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Integrated Water Resources Management in Peru – The Long Road Ahead

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LIMA - PERU



GROUNDWATER RESOURCES

Groundwater Resources

- ◆ Used intensively and measured in the Coast only.
- ◆ Annual potential exploitation 2 700 MCM.
- ◆ Use: 1 500 MCM
- ◆ Some areas are critical
- ◆ Main problems:
 - Overexploitation. (Ica: Villacuri-Ica- Pampas de Lancha and Tacna: La Yarada)
 - Saline intrusion: Tacna: La Yarada (Peru – Chile border)

GW Resources – Ica case

- ◆ Agricultural exports: vines and asparagus – great economic value
- ◆ Irrigated with GW.
- ◆ Near zero unemployment in the region.
- ◆ Overexploitation is detected → Continuous lowering the water table at 1.46 m/year.

Actions by ANA – National Water Authority

- ◆ Information, sensibilization, communication capacity building.
- ◆ Aquifer evaluation.
- ◆ Reduction in GW volume exploitation: better irrigation efficiency,
- ◆ Control, monitoring and supervision
- ◆ Artificial recharge projects
- ◆ Modernization of IWRM.
- ◆ Israeli Cooperation Agency – MASHAV – will help.

And a short note on water and poverty

MUNICIPAL WATER

Largest populated metropolitan areas of Peru.

City	Altitude (m)	Basin	Geographical Area	Population (2007)
Lima-Callao	154 (Downtown Lima)	Pacific	Coast	8 472 935
Arequipa	2335	Pacific	Mountains	749 291
Trujillo	34	Pacific	Coast	682 834
Chiclayo	29	Pacific	Coast	524 442
Piura	29	Pacific	Coast	377 496
Iquitos	106	Amazon	Lower Jungle	370 962
Cuzco	3399	Amazon	Mountains	348 935

Coverage of Sanitation Services in Peru

Service	Coverage (%)		
	1990	2005	2015
Water	63	76	82
Sewage	54	57	77
Wastewater Treatment	5	22	100

Total annual volumes and percentages of wastewater with and without treatment.

Wastewater produced by sanitation services	Volume per year (m³/s)	Q (m³/s)	% Treatment
With treatment	217253807	6,89	29,10
Without treatment	530027896	16,81	70,90
Total	747281703	23,70	100,00

Sanitation Coverage in Selected Cities of Peru

Metropolitan Area	Number of Connections	Water Coverage (%)	Sewage Coverage (%)	Wastewater treatment Coverage (%)	Micro measurement	Unaccounted water (Non-billed water)	Company
Lima-Callao	1194879	88.1	83.7	13.3	70.1	37.5	SEDAPAL S.A.
Arequipa	201144	82.2	71.6	16.1	64.2	35.9	SEDAPAR S.A.
Trujillo	135883	84.1	71.2	80.1	37.7	45.7	SEDALIB
Chiclayo	133767	84.0	75.8	89.2	9.3	41.6	EPSEL
Piura	163824	82.7	64.9	50.6	19.9	55.9	EPS Grau
Iquitos	56684	68.2	47.5	0.0	23.7	57.9	SEDALORETO S.A.
Cuzco	57497	96.7	85.8	75.4	78.2	46.0	SEDACUSCO S.A.

Potable Water Access and Poverty

- ◆ Many people do not have connections to the municipal water.
- ◆ It is necessary to consider alternatives to increase water availability for less favored people.
- ◆ Price of water for inhabitants of periurban areas is enormously high and quality is bad.



Cost of Municipal Water

Potable water and sanitation services varies from US\$ 0.52 (S/ 1.35) per m³ to US\$ 1.77/m³ (S/ 4.90 soles/m³) for housing with connection to the municipal water distribution system.

In urban areas with no water supply people pay US\$ 0.77 per cylinder or US\$ 12.69/m³ – 24 times more!!!

The screenshot shows a utility bill interface with a table of rates and a total amount. A red arrow points from the 'Información complementaria' section of the screenshot to the detailed table below.

