

THE CHALLENGES OF WATER RESOURCES MANAGEMENT IN PERU

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ABSTRACT

The intention of this paper is to further facilitate the analysis and discussion among policy-makers, water users and stakeholders, regarding Peruvian water resource management problems and viable alternative solutions, from a broad and historic perspective. It describes the water resources supply and demand situation as well as the regulatory framework and institutional arrangements.

This paper argues that problems mainly stem from an inadequate water policy, from a weak and ineffective water authority and institutional arrangements. There are serious water use conflicts, which have increased in the last years, and these are a manifestation of a causal problem. This situation has created a vicious cycle that impairs the governance of water.

A sweeping reform of water related institutions and new water policies are proposed in order to make them more effective and encourage public participation in decision-making processes. This requires the political will and government's commitment.

Only shifting to a new paradigm for sustainable water resources development, which will be pursued through education and an awareness process, would assure achieving water resources management's goals.

Keywords: Peruvian water policy, conflicts, public participation, water governance.

1. INTRODUCTION

On March 22, 2005, numerous Peruvian readers of "El Comercio" (a major newspaper of Peru with nation-wide coverage) were struck by reading the headlines: "Peru would face water scarcity as North African countries." How come?

Although Peru is one of the 17 countries of the world with the most freshwater available per capita, it is currently among the top 30 countries that suffer water stress and scarcity. This is due to the fact that 70% of the population of Peru live in semiarid and arid regions; whereas the abundant supply of freshwater is located in the lower part of the Amazon basin, scarcely populated. It is also because of the poor management and underutilization of available water resources.

Ancient Peruvians developed a culture based on respect and harmony with their environment, managing water resources and developing a fine hydraulic infrastructure. However, currently Peru suffers from a water crisis plagued by inefficient end-use,

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inefficient allocation of water, pollution, depletion of water resources, and widespread water conflicts.

Mounting conflicts as a result of historic and structural problems indicates that water management is approaching the crisis level in Peru. The water crisis is a crisis of governance; is not just a matter of economics or technology. This problem tends to be a worldwide illness. This was concluded in 2003 by the United Nations World Water Development Report – Water for People, Water for Life. Thus, politics and policies have the answers for the problem. The UN report concludes: “it is agreed that basic principles of effective governance include: participation by all stakeholder, transparency, equity, accountability, coherence, responsiveness, integration and ethical issues”.

Two months ago, on July 28th, 2006, a new government gained control of the public administration of Peru. President Alan García’s political agenda states that he intends to provide deprived Peruvians access to water and also aims to ensure sustainable economic improvement for the rural poor. The current government has the historical opportunity to address water resources management challenges and also achieve his political objectives. Success, as stated in this paper, requires “a committed government with the strength and leadership to undertake this sort of process of change within the State system and to convey the required consensus among stakeholders and law-makers.” Peru can not wait any more.

2. SETTING THE CASE

In this section the context and background of the situation of water resources management in Peru will be broadly explained. This is fundamental to understanding the Peruvian case and the author’s arguments.

2.1 Basic Features

2.1.1 Geography and Demography

Peru is located in the central and western part of South America, along the Pacific Ocean. It has a population of approximately 27 million people and most of them live in urban areas (75%). The urban population continues to grow fast due to migration from rural areas (in 1940 urban population was 35%). Lima, the capital city, located in the central coast, has a population of 8 million people.

Peru has an area of 1’285,216 Km.² comprising three major natural regions: the Coast, the Sierra and the Jungle:

- *The Coast* (covering 10%): a long and narrow desert along the Pacific Ocean in the West side of the country; climate varies from extreme arid (southern coast, rainfall 5 mm/year) to semiarid (extreme north); temperature is fairly moderate (between 15 to 30 °C); inhabited by two-thirds of the national population.
- *The Sierra* (31%): made up of the Andes range, a very mountainous area of highlands and valleys in the central part of the country, standing from 2,000 to 6,700 meters high; temperatures depending on the altitude, from mild valleys

to freezing highlands and snow-covered peaks; rainfall concentrated within summer months (December to March).

- *The Jungle* (59%): covered by the Amazon tropical forest, humid and warm; starting from the very humid eastern slopes of the Andes (at 2,000 m.) to the open Amazon plain; although the largest region is the most scarcely populated.

2.1.2 History

The first known communities in Peru date from 10,000 BC and were comprised of hunter-gatherer societies, which were sustained by hunting, fishing and harvesting. The first organized societies and cultures began around 3,000 B.C. In the following fifteen centuries, these populations increased and societies progressed, gaining organizational, technological and military development. The last stage of this societal evolution was the development of the Inca Empire, which predated the appearance of the Spanish and the colonial domination.

Table 1: Historical Chronology of Peru

Age / Period	Period
Primitive communities	10,000 BC – 3,000 BC
Pre-inca cultures	3,000 BC – 1,470 AD
Inca Empire	1,100 – 1,532 AD
Colonial age	1,532 - 1821 AD
Republican	1821 - present

Source: Gran Historia del Perú, Empresa Editora El Comercio, Lima, Peru

Ancient Peruvians made fine jewels, cloaks and ceramics. They built pyramids and palaces, which are annually admired by thousands of tourists. More remarkably, ancient Peruvians not only learned how to survive in the hardship of arid or semiarid climates and mountainous regions, but also developed a sustainable culture based on organization and technologies that adapted to their environment. As a result, they domesticated hundreds of plant and animal species, for food, medical and housing purposes and managed the various ecological niches of the Andes, well managing scarce water resources.

The Incas and pre-Inca cultures considered water as the blood from the mountain and venerated mountains as divinities. They were respectful of and lived in harmony with nature. They developed watershed management techniques to make steep mountain slopes suitable for agriculture. They also developed hydraulic infrastructure to make dry lands become productive: they built channels, aqueducts and terraces and developed irrigation systems. In fact, during the Inca period, there were 700,000 ha. irrigated area in the Peruvian Coast (76% of current irrigated area, according with Ministry of Agriculture) and 1'000,000 ha. of productive terraces in the Andes².

The colonial period provoked the rupture of the ancient Peruvian civilization. The Spanish domination meant: a) neglecting whatsoever form of native culture, b) ignoring the environmental characteristics of the country, c) the appropriation of economy surplus, and d) imposing their own rules, language and religion. In sum, during the

² Blossiers Pinedo, Javier et al, “Agricultura de Ladera a través de Andenes, Perú”, via: <http://www.rlc.fao.org>

Spanish domination was installed an alienated and privileged ruling class (urban) over the massive and deprived indigenous people (rural). Peru's independence from Spain did not automatically improve this negative situation, as the Spanish minority continued to maintain the economic and political power of the country³. The alienation between the Colonial State and the people was inherited by the Republic.

