



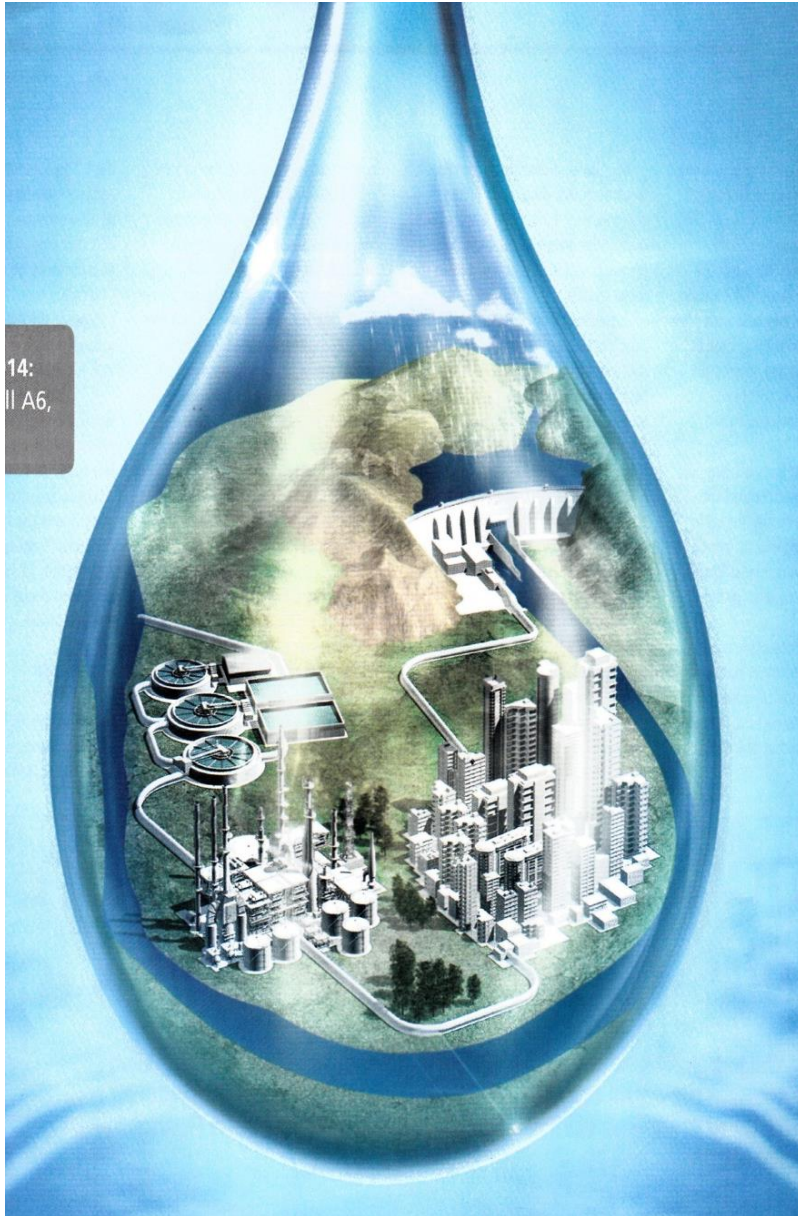
## Water scarcity problems related to water management in La Paz and El Alto

Presented by:

Juan Pablo De la Fuente Cusicanqui

IUPWARE Alumni Event 2018

# I. WATER CRISIS



## RECHARGE DEFICIT

- Retreat of glaciers
- Precipitation variability
- Lack of network maintenance (precariousness, breaks, leaking)

