

Westminster Energy Forum

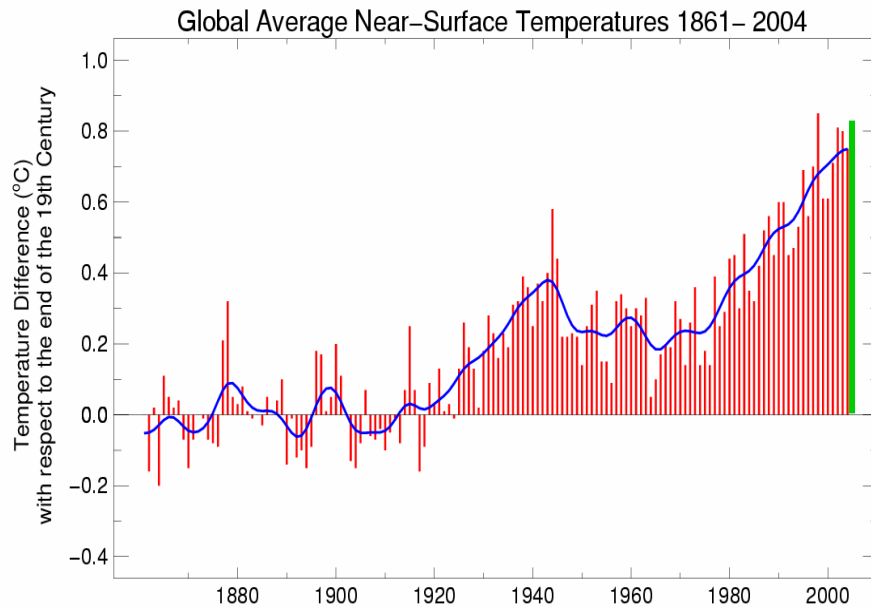
Impacts of Climate Change – trends and patterns