2.1.3 Economic and Social issues

Peru is currently struggling to leave the condition of a low income country to become a middle income country. The main macroeconomic and socioeconomic figures are shown in Table 2.

Table 2: Peru, Main Macroeconomic and Socioeconomic Figures

Currency: <i>Nuevo Sol</i> (1 US \$= 3.3)
Inflation rate (2005): 1.5% (a)
Gross National Product (2005): \$US 76,571 Million Dollars (a)
GNP per capita (2005): \$US 2,813 (a)
Unemployment rate (2001): 9.5% (b)
Underemployment rate (2001): 45% (b)
Informal economy: 60% of working force (c)
Poverty rate: 51.6% (2004) (c)
Extreme poverty rate: 19.2% (2004) (c)
Infant mortality rate (2000): (d)
Urban: 28 ‰
Rural: 60 ‰
Women illiteracy rate in rural areas: 37.4% (2002) (d)

Sources:

(a) Banco Central de Reserva del Perú

(b) U.S. Department of State

(c) Delegación de Comisión Europea en Perú

(d) Instituto Nacional de Estadística e Informática – INEI (Peru)

The Peruvian economy depends on the production of primary products with few added value, namely mining, fishing and agriculture products. On the other hand, Peru has to import diverse types of processed and industrial products including machinery, chemical products, processed food as well as food commodities.

Public policies throughout the Republican period had created and supported a short modern and formal sector in the Economy aside from a large traditional and informal sector. The traditional rural and urban informal sector comprises a high and still growing share of the active labor force, with less value-added contribution to GNP. This duality prevents and opposes a self-sustaining national economic development.

For these reasons it is not surprising to have a high percentage of impoverished Peruvian people, the majority of whom, 48% of the extreme poor⁴, are indigenous

³ This is well condensed by the Peruvian philosopher Francisco Miró Quesada (In: "El Comercio" newspaper, p. a5, Lima, June 30, 2006): "*The Peruvian peasant is an alien in his own homeland. This discrimination is the consequence of the Spanish conquest of the Incas and the subsequent (three and a half) centuries of colonial domination*".

⁴ ENAO – Perú, 2001

people living in the rural sector. The poverty rate in the rural area of the Sierra is 80%, whereas in the capital city of Lima it is 35%⁵. This situation is dire because the indigenous people make up a large part of the Peruvian population. There are over 8 million indigenous people still living in small communities or villages in the Andes of Peru.⁶

To conclude this section: the issue is not only poverty; the issue is a matter of exclusion, inequality, and corruption. This unfortunate formula creates conditions for conflicts, social unrest, and eventually subversion.⁷

2.2 Water Resources Supply and Demand

2.2.1 Supply

Peru is an endowed country in terms of freshwater resources, with 2'046,287 Mm³ or 77,534 m³/person-year. This ranks Peru as the 17th country of the world in terms of water availability per capita. However, water resources in Peru are unevenly distributed. Seventy percent of the Peruvian Population live in arid or semiarid areas of the Pacific basin, which have less than 2% of the available water resources of Peru⁸; 87% live in the Coast and Sierra regions, either in arid or semiarid climates⁹. Most of freshwater resources (more than 98%) are located in the Atlantic basin, primarily in the Amazon forest lowlands, which are scarcely populated and with few demands for water (see Table 3).

Table 3: Water Resources Supply in Peru

Basin	Watershed	Area (x1,000 km ²)	Population		Water	
			(x1,000)	%	Mm ³	%
Pacific	53	279,7	18 430	70	37 363	1,8
Atlantic	44	958,5	6 852	26	1 998 752	97,7
Titicaca	9	47,0	1 047	4	10 172	0,5
TOTAL	106	1 285,2	26 392	100	2 046 287	100,0

Source: National Strategy for Freshwater Resources Management in Peru (Multisectoral Technical Commission, December 2004).

2.2.2 Demand

The total consumptive uses for water comprises annual withdrawals of 20,072 Mm³ as shown in Table 4. This amount equals just 1% of the total national freshwater resources.

⁵ ENAO – Perú, 2002

⁶ via <http://voltage.net.org/article126618.html> "Peru: pueblos y comunidades marcharon contra la privatización del agua y contra la explotación minera"

⁷ According with Truth & Reconciliation Commission report (2003), during years 1980 and 2000 subversive movements and military repression have caused 69,000 deaths in Peru; 75% of the assassinated were indigenous people.

⁸ Source: National Strategy for Freshwater Resources Management in Peru (Multisectoral Technical Commission, December 2004).

⁹ Source: via <http://es.wikipedia.org>

Taking into account Peruvian society's weakness in coping with water stress, -due to a low water governance, as it is explained in this paper, Peru is ranked among the 30 countries confronting with the most severe water stress and scarcity (Ohlsson, 1999).

Agriculture is the main societal water user, using 80% of the total withdrawals for irrigating an area of 1'145,000 ha., mostly (77%) located in the Coast region¹⁰, irrigated area figures for year 2001). Despite of this, Agriculture is a low productive Sector: in holds 27% of national labor force but is responsible for only 7% of the GNP¹¹.

The domestic use, which has the first allocation priority according to the law, receives 12.2% of the water. However 24% of Peruvians have no access to water supply services, 43% have no basic sanitation facilities and only 22% of total domestic wastewater is properly treated¹².

The most significant non-consumptive use is energy, with 11,139 Mm³ of water turbined by hydroelectric plants, which generate 81% of the total energy produced in Peru¹³.

Mining and industry consume a smaller share of national water demand and both sectors yield significantly higher economic value than the others. Although the mining sector uses only 2% of total water withdrawals, 46% of national exports are mining products (US\$ 4,532 in year 2003)¹⁴. Mining is a high productive sector: 1% of national labor force and contributes with the 6% of GNP¹⁵. Industry takes 5.8 % of the water and contributes with 25% to GNP¹⁶. However, both high-yield sectors cause the most severe pollution problems in the country.

Table 4: Consumptive Uses for Water in Peru, by Sectoral Users (Mm³)

Basin	Domestic	Agriculture	Industrial	Mining	Total	%
Pacific	2,086	14,051	1,103	302	17,542	87.4
Atlantic	345	1,946	49	97	2,437	12.1
Titicaca	27	61	3	2	93	0.5
Total	2,458	16,058	1,155	401	20,072	100.0
%	12.2	80.0	5.8	2.0	100.0	

Source: INRENA (Peru), 2004.