Información complementaria

Estructura Tarifaria (05/06/2011)

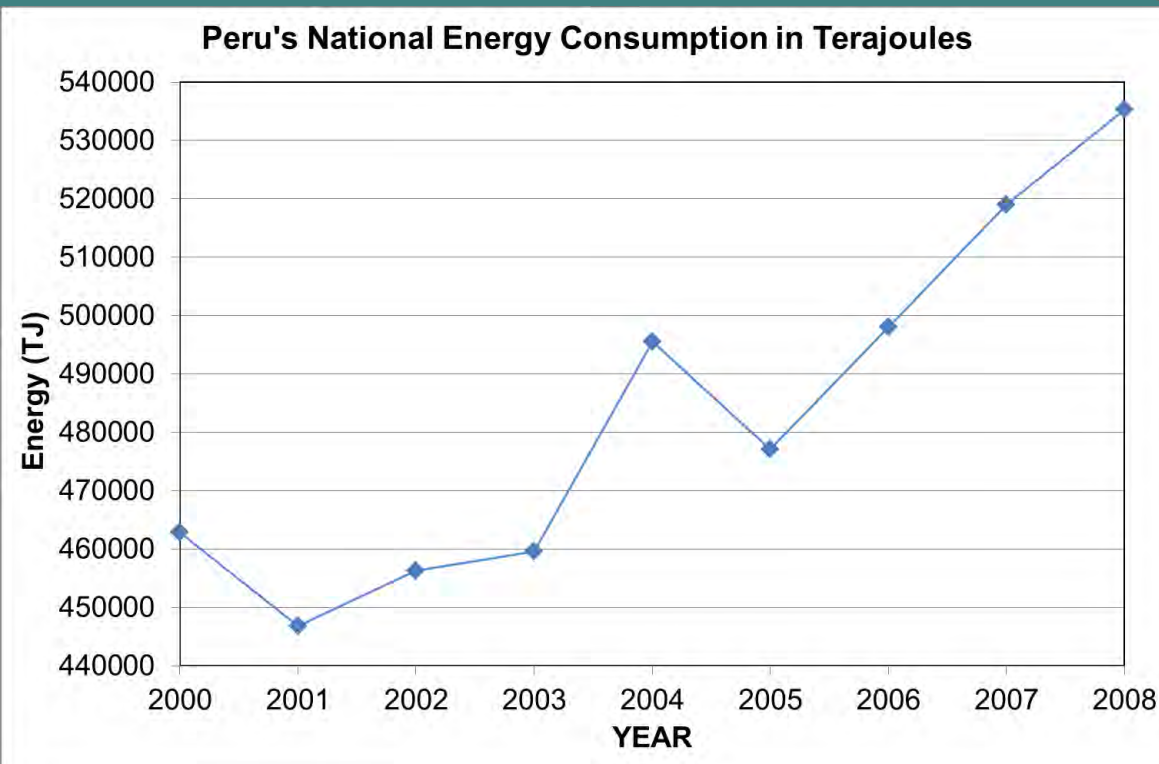
Tarifa	Rango	Agua	Alcant.
DOMESTICO	0 a 10	0.940	0.411
	10 a 25	1.091	0.477
	25 a 50	2.414	1.055
	50 a mas	4.095	1.789

Exchange rate 1 US\$ = S/. 2.60

ENERGY AND WATER

Energy consumption

Item	Year									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Population - Half year (Millions)	25.984	26.367	26.739	27.103	27.460	27.811	28.151	28.482	28.807	
Total Energy Consumption - TJ	462885	446811	456279	459664	495537	477175	498121	518982	535392	
Per capita energy consumption	17.81	16.95	17.06	16.96	18.05	17.16	17.69	18.22	18.59	



Per capita energy consumption rose from 17.81×10^6 J/person to 18.59×10^6 J/person, a 4.2% increase

Source of Electric Energy

Electrical Energy Source	Year									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Sugarcane bagasse	0	0	0	0	0	0	0	0	0	2
Diesel	511	107	109	251	858	59	120	65	342	184
Residual	650	466	472	616	1188	950	827	448	685	579
Coal	394	339	846	859	2170	831	881	840	909	929
Natural Gas	669	744	1006	1230	994	4062	4260	7314	9313	9261
Hydraulic	15410	16807	17224	17732	16693	17101	18671	18589	18010	18752
Total	17634	18463	19657	20688	21903	23003	24759	27256	29259	29707

Notice that Sugarcane bagasse is starting to show as a source of electric power. In addition, use of 7.8 % ethanol in gasoline is mandatory in Peru. There is an increasing trend for Using of agricultural products for energy purposes.

