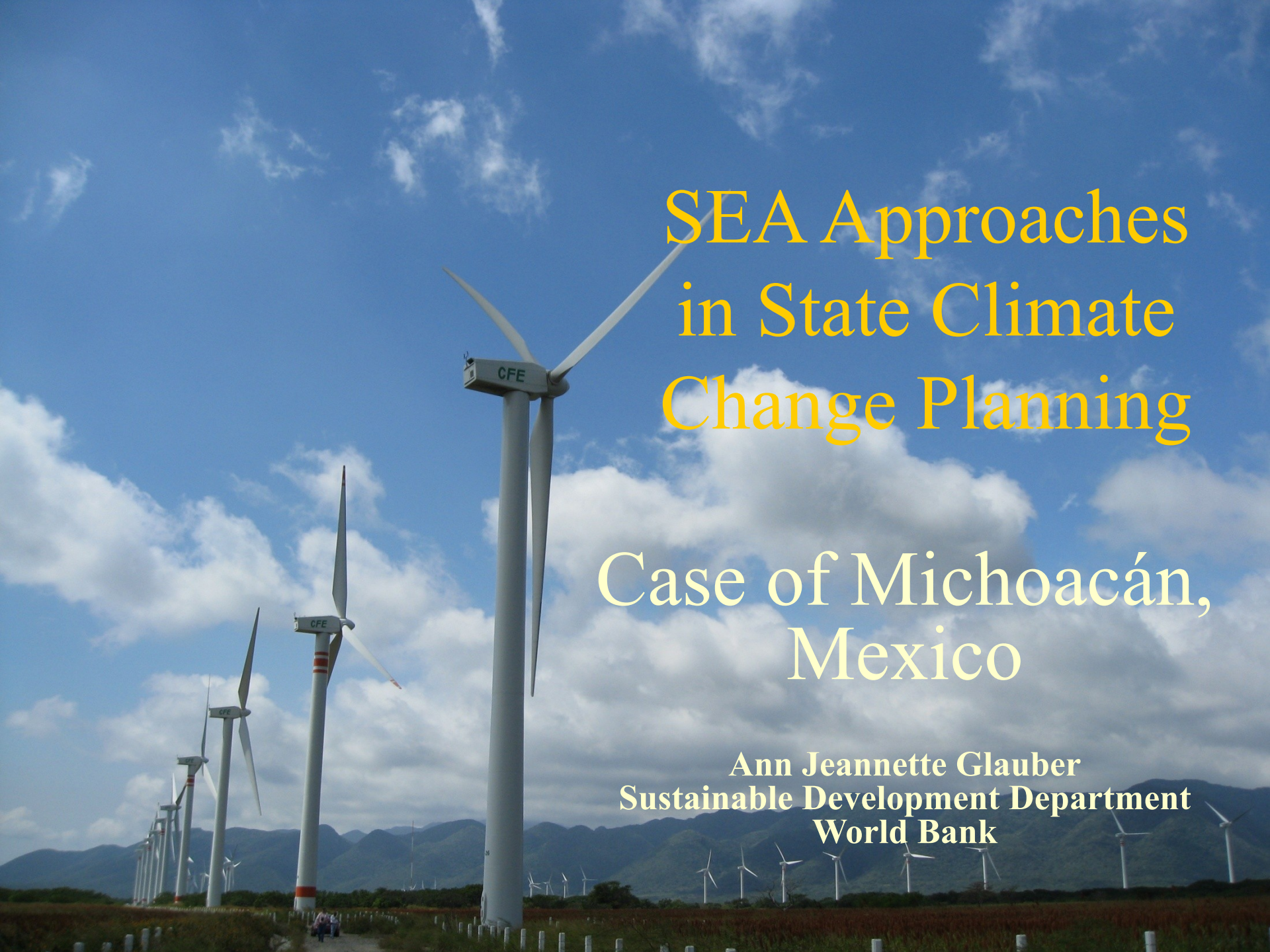


SEA Approaches in State Climate Change Planning

Case of Michoacán, Mexico

Ann Jeannette Glauber
Sustainable Development Department
World Bank

Planning for a Changing Climate

- Climate change is a major challenge
  - Climate variability significantly impacts poverty and rural poor
  - Uncertainty a reason for inaction? How can science help?
- Strategic planning as a tool
  - Improved decision-making
  - Mitigate climate risk
  - Enhanced sustainability

