

Pro-Actively coping with Climate Change and Globalization in the Peruvian Andes



Addressing communities in the Alto Andino to mitigate the effects of out migration
and glacial melting downstream through the Local Governance of Natural Resources

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Executive Summary

Abstract

The tropical portion of the Andean mountainous range plays a crucial role in the future quality of human life on Earth. This ecosystem is currently facing a social and environmental crisis and is in urgent need of pro-active intervention for the recuperation of its fundamental role in the hydrological cycle of the South-American sub-continent. In recent years the accelerated melting of glaciers, resulting from climate change has streamlined the role that slopes located more than 3500 masl play for water retention. On the other hand, the process of globalization has promoted the need for involving farming communities upstream to become environmental guardians of an already impoverished natural resources base. However, these farming communities represent the most vulnerable sector of society and in many cases, the area's abandonment occurred due to lack of opportunities. The development of appropriate governance structures in the framework of the Peruvian decentralization process and the transfer of financial resources it entails may help restore a demographic balance required for the management of natural resources

The Problem

Altitudes exceeding 3500 masl are known as the Alto Andino and represent one of the most valuable sources of water in the world. This richness is apparent in:

- a) Glaciers, which contain vital drinking water reserves. In addition, these glaciers play a buffer role in case of drought;
- b) rivers and lakes, including Lake Titicaca, one of the biggest water reserves in the world;
- c) the inherent capacity of mountain slopes to act as an absorbing sponge. This may be used to its fullest when these slopes are properly equipped with water capture infrastructure such as terraces and ditches. The captured water may be received via precipitation or the melting of glaciers.

However, the following threats are jeopardizing the possibility of taking advantage of these potential water resources

- a) Global Warming is reducing glacier coverage, thus limiting the role that the latter play as a buffer in times of drought;
- b) rivers are becoming seriously contaminated by imprudent mining practices, urban residual waters and also due to the neglect of river basins. Lakes and in particular Lake Titicaca are thus being contaminated by polluted tributaries;
- c) the crucial importance of maintaining existing and building new terraces and water ditches on mountainous slopes is being neglected due to the abandonment of rural areas by populations in working age.

as climate change and organization. This paper puts forward the hypothesis that it is possible to partly address these issues by tackling the problem of abandonment of terraces and ditches as well as bettering the overall management of natural resources. A primary issue affecting the management of natural resources is a lack of the required working force. This is caused by uninterrupted rural-urban migratory flows as well as migration to the lower quotas due to a well-paid coca leaf production industry with a demand for labour. The maintenance and construction of terraces and ditches is best managed however, by people rather than by machinery.

The result is a desertification crisis, with social and environmental consequences. Not only has the crisis affected rural areas, but it has dramatically disturbed the quality of urban environments as well, plaguing them with socio economic problems including overcrowding,

delinquency and vagrancy among others. Furthermore, this situation is expected to result in worsening food and water security issues, deeply affecting downstream environments at different altitudes in the near future.



To reverse this migratory trend it is necessary to identify appropriate mechanisms for channelling financial resources to rural dwellers in marginal areas of the Alto Andino in exchange for labour. In other words, it is necessary – at least in an initial phase - to develop schemes for the Payment of Environmental Services (PES).

Historical and current empirical evidence shows that conditions are propitious for the development of sustainable local economies in the Andean high-plateaus through, among others, the local governance of natural resources, which would provide farming communities with a tool for coping with external hazards affecting the area, such

Policy Implications

1. Environmental and Social Desertification

- 1.1 To restore the balance of natural resources in the Andean region, appropriate funding needs to be channelled in order to attract local population to perform this challenge. Recovering the vegetal cover in the Andean region is more of an institutional challenge, than one of infrastructure development because investments need to be channelled to finance human labor to focus on the management of natural resources.
- 1.2 Strong investment in human labor for the above described purpose will, on the one hand redress the environmental desertification issue, and on the other hand, the social desertification issue. This means that the complex problematique of the Andean ecosystem needs to be addressed in a multidisciplinary and transectorial approach, which simultaneously addresses the social concerns of local populations and the environmental crisis, looming on the Andean slopes.

2. Comparative Advantages of Conservation Agriculture

Agriculture in the high Andean plateaus is an intensive endeavour requiring human labor rather than the use of machinery. The fragility of the environment requires a small-scale management of soils in order to produce at its best. Existing terraces and ditches have mostly been built by human labor and are best maintained with human labor. In addition this will create a market for human labor, if appropriately rewarded with competitive wages encouraging local populations to carry out such jobs rather than equally well-paid jobs in the mining and drug economies.

Thus, the promotion of a striving market for human labor in conservation agriculture will constitute a deterrent for populations to migrate down-stream to work in the drug business.

3. Developing water markets

The greatest asset of altitudes more than 3500 masl is the water reserves that exists in those altitudes, as well as the capacity that slopes have to become water producing devices from precipitation and runoffs. However, this enormous wealth has never been appropriately rewarded by users located downstream. It has usually been believed that water being a natural endowment, should not be considered as a market good but rather was considered a public good. The logic of a globalized economy shows that water is a basic requirement for agricultural and industrial purposes, and should thus be prized according to the real market value and incorporated human labour that it has. Putting value on water is a challenge before the academic/scientific communities, civil society and Governments and should be the result of negotiations between all parties concerned. It will require a gradual and iterative process to arrive to initial approximations on the real value and prize and by whom, water should be paid. Methodologies should be developed incrementally by testing them first at local level between communities, applying in the process mechanisms for the participatory negotiation of conflicts. Only once such horizontal processes between communities located at higher and lower levels of one watershed are duly consolidated and communities' horizontal inter-linkages reinforced by the development of such institutional instruments as may be appropriate, most especially inter-municipal associations.

4. Reinforcing Governance structures

The municipal setup (together with religion and language) is one of the most sustainable institutions left behind by the colonization process. Municipalities are ubiquitous and cover the entire territory of Perú at a time when institutions are seriously being dismantled. However, municipalities are weak and require strengthening of their financial, political and administrative capacities to perform their role as promoters of development in remote areas. The biggest hurdle lies behind reinforcing the financial capacities of municipalities, which are still dependant of contribution from external sources, most especially the Central Government, (through such instruments as the Participatory Budget), the Mining Canon and multi bilateral donors. Unfortunately, local contributions are minimal when compared to external, thus meaning that the quality of municipal financial capital is relatively low and a strong need exists to strengthen the capacity of municipalities to collect contributions from local populations. This will have a dual effect. On the one hand, it will strengthen the financial capacities of municipalities, which is essential for them to provide services that will promote development in remote, rural areas. On the other hand, it will strengthen the control of local populations over municipal decision-making processes, thus strengthening the political capacities of municipalities.

5. Local institutions reflect the functioning of their community

5.1 The political capacities of municipalities are the basis for participatory democracy. It is thus necessary to create tools and mechanisms for farmers participation in decision making processes over municipal budgets

5.2 Referenda, plebiscites and open cabildos need to be held when necessary to decide on strategies for natural resources management

6. Local Contributions build Financial Capacities

There is a need to create tools to collect contributions from local populations both in kind and in cash in order to increase both, the financial capacities of the municipalities and the control of municipal decision making by local populations.

7. Glacier as Financial Capital

First of all, the Government of Peru together with the International community need to reduce carbon emissions. However, given the rapid pace of the melting of glaciers, communities residing beneath the area of influence of glaciers, especially those residing or working on the ablation zone (see figure #) or directly beneath it, need to start managing the excess down flow of water melting from glaciers. Secondly, Peruvians need to diversify their water sources away from those of glacier origin by resorting to new practices, such as water infiltration.

8. Climate Change as a driver for development

Rural communities in the Andean highlands seem homogeneously poor when observed by foreign visitors; however, a careful analysis of social structures would reveal that strong polarization exists between community members. Development programs identify drivers of change that bring advantages for rich and poor, so that potential changes have global appeal.

9. Human Labor has comparative advantages over Machinery

The above-described success of pre-Columbian cultures to guarantee soil fertility was based on a concerted effort of local populations, based on organizational structures that were successful in guaranteeing steady production on the one hand, and distributing wealth and guaranteeing food security, even in times of natural disasters.

10. Linking traditional organization structures and Governance

Pre-Columbian organizational structures are still active, especially for ceremonial purposes and as networks of solidarity in times of crisis. Unfortunately, however, they are dormant when it comes to productive purposes. This inertia of communities in utilizing their own organizational structures to cope with the challenges of production, is a defensive strategy against centuries of oppression and exploitation. The challenge for development projects is to revive those traditional structures and linking them with the emerging governance setup.

Intended audience

The audience targeted by this paper includes decision makers at the municipal and higher levels, especially at the intermediate regional level as well as multi-bilateral organizations which provided both financial and technical assistance. Most especially, this paper targets civil society organizations interested in influencing policy decision-making processes.

While this paper is not a project document, it does represent an effort by the authors to call on the scientific and other communities for the adoption of proactive stances concerning the future of the region.

This paper may be of interest to those concerned specifically with the conceptualization of a new development paradigm wherein the preservation of natural and cultural assets requires strong international political will. The paper may also be of interest to those within the Inter-Governmental Panel on Climate Change (IPCC), who are concerned with the adoption of a proactive stance that empowers rural communities toward the sustainable management of natural resources.

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Acronyms

CC	Climate Change
CCT	Conditional Cash Transfer
CONAM	Consejo Nacional del Ambiente
ENSO	El Niño Southern Oscillation
ES	Environmental Service
ESPH	Empresa de Servicios Públicos de Heredia
EU	European Union
FAO	Food and Agricultural Organization
FONCODES	Fondo de Cooperación para el Desarrollo Social
FTA	Free Trade Agreement
IIRSA	Integración de la Infraestructura Regional Suramericana
INEI	Instituto Nacional de Estadística e Informática
IPCC	Intergovernmental Panel on Climate Change
IUCN	World Conservation Union
MC	Mining Canon
MEM	Ministerio de Energía y Minas
NGO	Non Governmental Organization
NRM	Natural Resources Management
PB	Participatory Budget
PES	Payment for Environmental Services
PETT	Proyecto Especial de Titulación de Tierras
SAIS	Sociedades Agrícolas de Interés Social
IOH	Inter Oceanic Highway
WPP	Watershed Protection Program

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1. Introductory remarks

1.1 Formulation Process

Findings, conclusions, hypotheses and recommendations in this paper are based on the 2 year formulation process of a project document. This exercise represented an attempt by the Government of Peru to respond to the frequent recurrence of natural disasters in the Andean plateau. The recurrence of natural phenomena including drought, floods, snow storms, persistent cold weather and others have been forcing the government to declare states of emergency on a yearly basis. FAO was initially requested by the Government of Peru to coordinate inter-agency efforts towards the preparation of a risk management strategy.

Preliminary findings indicated that a long-term strategy for the sustainable management of natural resources was required. It was foreseen that such an effort would require reverting demographic processes that were driving rural populations away from marginal areas located more than 3500 masl. The need was foreseen for local populations to embark on a massive programme for the maintenance of existing and, where required, the construction of new infrastructure for water capture. This infrastructure includes terraces and ditches, as well as the restoration of the vegetal cover which acts as a sponge infiltrating precipitation into mountainous slopes in these quotas.

In view of the monumental challenge before it, the Peruvian Government requested assistance of FAO in the formulation of a *Feasibility Study* (this study is available on request, please contact the authors) which was intended as an instrument to pilot test strategies in 6 selected watersheds of the Peruvian Southern Andes. The preparation of the *Feasibility Study* was commissioned to FAO and funded by the EU fund managed by FAO. It was based on a broad consultation process involving local communities and authorities which was carried out for over more than 2 years. This consultation process was undertaken by a team of 4 selected FAO experts (water management, *camélidos*, seeds and finances) lead by Vincenzo Bellini a consultant designated for this purpose by the European Commission under Tomás Lindemann's overall supervision.

Funding for the implementation of the strategy is lagging behind but the urgency of restoring the environmental balance in the region is ever more desperate. As the project unfolded, it was further realized that coupled with the already existing desertification process a new threat is jeopardizing the future of the region. The new threat represented by the shrinking of the tropical glaciers as a result of global warming will most probably lead to the collapse of the already fragile Andean eco-system and, with it, the

environment of a substantial area of the South American sub-continent. A central hypothesis behind this paper is that the buffer role played until now by tropical glaciers in times of drought can be replaced, if only partially, by the restoration of water capture devices. This needs to be undertaken by a proactive alliance between the following actors: a) the governments of the concerned countries, including all those who receive their water sources from the Andean Plateau (i.e. Brazil, Paraguay, Argentina); b) the government of Peru at central, regional and local levels; c) civil society in urban and rural settings d) the private sectors (mining companies, agricultural producers, industrial producers) as they all have important stakes in future availability of water and e) the scientific community.

1.2 Methodology

The proposals in this paper tackle issues on the basis of an interdisciplinary and tran-sectoral approach. The complexity of the issue lies behind the fact that social, political, environmental and institutional factors must be addressed to ensure a long term solution. Furthermore, no

“A central hypothesis behind this paper is that the buffer role played until now by tropical glaciers in times of drought can be replaced, if only partially, by the restoration of water capture devices”

chronological sequence can be followed, but all issues need to be tackled simultaneously and no recipes can be pursued in a mechanical way.

This paper is an assessment of the current situation in the Andean high-plateaus, analysing the causes and consequences of the social and environmental desertification processes. Although the paper hypothesises the evolution of a double (social/environmental) desertification process, it is important to understand that environmental desertification is, in final analysis and to a large extent, the consequence of socio-economic processes that are described in more detail in this paper. What appears clearly is the connection between addressing the environmental and social issues as part and parcel of an inseparable equation.

There is an advantage in addressing farming communities starting from the household level given their ability to manage natural resources in a sustainable manner and guarantee food sovereignty for local families at the same time. For this, problems impeding development such as poverty will need an “exit strategy” to address the issue with long term solutions. With current global threats, including globalization and climate change, the appropriate management and preservation of natural resources will become central in the lives of Andean communities and downstream urban populations. Therefore, the paper argues the importance of applying strategies that enable for the compensation to local populations for any potential role played as guardians of the environment and preservers of natural resources.

The social and environmental fragility of Peruvian Andes needs to be tackled by strengthening existing local institutions. Building the institutional capacities of structures belonging to the municipal chain requires addressing three dimensions: political, administrative and financial. Strengthening the political capacities of local institutions is about strengthening communal participation in municipal and higher level policy decision-making (and has no relation to partisan politics). Achieving such participation requires the adoption of a bottom-up approach that will empower local families. Strengthening the financial capacities is about strengthening municipal budgets by increasing budgetary allocations from external revenues, such as the *presupuesto participativo*, donor contributions, social programmes and others as well as most importantly from local contributions. It also requires addressing the anthropological lessons described in Section 3.3. This can only be done by increasing local earnings through the introduction of such schemes as the Payment for Environmental Services (PES) which are addressed later in this paper. The development of such schemes will require strong inter-disciplinarily and cross sectoriality in project implementation.

The decentralization process in Peru has focused on the active involvement of the constituency in the decision making processes aiming, among others, at the eradication of corruption and the mismanagement of resources. It is hoped that this will provide rural institutions and populations with a tool for the appropriate management and allocation of resources that permits the development of employment opportunities and agricultural infrastructure.

1.3 Description of the paper

This paper is divided into three main chapters. Chapters 2 and 3 discuss the environmental (loss of soil fertility) and social (abandonment of rural areas by economically active persons) desertification process. This will set the context to propose the economic alternatives of chapter 4, as well as the expected results in the following chapters.

An important feature of this paper is a prospective timeline (see section 5.1) which aims at chronologically summarizing the contents of this paper. The first part of the timeline, located on the left side of the page reviews past and current events. The second part of the timeline presents two alternative road-maps. The one leading to the best case scenario shows the outcomes required for its achievement. The one road map describing persisting current trends lead to the worst case scenario.

Chapter 2 suggests a historical timeline of environmental milestones in the Andes. The first two sections outline ancient agricultural techniques and discuss land tenure regimes before and

after the Spanish colonization. The last section of the chapter focuses on external hazards affecting the region: climate change and globalization. Climate change, and in particular, the receding glaciers pose the threat of water shortage within the near future. Globalization however, while jeopardizing regional and local economies, also represents an opportunity for global integration.

Chapter 3 analyses what is defined as the social process of desertification. This is understood to be the social, economic and political causes of rural land abandonment, where this abandonment further exacerbates socio-environmental stability. The first section in this chapter considers poverty and political violence as the root causes of social and thus, environmental desertification. The following section in this chapter analyses the historical patterns for rural-urban migration and its effects on both: urban and rural environments. Section 3.3 describes the anthropological dynamics including an analysis on traditional work structures, the gender factor in decision making processes, identity and culture as well as Andean Cosmogony. Lastly, this paper identifies the need to reinforce the role of local institutions in the management and allocation of resources. This section offers a brief analysis of the role and shortcomings of municipalities, followed by suggestions for their strengthening.

