



First National Communication to the UNFCCC



Colombia

**First National Communication to the
United Nations Framework Convention
on Climate Change**



República de Colombia



The UN Framework Convention on Climate Change

Adoption: UNFCCC adopted in 1992 during the Earth Summit at Rio. Became effective in 1994

States-Parties: 186 states have ratified the UNFCCC so far. Colombia did so in 1994

Objective: To stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to:

- Allow for ecosystems to adapt naturally to climate change
- Ensure that food production will not be threatened
- Allow economic development to proceed in a sustainable manner

Commitments: Among the commitments made is the preparation of National Communications.



First National Communication of Colombia

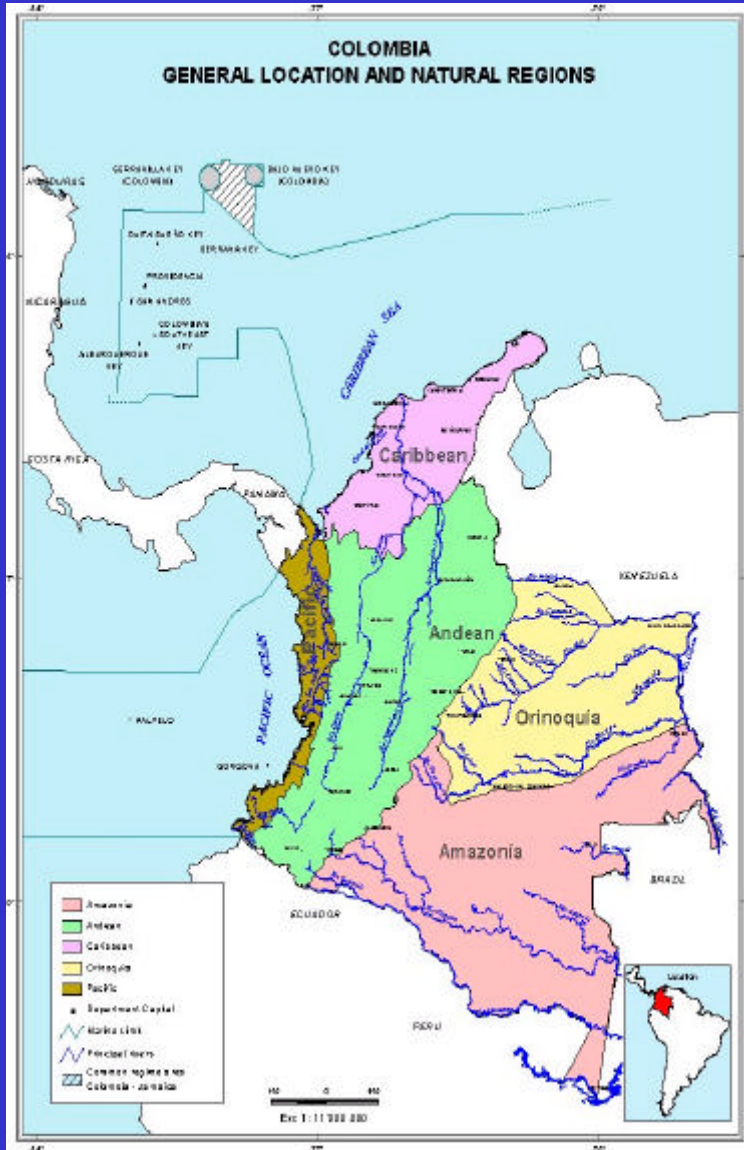
- ➔ **Introduction**
- ➔ **Executive summary**
- ➔ **National Circumstances**
- ➔ **National Inventory of Greenhouse Gases (GHG) sources and sinks-1990 and 1994**
 - ✓ Five sectors: Energy, Industrial Processes, Agriculture, Land Use Change and Forestry (LUCF) and Waste.
 - ✓ Reports the national emissions of direct GHG (CO₂, CH₄, N₂O), indirect GHG (CO, NO_x, NMVOC); SO₂ (aerosol precursor) and the capture of CO₂ by the LUCF sector.
 - ✓ In order to determine the direct aggregate effect of the various GHG on climate change (Global Warming Potential), emissions were also expressed in terms of CO₂ equivalent.
- ➔ **Actions to mitigate GHG emissions (1994-2000).**
- ➔ **Vulnerability and means of adaptation to the effects of global climate change in:** coastal zones, water resources, high plateau zones, glaciers and other ecosystems, soils and land affected by desertification, vegetation covers, agricultural sector and communities affected by dengue and malaria.
- ➔ **Technical, financial constraints and recommendations**
 - ✓ Methodological problems due to the use of the IPCC directives
 - ✓ Problems in obtaining information.
 - ✓ Recommendations for technical and financial support in the framework of future National Communications.



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Colombia: National Circumstances



AREA AND REGIONS: 2'070.408 Km² (1'141.748 Km² continental land mass and 958.660 Km² territorial waters). Fourth largest country in South America and the only one with Caribbean and Pacific Coasts. Five main natural regions on the mainland: Caribbean, Andean, Pacific, Orinoquia and Amazonia

CLIMATE: The greater part of the country enjoys an annual average of 24-28°C

PRODUCTION OF WATER

Magdalena-Cauca basins and basins draining into the Caribbean: 25% of annual water production in the country (95% of water used in production and domestic activities).

Pacific Region: Runoff of 4000-12000 mm/year and > 14000mm/year in some areas.

Areas suffering from excessive deficits (200-500mm/year): Guajira, San Andres and Providencia Islands, Cesar. The Sabana de Bogota is the most critical (low natural offer of 500 mm/year and the greatest population pressure in the country)



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Colombia- National Circumstances

Population

- 42 million: third largest in America
- Andean Region (65%); Caribbean Region (20%); Pacific Region (11%); Amazonia and Orinoquia (4%)
- 71% in urban areas. Urban population is not only concentrated in the country's capital Bogota (15%) but is widely distributed among various cities: Cali and Medellín, with nearly 2 million each, and Barranquilla with over a million people. These four cities combined account for about 30% of the total.
- Colombian cities' inhabitants experienced a large increase from 57% of the total population in 1970 to 71% in 2000.
- 90% of the population is under age 50

Colombia's average GDP growth 1991-2000: 2.6%

- Regional GDP Structure (year 2000): Andean (74%), Caribbean (15,61%), Pacific (3.5%)

Structure of the real GDP (1999)

- Trade and services sectors (50%), agriculture, livestock and mining activities (22%), manufacturing (13%), construction (4.21%)



National Inventory of GHG -1990 and 1994 (Gg)

TOTAL EMISSIONS OF GHG AND OTHER GASES -1990 (Gg)

