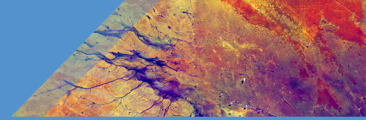


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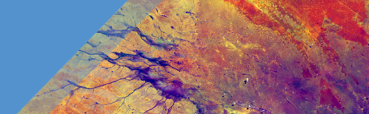
Impactos, Adaptación y Vulnerabilidad en América Central y del Sur

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América Central y del Sur es una región altamente expuesta y vulnerable, y fuertemente impactada por el cambio climático (inequidad, pobreza, crecimiento y alta densidad poblacional, cambios en el uso del suelo, pérdida de biodiversidad y economías basadas en la explotación de los recursos naturales)



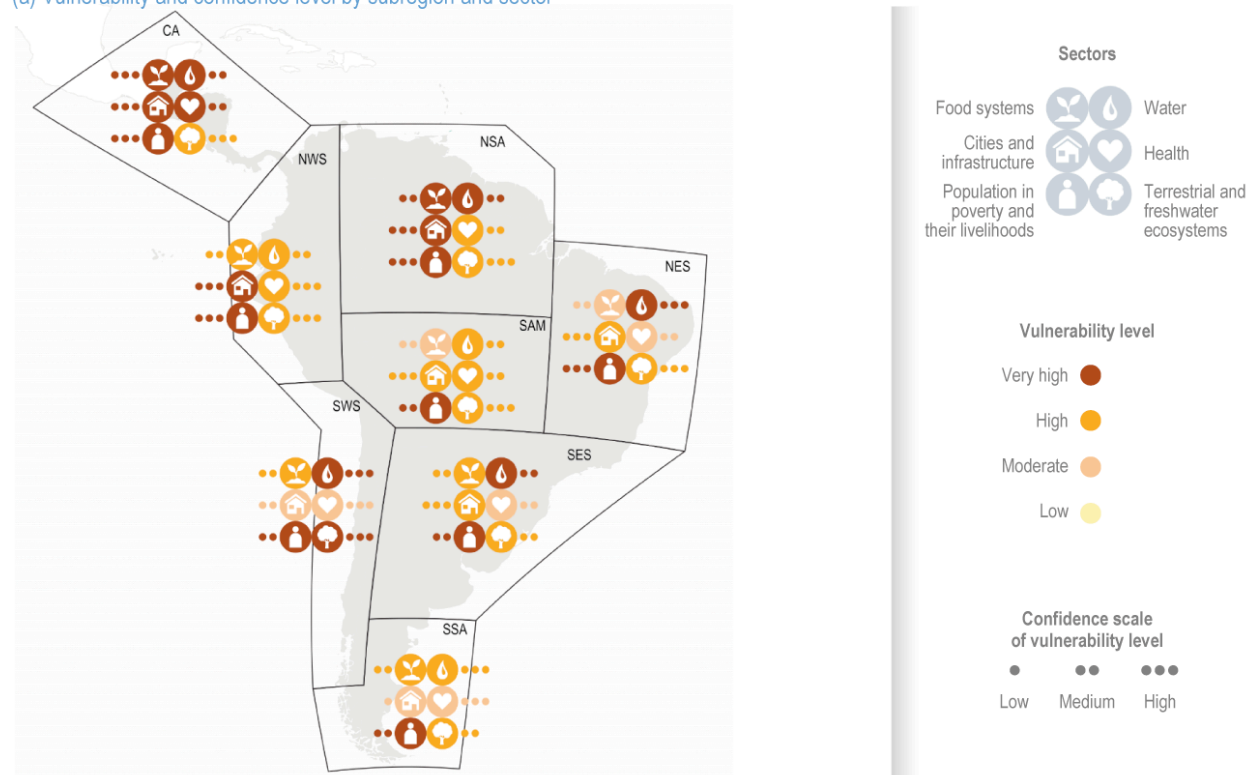
Observado:

Agricultura, agua y ciudades son los sectores más vulnerables al cambio climático