Wednesday, 06 December 2006



Roger B. Street – UK Climate Impacts Programme

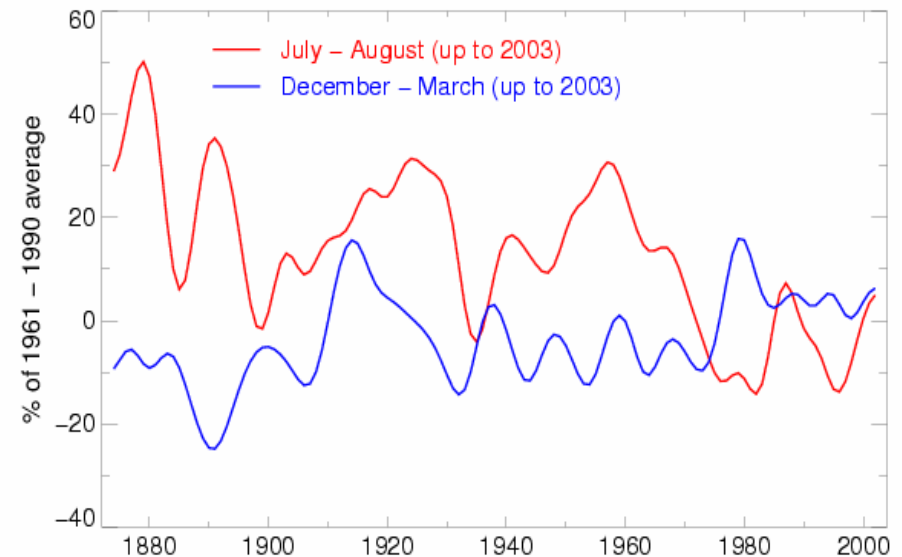
Climate is Changing



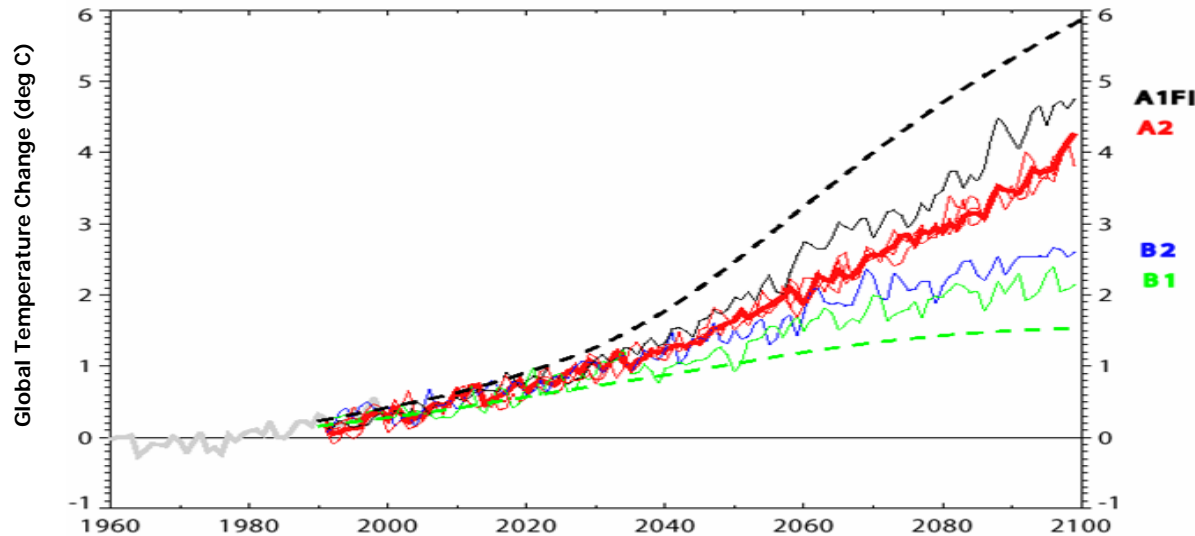
Projections suggest that **impacts could be significant** in England and **further action will be necessary** to ensure the viability and sustainability of social and economic infrastructure and systems.

Impacts of these changes are **apparent** (e.g., warmer winters and summers).

Individuals/businesses and organizations have already begun to **respond** → **adaptation** (e.g., flood planning, water resources, horticulture, etc.)

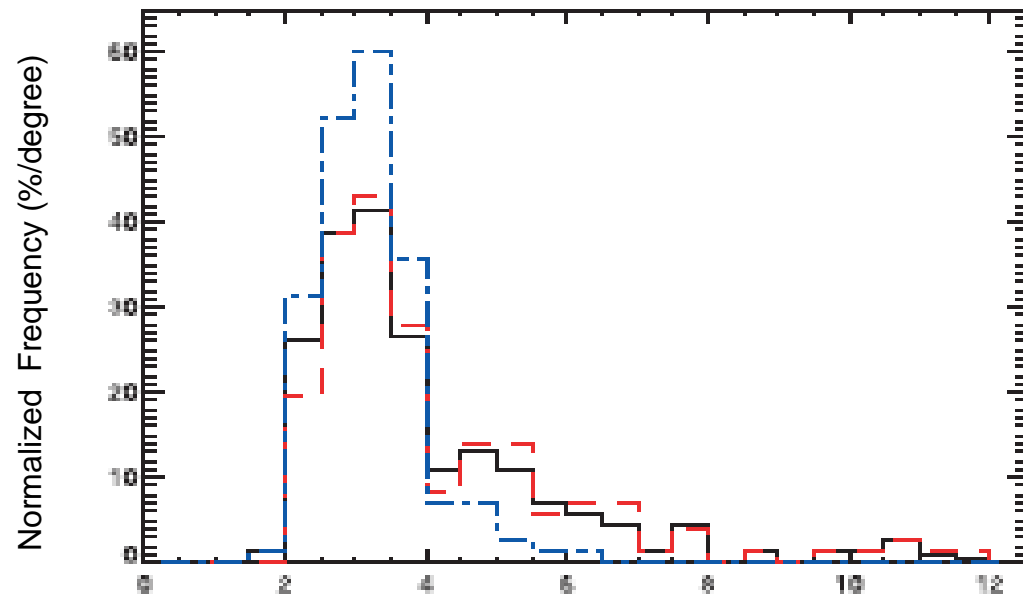


Climate Will Continue to Change



The range of projected temperature changes out to 2100 reflecting different socio-economic futures

