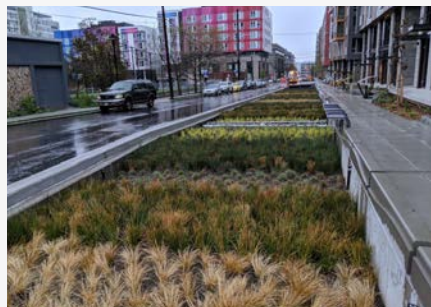
### Effective options:

- Cultivar improvements
- Agroforestry
- Farm and landscape diversification
- Community-based adaptation
- Strengthening biodiversity

### Wider benefits:

- Food security and nutrition
- Health and well-being
- Livelihoods





## Transforming cities

By 2050 urban areas could be home to two-thirds of the world's population.

### Effective options

- Nature-based and engineering approaches together
- Establishing green and blue spaces
- Urban agriculture
- Social-safety nets for disaster management

### Wider benefits

- Public health improvements
- Ecosystem conservation

## Adapting informal settlements

### Effective options:

- Local knowledge
- Adequate capacity (information, funding, tools)
- Engagement of policymakers
- Involvement of residents in decision-making
- Institutional change (accountability, commitment, transparency)



# Maladaptation

Adaptation that results in unintended consequences



The most disadvantaged groups are most affected by maladaptation.



## There are limits to adaptation

- Even effective adaptation cannot prevent all losses and damages
- Above 1.5°C some natural solutions may no longer work.
- Above 1.5°C, lack of fresh water could mean that people living on small islands and those dependent on glaciers and snowmelt can no longer adapt.
- By 2°C it will be challenging to farm multiple staple crops in many current growing areas.

## Financial constraints

- Current global financial flows are insufficient
- Most finance targets emissions reductions rather than adaptation
- Climate impacts can slow down economic growth





To avoid mounting losses, urgent action is required to adapt to climate change.

At the same time, it is essential to make rapid, deep cuts in greenhouse gas emissions to keep the maximum number of adaptation options open.



## Accelerating adaptation

- Political commitment and follow-through across all levels of government
- Institutional framework: clear goals, priorities that define responsibilities
- Enhancing knowledge of impacts and risks improves responses
- Monitoring and evaluation of adaptation measures are essential to track progress
- Inclusive governance that prioritises equity and justice – direct participation

## The wider benefits of adaptation



For more than 3.4 billion people in rural areas: improved roads, reliable energy, clean water, food security

**SDG 1: No poverty**



Green buildings, green spaces, clean water, renewable energy, sustainable transport – in cities

**SDG 3: Good health and wellbeing**



Policies that increase youth access to land, credit, knowledge and skills can support agri-food employment

**SDG 10: Reduced inequality**



Restored and connected habitats can provide corridors for vulnerable species

**SDG 14/15: Life on land & below water**

# SIXTH ASSESSMENT REPORT

Working Group II – Impacts, Adaptation and Vulnerability

INTERGOVERNMENTAL PANEL ON climate change

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## Land and ocean ecosystems

### Examples of climate responses and adaptation options

Potential feasibility:

Forest-based adaptation\*

**high**

Sustainable aquaculture and fisheries

**medium**

Agroforestry

**medium**

Biodiversity management and ecosystem connectivity

**medium**

Synergies with mitigation:

**high**

**medium**

**high**

**high**

\*

Including sustainable forest management, forest conservation and restoration, reforestation and afforestation

● *High confidence*

● *Medium confidence*

● *Low confidence*

### Relation with Sustainable Development Goals



SDGs are integrated and indivisible, and efforts to achieve any goal in isolation may trigger synergies or trade-offs with other SDGs

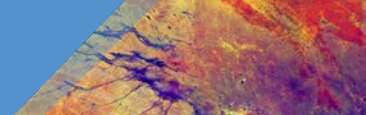


- 1: No Poverty
- 2: Zero Hunger
- 3: Good Health and Well-being
- 4: Quality Education
- 5: Gender Equality
- 6: Clean Water and Sanitation
- 7: Affordable and Clean Energy
- 8: Decent Work and Economic Growth
- 9: Industry, Innovation and Infrastructure
- 10: Reducing Inequality
- 11: Sustainable Cities and Communities
- 12: Responsible Consumption and Production
- 13: Climate Action
- 14: Life Below Water
- 15: Life On Land
- 16: Peace, Justice, and Strong Institutions
- 17: Partnerships for the Goals

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INTERGOVERNMENTAL PANEL ON climate change



## Land and ocean ecosystems

## Urban and infrastructure systems

### Examples of climate responses and adaptation options

Forest-based adaptation\*

Sustainable aquaculture and fisheries

Agroforestry

Biodiversity management and ecosystem connectivity

Green infrastructure and ecosystem services

Sustainable land use and urban planning

Sustainable urban water management

\* Including sustainable forest management, forest conservation and restoration, reforestation and afforestation