Cases (i) State negligence and (ii) the lesser evil was 1000 times better.

WATER AND ENVIRONMENT

Examples of Severe Environment and Water Degradation

- ◆ Environment degradation has occurred in the Madre de Dios region (SE Peru) due to illegal gold mining activities.
 - Deforestation
 - Increase in sediment production
 - Incorporation of mercury and formation of methyl mercury.
 - Three fish species already show above permissible limits contents of mercury

Illegal Mining Destroys the Amazon Rainforest in SE Peru



Other Impacts

- ◆ Negative Social Impacts:
 - Affects main source of proteins (fish) of the population → food safety.
 - Unsafe working conditions.
 - People trafficking → semi-slavery
 - Exploitation of minors – all kinds.
- ◆ Economic Impact
 - Resource
 - Money laundering from illegal activities
 - Tax evasion

The Tambogrande valley case : Wherever you leave a void, it is filled fast –

- ◆ Empresa Minera Manhattan Sechura (EMMS), a subsidiary of Manhattan Minerals Corporation had a concession for the exploitation of gold and silver.
- ◆ Initial estimates: 853 Million ounces of gold and 10.2 million ounces of silver.
- ◆ Tambogrande Valley famous for the production of limes and mangoes.

Tambogrande (2)

- ◆ Farmers protested, even vandalizing EMMS property. Five people died.
- ◆ Farmers got support from NGOs.
- ◆ Company concession rights terminated in 2003.
- ◆ Local farmers and migrant miners started digging for gold in 2005.
- ◆ Uncontrolled use of sodium cyanide is polluting the Quiroz and Chipilico river.
- ◆ 10,000 Ha of crops have been lost so far.
- ◆ “The prescription drug was worse than the disease”

MODERNIZATION OF WATER RESOURCES MANAGEMENT

General Water Law (1969)

- ◆ Given under a “nationalist” dictatorship. (First phase: 1968 – 1975 / Second phase: 1975 -1980)
- ◆ Focused only on agriculture.
- ◆ Only promoted agriculture in the Pacific Basin → Coast.
- ◆ The largest reservoirs were built during the two governments.
- ◆ Did not promote an integral approach.

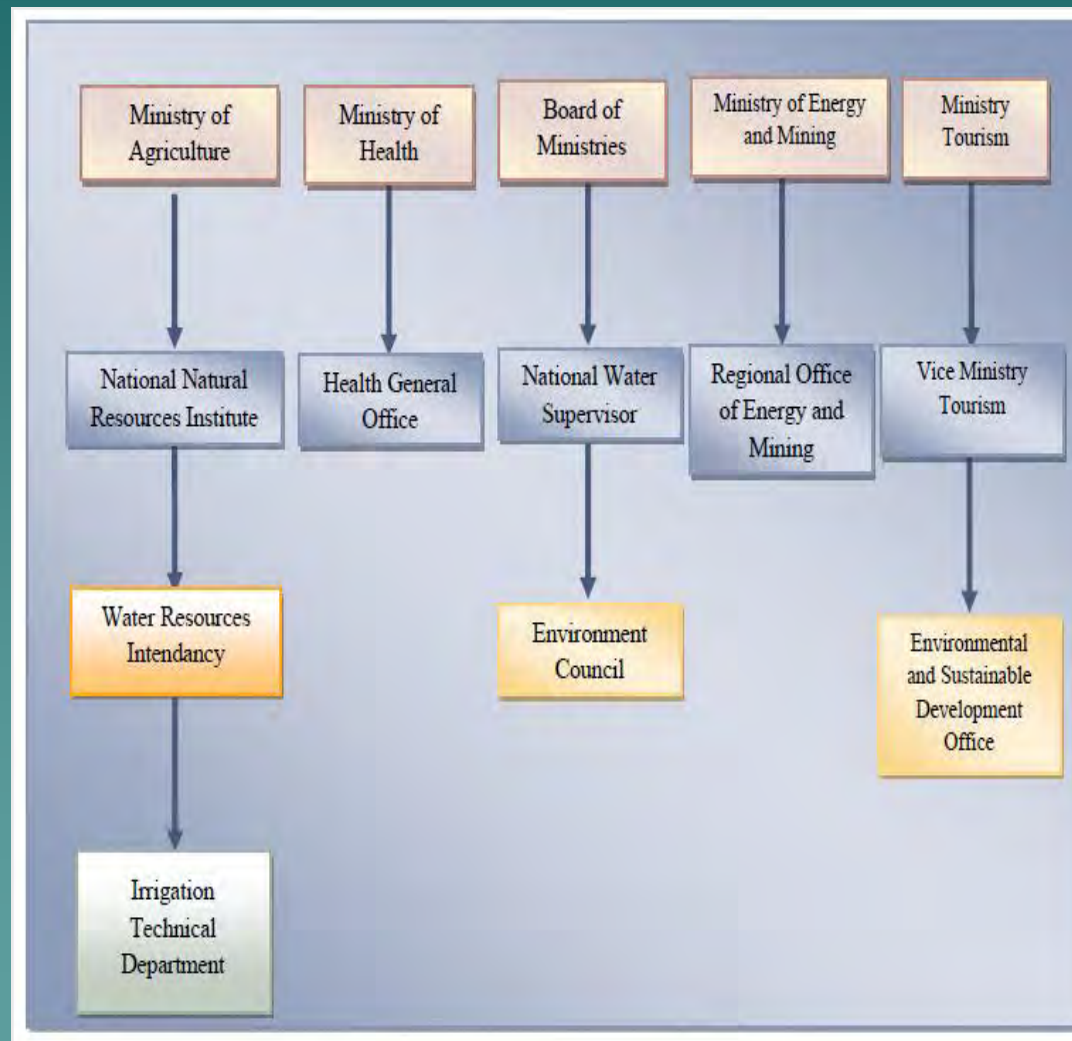
Use priority in GWL (1969)