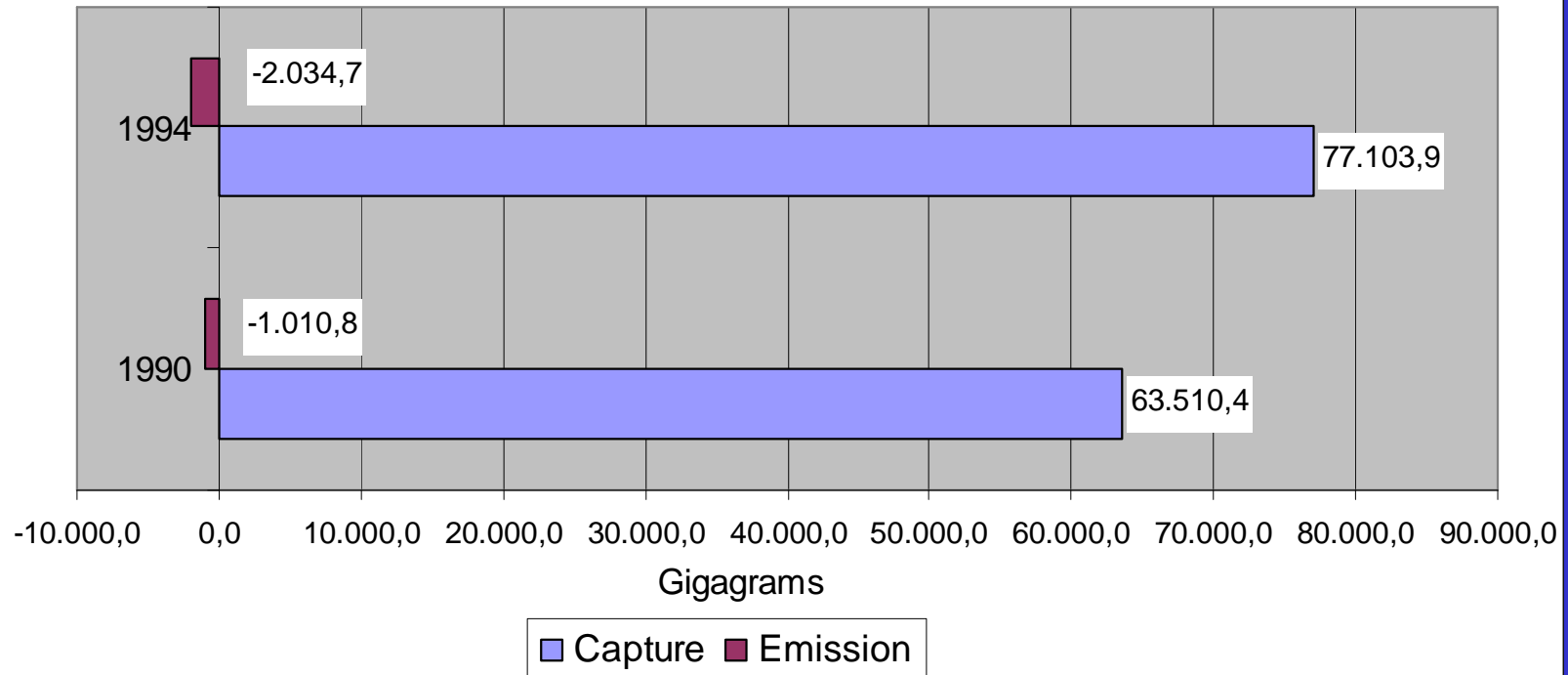
Sectors	Direct Greenhouse Gases			Other Gases			
	CO ₂	CH ₄	N ₂ O	CO	NO _x	NMVOC	SO ₂
Energy	46.886,1	268,3	1,3	2.602,5	249,9	394,4	135,5
Industrial Processes	4.744,5	0,2	0,2	2,4	0,9	25,3	6,3
Agriculture		1.517,2	76,0	2.184,9	44,0		
Land Use Change and Forestry	11.879,8	4,2	0,03	37,0	1,05		
Waste		173,9	1,9				
Total Country (Gg)	63.510,4	1.963,9	79,4	4.826,7	295,9	419,7	141,8

TOTAL EMISSIONS OF GHG AND OTHER GASES -1994 (Gg)

Sectors	Direct Greenhouse Gases			Other Gases			
	CO ₂	CH ₄	N ₂ O	CO	NO _x	NMVOC	SO ₂
Energy	55.351,7	284,4	1,5	2.874,5	289,48	423,57	162,45
Industrial Processes	5.212,3	0,4	0,3	2,9	1,1	29,8	7,8
Agriculture		1.634,3	87,5	2.178,0	43,8		
Land Use Change and Forestry	16.540,0	4,2	0,03	37,0	1,05		
Waste		193,4	2,0				
Total Country (Gg)	77.103,9	2.116,7	91,3	5.092,3	335,4	453,3	170,2

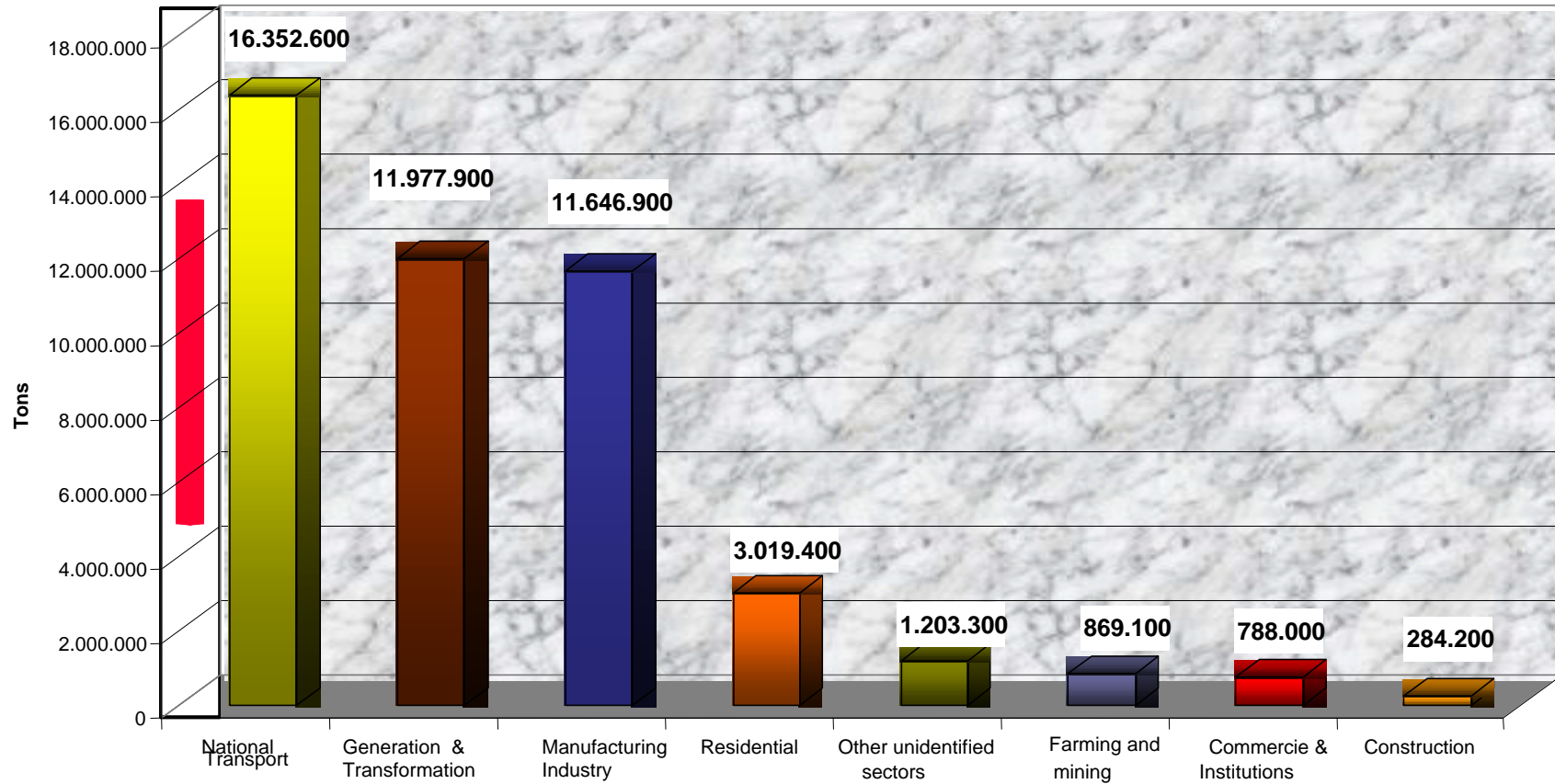
National inventory: Balance in Gigagrams

