

# Canadá, México, USA:

## IMPACTOS, ADAPTACION, Y VULNERABILIDAD

Quinto Reporte del IPCC sobre Cambio Climático en Norteamérica y Centroamérica

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URBAN FUTURES RAL-NCAR

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[www.ral.ucar.edu/urban-futures](http://www.ral.ucar.edu/urban-futures)



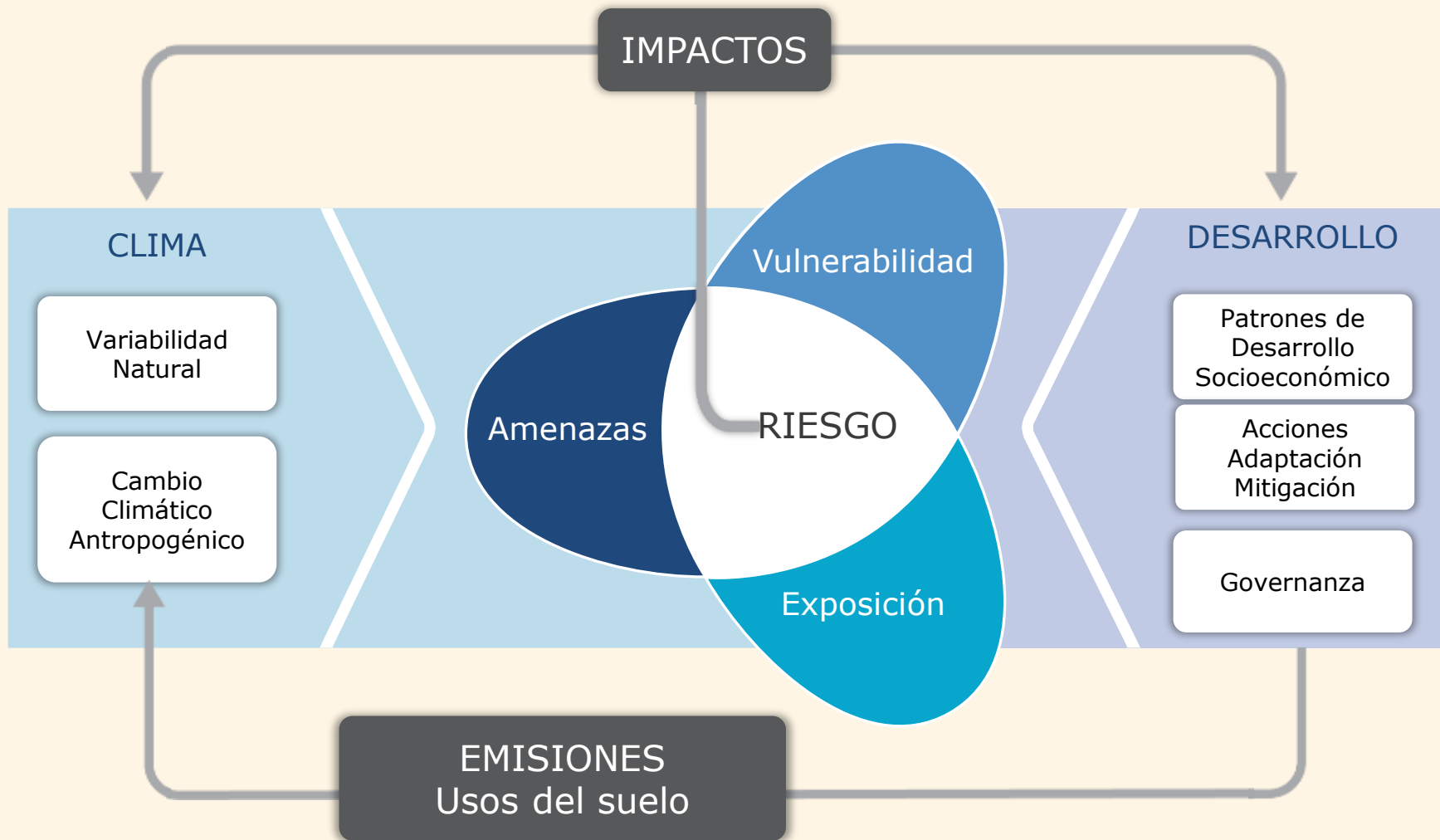
# ¿Qué es diferente y relevante para México y Centroamérica?

