The Vargas Disaster and Measures VENEZUELA DECEMBER 15, 1999



"Storm rainfall – Integral aligned risk management in Latin-American", October 2016, Uruguay

Hugo Pernía (Venezuela)



Republic of Venezuela: from 1.961 until December 15, 1.999

INTRODUCTION



Area: 1.497 Km² Coastline: 128 Km Average width: 8 Km Population : - Vargas State 260.000 h - Caracas 3.000.000 h - Miranda State 3.000.000

Milestone: Dec 12 1958 (ruled by Democracy) creation by law of Avila National Park (85.192 Ha) in Cordillera de La Costa.

INTRODUCTION





CLIMAS SECOS LITORAL CENTRAL



Yearly average rainfall: 475 mm

Monthly average rainfall, measured in stations located at: Maiquetia Airport and Mamo Naval Academy (Data Source: Venezuelan Aire Force)

INTRODUCTION - VARGAS STATE

(Andressen and Pulwarty)

Historical Facts

- Massive Flooding in Vargas : 1789, 1798, 1827, 1909, 1944, 1952

- From 1960 – 1998: Illegal settlement by low-income population along Vargas State

- Unregulated construction of buildings for high-income population.
- Bribery is a common practice to obtain any municipality permission.
- Feb 2 1999: Hugo Chavez was sworn in as President of Venezuela
- Nov 20 1999: Constituent Assembly of Venezuela finished the project of a *"Bolivarian"* Constitution

- Dec 15 1999: a constitutional referendum was planned. Voters would be asked whether they approved the new constitution.



Maiquetía- La Guaira- Punta de Mulatos- Macuto- El Cojo- Camurí Chico- Los Corales Caraballeda - Tanaguarena - Carmen de Uria





Chronology of a Disaster (1/4)

- Dec 5: **Civil Defense** issues warning to the population and city authorities due to 120 mm of rainfall in Vargas

- Dec 6: Venezuelan Air Force warns the National Government regarding rainfall: 3 times the historic average of the Vargas State

Dec 10: beginning of significant
landslides along the coastline, displacing
2.000 people.

- Dec 10: **Ministry of Environment** warns President Chavez of imminent threat, due to 250 mm rainfall.



Yearly average rainfall: 475 mm



Dec 15: constitutional referendum. Political forecasts expected above 50% of abstention (Voters 10.940.596).





Monthly average rainfall, measured in stations located at: Maiquetia Airport and Mamo Naval Academy (Data Source: Venezuelan Aire Force and Naval Army)



Daily rainfall, measured in metheorological stations located at: Maiquetia Airport and Mamo Naval Academy (Data Source: Venezuelan Aire Force and Naval Army)



Pluviometry-Topographical view of Avila National Park (between the stations Maiquetía and Cajigal). Pluviometric chart estimated for the whole rainfall from 01 until 16 December 1999

THE VARGAS DISASTER

Chronology of a Disaster (2/4)

- Dec 12: the massive evacuation of Vargas State (over 200.000 person) is discarded as an option by the Central Government, regardless the advice from all three agencies.

- Dec 15 (7:00 am – 4:00 pm): the constitutional referendum was held in the whole country.

In order to justify ignoring all preventive measures prior to the referendum, President Hugo Chavez invokes the words from the national Hero **Simón Bolívar** (1783-1830):

.. IF NATURES OPPOSES, WE WILL FIGHT NATURE ITSELF AND FORCE IT TO OBEY US



(Note: those words were given by Bolívar to a square full of people screaming, few minutes after a strong earthquake destroyed Caracas on 12TH March 1812, as related by royalist chronicler José Domingo Díaz)

Chronology of a Disaster (3/4)

- Dec 15 (08:00 pm): Heavy rains triggered thousands of landslides.
- Initially more than 20.000 are presumed dead...





Specialists estimate that 20 million cubic meters were deposited as a consequence of the event (Genatios, 2012)

Deposit thickness ranges from 4-5 m near the center of the alluvial cone (alluvial fan).

Towns like "Carmen de Uria" and "Cerro Grande" disappeared completely.