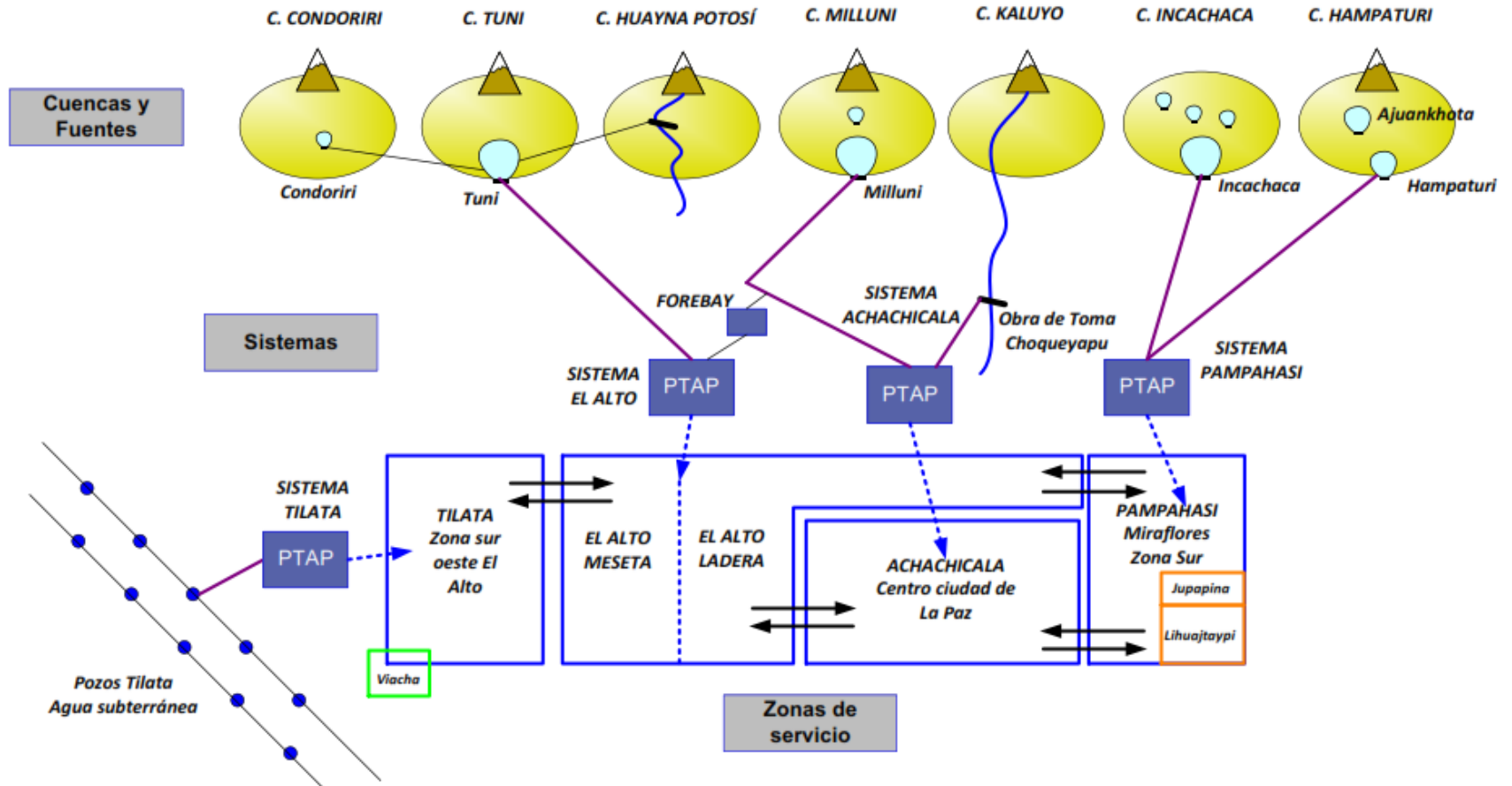
## WATER REQUIREMENTS Supply and demand

- |                |                            |
|----------------|----------------------------|
| ▪ El Alto:     | 30 Mm <sup>3</sup> /year   |
| ▪ Tilata:      | 3.3 Mm <sup>3</sup> /year  |
| ▪ Achachicala: | 16.4 Mm <sup>3</sup> /year |
| ▪ Pampahasi:   | 19 Mm <sup>3</sup> /year   |

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<b>Total:</b>	<b>70 Mm<sup>3</sup>/year</b>
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# I. WATER CRISIS