El cambio climático está generando las condiciones para aumentar la desigualdad y la pobreza en todas las subregiones de América Central y del Sur

Sectoral distribution of vulnerability to climate change for Central and South America

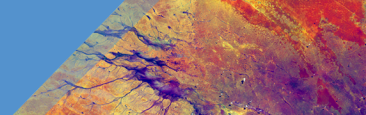
(a) Vulnerability and confidence level by subregion and sector



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ipcc
INTERGOVERNMENTAL PANEL ON climate change

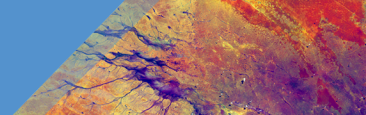


Observed and projected impacts for the subregions of Central and South America

		CA		NWS		NSA		SAM		NES		SES		SWS		SSA	
		Obs.	Proj.	Obs.	Proj.	Obs.	Proj.	Obs.	Proj.	Obs.	Proj.	Obs.	Proj.	Obs.	Proj.	Obs.	Proj.
Terrestrial and freshwater ecosystems and their services	Temperate forests	/	/	/	/	/	/	na	na	na	/	na	/	na	/	na	/
	Tropical forests	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Lakes, rivers and wetlands	na	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Grassland and savanna	/	/	/	/	/	/	na	na	na	na	na	na	na	na	na	na
	Deserts	/	/	na	na	/	/	na	na	na	/	/	na	na	na	/	/
	Mountains	●	●	●	●	●	●	na	na	na	na	na	na	na	na	na	na
Ocean and coastal ecosystems	Estuaries	na	na	na	na	na	/	/	/	na	na	na	na	na	na	na	na
	Mangroves	●	●	●	●	●	●	/	/	na	na	na	na	/	/	/	/
	Coral reefs	●	●	●	●	●	●	/	/	na	na	na	na	/	/	/	/
	Sandy beaches	na	na	na	na	na	na	/	/	na	na	na	na	na	na	na	na
	Kelp	/	/	na	na	/	/	/	/	na	na	na	na	na	na	na	na
	Rocky shores	na	na	na	na	na	na	/	/	na	na	na	na	na	na	na	na
	Saltmarshes	na	/	/	/	na	/	/	/	na	na	na	na	na	na	na	na
	Exclusive Economic Zones (EEZs)	●	●	●	●	●	●	/	/	na	na	na	na	na	na	na	na
Water	Cryosphere reservoir	/	/	●	●	/	/	/	/	/	/	●	●	●	●	●	●
	Aquifers and groundwater	na	●	●	●	na	na	na	na	na	na	na	na	na	na	na	na
	Stream flow	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Water quality	na	na	●	●	na	na	na	na	na	na	na	na	na	na	na	na
Food, fibre and other ecosystem products	Annual crop systems	●	●	●	●	na	na	na	na	na	na	na	na	na	na	na	na
	Livestock and pasture	●	●	●	●	na	na	na	na	na	na	na	na	na	na	na	na
	Permanent crops (fruit production)	●	●	●	●	na	na	na	na	na	na	na	na	na	na	na	na
	Forestry and wood production	●	●	●	●	na	na	na	na	na	na	na	na	na	na	na	na
	Fisheries and aquaculture systems	na	na	●	●	na	na	na	na	na	na	na	na	na	na	na	na
Cities and infrastructure	Urban land and built environment	●	●	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	Land Use	●	●	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Water supply, rainwater drainage and sewer infrastructure	Housing stock	●	●	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	Energy	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	Mobility and transport systems	●	●	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Health	Labor productivity	●	●	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	Morbidity	●	●	●	●	na	na	na	na	na	na	na	na	na	na	na	na
	Mortality	●	●	●	●	na	na	na	na	na	na	na	na	na	na	na	na
Poverty, livelihoods and sustainable development	Territory	●	●	●	●	na	na	na	na	na	na	na	na	na	na	na	na
	Livestock mortality	na	na	●	●	na	na	na	na	na	na	na	na	na	na	na	na
	Income	●	●	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Human dimension	Migration and displacement	●	●	●	●	na	na	na	na	na	na	na	na	na	na	na	na
	Conflicts	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Indigenous knowledge and local knowledge		●	●	●	●	na	na	na	na	na	na	na	na	na	na	na	na