2.3 Legal Framework and Institutional Arrangements

The legal framework for water management in Peru is ruled by the General Water Law, which consists of six major features:

¹⁰ Source: via <http://www.minag.gob.pe>

¹¹ Source: via <http://www.cied.org>

¹² Source: Nacional Plan for Water supply and Sanitation 2006 – 2015, Ministry of Housing, Construction and Water supply and Sanitation

¹³ Source: Source: National Strategy for Freshwater Resources Management in Peru (Multisectoral Technical Commission, December 2004).

¹⁴ Source: via, <http://www.proinversion.gob.pe>

¹⁵ Source: via <http://www.minem.gob.pe>

¹⁶ Source: via <http://www.adonde.com>

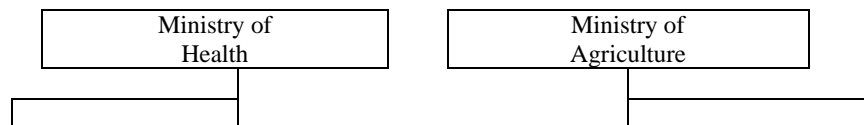
- Water resources are property of the State;
- Water rights transfers are prohibited;
- Water authority for quantity issues is within the Ministry of Agriculture administration¹⁷; for quality issues authority is Ministry of Health (see Figure 1);
- Law is biased to agricultural use (irrigation) and to the coast region conditions;
- Customary law in Andean region is ignored and not acknowledged;
- Water quality issues are poorly addressed.

The General Water Law was passed in 1969 by a military government that ruled Peru from 1968 to 1980. This was a leftist government that assigned a strong role of the State in the economy, in a interventionist manner. They developed a water policy, which in many regards is still valid today. This water policy assigns a hegemonic role to the State from the supply side and a limited role to the private sector from the demand side. The General Water Law was indeed a major tool to implement this Government policy. This sort of role is past. Since the 90's, the role of the State has changed. Currently the State is to promote, enhance, oversee and regulate the participation of private sector in the economy.

For these reasons the General Water Law is inadequate and obsolete. But so far all government attempts and proposals aimed to pass a new law and to modernize regulatory framework have failed, due to opposition from stakeholders or lack of consensus¹⁸.

The current water authority organization of Peru is shown in Figure 1¹⁹. As seen, the highest administrative level of water authority is the National Intendancy for Water Resources, within the National Institute for Natural Resources (INRENA)²⁰ of the Ministry of Agriculture. Currently, Peru is divided into 68 irrigation districts²¹, each of them in charge of a "Irrigation district technical administrator", who is the local water authority. Within a water district there are one or more water user organizations, by which formal irrigation users manage water. The water administrator also reports to the respective Agriculture Regional Director. Being subordinated to the Ministry of Agriculture administration has negatively affected the water authority at all levels, locally and nationally. In parallel and according to the law, the Ministry of Health is organized to act as the water authority for quality issues.

Figure 1: Current Water Authority Organization in Peru



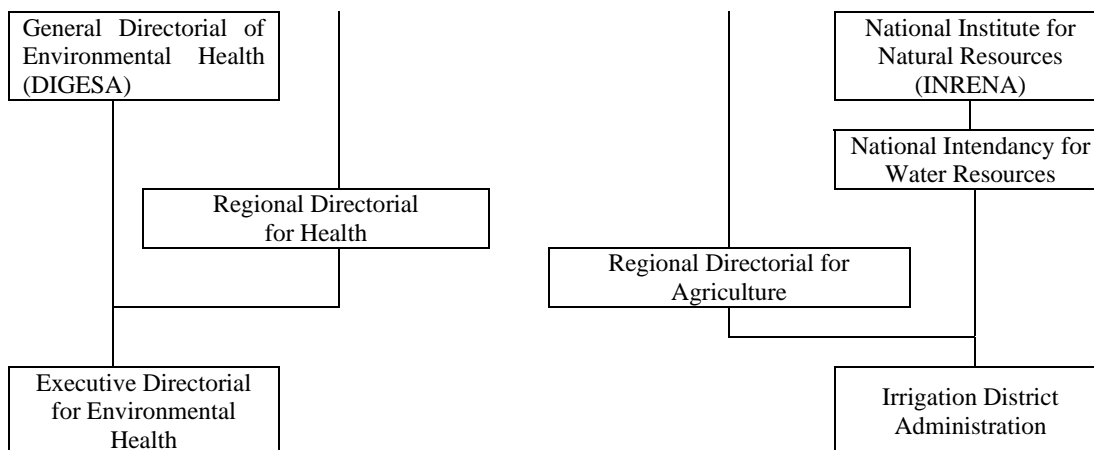
¹⁷ However, other Ministries and agencies have also roles and functions (allocation, regulations, studies, investment, technical aid), as shown in Table 5.

¹⁸ Discussions for a new water law started in 1993. It has been elaborated a number of proposals, last one was in May 2005.

¹⁹ To make the table simple, it is only shown the two main water authorities stated by the General Water Law (1969).

²⁰ Originally, according with the General Water Law, the highest water authority level was the General Directorial of Water, Soil and Irrigation, directly dependant from the Ministry of Agriculture.

²¹ Roland Valencia, officer, National Intendancy for Water Resources.



Actually, the roles of water authority are dispersed (and sometimes overlapped) among several government Sectors and agencies. In relation to water management from the supply side, Table 5 shows various roles and functions shared by different Government Sectors and State agencies, comprising the Presidential Advisory Board for Ministries, eight (08) ministries and thirteen (13) main State agencies.

Table 5: Peruvian Institutions Performing Water Management Roles

Sector / Agency	Role
National Intendancy for Water Resources (Ministry of Agriculture)	Water authority (in general), allocation of water resources (for most of the uses), conflict resolution among waters users
General Directorial for Environmental Health – DIGESA (Ministry of Health)	Preserving water quality, norms, monitoring and sanctions
Ministry of External Commerce and Tourism	Allocation of thermal water resources
Ministry of Energy and Mining	Sub soil concessions (allocation) for mining purposes ²²
Ministry of Production	Regulations for water use for industry and fishery purposes
National Directorial for Water and Sanitation – DNS (Ministry of Housing, Construction and Water supply and sanitation)	Authority for domestic use of water (water supply and sanitation)
Rural Water and Sanitation National Program – PRONASAR (Ministry of Housing, Construction and Water supply and sanitation)	Implementing water supply & sanitation in rural communities and small cities
National Fund for Compensation and Social Development - FONCODES (Ministry of Woman and Social Development)	Implementing water supply & sanitation in rural communities and small cities
National Council for the Environment –	Environmental authority: environmental

²² Sub soil concessions does not include water allocations, but in fact many times the concessionaire gets the control and use rights for surface water sources/bodies *de facto*.