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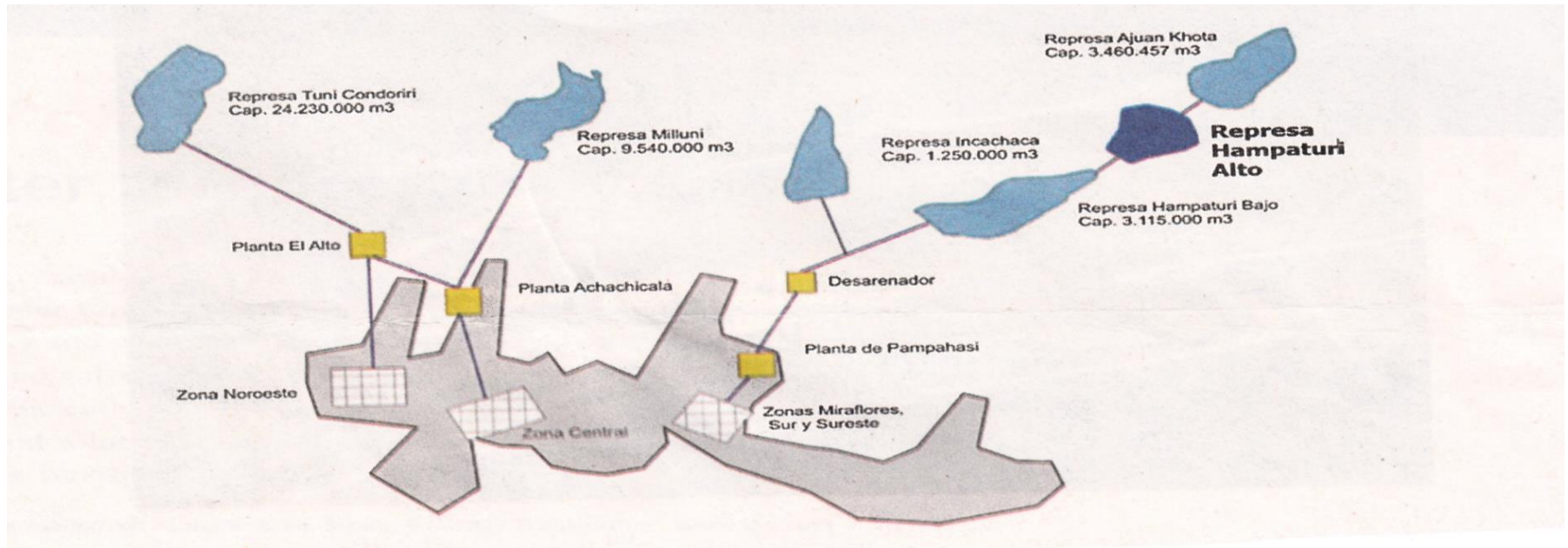
# I. WATER CRISIS

## ESCASEZ DE AGUA SE AGUDIZA EN 5 CAPITALES

■ Cinco ciudades capitales enfrentan problemas de abastecimiento de agua en el país. La escasez se atribuye en parte al fenómeno de El Niño que afectó a 174 mil familias de 172 municipios.



# I. WATER CRISIS



## MAIN REASONS FOR THE CRISIS

- Forests and Rain: decrease/disappear in 30 years (*Development and Investigation Institute of France*)
- Aridity, chaqu coast, heat of combustion. Decrease and disappearance of forests (-13% of forest area)
- Conflict in the use of water. Assignment
- Poisoning of soil, sterility
- Retreat of glaciers(-43% in 50 years)