Finally, chapter 4 proposes a series of strategies that may contribute to the activation of the regional economy. The first section opens proposing alternatives for attracting the local population back and thus, work force to the area. This section focuses on already existing revenues: the canons. This contribution that Central, regional and local governments obtain from foreign companies represents a valuable financial source for the development of infrastructure that benefits the whole community. Furthermore, the decentralization process that has been taking place in Peru in the past years aims at an active involvement of the constituency in decision making processes. The result has been the participatory budget, a fundamental element that allows for an accountable and more responsible form of spending funds locally. The last section explains the importance and potentials of adopting a Payment for Environmental Services Program (PES), as well as a rapid guideline of “do’s and don’ts” that will provide with a brief overview of its implementation. In addition, two experiences in the region are mentioned, which provides evidence of its sustainability and effectiveness.

The last part of this paper will discuss a list of expected outcomes at the social, economic and environmental levels as a consequence of the application of such economic alternatives in the current Peruvian context and conclusions derived from the paper.

Questions Addressed by the Paper²

The following questions are addressed throughout the paper:

- Is it possible to halt/revert the abandonment of farm plots in the Andean region?
- Is it possible to restore the vegetal cover in the Peruvian Andes?
- Is it possible to achieve food security/sovereignty and to generate sources of income in the Andean context by resorting to ancestral practices?
- Can traditional agricultural techniques for water infiltration transform mountains into water producing devices that replace the buffer role that melting glaciers used to perform?
- Which institutional structures are best positioned to ensure the resources from Environmental Service Payments reach those responsible for increased water availability?

² Evidence to support answers to the 2 sets of questions can only be produced through the implementation of programmes tailored to tackle these issues.

Questions requiring further research

The following questions are not addressed on this paper given their highly technical specificity and further research by the scientific community would be needed:

- Which techniques are the most efficient to measure increased water availability from infiltration?
- To what degree of specificity can these increases be attributed to specific infrastructure?
- What are the best methodologies to measure the value of this increased amount of water?
- What is the soil absorption capacity of a slope (capacity to absorb water) and how can it be measured?
- What is the life expectancy of mining and downstream agriculture in the case that actions as proposed in this paper are not pursued?
- Can science prove the argument that waters percolated into the bottom of Lake Titicaca reappear on surface in the Argentine Pampas?
- To what extent can the future of the Amazon be attributed to appropriate management of natural resources up-stream?

2. Environmental Context

This chapter focuses on the phenomenon of “Environmental Desertification” taking place in the area. While not all causes are explored, the following sections will identify the main determinants behind the phenomenon through a comparison of the region before and after the Spanish colonization, as well as an overview of the crisis currently affecting the area. Socio-political as well as economic historical changes over time are briefly depicted in order to create a clear chronological vision of Andean dynamics. Sections 1 and 2 discuss the importance of pre-Columbian strategies for the management of natural resources, based on the success to sustain large populations.

The possibility of rescuing traditional values in the use of land and other natural resources has been considered a feasible solution for overcoming food and water security issues. The last section of the chapter analyzes the major external hazards affecting the Andean plateaus and its communities. A particularly important factor is climate change, a growing concern for the scientific and civil societies which endangers the natural equilibrium of the Andean environment, an ecosystem of particular importance for populations at lower altitudes. However, climate change would be adding to the region’s other climatic phenomenon: the ENSO (El Nino Southern Oscillation), rendering the Andean high-plateaus vulnerable to further climatic and environmental alterations. Section two also explores socio-economic trends representing imminent perils: globalization, a socio-economic movement towards international and regional integration that seriously compromises the survival of regional and local economies; this *movement* is manifested with the signing of the FTA (Free Trade Agreement) and the building of the Transoceanic Highway, with numerous implications for local populations as well as for the environment.”

Figure 1 Poncho Verde⁴

The vision behind this paper refers to an image of the Andes represented by a mountain with a snow white top resembling a human head and beneath it, the mountain wears a *Poncho Verde*. This image refers to the high-plateaus, which represent the shoulders of this human body covered by pasture and other vegetation, protecting it from erosion and other desertification processes; thus enabling the flourishing of a dynamic agriculture in the Andes.

The concept of Poncho Verde was first created by Engineer Pablo Sanchez, who visualized the Andes as huge sponges with the capacity of absorbing and retaining water, essential for water supply in the Sierra and the coastal area. The Andes facing the Pacific contain 53 watersheds, of which 1.8% supplies water to the coastal region (where 70% of the national population is situated) the remaining 98.2% of Andean water flows unused into the Atlantic. It is important to foster agriculture in the Andean region, where 80% of the poorest rural population lives.³

³ <http://telecentros.inictel.net/contenido.php?x=110>

⁴ More details on the Poncho Verde can be found on the Feasibility Study, available on request from the authors

2.1 Traditional Andean Agriculture

“The pre-Hispanic agricultural system was based on 3 features: infrastructure development, communal property of land and communal management of natural resources”

Throughout time, farming communities have always depended on their strategies for the management of natural resources. The maximization of the environment translates in different ways, such as food security or an active local economy. In the case of the high Andean plateaus, this need was first understood by pre-Hispanic cultures, which developed a series of strategies that permitted the maximization of natural resources, allowing for the sustenance of hundreds of thousands, if not millions.⁵ These strategies, combined with a reciprocal and distributive kind of society⁶ were fundamental in the development and expansion of the empire, with the family as a societal unit of production⁷ in the long chain of the hierarchical organization. The agricultural system was based on three features: infrastructure development, communal property of land and communal management of natural resources⁸. These features proved successful risk management strategies, since families relied on the cultivation of simultaneous crops at different ecological levels, providing them with at least one secure crop per year.⁹ Furthermore, the constant migration process that communities practiced allowed for a regeneration of the soil's natural elements, resulting in grass coverage, which did not permit land exhaustion, a root cause for the current desertification problem.

Figure 2 Pre-Hispanic Agricultural Techniques¹⁰

Pre-Hispanic cultures focused their strategy for the management of natural resources around three dimensions: land, water and weather. In order to obtain the most of land, terraces were carefully built¹¹ and natural fertilizers (such as guano, manure and a strategy of burying seeds with small fish) were commonly used. Regarding the second dimension, water, numerous techniques were adopted. A truly efficient infrastructure permitted water to arrive even to the farthest crop in a moderate but constant manner, contributing thus, to soil fertility and resulting in close to full grass-coverage even in high altitudes. The last dimension, climate, was the most difficult to cope with. The region's severe and unstable weather compelled populations to raise crops for consumption and storage during dry season. The pre-Hispanic cultures adapted to these climatic difficulties by cultivating potato, a crop that was not only utilized for immediate consumption, but which was also possible to store indefinitely when dehydrated. The final product is known as chuño,¹² and guaranteed food supply all year round. In fact, this strategy proved so successful that dehydration was also applied to other products.¹³ According to available literature, bad harvests and low productive periods apparently did not represent a serious threat for the native populations due to their ability to manage and prepare themselves for adversities.

⁵ Available literature has not been able to agree on the estimated Incan population. Ciphers range between hundreds of thousands and millions

⁶ http://www.charango.cl/paginas/los_quechuas.htm

⁷ Ibid

⁸ Ibid

⁹ Interview with Adriana Herrera, Agrarian Analysis Officer FAO

¹⁰ Complementariedad Ecológica: <http://www.webconferencia.net/foros/civilizaciones/las-civilizaciones-precolombinas-285826.html>

¹¹ <http://links.jstor.org/sici?sici=0011-3204%28198708%2F10%2928%3A4%3C409%3ATAITP%3E2.0.CO%3B2-M&size=LARGE&origin=JSTOR-enlargePage>

¹² <http://www.portalplanetasedna.com.ar/incas.htm>

¹³ Complementariedad Ecológica: <http://www.webconferencia.net/foros/civilizaciones/las-civilizaciones-precolombinas-285826.html>

The pre-Hispanic system remained intact for centuries until the arrival of the Spanish, when a new order was established. Spanish colonisation brought a change nearly on every aspect of life, focusing on mine work and the extraction of minerals, thus leaving agriculture aside. With time, the introduction of technology industries took over agriculture and Andean infrastructures were abandoned when not destroyed.

The current situation of Andean communities in Peru is critical. Food and water security are at risk, affecting not only the poor rural areas in the high-plateaus, but with eventual influence over cities and urban centres across the country. The so-called environmental desertification is caused, largely, by the socio economic circumstances that force Andean people to leave the lands and agricultural activities in search of employment opportunities and quality life in other regions of Peru. The result is a marked decrease of population in Andean regions, crucial for the maintenance of large infrastructures, the same that made once the Andean plateaus one of the richest ecosystems.

The prosperous times of pre-Hispanic cultures demonstrates the value of indigenous knowledge on the management of natural resources: large and complex infrastructures combined with cooperative strategies allow for the development of a sustainable economy of its inhabitants. Rescuing traditional values in the management of natural resources represents an essential feature for the health of a farming economy. Furthermore, the food and water scarcity issues would decrease as a result of the aforementioned strategies. The concept of rescuing tradition for the management of natural resources is also considered as an important element in the fight for food security by the Intergovernmental Commission for Climate Change, as mentioned on their 2001 Regional Impact Study.¹⁴

While the Inca Empire based its management of natural resources strategy on a top-down societal system, the result was a well-organized society capable of successfully handle the rough conditions of the region while achieving surplus enough to ensure food security for its population.

2.2 Land Tenure Regimes

Mountainous areas are fragile environments and the Andean high-plateaus are no exception: weather is severe throughout the year and soil conditions vary according to altitude and edaphic factors. These features constrained local populations to build up their life style around environment from the very beginning. As explained in the previous section, Incan and pre-

Incan cultures shaped politics, economy, society and even their religious beliefs according to the surrounding environmental conditions. Land tenure is no exception and together with labour organization, these two aspects also evolved in function of the environment. However, throughout time, regional and later national interests shifted, as explained below, resulting in a mismanagement of the natural resources.

The arrival of the Spanish to Peru marked the breaking point of the Incan system through the introduction of new policies regarding land tenure and productive activities. In fact, agriculture is no longer an end in itself but becomes a means, initially for the mining industry and later for industrial development. Guaranteeing food security was not to be considered a priority anymore, with dramatic implications for the balance between food security

and environmental conditions achieved by local populations. By the 19th century, privatization of land gradually became a key feature of agricultural production with an impact even on higher altitudes, limiting the viability of farming systems based on slash-and-burn agriculture, which had proved sustainable for centuries.¹⁵ However, whereas natural population growth (which results from absolute growth) is dramatic in the period from 1950 through the current

“Agriculture is no longer an end in itself but becomes a means, initially for the mining industry and later for industrial development”

¹⁴ <http://www.grida.no/climate/ipcc/regional/149.htm>

¹⁵ Proyecto de Titulacion y Registro de Tierras: Analisis de los Aspectos Sociales

day¹⁶ a simultaneous process of social demographic growth in the cities (which results from rural-urban migratory trends), takes place with two contemporary and contradictory impacts on natural resources management in the Andean high-plateaus. On the one side, (a) the pressure for land reduces land availability per family as well as the possibility of pursuing migratory agriculture and, consequently, slash-and-burn agriculture can no longer resort to leaving the land fallow for the regeneration of natural resources. On the other side, (b) migratory flows result in the gradual abandonment of infrastructures for the management of natural resources.¹⁷

Land privatization reduces the land available to small farmers; until the mid 1960s, the territory was mainly divided in latifundia which had seriously affected native populations who had relied on constant mobilization for the management

of multiple crops, forcing them to become workers and no longer owners of the land. However, on June 1969 Gen. Velasco introduced the legislation for the Agrarian Reform with three main characteristics:¹⁸

a) It was massive, which not only affected latifundia but also medium and small landholders across the territory; b) land was no longer transferable, therefore the land market was shut; c) SAIS (Sociedades Agrícolas de Interés Social) were promoted; that is, associative enterprises under a regime of collective property in order to increase economies of scale and productivity;¹⁹ however,

when associations disintegrated a decade later, land was reorganized in individual parcels, and production was dominated by subsistence farming, which seriously damaged production and markets.²⁰

At this point, a clear division of activities according to land tenure was visible: while community land tenure tended to concentrate on grazing and fallowing in the higher parts of the region, private lands concentrated on specialized horticulture, long-term fallowing and permanent irrigation, usually located in the lower altitudes.²¹

This crisis for the small producers leaves small space for the development of agriculture given the limitations imposed by a highly competitive market.

However, there is a potential for restoring the capacity to small producers through an emerging market: Payment for Environmental Services and the use of revenues in exchange of natural resources. The origin and potentials for this proposal are analyzed in chapter 4.

In early 1990s, the Government initiated a project for the formalization of land tenure in order to develop a land market with the aim of reactivating investment in the rural sector.²² Furthermore it began to be envisaged for recognized tenure, as well as for inheritance. In the Andes, the importance of formalizing land tenure derives from constant necessity to migrate to coast, resulting in irregular tenancy (such as occupation, or theft).²³ Therefore, an institution



¹⁶ www.prc.utexas.edu/urbancenter/documents/2LimaSistemaUrbano2.pdf

Image: http://martingoodman.com/soyouwanttobeawriter/2006_04_01_soyouwanttobeawriter_archive.html

¹⁷ Interview with Adriana Herrera, FAO Agrarian Analysis Officer

¹⁸ http://www.minag.gob.pe/tc_titulacion.shtml

¹⁹ Ibid

²⁰ Ibid

²¹ Land Tenure, Ecological Zone and Agricultural Regime in the Central Andes:

<http://links.jstor.org/sici?sici=0094-0496%28198102%2978%3A1%3C139%3ALTEZAA%3E2.0.CO%3B2-Y>

²² http://www.minag.gob.pe/tc_titulacion.shtml

²³ Proyecto de Titulación y Registro de Tierras: Análisis de los Aspectos Sociales

was set with the objective of promoting and administrating the process of titling: the PETT (Proyecto Especial de Titulación de Tierras). Three important impacts have been identified through the implementation of the project. First, there has been a significant increment in investment, because of the rise in productivity. Second, the PETT abolished the ban on land market imposed by the Agrarian Reform, allowing for transactions and activating the market. Third, with a legal tenancy, it is possible to get access to loans and credits, a fundamental aspect for the development of small scale economy.²⁴

Another important weakness of the Agrarian sector was the lack of investment from the private sector. To overcome this, much of the legislation on this issue that was still valid from the Agrarian Reform was abolished, expecting to stimulate a rise of investment in the agrarian sector.²⁵

Although the aforementioned improvements benefit many small and medium landholders, the current situation continues to be one of general mismanagement or abandonment. Land has been re divided mainly in small private plots, and only a few communal territories still survive in the highest inhabited altitudes.²⁶ Yet, lack of organization and of market opportunities denies communities and small holders the possibilities of rural development. Subsistence farming is the predominant activity, rendering vulnerable local populations to the different hazards that affect the area. Yet, the high Andean plateaus not only have all the potentials for becoming a richer zone, either for its natural resources or by the beauty of its landscape, but it also has the certainty, demonstrated by the success achieved by pre-Hispanic cultures.

A strategy for the management of natural resources combined with an efficient and effective land market and best use of traditional tenure systems ensures the capacity of the territory for its integration into innovative markets, which will benefit local population not only in terms of food security, but also in social as well as in economic aspects.

2.3 Climate Change: Global Warming and the Retreat of Glaciers

Climate change is one of the most concerning global threats for the near future, with serious social and economic implications for human kind. During the last century, the Earth's average surface temperature rose by around 0.6°C,²⁷ and it is expected to continue to increase by a further 1.4 to 5.8°C by the end of this century,²⁸ triggering a series of climatic effects on ecosystems. While there is no full consensus about its origin, this phenomenon is frequently attributed to human activity, especially the burning of fossil fuels and deforestation. However, climate change is heavily influenced by other factors as well, like development, land-use practices, population growth, economic trends and community behaviour.²⁹

Though climate change is believed to bring about a number of negative consequences, some areas such as the high-Andean plateaus will benefit from favourable climate effects in the initial phase of this phenomenon, such as the increase of temperatures. Some examples include a decrease in death rates tolls for winter disease; or in the temporarily fertilization of soil caused by melting of glaciers and ice caps, as well as for the increment in precipitations³⁰. Moreover, climate change would only be adding to another climatic phenomenon affecting Peru for centuries, the El Nino phenomenon (El Nino Southern Oscillation). Climate change has added a new dimension to the ENSO event by magnifying its effects, thus, seriously compromising the subsistence of rural as well as urban inhabitants.