Sector / Agency	Role
CONAM (Presidential Advisory Board for Ministries)	policy, norms, water quality monitoring and control, sanctions, environmental studies approval ²³ .
National Institute for Natural Resources – INRENA (Ministry of Agriculture)	Studies and inventories of water resources
Water, Land and Watershed Management National Program – PRONAMACHCS (Ministry of Agriculture)	Technical assistance for small farmers in the Andean region
Sectoral Irrigation Program – PSI (Ministry of Agriculture)	Technical assistance for irrigation farmers in valleys of the Coast
National Institute for Development – INADE (Ministry of Housing, Construction and Water supply and sanitation)	Implementing irrigation projects
National Intendancy for electrical services – OSINERG (Presidential Advisory Board for Ministries)	Electric facilities tariff regulation (mostly hydro energy)
National Intendancy for water supply and sanitation services – SUNASS (Presidential Advisory Board for Ministries)	Water tariff regulation for domestic use
Meteorology and Hydrology National Service – SENAMHI (Ministry of Defense)	Collecting, processing and providing meteorological data
National Institute for Civilian Defense – INDECI (Presidential Advisory Board for Ministries)	Prevention and response to natural (hydrologic) disasters

3. THE PROBLEMS

The Peruvian water policy²⁴, legal framework and institutional arrangements developed in the last 37 years in Peru have caused severe deficiencies and flaws in the Peruvian water management situation, which can be further categorized in two major groups. Empirical evidences gathered and assessed by the author are reported in this section.

3.1 Water-policy related problems

- a. Implemented water policy has proved to be inadequate and unable to achieve sustainable development goals. This situation can be characterized by specific problems which have derived to consequences, which in fact are other problems. This cause-effect relationship is presented in Table 6.

Table 6: Water-policy related problems in Peru

Cause	Effects
Water law biased to agricultural irrigation and coastal region conditions	• Inappropriate water law framework for people of the Sierra and Jungle regions;

²³ Since October, 2005, as stated by law N° 28611 “General Law for the Environment”.

²⁴ Including not only approved official policies, but also *de facto* policies: actual but not written policies, usually with negative outcomes.

Cause	Effects
	<ul style="list-style-type: none"> • Sierra region stagnated, with little support to aid agricultural development
Concentration of decisions at the central level of government, decisions are taken in Lima	<ul style="list-style-type: none"> • Laws and regulations are not appropriate for the regions and provinces outside of Lima; • Sense of frustration and discontent; people see a hierarchical and authoritarian decision-making process.
No acknowledgement of indigenous water rights	<ul style="list-style-type: none"> • Mining users and Coast and Jungle regions's users are allocated water and land resources, which were formerly in hands of indigenous people • Indigenous people's quality of life worsens and poverty increases.
Assigning an oversized role to water management from the supply side	<ul style="list-style-type: none"> • During the period 1971-2001, US \$ 5,000 million were invested in large scale irrigation schemes with few results²⁵; • End-use efficiency measures/improvements are not emphasized; • Externalities from irrigation projects: 33% of irrigated area on the Coast region is affected by saline soils and flooded lands.
Allocation efficiency is not pursued (water transfers prohibited)	<ul style="list-style-type: none"> • Low productive agriculture due to low-yield crops allocation; • Farmers are not given incentives to be efficient (low end-use efficiency)
A welfare approach for state investment and expenditures	<ul style="list-style-type: none"> • Subsidized water tariffs (irrigation and domestic)²⁶; • Private initiatives are discouraged; therefore a lack of private investment for water resources development and for responding the demand.
No access to water supply for 38% of rural families; no basic sanitation services for 70% of rural families ²⁷	<ul style="list-style-type: none"> • High incidence of infant mortality and water-related diseases among deprived families²⁸; • Increasing poverty in deprived people.

3.2 Water-authority related problems

As a direct consequence of the legal framework and subsequent institutional arrangements, there is a weak water authority and it is unable to fulfill its own roles

²⁵ Source: National Strategy for Freshwater Resources Management in Peru (Multisectoral Technical Commission, December 2004).

²⁶ Water tariffs for traditional irrigation in a valley of the Coast in La Libertad Department are between US\$ 0.003 and 0.004 per m³ (Gerardo Alegría, officer, Chavimochic Irrigation Project, 2005)

²⁷ Source: Ministry of Housing, Construction, Domestic water supply and Sanitation (2005). In total, 6.4 million Peruvians, from small rural villages and marginal urban areas, have no access to water facilities.

²⁸ Acute Diarrhea incidence rate (a water-related disease) in Peru is 192 % (Ministry of Health, 2004)

mandated by the law. This situation is assessed by negative factors related through a cause-effect relationship of problems related to the performance of the water authority in Peru, as shown in Table 7.

Table 7: Water-authority related problems in Peru

Cause Problemas Relacionados con Políticas de Agua	Effects
Water authority is subordinated to the agricultural sector administration	<ul style="list-style-type: none"> • Water authority decisions are biased to agricultural sector, which limits its leadership; • Water authority lacks a comprehensive view of the problems; therefore it can not accurately assess supply and demands, nor propose solutions.
Concentration of power of the public administration at the central level (capital city of Lima)	<ul style="list-style-type: none"> • Laws and norms are not appropriate for regions and provinces outside of Lima • Government decisions and actions are not supported by people.
Politicians' interference with water authorities' decisions and/or non-compliance of the law	<ul style="list-style-type: none"> • Unjust and/or incorrect decisions are made against society's interests; • Water tariffs do not cover O&M, water conservation nor water treatment costs; • Public budget is wasted or ineffectively allocated.
Fragmentation, overlapping and/or poor coordination between various state water-related agencies	<ul style="list-style-type: none"> • Inefficient and/or ineffective use of scarce public budget; • Pollution and depletion of water resources.
Corruption of some functionaries and officials	<ul style="list-style-type: none"> • Sense of mistrust and discontent among the people in relation to government actions; • Pollution and depletion of water resources
Insufficient budget to fulfill water-related agencies' functions and plans	<ul style="list-style-type: none"> • Agencies' functions and plans can not be accomplished.
Illegal and informal users in water supply systems (irrigation and domestic), with no sanctions	<ul style="list-style-type: none"> • Financial deficit by water management organizations; • Encouraging a norm-disobedient culture

Deficiencies in government performance have caused inefficiencies in water management and conflicts among users. It could be briefly stated that the described problems with the Peruvian water management situation have caused the following three major effects:

- Inefficient water end-use;
- Inefficient water allocation use;
- Conflicts among water users and stakeholders.

