Impact of Climate Change in West Asia Region: Research and Development on Adaptation and Mitigation

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Background and Facts

- Based on the findings of the IPCC on Climate Change, and modeling and research evidence quoted in the AFED report, Arab countries are the most vulnerable to the potential impacts of climate change

- The most significant impacts are increased average temperatures, erratic precipitation, and sea level rise (SLR), loss of biodiversity, and spread of diseases (AFED 2009)

- The Arab region which already suffers from:

- water scarcity, aridity, drought, and dust/sandstorms
- Extensive coastal zones with highly populated cities
- Food shortage

Background and Facts ……

- Biological diversity in Arab countries: AFED report warns that a 2¼C rise in temperatures will cause 40 per cent of all species in Arab countries to become extinct

- Therefore, the Arab region is by no means an exception; because of very high vulnerability of Arab countries to the projected impacts of climate change

- Scientists are warning Arab governments to act decisively to prevent potential environmental disasters

Climate Change *Images*

Causes of Climate Change

- Human causes include burning fossil fuels, cutting down forests, bush fires, and transforming forest land to agricultural farms, cities, and roads. These activities all release greenhouse gases into the atmosphere.
- Natural causes include changes in the Earth's orbit, the sun's intensity, the circulation of the ocean and the atmosphere, and volcanic activity.

The Evidence: Direct Observations of Climate Change

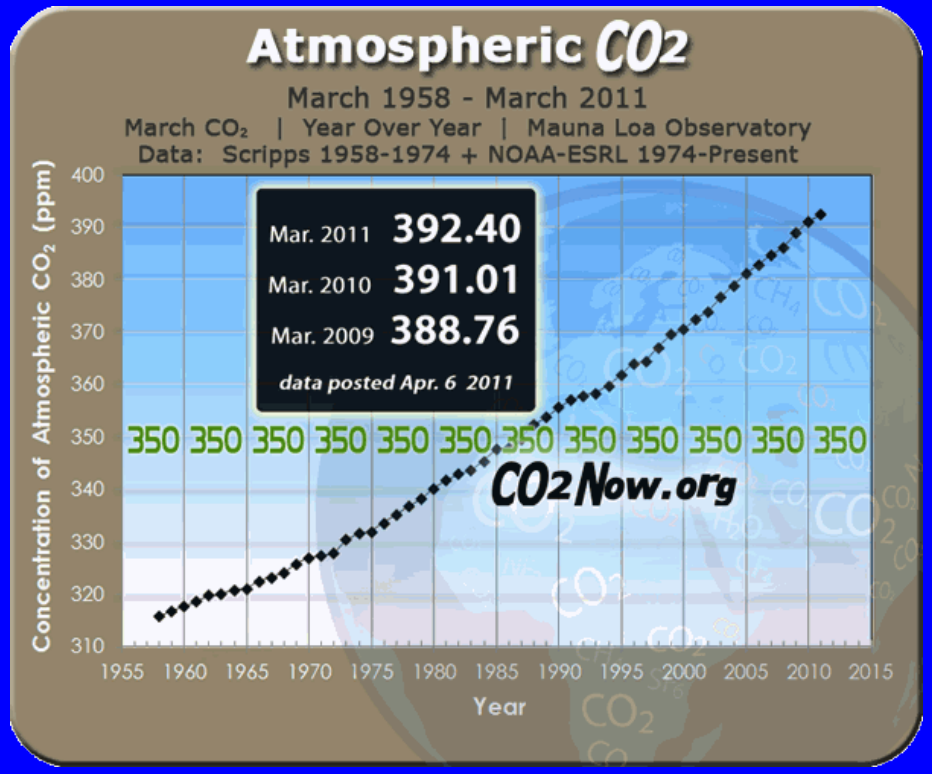
- There is NO disagreement among scientists about whether the climate is changing, increasing the atmospheric CO_2 or whether the atmospheric system is becoming warmer

- During the last nine decades, the atmospheric concentration of CO_2 has increased by 36%, primarily as a result of anthropogenic activities (IPCC 2007).