## II. MITIGATION OF THE CRISIS



### ■ Construction of:

- Khaluyo, approximately
- Diversion Palcoma
- Diversion Pongo

16 Mm<sup>3</sup> /year

9 Mm<sup>3</sup> /year

4 Mm<sup>3</sup> /year

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**Total:**

**29 Mm<sup>3</sup> /year - 80 M. \$us.  
investment**

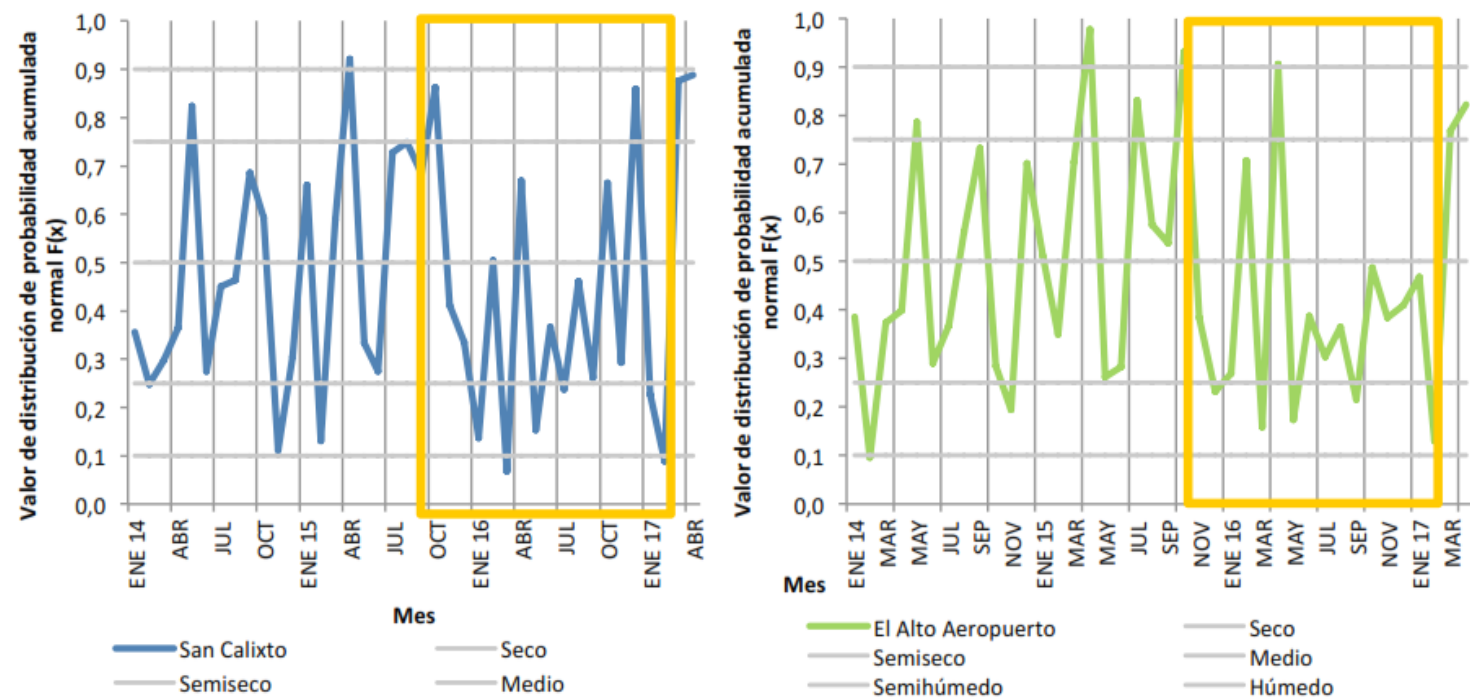
# III. EVALUATION



Identificación de la Estación				Registro [Años]			Vacíos [%]	
Estación	Latitud [° ' " ]	Longitud [° ' " ]	Altura [msnm]	Año Inicio	Año Final	Registro [años]	Min Vacíos [%]	Max Vacíos [%]
San Calixto	16° 28' 51"	68° 07' 57"	3658	1917	2017	101	1.98%	4.95%
El Alto Aeropuerto	16° 30' 37"	68° 11' 55"	4071	1942	2017	76	1.32%	7.89%
Ayo Ayo	17° 05' 39"	68° 00' 30"	3888	1953	2017	65	1.54%	13.85%
Calacoto	17° 16' 50"	68° 38' 08"	3826	1950	2017	68	14.71%	25.00%
Copacabana	16° 10' 09"	69° 05' 19"	3815	1943	2017	75	5.33%	20.00%
El Belén	16° 00' 59"	68° 41' 52"	3833	1949	2017	69	10.14%	26.09%
Laykacota	16° 30' 17"	68° 07' 24"	3632	1945	2017	73	2.74%	12.33%
Vino Tinto	16° 28' 51"	68° 08' 20"	3865	1917	2017	101	58.42%	60.40%