This situation, in turn, increases environmental degradation, the depletion of natural resources, and widespread poverty. The current situation may worsen due to climate

changes and the global warming phenomena and would cause a decrease of the actual availability of water resources

Esta situación, a su vez, incrementa la degradación ambiental, el agotamiento de los recursos naturales y la pobreza generalizada. La situación actual se puede agravar debido a los fenómenos de cambio climático calentamiento global que provocarían la disminución de los recursos hídricos disponibles²⁹.

The challenge to Peruvian society and government sector is to confront and overturn this negative reality in a democratic, intelligent and definitive manner.

4. THE CONFLICTS

IPROGA, the Peruvian Institute for Water Management Promotion, proposes the following definition for water use conflicts:

A water use conflict is a situation by which two or more persons or bodies compete for the control, access, use and/or possession of a water resource, in terms of any or all of its attributes: quantity, quality and opportunity.

Water use conflicts surge when any of the problems exposed in the previous section affects two parties' interests. The tension raises when there is a body (individual or group) that is severely affected by a water-policy and/or water-authority related problem. Thus, the affected body reacts against who they consider is the causal agent (or the visible cause) of the problem.

Current water use conflicts in Peru were originated during the colonial age. These problems are rooted in the historical facts mentioned in sections 2.1.2 and 2.1.3. These are the visible reminders of a water crisis that Peruvians are currently confronting and challenged to solve.

The water-policy and water-authority related problems and water use conflicts have shaped an adverse panorama that may threaten and jeopardize water governance conditions in Peru and this should be stopped and reversed.

The water governance, according to Rogers (2002), refers to the range of political, social, economic, and administrative systems that are in place to allocate, develop, and manage water resources and the delivery of water services for a society. Water governance is the capability of a social system to mobilize energies in a coherent manner, for the sustainable development of water resources. The notion includes the ability to design public policies which are socially accepted and to make their implementation effective by the different actors/stakeholders involved in the process.

The following quote coming from an internet newsletter,³⁰ clearly portrays the situation in Peru regarding water use conflicts. This is the case of a water-policy related problem: "no acknowledgement of indigenous water rights" (Table 6). These effects are suffered by Andean farmer communities in Piura.

²⁹ Como ejemplo, las áreas de glaciares (2,600 Km²) se han reducido en un 22% en los últimos 27 a 35 años (Source: via <http://www.conam.gob.pe>).

³⁰ Via <http://www.consumosolidario.org/>

Mining company Majaz: a bloody conflict

Lima, August 4, 2005

Seven peasants from communities in the north of Peru died when the police tried to stop them from marching towards the area of exploration of the Mining Company Majaz (Region of Piura) during a protest, according to reports by community members, local authorities and a catholic bishop.

Furthermore, 40 people were injured, between six and eight disappeared and 32 were detained by the police, according to the bishop. He had tried to mediate between the communities and the Majaz company. This company explores a copper mine in the Blanco River, a freshwater reserve area, which could result in contamination in the future.

The local communities oppose the company's operations because an important aquifer (wetlands) that feeds the Blanco and Quiroz rivers is located here. These rivers are fundamental in supplying water to the communities from the Pacific and Atlantic basins.

Pereyra (2005), reported about a survey carried out in 2004, in 11 of the 24 Departments of Peru, concluding that water use conflicts have been increasing alarmingly in Peru. He identified 85 different water use conflicts and classified them in various types according to the following criteria:

- When the resource attribute is the cause: quality and/or quantity of water, use opportunity or a combination of these;
- According to the state of the conflict: open (current), latent (have stopped without solving it) and potential (could eventually start);
- Sector users conflicts: when users of different sectors are conflicting (e.g. a water utility company and farmers competing for a source of water);
- Territorial conflicts: people and users from different regions, provinces, valleys, irrigations schemes, are in dispute for the same water resource.

The Eight Report 2004 – 2005 from the Defender of the Town³¹ to the Congress of Peru concluded: “Social and political conflicts are currently a very serious concern for the country and a high-priority issue for the State”. The same report pointed out that 78% of total conflicts have occurred in impoverished zones of the country.

At the present time in Peru there are diverse and acute social conflicts among water users and stakeholders. Table 8 shows some of the important and frequent types of conflicts currently confronting Peruvian society from the author's point of view.

Table 8: Main Kinds of Water Use Conflicts in Peru

³¹ The “Defender of the Town” is an independent constitutional organ. Its mission is to protect the constitutional and fundamental rights of the person and the community, to supervise the fulfillment of the duties of the public administration and the benefit of the services public to the citizenship.

Parties in conflict	Conflicting issue
Formal irrigation users versus informal users in the coastal valleys	Dispute of volume of water
Small farming communities in the Andes and native communities in the Amazon area versus mining (Andes) and oil (Amazon) companies	Quality of water bodies (preserving against contaminating)
Upstream versus downstream water users, in the Pacific watersheds	Dispute of volume of water
Water & sanitation facility companies versus upper communities	Dispute of volume of water
Water & sanitation facility companies versus downstream communities	Quality of water bodies (public health)
Neighboring regions, watersheds and irrigation schemes	Dispute of volume of water (disputing the same water resources)
Users organization and groups of interests versus government.	Stakeholders' confrontation regarding water rights interests (a new water law)