● High confidence  
● Medium confidence  
● Low confidence

Potential feasibility:

high

medium

medium

medium

medium

medium

medium

Synergies with mitigation:

high

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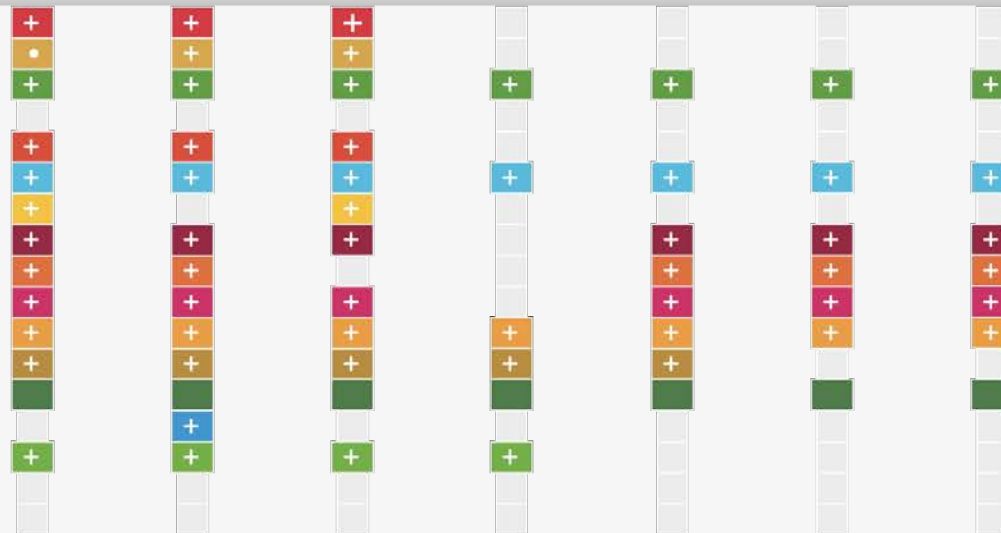
high

low

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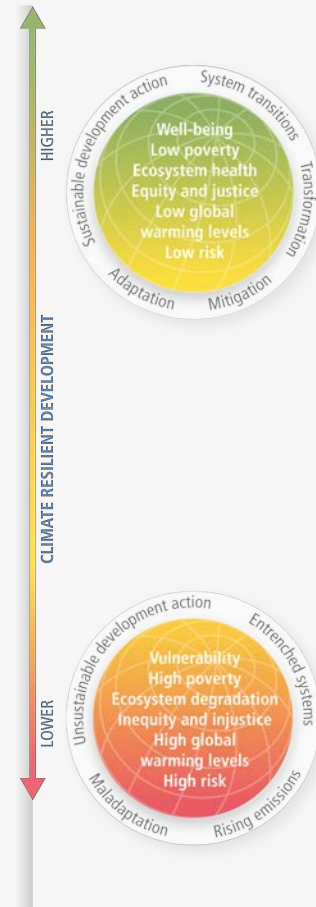


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## Our future?

- Reduced climate risks – adaptation
- Reduced greenhouse gas emissions – mitigation
- Enhanced biodiversity
- Achieved the Sustainable Development Goals

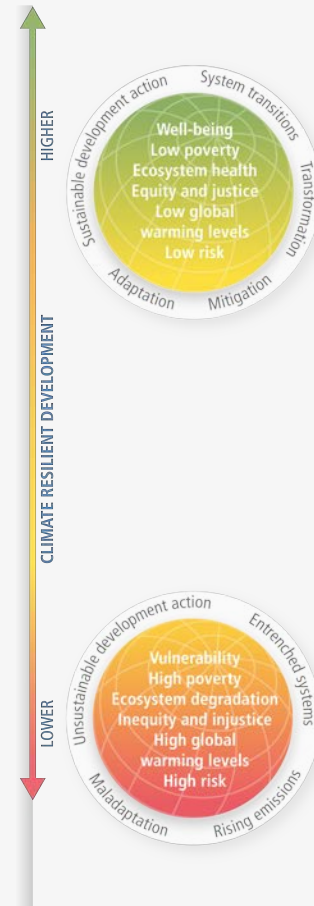
**This is Climate Resilient Development.**



# Climate Resilient Development

## The solutions framework:

- Is considered across government and all of civil society
- Involves everyone – forming partnerships