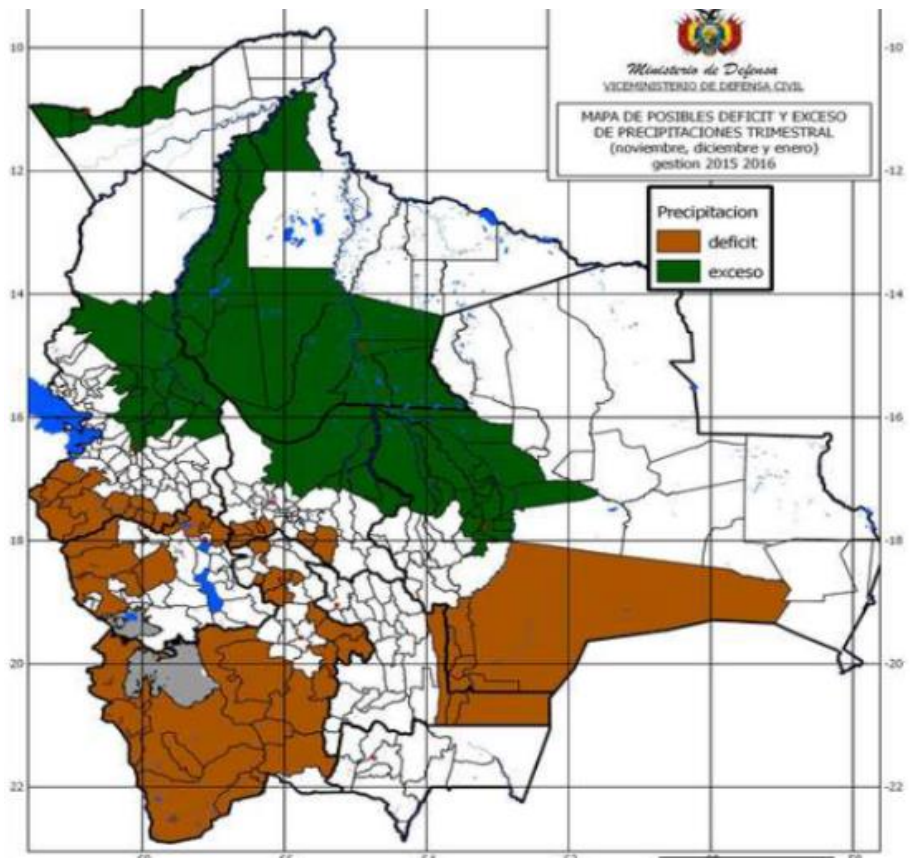
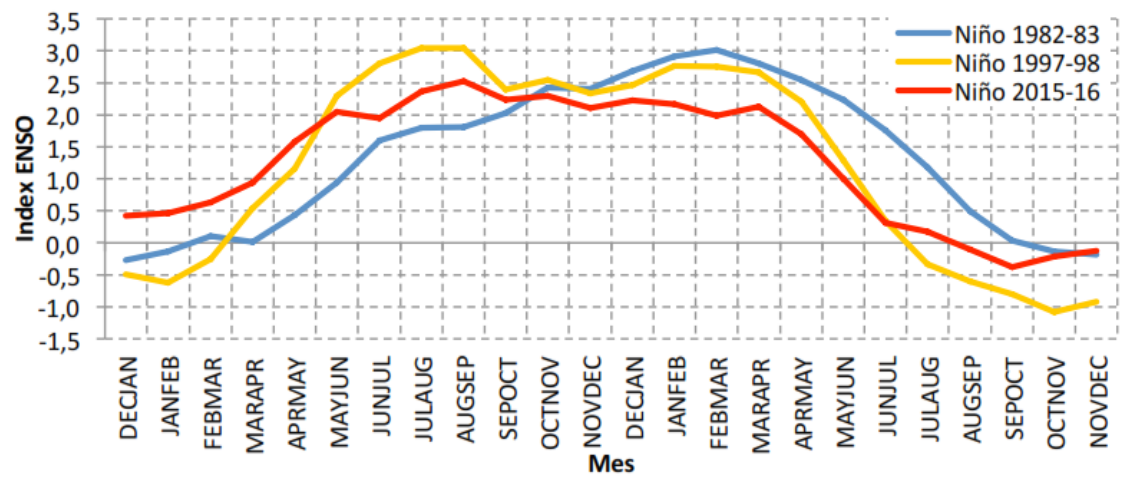