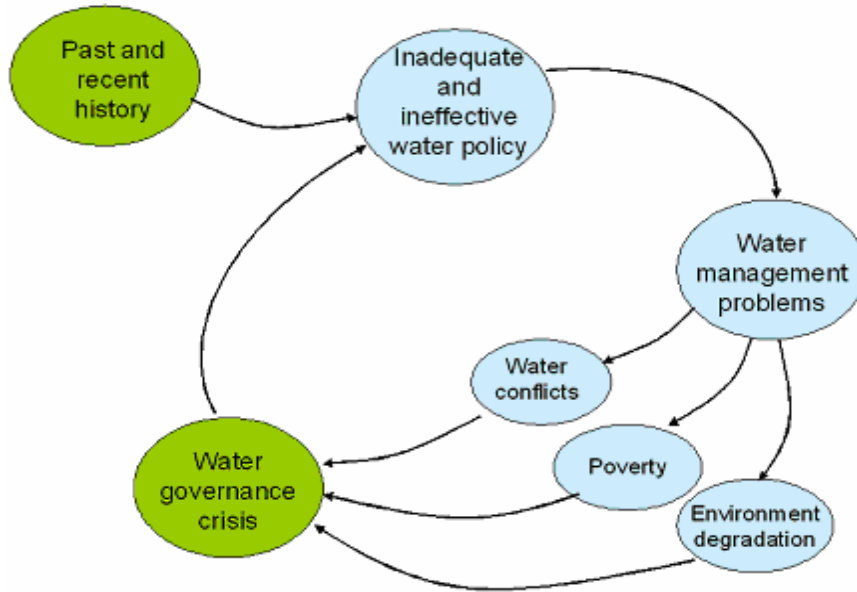
Conflicts will always happen. They are expected to happen in a situation of scarce and/or inefficiently managed water resources among competing users in a common watershed and/or when demanded by coming new users. Not even an integrated water resources management approach can guarantee a conflict-free social environment. This would be a utopia. However, what makes water use conflict in Peru a serious concern is:

- a) Their tendency to increase in number and size;
- b) The complex historical and political roots that have originated favorable conditions for conflicts;
- c) Lack of mechanisms for conflict-resolution and the lack of appropriate institutional arrangements for people's and grass-roots organizations' participation.

Conflicts are usually viewed negatively; however, conflicts can also be viewed as an opportunity of positive radical change for the better. Open conflicts remind Peruvian society, including the political class, that behind a conflict there is a problem that has to be confronted and solved, and that careful and great decisions must be made in order to avoid future problems.

From a systemic approach, this negative situation could be comprehensively understood as a vicious cycle, shown by Figure 2. Fed by the historical and political roots, the inadequate and ineffective water policy implemented in Peru has caused water management problems and conflicts. This worsens water governance conditions, in turn, causing water policy to remain inadequate and ineffective.

Figure 2: Vicious Cycle of Water Resources Management in Peru



5. ADDRESSING THE CHALLENGES

This section will briefly address the issues and measures that are viewed by the author as necessary and crucial to be undertaken by Peruvian society in order to:

- Improve water resource management;
- Contribute to achieving sustainable development goals;
- Contribute to solve water use conflicts;
- Enabling and improving water governance.

5.1 Water Policy

Solanes and Jouravlev (2006) correctly affirm that “governance implies the capacity to both generate and implement appropriate policies. These capacities are the result of having established consensus, having designed coherent management systems, as well as adequate administration of the system. A core element of governance is the capacity of constructing institutional arrangements in harmony with the nature of the abilities, limitations and expectations of the system or area under consideration.”

A new effective and appropriate water policy is urgently needed in Peru. This water policy would include the following main elements:³²

- a) State ownership of water resources (surface and underwater)³³.
- b) Implementing an integrated water resources management approach³⁴ in a consistent and systemic manner.

³² Some of these elements coincide with the principles and strategies of the National Strategy for Freshwater Resources Management in Peru (Multisectoral Technical Commission, December 2004).

³³ Keeping the same principle stated by the current General Water Law.

³⁴ IWRM basically means to integrate and harmonize multiple uses of water and diverse water users, in their natural and cultural space -the watershed, for the better-off of their inhabitants and well-being of future generations. It also means to assemble and to complement the roles and functions of the water-related state agencies in an efficient manner.

- c) Improving end-use water efficiency through promoting technological improvements and no subsidies to operation and maintenance costs.
- d) Allowing water transfers among users under certain conditions, as a mean to promote allocation efficiency, high-yield crops or higher return to water inputs.
- e) Coordinating between water sector policy-makers and macroeconomic policy-makers in order to develop wise and sound macroeconomic measures (economic incentives, targeted subsidies, interest rates, etc), in order to convey decisions of water users and to make more effective public water resources investments.
- f) Promoting actors and stakeholders joint participation (water user organizations, grass root organizations, NGO's, State and private water-related agencies) at watershed, river basin and national levels, as an approach for participative planning, interests compromising and conflict resolution.
- g) Developing payment or compensation mechanisms for environmental services between downstream and upstream users/dwellers, in order to promote water and land resources conservation and environmental sustainability.
- h) To effectively ensure equitable access to water for people; this gives priority to providing safe drinking water and basic sanitation for all in a sustainable manner.
- i) Recognizing and guaranteeing indigenous uses and customary laws, particularly in the Andean and Amazon regions.
- j) Promoting private investment for water resources development, and private sector participation in the management (operation and maintenance) of water facilities;
- k) Promoting that all users and stakeholders comply with the law and be socially sensitive and environmentally aware.

A new water law would be a major instrument for implementing an effective water policy. It is very important that the new water law be short and simple, dealing only with ruling principles and general norms. This would allow the water authority at the river basin level (regional) to approve their own norms that are suitable and appropriate to their own reality. This is recommended for two reasons: i) it would allow national law and policies to be adapted and tailored to the specific cultural, geographic, climate, social and economic characteristics of Peru at the regional level; ii) it would favor social participation to discuss and to reach consensus at a regional and even local level. Thus allowing them to discuss, approve and update their own norms.

5.2 Water Authority

Although this issue is subordinated to water policy, it deserves particular attention. It is imperative to restructure the water management system by implementing a strong and single water authority entitled for multiple uses, which should be autonomous, reliable, capable and to perform a participative leadership. This authority should not be dependent on any Ministry and is to be assigned a territory comprised within a certain river basin.

The water authority, in a decentralized mode, has to perform the following roles:

- Promoting and ensuring water users' and stakeholders' participation/involvement in:
 - Planning and decision-making processes, taking the watershed as the territorial unit,
 - conflict-resolution mechanisms;
- Allocation of water rights;

- Approving norms related to water resources management for multiple uses³⁵;
- Sanctioning law-violators;
- Regulating tariffs and standards³⁶;
- Getting mobilized resources from lower to upper watersheds, for water & soil conservation;
- Assessing water supply and demands, risk assessment;
- Implementing and integrating an information system, including: inventory of sources; collecting, monitoring and processing meteorological and hydrologic data; land use information.

In order to ensure the institutional structure that has to support this process, it is recommended to consider the creation of a Ministry of Environment and Water Resources in Peru, as other Latin American countries already have. This ministry would have the mandate to accomplish an integrated water resources management approach harmonized with environment and renewable natural resources management. This does not necessarily mean to increase bureaucracy but to move them, because government agencies that currently fulfill natural resources management roles (as INRENA, CONAM, SENAMHI, see Table 6) would have to become part of this new Ministry.