Aggregate Balance of CO₂ Emissions and Capture



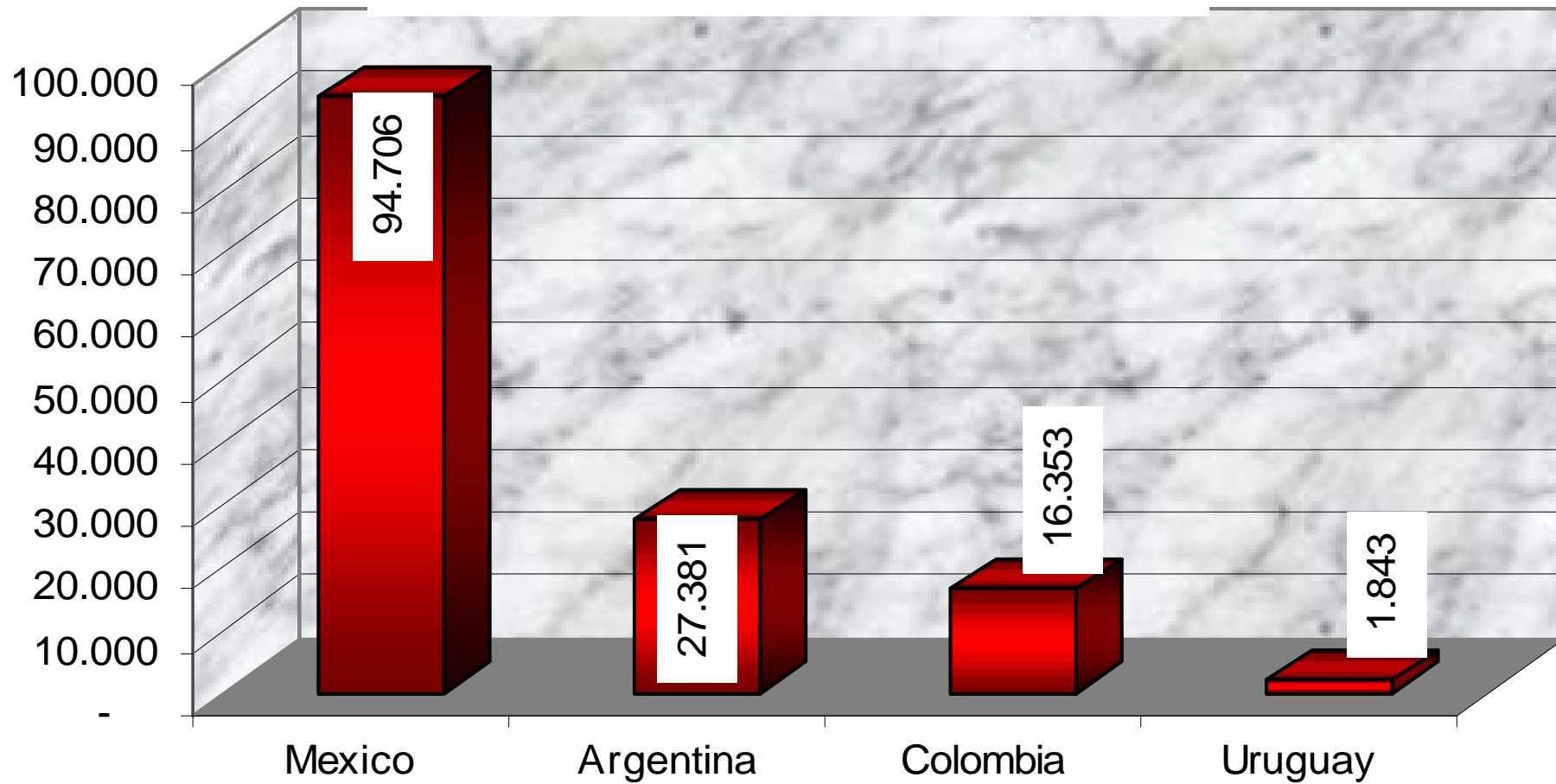
National Inventory: CO₂ Emissions of the Energy Sector (Tons)

SECTOR EMISSIONS OF CO₂ (1990)