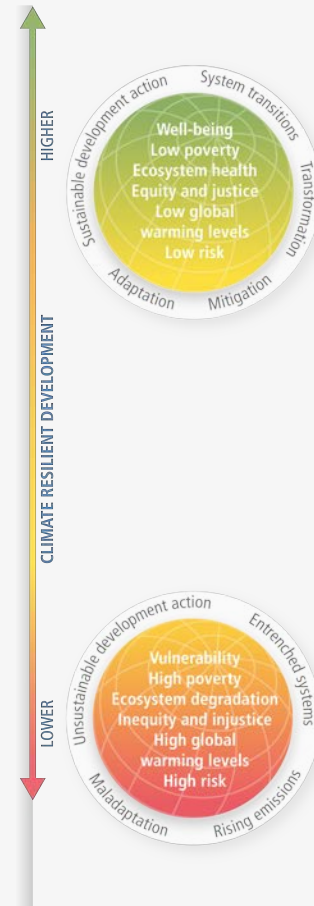
# Climate Resilient Development

## The solutions framework:

- Draws on wide-ranging knowledge (scientific, Indigenous, local, practical)



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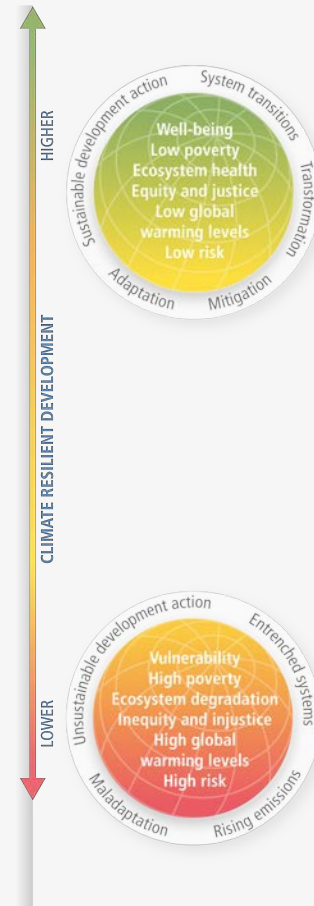
# Climate Resilient Development

## The solutions framework:

- Conserves and restores ecosystems



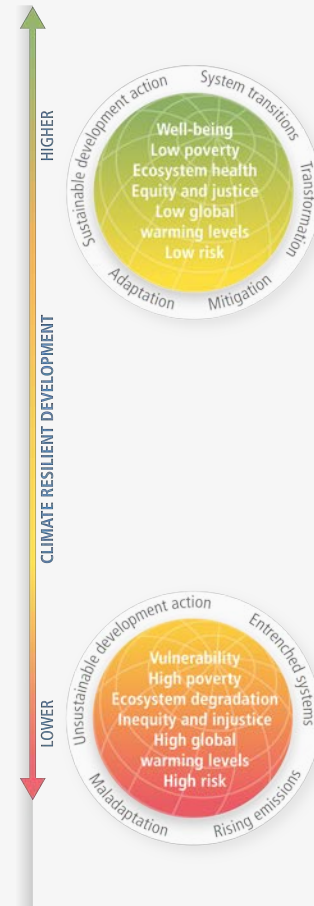
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# Climate Resilient Development

## The solutions framework:

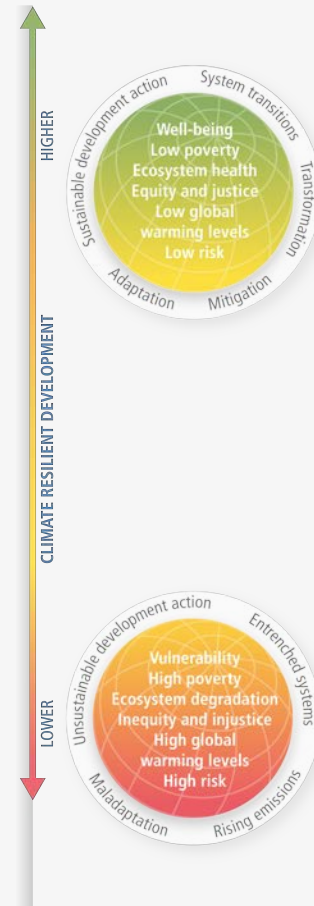
- Involves marginalized groups
- Prioritises equity and justice
- Reconciles different interests, values and world views



# Climate Resilient Development

## The solutions framework:

- Requires scaled-up investment and international cooperation



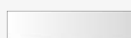
## Increasing urgency

Starting today,  
every action, every  
decision matters.