Mexico: At Forefront on Climate Change

- Clear leadership at Executive Level
  - Inter-Secretarial Commission on CC
  - National Climate Change Strategy
    - 50% reduction of GHG by 2050
  - Special Program for Climate Change (PECC)
    - Sectoral Emissions Baseline and Targets
    - Adaptation plans
- Climate Performance Index: Mexico Ranked 8th in world

Next Step: Addressing Climate Change at Subnational Level

- States pivotal to implementing policies
  - Ample resources (national, donors), little clarity on how to proceed
- To-date, two plans finalized
  - Strong academic focus, limited participation
  - Implementation likely to be challenging
- State of Michoacán requested WB assistance

Michoacán
State Climate Change Action Plan

- Objective: Identify mitigation potential, key vulnerabilities, prioritize adaptation measures
- Support for SEA approach to guide plan development
- Process:
  - Stakeholder Analysis
  - Workshop to set priorities
  - Challenge – uncertainty + broad CC affects in virtually all sectors = how to prioritize?

SEA Principles Incorporated into Climate Change Planning

- SEA
- Baseline Study
- Screening/Scoping
- Establish Environmental Indicators
- Identify Options

- Adaptation Planning
- Climate change projections
- Confidence in major statements
- Establishing areas of interest
- Establish benchmarks
- Adaptation options

Best Practice in Planning for Adaptation

- Australia's *Climate Change Impacts & Risk Management: Guide for Business and Government (2006;* www.greenhouse.gov.)
  - A climate risk matrix of impacts and adaptation for key sectors
- Participatory, risk-management approach
- Assess likely climate change impacts
- Develop adaptation responses