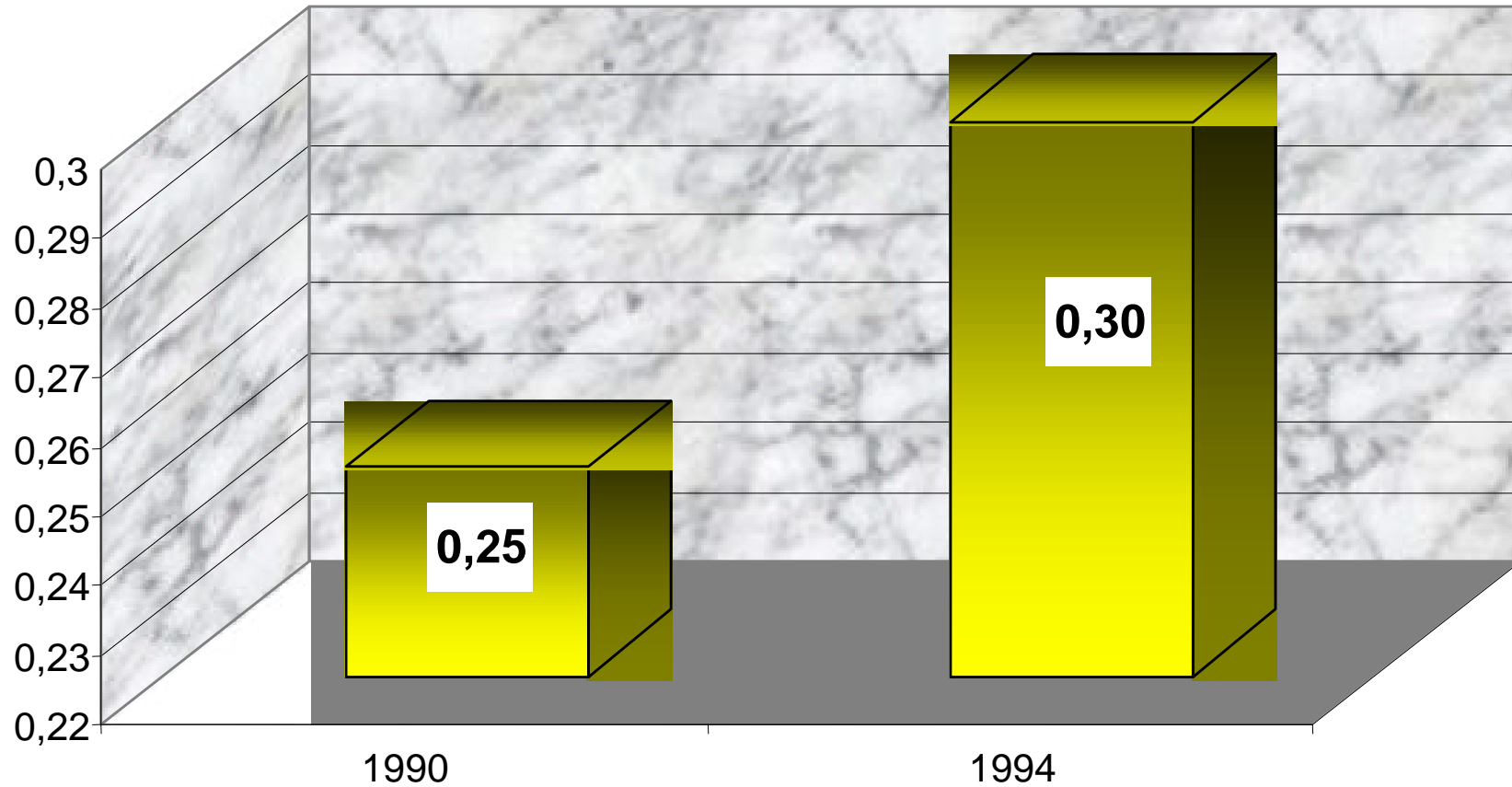
National Inventory: Transport Sector Emissions.

CO₂ emisisions by transport (000 tons)
1990



National inventory

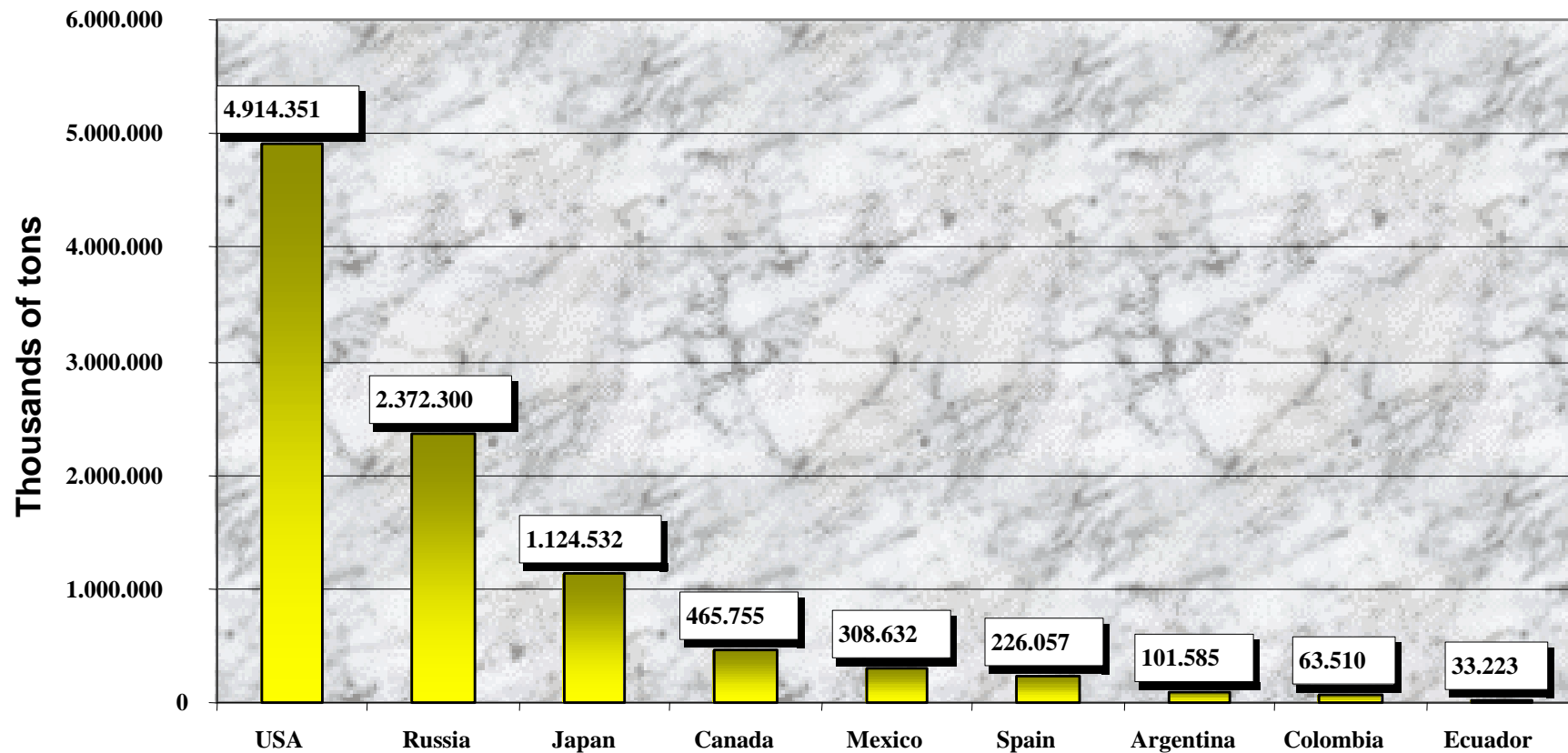
Colombia's Share of World Emissions of CO₂



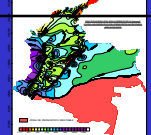
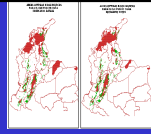
National inventory