According to researchers, this type of extraordinary rainfall has a repeat interval (recurrence interval or return period) estimated at 500 years.

Chronology of a Disaster (4/4)

- Dec 14: the Miranda State (ruled by opposition leader E. Mendoza) is declared in ALERT. Evacuation of civilians starts with support of **Miranda Governorship**. Central Goverment acusses of sabotage Mr. Mendoza.

- Dec 15: remarkable abstention in places with displaced people in Miranda.

- Dec 16: El Guapo Dam breaks under the pressure of water. 25.000 persons affected.





El Guapo - River Dam / Miranda State The reservoir created has a 60m high dam with a surface area of 600 Ha During heavy rainfall in 1999, the existing dam in the area on the Guapo river suffered serious damages. In 2005 rebuilding works began. The dam was reconstructed with a cost of USD 67.2M, providing potable water to 130,000 residents.











- The flood ravaged the Vargas state on Dec. 16 1999, after torrential rains in few days.
- Several towns and villages along 60 Km coastline, were buried under 4 m of mud. The mudslides altered the coastline of Vargas.
- More than 100.000 were evacuated after the disaster struck. More than 8.000 houses were destroyed.
- Dead persons: minimum 1.000 (estimated 2.500)
- Estimated losses: 4.000 million USD

Tabla 3. Siete mayores eventos catastróficos por inundaciones y deslaves en Venezuela según el número de muertes.

Evento	Muertos	Municipio	Estado	Mes	Año	Afectados	Resumen
1. Tragedia de Vargas	Más de 758	Vargas	Vargas	12	1999	267462	Mínimo: 700 Moda: 30.000 Máximo: 50.000
							Mínimo: 96
2. Tragedia del rio El Limón 3. Tormenta Bret	350	Girardot	Aragua	9	1987	17000	Moda: 350 Máximo: 550
							Mínimo: 70 Moda: 84
	84	Libertador	Distrito Capital	8	1993	11219	Máximo: 125
4. Vaguada del 99	77	Libertador	Distrito Capital	12	1999	43837	Mínimo: 30 Moda: 50
							Máximo: 300
5. Desborde de la	53	Páez	Miranda	12	1999	45000	Mínimo: 4 Moda: 50
varios ríos.							Máximo: 55
6 Desborde del río	50	Varios	Mérida	10	1987	3000	Minimo: 20 Moda: 50
San Pedro	00	Vanos	Wendu	10	1501	0000	Máximo: 60
7 Desborde del río	48	Antonio Pinto	Mérida	2	2005	16000	Mínimo: 27 Moda: 47
Mocoties		Salinas					Máximo: 120

Fuentes principales: Base de datos desinventar, EM-DAT, Dartmouth Flood Observatory, Últimas noticias, El nacional, El universal.





THE VARGAS STATE TRAGEDY / DECEMBER 1999



THE VARGAS STATE TRAGEDY (VENEZUELA) / DECEMBER 1999

Results of Constitutional Referendum

Yes	: 3.301.475 (71,78%)					
No	: 1.298.105 (28,22%)					
Nuled	: 219.476 (4,55%)					
Valid voters : 4.599.580						
Voters population : 10.940.596 (100%)						
Total voters	: 4.819.056 (44,38%)					
Abstention	: 6.041.743 (55,62%)					



"Felizmente, por encima de las tragedias, aquí está la nueva Constitución"

Lieutenant colonel Hugo Chavez

TV Broadcast message 16.12.1999

Measures : Inmediate Reaction

- 05.01.2000: a new Office was created to centralize the process for reconstruction (AUTORIDAD UNICA). The former Science Minister was designated for this service.

- 08.06.2000: a state-controled corporation was created in order to proceed with the financial issues (CORPO-VARGAS).

- In less than a year, several projects where developed by a team of 200 high-level specialists ("Autoridad Única") focusing on:

- urban planning,
- watersheds management
- Hydraulic protection
- disaster prevention
- rebuild of damage infraestructure

- Goverment rejected the most of their proposed works, and re-shape them again.