Villamar

Zamora

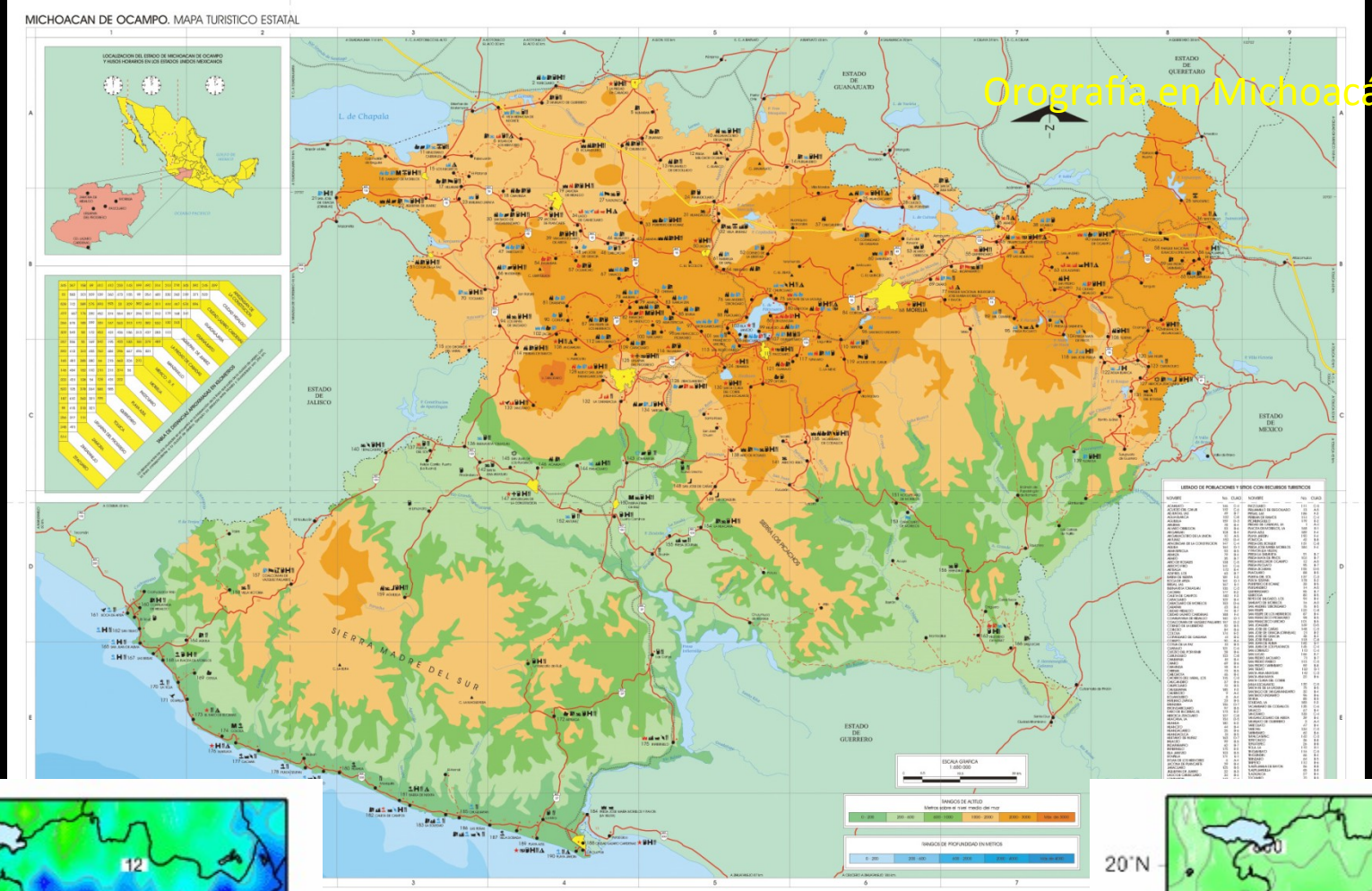
Zinapécuaro

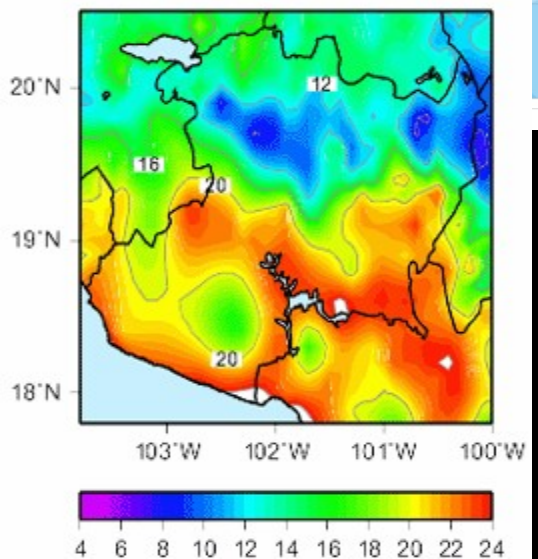
Cuitzeo

Morelia

Uruapan

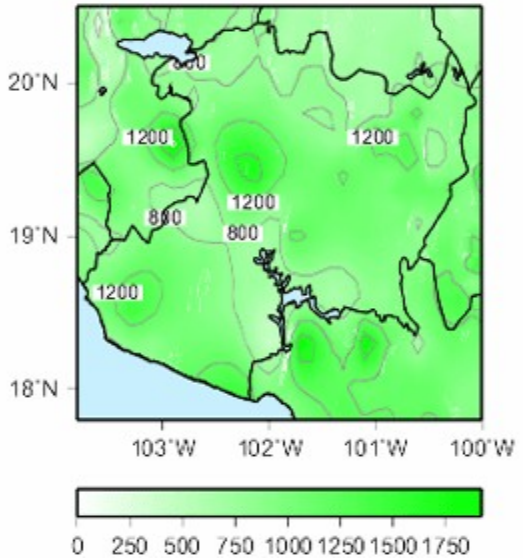
Cuerámaro
Rosas
Empalme Escobedo (Escobedo)
Salamanca
Valtierrilla
Villagrán
Celaya
Cortázar
Abasolo
Pénjamo
Valle de Santiago
Jaral del Progreso
Pastor Ortiz
San Nicolás de Los Agustinos
Yuriria
Salvatierra
Villachuato
La Calera
Moroleón
Pajacuarán
Zamora de Hidalgo
Chavinda
Puruándiro
Cerano (San Juan Cerano)
Santa Ana Maya
Huandacareo
Irámuco
Cuitzeo del Porvenir
Panindicuaro
Purepero de Echaiz
Jacona de Plancarte
Santiago Tangamandapio
Tarecuato
Carapan
Chilchota
Zacapú
Álvaro Obregón
Zinapécuaro de Figueroa
Indaparapeo
Queréndaro
Tinguindín
Tanaco
Cherán
Quiroga
Morelos
Nahuatzén
Paracho de Verduzco
Los Reyes de Salgado
Patzcuaro
Pátzcuaro
Acuitzio del Canje
Capácuaro
Tingambato
Peribán de Ramos
Santa Clara del Cobre
Opopeo
Villa Madero
Teretan