- ◆ Direct Use
- ◆ Municipal Water
- ◆ Agriculture
- ◆ All other uses

Desintegrated Water Management

- ◆ Ministry of agriculture → water licenses and permits.
- ◆ Ministry of Health → water quality.
- ◆ Board of Ministers → Environmental issues.
- ◆ Ministry of Energy and Mines → Water licenses and permits for mining.

Water Management according to General Water Law (1969)



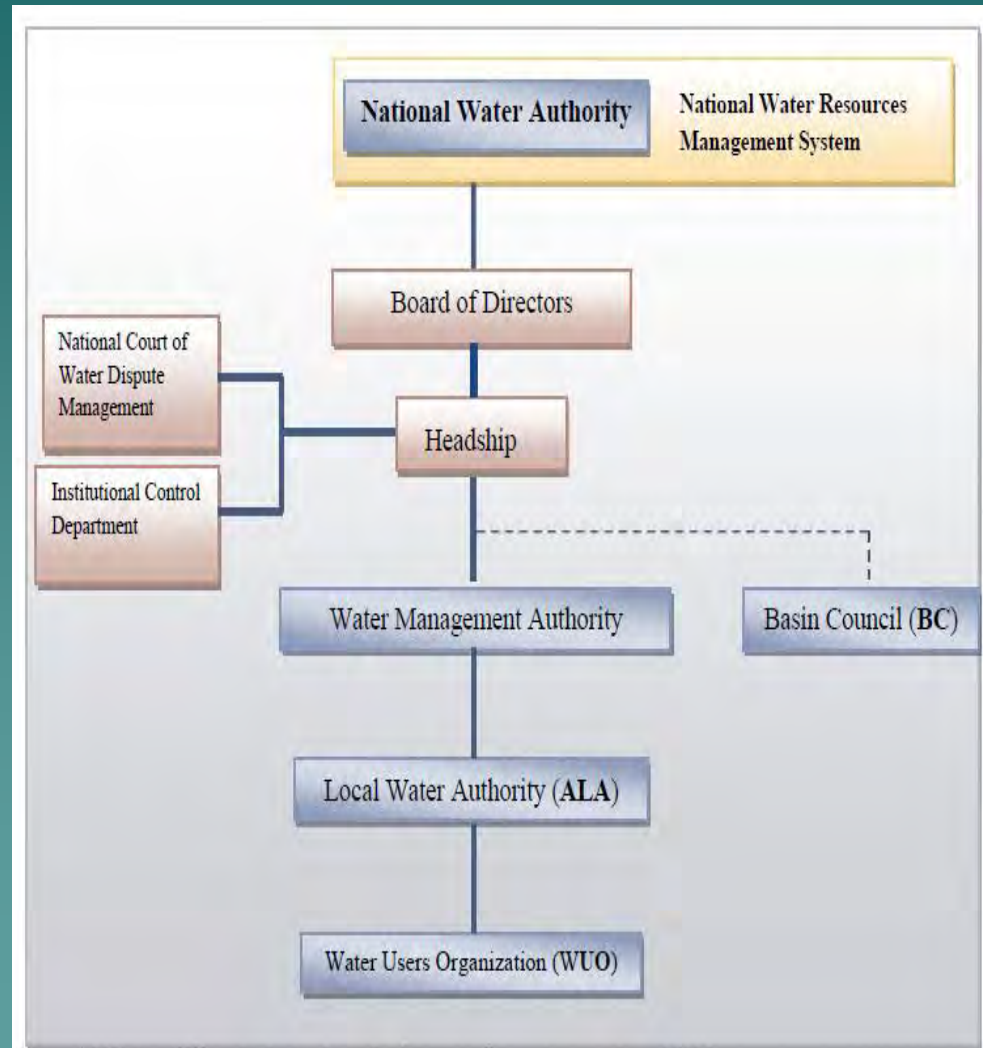
Drivers for WRL

- ◆ UN Water Conference, Dublin Principles, Rio Declaration – Agenda 21, World Summit Sustainable Development.
- ◆ Eventually → Free Trade Agreement with the United States accelerated the process.
- ◆ US Environmental Protection Agency requirements were taken into account.

Water Resources Law (2009)

- ◆ More integral, basin based approach.
- ◆ Priorities:
 - Direct Use.
 - Municipal Water
 - All other uses
- ◆ Creation of the National Water Authority – ANA in Spanish.

Water Management according to Water Law (2009)



ANA duties

- ◆ Development of Water policy
- ◆ Formulate rules and procedures → ensure an integrated approach
- ◆ Coordinate and organize actions to implement the National Water Resources System.
- ◆ Technical opinion about water availability

ANA duties

- ◆ Promote knowledge exchange.
- ◆ Jurisdiction
- ◆ Impose sanctions.
- ◆ Grant water laices
- ◆ Develop educational activities
- ◆ Promote recognition of economic and environmental value of water.

Conclusions (I)

- ◆ Peru is a very uneven country from the geographical, demographical and hydrologic viewpoint. The Pacific Basin is a very dry area, whereas the Jungle is a very humid area. The Sierra (Mountains) is a region with a wide variety of climates. The majority of the people live where water is most scarce, which is near the coastline.
- ◆ The birth rate has decreased, especially in Lima, the largest metropolitan area. However, the population growth rate is one of the highest of the nation due to migration from the highlands and the jungle. A similar pattern is observed in other coastal cities. This creates pressure on water consumption in the Pacific Basin.