- Integración de adaptación y riesgo


- Amenazas, impactos, vulnerabilidad
- Abordaje regional
- Vínculos desarrollo y clima

- Análisis detallado de límites, barreras y **opciones** de adaptación









Cambios observados  
impactan ya

recursos naturales, economías  
y calidad de vida

OBSERVED IMPACTS  
OF CLIMATE CHANGE  
**ARE WIDESPREAD**  
AND CONSEQUENTIAL





### Physical systems

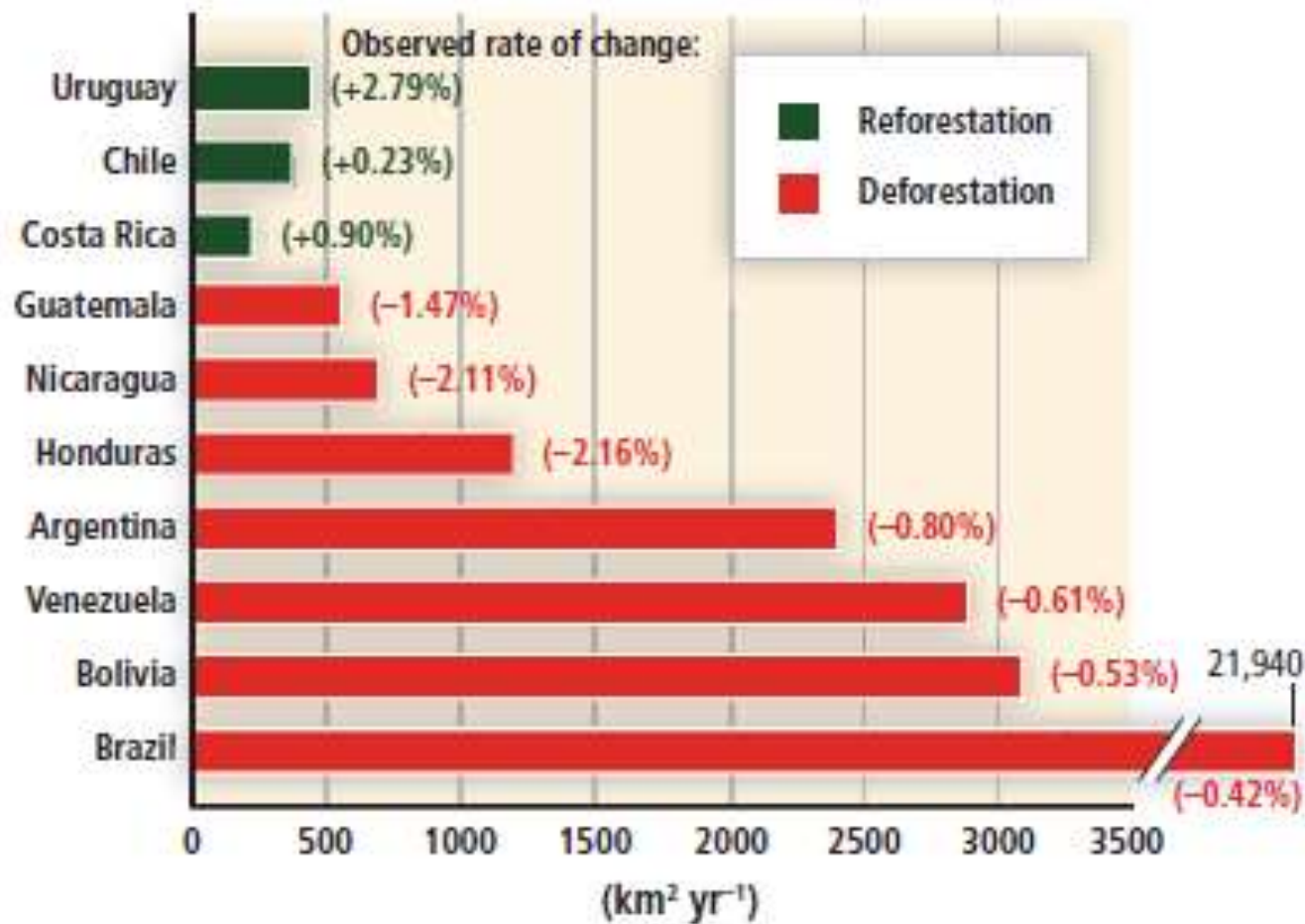
1. Glacier retreat in the Andes in South America (Section 27.3.1)
2. Streamflow increase La Plata Basin (Section 27.3.2.1)
3. Increase in heavy precipitation and in risk of flooding in southeastern South America, and northern South America (Section 27.3.3.1)
4. Changes in extreme flows in Amazon River (Section 27.3.4.1)
5. Coastal erosion and other physical sea level rise (Section 27.3.2.1)