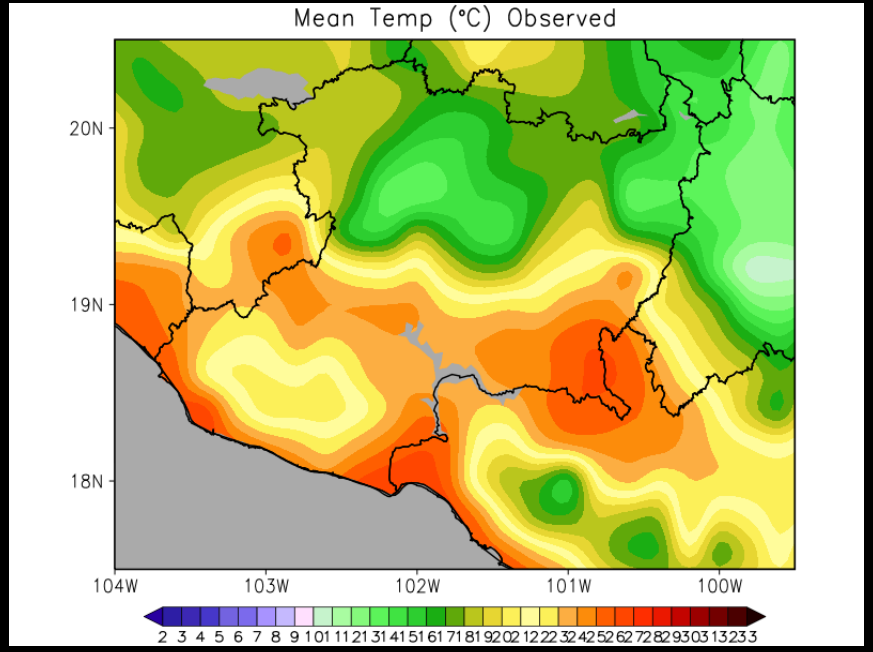
Average Annual Temperature

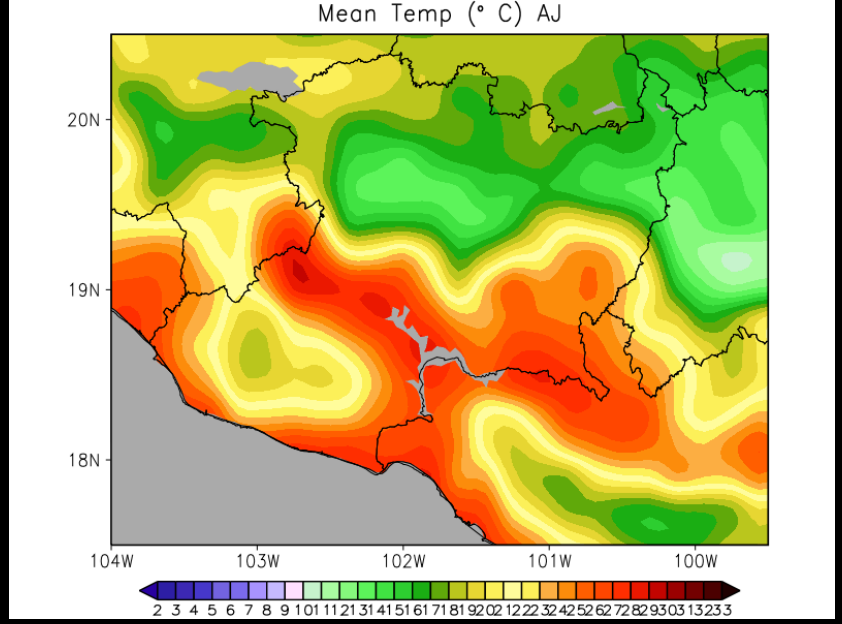
Average Total Precipitation



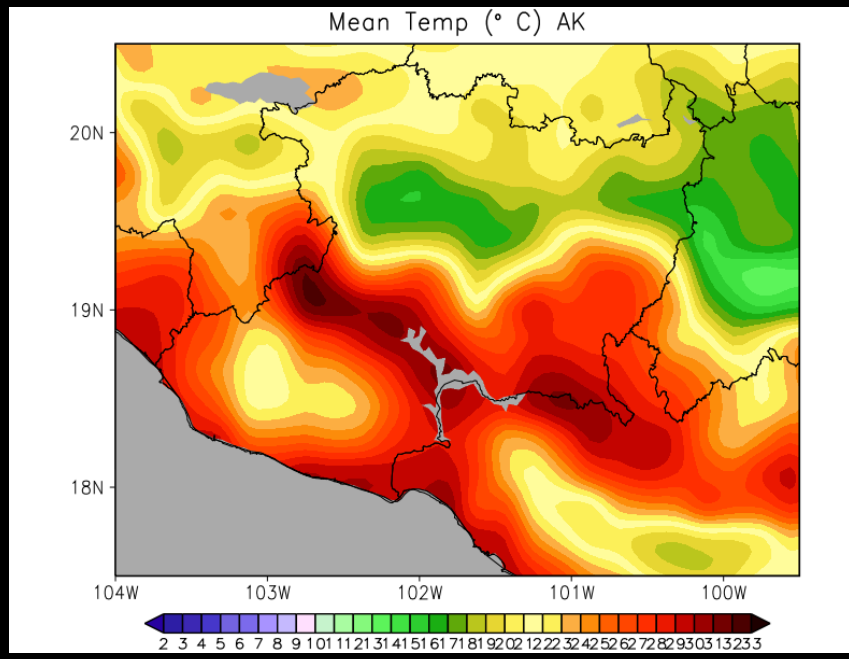
Agriculture Key Source of Employment, Growth

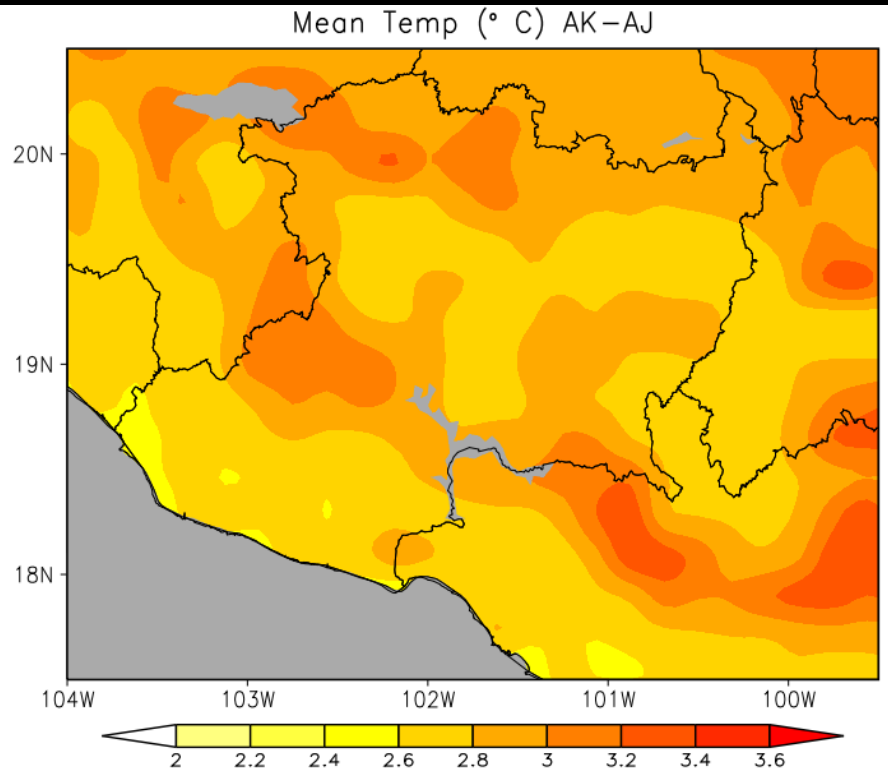
Principal Agricultural Products, 2008	Production (kg)	% of National Total	National Ranking
Strawberry	**106 906**	**60.0**	**1 of 8**
Guayaba	**129 271**	**45.3**	**1 of 21**
Melon	**110 819**	**19.1**	**1 of 27**
Avocado	**1 024 582**	**88.1**	**1 of 28**
Lime	**421 999**	**18.9**	**3 of 25**
Onion	**165 650**	**13.3**	**3 of 26**
Tomato	**175 703**	**7.8**	**3 of 32**





