

A young boy is shown in profile, drinking water from a clear plastic bottle. He is shirtless and has a focused expression. In the background, a Cuban flag is visible, partially obscured by a dark metal railing. The overall scene suggests a public water source in Cuba.

Water Resources in Cuba

FIU

Global Water
for Sustainability
Program - GLOWS

School of Environment, Arts & Society
College of Arts & Sciences

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CUBAN ARCHIPIELAGO

**Surface : 109,886.9 km²
(Survey 2002)**

**Population (Census 2012):
11,167,135 inhabitants.**



STATS

- 652 watersheds
- over 100 aquifers
- annual fresh water withdraw: 7.56 billion cubic meters
- 56th country in water withdraw (of 176) - FAO



Watershed of National Interest



Watershed	Location (province)	Area (Km ²)	Population
Cuyaguaje	Pinar del Río	795	40 210
Almendares-Vento	Habana, Ciudad de La Habana	402	570 000
Ariguanabo	Habana, Ciudad de La Habana	295	90 000
Hanabanilla	Sancti Spiritus, Villa Clara, Cienfuegos	287	7 000
Zaza	Sancti Spíritus, Villa Clara	2 413	264 150
Cauto	Granma, Stgo de Cuba, Las Tunas, Holguín	9 540	1 167 400
Gtmo-Guaso	Guantánamo, Stgo de Cuba	2 347	410 000
Toa	Guantánamo, Holguín	1 061	12 300
Mayarí	Holguín y Santiago de Cuba	1 261	48 786