It is evident that implementing these policies will not be an easy task. In many cases it would be like “to swimming against the current”. It is also clear that the implementation of a new water policy is a process, indeed a long-term process, so a strategic plan would be essential in order to succeed on this goal.

A crucial and critical ingredient for implementing an effective water policy and installing a strong water authority in Peru is the political will. It requires a committed government with the strength and leadership to undertake this sort of process of change within the State system and to convey the required consensus among stakeholders and law-makers. The decision-makers’ commitment is needed to design and implement an institutional capacity building strategy within the Peruvian public administration system. This has been well addressed by Dourojeanni and Jouravlev (2001). This implementation also implies that policy-makers need to undertake a holist and comprehensive approach for water management, restructuring the current institutional and legal framework, in order to implement integrated water resources management instruments. These measures are crucial since currently water management from the supply side is strongly sectoral in Peru, fragmented, inefficient, and subordinated to the Agriculture sector.

5.3 Public Participation and Decentralization

New policies and regulations should not be imposed on the water users. Initiatives are supposed to come from the national government, but have to be enriched and legitimized with the views and contributions from the various water users/actors from the different regions of the nation, arriving as possible at broad consensus. For this reason, public hearings or consultation have to be hold. Also, in order to adequately inform the public, actors and stakeholders about the issues on scene, it would be useful to prepare and disseminate written information using the media for this purpose.

³⁵ For Amazon river basin entities, this includes navigation and fishing uses.

³⁶ For the case of domestic use, the subordination of the current regulatory agency to the (future) water authority would require a precedent well functioning of the national and river basin entity.

Water authority has to perform a participative leadership. This is very important in a country like Peru, with little tradition of public participation in government issues, a weak democratic system, a large rural area, and a wide informal sector of the economy where the State is distant from the people. Decision-making and conflict-resolution processes must be done at the local level, from the bottom-up. For this sake, water authority needs to be close to users and stakeholders as much as possible.

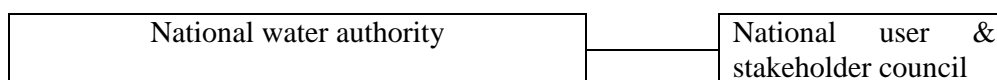
The decentralization is another critical issue to address if sustainable water resource management goals and improvements in water governance are to be achieved. This is true because historically Peru has been and is still a very centralized country.³⁷ In 2002 the Peruvian Congress modified the Constitution and then passed a law establishing the political, economic and administrative decentralization of the Peruvian State³⁸. However, decentralizing the overwhelming political and economic power concentrated in the capital city of Lima will be quite a long-term process and it will not be attained with only laws.

In order to favor public participation (water user organizations, grass root organizations, NGO's, State and private water-related agencies) in water management affairs, water authority's roles and functions and decisions have to be decentralized from the national level to river basin and watershed levels. For this sake, the national territory has to be divided by river basins. Each of them further subdivided by watersheds (according with technical, economic and cultural criteria), in order to establish and organize "River Basin Entities" and "Watersheds agencies". It is recommended to complete this process prior to the configuration of the definite political-administrative regions, as mandated by the law,³⁹ so river basin limits could be taken into account as references for the latter configuration of the regions.

Figure 3 shows a simplified version of an alternative structure for water management system in Peru. In all of these levels the public participation is performed through a sort of platform called "user and stakeholder council"⁴⁰, which would fulfill the following roles:

- Participatory planning and decision-making for water resources development;
- Compromising mechanism on controversial issues;
- Surveillance of public budget use;
- Discussion panel on specific issues.

Figure 3: Proposed National Water Management System for Peru

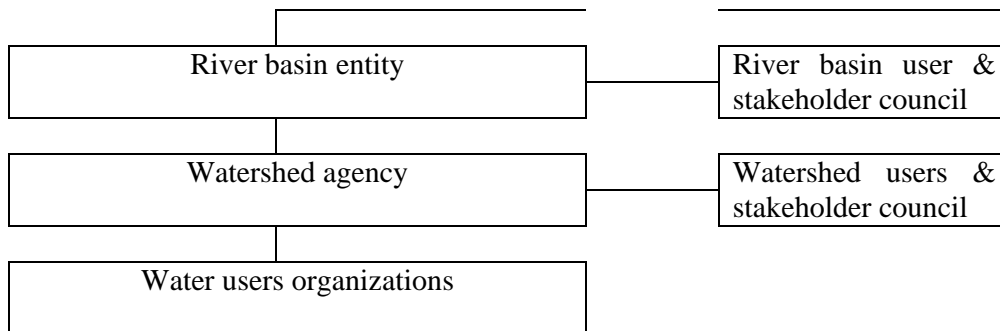


³⁷ 55% of Peruvian GNP is produced in the city of Lima; 77% of taxes are collected in Lima (Source: via http://www.actualidadeconomica-peru.com/antiores/ae_2001/220/descentralizacion.pdf)

³⁸ Law N° 27783.- "Ley de Bases de la Descentralización", July 17, 2002.

³⁹ According with Law 28274 – Ley de Incentivos para la Integración y Conformación de Regiones" (June 16, 2004), future and definitive regions will be formed by the fusion of two or more neighboring departments, starting from initiatives from their respective departmental authorities.

⁴⁰ Similar to a multiple stakeholder platform (MSP), but with a legal mandate and financially supported by the State. Currently, there are some platforms functioning in some areas of Peru, formed by local stakeholders' initiative, with some kind of external technical and financial aid. Only few of them, as IRAGER in Piura, have a regular performance.



5.4 Education and Awareness:

The proposed ideas will not happen spontaneously. The political will would not come automatically and if it comes it may be easily diffused. The only safe and irreversible way to interrupt the vicious cycle formerly described (Figure 2) is through a shift of paradigm in Peruvian society regarding water resources.

A paradigm is the set of experiences, beliefs and values that affect the way an individual perceives reality and responds to that perception. A “dominant paradigm” refers to the values, or system of thought, in a society that are most standard and widely held at a given time. Dominant paradigms are shaped both by the community’s cultural background and by the context of the historical moment. A “paradigm shift” denotes a change in how a given society goes about organizing and understanding reality⁴¹.

This is not new and there are already strong social movements in some other countries, advocating a new paradigm for water resources development. Arrojo (2006) proposes “a new culture for water”, sharing his views regarding the case of Spain.

