THE WORKING GROUP II

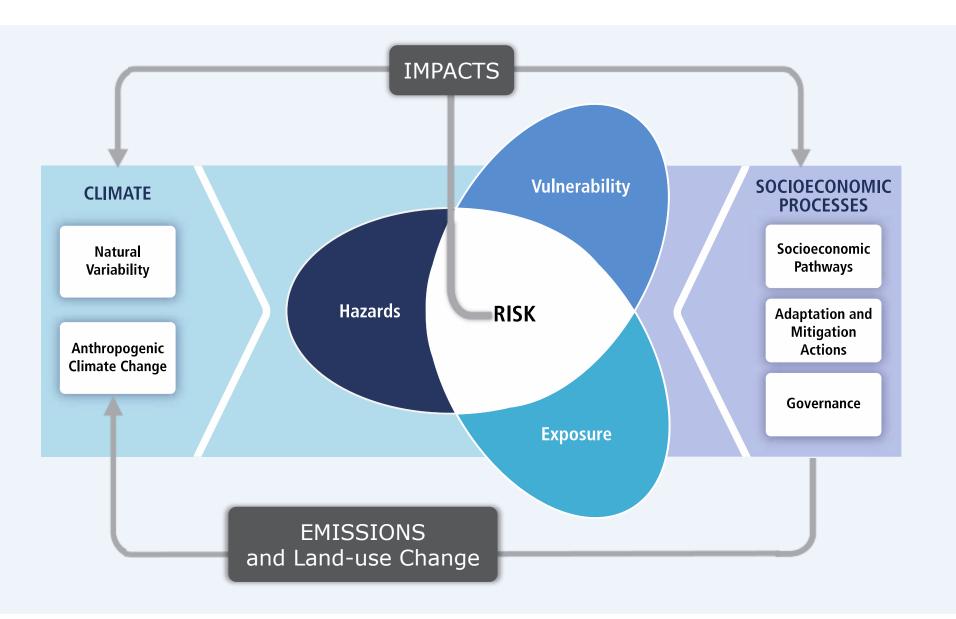
CONTRIBUTION TO THE IPCC'S FIFTH ASSESSMENT REPORT (2014)

INTERGOVERNMENTAL PANEL ON Climate change

iocc

IMPACTS, ADAPTATION, AND VULNERABILITY



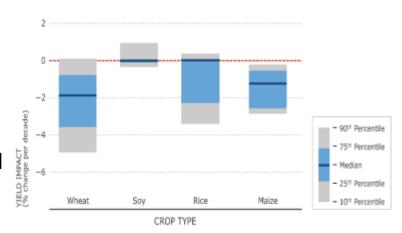




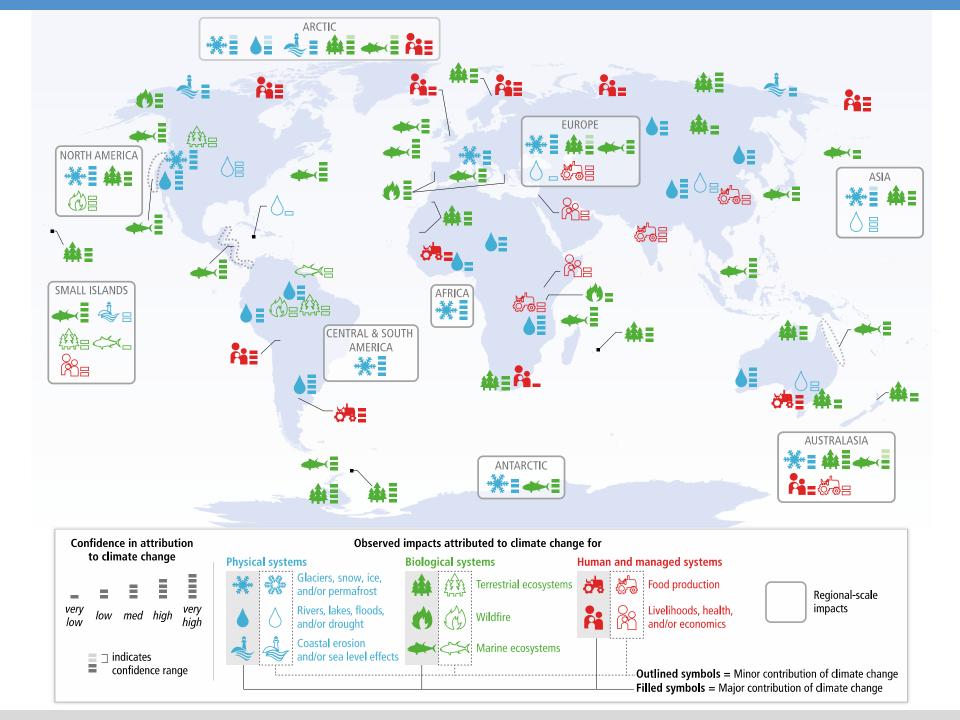
OBSERVATIONS (AT GLOBAL/EXTENDED LEVEL)