- Dr.-Ing. C. Genatios resigned from any duty at the Bolivarian Goverment in 2002.



AUAEV (Unique Autority for Vargas) proposals:

- Urban planning for every single basin in the coastline (33 cuencas)
- Do not issue any construction permission even for partial reconstruction, without the inspection of municipal engineering office.
- Improvement of water channels and other hidraulic civil works
- Development of new roads and well-designed bridges

Measures : International Cooperation

- Several countries sent their experts to collaborate with the relief work and planning lead by "Autoridad Única":

- 🔲 Japan
- China
- Austria
- Italy
- Spain
- Norway
- USA

- German Goverment offers a new system for potable water. German President Johannes Rau help with the delivery of material for a new water supply and sewage disposal system (6 years project).

- Self-organised venezuelan baseball players (US Major Leage Baseball) raised over \$ 500.000 in relief funds.





Omar Vizquel – Cleveland Indians 2.877 hits



Gauff Engineering GmbH /Nuremberg

Measures: CORPOVARGAS

- 2003: ordered structural measures for retention and storage of sediments, and control channels
- Construction of 35 sediment control dams, most of them were open-style.
- Intervention works in 25 basins (of 33 along the coastline)
- Most of sediment control dams were constructed by stone-gabions, instead of concrete or even with stand piping.







b)

Open Dams (slotted):

- a) Reinforced concrete in Qda. Guanape
- b) Simple concrete in Qda. Curucuti
- c) Gavions dam in El Cojo

Measures: CORPOVARGAS

- Flash-Flood Early-Warning System: installation of 33 pluviometric stations and 9 hydrometric stations

- Corpovargas was finally closed in 2010.

- After 2011 the stations belonging to the Early Warning System do not offer realtime data, due to lack of maintenance.



d) Gavions open dam (window type) in Camuri Chico.



e) Slotted open dam (steel tubular) inTacagua



f) Gavions closed dam in Macuto

Measures: Analysis and Weaknesses (I)

- Few years after the tragedy, the "Autoridad Única" (2002) office and "Corpo-Vargas" (2009) were closed, and their competences assumed by local goverment.
- However the high budgets for the projects, after 17 years of the event, relevant works are still in execution.
- The poor quality of civil works was demonstrated during the Heavy Rainfall "Vaguada" of Feb 2005.
- The early warning system was abandoned.
- Only Community-based early warning systems still survive in some villages, due the support of universities and other major actors.



Bridge at Camurí Grande after the intense rainfall (vaguada) 2005



February 10, 2005



Pictures from: http://alertanaiguata.wixsite.com

Measures : Analysis and Weaknesses (II)

- The poor quality of civil works was demonstrated after the intense rainfall (Vaguada) of Feb 2005
- Experts suggest the demolition of some works, such as the stone gabions in the rivers, to be replaced with concrete



Stone Gabions at Quebrada El Cojo









Figura 6.- Vista desde aguas abajo de la Presa # 2 en Quebrada Piedra Azul. Foto izquierda tomada en Marzo 2005 y fo derecha en Abril 2007, observándose descenso del lecho de unos 3 m aproximadamente al pié del contradique.

Measures : Analysis and Weaknesses (III)

- Town planning and stretegic green areas, was replaced by the populism criteria, for the deployment of new settlement for displaced population.
- Massive state-owned block-buildings (Mision Vivienda) were constructed in the same areas where the destruction happened,
- Those works were criticised by specialists because of the exposición of human lives to the same threat (Rio San Juan) in the forthcoming decades.



Gran Misión Vivienda Caraballeda 2012 Those towers were builded between 2011 to 2014

Yacht Club at Hotel Macuto Sheraton / Dic 1999



Measures: New Coastline Use

- Above the sediments that created more than 100 Ha, goverment decides to construct light weight structures, as sport arena, squares and boulevards, along the coastline.



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Non-Scientific references

- Author's perspective

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In Memoriam of victims of a man-made disaster

If you have a question, don't hesitate to ask, or writte me at: hugo.pernia@gmx.de