Conclusions (II)

- ◆ Economic growth has also created pressure on food consumption. It has been shown that as the annual per capita income has increased; the per capita consumption of chicken meat has also increased. A similar trend has been observed in other food products.
- ◆ Use of blue water is intense along the Peruvian Coast. Rice, a low cost product, is its higher consumer. In some areas, export products of high value are grown and they even use very water efficient irrigation methods. A more rational use of water must be encouraged or even enforced as the water resources are being exhausted along the Pacific Basin.

Conclusions (III)

- ◆ Uncontrolled and illegal economic activities, such as illegal gold mining, are destroying the environment and heavily damaging Peru's water resources. In some cases, damages might be irreversible. It is necessary to enforce rules and regulations especially in the lower Jungle, where negligence from past authorities have allowed the formation of gold mining colonies that are preying on the environment. Some measures such as the issuance of certificates of origin for gold products may be necessary in the long term.
- ◆ Conflicts between agriculture, farming and other economic activities have occurred in the last years. These conflicts are related to the use and preservation of water. New avenues of communication are needed to avoid conflict which has already caused deaths and serious economic losses.

Conclusions (IV)

- ◆ The recent creation of the Water National Authority, ANA, the Ministry of Environment and the publication of new Water Law with new regulations have created a better framework for the integration of water resources management. However, Peru is a vast country and it is necessary to **enforce the new rules and environmental regulations**. There is an urgent need to form new capacities in the people in charge of natural resources management and to enforce laws and regulations.

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Thank you for your
attention!

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