- Glaciers continue to shrink almost worldwide affecting runoff and water resources downstream.
- Changing precipitation or melting snow and ice are altering hydrological systems, affecting water resources in terms of quantity and quality.
- Many terrestrial, freshwater, and marine species have shifted their geographic ranges, seasonal activities, migration patterns, abundances, and species interactions.
- Negative impacts of climate change on crop yields have been more common than positive ones.
- There has been increased heat-related mortality and decreased cold-related mortality.
- For some regions local changes in temperature and rainfall have altered the distribution of some waterborne illnesses and disease vectors.









VULNERABILITY AND EXPOSURE

SOCIAL + NATURAL SCIENCES

- People who are socially, economically, culturally, politically, institutionally, or otherwise marginalized are especially vulnerable to climate change and also to some adaptation and mitigation responses.
- This includes aspects related to gender, class, ethnicity, age, and (dis)ability discrimination.
- Very evident in connection to impacts
 associated to climate-related extremes
 (heat waves, droughts, floods, cyclones, and
 wildfires).
- This also includes impacts of observed positive effects (social networks or agriculture) which are often limited to the poor and marginalized people





ADAPTATION

- Throughout history, people and societies have adjusted to and coped with climate, climate variability, and extremes, with varying degrees of success.
- Adaptation experience is accumulating across regions in the public and private sector and within communities.

BUT AS WELL,

- Governments at various levels are starting to develop adaptation plans and policies and to integrate climate-change considerations into broader development plans.
- Most assessments of adaptation have been restricted to impacts, vulnerability.
- When it comes to implementation actions, these are limited to:
 - Engineered and technological options are more common
 - Often linked to disaster risk management and water management.
 - Mostly associated with gaining co-benefits
 - Increasing recognition of
 - the value of social, institutional, and ecosystem-based measures
 - But as well on the constraints and LIMITS for adaptation.