### Biological systems

6. Bleaching of coral reefs in western Caribbean (Section 27.3.2.1)
7. Degrading and receding rainforest in Amazonia and northern South America (Section 27.3.3.1)
8. Reduction in fisheries stock (Section 27.3.4.1)

### Human and managed systems

9. Increase in frequency and extension of drought (Section 27.3.7.1)
10. Increases in agricultural yield in southeastern South America (Section 27.3.4.1)
11. Shifting in agricultural zoning (Section 27.3.4.1)



**Figure 27-3** | Forest cover change per year for selected countries in Central and South America (2005–2010). Notice three countries listed with a positive change in forest cover (based on data from FAO, 2010).

# COMUNIDADES, TERRITORIOS Y ECOSISTEMAS SON **VULNERABLES** POR DISTINTAS RAZONES

PEOPLE, SOCIETIES,  
AND ECOSYSTEMS  
AROUND THE WORLD

**VULNERABLE  
AND EXPOSED**

IN DIFFERENT WAYS



# Agricultura

- Relativamente bajos niveles de desarrollo humano en
  - Pueden incrementar vulnerabilidad
  - Sus riesgos sociales son altos (acceso a crédito, seguros)
- Mercados y factibilidad técnica insuficientes para promover adaptación
- Apoyo institucional es clave



A close-up photograph of several dried corn cobs in a field. The husks are brown and brittle, with some green leaves still visible. The background is a soft-focus field of similar corn plants.

DE MANTENERSE EL ALTO  
NIVEL DE EMISIONES  
LOS RIESGOS DEL  
CAMBIO CLIMATICO

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SERAN IRREVERSIBLES

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RISKS OF  
CLIMATE CHANGE

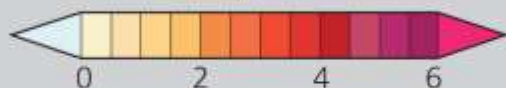
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**INCREASE**

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WITH CONTINUED  
HIGH EMISSIONS

## Annual Temperature Change

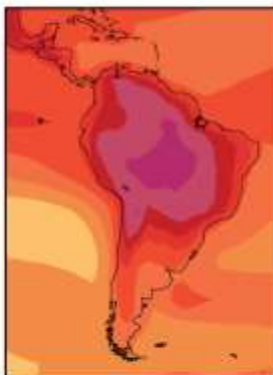
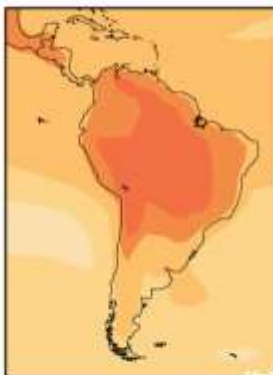


Difference from  
1986–2005 mean (°C)

mid 21st century

late 21st century

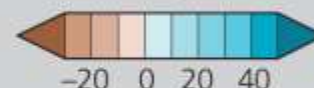
RCP8.5



RCP2.6



## Annual Precipitation Change



Difference from  
1986–2005 mean (%)

mid 21st century

late 21st century

RCP8.5



RCP2.6



Solid Color

Very strong  
agreement

White Dots

Strong  
agreement

Gray

Divergent  
changes

Diagonal Lines





A MAYOR CALENTAMIENTO  
MAYOR PROBABILIDAD DE

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**IMPACTOS SEVEROS Y  
PROFUNDOS**

