- There is now clear evidence that the Earth's climate is warming:
  - Modelling studies suggests that Arab region will face an increase of 2 º C to 5.5 º C in the surface temperature by the end of this century
- These indicate that climate change has already become a major global challenge for the 21st century

Atmospheric CO2 for March 2011

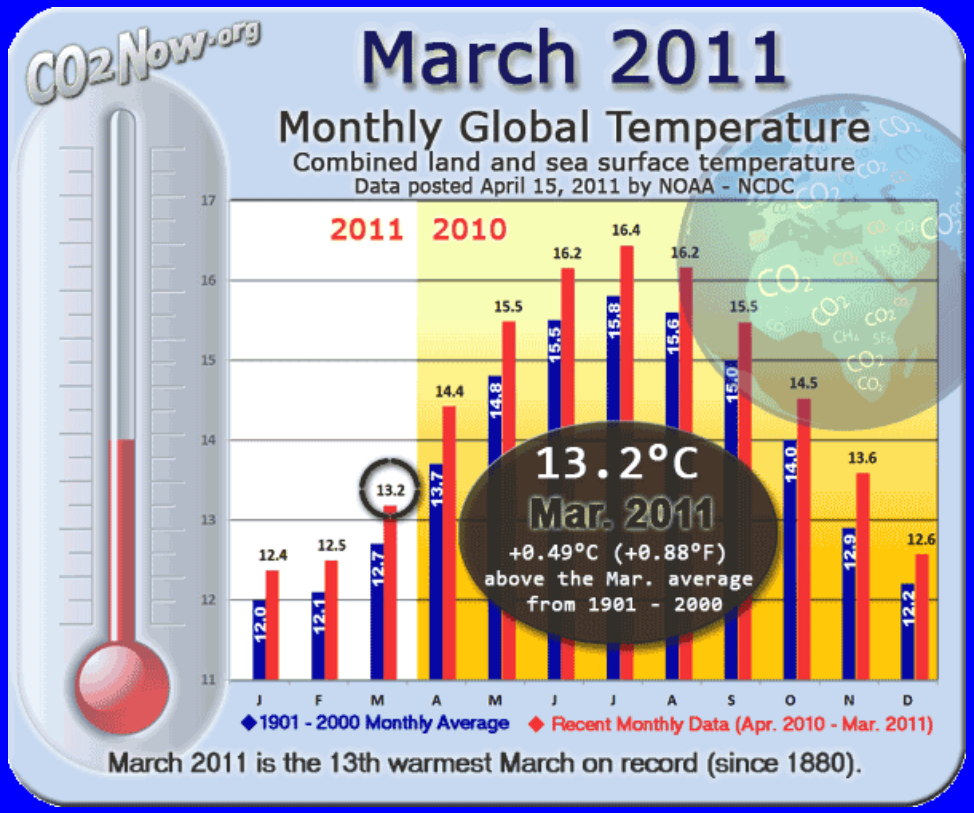
392.40ppm



Carbon dioxide (CO2) is the main greenhouse gas that results from human activities and causes global warming and climate change.