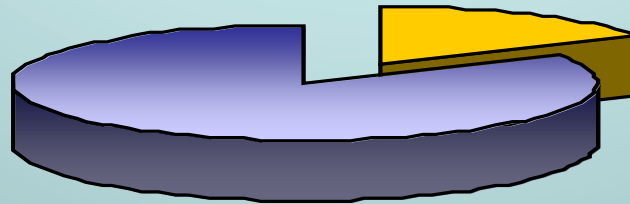
Water Resources

Potential

TOTAL

38,100 million m³

Surface
31,700 million m³



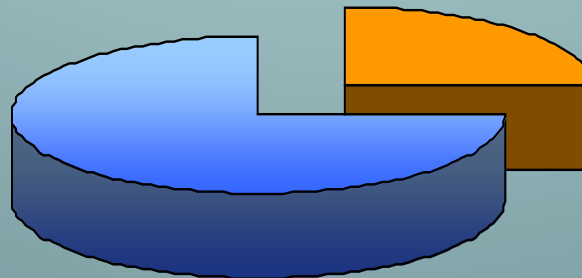
Subsurface
6,400 million m³

Available

TOTAL

24,000 million m³

Surface
75 %



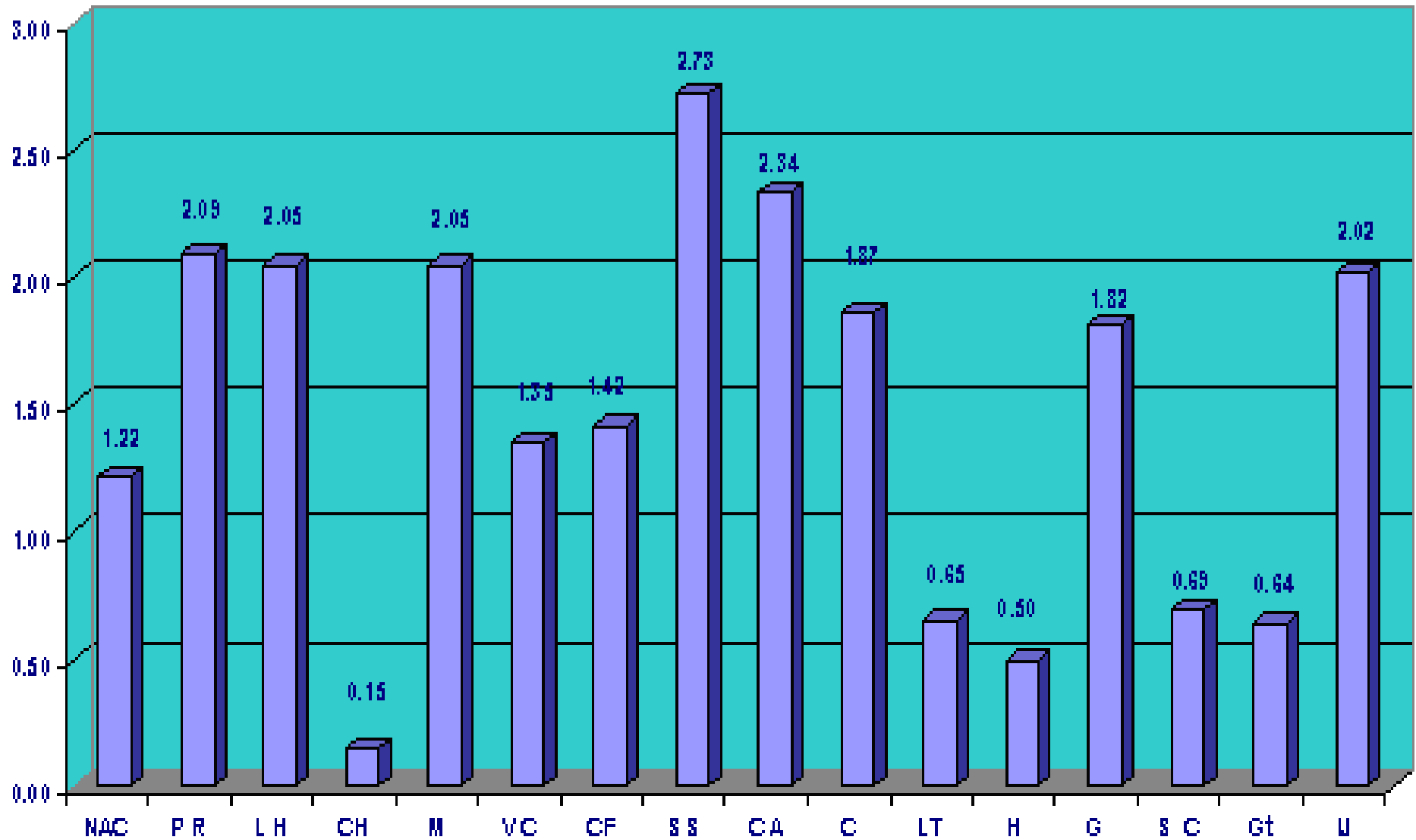
Subsurface
25 %

Accessibility to Water by Province

(million m³/year)

Province	Surface Water	Ground Water	Total
Pinar Del Rio	1,305	226	1,531
La Habana	410	1,088	1,498
Ciudad de La Habana	41	289	330
Matanzas	184	1,211	1,395
Villa Clara	851	188	1,040
Cienfuegos	431	136	567
Sancti Spiritus	1,204	62	1,266
Ciego De Avila	154	824	978
Camaguey	1,248	218	1,466
Las Tunas	276	71	347
Holguin	481	31	512
Granma	1,407	103	1,510
Santiago de Cuba	716	9	725
Guantanamo	313	16	329
Isla de La Juventud	153	22	175
Total	9,174	4,494	13,669

Water Resources Availability per Person (Mm³/person)