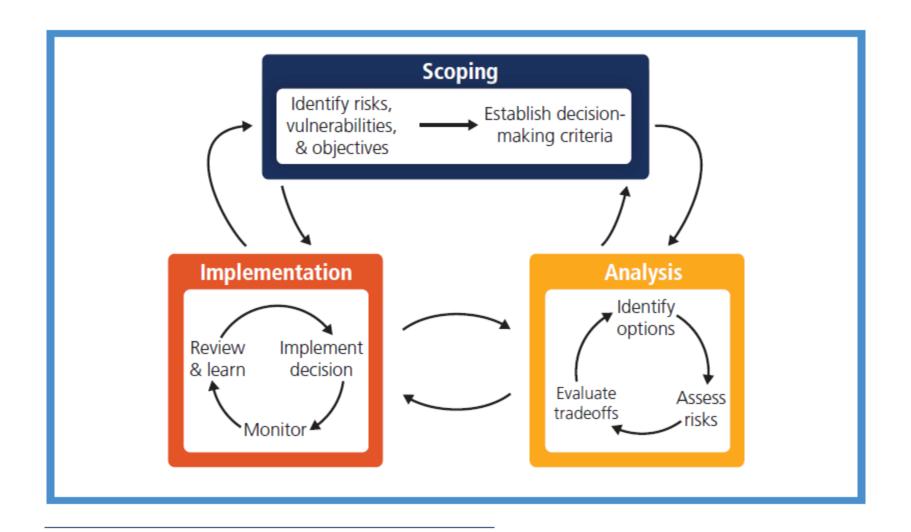




Examples of adaptation across regions:

- Africa: Most governments are initiating governance systems for adaptation. Isolated efforts using disaster risk management, adjustments in technologies and infrastructure, ecosystembased approaches, basic public health measures, and livelihood diversification to reduce vulnerability.
- Europe: Adaptation policy developed across all levels of government, with some adaptation planning integrated into coastal and water management, into environmental protection and land planning, and into disaster risk management.
- Asia: In some areas, climate adaptation action is mainstreamed into subnational development planning, early warning systems, integrated water resources management, agroforestry, and coastal reforestation of mangroves.
- Australia: Planning for sea level rise, and in southern Australia for reduced water availability.
- North America: Governments even at municipal level are engaging in incremental adaptation assessment and planning. Some proactive adaptation is occurring to protect longer-term investments in energy and public infrastructure.
- •Central and South America: Ecosystem-based and community management adaptation mostly in protected areas. In some areas resilient crop varieties, climate forecasts, and integrated water resources management within the agricultural sector.
- Arctic: In some communities adaptive co-management strategies and communications infrastructure, combining traditional and scientific knowledge.
- Small islands (very diverse): Community-based adaptation in conjunction with other development activities.
- Oceans: International cooperation and marine spatial planning are starting to facilitate adaptation to climate change, but challenges of spatial scale and governance issues.

Uncertainity in climate change and other social future aspects = risk managment

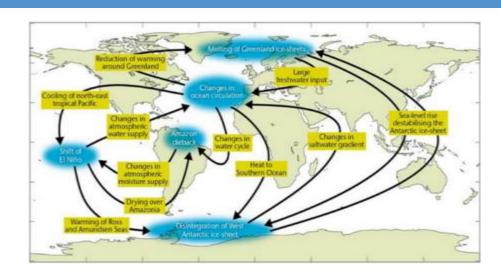


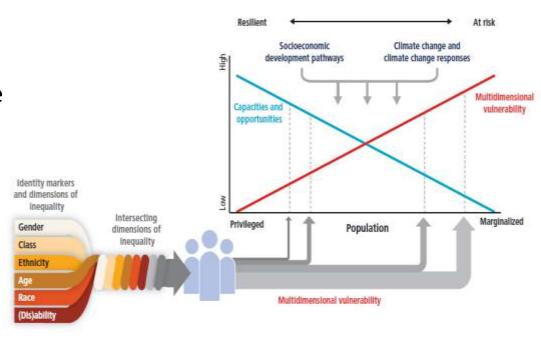


FIRST Assess risks

- Future risks related to climate change vary substantially across plausible alternative development pathways, and the relative importance of development and climate change varies by sector, region, and time period.
- Scenarios are useful tools for characterizing possible future socioeconomic pathways, climate change and its risks, and policy implications.

VERY COMPLEX!