²⁴ http://www.minag.gob.pe/tc_t_proceso.shtml

²⁵ http://www.minag.gob.pe/tc_titulacion.shtml

²⁶ Proyecto de Titulación y Registro de Tierras: Análisis de los Aspectos Sociales

²⁷ <http://www.ipcc.ch/>

²⁸ http://ec.europa.eu/environment/climat/home_en.htm

²⁹ <http://www.grida.no/climate/ipcc/regional/123.htm>

³⁰ <http://www.grida.no/climate/ipcc/regional/136.htm>

“In terms of climate change vulnerability, Peru ranks third after Bangladesh and Honduras”

Figure 3 El Niño phenomenon³¹

The ENSO (El Niño Southern Oscillation) was first reported during Spanish colonial times, with an almost yearly recurrence of varying intensity. It is a warm stream affecting the coasts of Peru accompanied by a series of extreme weather phenomena, such as landslides, floods and droughts which seriously disturb the lives of Peruvians. The 1997-98 El Niño Contingency Plan demonstrated the importance of preparedness and organization when mitigating the effects of climate phenomena.³² Health measures reduced to the minimum the spread of diseases, and rapid reconstruction of infrastructure permitted the opening of isolated rural communities, allowing for the reconstruction of houses, health centres, etc

The Andean high-plateaus are particularly influential over the region's climate. Most rivers originate more than 4000masl and then flow down-hill. An increase in temperature at such altitudes will cause acceleration in the melting of glaciers, damaging the natural balance of the mountainous ecosystem. Glaciers are of extreme importance for communities living at high

altitudes because they act as buffers against extreme climatic phenomena: heavy precipitation at high quotas usually freezes and adds to the glaciers' **accumulation zone** while in times of drought a slow melting of the **ablation zone**, the lowest of the glacier (see table 4 below) permits a moderate but constant flow of water down hill.³³ Every year, millions of m³ of water are stored during the winter months in the form of ice and gradually released as melting water in spring coinciding with the growing season. The disappearance of ice caps changes this flow regime, leading to greater summer run-off benefiting not only small farming communities, but entire urban populations at lower altitudes. Without

additional storage to capture increased summer run-offs, "7,000 million m³ of water (representing 10 years of water needs of Lima)"³⁴ flow unused to the ocean, leading to water scarcity in the drier months.³⁵

"Peru is home to the world's biggest expanse of tropical glaciers. Of the 2500 km² of glaciers in the 4 countries of the Tropical Andes (Bolivia, Colombia, Ecuador, and Peru) 70% are in Peru and 20% in Bolivia."³⁶ In 1970, 18 great glacier areas or snowed cordilleras existed in Peru, covering an extension of 2041 km². In 1997, the surface had reduced to 1595 km², meaning that in only 27 years, the reduction has been of a magnitude of 21%. Studies show that, due to this important loss in the ice caps, those glaciers with small accumulation areas are bound to vanish. The glacier melting process is jeopardizing local populations, in as far as hanging glaciers and new lagoons in unstable areas store important volumes of water, which may cause landslides."³⁷



Image: http://www.inrena.gob.pe/escolares/imagenes_imp/planeta102.htm

³¹ www.cepes.org.pe/debate/debate33/01-articulo-da33.pdf

³² Ibid

³³ Castello Luis, FAO Representative in Peru

³⁴ Ciguarán María Paz, ex-Directora de Cambio Climático, CONAM

³⁵ Barnett, "Potential Impact of a warming climate on water availability in snow-dominated regions"

³⁶ The Economist, July 14th – 20th – *Climate Change in the Andes – When ice turns into water – Glacier melting poses potentially costly problems for Peru and Bolivia – Macusani, Perú.*

³⁷ http://inrena.gob.pe/irh/irh_proy_glaciares.htm

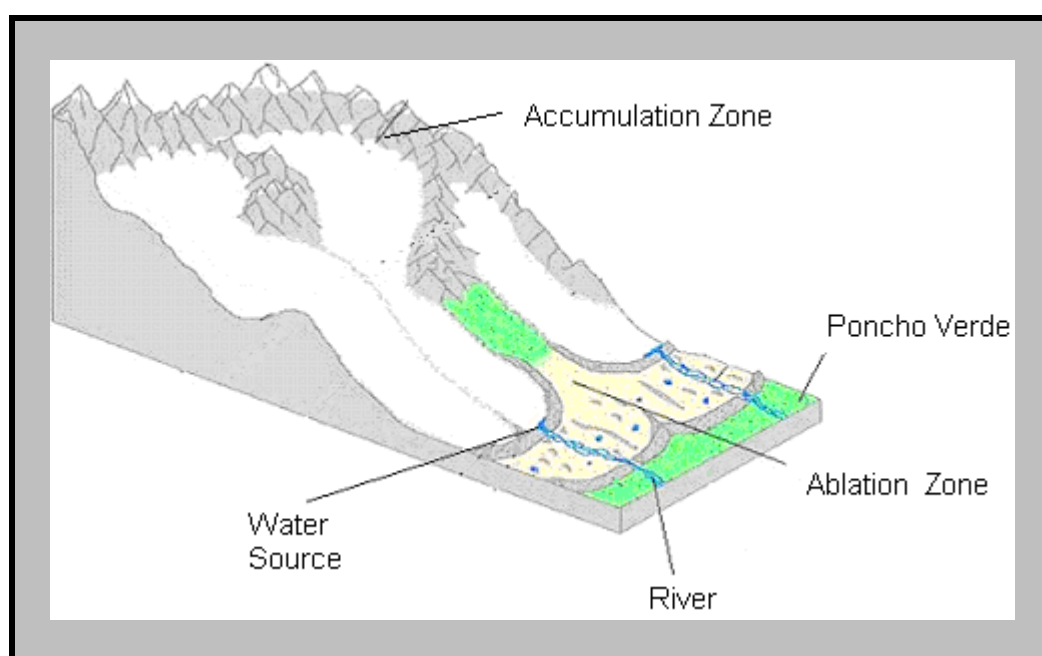
“Every year,
7,000 million m³
of water flow
unused into the
ocean. This
equals the water
needs of Lima
over 10 years”

Numerous studies have predicted an important reduction of glaciers within the next 50 years,³⁸ jeopardizing the main sources of soft waters for millions. However, the most vulnerable victims are the local communities in high mountain regions for two reasons: (a) These communities are particularly susceptible to climate change because of the geographical vulnerability of the area to extreme weather events, as well as for (b) the precarious or even lack of risk management strategies that could mitigate the effects of these phenomena.

Planning and cooperation strategies are the key to overcome the phenomenon. If consciousness about the risks of climate change is not developed, it could completely disrupt lifestyle in mountain villages by altering already marginal food production and the availability of water resources. This would result in infinite contingency plans around the world for the mitigation of natural hazards constantly threatening economies and the lives of populations.

In the following paragraphs, three factors will be taken as an example of the impacts of climate change in the Andean zone: agriculture, since it is the leading activity and means of subsistence for many local populations; water, because of its importance for agriculture and for life itself and livelihoods for its significance in the sustainability of rural economies.

Figure 4 Ablation and Accumulation Zones on Glaciers³⁹



2.3.1 Effects of Climate Change on Agriculture, Water and Livelihoods

As explained above, agriculture is one of the most important sectors in the Andean economy because it occupies an important segment of the economically active population; most importantly though, agriculture provides the base for food security. Land-use and climate change are closely related; which is why those areas that rely on agriculture will suffer the most the effects of climate change, facing major imbalances between local production costs and international prices of staple foods.⁴⁰ Considering that, under changing climate conditions, land use becomes a key factor for agricultural production as well as for environmental preservation, effective land-use regulations will be necessary to reduce the vulnerability of this type of



³⁸ <http://www.dawn.com/2007/03/12/top14.htm>

³⁹ <http://www.glaciologia.cl/images/Image4.jpg>

⁴⁰ <http://www.grida.no/climate/ipcc/regional/142.htm>

productive system to climate change⁴¹.

As for water, the rise of temperature in the Andean high-plateaus seriously compromises the existence of important snow and ice surfaces that provide entire rural and urban populations with freshwater through the melting of snow. This would prove devastating for the local communities that have based their livelihoods on subsistence farming for centuries. A further effect of the reduction of ice surfaces is the alteration of the atmospheric circulation, which modifies snowfall and precipitation rates, leading to shortage of water supply and underground water supplies downstream. This affects not only communities and peoples in the mid and high altitudes, but also important production sectors, such as industry and power generation in the piedmont areas. To this scenario, constant population growth and development of water-consuming activities must be added.⁴² An estimate on water availability has been undertaken, where it is calculated that, if measures are immediately taken, water availability will drop by 53.2% by the year 2050 in Peru.⁴³ However, if the present scenario range continues, by 2050 the drop range raises up to 63.3%.⁴⁴

The concept of livelihoods is best understood as the “capabilities, assets (of 5 types: natural, physical, human, financial and social) and activities required for a means of living.”⁴⁵

*“By 2050,
water
availability in
Peru will drop
more than
50%”*

A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.”⁴⁶ Climate change has the potential of compromising the livelihoods of subsistence farmers and pastoral peoples, who account for a vast majority of the Andean plateau population. Crop areas are likely to change due to climatic conditions, tending to be reduced. Shifts of vegetation belts and altered hydrological patterns may have major implications for the use and conservation of land by local populations.⁴⁷ These shifts may lead to competition between alternative land uses toward the mountaintops. In the

Andean high-plateaus, hundreds live in precarious situations on already unstable hillsides that are particularly vulnerable to climatic impacts. In recent decades, many people have been killed or seriously injured and many others left homeless by landslides and other extreme climatic events. Climate change is a threat for rural livelihoods and the living standards are expected to reach even lower levels for the next decades.

2.3.2 Globalization

The accelerated process of economic, social and political integration that has been developing in the past decades has been determined by the advance of technology and communication systems. International markets regulate national and regional economies, and profit translates into large production at the minimum cost. In the Andean region, globalization is present in the form of supermarket chains that compete with the small-scale local production. The lower purchase cost of the former against the higher costs of production of the latter render agriculture an inconvenient activity, perpetuating thus, the abandonment of land and related activities. The promotion of locally manufactured products represents an essential feature for the activation of local economies. Local markets do not only render agriculture profitable but also guarantee food supply for local consumption. To attend this problem, the Sierra Exportadora Program was created. On November 2006, this Decentralized Organism initiated, with the objective of bridging local agriculture with external markets, coordinating financial

⁴¹ http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm (executive summary full)

⁴² <http://www.grida.no/climate/ipcc/regional/122.htm>

⁴³ <http://www.grida.no/climate/ipcc/regional/138.htm>

⁴⁴ Ibid

⁴⁵ IUCN: Livelihoods and Climate Change

⁴⁶ Ibid

⁴⁷ <http://www.grida.no/climate/ipcc/regional/136.htm>

and human resources in the Sierra area and working together with local and regional governments.

2.3.2.1 Inter-Oceanic Highway

In 2004, the presidents of Brazil and Peru signed an agreement which would ease the communication and market development through the construction of a highway connecting the Brazilian ports of Rio de Janeiro and Santos, with the Peruvian ports of Ilo, Marcona and Matarani.⁴⁸ This project has been discussed by both countries for years before its implementation, since it means the opening of new transoceanic markets for both nations.

However, this agreement is only a small part of a much larger project, which aims at the infrastructural integration of South America. The IIRSA (Integración de la Infraestructura Regional Suramericana) scheme entails a process of physical, and most importantly, economic incorporation of the region, essential for the development of industries, markets and communication in general. Simultaneously, however, this project has also been severely criticized from various sectors of society, since it implies a variety of negative environmental and social effects for thousands. One of the first critics this project faced is the fact that it was approved by both governments without a Feasibility Study,⁴⁹ essential for evaluating the effects on the concerning area and assess whether the benefits outweigh the costs. Later, a rapid Feasibility Study was developed, but some inaccuracies put into question the credibility of the Study.⁵⁰

Although Latin America is characterized by a rich local tradition (partly maintained until these days by isolationism) and an unusual variety of ecosystems and biodiversity; it is also truth that the region also faces a problem of lack of communication and isolationism that collaborates to the precarious situation of many isolated communities, especially in the Andean region. A project like IIRSA would bring several financial and developmental advantages for native populations and small communities in the need for new economic incentives for better livelihoods.

Figure 5 Expected Impacts of the IOH Project⁵¹

Positive Impacts	Negative Impacts
• Opening of new markets • Increase of local prices and tourism • More and improved access to basic services • Increase in economic opportunities • More and better local, regional and national integration • More and improved communication	• Displacement of communities • Pollution, accidents, • Vegetation and wildlife threatened • Land occupation • Illegal markets (drugs, protected species, slavery and prostitution) • Loss of traditional knowledge, including language

The hazards above described are of different nature; however, they all contribute to the phenomenon of environmental desertification. While climate change and the ENSO phenomenon may not be avoided, its effects can be mitigated with the proper contingency plans (see box 3), allowing for a dynamic socio economic recovery. As section 1 explains, these hazards are present since pre-Columbian times. Yet, the proper strategies for the management of natural resources allowed for a rapid recovery of the area. Regarding the last two phenomena, globalization and climate change, it is important to value the cost benefit of their impacts on small farming communities, and different ways to mitigate the negative socio economic as well as the environmental impacts. It is essential to search for the balance between

⁴⁸ www.labor.org.pe/descargas/Informe_interoceanica_IIRSA_Labor_2006.pdf

⁴⁹ <http://www.biceca.org/es/Article.28.aspx>

⁵⁰ Ibid

⁵¹ www.mtc.gob.pe/portal/transportes/asuntos/proyectos/pvis/tramo_3/eisa/6.0_Identificacion_Impactos.pdf

the need for communication and integration for active national and regional economies, and conservation and preservation of the environment, protecting thus, the valuable natural resources that ensure the health of regional and local economies.



3.

3. Social Context

The third chapter of this paper explores the other face of the desertification process: “Social Desertification”. For this part, two direct causes are analyzed and possible recommendations outlined at the end of each section. The first determinant to be considered is poverty. While a

“Climate Change may become a driver for development, as those having the greatest influence in policy decision making have a true stake in alleviating the poverty of those living upstream”

constant in Peru, this phenomenon is particularly relevant given that developing strategies to avert poverty represent the only possibility to halt and even revert the process of social desertification in the Andes. The following section evolves as a consequence of poverty, focusing on rural-urban migration. The phenomenon initiated in the mid-1950s with the industrial and economic boom that flourished in the cities and urban centres. Following a period of political violence, emigrants have shown a willingness to return to their lands; however, this entails a return to extreme poverty conditions as well. Given the situation, many refrain and prefer to live in extreme conditions in the shanty towns surrounding urban centres. The chapter describes the situation of both, the urban and the rural, as well as discussing the importance of reverting the process.

With this chapter, the concept of “desertification” completes, both the environmental and social faces of the problem are described and analyzed, providing with a general overview of the situation.

Furthermore, two hypotheses may be drawn from the first two chapters:

- a) To a large extent, environmental desertification is caused by social desertification, highlighting the importance of tackling the issues causing the latter and eventually feed back into each other.
- b) Climate change may become a driver for development as it affects all sectors of society, including the rich, the poor, the urban, the rural, as well as those living in coastal, mountainous and jungle areas. It is thus, in the interest of the more powerful sectors of society who have the greatest influence in policy decision making to address the needs of the poor by financing the restoration of water catchment devices upstream.

3.1 Andean Livelihoods

Regional economies throughout Latin America face several obstacles concerning development; however, the most pressing one has become poverty with rapidly increasing rates. Small farmers and local communities who base their food security on farming are particularly susceptible to poverty, given their vulnerability to different hazards that affect the area (see chapter 2). In Peru, poverty and extreme poverty seriously affect a considerable part of the population. The problem is not caused by lack of resources, but by their unequal and inefficient distribution. Cities and urban centres have been favoured by the Government for their rapidly growing population and industries. However, this imbalance has resulted in an aggravation of poverty in rural areas. Government’s inaction in the provision of basic services, including health and education, as well as sanitary infrastructure has proved a major obstacle for human development.⁵² Furthermore, social and cultural discrimination contribute to the isolation of native communities, preventing them from developing a sustainable economy.

The National Statistics Institute, INEI, carried out a Living Conditions Enquiry in 2001,⁵³ which considered two poverty categories: total and extreme poverty. The results revealed that at the national level, total poverty rated 54.8% while extreme poverty rated 24.4%. A further distinction was made between rural and urban centres, showing that urban areas rated 42% of total poverty and 9.9% of extreme poverty. On the other hand, rural areas rated 78.4% of total

⁵² <http://www.perupolitico.com/?p=374>

⁵³ <http://www.foncodes.gob.pe/mapapobreza/>

poverty and 51.3% of extreme poverty.⁵⁴ This meant that 40% of total population did not have access to basic needs.⁵⁵ While the exceptional richness of Andean ecosystems and climates express itself in the abundance of its bio-diversity, representing a valuable source of income and food security, poverty in the region remains a chronic issue for thousands. Poverty rates continue to increase throughout time even though land in lower altitudes is easily cultivable and with the strategies implemented by pre-Columbian cultures even higher altitudes were fertile.