Comparison of Global CO₂ Emissions

Total National Emissions of CO₂ -1990 (Gg)



Colombia Vulnerability to Climate Change

	Vulnerability of Coastal and Island Zones
	Vulnerability of Glacier zones
	Vulnerability of Soils and Land in process of Desertification
	Vulnerability of Water Resources
	Vulnerability of Ecosystems
	Vulnerability of Agriculture
	Vulnerabilidad of Human Health



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Climate Change Scenarios for the Vulnerability Assessment

Climate Change Scenarios used for the Vulnerability Assessment in the National Communication:

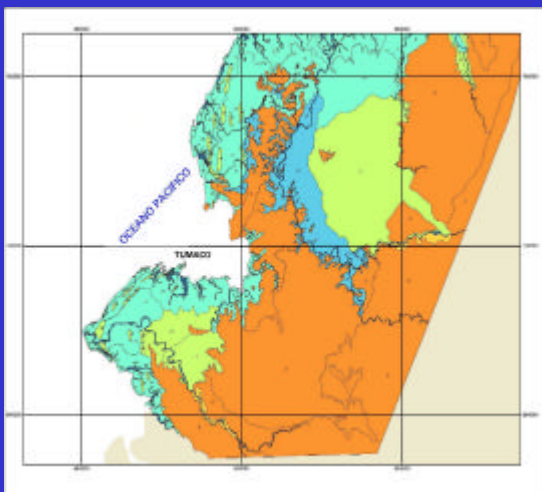
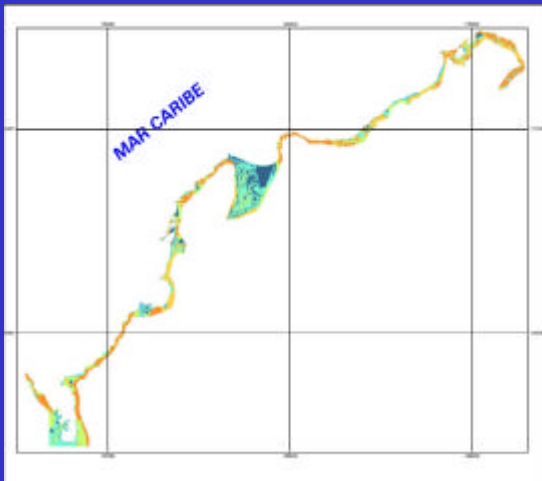
- **Sea Level Rise**: A sea level rise of 0.8-1 meter by the year 2100 was projected for the Caribbean and Pacific Coast of Colombia
- **Air Temperature**: Increase of the mean annual temperature of 1-2 °C over the period 2050-2060
- **Precipitation**: Changes of $\pm 15\%$ in annual precipitation patterns observed over the period 1961-1990 are likely to occur in the different regions of the country.



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Vulnerability of the Colombian Coastal Zone to the Sea Level Rise

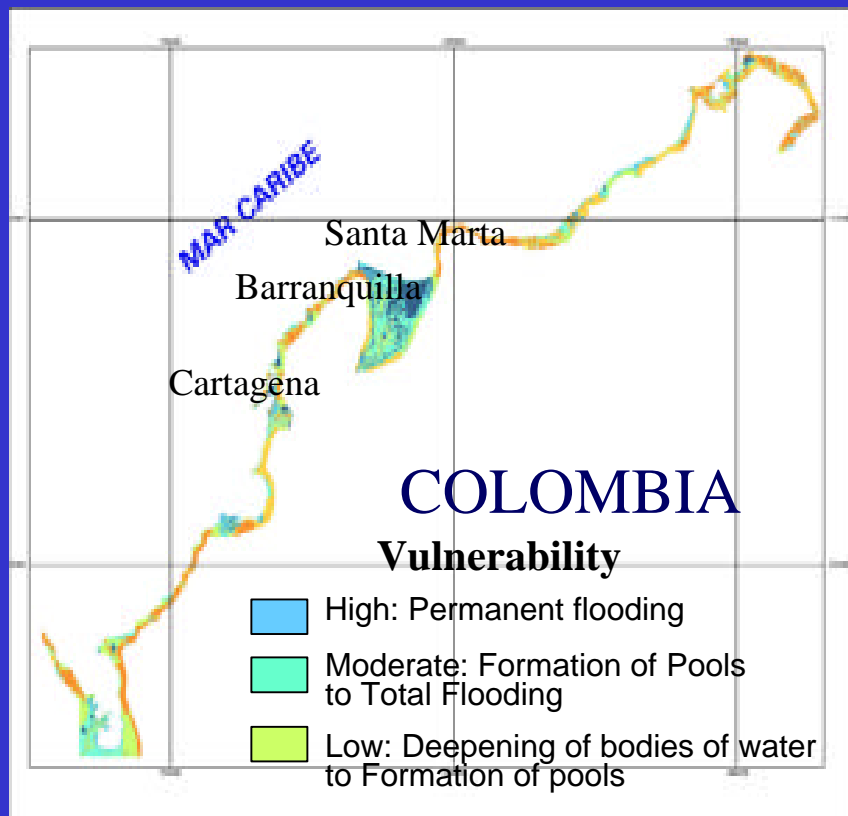


➤ 4.900 km² of lying coast would be affected by permanent flooding

➤ Natural systems (beaches, coast swamps by marshers and mangroves) would be the worst affected by erosion and coastal flooding

➤ 1.4 million people (4% of the national total) live in the coastal area (Caribbean and Pacific) which would be affected by sea level rise, 85% of them live in urban areas

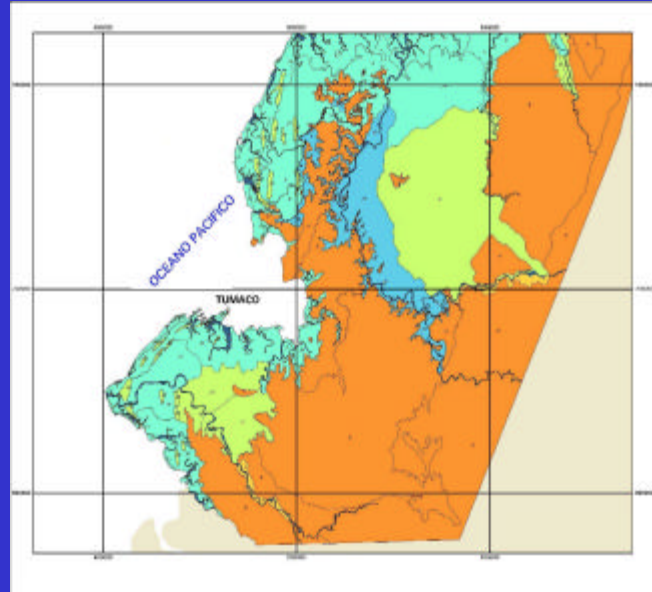
Vulnerability of the Caribbean Coastal Zone