Impact level Low ○ Medium ○ High ○ na = not assessed / = not applicable Central America (CA) • Northwest South America (NWS) • Northern South America (NSA) • South America (SAM) • Northeast South America (NES) • Southeast South America (SES) • Southern South America (SSA)

Confidence level: Observed impacts Low Medium High Projected impacts Low Medium High



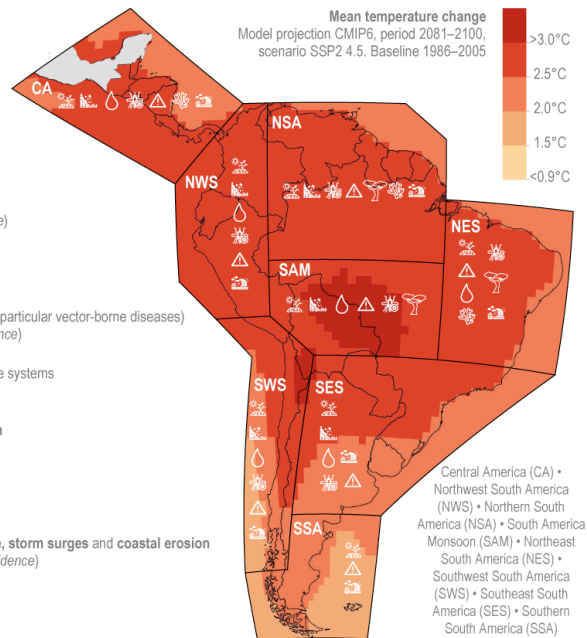
Riesgos clave

1. Seguridad Alimentaria por sequía
2. Vida e infraestructura por inundaciones y deslizamientos de tierra
3. Seguridad hídrica
4. Epidemias
5. Infraestructura y los servicios públicos
6. Cambios en los biomas del Amazonas
7. Blanqueamiento del coral
8. Comunidades y ecosistemas costeros a aumento del nivel del mar, tormentas y erosión costera

key risks by subregion in Central and South America

Key risks

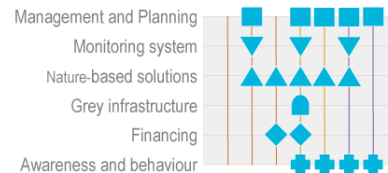
- (1) Risk of **food insecurity** due to frequent/extreme droughts
• Central and South America (*Medium confidence*)
- (2) Risk to life and infrastructure due to **floods and landslides**
• CA, NWS, NSA, SAM, SES, SWS (*Medium confidence*)
- (3) Risk of **water insecurity**
• CA, NWS, SAM, NES, SES, SWS (*High confidence*)
- (4) Risk of severe health effects due to increasing **epidemics** (in particular vector-borne diseases)
• CA, NWS, NSA, SAM, NES, SES, SWS (*High confidence*)
- (5) **Systemic risks** of surpassing infrastructure and public service systems
• Central and South America (*Medium confidence*)
- (6) Risk of large-scale changes and **biome shifts in the Amazon**
• NSA, SAM, NES (*Medium confidence*)
- (7) Risk to coral reef ecosystems due to **coral bleaching**
• CA, NSA, NES (*High confidence*)
- (8) Risk to coastal socio-ecological systems due to **sea level rise, storm surges and coastal erosion**
• CA, NWS, NSA, NES, SES, SWS, SSA (*Medium confidence*)



Adaptación a cambios en la disponibilidad de agua

- Mayoría de la evidencia viene de la literatura gris
- Estado muy previo (diseño e implementación)
- Algunos avances en la incorporación de NDCs, leyes de cambio climático.