T media anual





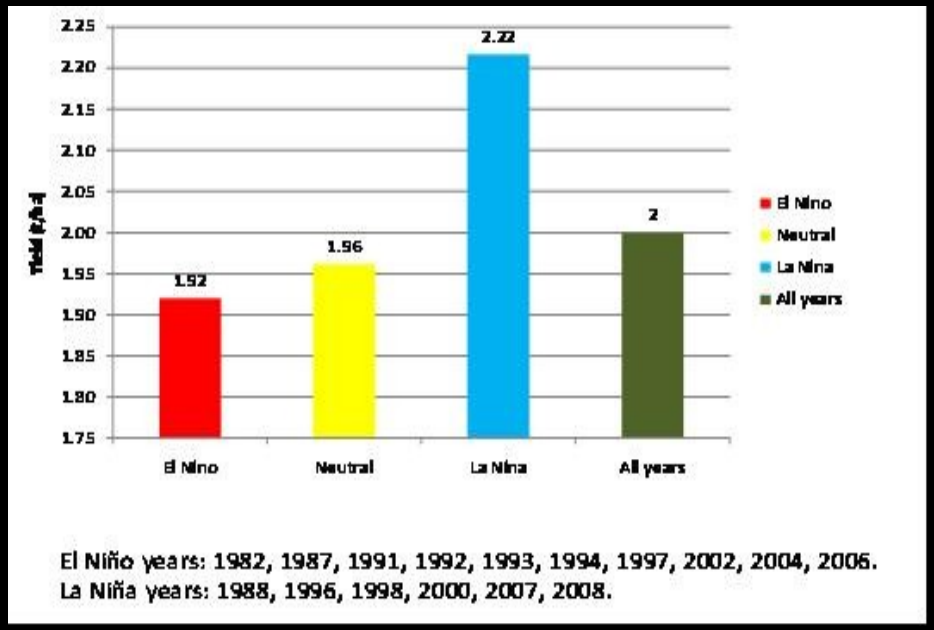
Sensitivity

Climate Change Characteristic	Scenario A 2030 SRES A1B Magana	Scenario B 2030 SRES A1B 25%	Scenario C 2030 SRES A1B 75%
Average Temperature	+1.5° C	+1.7°C	+1.3°C
Max Temperature	+2.5° C	+2.7°C	+2.3°C
Min Temperature	+2.0° C	+2.2°C	+1.8°C
Precipitation intensity	+ 2.0 mm/day	NA	NA
Annual Precipitation	-5%	-10%	+5%