Frequency distribution of projected global mean surface temperatures following a doubling of atmospheric CO₂ based on multiple simulations – temperature change > 2°C



Summary of Climate Change for the UK

Long-term/Seasonal Averages*

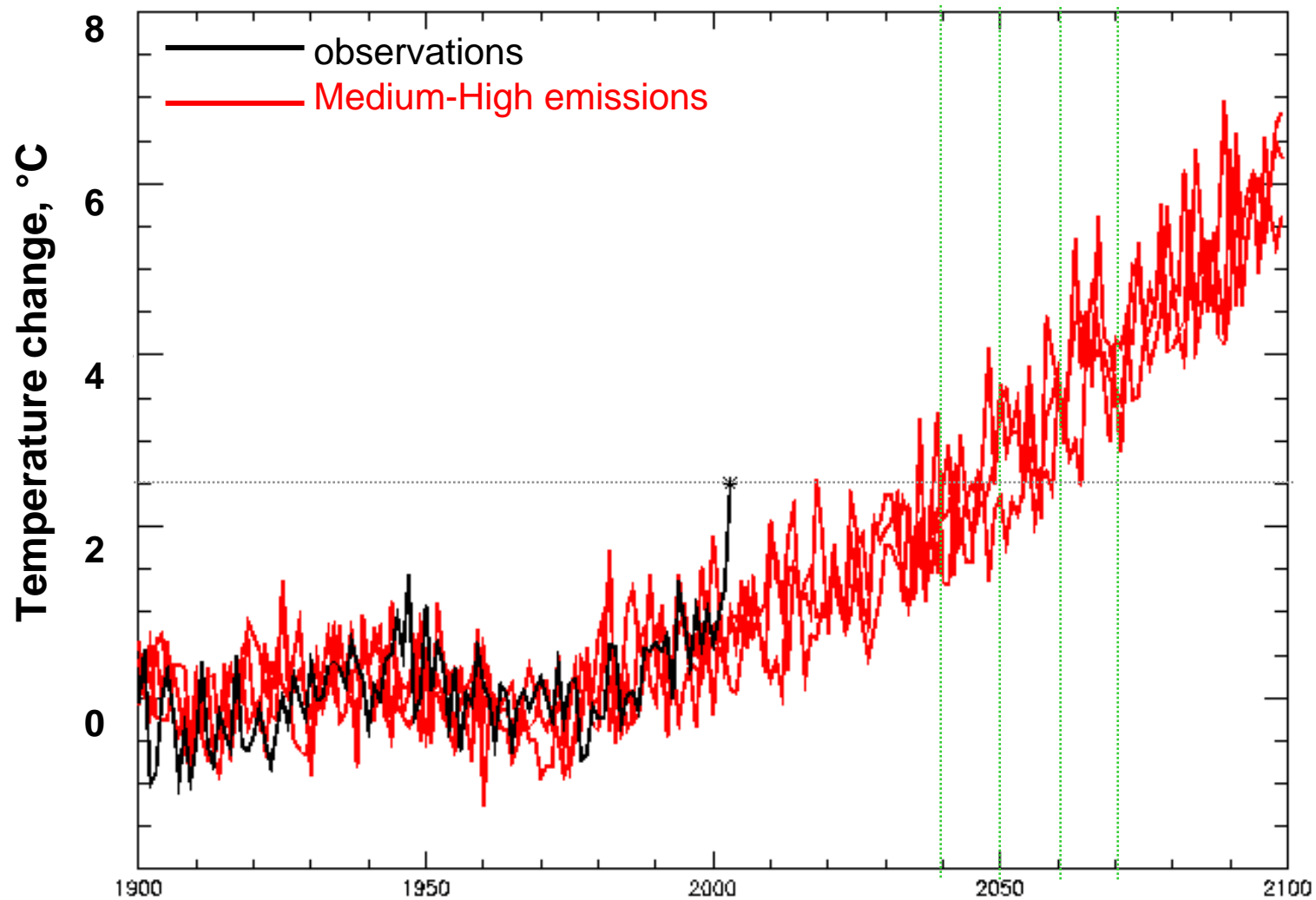
- Warmer, drier summers (up to 5°C warmer in the southeast)
- Milder, wetter winters (up to 30% more precipitation)
- Rising sea levels
- Significant decrease in soil moisture content (summer and autumn)
- Increase in length of growing season and reduced number of days per year with frost