(b) Adaptation

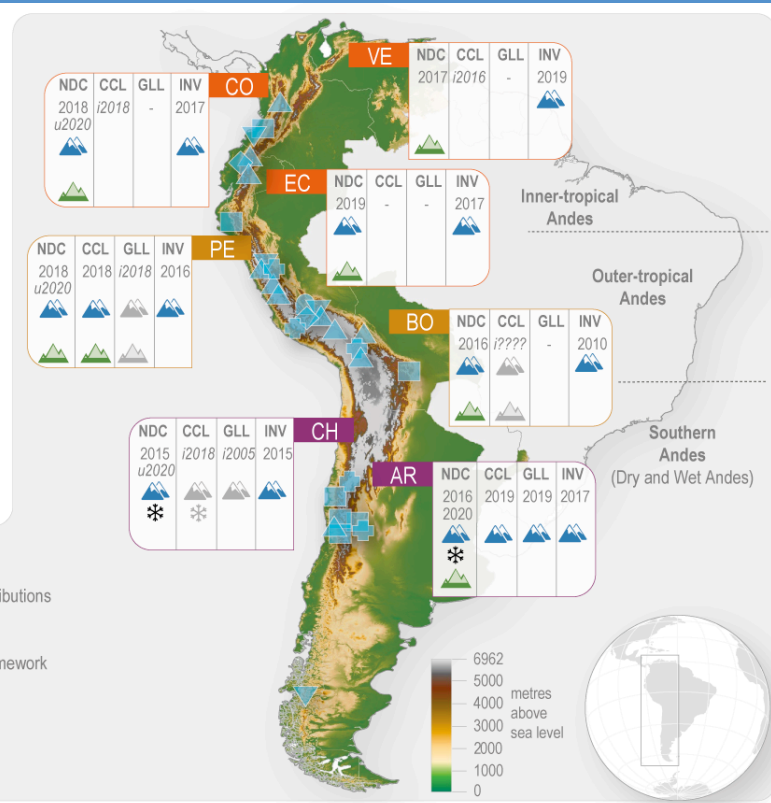


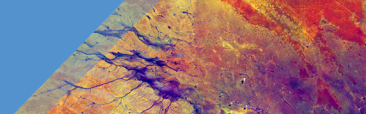
(c) Policies and inventory

NDC = Submission year(s) of Nationally Determined Contributions
 CCL = Climate change law
 GLL = Glacier law
 INV = Last national glacier inventory

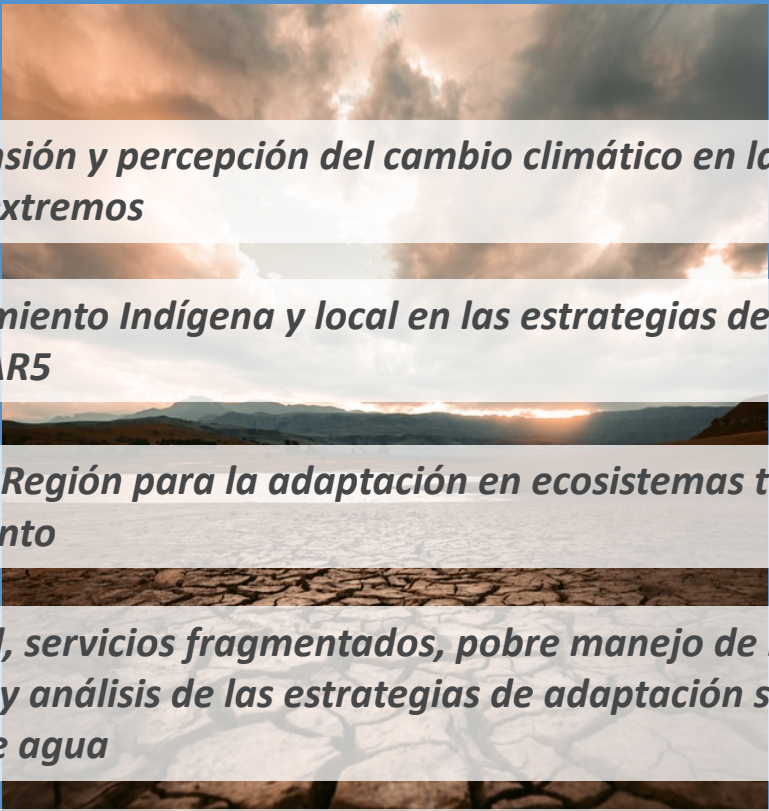
Glaciers
 Snow
 Mountain ecosystems
 Grey colour = not come into force