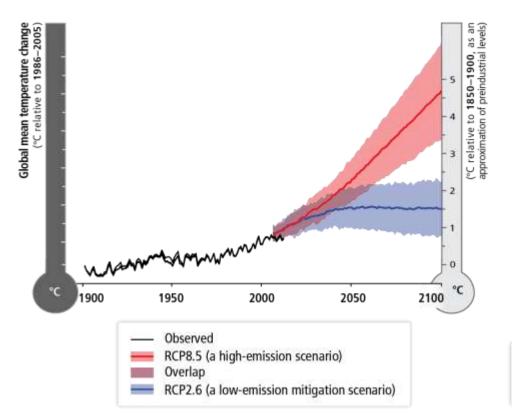


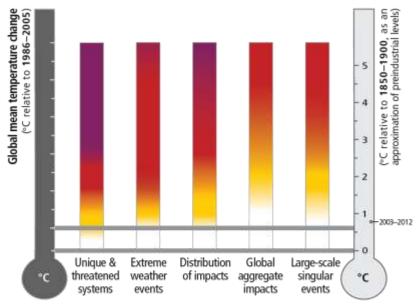


WGII key risks (identified with high confidence, span sectors and regions)

- i) Risk of death, injury, ill-health, or disrupted livelihoods in low-lying coastal zones and small island developing states and other small islands, due to storm surges, coastal flooding, and sea level rise.
- ii) Risk of severe ill-health and disrupted livelihoods for large urban populations due to inland flooding in some regions.
- iii) Systemic risks due to extreme weather events leading to breakdown of infrastructure networks and critical services such as electricity, water supply, and health and emergency services.
- iv) Risk of mortality and morbidity during periods of extreme heat, particularly for vulnerable urban populations and those working outdoors in urban or rural areas
- v) Risk of food insecurity and the breakdown of food systems linked to warming, drought, flooding, and precipitation variability and extremes, particularly for poorer populations in urban and rural settings.
- vi) Risk of loss of rural livelihoods and income due to insufficient access to drinking and irrigation water and reduced agricultural productivity, particularly for farmers and pastoralists with minimal capital in semi-arid regions.
- vii) Risk of loss of marine and coastal ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for coastal livelihoods, especially for fishing communities in the tropics and the Arctic.
- viii) Risk of loss of terrestrial and inland water ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for livelihoods

ADAPTATION + MITIGATION ARE IMPORTANT



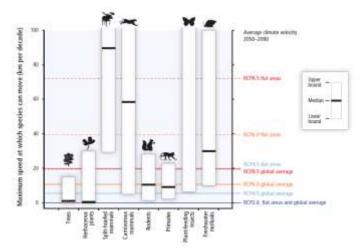




Key Risks (HAZARD, EXPOSURE AND VULNERABILITY) across Sectors and Regions

- Freshwater-related risks of climate change increase significantly with increasing greenhouse gas concentrations.
- Climate change over the 21st century is projected to reduce renewable surface water and groundwater resources significantly in most dry subtropical regions, intensifying competition for water among sectors.
- A large fraction of both terrestrial and freshwater species faces increased extinction risk under projected climate change during and beyond the 21st century, especially as climate change interacts with other stressors (habitat modification, overexploitation, pollution, and invasive species).
- Due to sea level rise projected coastal systems and low-lying areas will increasingly experience adverse impacts such as submergence, coastal flooding, and coastal erosion.