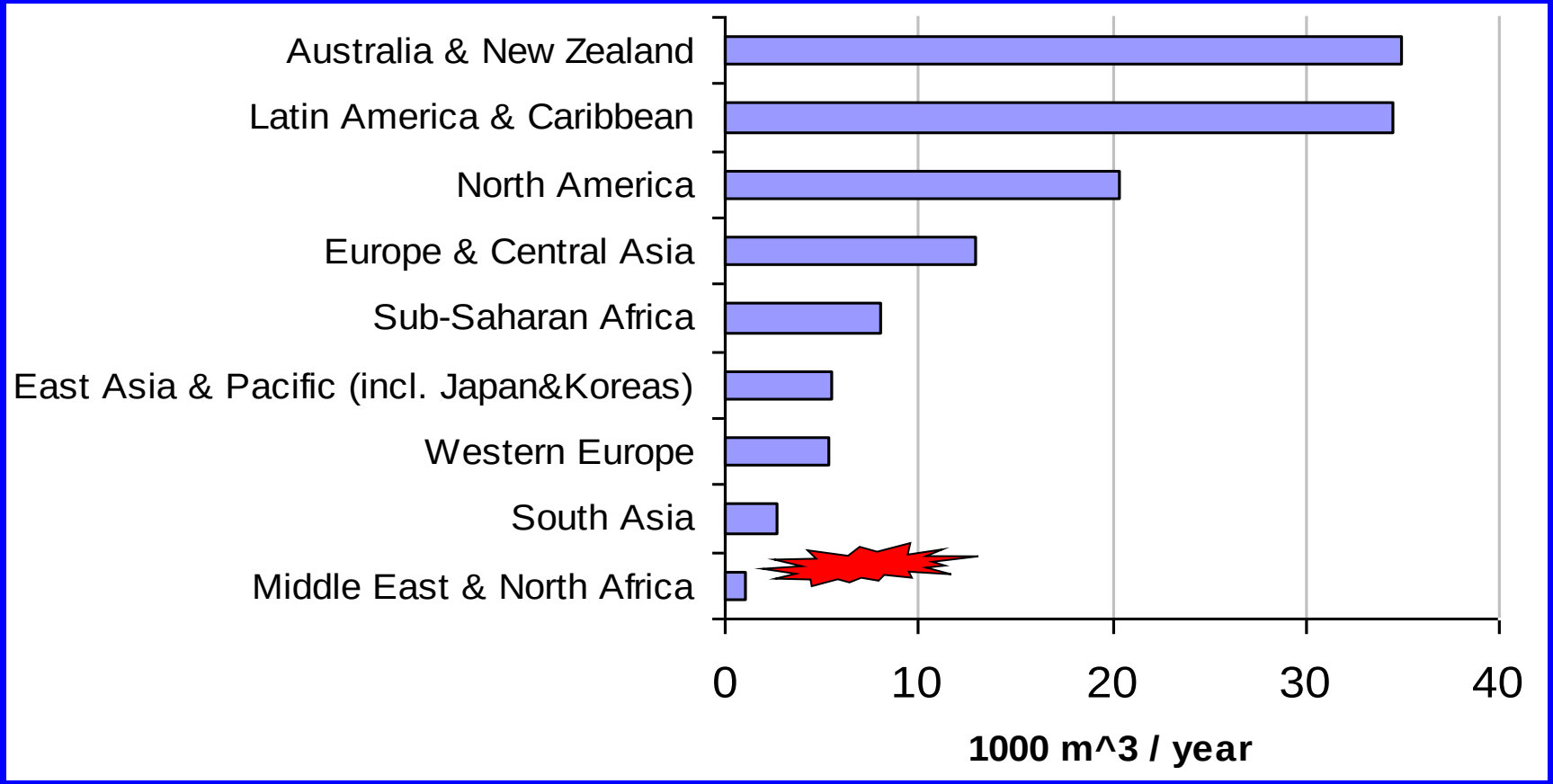
Data Source: Earth Systems Research Laboratory (ESRL) / National Oceanic and Atmospheric Administration (NOAA): Location: Mauna Loa Observatory, Hawaii

Global Temperature Update



Data Source: Earth Systems Research Laboratory (ESRL) / National Oceanic and Atmospheric Administration (NOAA): Location: Mauna Loa Observatory, Hawaii

Renewable water resources per capita



Adapted from AFED Report 2009.

Vulnerability and Adaptation

- The degree to which a system is susceptible to, or unable to cope with, adverse effects of CC including climate variability & extremes.
- It is a function of the magnitude, and rate of change to which a system is exposed, its sensitivity, and its adaptive capacity.
- Adaptation is the adjustment in natural or human systems to a new or changing environment (IPCC)

Adaptation

Adaptation refers to responses to climate change that may be used to reduce vulnerability or to actions planned to take advantage of new event that may arise as a result of climate change