u = update
i = initialized framework





Adaptación



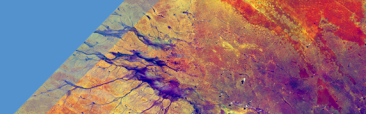
Existe una mejor comprensión y percepción del cambio climático en la Región a consecuencia del aumento de eventos extremos

La integración del conocimiento Indígena y local en las estrategias de adaptación han incrementando desde el AR5

La principal barrera en la Región para la adaptación en ecosistemas terrestres, acuáticos y marinos es el financiamiento

Inestabilidad institucional, servicios fragmentados, pobre manejo de los recursos hídricos, falta de datos, y un monitoreo y análisis de las estrategias de adaptación son barreras para abordar los desafíos en materia de agua

Desigualdad, pobreza e informalidad modulan el funcionamiento de las ciudades que limitan la adaptación e incrementan las vulnerabilidades existentes

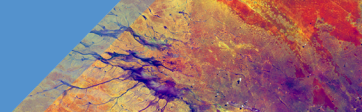


Adaptación en agricultura

Author, year	Countries	Crop systems	Adaptation strategies	Main drivers promoting climate change adaptation	Main drivers limiting climate change adaptation	Main barriers detected
de Souza Filho, 2021	Brazil	Cattle farmers	Integrated crop-livestock and livestock-forestry systems	Credit access Extension services	Lack of resources	Lack of agricultural market access strategies
Magalhaes, 2021	Brazil	Several crops	Farm management	Previous experience with risks	Inadequate infrastructure Low purchasing power	Infrastructure limiting opportunities
Carrer, 2020	Brazil	Several crops	Agricultural insurance	Schooling Technical assistance	High risk propensity	Limited financial market access
Quiroga, 2020	Nicaragua	Coffee	Several adaptation measures	Farm size Awareness of climate change Schooling	Limited access to rainwater	Absence of climate change education
Bro, 2019	Nicaragua	Coffee	Crop Soil and water	Schooling Participation in cooperatives Radio	Household size	Institutional framework to promote cooperatives
Leroy, 2019	Venezuela and Colombia	Several crops in high altitudes	Irrigation management	Perception of water scarcity Local knowledge	Degradation of fragile areas	Ineffectiveness of local institutions
Cherubin, 2019	Colombia	Several crops and pasture	Agroforestry systems	Improving soil quality and biota	Degradation of conventional pasture	Lack of crop diversification
Harvey, 2018	Costa Rica, Honduras and Guatemala	Coffee, beans and maize	Several adaptation practices	Awareness of climate change	Affordability of adaptation practices	Lack of adaptation involving agroecological and socioeconomic contexts
Chen, 2018	Costa Rica and Nicaragua	Several crops	Intensification and diversification	Access to weather information Participation in organizations Credit access Farming experience	Land renting	Lack of crop and practices diversification

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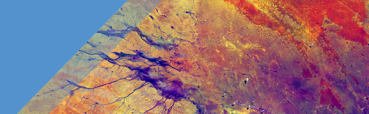