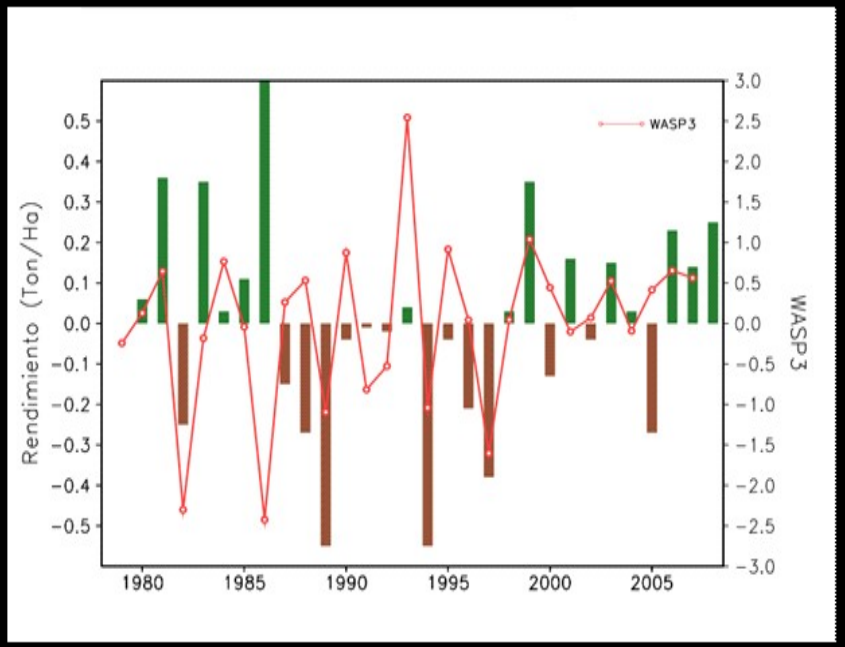
Impact and Risk

Features of climate change	Water Quantity	Water Quality	Water Infrastructure	health	Ecosystem
Higher minimum temperatures	Increased evapotranspiration and decreased water availability Increases use and demand for water	• Increased decomposition and eutrophication • Increases the BOD / decreased OD Higher concentrations of toxics due to higher evaporation, all leading to a deterioration in water quality		Need for investment • Increase in the dispersion of air pollutants • Reduces problems of cold-related illnesses • Increase pest problems	Impact on biodiversity • Changes in migration routes • Negative impact on biodiversity due to reduction of spawning areas and changes in pollination.
Higher maximum temperatures	Increased evapotranspiration and decreased water availability Increases use and demand for water	• Increased decomposition and eutrophication • Increases the BOD / decreased OD Higher concentrations of toxics due to higher evaporation, all leading to a deterioration in water quality		• Increase in vector and Gastrointestinal diseases • Increased stress from high temperatures (heat shock)	Forest fires on the rise • Impact on biodiversity • Changes in migration routes

Rain Impact on White Maize



El Niño years: 1982, 1987, 1991, 1992, 1993, 1994, 1997, 2002, 2004, 2006.
La Niña years: 1988, 1996, 1998, 2000, 2007, 2008.



Priority Adaptation Measures

Features of climate change	Water Quantity	Water Quality	Water Infrastructure	health	Ecosystem
Higher minimum temperatures	Improved irrigation technology Conversion of crops Other measures to improve water use efficiency	Improved wastewater treatment		A system for issuance of health warnings	Studies to determine the degree of damage to biodiversity as a basis for formulating plans for conservation and management
Higher maximum temperatures	Improved information and communication. Improved irrigation technology Conversion of crops. • Adjustment mechanism to existing water rights. Other measures to improve water use efficiency	Efficient management of agrochemicals to reduce pollution Better handling of sewage Reuse of rainwater.		Costing of each of the diseases associated with climate change. Development of clinical guidelines. Improved information and communication.	Monitoring of pest control. Eliminate the practice of agricultural burning. Strengthen fire control. To strengthen the conservation of protected natural areas
Increased intensity of precipitation	Development of systems to prevent soil erosion Regulation of land use to reduce settlements in	Reforestation of upper watersheds Protection of river banks to reduce sediment	Review infrastructure vulnerabilities and securing the infrastructure against flooding / inability to	Establish early warning systems and action in coordination with the local population and	Give priority to conservation of ecosystems that help reduce the impact of floods (wetlands and

Results To-Date

- Stage set for sustained stakeholder involvement, responsiveness to new information
- Measures and policies to improve efficiency are even more important
- Focus on “no regret” measures, beneficial across a wide range of climate outcomes
  - CC amplifies urgency and magnitude of required responses, but not type of adaptations

Conclusions

- Responding to climate change requires multi-sectoral, participatory approaches
- Effective methodologies must incorporate science, uncertainty for key sectors
  - Risk management approach appropriate
  - SEA can provide useful framework
- Climate variability likely to increase
  - Adaptation measures must be cost-effective and robust to different climate futures

Thank you

For more information:

aglauber@worldbank.org

dgeorge@worldbank.org

rdamania@worldbank.org

Limitations of Risk Matrix Approach

- Biological and bio-economic processes
  - E.g. CO2 effects on trees, tree/grass/crop relationships, temperature and effects on animal/crop production, gross margins and biodiversity
- Interactive effect of climate variables (single vs. combined)
- Where climate has both detrimental and beneficial effects
- Reconciling climate variability and change
- Analysis and interpretation of whole system performance, e.g. cost-benefit analysis.