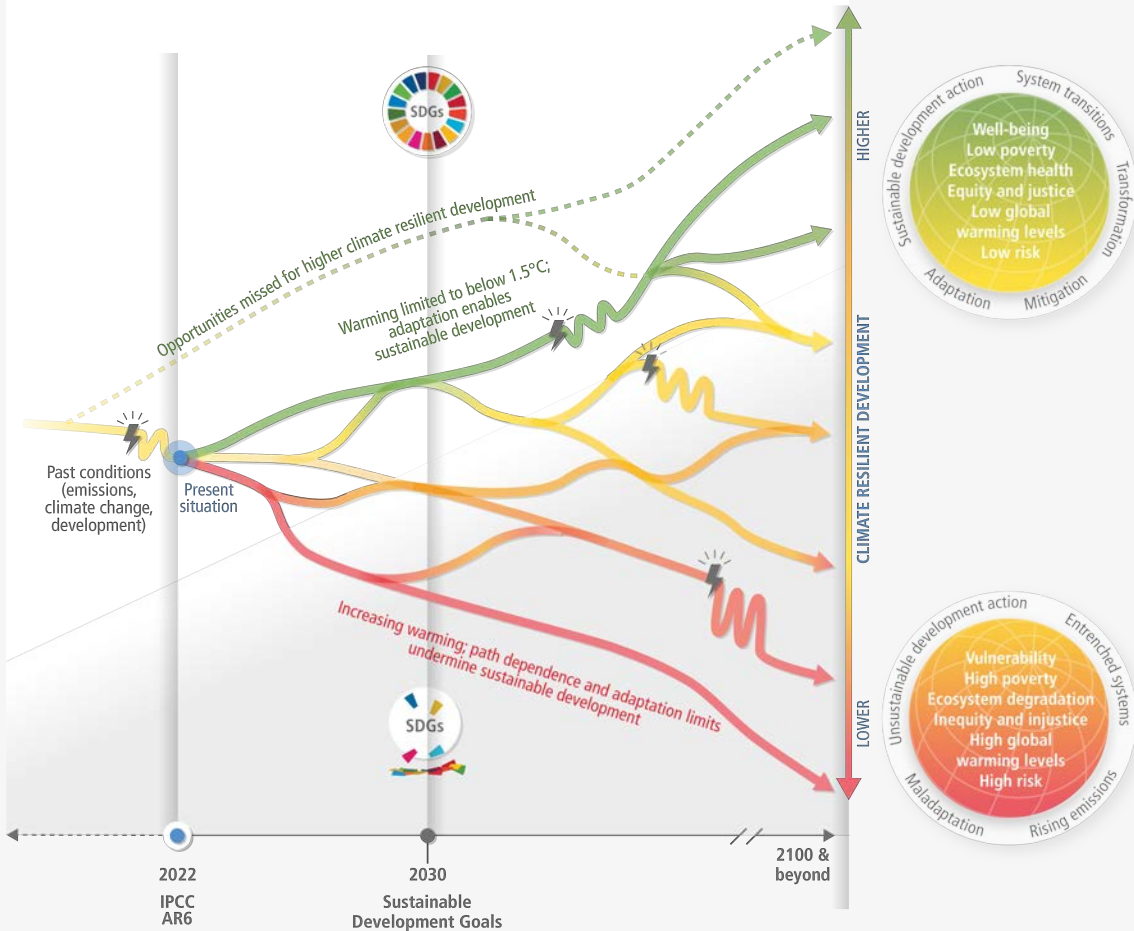
Worldwide action is more urgent  
than previously assessed.



Illustrative climatic or non-climatic shock,  
e.g. COVID-19, drought or floods,  
that disrupts the development pathway



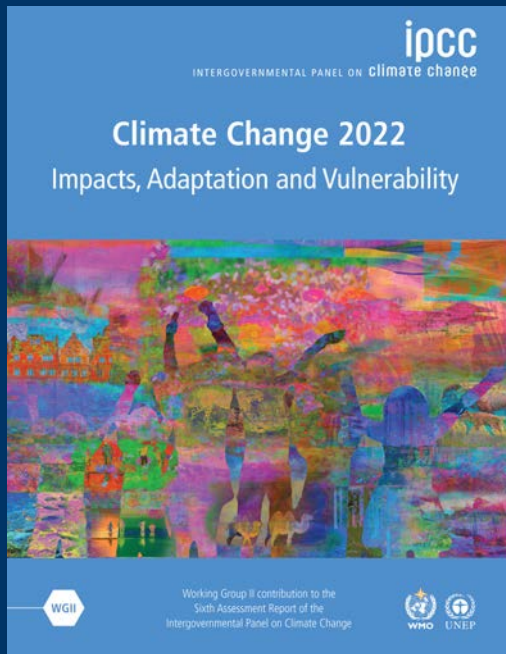
Narrowing window of  
opportunity for higher CRD



“

Climate resilient development is already challenging at current global warming levels.

The prospects will become further limited if warming exceeds 1.5°C and may not be possible if warming exceeds 2°C.



The science is clear.

Any further delay in concerted global action will miss a brief and rapidly closing window to secure a liveable future.

This report offers solutions to the world.