Adaptación en agricultura

Authors, year	Countries	Crop systems	Adaptation strategies	Main drivers promoting climate change adaptation	Main drivers limiting climate change adaptation	Main barriers detected
Vidal Merino, 2019	Peru	Several crops	Water management	Farm size Capital Irrigated proportion	Limited access to off-farm activities Small cultivated area	Lack of site-specific design of interventions
Meldrum, 2018	Bolivia	Potato, quinoa and others	Diversification of crop portfolio	Weather information	Loss to traditional knowledge	Lack of resilience and actions to expand and maintain variety portfolio
Lan, 2018	Nicaragua	Cocoa	Crop management	Schooling Household size Farm size	Lack of income	Income inequality Gaps of profitability of practices Benefits of practices depends on its costs
Kongsager, 2017	Belize	Maize	Alley cropping	Schooling	Land tenure Market distance Degradation of fragile areas	Lack of land tenure Lack of market access Lack of trust
Schembergue, 2017	Brazil	Several crops	Agroforestry systems	Financing Presence of associations Credit access	High potential for agriculture Lack of climate information	Adaptation conditioned by agricultural, socioeconomic and climatic conditions
Harvey, 2017	Guatemala, Honduras and Costa Rica	Coffee and maize	Ecosystem based adaptation	Schooling Age Farming experience Access to technological support	Lack of land tenure	Lack of access to training and finance
Roco, 2016	Chile	Several crops	Water management	Farm size Access to weather information	Locations Age	Lack of availability and access to climate change information
Mussetta, 2015	Argentina	Vine and others	Crop and water management	Organization of producers Labor availability Knowledge and information access Technology access	Water allocation system	Lack of water management and distribution strategies

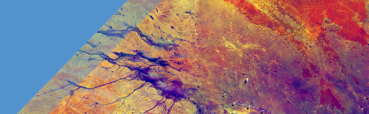
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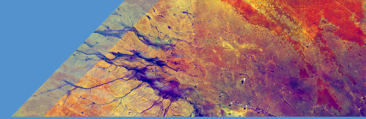
Adaptación en Salud

Hazard and impacts on human health	Examples of adaptation strategies		
	Public	Private	Communal
Extreme heat and cold: deaths / illness by thermal stress	• Creation of urban green spaces/ • Health promotion campaigns. • Establish shelters during heat waves • Technology transfer for home heating	• Cooling by swamp coolers, air conditioning, open windows, wet the floors, shade trees. • Bioclimatic building design	• Training of community health volunteers to recognize and treat heat strain.
Extreme rainfall, wildfire, wind speed: injury / deaths from floods, storms, cyclones, bushfires and landslides	• Early warning systems (EWS) for extreme climate events. • Safe housing programs and relocation • Green-grey infrastructure (e.g., channels, drainage systems)	• Green-grey infrastructure to prevent landslides. • Insurance mechanisms and financing for long-term recovery.	• Communal efforts to clear debris from canals to reduce flood risk • Cooperative efforts to rebuild following a flood event
Drought and dryness: poor nutrition due to reduced food yields and dehydration due to limited or inadequate management of freshwater	• Formalizing land ownership for small farmers and Indigenous people. • Address emerging water conflicts.	• Water infrastructure and irrigation. • Soil moisture retention techniques • Insurance mechanisms. • Selection of drought resistant crops.	• Incorporation of local stakeholders in formulating adaptation responses. • Recognition of Indigenous and local wisdom and knowledge.
Changes in climate that promote microbial proliferation: food poisoning, and unsafe drinking water	• Restoration of watersheds • Integrated health-climate surveillance • Improve access to drinking water, drainage, sanitation and waste removal.	• Water disinfection: boiling, chlorination. • Purchasing water or water filters.	• Participatory water management strategies, including protection of drinking water sources.
Changes in climate that affect vector-pathogen host relations and infectious disease geography/seasonality	• Vector control • EWS for epidemics • Nature-based solutions (NbS) (e.g., forest conservation)	• Use of bed nets and screens • Use of repellent and insecticides. • Elimination of standing water.	• Community volunteers to collect blood smears for malaria diagnosis • Community-led elimination of vector habitat.
Sea level rise and storm surges: impaired crop, livestock and fisheries yields; unsafe drinking water, leading to impaired nutrition	• Improve governance of water utilities. • Address emerging water conflicts. • Protection, restoration and soil conservation to recharge aquifers.	• Improve water efficiency in agriculture.	• Incorporation of local stakeholders in formulating adaptation responses. • Recognition of Indigenous and local wisdom and knowledge.
Environmental degradation: loss of livelihoods and displacement leading to poverty and adverse health outcomes.	• Long-term risk management planning for cities. • Sustainable forestry programs. • Protection and restoration of lacustrine areas.	• Identification of alternative livelihoods.	• Community-led efforts to reforest and restore/protect watersheds.