The Southern Peruvian Andes region includes six departments: Tacna, Moquegua, Puno, Arequipa, Cuzco, Apurímac, Ayacucho and Huancavelica. The region has the potential of developing a sustainable economy due to the presence of valuable natural resources (including the largest continental reserves of soft waters in the region) in the ecosystem. Paradoxically, these territories present higher rates of extreme poverty, partly due to the fact that communities tend to isolate themselves from larger urban centres. The building up of a sustainable economy can only be achieved through the development of appropriate strategies for the management of natural resources, allowing for a renewal cycle and in balance with the ecosystem, rendering the Andean high-plateaus once again fertile and highly productive.⁵⁶

3.1.1 Social Aid Programs

In the past decades different welfare programs were implemented by the Government in order to reduce poverty in various regions of Peru. Although these programs were very useful in the reduction of extreme poverty, they often lack an “exit strategy” focusing on emergency issues and applying short term solutions, without a vision for a definitive eradication of poverty. One of them is FONCODES,⁵⁷ a Social Investment Fund created in 1991 as a response to the economic readjustment of the time through the implementation of infrastructure that could improve the quality of life in rural areas. Today, FONCODES continues its work against poverty, and in an effort to recognize the poorest Departments, the Program developed a “Poverty Map” in 2006.⁵⁸ In line with prevailing views concerning the issue of poverty, this study did not aim at measuring economic wealth, but at identifying vulnerability to poverty through lack of basic needs and other human development indexes.⁵⁹ Based on these indicators, Peru was divided in five levels (quintiles) of poverty. The results prove that, although the poverty level decreased at the national level, difference between urban and rural departments is abysmal. The better-off 20% of population live almost exclusively in the Lima and Callao departments, while the poorest 20% of the population live mostly in the rural departments of Loreto and Huancavelica.⁶⁰ Furthermore, while lack of access to water affects 14% of urban population, in rural areas it affects up to 67% of the population.⁶¹

Within the poverty map, the Andean departments rated very differently: Huancavelica, Ayacucho and Apurímac were among the departments containing the 20% poorest population; followed by Puno and Cuzco, containing the second 20% poorest part of population. Finally, Arequipa, Moquegua and Tacna rated among the better-off behind Lima and Callao.⁶² The Poverty Map was also designed with the aim of properly identifying those departments in need, so as to properly allocate a fund of 300 million Soles (About 1 million dollars) in development and social programs.⁶³ Those departments in need will be prioritized with around 50% of the

⁵⁴http://www.oeiperu.org/marco_legal/Documentos%20Peru%202003/F.Lucha%20contra%20la%20Pobreza/16.Encuesta%20Nacional%20Pobreza%202001_%20INEI.pdf

⁵⁵ Ibidem

⁵⁶ <http://www.ciedperu.org/bae/b51b.htm>

⁵⁷ Fondo de Cooperacion para el Desarrollo Social

⁵⁸ <http://www.foncodes.gob.pe/mapapobreza/>

⁵⁹ <http://www.perupolitico.com/?p=374>

⁶⁰ Ibidem

⁶¹ Ibidem

⁶² <http://www.foncodes.gob.pe/mapapobreza/>

⁶³ <http://www.perupolitico.com/?p=374>

fund, targeting the 20% poorest population.⁶⁴ Although this poverty map along with the fund will prove an important aid for several departments, many others will be inevitably overlooked, ignoring thousands of families in extreme poverty. While the Andean region will be partially benefited, the funds will be divided among 811 departments⁶⁵ rated with the highest levels of extreme poverty.

The following chart introduces the poverty and extreme poverty rates of the Andean departments, as well as the investment made on development and social projects during 2006.

Figure 6 Andean Departments: Population, Poverty rates and Investment during 2006⁶⁶

Department	Population	% of Total Poverty	% of Extreme Poverty	Investment
Arequipa	437,362	78	47.4	13,094,058.00
Moquegua	150,175	29.6	7.6	1,564,596.50
Tacna	284,547	32.8	5.2	2,405,088.00
Puno	1,230,394	78	46.1	28,351,524.00
Cuzco	1,188,242	75.3	51.3	41,715,704.00
Huancavelica	442,628	88	74.4	18,212,874.00
Ayacucho	542,747	72.5	45.4	30,317,328.00
Apurímac	437,362	78	47.4	13,094,058.00

As it may be observed, the funds allocated vary for different departments and the investment is not proportional to the percentage of population in need. FONCODES considered different factors other than the total population living in poverty in order to allocate its funds.⁶⁷ The FONCODES Program focuses on three areas: 1) the development of infrastructure, such as schools, health centres, sewage and others. 2) Productive projects, for the development of economic incentives and 3) development of public and civil capabilities, with instruction for local authorities in the management and coordination of development programs.⁶⁸ While FONCODES does help avert poverty in many departments, it focuses its attention and investments on small urban centres, where a minimum percentage of the department population lives, generally leaving aside those in extreme poverty, composed of small farmers who live in the higher quotas of the mountains and who practise subsistence farming.

The exclusion of population located in the higher altitudes furthers polarization in society, benefiting primarily urban elites who have been the traditional recipients of development programs. In addition, the exclusion hinders any chance of tapping the potential populations living in the higher altitudes have to become guardians of the environment with a fundamental role in watershed management, which, as stated in chapter 4 requires, above all, addressing populations living above 4000 masl. The following chart shows the percentage of investment for agricultural and urban development projects and the percentage of population benefited from these investments.

⁶⁴ Ibidem

⁶⁵ <http://www.perupolitico.com/?p=374>

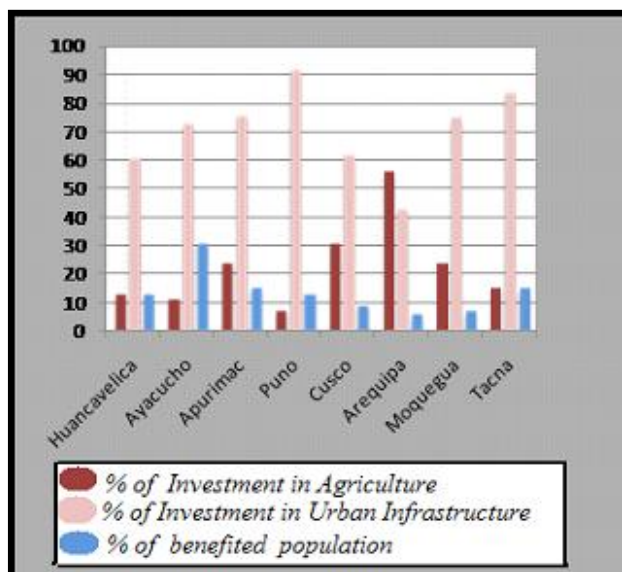
⁶⁶ Chart elaborated on the basis of the information obtained at:

<http://www.foncodes.gob.pe/mapapobreza/index.asp>

⁶⁷ [wbln0018.worldbank.org/.../dcb1b36cc975728f852567e500046b13/\\$FILE/foncod1.doc](http://wbln0018.worldbank.org/.../dcb1b36cc975728f852567e500046b13/$FILE/foncod1.doc)

⁶⁸ Ibidem

Figure 7 Percentages of Investment on Agricultural and Urban Development, and Percentages of Population Benefited⁶⁹



In general, as the chart shows, investments concentrated on programs for urban development, leaving a small percentage for Agricultural Programs, crucial for the development of a sustainable economy. A consequence of this concentration on urban areas is that a large majority of the population is not benefited. Of the Andean departments, only 3 have a benefited population of 15% or above. While FONCODES has brought a series of advantages through the improvement of infrastructure, it has targeted a small proportion of the rural society, rendering it difficult to avert poverty definitively

Another program implemented by the government was the JUNTOS initiative.⁷⁰ This program belongs to the CCT (Conditional Cash Transfer) kind, which conditions money to a particular activity, such as making the children attend school, or regular visits for.

medical check-up.⁷¹ The aim of these programs is the breaking of the “poverty cycle” through the accumulation of human capital.⁷² While some aspects of the CCT have a positive impact on population, there are some factors that make this kind of programs not always the most

appropriate when averting poverty. A strong monitoring and evaluation systems are necessary, for which considerable funds and personal are needed; furthermore, strong administrative capacities are required due to its bureaucratic burden. Furthermore, CCTs can induce to clientelistic aims, which affect local accountability in small communities, and could create an apathetic attitude towards the Program.⁷³

The abatement of poverty must be addressed urgently, since it signifies the opening up of economic alternatives, providing small farmers with access to new technologies that will improve the quality and quantity of their products, giving the much needed “added value” to local goods. Development and social programs like the FONCODES and JUNTOS are useful but not enough; a full commitment to invest on the physical, natural, human and social capitals of the Andean region is essential.

3.2 Demographic Factors

In the past decades, the challenge of poverty in Peru has taken new dimensions. This socio-economic phenomenon is not only a problem in itself, but has become the cause of yet another problem: internal migration. Lack of resources and economic incentives forces many to search for new opportunities outside the community, that is, in cities and urban centres. Constant negligence from authorities critically worsened the situation, whether by not allocating the necessary funds or by not applying enough and appropriate development programs to meet local needs. Parallel to poverty, the insecurity generated by terrorist action during the 80s and 90s intensified migration flows toward urban areas, driving thousands of families to search for a safer future in the cities.

⁶⁹ Chart elaborated on the basis of information obtained at: <http://www.foncodes.gob.pe/mapapobreza/>

⁷⁰ <http://www.oportunidades.gob.mx/htmls/libro/Cap%2009%20PERU%20PROGRAMA%20JUNTOS.pdf>

⁷¹ <http://palestra.pucp.edu.pe/index.php?id=139>

⁷² [wbln0018.worldbank.org/.../dcb1b36cc975728f852567e500046b13/\\$FILE/foncod1.doc](http://wbln0018.worldbank.org/.../dcb1b36cc975728f852567e500046b13/$FILE/foncod1.doc)

⁷³ <http://palestra.pucp.edu.pe/index.php?id=139&num=3>

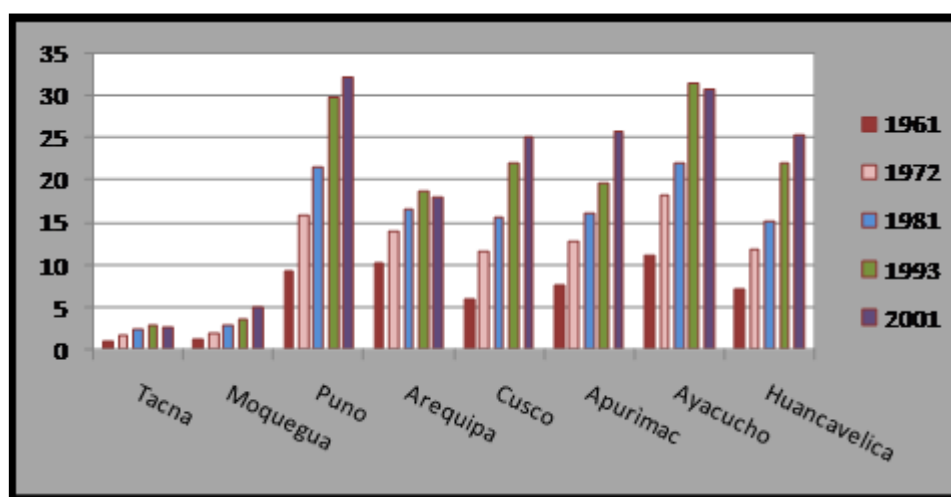
“Social Programs, including CCTs could create an apathetic attitude by beneficiaries”

Migration is a response to the national economic trends of the time, implying an unknown number of people moving towards other areas that, in most cases, are not prepared to receive such amount of people. This is the case of Peruvian cities and urban centres, which today suffer of overcrowding and with several socio economic implications for its population. While the Government has taken steps for the reduction of poverty in rural areas, the phenomenon prevails, driving people toward cities everyday in search of better living conditions and economic opportunities. Migration, besides becoming massive in the past years, has also become selective, meaning that migrant population is primarily constituted by people in working age, leaving behind children and elderly, who marginally contribute to the household economy.

“A demographic inversion has taken place between the 1960s (wherein 70% of the population was rural) and 2000, wherein 30% of the national population lives in rural areas”

Internal migration is constant over the past half century. Whereas 70% of the population were reported to live in rural areas, rapid industrial growth starting in the early 1960s added importance to political and social centres, resulting in a demographic inversion and, according to recent statistical data around 30% of the national population lives in rural areas, and only Lima accounts for one fourth of the national population.⁷⁴ Furthermore, high birth rates in rural areas produced a rapid demographic growth, not always related to economic growth. This means that population outweighs resources and endangers food security, especially when climatic phenomena such as floods or droughts occur in an increasing rate. The promise of better living conditions attracted hundreds of rural workers to the cities. Four decades later, migration flows continue to grow, concentrating a vast majority of emigrants in the Lima and Callao Departments.⁷⁵

Figure 8 Emigrants in 1961, 1972, 1981, 1993 and 2001⁷⁶

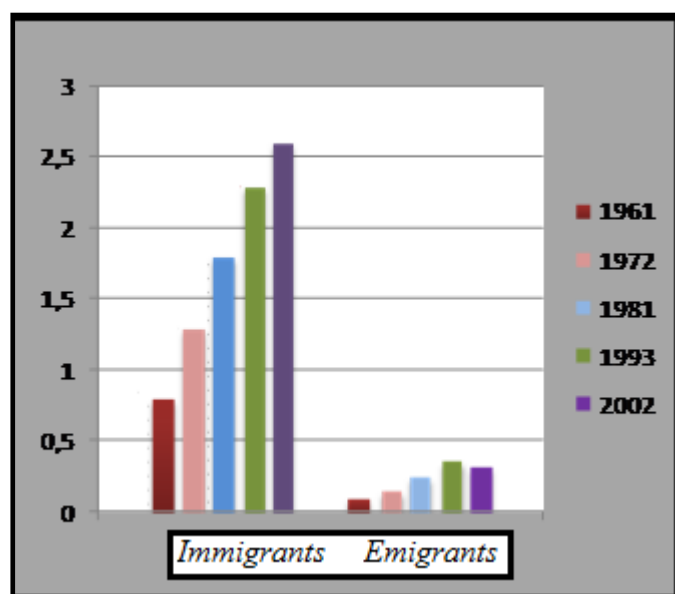


⁷⁴ <http://www.uasb.edu.ec/padh/revista7/articulos/tammy%20quintanilla.htm>

⁷⁵ <http://www.inei.gob.pe/Sisd/index.asp>

⁷⁶ Ibidem

Figure 9 Migration flows in Lima and Callao in 1961, 1972, 1981, 1993 and 2002⁷⁷



As it may be observed, all departments have shown an increment in emigration throughout time, with Puno and Ayacucho literally becoming an ‘expulsion Department’. According to the Poverty Map⁷⁸ Lima and Callao are the richest Departments in Peru and Table 9 shows their migration flow rates. In 1961, out of the total migration flow, 89% corresponds to immigrants, rising to 110% in 1972, to 113% in 1981, 1993 and 2002.⁷⁹

The pressure of internal migration in urban contexts is constantly growing. Local authorities cannot provide basic services for all of its citizens, leaving aside the poorest suburban areas mainly composed of immigrants. Because economic opportunities

are not always available, illegal activities such as theft or crimes are recurrent. As a consequence, rural immigrants suffer from discrimination which frequently impedes social integration.

3.2.1 Political Violence

While lack of access to livelihoods opportunities remains one of the main causes of migratory flows, the latter are also closely linked to a related socio-political phenomenon: terrorist action. During the 80s and 90s violence in rural areas forced thousands of families to seek refuge in urban centres. With almost 70 000 victims, subversive action did not reach importance in Peruvian public opinion until violence arrived to urban centres.⁸⁰ The Andean Departments, together with other rural areas in the country were the most affected, given the already

precarious situation prevailing in the area. Violence affected rural and urban areas at different scales and resulting particularly damaging for the vulnerable rural and subsistence farming economies. Subversive action started in the early 80s, reaching its peak between 1983 and 1984.⁸¹ A well orchestrated government effort to combat it finally managed to eliminate the scourge of terrorism towards the end of the 1980s.

The Truth and Reconciliation Commission, established in 2001 declared that almost 70 000 people were affected by terrorist action.⁸² It is interesting to highlight that in most cases, victims belonged to the weakest part of society.

Violence was disproportionately larger in the poorest departments. Only Ayacucho (rated amongst the poorest departments by the Poverty Map) accounted for 40% of the total victims; and Junín, Huánuco, Huancavelica, Apurímac and San Martín resulted in an 85% of the cases received by the Commission.⁸³ The Final Report also distinguished by social class. Discrimination among victims was obvious given that 79% of the victims belonged to rural areas. Furthermore, natives (or native languages speaking people) rated over 75% of the victims⁸⁴

“Almost 70 000 people were affected by terrorist action...”

79% of the victims belonged to rural areas”

⁷⁷ Ibid

⁷⁸ See Poverty Section

⁷⁹ <http://www.inei.gob.pe/Sisd/index.asp>

⁸⁰ <http://web.amnesty.org/library/Index/ENGAMR460032004>

⁸¹ Ibidem

⁸² Ibidem

⁸³ http://www.abep.nepo.unicamp.br/site_eventos_alap/PDF/ALAP2004_300.PDF

⁸⁴ Ibidem

Political violence affected rural peasants in three different ways: a) familiar, with human rights violations such as deaths, torture and persecutions among others b) Institutional, through the break of the social net which based the political, economic and social dynamics of communities and c) Infrastructure, due to the destruction of homes, hospitals, schools etc.⁸⁵

3.2.2 Abandonment of rural areas

The above mentioned phenomena produced intensive migratory flows which resulted in overcrowding of urban centres, along with many socio economic problems, such as discrimination, delinquency, vagrancy, etc.⁸⁶ However, while cities faced issues of overpopulation, rural areas were abandoned. Intensive emigration equalled abandonment of the area, meaning that also productive as well as social infrastructure was abandoned. This seriously affected grasslands and livestock, as well as crops, provoking a serious reduction in the production and, what's more, in food security.