Extremes*

- More very hot days – intensity as well as frequency
- More intense downpours of rain
- Extreme sea levels will be experienced more frequently (10-20 times more frequent for some east coast locations)

High levels of confidence in changes in average temperature and summer precipitation, but less confidence in future patterns of wind, storms and specifics associated with extreme events

Changes in Extremes



Headlines for Business

- **Climate variability and change will present challenges and opportunities to businesses and the business sectors**
- **Responding – adaptation and mitigation – challenges dealing with risks and opportunities associated with responding to climate change**
- **These challenges and opportunities could arise across all business areas, not just the more obvious ones of product and service design and delivery.**

Logistics – supply chain, utilities and transport infrastructure

Finance – investments, insurance and shareholder reputation

Markets – demand for goods and services

Process – production process and supply chain

People – workforce, customers and changing lifestyles

Premises – building design, construction, maintenance and facilities management

Management – business failure, diversification or expansion; reactive or proactive response; and risk aversion



Business Response to Date

Most companies dealing with climate risks as:

- An ongoing process of risk management, or
- A response to changing market demand and opportunities

Climate change headline often related to image issues

Concerns:

- Physical impacts rather than indirect impacts
- Need for clear guidelines on physical adaptation – clarity for long-term investment decisions
- Including adaptation into current strategies and guidelines
- Encouraging monetary incentives from the insurance and banking industry to accelerate adaptation investments

Impacts of Climate Risks

Logistics – vulnerability of supply chain, utilities and transport

- Flooding implications for underground infrastructure
- Storm damage to transmission lines – vulnerability of large scale networks
- Changes in quality and increase in temperature of cooling waters
- Transportation closures (railway and roadway) due to high temperatures

Finance – implications for investments, insurance and reputation

- Failure to climate proof – implications for investments and insurance
- Increased liabilities (especially if failure to act)
- Increased costs of reactive rather than proactive responses (e.g., part of capital planning)

Impacts of Climate Risks

Markets – changing demand for good and services

- Changing seasonal energy demands – milder winters and warmer summers with more extreme hot periods
- Changes in demand due to adaptation in other sectors (e.g., irrigation) or mitigation responses (e.g., transportation)
- Diversification – increased demand and opportunities for renewables – local supply

Process – production and service delivery

- Changing quantity and increased temperature of water
- Vulnerability of service delivery during periods of flooding
- Wind energy – implications for operational limits (positive and negative)
- Biomass – implications for those sources that are water intensive

Impacts of Climate Risks

People – workforce, customers and changing lifestyles

- Threats to working conditions and travel arrangements for service staff
- Increased problems with access to infrastructure during extreme weather (and sea condition) events
- Changing thermal comfort and other energy demands as lifestyles change

Premises – building design, construction and facilities management

- Risks to buildings and infrastructure – flooding, subsidence, extreme events – implications for insurability
- Increased costs of operations and maintenance (structures and grounds)
- Retrofitting costs to deal with increased temperatures and regulations

