

WATER RESOURCE MANAGEMENT IN "LA PAZ" AND "EL ALTO" CITY UMSA - BOLIVIA TOHOKU UNIVERSITY SENDAI - JAPAN November 2012

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"Many of the wars of this century are about oil but the next wars will be about water"









La Paz and El Alto City





•The population of La Paz and El Alto City is over 2,03 and 1.18 million inhabitants (2010) and has around 302.000 (connections with access to drinking water).

•EPSAS (Public and Social Enterprise for Drinking and Wastewater) administrate the system



Annually produces an approximate volume of 64 hm3.
It has more than 3,000 kms. of main pipes for water distribution.

WATER SUPPLY SYSTEM



Management "C" Concepts

- Cantidad de Agua
- Calidad del Agua
- Continuidad del Sistema
- Capacidad del Sistema
- Cobertura del Sistema
- Costo del Servicio
- Capacidad de Gestión
- Cultura, Uso del agua

- Quantity of Water
- Quality of Water
- Continuity (System)
- Capacity (System)
- Coverage (System)
- Cost Service Tariff
- Capacity (Management)
- Culture (Use of Water)

COMPARISON OF WATER RESERVES 2010 - 2011

Represa	Capacidad	Septiembre 2010	Septiembre 2011	
Tuni	21.549.000 m3	10.700.000 m3	11.058.128 m3	
Milluni	10.800.000 m3	4.500.000 m3	4.0530322m3	
Incachaca	4.560.000 m3	1.787.000 m3	1.851.437 m3	
Hampaturi	3.340.000 m3	1.250.000 m3	1.084.824 m3	
Ajuankhota	3.360.500 m3	1.000.000 m3	1.535.304 m3	

COMPARACIÓN DE LAS RESERVAS DE AGUA 2010-2011

RESERVORIOS PEQUEÑOS QUE ALIMENTAN A REPRESAS GRANDES

	Represa a la	Capacidad	
	que favorece		
Condoriri	Tuni	100.000 m3	
Estrellani	Incachaca	800.000 m3	
Sorajahuira	Incachaca	200.000 m3	
Quinquillosa	Incachaca	500.000 m3	
Ferkecota	Hampaturi	500.000 m3	
Kenkahuikara	Ajuankhota	500.000 m3	
Mikaya	Ajuankhota	200.000m3	

The figures show that the reservoirs do not reach their capacity by the scarcity of water. Glaciers do not provide enough water, especially in the winter. Also rain fall should be taken into account.

Shortage of water



Tuni Condoriri



HUAYNA POTOSÍ



MILLUNI



Water Quality

El Alto Water treatment plant



Achachicala Water treatment plant



HAMPATURI



INCACHACA





INDICATORS COVERAGE SERVICE IN THE LA PAZ AND EL ALTO CITIES

Water coverage: City of La Paz 97.59% (119,019 cnxs). El Alto City 88.73% (183,144 cnxs)





2011: 73,5

Water Costs

Tariffs

Level	Value \$us/m3	Category		
		Domestic	Commercial	Industrial
High	1.1862	Greater dan 300	Greater than 20	
Medium High	0.6642	151 a 300	1 a 20	
Average	0.4428	31 a 150		
Decline	0.2214	1 a 30		
Elder solidary	0.1771	1 a 15		
Rate solidary		1 a 15		

EDUCATION AND CULTURE WATER USES



MAJOR PROBLEMS

CLIMATE CHANGE ISSUES Retreat Glacier



LOOKING FOR NEW WATER SOURCES SURFACE WATER VS GROUNDWATER

DEMAND GROWTH - PROBLEMS OF SERVICE





BALANCE: TUNI RESERVOIR, AÑO 2011



Watershed Management



UNACCOUNTED FOR WATER (UFW)

- •UFW reaches a 31 % in the cities of La Paz and El Alto.
- •Illegal connections and leakages affects the Availability of water, demanding additional energy.
- •UFW reduces the possibility to increase service coverage.
- •UWF produce a service at low pressure, discontinuous service without quality
- •Lack of Information and limited equipment for data collection and analysis in the management of UFW



WATER NETWORK MANAGEMENT

Renewal Network

•Renovation and implementation of equipment for optimal operation, control and measurement systems (pipes, valves, special parts).



•Improvement and Implementation of new automated systems for online control.





STRATEGIES

INSTITUTIONAL STRATEGIES

- Optimizing water resources and the ability to transport, and treatment: larger reservoirs sources, reduction of unaccounted for water.
- Assist in studies for adaptation to climate change as glaciers retreat for determining future capacity of the sources. (TASK for government and Universities)
- Implement new measures and technologies for the proper treatment and water use and reuse.

Follow the increased demand and study the water problem throughout new projects focused on Technical, Economical, Social and Environmental (TESA) point of view, in order to establish a real water demand.

 Update Strategic Plans and Development a Master Plan for Water and Sewer, Emergency Plan and, short-term measures.

- Continue the implementation of the Institutional Strengthening Plan:
 Equipment, Training, Organization and Methods, updating and implementation of computerized systems and information.
- Incorporate in the university's curriculum the study of topics related to water management and climate changes.
- Strategic alliances with municipal, departmental and national government, and other institutions (Universities).

SHORT AND MIDDLE TERM STRATEGIES INTO THE CLIMATE CHANGE FRAMEWORK (INCREASE RESERVOIR CAPACITY



STRENGTHENING AND TRAINING

ORGANIZATION AND METHODOLOGY:

TO INCORPORATE THE CONCEPT OF WATERSHED MANAGEMENT, WATER RESOURCES MANAGEMENT IN THE FRAMEWORK OF CLIMATE CHANGE.

DEVELOPMENT OF NEW TECHNOLOGIES FOR ADMINISTRATION, OPERATION AND MAINTENANCE DRINKING WATER SYSTEMS, SEWERAGE AND ENERGY EFFICIENCY.

SOCIAL STRATEGIES FOR CONFLICT MANAGEMENT RELATED TO WATER SUPPLY AND WATER CONSUMPTION

NEW MANAGEMENT TEAMS: WATER ENTERPRISES, UNIVERSITIES AND GOVERNMENT.