Resorting to an expression used by some social scientists, we will identify this abandonment by an important part of the population as “social desertification”. This process affects on the environment, livelihoods, economy and production in general, with devastating consequences for the sustainable economy of local population. For the Andean high-plateaus, this abandonment carries serious consequences. What is more, the fact that migration based on economic reasons is selective translates in a loss of work force, so necessary for the subsistence farming.

It is important to foster the importance of returning to rural areas through the rebuilding of social as well as productive nets that may sustain rural communities. Through the implementation of appropriate development programs with a clear ‘exit strategy’ that may induce to a sustainable economy, rural areas may become attractive to local populations who abandoned the area either for safety or for economic reasons. Returning migration is vital because on the first hand, it would considerably reduce poverty rates definitively and not just temporarily. On the other hand, returning migration would also alleviate pressure on urban centres, with the possibility of offering better and more efficient services for the population.

3.3 Anthropological Dynamics

The sustainability and success of Andean agricultural practices is rooted in pre-Columbian tradition and organization, which weaves its nets around food production and management of Natural Resources. This section aims at summarizing main factors considered as the pillars of Andean identity, analyzing four major topics: work ethics and norms; gender, culture and identity and the environment and cosmology. This analysis, though brief, is essential for

“..Economic exchange in the rural Andes has historically been one of non-monetary exchange.”

understanding and improving cultural interaction and communication. Developing communication between migrants and their communities of origin is essential to: a) facilitate buffering the cultural shock related to the settlement in potentially hostile urban environments; b) ease their return to their communities of origin.

It is essential to find a compromise between traditional leadership structures and the socio-political set-up (the municipalities) inherited from colonial times, so that leadership may work through dialogue towards a single objective: re-flourishing of the region’s economy and environment, that will constitute a new drive through the Participatory Budget (See Section 4.2). On the other hand, economic incentives such as Payment for Environmental Services are particularly promising, given the collaborative nature of Andean communities, building not only an economic bridge between communities in higher altitudes with small and medium urban centres downstream,

⁸⁵ Ibidem

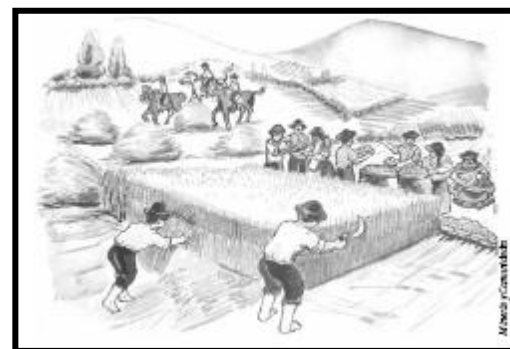
⁸⁶ inc.perucultural.org.pe/textos/lineamientos.pdf

but also fostering communication and cultural exchange, fundamental to overcome alienation and discrimination.

3.3.1 Organization, Work ethics and Norms

Economic exchange in the rural Peruvian Andes has historically been one of non-monetary reciprocity. In terms of the type of assistance required for many farming tasks a few extra pairs of hands are far more appreciated and productive than money. Therefore there are a number of systems in place that, based on reciprocity, formalise the “I scratch your back, you scratch mine” work ethic and highlight the *communalistic* sentiment of Andean people. Work systems such as the *faena*, *mink’a* and *áyni* (see glossary) have functioned to everyone’s benefit for hundreds of years and are not only apt for the needs of agricultural life but also have influenced and worked in accordance to local kinship norms such as *compradazgo* and *ayllu* or other forms of community organisation such as *moieties*. The festivities that set the pace for communal work also provide valuable lessons in Andean life, livelihoods, farming systems and the nature of the agricultural cycle. For public works (*faena*) those who would benefit the most from communal work must also contribute the most. Contributions are usually in the form of food and *chicha* for workers. Food, *chicha* and gossip are constants throughout the day making the projects often festive in spirit. The organisation of workers always ensures that work is not only divided by task, but according to the degree of effort required both physically and financially as well as the number of people that a task requires. These considerations are made so that division of labour is seen to be fair, mitigating any negative feelings and ensuring full cooperation and smooth, productive operations⁸⁷. Principles of fairness and proportionality also apply to traditional methods of water distribution and the labour required for it.⁸⁸ Empirical evidence shows that comuneros organise themselves best when decision making processes remain in their control and according to what seems the most logical and fair to them⁸⁹. In kind payments need to be contemplated as one alternative when it comes to the Payment for Environmental Services.

When *comuneros* migrate to the cities their membership is often left intact and thus they must continue to uphold their communal obligations. As a result family members have had to complete the work of one or more comuneros in the extended family which is a considerable strain, particularly during the *faenas*. With fewer family members around due to massive emigration, the cash hire of labour and *paylla* is becoming more common.⁹⁰ Demographic change is threatening the above family and community institutions, institutions that have been used successfully for many hundreds of years and are crucial for maintaining social networks and hence social capital, essential for development. Furthermore, many *campesinos* are becoming increasingly concerned about the influence that mining and emigration to urban areas is having on communal behaviours and norms. Strict timetables, salaried wage payment and a short term focus have weakened peoples’ bond with the environment and fellow community members. A change from a community focus to individual contracts, particularly in mining areas has lessened the need to work together for the success of all,⁹¹ thus lessening the need for *faenas*, *mink’a* etc.⁹² Although still proud of collective traditions, changes in employment and ways of working, particularly changes from an agricultural cycle with no timetable to strictly monitored work hours, are dampening community spirit which in turn breaks down the social networks



⁸⁷ http://usuarios.lycos.es/sfroemmi/chapter13_communalvalues_froemming1999.pdf

⁸⁸ http://www.naturalhistorymag.com/master.html?http://www.naturalhistorymag.com/1102/1002_feature.html

⁸⁹ <http://links.jstor.org/sici?sici=0084-6570%281984%292%3A13%3C119%3AAS%3E2.0.CO%3B2-I>

⁹⁰ <http://www.fao.org/docrep/004/y3549e/y3549e12.htm>

⁹¹ http://www.mountainvoices.org/p_th_community_activities.asp

⁹² http://www.mountainvoices.org/P_th_Social_Change.asp

necessary for economic exchange and development. Less people available or even willing to work together also puts households with fewer resources in a very precarious situation, with few people to turn to for help in the fields. For these reasons, it is important to take into consideration in-kind payment when evaluating forms of retribution of Payment for Environmental Services schemes (see Section 4.3)

Domestic labour scarcity also leads to ‘small crises’, such as a ceremonial weaving left incomplete, a field left unploughed or a family separated for half a year. According to Collins⁹³, these ‘small crises’ undermine the long term viability of Altiplano households and communities.

3.3.2 Gender Dimensions

Women and men often have different priorities and hence may have different needs from the land or in-kind payments and uses of natural resources. Due to slight differences in cultural knowledge and differing gender roles within the home economics and farming spheres, decisions about natural resource management, food production, participation in in-kind payments or any other compensation scheme are best handled by different generations of the community’s men *and* women. Lack of consultation with women has led to conflict between men and women over resource management.⁹⁴ It must be noted that women tend to carry out activities that allow for multitasking and in particular child rearing, such as housework, sowing, weeding and spinning. It would therefore be best to promote their self-organisation for tasks to ensure the most appropriate divisions of labour both practically and culturally. Although women play an important role within the household concerning issues of expenditure, resources, production etc. and are known to influence their male partners, their own voice is rarely heard in public decision-making situations.⁹⁵ A concerted effort must be given to ensure their involvement in participatory decision-making processes. In the absence of a male partner and unless the woman is divorced or widowed, the father is typically the household head and considered the authority. As a result of high social desertification many women have since been left in the position of household head, meaning that whilst they have full responsibility they do not have control over communal or individually-owned land.⁹⁶ Despite this, their role as household heads even if only over limited periods of time, has given women an



opportunity to demonstrate their capabilities. Cases may emerge where women won’t want to fully relinquish their positions as household heads when their husbands return and so some system of compromise needs to be developed within the household. In typically male-dominated societies and those with traditional gender role norms such as in the Andes, one must be alert for increases in domestic violence as a result of women’s increased independence.

⁹³ <http://www.jstor.org/view/00027294/ap020476/02a00670/0?currentResult=00027294%2bap020476%2b02a00670%2b0%2c03&searchUrl=http%3A%2F%2Fwww.jstor.org%2Fsearch%2FBasicResults%3Fhp%3D25%26si%3D1%26gw%3Djtx%26jtxsi%3D1%26jcp%3D1%26arts%3D1%26Query%3Dschmink%2Bunseasonal%2Bmigrations%26wc%3Don>

⁹⁴ http://www.idrc.ca/en/ev-6367-201-1-DO_TOPIC.html

⁹⁵ http://www.fao.org/docrep/V9651E/v9651e01.htm#P13_1137

⁹⁶ <http://www.ncrcrd.iastate.edu/pubs/flora/presentations/women-natresgmt-andes.pdf>

3.3.3 Culture and Identity

Out migration also changes the identity of those who leave. When people go to the city they are exposed to new influences which can greatly change their outlook on life, it can also sharpen and redefine their own identity⁹⁷, especially as they band together in groups and talk about their 'home' in contrast to their new surroundings and other 'peoples' in comparison to themselves. So whilst many emigrants return to their original hometowns for festivals and to visit family, the social, economic, environmental and livelihood changes met with outside of agricultural living may well have changed their overall attitude and priorities. As a result it becomes hard for some people to simply return to their old lifestyles.⁹⁸ This must be taken into consideration when encouraging emigrants to return.

In the Andean context knowledge tends to be passed on orally, generation to generation, not through the use of writing. As a result, out-migration contributes to a loss of identity and cultural knowledge such as medicinal plant knowledge, weaving techniques and language. A loss of medicinal plant knowledge means both local people and their livestock will suffer. 'Modern' medicine is expensive and not easily available. Indigenous languages are already disappearing fast under the strain of dominant Spanish. Only around 30% of the rural population speak an indigenous language, either Quechua or Aymara.⁹⁹ Whilst they serve no useful purpose in modern Peru, these ancient languages do however serve as a hugely important cultural and ethnic marker, one which cannot afford to be lost. Optimistically speaking, an increased cultural pride due to a revival of traditional agricultural techniques could potentially aid the revival of indigenous languages and traditions.

Furthermore, it is worth noting the extent to which terraces have influenced other facets of Andean culture and cosmological ritual, from weavings to architecture, ceramics and other ceremonial artefacts to their presence in sacred locations, Andean cosmology and even language.¹⁰⁰ For all their practical purposes terraces also serve as a symbolic image. The rebuilding of terraces will place renewed value on Andean cultural heritage and traditions, reviving a sense of collective identity and pride.¹⁰¹ It could even potentially spawn a renewed production of particular arts and crafts techniques.



3.3.4 The Environment and Andean Cosmogony

Environmental problems are beginning to impact negatively on communal activities. The Qoyllur Rit'i festival held each year in the Sinakara valley (4500masl) attracts over 10,000 pilgrims. These pilgrims believe that the ice in that region possesses medicinal powers so people traditionally leave the festival with large blocks of ice strapped to their backs¹⁰². In 2003 however, the festival guardians were forced to ban this tradition, upsetting many pilgrims, in order to protect the disappearing glaciers.¹⁰³ The contamination of water supplies by mining practices has also affected communal activities. For example, before their contamination entire communities would go to the river every Sunday to wash their clothes. The entire day would have a festive spirit; people

⁹⁷ http://www.mountainvoices.org/p_th_identity.asp 2002

⁹⁸ <http://www.mountainvoices.org/peru.asp> 2002

⁹⁹ [http://wbln0018.worldbank.org/LAC/lacinfoclient.nsf/6f1c77f445edaa6585256746007718fe/7a04bbb3dece99d685256e450076462f/\\$FILE/Peru%20-%20Sierra%20Rural%20Development%20Strategy.pdf](http://wbln0018.worldbank.org/LAC/lacinfoclient.nsf/6f1c77f445edaa6585256746007718fe/7a04bbb3dece99d685256e450076462f/$FILE/Peru%20-%20Sierra%20Rural%20Development%20Strategy.pdf) 2002

¹⁰⁰ In Quechua "patas" refers to an agricultural terrace. When used as a suffix added after a word it describes an edge. Ñawinpata = eyelid, mayupata = riverbank. <http://links.jstor.org/sici?sici=0004-3249%28198223%2942%3A3%3C200%3ATSOAT%3E2.0.CO%3B2-W>

¹⁰¹ <http://links.jstor.org/sici?sici=0004-3249%28198223%2942%3A3%3C200%3ATSOAT%3E2.0.CO%3B2-W>

¹⁰² [http://www.ifeanet.org/publicaciones/boletines/11\(1-2\)/37.pdf](http://www.ifeanet.org/publicaciones/boletines/11(1-2)/37.pdf)

¹⁰³ <http://news.bbc.co.uk/1/hi/world/americas/3172572.stm>

drinking chicha, children playing, men fishing, women cooking; everyone would help each other out. Now the river is too dirty even to clean their clothes or to fish so this community bonding activity has stopped.¹⁰⁴ These activities are crucial for the continuation of cultural norms and social networking.

Furthermore, Andean peoples feel themselves to be not just close to, but unified with the cosmos and with nature. They revere Pachamama, mother-earth and Apus, the spirits that are the mountains and which provide them with water and determine weather. There are many rituals in which locals give back to and thank Pachamama for what she has given them. These offerings are not a payment but are to restore balance and harmony in their relationship with nature. This relationship with nature and in particular with mountains may constitute a motivational factor for people wanting to participate in Payment for Environmental Services and mitigate the problems of environmental desertification. In other words, the identification of Andean communities with Pachamama might constitute the backbone of proposals to develop compensation schemes for local populations who contribute to the well-being of the environment. Research carried out concerning watershed management practices of Pre-Colombian times show evidence of the implementation of Payment for Environmental Services during that period.¹⁰⁵

3.4 Local Institutions

Over the centuries, municipalities established during the Spanish colonization in Latin America have proven their resilience to cope with socio economic and political transformations. In rural areas, such as the Peruvian Andean region, the municipality represents the bonding process between the family and higher levels of decision-making. Nonetheless, municipalities still lack the necessary financial, administrative and political capacities to develop activities that would improve the area and quality of life of its constituency. Furthermore, decisions crucial for the

“In rural areas, the municipality represents the bonding process between the family and higher levels of decision-making”

improvement of an area are usually taken by higher decision-making institutions, which fail to consider the importance of popular opinion nor the views of the municipality in decision making processes. The result is a vacuum in the communication between families and regional and Central Governments, limiting the provision of services to rural populations which consequently hampers economic and social development in the area.

In an effort to overcome this vacuum of communication, the Peruvian Government identified the need for renewed and more participatory governance structures. This was to be achieved through a decentralization process, giving local institutions a more important role in decision making over resource management. The Decentralization Law, approved in the 1990s¹⁰⁶ declared the transfer of some responsibilities, giving them a more relevant role in local decision making.

The initiative of granting more responsibilities to municipalities aims at strengthening **participatory policy-making processes**, which facilitate communication between the family and higher level decision-making bodies. In general, families are the main users of natural resources, remain the first socio-institutional reference of individuals, which is why **bottom-up consolidation** is essential for the management of natural resources and the reduction of risks related to natural disasters.¹⁰⁷

Figure 1 1: Municipal Chain¹⁰⁸

¹⁰⁴ <http://www.mountainvoices.org/>

¹⁰⁵ <http://www.iied.org/pubs/pdf/full/13536IIED.pdf>

¹⁰⁶ www.idreh.gob.pe/normas/Ley_Marco_Decentralizacion.pdf

¹⁰⁷ Feasibility Study: “Gobernabilidad y Gestion Sostenida de Recursos Naturales”

¹⁰⁸ Lindemann, T.: “Lessons learnt in the field of decentralization and local Government development in rural

The concept of the municipal chain refers to the dynamic relationship linking the base of society, i.e. the family, to planning processes at local and higher levels of government through *horizontal linkages* (inter-comunal and inter-municipal level associations for the provision of services). Such linkages enable vertical integration (at the provincial and central government levels). The importance of a strong municipal chain is that of putting the citizens in contact with higher levels of Government, where the distribution of resources is determined.

3.4.1 Current Situation

Although rural municipalities remain a key institution for the development of an area, the organizational system regulating these institutions is prone to corruption. The result has been that of mistrust of bureaucrats by local citizens, affecting the political, financial and administrative capacities of the institutions. While municipalities currently hold a weak position, these institutions have the potential to become key elements in the socio-economic net that would allow for local development. This is due to the following reasons:

- Municipalities throughout Peru (as in the rest of Latin America) are **ubiquitous**. This means that they can be found to be present in any locality, from the capital to the smallest village.
- These institutions have the advantage of **legitimacy** due to electoral processes that are now prevalent in Peru, as well as in the rest of Latin America;
- Municipalities also have the advantage of **cross-coverage**, meaning that these institutions have a wide action spectrum and are in the position to manage issues in different sectors: food security, sustainable use of NR, tax collection, etc;
- in line with the principle of **subsidiarity**, municipalities (which have the advantage of their closeness to civil society) can deliver services tailored to the requirements of the local population.
- Although municipal limits do not necessarily coincide with those of watersheds, they do feature the prerogative of joining other municipalities for the sustainable management of watersheds through an **inter-municipal arrangement**.