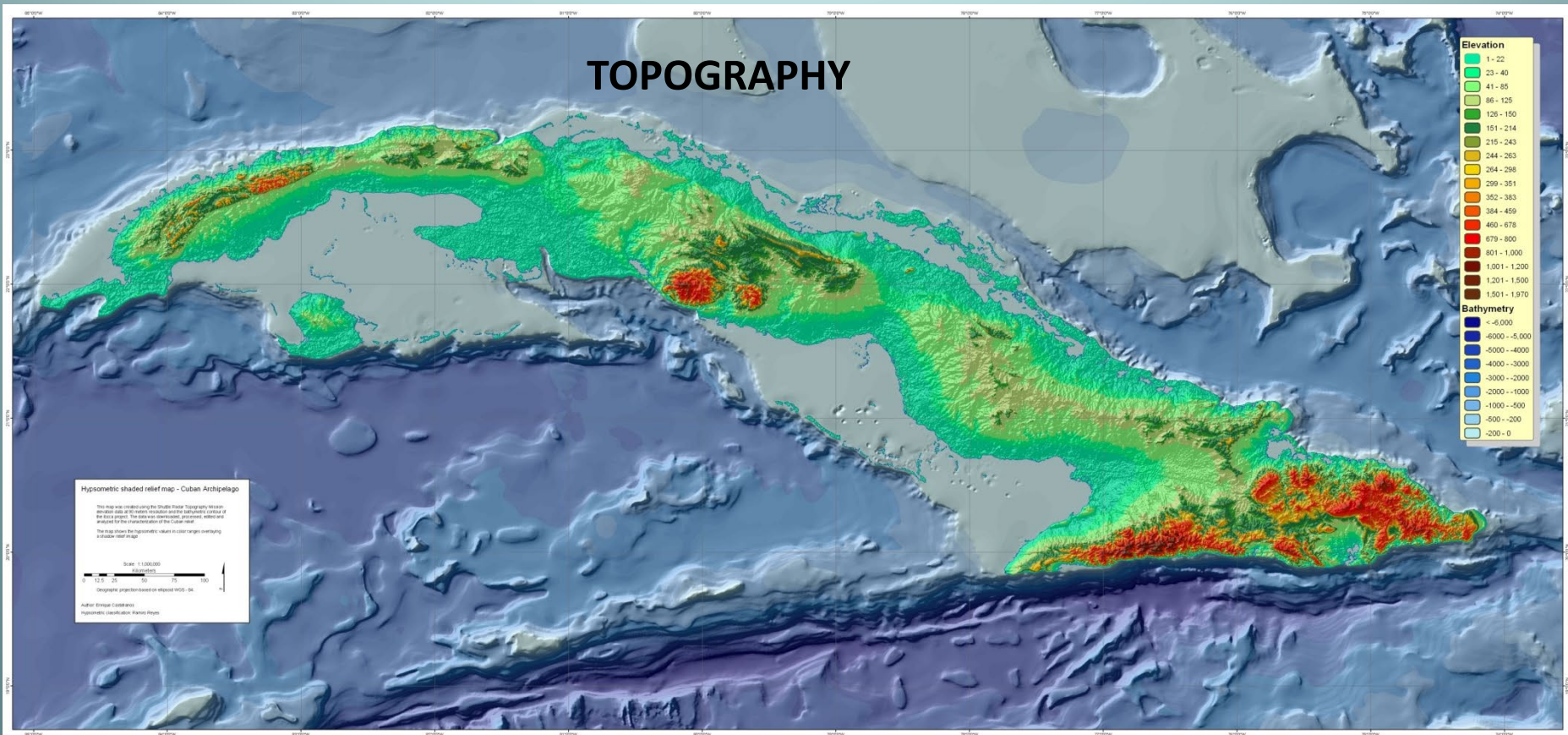


Characteristics of Rivers in CUBA:

Small watersheds and short rivers

85 % of rivers are less than 40Km long and the basin is less than 200km²

In the Central South and Eastern regions rivers have steep slopes



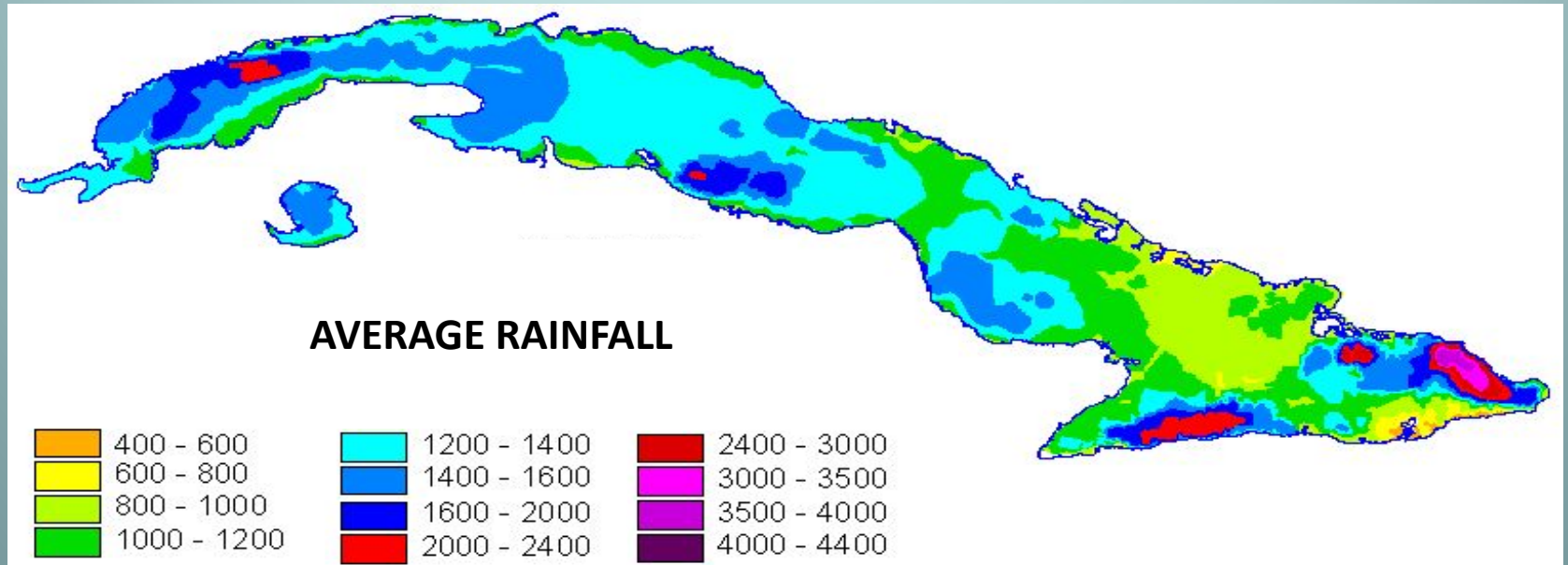


Xerophytic coastal and subcoastal scrubland

Rainfall

Annual Mean Rainfall in Cuba = 1 335 mm (Resolution 4/2006 INRH)

MAXIMUM PRECIPITATION: 4 000 mm In Pico “El Toldo”, HOLGUÍN



MINIMUM PRECIPITATION: 400 mm in San Antonio del Sur, GUANTÁNAMO

Rainfall (mm) in basins of national interest

(Resolution 4/2006 INRH)

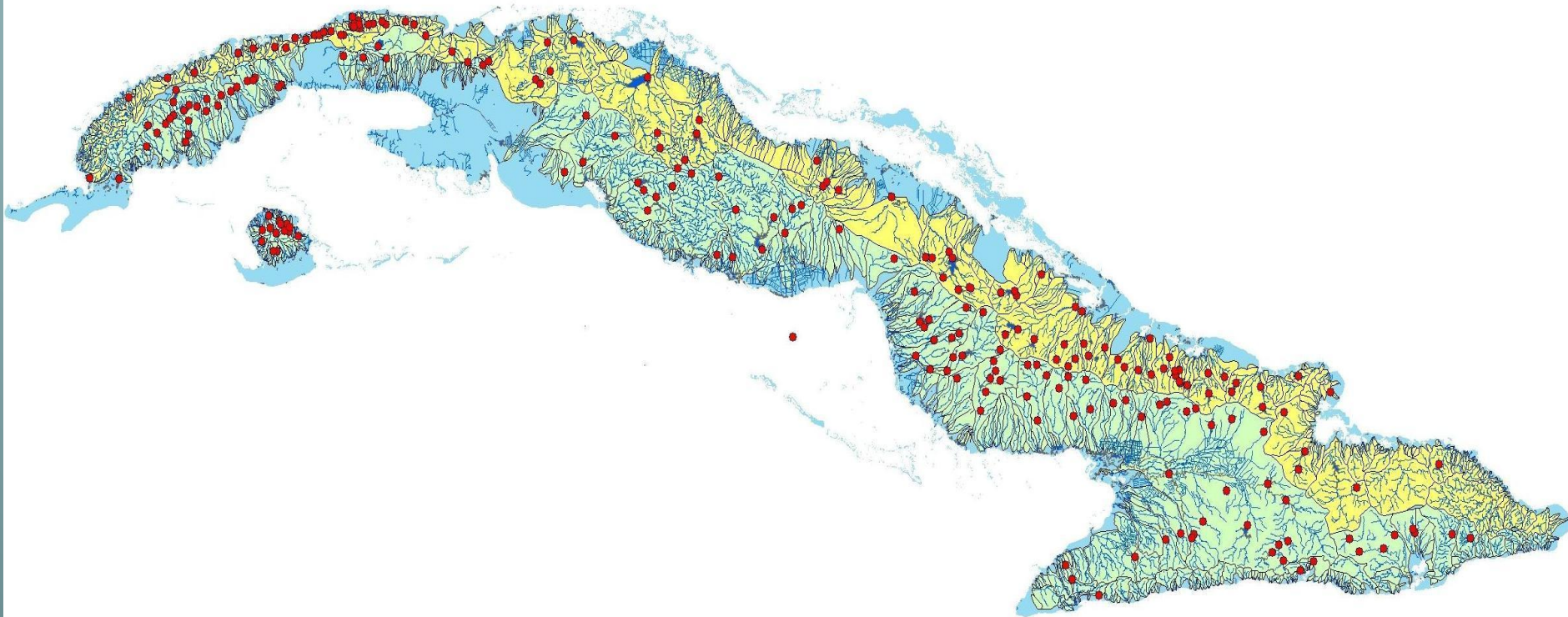
Basin	1931 - 1960	1961-2000	Difference
Cuyaguaje	1637	1475	-162
Ariguanabo	1469	1514	45
Almendares-Vento	1272	1446	174
Hanabanilla	2085	1986	-99
Zaza	1484	1427	-57
Cauto	1479	1112	-367
Guantánamo-Guaso	1181	1027	-154
Toa	2468	2518	50