Factibilidad de la adaptación

System	Adaptation option	Evidence	Agreement	Dimension assessed					
				Economic	Technological	Institutional	Social	Environmental	Geophysical
Food, fibre and other ecosystem products	Agroforestry	Medium	High	Insignificant barriers	Mixed effect	Significant barriers	Mixed effect	Insignificant barriers	Mixed effect
Health and wellbeing	Early warning systems	Robust	High	Insignificant barriers	Mixed effect	Significant barriers	Mixed effect	Insignificant barriers	Mixed effect
Water	Multi-use of water storage approaches	Robust	Medium	Insignificant barriers	Mixed effect	Mixed effect	Mixed effect	Mixed effect	Insignificant barriers
Freshwater and terrestrial ecosystems	Ecosystem-based adaptation (EbA)	Medium	High	Insignificant barriers	Mixed effect	Mixed effect	Insignificant barriers	Insignificant barriers	Insignificant barriers



Brechas de conocimiento

Datos (heterogéneos en calidad y cantidad y en geografía, mala resolución) que limitan el entendimiento y la atribución

Limitado número de estudios de percepción al cambio climático sobre todo en sectores rurales lo que impide los procesos de toma de decisiones y la implementación de medidas de adaptación

Gran número de estudios abordan el estudio de la vulnerabilidad bajo el concepto del AR4 y no el AR5 que separa la exposición de la vulnerabilidad

Limitado número de estudios abordando riesgos y sus promotores

Falta de estudios que abordan los límites de la adaptación

Falta de estudios que abordan la relación entre cambio climático y procesos socioeconómicos

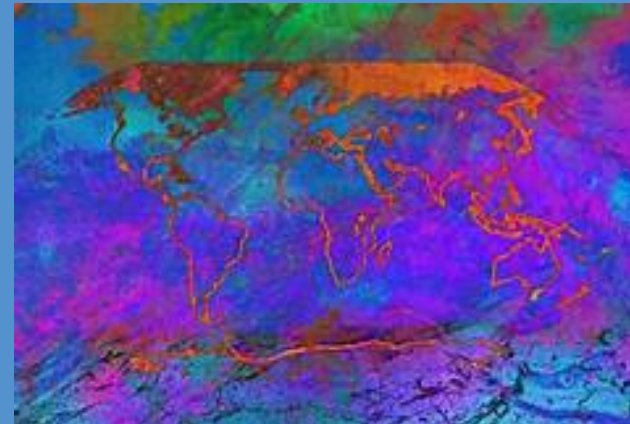
Limitado conocimiento sobre que factores socioeconómicos modulan la vulnerabilidad y la capacidad adaptativa

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Working Group II – Impacts, Adaptation and Vulnerability

Las medidas de adaptación, si se seleccionan cuidadosamente teniendo en cuenta los sistemas humanos y ambientales acoplados, proporcionarán contribuciones significativas al desarrollo sostenible de la región si se implementan considerando estrategias integrales para reducir pobreza, desigualdad y riesgos.

La adaptación y la construcción de resiliencia ofrecen no solo una oportunidad para reducir los impactos del cambio climático, sino también la oportunidad de reducir la desigualdad y las brechas de desarrollo, lograr economías dinámicas y regular el uso sostenible y la transformación del territorio.



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Working Group II – Impacts, Adaptation and Vulnerability

¡Gracias por su atención!

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