Figure 10 Shortcomings of Municipalities¹⁰⁹

1) Capture of benefits by the elites.

The biggest risk facing the government as a result of decentralization processes is that in transferring responsibilities to the Municipality, those in control of current power structures will use the benefits to further increase their own power and control. To this day, the dominant power structures of rural Latin America remain clientelistic. It is no coincidence therefore, that the asymmetry of power in rural areas is reflected across a region, which demonstrates the most uneven distribution of wealth in the world. If this clientelism remains unchanged during the processes of decentralization then rural poverty will not be reduced let alone eliminated.

2) Paternalistic and patronizing practices.

Probably as a result of the colonial character of that legacy, there exists a paternalistic and patronizing culture deeply rooted in the behaviour of the members of municipal institutions from the Municipality which tends to belong to the patriarchs down to the village whose heads tend to be nominated by the patriarch. That culture is basically manifested in an attitude by which the municipal power brokers and local politicians dole out resources as part of a mechanism of political patronage.

3) Poverty and Financial dependency.

Municipalities, especially in rural areas, receive little funding from central government and their few employees tend to be political appointees of the mayor, rarely trained and lacking in experience.

4) Accountability.

Mayors tend to depend on central government, for the paid expenses of both themselves and their staff, as well as for administrative purposes. For these reasons, mayors tend to feel accountable to central government and are therefore, more committed to satisfy the demands of Congress Members rather than the demands of their own citizens

5) Municipal Fragmentation.

Rural municipalities are characteristically very small and, therefore, lack the economies of scale necessary for making the investment required for building the infrastructure that will aid local development. This fragmentation also limits access to policy decision-makers and the government at the national level.

The shortcomings mentioned in table 11 describe the prevailing situation for Peruvian municipalities. For this to be resolved, the three dimensions of municipalities: political, financial and administrative capacities must be developed.¹¹⁰

Political capacities represent a municipality's capability to influence higher levels of policy decision-making, and their ability to include the poorest in local decision making. The key to building political capacities lies in the participation of all citizens whilst at the same time, breaking the power monopoly held by local leaders, consequently resulting the legitimacy of municipality.

Developing **financial capacities** of municipalities is fundamental, since municipalities depend almost entirely on external funding (around 90% is received via transfers from the Central government)¹¹¹, giving local leaders a sense of accountability towards the Government rather than towards their citizens. Thus, it is hoped that financial capabilities can be increased with the introduction of economic incentives for sustainable local incomes which will then allow for an increase in local taxation. This will provide local leaders with a stronger incentive to work for the benefit of their citizens and will reinforce downward accountability. The quality of capital held by a municipality is relative to the proportion of internally sourced funds. The higher this proportion is, the healthier the municipal finances will be.

It is important to reinforce **administrative capacities**, (consisting in the human and infrastructural capacities at the disposal of a given municipality)¹¹² which will provide the groundwork for the encouragement and facilitation of aid programs; as well as for investment in fundamental apparatuses such as basic services, natural resources management and risk management.

The absence of auditing mechanisms and a sense of downward accountability, frequently lead to corruption. This corruption and the subsequent mistrust of politicians by local populations, has significantly affected the political, financial and administrative capacities of municipalities. However, for these institutions to exercise a key role in the development of rural areas and to re-position themselves at the centre of a municipal chain that links the rural family to municipal, inter-municipal and higher levels of national decision-making processes via communal organizations there is a need to develop municipal chains that ensures back and forth communication between and among different institutional layers.

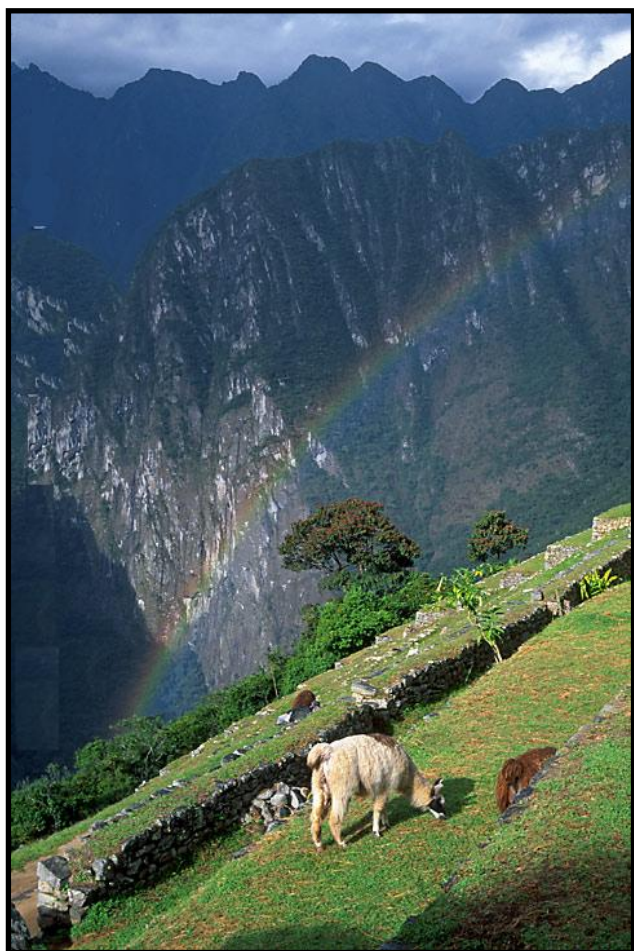
¹¹⁰ Ibidem

¹¹¹ Ibidem

¹¹² Ibidem

4 Emerging Opportunities

While chapters 2 and 3 focused on the problems facing Peru, the following chapter will explore the potentials for improvement of the Andean high plateaus. This chapter is divided into two main parts: the first part, proposes that, even though resources exist, the capacities for their



capture at the local level are lacking. Local institutions are often seen with mistrust by the constituency; yet, these institutions remain the most legitimate and strongest link between citizens and higher levels of governance. This section proposes that part of the solution for the desertification problem lies in strengthening the institutional capacities of municipalities to ensure the capture and administration of resources. The section also highlights the importance of reinforcing the “municipal chain”, a fundamental structure for communication between families, which constitutes the base of society and higher levels of governance. Furthermore, this section describes the current situation of Peruvian rural municipalities and the characteristics needed for a strong local institution.

The second part of this chapter proposes and analyzes a series of alternatives for financing Andean development. The first section discusses the Participatory Budget (PB), a fundamental element of the decentralization process in Peru that has been taking place over the past few years. The importance of the PB is its potential to considerably limit the problem of mismanagement; blighting rural municipalities. Examples of this mismanagement include the construction of megalomaniac municipal

buildings and the unnecessary improvement of urban streets at the expense of investments essential for the promotion of production in remote rural areas. The seizure of funds by local elites is a frequent occurrence; however, the PB is likely to overcome this problem and succeed in the appropriate allocation of resources through the active participation of the whole population. The following section analyzes another important economic input into rural municipalities: the mining canon. The establishment of this tax, the revenues of which are destined for the improvement of infrastructure and development programs is a significant new source of socio-economic development for rural areas, made possible by the presence of trans-national mining companies. This section also considers the roles of different actors, such as governments, mining companies and NGOs.

The last section of the chapter is a proposal for the implementation of a *Payment for Environmental Services* (PES) a program that, in the opinion of the authors, holds great promise for the region. This scheme, which has been successfully implemented in various countries in Latin America, treats the conservation of natural resources as marketable goods. This section argues that important opportunities for the promotion of a PES scheme exist in the Andean region. We therefore include a general guideline of “do’s and don’ts”, as well as a brief description of two case studies in the region.

The aim of this chapter is to give the reader a general overview of the existing and potential economic strategies that would aid sustainable development in the Andean region. Aside from the three possibilities described above, other possibilities will be briefly addressed in the following paragraphs. The first proposal is Eco-tourism, an emerging market which attracts

millions from across the world. For this economic initiative to be a success, however, an adequate infrastructure is a pre requisite as being able to attract and receive tourism is essential. Eco-tourism would essentially be a natural consequence of well investment funds, attracting further capital to the region and its communities. The richness of its ecosystem added to the historical importance of the territory lends the Andean high-plateaus the development of this market.

The region's particular geographical characteristics are also favourable for the breeding of "camélidos". These animals are a native Andean species, apt to cope with high-altitudes as well as Andean weather. Native populations relied on camélidos for transportation and food. Lamas are also considered highly valuable by native populations as they provide both wool and leather. While the extreme economic conditions in the area forced the local populations to neglect lamas, increasingly relying on cattle, these animals represent an opportunity to develop an exotic market, and hence offer many possibilities for the development of local economies.

4.1 Mining Canon

The Peruvian national economy has traditionally revolved around two economic spheres. The first is a modern sector, essentially dedicated to service delivery.¹¹³ The second concerns itself with subsistence farming and related activities, which usually occur at the higher altitudes of the sierra and Amazon areas. However, despite its existence since pre-colonial times a third economic sector, the mining industry, has gained importance in the past decades. Peruvian soil has an unusually high mineral richness; the country is the second greatest silver exporter and the sixth greatest gold exporter in the world.¹¹⁴ Mining is fundamentally geared towards external markets and accounts for 45% of total exports;¹¹⁵ however, this makes up only 4% of total GDP.¹¹⁶

Despite the existence of mining since pre-colonial times, it was the Central Government's decision in the 1990s of liberalizing the economy that permitted the entrance of trans-national companies, leading to a boom of the mining industry. The aim of this liberalization was to overcome balance of payments deficit. In fact, between 1994 and 2004, mining showed an annual increase of 10%, demonstrating its economic potential.¹¹⁷ While the Central Government considers mining a fundamental element of the national economy, its impact on the local communities and the environment is downplayed. Numerous socio-economic as well as environmental consequences accompany industry practice; however, finding a solution to these problems has proved extremely difficult due to the success and importance in establishing this industry. The following chart shows the benefits of mining activity that the Government expects, compared to the social, economic and environmental implications.

Figure 11 Cost-Benefit Chart of mining Activities¹¹⁸

Level	Govt's Expectation	Implications
Economic	▪ Rise in export of NR ▪ Fiscal revenues (taxes and bonus)	▪ Low level of domestic NR processing ▪ Activities operate in enclaves and do not integrate into the local economy ▪ Fluctuating international markets
Social	▪ Employment in non- urban areas	▪ Low absorption capacity for local wo/men workforce ▪ Low local employment rates ▪ Local infrastructure affected

Image: <http://www.photosseek.com/peru/03PER-17-09-LlamaRainbow.jpg>

¹¹³ www.derechoalimentacion.org/gestioncontenidosKWDERECHO/imgsvr/recofirma/doc/caso%20peru.pdf

¹¹⁴ Ibidem

¹¹⁵ Ibidem

¹¹⁶ <http://www.deudaecologica.org/modules.php?name=News&file=article&sid=137>

¹¹⁷ http://www.quechuanetwork.org/only_article.cfm?lang=s&path=052204_1638.htm

¹¹⁸ www.staepa-cajamarca.de/doku/jump.php?doku=vortrag_arana.pdf

- Water extraction for mineral cleaning and its pollution
- Soil contamination/ erosion
- Noise and air pollution
- Solid and hazardous wastes

The chart proves that mining activity is particularly costly for local communities. The environmental consequences are the most dangerous because they are irreversible. When a trans-national company begins the “exploration” phase, soil erosion occurs, rendering it infertile. Furthermore, gold mining is highly dangerous in terms of water pollution, due to an accumulation of mercury as a result of mining techniques, rendering drinking waters toxic for hundreds of citizens.¹¹⁹ The social implications of a mining company for the local community are equally concerning, though. Because this kind of activity requires highly specialized workforce, local populations do not find the expected employment opportunities, shuttering any possibility of economic alternatives. This is a growing concern, since this industry occupies only 1% of the economically active population, a very low level considering the millions of hectares this activity compromises.¹²⁰ Furthermore, in the sierra, communities dedicated to cattle raising are systematically pushed towards higher altitudes to leave territories for mining activity, reducing even more economic possibilities.

Because expecting that mining activity is eradicated from national economy is unrealistic possibilities for economic progress should be analyzed within the existing context. In 2001, a Law was introduced which established that part of the taxes the Central Government received in terms of rent and others by mining companies, a part would be destined to the regional, distrital and local Governments for the financing of development and infrastructure projects with local and regional impact.¹²¹ This is known as Mining Canon, and is distributed considering poverty, population and basic needs indexes.¹²²

A proper use of the mining canon could signify an important element for the improvement of local communities. Local population must be actively involved in decision-making processes of allocating the mining canon, in order to supervise and approve its spending into necessary and convenient projects for the community. Furthermore, mining companies should make an effort to integrate better into the local economy through a higher rate of employment.

Local participation must be encouraged since the initial phase of exploration. Access to information is essential for the value of socio-economic impacts on the community in order to act accordingly. For this, it is necessary the establishment of a monitoring Committee by the civil society recognized as the guardian of mining activities. All necessary evaluations of social and environmental impacts must be carried out effectively as to plan prevention programs rather than mitigation projects.

The Role of Mining Companies. While it is the role of the Government and the civil society to take the initiative in preventing and protecting both the environment and community; it is also the duty of mining companies to work in harmony with its surroundings, otherwise known as Civil Responsibility.

On its official website, one of the leading companies in Tacna and Moquegua, the Southern Copper¹²³ describes its actions to protect the land, water and air on its Environmental Compliance and Management Program. In addition, this Company also contributes to develop a sustainable economy in Tacna and Moquegua through the building of water management infrastructure and the support of cattle-raising improvement activities, among others. It should

¹¹⁹ <http://www.deudaecologica.org/modules.php?name=News&file=article&sid=137>

¹²⁰ www.staepa-cajamarca.de/doku/jump.php?doku=vortrag_arana.pdf

¹²¹ http://www.quechuanetwork.org/only_article.cfm?lang=s&path=052204_1638.htm

¹²² <http://www.minem.gob.pe/archivos/dgm/inversiones/exposiciones/CanonMinero.pdf>

¹²³ <http://www.southernperu.com/Comunidad/Inversi%C3%B3nSocial/tabid/134/Default.aspx>

be noticed the importance and benefits for the company of actively integrating to the development of surrounding areas.

The Role of Government. This entity is probably the most important actor in charge of establishing and regulating legislation for mining companies. In Peru, the Ministry of Energy and Mines¹²⁴ is the highest authority promoting and controlling the rational use of natural resources in harmony with the environment and the surrounding communities. The MEM, however, also recognises the importance of integrating local economies and communities, working in a context of decentralization and promoting participation through legislation such as the mining canon.

The Role of International Agencies. International Organizations play a fundamental role as neutral actors, ensuring the compliance of legislation and the promotion of new economic incentives for the community. These organizations, usually of high profile, count with a strong voice and legitimacy, rendering it difficult for Companies to violate social, economic and environmental regulations.

The mining canon represents an opportunity to recognize the importance of natural resources, as well as to reinvest on their preservation and conservation for a healthier local economy, bettering the lives of small farming communities.

4.2 Participatory Budget

As mentioned in the Local Institutions section, despite some limitations the process of decentralization in Peru is at an advanced stage of execution. A crucial component is the Participatory Budget, which guarantees local population control of resources, which in the past drained towards higher levels of government. The Participatory Budget aims at ensuring that local populations receive a percentage of the resources that the Central Government periodically gives to Regional Governments.

Now that the Participatory Budget is a reality, the challenge lies behind guaranteeing its effectiveness and transparency. For this, it is necessary to develop a municipal chain that connects the rural family (especially the isolated ones living in remote communities located in areas of poverty above 3500m). This chain is articulated around the municipal structure described in Table 10. On the other hand, it is not the goal of this resource to arrive to families as charity, but as a payment for a service or a product. Empirical evidence demonstrates that charity may generate, on the one side, a clientelistic culture and on the other, it may cause a tendency toward apathetic attitudes.

The decentralization effort that began in 2002 in Peru has brought numerous socio political as well as economic changes. One element of this process in particular is the emphasis on participatory processes.¹²⁵ In this context, Peruvians have become an active part of the local, regional and national decision-making processes and fundamental elements of participatory democracy in Peru, as opposed to an exclusively representative democratic system. Active involvement by population results in more accountability and a closer relationship between constituencies and Governments.