Temporal distribution of rainfall and temperature

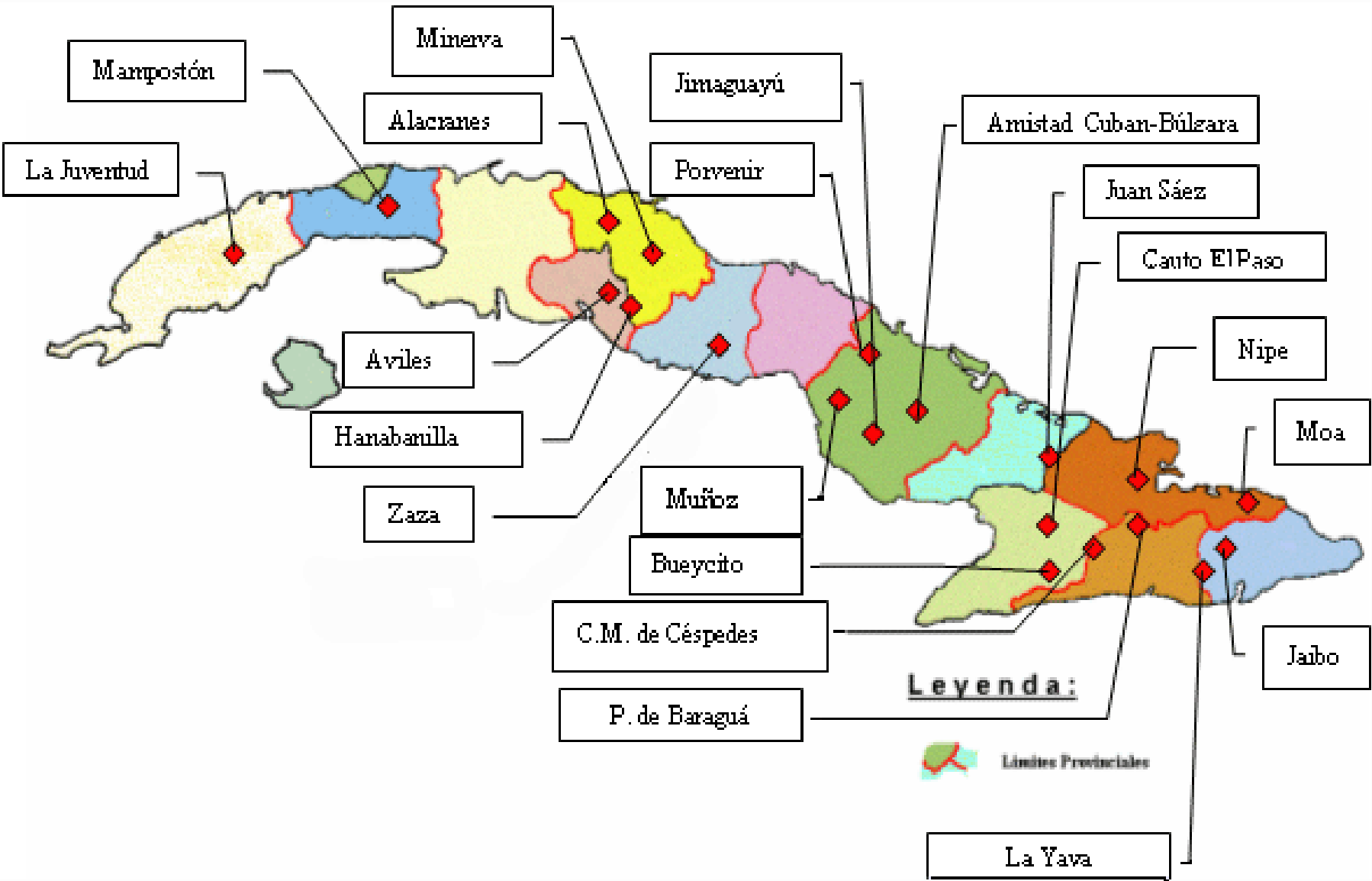
Month	Mean Temperature , C		Total Average Rainfall (mm)	Number of days with rainfall
	Daily Minimum	Daily Maximum		
Ene	18.6	25.8	64.4	5.0
Feb	18.6	26.1	68.6	5.0
Mar	19.7	27.6	46.2	3.0
Abr	20.9	28.6	53.7	3.0
May	22.4	29.8	98.0	6.0
Jun	23.4	30.5	182.3	10.0
Jul	23.8	31.3	105.6	7.0
Ago	24.1	31.6	99.6	9.0
Sep	23.8	31.0	144.4	10.0
Oct	23.0	29.2	180.5	11.0
Nov	21.3	27.7	88.3	6.0
Dic	19.5	26.5	57.6	5.0