- **56%** of the population would be affected by flooding
- **9%** of urban households and **28%** of rural households would be highly vulnerable to flooding
- **4.9%** of the agriculture area would be exposed to different degrees of flooding, **49.5%** of which would be highly vulnerable (banana **39.2%**; african palm **9.7%**; transient tradable crops **6.8%**)

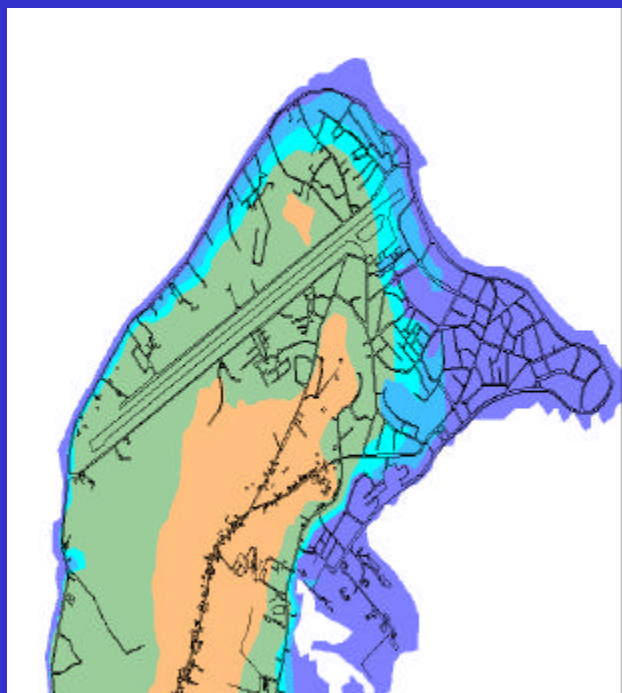
- **The industrial area would be highly vulnerable to flooding: 75.3% in Barranquilla and 99.7% in Cartagena**
- **44.8%** of the road infrastructure would be highly vulnerable to flooding

Vulnerability of the Colombian Pacific Coast to the Sea Level Rise

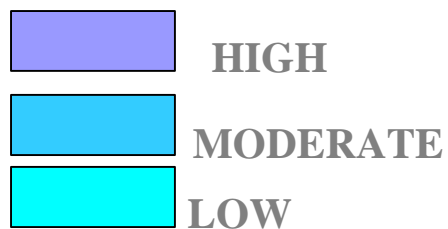


- 13% of households are highly vulnerable and 62% are moderately vulnerable.
- 48% of households in urban areas and 87% of households in rural areas would be highly vulnerable
- Buenaventura (main commercial port in the Pacific coast), Tumaco y Satinga would be highly vulnerable

Vulnerability of San Andres Islands

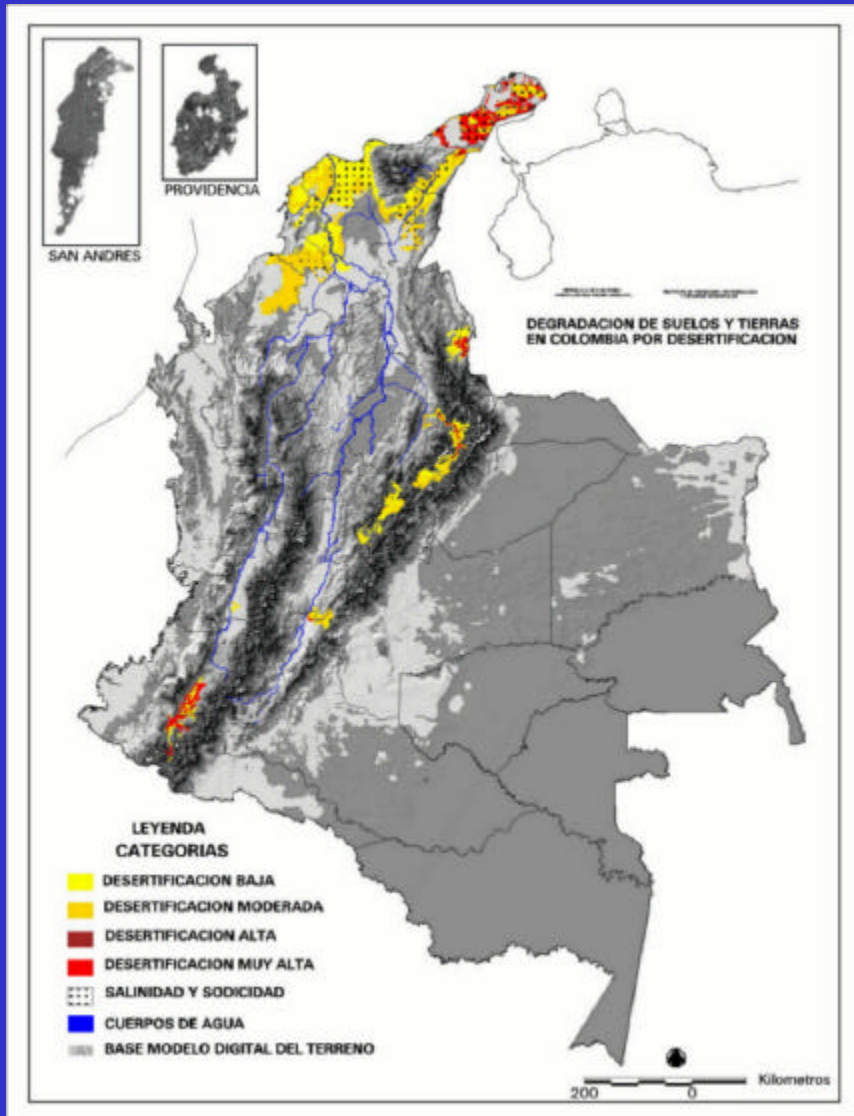


THREAT



- The total area of the island of San Andres could be reduced by 17%
- Most affected zones by inundation: those containing the richest of the island's natural resources and areas where the tourism industry and commerce are established. The high vulnerability of these zones is due to the presence of infills which were built over in the 1950s.
- The public service infrastructure would be affected, particularly the sewerage system, water supplies and roads.
- Current processes of erosion would increase