Adaptation Options

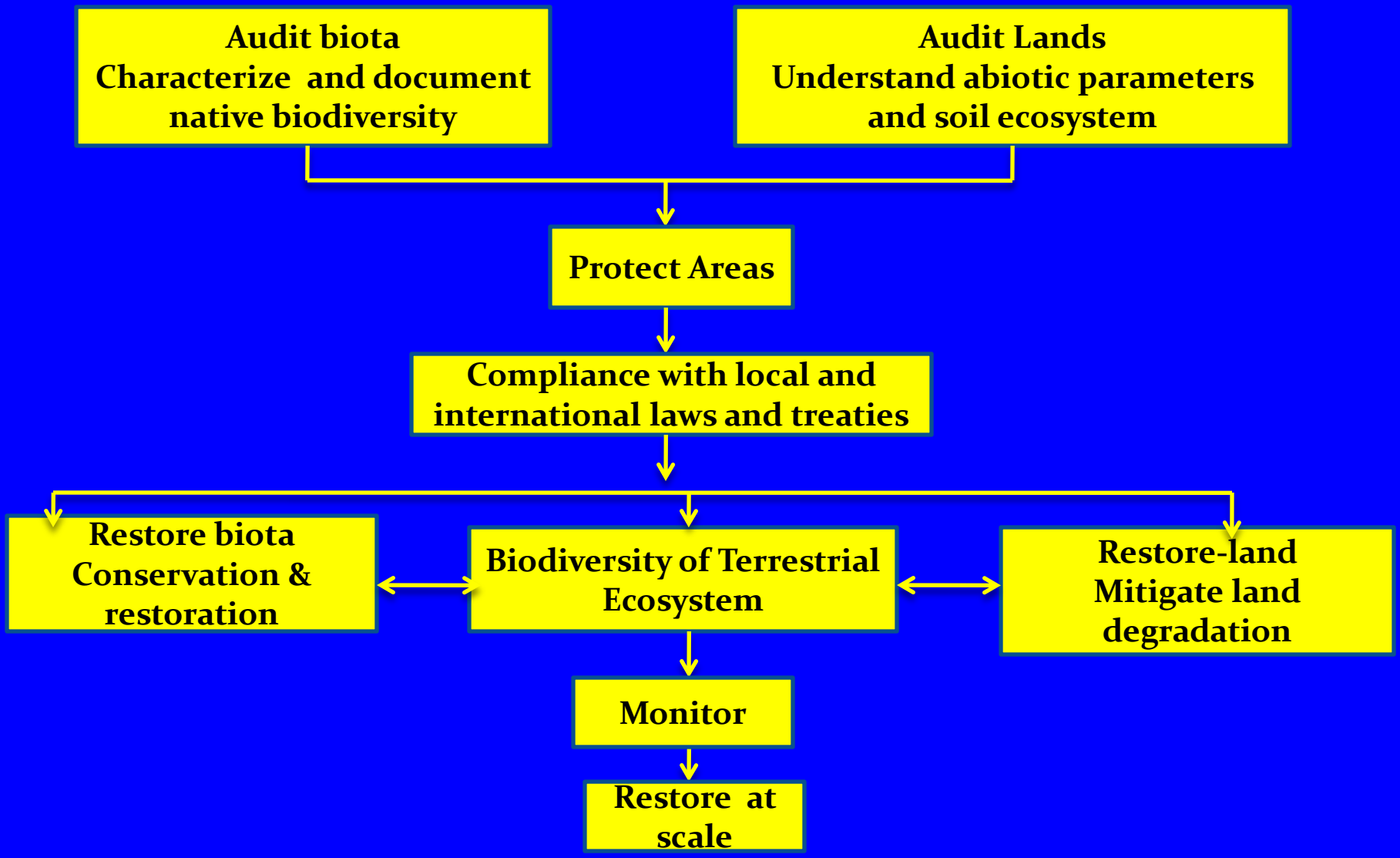
Autonomous adaptation	Natural or without response to climate change	Natural response to drought or seasonal changes
Establishing adaptive capacity	Creating database information, regulatory and managerial system , capacity building	Appropriate research funding, citizen awareness, national policy build up
Adaptive actions	Implementation that help reduce vulnerability and risk	Conservation, revegetation, water collection and storage, new crop-varieties, infrastructure

Arab regions, MENA and Africa Sahel are accustomed to coping with a warm and arid climate. However, the projected changes in temperature and precipitation may be beyond their coping. Therefore, an urgent need for selection of appropriate adaptation strategies will be critical.

Biodiversity of Terrestrial Ecosystem Research at KISR

- KISR has taken a long-term research on conservation and restoration of Kuwait's Ecosystem and Biodiversity in response to climate change challenge

How the Change is Address ?



Global Objective of Biodiversity Research at KISR

The objective of this research is to establish a vegetation monitoring program in different plant communities in Kuwait to examine short- and long-term changes in species composition in response to climatic variables and specific objectives Include:

- Terrestrial and Coastal Biodiversity Survey
- Vegetation Restoration
- Establishment of Protocols for biodiversity Monitoring
- Establishment of Indicators for Long Term monitoring of Impact of Climate Change on Biodiversity
- Metagenomics of Kuwaiti Soils
- Mass Seed Production and Seedling Production
- Database development