In this context, the National Constitution established the development of participatory processes for the formulation of regional and local budgets, also known as Participatory Budget. Article 199 in the Constitution dictates that decentralized Governments formulate their budgets with the participation of citizens, and will give yearly accountability of their actions.¹²⁶ Since its first application in 2004, the participatory budget has established as its primary objectives:¹²⁷

¹²⁴ http://www.minem.gob.pe/mineria/pub_public03.asp

Image: [http://community.iexplore.com/photos/journal_photos/Llamas_of%20Machu%20Pichu%20\(2\).jpg](http://community.iexplore.com/photos/journal_photos/Llamas_of%20Machu%20Pichu%20(2).jpg)

¹²⁵ http://www.lasociedadcivil.org/uploads/ciberteca/e_conterno.pdf

¹²⁶ Idem

¹²⁷ www.transparencia.org.pe/documentos/ley_marco_del_presupuesto_participativo_28056.pdf

- To promote the creation of economic, environmental and cultural conditions that improve the quality life of its citizens and to strengthen their capabilities for the basis of development, permitting concrete actions that reinforce the links of identity, belonging and trust relationships.
- To improve the assignation and execution of public resources, according to discussed and agreed priorities; creating thus, a culture of fiscal responsibility and accountability.
- Reinforce the state-civil society relationship in the context of an active participatory constituency that uses the mechanisms of direct democracy and representative democracy, building shared compromises and responsibilities.

The PB proves an efficient tool for general decision making and spending procedures in local and regional Governments. In contrast with traditional methods, the PB will only formulate its decisions on the base of participatory diagnosis of priorities. Accountability as well as interest and social involvement will increase, improving the state-society relationship. A more efficient allocation of resources inevitably results in social and economic development, reducing corruption incentives. Furthermore, active participation will produce more compromise for financial contribution.

4.3 Payment for Environmental Services

One of the greatest challenges of efficient economic incentives is their flexibility to adapt, grow and change according to the surrounding context. The Andean region currently faces problems of various natures, which need comprehensible programs that permit the access of the entire community to decision-making. Active participation of the local population is a requirement, leading to interest and involvement of the community and resulting in legitimacy of such economic alternatives. Because the Andean region is of great biodiversity and environmental richness of invaluable importance for the rest of the country, it is in the interest of all actors to preserve the natural balance of the mountainous ecosystem. Payment for Environmental Services is an economic incentive that meets all these requirements, since it actively involves the community and benefits both, the local economy and the natural balance of the ecosystem.

This kind of program is not new in Latin America, and examples in other countries of the region have proved successful. While there is no single definition for Payment for Environmental Services, this program may be best described as the provision of an environmental benefit from a provider who, in exchange, will receive a payment from a receiver.¹²⁸ Currently, PES systems are classified in four categories according to the type of service they deliver: a) carbon sequestration and storage, b) biodiversity protection, c) watershed protection and d) landscape beauty.¹²⁹

Given the region's geographic and edaphic characteristics and the extent of influence over the balance of the hydrological cycle, the Andean region is an area with potentials for the development of a Watershed Protection Program. This program will not only benefit local communities at the highest altitudes where, as seen in chapter 3, the highest poor indexes are found, but it will ensure a natural equilibrium of the hydrological cycle, essential for Peruvians in general.

¹²⁸ www.cifor.cgiar.org/pes/publications/pdf_files/hydrology_report.pdf

¹²⁹ www.prisma2.org/sv/contenidos/svrdocumentos/196.archivo

4.3.1 Payment for Environmental Services: Do's and Don'ts ¹³⁰

1. Identification of ES need: A baseline is essential for buyers of an Environmental Service (ES) to plan and assess the benefits obtained from PES. Identifying the necessity of an ES provides legitimacy and ensures that parties will not eventually walk out of the contract. An essential element is to define the service that is being bought/ sold, as well as the cause-effect relationship of such service.

2. Assessing the economic, political and social feasibility of implementing PES: This will allow for the eventual creation of the proper conditions necessary for PES to thrive. Targeting research is necessary for the identification of the scientific linkages between upstream land management practices and downstream impacts. PES programs require a supporting institutional infrastructure/ governance that allows for its management. Municipalities have an important role since they are cross-sectoral and can join into inter-municipal associations in order to deal with watershed units. Usually, due to mistrust between the parties, the PES program should foresee the funding of the first round of payments, in order to gain the trust of the buyer and ensure its participation on the program. The willingness to pay is an essential element; it is the voluntary nature of its contract that makes this kind of schemes feasible.

Essential pre-requisites for the deliverers of an ES should be appropriate forms of property rights, which ensures tenure and facilitates the identification of service providers. Also, PES must offer real land-use options for the service deliverers, permitting them to build up relying on other economic resources. Furthermore, the opportunity cost of emigrating to the production and processing of coca must be taken into consideration when establishing payment tariffs.

3. Consciousness Campaign / Awareness Raising and Consequential Impact: A consciousness campaign creates general consent in the population and attracts demand from the private sector. In many countries, some ES are considered as a public good, and consumers do not realize the costs of providing and maintaining an ES. A consciousness campaign should help in the realization that an ES must be paid for.

In more developed countries, improved understanding of the benefits provided by watersheds and the growing threats that they are facing have increased beneficiaries' willingness to pay.

4. Access to Information: A PES contract is voluntary by nature, which means that it is the result of negotiations. To ensure the success and stability of a PES contract, all parties must be well informed on the implications and be realistic on the outcomes; otherwise frustration might emerge and endanger the contract. There are likely to be significant costs involved in designing and maintaining such a scheme, usually they are at the expense of the PES buyer; however, these must always be agreed in advance. PES buyers also need to consider that ES are subject to environmental changes that cannot be controlled by ES suppliers, not offering a guarantee or immediate outcomes to the ES buyer.

It should be kept in mind that:

Contractual arrangements among private parties tend to be more effective at smaller scales, while at larger scales there is a greater role for government and other intermediary organizations. Methodologies for PES need to be built through an iterative process. In an initial stage, these methodologies should be built at small scale, between communities living at short distance within the same watershed. The example of Bolivia (see Table 14) describes the

¹³⁰ This is the result of research from different sources:

www.prisma2.org.sv/contenidos/svrdocumentos/196.archivo

www.cifor.cgiar.org/pes/publications/pdf_files/hydrology_report.pdf

www.rlc.fao.org/foro/psa/pdf/procuencas.pdf

www.qeh.ox.ac.uk/dissemination/conference-papers/muradian.pdf/

<http://www.rlc.fao.org/prior/reclnat/forodocs.htm>

Image: http://www.condesan.org/e-foros/agroindustria_rural/GENERO.jpg

process. At a second stage, methodologies should be built at an “*intermediate level*” between farming communities and near-by towns (such as Puno and Juliaca), industries and agro-industries. Once methodologies have been built at that level, they can be up scaled into the national level, to secure contributions from farther away larger cities

Funding will also be necessary, since an ES buyer will be often financing to infinity

5. Monitoring: Once a PES contract has been settled, regular monitoring becomes essential to guarantee the contract’s application and respect and that no perversion have emerged (i.e. leakage, permanence, etc). Furthermore, monitoring keeps the community actively involved, providing a sense of responsibility as well as local employment.

6. Payment Options: Flexibility on forms of payment facilitates the negotiations of the contract. In some cases, the ES provider will be an indigenous community or an isolated village of small landowners who will not find in cash a profitable remuneration, either because they do not have experience in administering money or simply because they would not spend it wisely, and waste it in luxuries. Payment should also be flexible, not only cash, but also in-kind or in the form of benefits and alternated with cash. Payment should not be up front but in periodic and small amounts, so as to provide a clear incentive for the provider to continue to adhere to contractual obligations, and a possibility for the buyer to exit the system in the case of the provider’s non compliance. At the same time, in-kind payment benefits the community or village by offering a different economic opportunity. An assessment of local necessities will result in wider acceptance for a PES from the ES providers.

Figure 12 Payment for Environmental Services (PES), Lessons from Bolivia¹³¹

The case of Bolivia is a pilot PES, which has shown positive results. The Program was introduced in the Los Negros Valley, where two communities were in conflict for water use. An up-stream and down-stream communities have identified their water stream linkage, despite their social and cultural differences. In this context, NATURA, an environmental group, has proposed the implementation of a Watershed Protection Program, ensuring water supply from the up-stream community of Santa Rosa to the down stream ES buyer, Los Negros community. The need for the ES was evident by the reduced flow of water during the dry season (it had halved in the past twenty years), clearly produced, among other factors, by an increase in up-stream deforestation. The approach of NATURA was not to demand money from the Negreños, since this would hardly benefit the Santaroseños and harmful for the Negreños. Thus, in-kind payment was proposed.

This contract resulted in the compensation for protection of the native vegetation the watershed in the form of one beehive and training in honey production for every ten hectares of water-producing cloud forest that upstream landowners protected – a cash equivalent to US\$ 3 a year per hectare, payable up front. This PES scheme is gradually building trust in contracts and markets, and strengthening property rights by reinforcing locally developed and accepted institutions. In 2006, the contract was renewed and the in-kind payment was changed for barbed wire. Useful for the delimitation of properties, enhancing thus, the ES supply.

The Bolivian example shows the importance of in-kind payment for small communities. It also proves the link that such a Programme may provide to communities, building inter community linkages useful for the construction of socio economic nets. The Andean region is



¹³¹ <http://www.perc.org/perc.php?id=846>

Image: <http://www.radiologico.org/apicultura/wp-content/uploads/2006/03/bolivia3.jpg>

represents a valuable source of environmental services of different kinds and the application of a PES program has much potential for Andean communities, often willing to receive new economic incentives.

7. Keep Priorities on Top

It is important to keep as the main objective the improvement of environmental services through production, rather than sole protection. Poverty alleviation is an important side objective, which can be pursued through timely interventions, but it should never become the primary objective of a PES program. Production will avoid dependency, also generating rural employment.

8. Establish Linkages

Establishing linkages with both local organizations that can support project-level implementation and river basin organizations, as well as NGOs and local and regional Governments ensures support and legitimacy, as well as financing.

Figure 13 PES - Lessons from Costa Rica¹³²

The case of Costa Rica may be considered as one of the pioneer PES programs implemented in the region. In the mid-1990s, the new Forestal Law was approved, establishing for the first time the Payment for Environmental Services. The law recognized the conservation efforts as a market good and the need to pay those who provide them. The government of Costa Rica is highly involved in PES Programs across the country, granting it a particular impulse that ensures its application and attainment.

A particularly successful example is the one in Heredia. The municipal supplier of public services, ESPH embraced the policy of PES for its drinking water supply services, recognizing the importance of protecting and preserving watersheds in Heredia, which supply water to different urban centres.

On March 2000, an additional fee was implemented in the water bill, which recognised water as an economic asset, developing consciousness among its users on the importance of the payment to those who work for its preservation. Experts of ESPH assist those who join the PES scheme with technical and legal advice, as well as being in charge of regular monitoring of the area. Furthermore, in Heredia, water users pay US\$ 0,005/ m³ of water; with the implementation of the PES Program, the estimation was of US\$0,0056/m³ of water.

The case of Costa Rica is a clear example of the importance of an involved Government. Furthermore, Heredia's water supply company accompanied this addition on its bill with a strong publicitary campaign about the importance of protecting watersheds and the small effort it implied for the citizens. In fact, a survey carried out by the company itself showed that 92% of users were willing to pay the extra amount in order to ensure watershed protection. An awareness campaign informing and involving the community/ constituency is essential for the legitimization of such a program.

¹³² www.yale.edu/tri/pdfs/bulletin2006/019RedondoWelsh.pdf

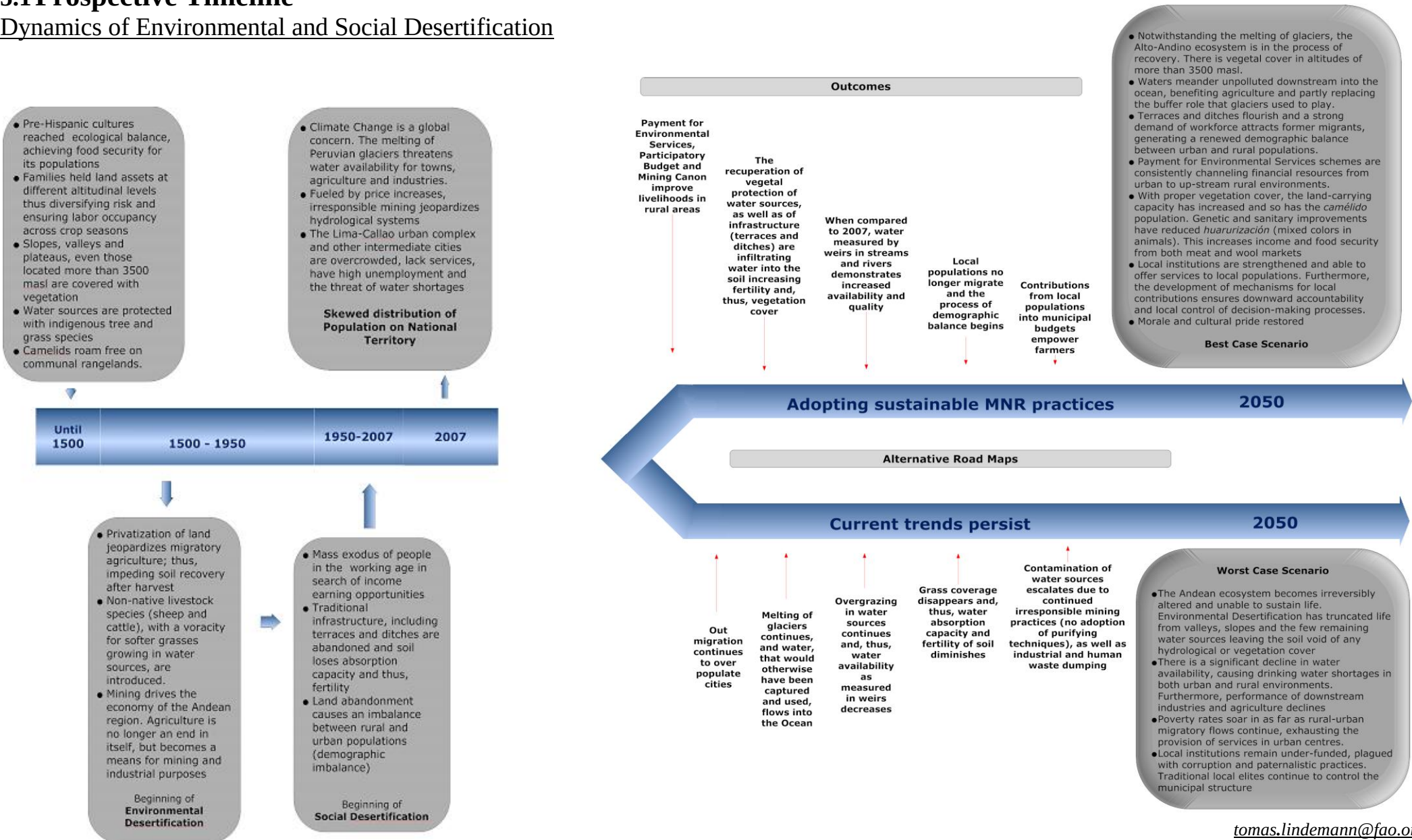
5 Final Remarks

An uninterrupted continuation of prevailing trends will lead to the collapse of the Andean socio-economic system. However, a number of external and internal policies, processes and institutions are in place, creating an environment in which it is possible to address the roots of the environmental and social crises. The decentralization process initiated in the early years of this millennium is democratizing decision-making processes. It is also helping to monitor corruption in institutions at local level. The recent escalation of awareness concerning the consequences of climate change explains a change of political will, both at global, national and local levels to tackle the deterioration of natural resources and in particular to deal with preservation of water resources.

The outcomes and conclusions presented below are based on the understanding that existing institutions and processes need to be supported rather than new ones created. There is a need for strengthening the socio-economic net in Andean communities and the economic opportunities outlined/proposed in chapter 4 are in line with the reality of the region.