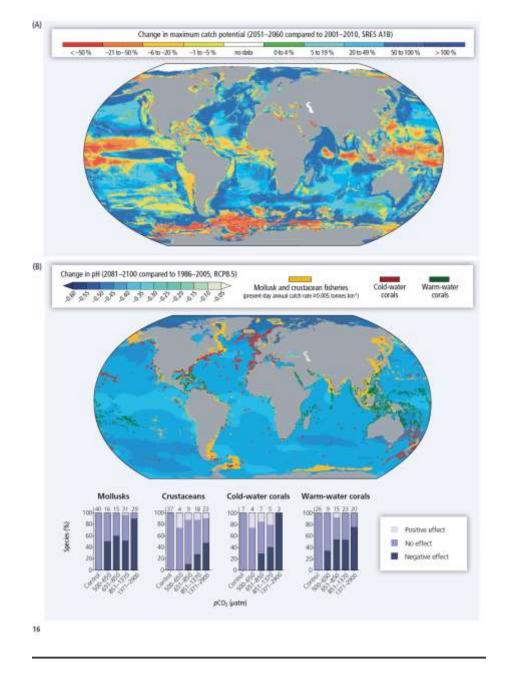




Marine systems

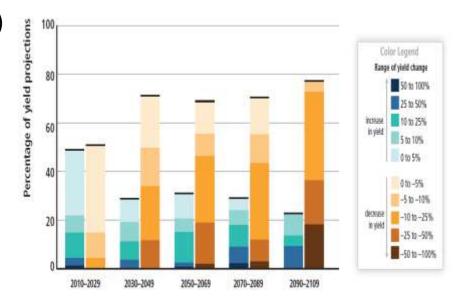
Due to projected climate change by the mid 21st century and beyond, global marine-species redistribution and marine-biodiversity reduction in sensitive regions will challenge the sustained provision of fisheries productivity and other ecosystem services (high confidence).

For medium- to high-emission scenarios (RCP4.5, 6.0, and 8.5), ocean acidification poses substantial risks to marine ecosystems, especially polar ecosystems and coral reefs, associated with impacts on the physiology, behavior, and population dynamics of individual species from phytoplankton to animals (medium to high confidence).



Food security

- For the major crops (wheat, rice, and maize) in tropical and temperate regions, climate change without adaptation is projected to negatively impact production for local temperature increases of 2°C or more above late-20thcentury levels, although individual locations may benefit.
- All aspects of food security are potentially affected by climate change, including food access, utilization, and price stability (high confidence).



Health

- Until mid-century, projected climate change will impact human health mainly by exacerbating health problems that already exist.
- Throughout the 21st century, climate change is expected to lead to increases in ill-health in many regions and especially in developing countries with low income, as compared to a baseline without climate change.



Uncertain but Plausible Risks

- Many global risks of climate change are concentrated in urban areas.
- Global economic impacts from climate change are difficult to estimate.
- Throughout the 21st century, climatechange impacts are projected to slow down economic growth, make poverty reduction more difficult.
- Climate change over the 21st century is projected to increase displacement of people.
- Climate change can indirectly increase risks of violent conflicts in the form of civil war and inter-group violence by amplifying well-documented drivers of these conflicts such as poverty and economic shocks.







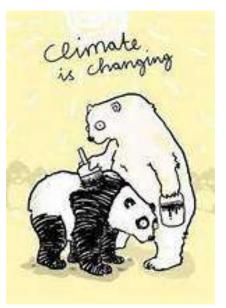




Principles for Effective Adaptation

- Adaptation is place- and context-specific, with no single approach for reducing risks appropriate across all
- Adaptation planning and implementation can be enhanced through complementary actions across levels, from individuals to governments
- Local government and the private sector are increasingly recognized as critical to progress in adaptation
- A first step towards adaptation to future climate change is reducing vulnerability and exposure to present climate variability
- Strategies include actions with co-benefits for other objectives. Available strategies and actions can increase
- Indigenous, local, and traditional knowledge systems and practices, including indigenous peoples' holistic view of community and environment, are a major resource for adapting to climate change
- Existing and emerging economic instruments can foster adaptation by providing incentives for anticipating and reducing impacts
- Properly assess social process even if complex for adaptation planning
- Avoid maladaptation
- Assess cost for adaptation and define funding sources
- Prefer option with co-benefits

ADAPTING





Climate-resilient Pathways and Transformation

- They are sustainable-development trajectories that combine adaptation and mitigation to reduce climate change and its impacts
- Prospects for climate-resilient pathways for sustainable development are related fundamentally to what the world accomplishes with climate-change mitigation
- Greater rates and magnitude of climate change increase the likelihood of exceeding adaptation limits
- Transformations in economic, social, technological, and political decisions and actions can enable climate-resilient pathways
- Significant co-benefits, synergies, and trade-offs exist between mitigation and adaptation and among different adaptation responses; interactions occur both within and across regions

EXAMPLE ENERGY WATER FOOD NEXUS for mitigation and adaptation