Impacts of Climate Risks

Management Implications

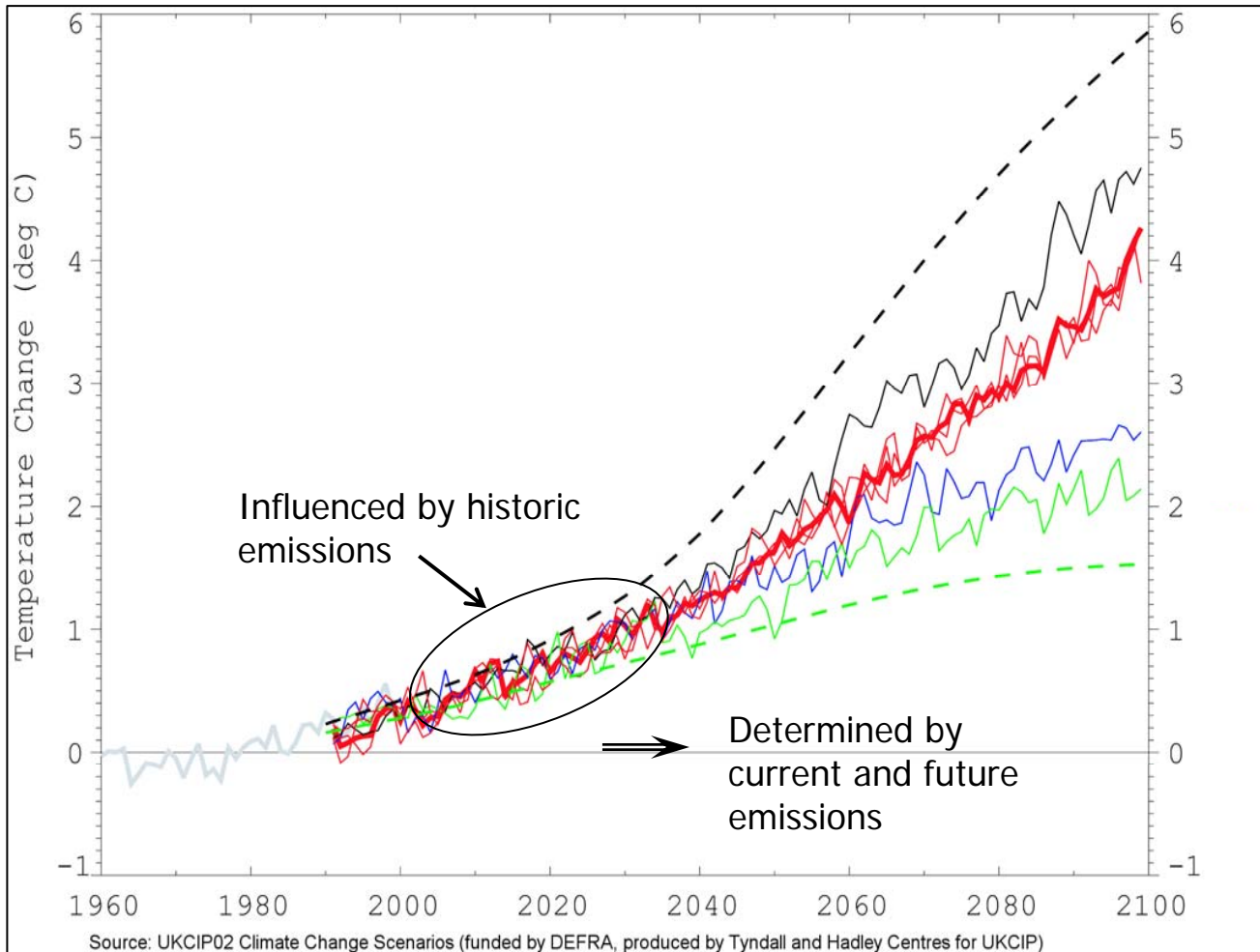
- Changing in breadth of risk management culture to include climate risks – including managing these risks with changing climate, environment and regulatory regime
- Introducing adaptation into decision-making and planning structures, including capital investment plans
- Capability to respond to/anticipate changes in customer demands and regulatory regimes – engage as a stakeholder and a leader for change

Impacts of Climate Risks - Global

Implications of climate change when operating in a global market

- Changes in the supply of biofuels – supply and demand
- Opportunities to lead and benefit from technological advances – including adaptive responses
- Impacts on fossil fuel extraction in marine areas due to changes in adverse weather and sea conditions
- Increased instability of permafrost may impact of the viability of recovering methane from methane hydrate sources
- Impacts on energy supplies in other countries will change demand and supply within the global market – effects on investments