Vulnerability of soils and land affected by desertification

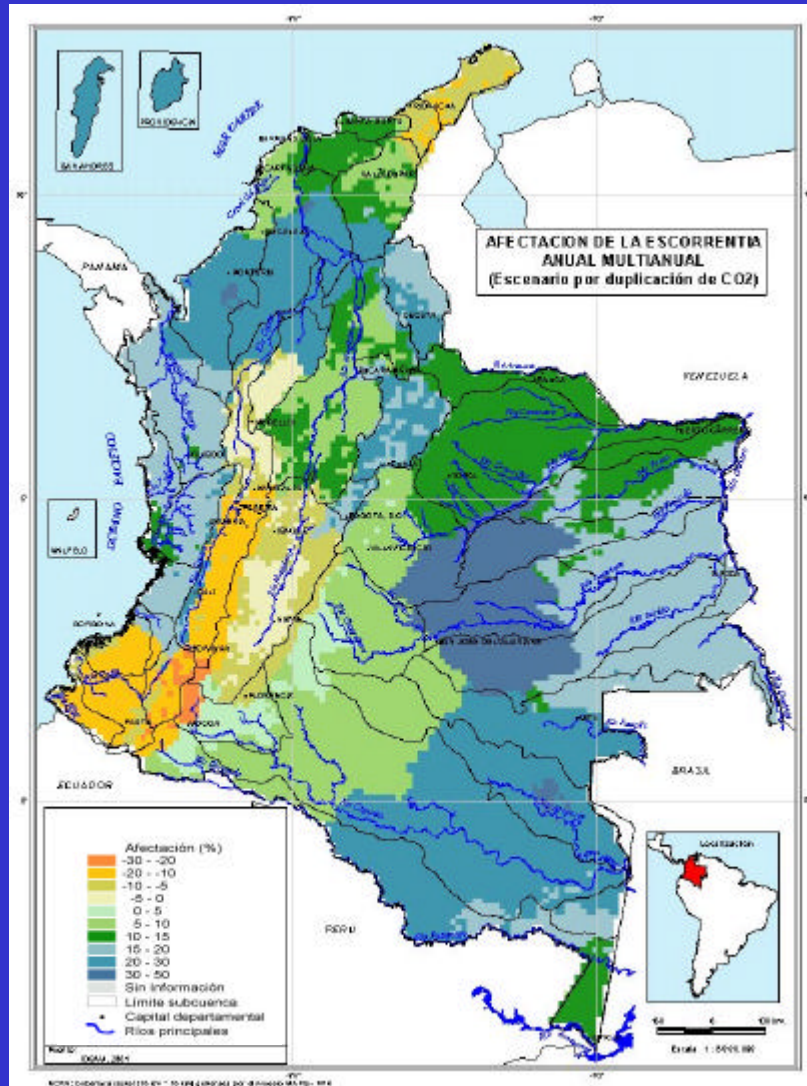


- Area currently affected by desertification : 4'828.875 Hectares (representing 4.1% of national territory)
- Area potentially desertified by climate change: 3.6 million Hectares
- With climate change desertified land and soils could cover 8% of the country (Caribbean plains, Andean valleys, Cundinamarca-Boyaca plateau, Nariño) including the main development poles (agriculture, livestock breeding, mining, urban and transport)

Vulnerability of the hydrological regime

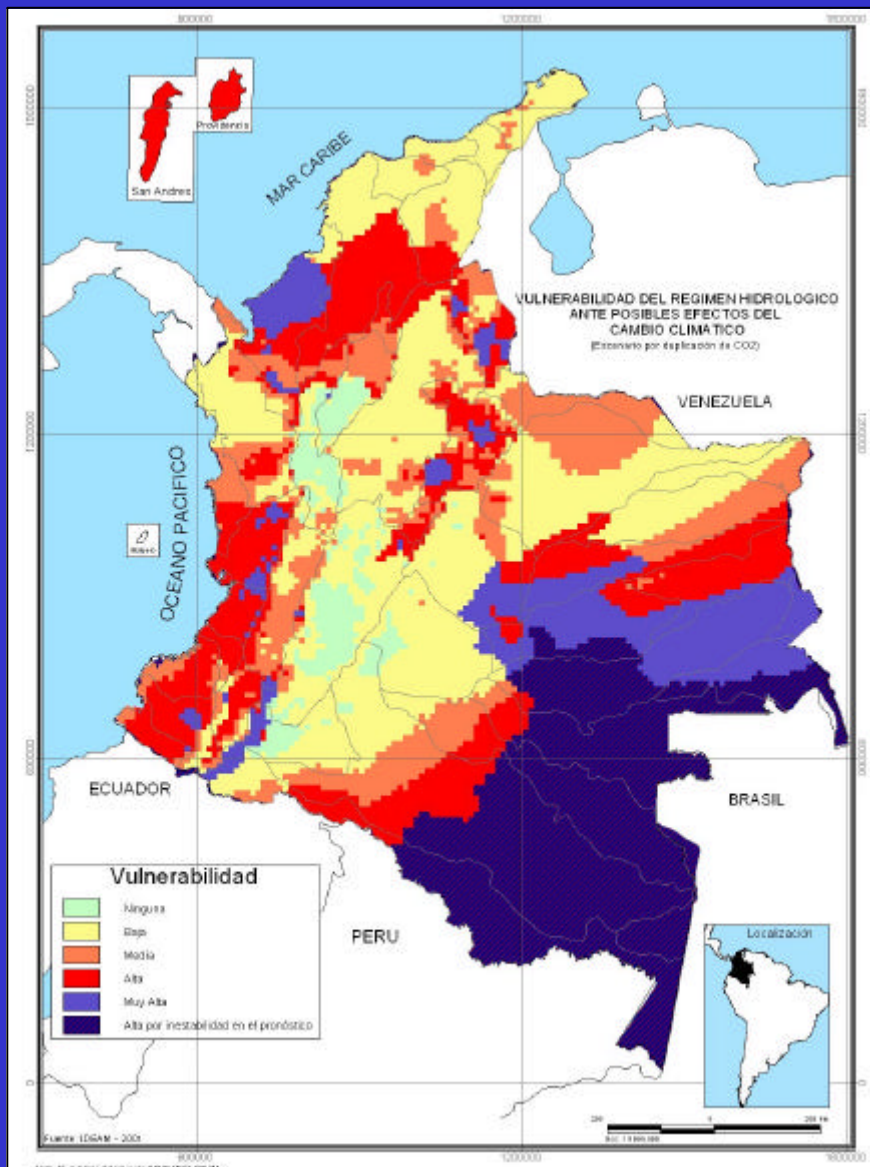
Effects of climate change on the hydrological regime:

- In some areas, there would be an increase in levels of runoff norma, where distribution over time will be more uniform.
- In other areas, there would be a decrease in levels of runoff norma, where distribution over time would be much more varied.

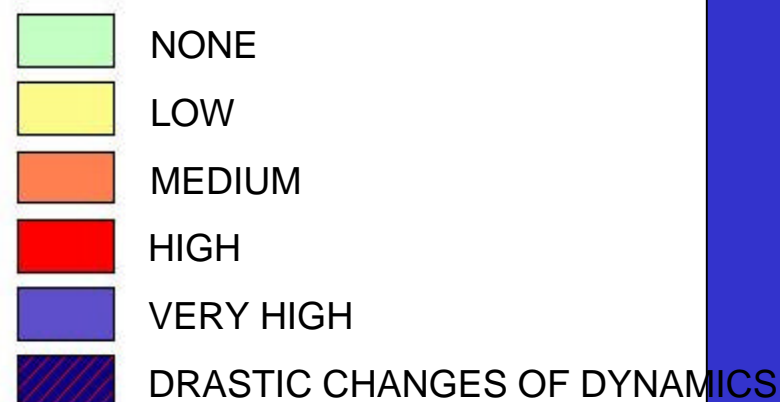


Vulnerability of the hydrological regime

- 50 % of the country would be affected to a high/very high degree by the magnitude of the changes in runoff norma or by complete changes in the functioning of the entire hydrological regime
- There would be drastic changes to the hydrological regime in the Amazon basin.