INCREASING MAGNITUDES  
OF WARMING INCREASE  
THE LIKELIHOOD OF

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**SEVERE AND  
PERVASIVE IMPACTS**



**Table 27-8** | Key risks from climate change and the potential for risk reduction through mitigation and adaptation.

Climate-related drivers of impacts							
 Warming trend	 Extreme temperature	 Drying trend	 Extreme precipitation	 Precipitation	 Snow cover	 Ocean acidification	 Carbon dioxide fertilization
Key risk	Adaptation issues & prospects						Climatic drivers
Water availability in semi-arid and glacier-melt-dependent regions and Central America; flooding and landslides in urban and rural areas due to extreme precipitation ( <i>high confidence</i> )  [27.3]	<ul style="list-style-type: none"> <li>• Integrated water resource management</li> <li>• Urban and rural flood management (including infrastructure), early warning systems, better weather and runoff forecasts, and infectious disease control</li> </ul>						   
CA coral reef bleaching ( <i>high confidence</i> )  [27.3.3]	Limited evidence for autonomous genetic adaptation of corals; other adaptation options are limited to reducing other stresses, mainly enhancing water quality and limiting pressures from tourism and fishing.						 
Decreased food production and food quality ( <i>medium confidence</i> )  [27.3]	<ul style="list-style-type: none"> <li>• Development of new crop varieties more adapted to climate change (temperature and drought)</li> <li>• Offsetting of human and animal health impacts of reduced food quality</li> <li>• Offsetting of economic impacts of land-use change</li> <li>• Strengthening traditional indigenous knowledge systems and practices</li> </ul>						 



Floods/Inundaciones



Wildfires/Incendios



Water/agua



Dislocación de infraestructuras costeras





**Animales marinos/Marine animals**



**Seguridad alimentaria/agricultura**



**Animales terrestres Land animals**



**Salud humana**







**CAMBIO CLIMATICO**

**ES UN RETO A LA GESTION  
DE RIESGO**

**CLIMATE CHANGE**

**A CHALLENGE IN  
MANAGING RISKS**

**ipcc**

INTERGOVERNMENTAL PANEL ON climate change



Overlapping Approaches	Category	Examples
Vulnerability and exposure reduction through development, planning, and practices including many low-regrets measures and transformational adjustments	Human development	Improved access to education, nutrition, health facilities, energy, safe housing & settlement support structures; Reduced gender inequality & marginalization in other forms.
	Poverty alleviation	Improved access to & control of local resources; Land tenure; Disaster risk reduction; Social protection; Insurance schemes.
	Livelihood security	Income, asset, & livelihood diversification; Improved infrastructure; Access to technology for; Increased decision-making power; Changed cropping, livestock, & aquaculture practices; networks.
	Disaster risk management	Early warning systems; Hazard & vulnerability mapping; Diversifying water resources; Improved & cyclone shelters; Building codes & practices; Storm & wastewater management; Transport improvements.
	Ecosystem management	Maintaining wetlands & urban green spaces; Coastal afforestation; Watershed & reservoir management; Reduction of other stressors on ecosystems & of habitat fragmentation; Maintenance of ecological services; Manipulation of disturbance regimes; Community-based natural resource management.
	Spatial or land-use planning	Provisioning of adequate housing, infrastructure, & services; Managing development in flood risk areas; Urban planning & upgrading programs; Land zoning laws; Easements; Protected areas.
	Structural/physical	<p><b>Engineered &amp; built-environment options:</b> Sea walls &amp; coastal protection structures; Flood storage; Improved drainage; Flood &amp; cyclone management; Transport &amp; road infrastructure adjustments.</p> <p><b>Technological options:</b> New crop &amp; animal husbandry methods; Efficient irrigation; Water-saving preservation facilities; Hazard &amp; vulnerability mapping; Mechanical &amp; passive cooling; Technology for early warning systems.</p> <p><b>Ecosystem-based options:</b> Ecological restoration &amp; replanting; Green infrastructure co-management; Assisted species migration; In situ conservation; Community-based natural resource management.</p> <p><b>Services:</b> Social safety nets &amp; social protection including water &amp; sanitation; Vaccination &amp; health services.</p>