Need for Adaptation and Mitigation



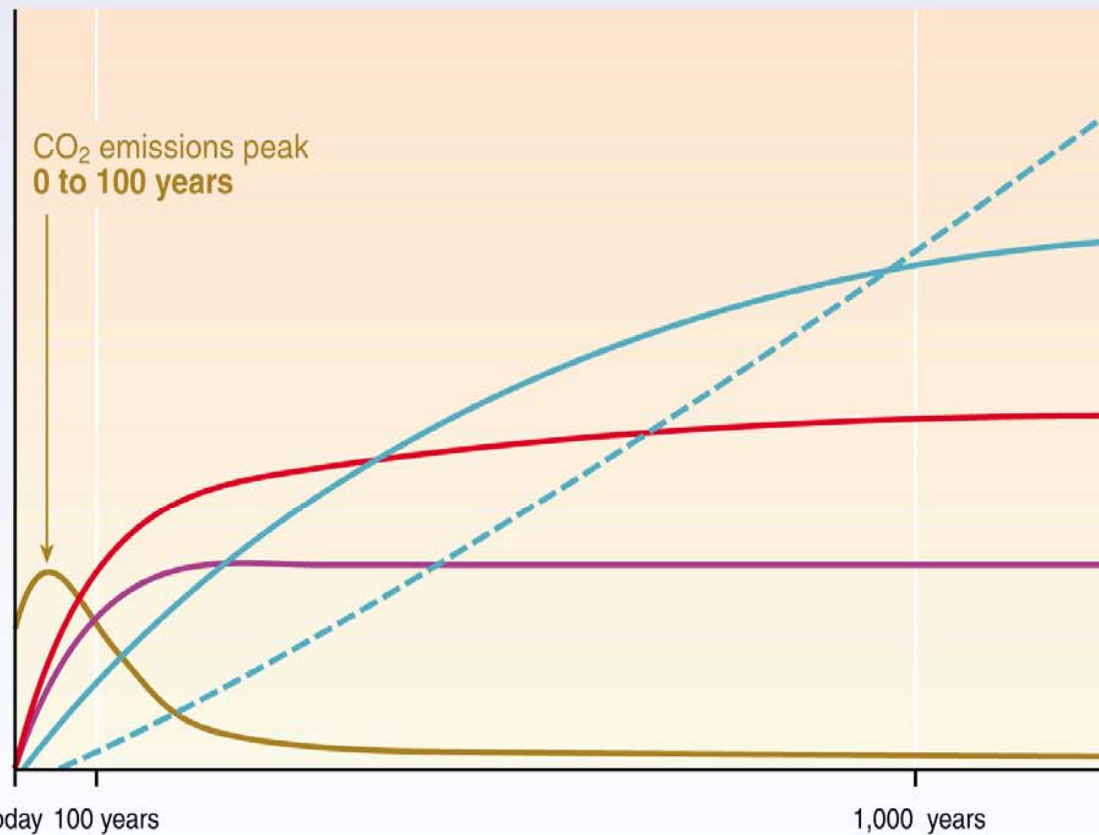
Adaptation is needed as we are already committed to some degree of climate change regardless of mitigation efforts.

Mitigation is needed to reduce the amount and rate of future climate change – avoiding dangerous or unacceptable climate change

Adaptation – for the long haul

CO₂ concentration, temperature, and sea level continue to rise long after emissions are reduced

Magnitude of response



Time taken to reach equilibrium

Sea-level rise due to ice melting:
several millennia

Sea-level rise due to thermal expansion:
centuries to millennia

Temperature stabilization:
a few centuries

CO₂ stabilization:
100 to 300 years

CO₂ emissions

Adaptation Strategies & Measures

Building Adaptive Capacity – creating information, social capital, conditions (regulatory, institutional, and managerial), and support systems and means that are needed as a foundation for delivering adaptation actions

Awareness raising

Developing supportive policies

Data collection and monitoring

Research

Changing standards

Organizational learning

Delivering Adaptation Actions – measures when implemented reduce vulnerability to climate risks or exploit climate opportunities

Climate proofing

Accepting losses

Living with risks

Exploiting opportunities

Principles of Good Adaptation

Evolved through practice; characteristic of 'good' adaptation:

- Work in partnership
- Understand risks and thresholds, including associated uncertainties.
- Frame and communicate SMART objectives/outcomes
- Manage climate and non-climate risks using a balanced approach
- Focus on actions to manage priority climate risks and opportunities
- Address today's climate variability and extremes as a starting point
- Use a phased approach to cope with uncertainty.
- Evaluate no/low regrets and win-win adaptation options.
- Avoid actions that foreclose or limit future or others adaptations
- Review the continued effectiveness of adaptation decisions - continuous improvement approach

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