Surface Water Reservoirs

Estimated Total Capacity: 50 million cubic meters



Reservoirs with over 100 Hm3



Water Quality

Drinking Water Infrastructure

- 240 reservoirs
- 805 micro-dams
- 6 large pumping stations
- 2,416 aqueducts
- more than 22,500 kilometers (14,000 miles) of pipelines.



Chlorination Station Density in Cuba by Province Superimposed on a Map Showing Approximate Locations of Surface Water Treatment Plants

- Chlorination station density: 0 – 300 stations (green scale)
- Water Treatment Plants: 0 - >500 l/s (pink dots)



6% of Cubans must get their water from cistern trucks or other means, mainly due to the effects of drought and/or damage to pumps.



WATER RESOURCES MONITORING and INFORMATION PROVIDER

Servicio Hidrológico Nacional – INRH

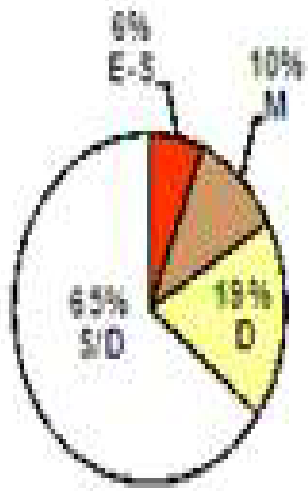
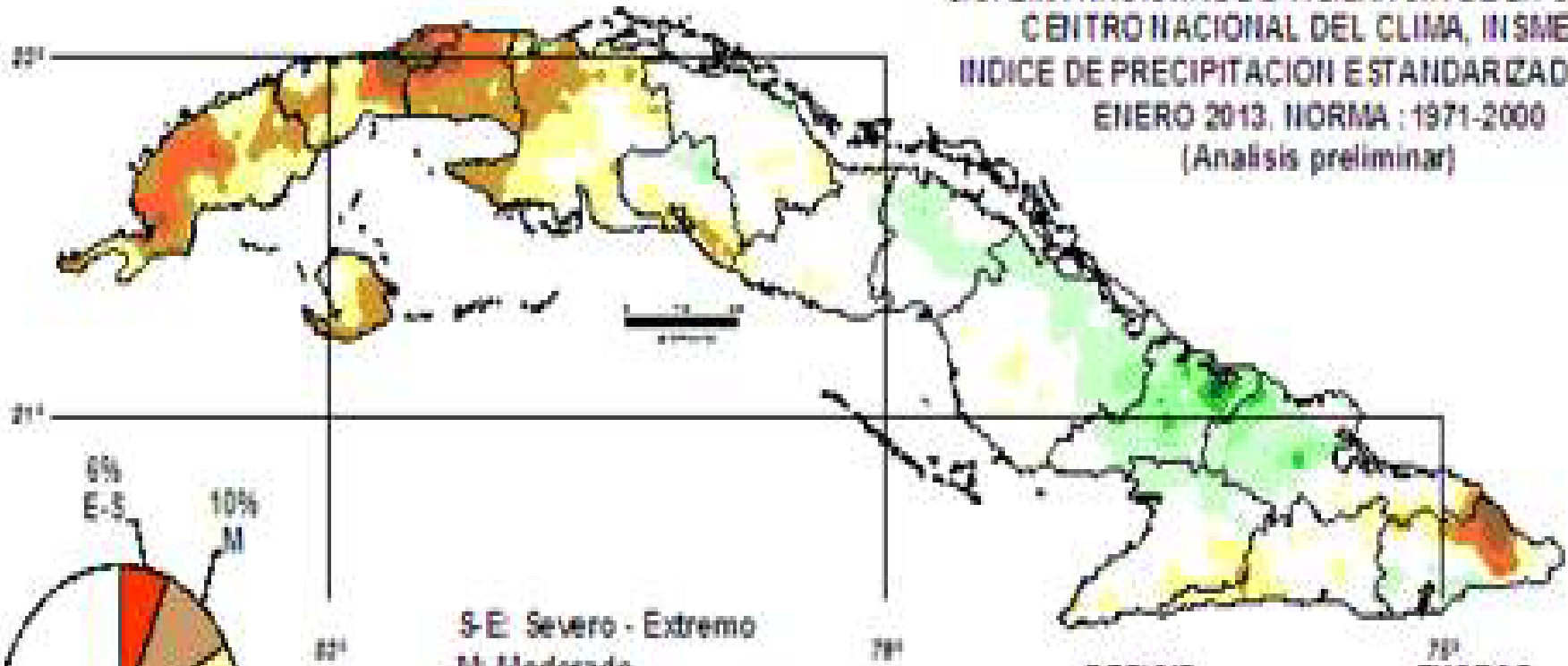
National Hydrological Service