# III. EVALUATION



Estación	AGO 15	SEP	OCT	NOV	DIC	ENE 16	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DIC	ENE 17	FEB	MAR	ABR
San Calixto	0.75	0.68	0.86	0.41	0.33	0.14	0.50	0.07	0.67	0.15	0.37	0.24	0.46	0.26	0.67	0.29	0.86	0.23	0.09	0.88	0.89
El Alto Aeropuerto	0.57	0.54	0.93	0.38	0.23	0.27	0.71	0.16	0.91	0.17	0.39	0.30	0.36	0.22	0.49	0.38	0.41	0.47	0.13	0.77	0.82
Ayo Ayo	0.84	0.57	0.83	0.84	0.30	0.31	0.80	0.06	0.88	0.22	0.94	0.44	0.30	0.19	0.89	0.12	0.42	0.08	0.24	0.56	0.64
Calacoto	0.30	0.32	0.50	0.31	0.26	0.06	0.61	0.25	0.99	0.29	0.32	0.55	0.30	0.25	0.25	0.18	0.51	0.33	0.27	0.57	0.49
Copacabana	0.95	0.76	0.57	0.71	0.43	0.54	0.78	0.39	1.00	0.18	0.75	0.81	0.60	0.28	0.13	0.33	0.23	0.67	0.65	0.75	0.97
El Belen	0.59	0.30	0.32	0.24	0.13	0.04	0.57	0.15	0.14	0.25	0.50	0.48	0.51	0.12	0.27	0.16	0.07	0.16	0.02	0.42	0.89
Laykacota	0.72	0.63	0.80	0.45	0.58	0.10	0.64	0.05	0.63	0.16	0.39	0.24	0.45	0.18	0.72	0.27	0.71	0.44	0.12	0.79	0.87
Vino Tinto	0.69	0.71	0.62	0.40	0.36	0.13	0.50	0.04	0.76	0.14	0.33	0.21	0.47	0.20	0.60	0.13	0.46	0.18	0.10	0.86	0.94
Promedio	0.68	0.56	0.68	0.47	0.33	0.20	0.64	0.15	0.75	0.20	0.50	0.41	0.43	0.21	0.50	0.23	0.46	0.32	0.20	0.70	0.82
Max	0.95	0.76	0.93	0.84	0.58	0.54	0.80	0.39	1.00	0.29	0.94	0.81	0.60	0.28	0.89	0.38	0.86	0.67	0.65	0.88	0.97
Min	0.30	0.30	0.32	0.24	0.13	0.04	0.50	0.04	0.14	0.14	0.32	0.21	0.30	0.12	0.13	0.12	0.07	0.08	0.02	0.42	0.49

# III. EVALUATION





# III. EVALUATION

- **October, 2015 to February, 2016:** EPSAS, as water service provider for La Paz and El Alto, is required to submit a contingency plan for extraordinary events. They presented this plan for El Niño event in 2015/2016, concluding that there was enough stored water in the reservoirs to ensure completely water supply in 2015 and recommending just some maintenance actions.
- **March to August, 2016:** In March 2016, the Water Supply and Sanitation Control Authority (AAPS) instructs EPSAS to make a new contingency plan for the dry season of 2016. The conclusion from this plan was that there was not risk of water scarcity, and that all the reservoirs were above 78%.
- **Septembre to October, 2016:** The AAPS by instruction of the MMAyA, requests information from EPSAS about the general state of the potable water and sewerage systems, including the balance of supply and demand for drinking water systems. This request is answered by EPSAS with expanded information of the state of the potable water and sanitary sewer systems, without touching on the issue of reserves of water in the reservoirs, but the state of coverage and operation of the systems and plants of treatment of drinking water and wastewater.

## II. EVALUATION

▪ **Septembre to October, 2016:** Just two weeks later, the management of operations of EPSAS, by report of the department of production, informs its general management, contingency actions due to ***the critical levels of the reservoirs***, which included the transfer of drinking water from the Pampahasi system to the Achachicala system. In addition to the restriction of pressures in some neighborhoods of the city.

In the month of October 2016, EPSAS sends to the AAPS the 2016 drought event contingency plan, in which communicates the risks in the continuity of the service of the Pampahasi and Achachicala systems if there is not enough rainfall in the months of September to December, communicating that this situation could cause the emptying of the reservoirs of Ajuankhota, Hampaturi and Incachaca.

▪ **November to December, 2016:** It is in the month of November 2016 that the emergency breaks out in the cities of La Paz and El Alto with the water rationing in 94 neighborhoods in the southern zone and the eastern slope of La Paz between 08:00 and 20:00 starting on Wednesday, November 9.



# III. EVALUATION

## CAUSES

### EXCESSIVE INCREASE IN DEMAND

- Higher population
- Higher demand for food and irrigation
- Higher industrial demand

### INVESTMENT IN INFRASTRUCTURE

- very low in the last 25 years
- No expansions planned 20 - 25 years ago

## POSSIBLE SOLUTIONS

To increase resilience in La Paz/El Alto we suggest to:

- strengthen the operation and maintenance of water systems,
- implement demand management policies, while preparing the population for droughts,
- improve the management and exchange of water resources information,
- conclude the EPSAS intervention by national authorities to improve coordination with local governments, and
- resume the implementation of the Metropolitan Master Plan of La Paz/El Alto.

**GRACIAS.....**

**THANK YOU....**