What does Peruvian society have to agree on? The new paradigm for water resources in Peru would include the following essential features:

- A common vision for national identity;
- Shared values and attitudes:
 - Environment awareness: to take care of environment is “a must” now and it is in our self interest;
 - Respect for the law and norms: if legitimate, it is not necessary a guard to obey it;
 - Pride of our own history and culture: this ensures self-esteem and self-confidence, individually and socially.
- Agreed core goals:
 - Equity, everybody has access to water;
 - Efficiency, water is socially scarce and negative externalities are undesired, thus economic efficiency is needed;
 - Environment conservation, ensuring environmental assets and resources for future generations.

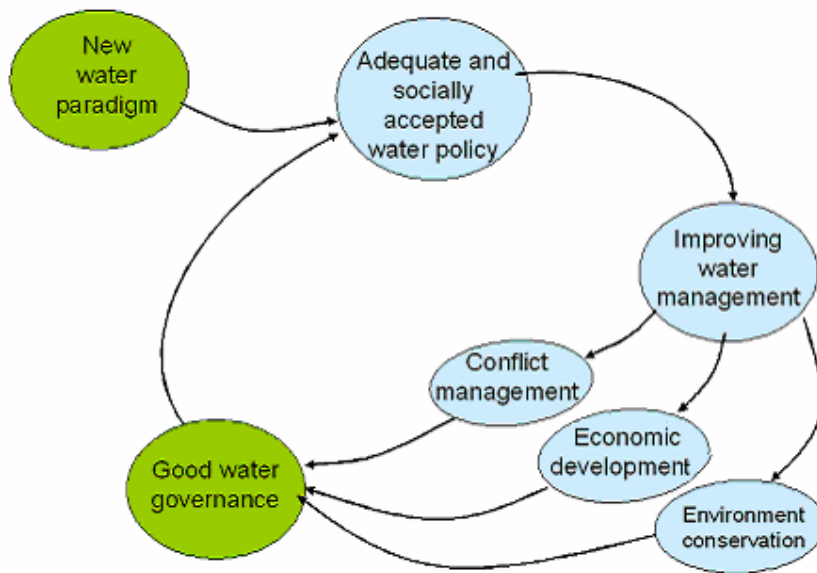
Open discussions and public debates, disseminating messages through the media can help build a consensus and may positively affect this new paradigm. Nevertheless, the

⁴¹ Via <http://en.wikipedia.org/wiki/Paradigm>

new paradigm would be basically the progressive result of a generational education process; this would be the enabling key issue and the starting point for the sustainable development of water resources management in Peru. This positive social change can be attained through massive and well designed educational for children, youngsters and adults as well. These programs would enhance civil rights, values and environmental awareness. This of course is the primary role of government. However, to ensure desired results and even to accelerate the process, government efforts have to be complemented and catalyzed by the action of civil society, agents of positive change are needed. This is a essential role to play from committed non government organizations, grass roots organizations, interest groups, and influential leaders.

When this paradigm-shift is achieved, which means to reach a new socially accepted paradigm, the vicious cycle will be reversed. This paradigm shift for a new culture for water would encourage and support a new water policy adequate and socially accepted, boosting up the virtuous cycle for sustainable water resources management in Peru. This is graphically shown in Figure 4.

Figure 4: Virtuous Cycle of water resources management in Peru



6. CONCLUDING REMARKS

Peru is maybe one of the few countries in the world where these two major paradoxes related to water resources management coexist: i) a great past but a present in crisis; ii) abundance and scarcity at the same time.

The colonial period provoked the rupture of the ancient Peruvian culture. The Spanish installed an alienated and privileged ruling class (urban) and subdued the massive and deprived indigenous population (rural). Peru's independence from Spain did not automatically improve this negative situation, as the Spanish minority continued to

maintain the economic and political power of the country. The alienation between the Colonial State and the people was inherited by the Republic.

General Water Law is inadequate and obsolete. Water policy and institutional arrangements developed in the last 37 years in Peru have caused severe deficiencies and flaws in the Peruvian water management situation. Water management problems are categorized in two major groups: water-policies related problems as well as water-authority related problems, presented by the author.

The described problems of the Peruvian water management situation have caused the following three major effects: i) inefficient water end-use; ii) inefficient water allocation use; and, iii) conflicts among water users and stakeholders. This situation, in turn, increases environmental degradation, natural resources depletion, and widespread poverty.

Currently in Peru there are diverse and acute social conflicts among water users and stakeholders. What makes water use conflict in Peru a serious concern is: i) their tendency to increase in number and size; ii) the complex historical and political roots that have originated favorable conditions for conflicts; and, iii) the lack of mechanisms for conflict-resolution and the lack of appropriate institutional arrangements for people's and grass-roots organizations' participation.

From a systemic approach, this negative situation could be comprehensively understood as a vicious cycle. Fed by the historical and political roots, the inadequate and ineffective water policy implemented in Peru has caused water management problems and conflicts. This worsens water governance conditions, in turn, causing water policy to remain inadequate and ineffective.

The issues and measures viewed by the author as necessary and crucial to be undertaken by Peruvian society are comprised in four relevant topics: i) implementing a new water policy and a new water law; ii) developing a strong, autonomous, reliable and participative water authority; iii) to encourage public participation and decentralization; and, iv) promoting education and awareness in the public. The success on dealing with these issues would result in the following outcomes: a) improved water resources management; b) contribution to achieving sustainable development goals; c) contribution to solve water use conflicts; and, d) enabling and improving water governance.

Finally, the only safe and irreversible way to interrupt the vicious cycle of water resources management in Peru is through a paradigm shift, a new paradigm for water resources. This new paradigm stands for: i) a common vision for national identity; b) shared values and attitudes; and, iii) agreed core goals. This would be the progressive result of a generational education process. When this paradigm-shift is achieved, which means to reach a new socially accepted paradigm, the vicious cycle will be reversed and the virtuous cycle for sustainable water resources management in Peru would start.

7. ACKNOWLEDGEMENTS

I would like to first thank Dr. Jose Galizia Tundisi, Chair of the IAP Water Programme Regional Workshop for the Americas, for generously inviting me to participate in the workshop held in Sao Paulo, Brazil, on July 24-28, 2006.

My appreciation to a special friend, Dr. Ignacio Benavent, Director of the Hydraulics, Hydrology and Sanitary Engineering Institute of the University of Piura, who lead the Peruvian representation for this international workshop.

I also would like to thank Miss Rebecca Heritage, from Rutgers University. She notably helped in reviewing my drafts and gave me her priceless time to correct and improve my English scripts.

Finally, I like share my gratitude to my family for their unconditional support and care, which encouraged me to accomplish this task.

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