Services y products (web: www.hidro.cu)

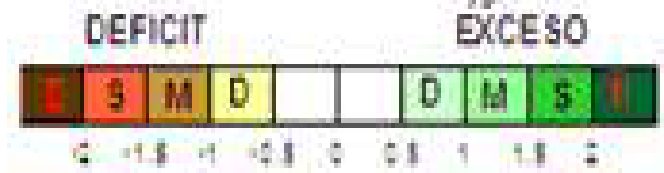
- Daily rainfall
- Monthly Hydrological Bulletins (Rainfall, water levels in resevoirs, groundwater)
- Studies and hydrological assessments
- Data gathering and analisis (hydromet stations)
- Extreme events ventos (droughts and floods) Early warning system for watersheds (not available in all watersheds)

Pluviometers	2 050 (1 x 53 km²)
Pluviographs	55
Climate stations	13
Hydromet stations	38
Hidrogeológico stations	1 683
Water Quality statios(RedCal)	2 315 (1 x 49 km²)

SISTEMA NACIONAL DE VIGILANCIA DE LA SEQUIA
 CENTRO NACIONAL DEL CLIMA, INSMET
 INDICE DE PRECIPITACION ESTANDARIZADO (SPI)
 ENERO 2013, NORMA : 1971-2000
 (Análisis preliminar)



S-E: Severo - Extremo
 M: Moderado
 D: Débil
 S/D: Sin Déficit



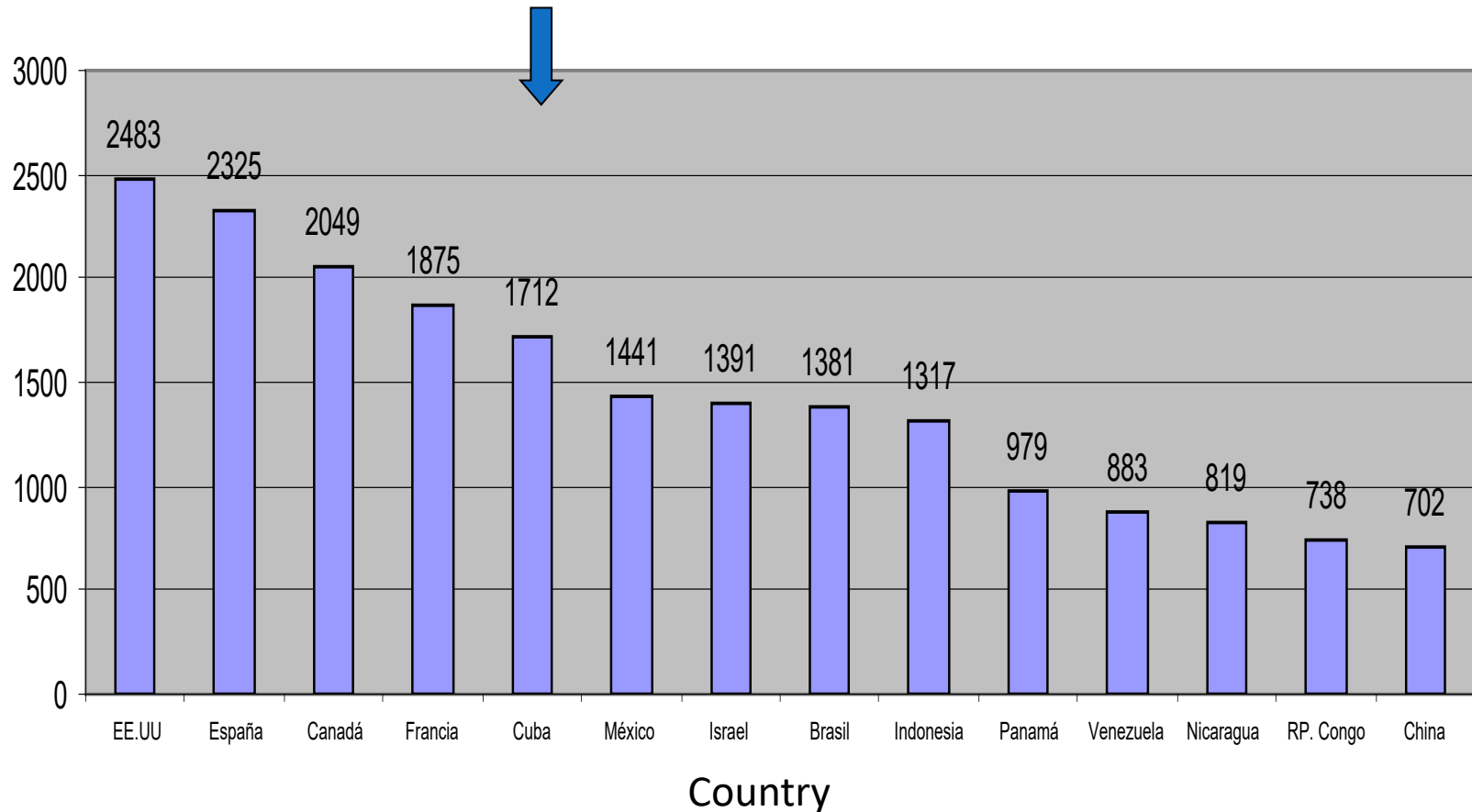
SPI (Índice de Precipitación Estandarizada)