VULNERABILITY TO CLIMATE CHANGE (REDUCTION OR INCREASE) IN WATER SUPPLY



Vulnerability of high mountain ecosystems



Vegetation	PRESENT CLIMATE (1 x CO ₂)	FUTURE CLIMATE (2 x CO ₂)	DIFFERENCE BETWEEN FUTURE AND PRESENT CLIMATES (2 x CO ₂ - 1 x CO ₂)	
	Hectares	Hectares	Hectares	Change (%)
Páramo	323.000	84.830	-238.170	-75
Superpáramo	40.500	6.000	-34.500	-85
Glacier zones	45.500	1800	-43.700	-95



Vulnerability of the Agricultural Sector

PARAMETERS	CURRENT SCENARIO	FUTURE SCENARIO* 2 x CO ₂
BIOCLIMATIC RANGES WITH HIGH SOIL OFFER		
COLD, VERY HUMID (Hectares)	361021	191854 (-46.9%)
COLD, RAINY (Hectares)	92240	49767 (-46.0%)
PARAMO, VERY HUMID (Hectares)	55366	27405 (-50.5%)
INTENSIVE AGRICULTURE SOILS AFFECTED BY DESERTIFICATION IN DRY ZONES		Increase of 1.4%
BANANA, PALM OIL AND SUGAR CANE PLANTATION AREAS SUSCEPTIBLE TO DESERTIFICATION		Increase of 3.0%
IRRIGATION DISTRICTS		
NUMBER OF DISTRICTS IN DESERTIFICATION AREAS	15	23
IRRIGATION DISTRICT AREAS WITH DESERTIFICATION	32.2%	91.3%

Vulnerability of human health to climate change



➤ The zones most vulnerable to malaria after climate change would cover all municipalities in Choco and Guaviare, some of Putumayo, Caquetá, Amazonas, Meta, Vichada, Vaupés, Guainia, Arauca, the Pacific watershed of the Departments of Nariño, Cauca and Valle, Urabá-Antioquia, southern Guajira, Catatumbo the lower Magdalena, lower Cauca, Nechi, upper San Jorge and upper Sinú.

➤ Experts agree that the areas most vulnerable to dengue would be those where it is now most prevalent: Santander, Norte de Santander, Tolima, Huila, Atlántico and Valle del Cauca.

Measures for adaptation

- Actions in the integrated management plan for coastal areas should be strengthened.
- For páramo ecosystems, action should be designed to restrict the spread of agricultural activities in high mountain areas.
- In the health sector, health services need to be strengthened in zones identified as vulnerable.
- The sensitivity of producers to changes in the water offer should be reduced.

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ACTION REQUIRED: TECHNICAL

- Measures should be defined to adapt ecosystems and human health to the adverse effects of climate change. Measures should be defined to mitigate GEI gases through a national mitigation strategy.
- This first National Communication will be the basis for presentation of two projects to GEF. The first refers to the vulnerability of the agricultural sector to the effects of climate change. The second refers to the vulnerability and measures to be taken by the Colombian Caribbean islands to adapt to the effects of climate change.

PFIRST NATIONAL COMMUNICATION: COLOMBIA

ACTION TO BE TAKEN: POLITICAL

- This First National Communication will be the basis for the structuring of a national climate change policy
- An inter-institutional working agenda for climate change should be drawn up in order to avoid duplication of effort and to present a single national and international position
- Institutional capacity should be technically and financially strengthened in order to ensure that future National Communications are correctly prepared.



INSTITUTIONS CONSULTED

Ministry of the Environment
Ministry of Mines and Energy
Ministry of Transport
Ministry of Agriculture
Ministry of Health
Ministry of Development
Ministry of Foreign Trade
Superintendency of Public Services
Regional Development Corporations CARs
Asociación de Corporaciones Autónomas Regionales
Asociación Nacional de Industriales -ANDI
Asociación Colombiana de Reforestadores -ACOFORE
Asociación de Cultivadores de Caña de Azúcar -ASOCAÑA
Centro de Estudios Ganaderos -CEGA
Centro de Estudios para la Investigación de la Caña de Azúcar
Centro de Investigaciones del Café - CENICAFE
Centro de Investigaciones en Palma de Aceite -CENIPALMA
Centro Internacional de Agricultura Tropical -CIAT
Corporación Nacional de Investigación Forestal -CONIF
Departamento Nacional de Estadística - DANE
Departamento Nacional de Planeación – DNP
Instituto Nacional de Salud
Instituto Geográfico Agustín Codazzi -IGAC
Instituto de Investigaciones en Geociencias, Minería
y Química –INGEOMINAS
Sociedad Colombiana de Agricultores

Instituto de Investigación de Recursos Biológicos Alexander von Humboldt
Instituto de Investigación Marina y Costera INVEMAR
Unidad de Planeación Minero Energética - UPME
Unidad Ejecutiva de Servicios Públicos de Bogotá
Departamento Nacional de Estadística - DANE
Departamento Nacional de Planeación – DNP
Federación de Productores de Arroz - FEDEARROZ
Federación de Productores de Palma Africana
Federación Nacional de Avicultores - FENAVI
Federación Nacional de Cafeteros
Federación Nacional de Productores de Papa
Instituto Colombiano de Productores de Cemento
Fundación Tropenbos
Fundación Biocolombia
Academia Colombiana de Ciencias Exactas, Físicas y Naturales
Universidad Nacional de Colombia
Universidad Javeriana
Universidad Industrial de Santander
Universidad Distrital Francisco José de Caldas
Universidad de los Andes
Empresa Colombiana de Petróleos
Terpel de la Sabana
Texaco de Colombia
Exxonmobil de Colombia

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INSTITUTIONS CONSULTED

IPCC - Intergovernmental Panel for Climate Change

FAO - United Nations Food and Agriculture Organization

NOAA - National Ocean and Atmospheric Administration

NCAR - National Center for Atmospheric Research

UNDP - United Nations Development Program

- Institute for Meteorology - Max Planck

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WEBSITES

- **Convention on Climate Change**

<http://unfccc.int/resource/docs/natc/colnc1.pdf>

- **Ideam:**

<http://www.ideam.gov.co/publica/cambioclimatico/primeracomunicacioncolombia.pdf>

<http://www.ideam.gov.co/index4.asp>

- **Ministry of the Environment**

<ftp://ftp.minambiente.gov.co/cambio/pcc-ver2.pdf>