Overlapping Approaches	Category	Examples	Resilience Indicators
Vulnerability and exposure reduction through development, planning, and practices including many low-regrets measures and transformational adjustments	Human development	Improved access to education, nutrition, health facilities, energy, safe housing & settlement support structures; Reduced gender inequality & marginalization in other forms.	<ul style="list-style-type: none"> <li>Access to education: 100% enrollment rate</li> <li>Access to health services: 100% coverage</li> <li>Access to energy: 100% coverage</li> <li>Access to safe housing: 100% coverage</li> </ul>
	Poverty alleviation	Improved access to & control of local resources; Land tenure; Disaster risk reduction; Social protection; Insurance schemes.	<ul style="list-style-type: none"> <li>Access to land: 100% coverage</li> <li>Access to disaster risk reduction: 100% coverage</li> <li>Access to social protection: 100% coverage</li> <li>Access to insurance: 100% coverage</li> </ul>
	Livelihood security	Income, asset, & livelihood diversification; Improved infrastructure; Access to technology for; Increased decision-making power; Changed cropping, livestock, & aquaculture practices; networks.	<ul style="list-style-type: none"> <li>Access to income: 100% coverage</li> <li>Access to assets: 100% coverage</li> <li>Access to technology: 100% coverage</li> <li>Access to decision-making power: 100% coverage</li> </ul>
	Disaster risk management	Early warning systems; Hazard & vulnerability mapping; Diversifying water resources; Improved & cyclone shelters; Building codes & practices; Storm & wastewater management; Transport improvements.	<ul style="list-style-type: none"> <li>Access to early warning systems: 100% coverage</li> <li>Access to hazard &amp; vulnerability mapping: 100% coverage</li> <li>Access to diversified water resources: 100% coverage</li> <li>Access to improved cyclone shelters: 100% coverage</li> <li>Access to building codes &amp; practices: 100% coverage</li> <li>Access to storm &amp; wastewater management: 100% coverage</li> <li>Access to transport improvements: 100% coverage</li> </ul>
Structural/physical	Engineered & built-environment options	Sea walls & coastal protection structures; Flood storage; Improved drainage; Flood & cyclone management; Transport & road infrastructure adjustments.	<ul style="list-style-type: none"> <li>Access to sea walls &amp; coastal protection structures: 100% coverage</li> <li>Access to flood storage: 100% coverage</li> <li>Access to improved drainage: 100% coverage</li> <li>Access to flood &amp; cyclone management: 100% coverage</li> <li>Access to transport &amp; road infrastructure adjustments: 100% coverage</li> </ul>
	Technological options	New crop & animal husbandry methods; Efficient irrigation; Water-saving preservation facilities; Hazard & vulnerability mapping; Mechanical & passive cooling; Technology for early warning systems.	<ul style="list-style-type: none"> <li>Access to new crop &amp; animal husbandry methods: 100% coverage</li> <li>Access to efficient irrigation: 100% coverage</li> <li>Access to water-saving preservation facilities: 100% coverage</li> <li>Access to hazard &amp; vulnerability mapping: 100% coverage</li> <li>Access to mechanical &amp; passive cooling: 100% coverage</li> <li>Access to technology for early warning systems: 100% coverage</li> </ul>
	Ecosystem-based options	Ecological restoration & replanting; Green infrastructure co-management; Assisted species migration; In situ conservation; Community-based natural resource management.	<ul style="list-style-type: none"> <li>Access to ecological restoration &amp; replanting: 100% coverage</li> <li>Access to green infrastructure co-management: 100% coverage</li> <li>Access to assisted species migration: 100% coverage</li> <li>Access to in situ conservation: 100% coverage</li> <li>Access to community-based natural resource management: 100% coverage</li> </ul>
	Services	Social safety nets & social protection including water & sanitation; Vaccination & health services.	<ul style="list-style-type: none"> <li>Access to social safety nets &amp; social protection: 100% coverage</li> <li>Access to water &amp; sanitation: 100% coverage</li> <li>Access to vaccination &amp; health services: 100% coverage</li> </ul>



**ADAPTATION IS  
ALREADY OCCURING**