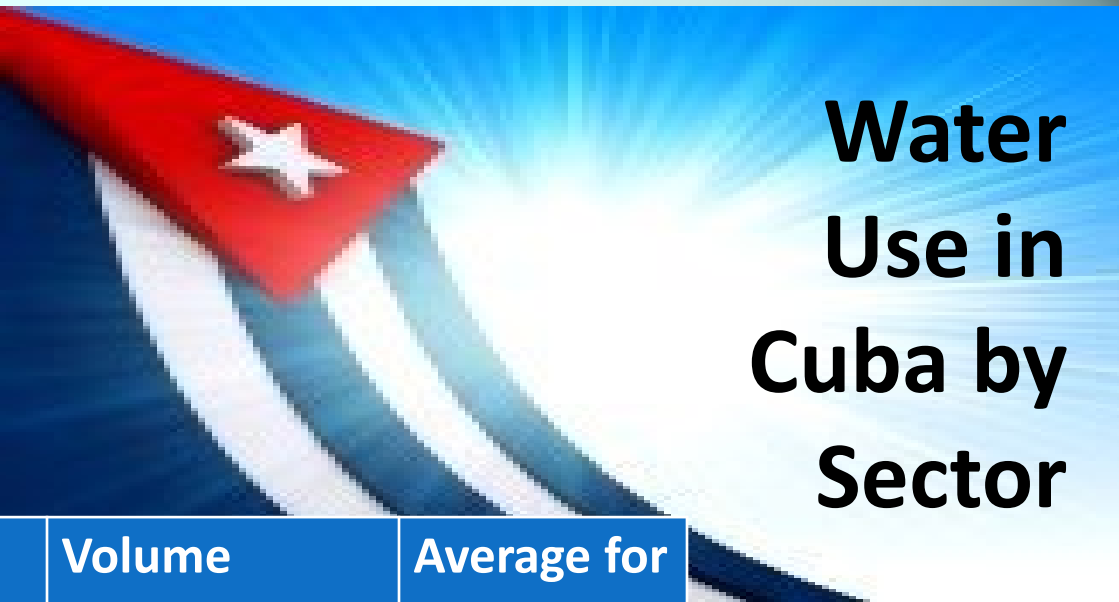
Water Footprint in m³/person/year

The water footprint of a nation shows the total volume of water that is used to produce the goods and services consumed by the inhabitants of the nation.

m³/person/year

Water Footprint





Water Use in Cuba by Sector

USE PER SECTOR	Volume (10 ⁹ m ³ /yr)	Average for the period
Agriculture	3.569	2008-2012
Industrial	0.7607	2003-2007
Municipal	1.187	2003-2007
Total	4,424	2003-2012



Thank you

Gracias