Biodiversity Research Areas

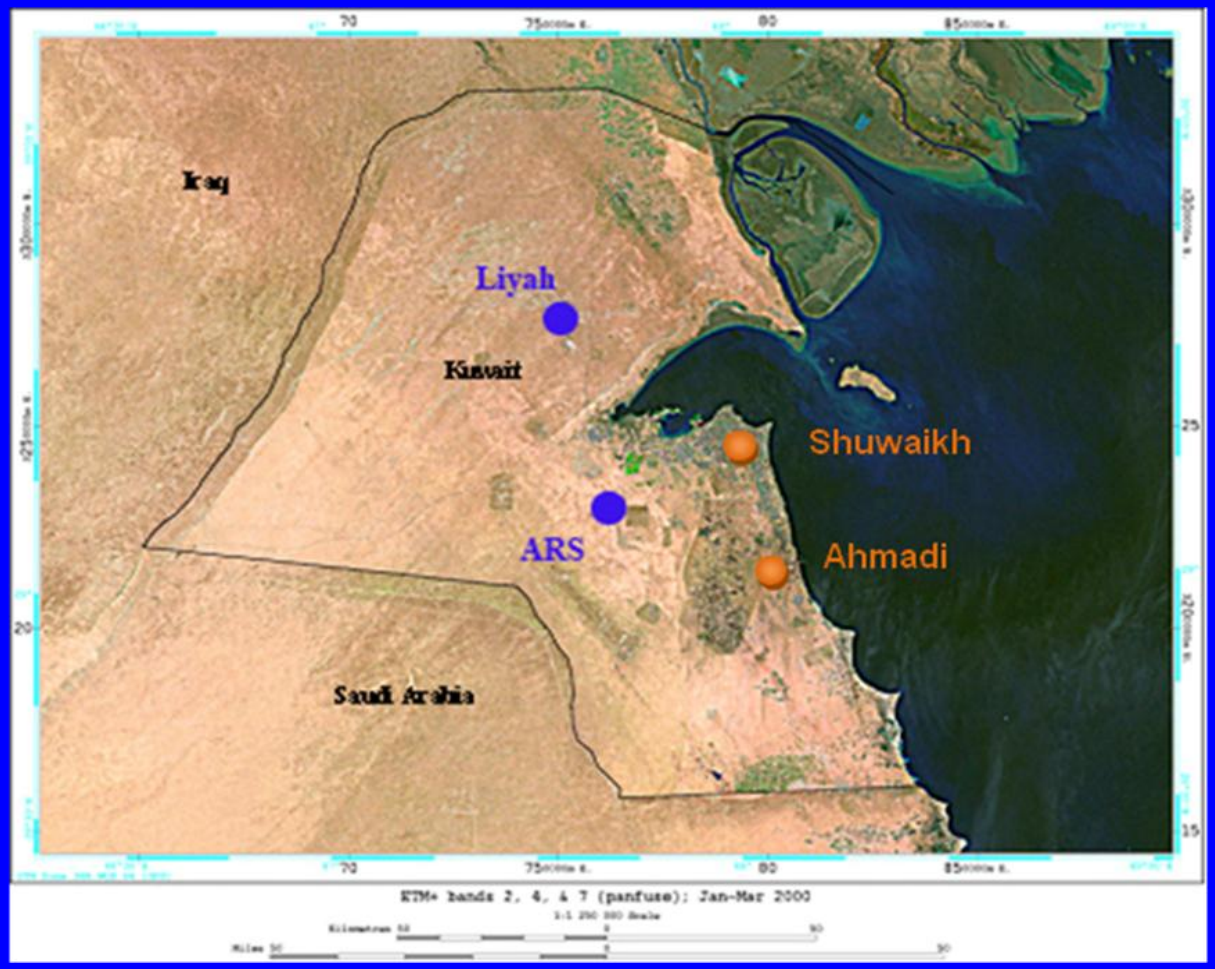


Plate 1. Satellite image showing the location of the four main study areas

Expected Outcome of the Project

- Extensive database of species composition and population size of plants at the various sites, as well as relevant data on soils and climate
- Database of plant traits for species present in the study sites
- Interpretation of scenarios as to the potential effects of climate change on plant biodiversity and vegetation in Kuwait
- Authentic baseline database for microbial community structure from Kuwaiti desert and urban ecosystem

Conclusion and recommendations

- Higher temperatures and reduced precipitation will exacerbate the water scarcity and increase the frequency of droughts, soil erosions and nutrient loss

- These changes will have significant effect on biodiversity
- Immediate attention needed to enhance research capacity in the area of impact of climate change

- Identifying options for adaptation in vulnerable areas

- Upgrading water, energy, and ecosystem conservation programs

Conclusion and recommendations

- Availability of pilot and long-term research funding, technology transfer, and sharing knowledge are the vital to combat the challenges of climate change

- Reducing gaps between scientific research and policymakers and raise public awareness