5.1 Prospective Timeline

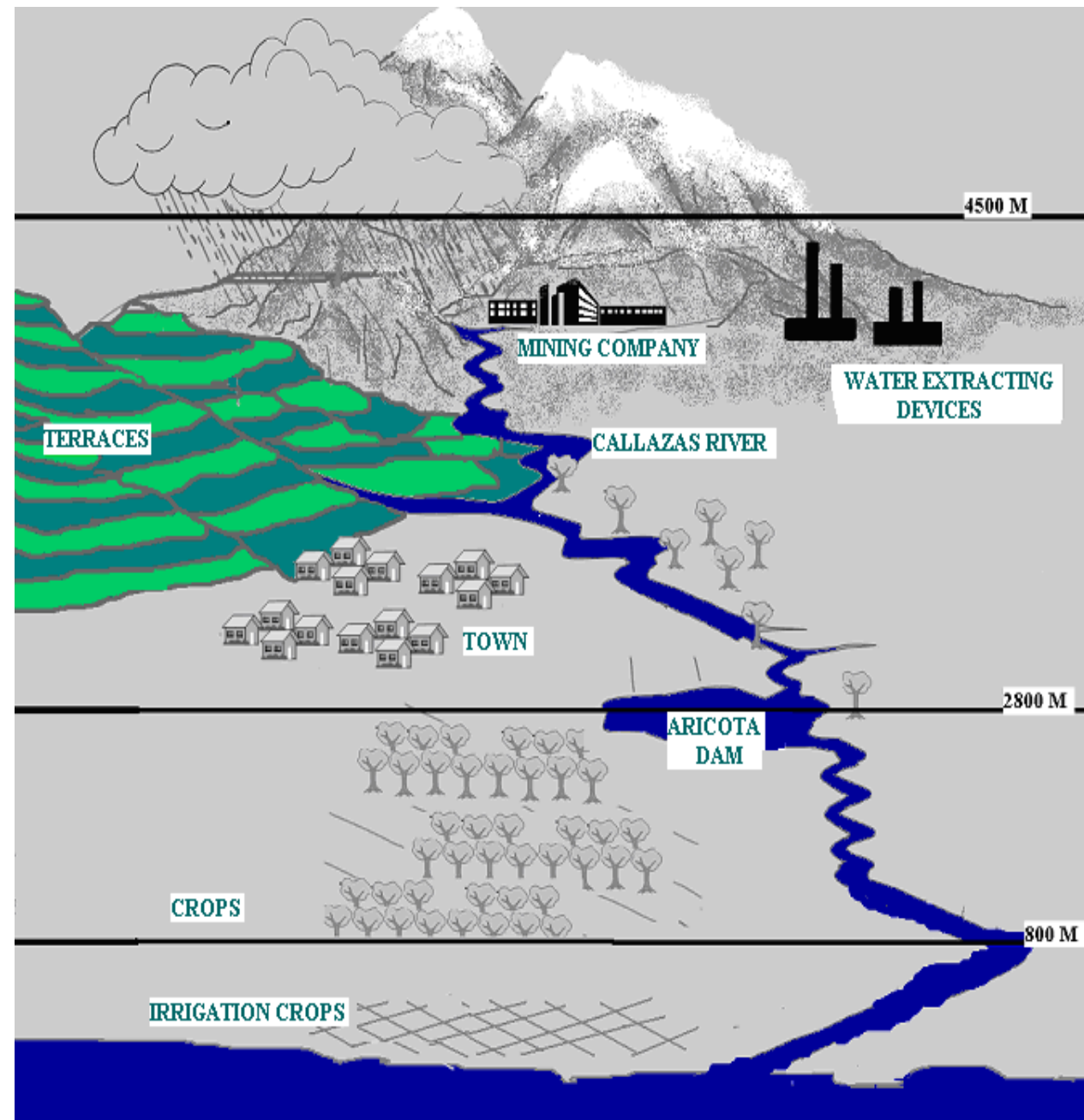
Dynamics of Environmental and Social Desertification



Dynamics of the Callazas River

The Callazas river watershed helps illustrate a trend which is replicated in most of the rivers of the Andean range.

- City of Candarave (4000 masl):
 - Supply problems
 - Water pollution (non-existent purification mechanisms)
- Fruit and Vegetable producers (2500- 4000 masl)
 - Loss of productive potential (quantity/quality)
- Water level Aricota dam (2800 masl)
 - Decrease of 600 MMC in 30 years
- Tacna (coast)
 - Reduction of water availability



Outcomes

5.1.1 Restoring grass coverage

It is important to recognize the crucial role played by **traditional infrastructure** (terraces, infiltration ditches) in the management of natural resources, particularly in the initial phase of recuperating grass coverage. Once developed, this grass coverage will act as a **sponge** to permeate water into the soil, thus recuperating the soils' fertility. Reforestation (chiefly resorting to native species) will also play a key role in protecting water sources and courses.

5.2.2. Governance structures consolidating

5.2.2.1 Local institutions flourish in the favourable environment created by the decentralization law, shifting **accountability** down-ward towards local populations and allowing for active participation of local populations in decision making processes. This involvement will also promote the development of the *Presupuesto Participativo* (participatory budget) foreseen in the decentralization law. This Participatory Budget is the criterion for more responsible decision making and an improved participatory democracy;

5.2.2.2. As a result of the revenues from economic alternatives such as Payment for Environmental Services (PES), tourism development and others (see Section 4.3), the Government of Peru is in the position of paying the inhabitants of the Andean plateaus for their contribution to the preservation of the regional natural resources, as well as for the maintenance of the grass coverage. In turn, rural populations in the plateaus have the ability to **pay taxes** to the local municipality, thereby contributing to the financial capacities of the municipality and making it themselves who the municipalities are answerable. This will result in an active role for rural populations in decision making processes.

5.2.3. Developing Socio-Environmental Awareness

As a result of an intense and effective publicity campaign in urban centres, civilians will understand the importance and limits of natural resources (in particular water) and will become interested and cooperative in the development of economic alternatives that permit its conservation and improvement. Furthermore, there is a need for understanding the role that Andean communities play as guardians of natural resources, especially water, located more than 3500 masl. Furthermore, with increased awareness civil society will also become critical of activities that endanger those same natural resources. This would render it difficult to develop harmful activities that do not abide by the environmental laws.

5.2.4 Payment for Environmental Services Programs Mainstreamed

Local institutions need to play a key role in distributing PES revenues to local populations against the delivery of required infrastructure. For this reason, a national effort needs to be made to devise strategies for the promotion of PES to “**water producers**” upstream. Furthermore, PES may encourage a trend of reversed migration processes by attracting former migrants back to their original lands, where they may be engaged in the restoration of infrastructures, such as water capture devices.

5.2.5 Demographic Balance Improved

Attracted by opportunities arising from economic development in the region, an inversed migratory trend brings émigrés back to their communities of origin in search of their roots and a dignified life-style that respects their traditions. This results in a more balanced distribution of population within the national territory partly lifting the burden of cities from the stress of overpopulation.

Evidence from the Bolivian decentralization process in the 1990s has shown that as resources flow down the line to the municipal level, even migrants who have benefited from their life in

urban settings by educating themselves at technical or professional levels, tend to return to the village of origin.

5.2.6 Andean Landscape in Recuperation

With the flourishing of grass coverage, local populations are in a position to properly feed their livestock, in particular their *camelidos*, and generate a surplus of ichu (local grass). Ichu is used for the construction of roofs and provides improved thermal conditions for their homes and animal shelters. This will improve the pride people have for their own traditions and will ultimately help boost tourism.

5.3 Conclusions

5.3.1 Environmental and Social Desertification

Various factors are generating an environmental crisis in the Andean region. In recent decades two single factors have come to aggravate an already existing environmental crisis i.e. the revival of the mining sector with its effect of polluting entire watersheds and the global warming process, which is determining the melting of glaciers in the tropical Andes.

While urgent measures are required to further improve environmental responsibility of mining companies as well as the reduction of carbon emissions by polluting local and non-local industries: actions need and can be taken immediately to develop existing and new water infiltration infrastructure, as well as the grass coverage in order to replace the role that melting glaciers used to play while in full existence. However, during the second half of the last century, a massive exodus of the farming population has reduced dramatically the availability of human labor to perform the task of maintaining existing and building new water infiltration infrastructures.

5.3.2 Comparative Advantages of Traditional Agriculture

The re-adoption of traditional agricultural strategies combined with appropriate technologies is fundamental for coping with external hazards such as globalization and climate change and the ensuing food security crisis. The contribution of the above described strategy for the management of natural resources is twofold. In the first instance, increasing soil fertility through water infiltration will improve agricultural production, both qualitatively and quantitatively. Secondly, waters from precipitation as well as from melting glaciers will infiltrate in the soil and flow steadily to lower altitudes, ultimately feeding into rivers, lakes and other water reserves that are vital sources of water-supply for urban dwellers, industries and coastal agriculture. Potentially, the infiltration of water into sloped soils may represent a strategy to compensate for the loss of glacier coverage upstream. There is thus, a responsibility for us all to support the revival of traditional water catching devices, such as terraces and ditches in the Andean plateaux.

5.3.3 Globalization helps in drawing attention to the importance of preserving water sources up-stream

Globalization has brought about deep changes on the overall landscape of the Andes. One such change includes the introduction of supermarkets selling food items at prices lower than the costs of small farmer production thus, jeopardizing their sustainability. On the other hand, however, globalization represents the connectedness (via such means as the internet and the network of roads known as Carretera Interoceánica) of remote areas with the “modern world,” generating awareness about the fundamental role that their actions play in the hydrological cycle of the region. This provides an environment in which local communities are able to earn unprecedented income from the most precious of all goods for humanity: water.

5.3.4 Comparative Advantages of Municipalities in the Management of Natural Resources

In view of their multi-pronged sectoral and disciplinary coverage, municipalities have the comparative advantage for addressing the complex issues concerning the management of

natural resources in the fragile eco-social system that is the Andean high-plateaux. Their comparative advantage lies in their ability to function as a bridge between local communities (bottom-up) and Central Government (top-down). In the bottom-up building of municipal capacities, there is a need for projects to address communal inertias by tackling issues at the household level, where natural resources are primarily managed. By building concentrically around household up to the communal level and progressing to the municipal level, the close connection between the family (the first in the institutional chain) and other institutional strata is continually maintained, helping to bring natural resources management to the forefront of discussions when it comes to assigning municipal budgets.

5.3.5 Local Institutions reflect the functioning of its community

Local institutions represent indicators of progress in the achievement of democratic processes. The greater the participation of local populations in municipal decision-making processes, the greater is the progress towards achieving participatory democracy. Participatory democracy consists of the inclusion of civilians in the dynamics of local institutions' decision-making processes. When clientelism and other shortcomings are present, the municipality is weak, debilitating its financial, political and administrative capacities.

5.3.6 Local Contributions build institutional capacities

- 5.3.6.1 In order to strengthen the financial capacity of municipalities, there is a need to increase municipal revenues from local contributors. Local contributions represent a minimal proportion of municipal budgets when compared with resources coming from such sources as the mining canon and the participatory budget. Over the last couple of decades, these two sources have significantly helped build financial capacities. However, no matter how great these contributions may become in the future, they will be irrelevant for the purpose of poverty alleviation and ownership of institutions by local populations if they are not accompanied by a parallel increase in contributions from local populations. For this purpose, it is essential to revise the paternalistic view that local populations are too poor to contribute to local institutions.

5.3.7 Glaciers as Financial Capital

When financial capitals are prudently managed, they steadily release their revenues on a yearly basis; when irresponsible generations take over the management of such capital they tend to deplete it by overspending. While the original capital may continue to provide revenues for a number of years, after a given period gambling will exhaust the reserves and the revenues disappear. Similarly, glaciers release their quota of water every year to compensate for water losses in times of drought. It is only if new generations react pro-actively to the loss of this "financial capital" (in this case to the rapid depletion of glacier volumes) that the enterprise (the Andean plateaus) can recover from the shock. A Pro-active response to the threat of glacier melting dictates a multi-pronged approach.

5.3.8 Climate Change as a driver for Development

A key risk for the decentralization process is that benefits of development programs may still be captured by local elites. Focusing on the rural poor may cause yet another bottle-neck for rural development consisting in its sabotage by the local elites of those programs. It is therefore important that development programs identify drivers of change that bring advantages for both rich and poor, so that potential changes have global appeal. Due to the impact climate change will have on all sectors of society, rich and poor have a stake in preventing them from becoming a serious threat for their livelihoods; for this reason climate change potentially represents that kind of driver at the sub-national, national and global levels.

6 Bibliography

- Los Quechuas

http://www.charango.cl/paginas/los_quechuas.htm

- Complementariedad Ecológica:

<http://www.webconferencia.net/foros/civilizaciones/las-civilizaciones-precolombinas-285826.html>

- Terracing and Irrigation in the Peruvian Highlands

<http://links.jstor.org/sici?sici=00113204%28198708%2F10%2928%3A4%3C409%3ATAIITP%3E2.0.CO%3B2-M&size=LARGE&origin=JSTOR-enlargePage>

- Historia de los Incas

<http://www.portalplanetasedna.com.ar/incas.htm>

- Las Civilizaciones Pre-colombinas

<http://www.webconferencia.net/foros/civilizaciones/las-civilizaciones-precolombinas-285826.html>

- HERRERA, Adriana - Proyecto de Titulación y Registro de Tierras: Análisis de los Aspectos Sociales, Informe N°01/79IADB-PER; Fecha 20/09/2001

- Lima: Ciudad cada vez menos pretenciosa

www.prc.utexas.edu/urbancenter/documents/2LimaSistemaUrbano2.pdf

- Titulación Agraria en Perú

http://www.minag.gob.pe/tc_titulacion.shtml

- Land Tenure, Ecological Zone and Agricultural Regime in the Central Andes:

<http://links.jstor.org/sici?sici=0094-0496%28198102%2978%3A1%3C139%3ALTEZAA%3E2.0.CO%3B2-Y>

- El Proceso de Reforma Agraria

http://www.minag.gob.pe/tc_titulacion.shtml

- The Regional Impacts of Climate Change

<http://www.grida.no/climate/ipcc/regional/149.htm>

- European Commission on Environment and Climate Change

http://ec.europa.eu/environment/climat/home_en.htm

- The Regional Impacts of Climate Change: Executive Summary

<http://www.grida.no/climate/ipcc/regional/123.htm>

- The Regional Impacts of Climate Change: Mountain Ecosystem and Cryosphere:

<http://www.grida.no/climate/ipcc/regional/136.htm>

- El fenómeno El Niño en el Perú: Reflexiones desde la Historia:

www.cepes.org.pe/debate/debate33/01-articulo-da33.pdf

- Glacier depletion to hit river flows after 50 years

<http://www.dawn.com/2007/03/12/top14.htm>

- The Regional Impacts of Climate Change: Agriculture
<http://www.grida.no/climate/ipcc/regional/142.htm>
- Stern Review on the economics of climate change
http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm (executive summary full)
- The Regional Impacts of Climate Change: Hydrology, Water Resources, and Freshwater Fisheries
<http://www.grida.no/climate/ipcc/regional/138.htm>
- Glaciares, Lagunas Altoandinas Deglaciación y Cambio Climático
http://inrena.gob.pe/irh/irh_proy_glaciares.htm
- Laboratorio de Glaciología
<http://www.glaciologia.cl/images/Image4.jpg>
- IUCN: Livelihoods and Climate Change (available on request from the authors)
- Carretera Interoceánica Sur. Consideraciones para su aprovechamiento
www.labor.org.pe/descargas/Informe_interoceanica_IIRSA_Labor_2006.pdf
- La Carretera Transoceánica de Brasil-Perú: Resumen de Proyecto
<http://www.biceca.org/es/Article.28.aspx>
- Proyecto IIRSA: Identificación y Evaluación de Impactos Socio-Ambientales
[www.mtc.gob.pe/portal/transportes/asuntos/proyectos/pvis/tramo_3/eisa/6.0 Identificacaci on Impactos.pdf](http://www.mtc.gob.pe/portal/transportes/asuntos/proyectos/pvis/tramo_3/eisa/6.0_Identificacion_Impactos.pdf)
- Perú Político: El Mapa de la Pobreza 2006:
<http://www.perupolitico.com/?p=374>
- Mapa de la Pobreza 2006
<http://www.foncodes.gob.pe/mapapobreza/>
- Agricultura Sostenible en la Región Andina
<http://www.ciedperu.org/bae/b51b.htm>
- Perú: Programa JUNTOS
<http://www.oportunidades.gob.mx/htmls/libro/Cap%2009%20PERU%20PROGRAMA%20JUNTOS.pdf>
- Palestra: Las Transferencias Monetarias Condicionadas
<http://palestra.pucp.edu.pe/index.php?id=139>
- Aportes Andinos: Migración, Género y Derechos Humanos en Perú
<http://www.uasb.edu.ec/padh/revista7/articulos/tammy%20quintanilla.htm>
- INEI: Instituto Nacional de Estadística e Informática
<http://www.inei.gob.pe/Sisd/index.asp>
- Peru. The Truth and Reconciliation Commission – a first step towards a country without injustice
<http://web.amnesty.org/library/Index/ENGAMR460032004>

- Despoblación y Despoblamiento en Áreas de Violencia Política, Perú 1980-2000

http://www.abep.nepo.unicamp.br/site_eventos_alap/PDF/ALAP2004_300.PDF

www.idreh.gob.pe/normas/Ley_Marco_Descentralizacion.pdf

- Feasibility Study: “Gobernabilidad y Gestión Sostenida de Recursos Naturales” This document is available on request from Tomas Lindemann
- Lindemann, T.: “Lessons learnt in the field of decentralization and local Government development in rural areas of Latin America” :

http://www.fao.org/sd/dim_in2/in2_050501a1_en.htm

- Mountain Voices: Peru

<http://www.mountainvoices.org/peru.asp>

- A Rural Development Strategy for the Peruvian Sierra 2002 p.12 , FAO and World Bank
[http://wbln0018.worldbank.org/LAC/lacinfoclient.nsf/6f1c77f445edaa6585256746007718fe/7a04bbb3dece99d685256e450076462f/\\$FILE/Peru%20-%20Sierra%20Rural%20Development%20Strategy.pdf](http://wbln0018.worldbank.org/LAC/lacinfoclient.nsf/6f1c77f445edaa6585256746007718fe/7a04bbb3dece99d685256e450076462f/$FILE/Peru%20-%20Sierra%20Rural%20Development%20Strategy.pdf)

- Reciprocity for Life security

www.metafro.be/leisa/1998/14-4-28.pdf

- Rational Choice and Collective Action in an Andean Community

http://usuarios.lycos.es/sfroemmi/chapter13_communalvalues_froemming1999.pdf

- Trickle Down Theory, Andean Style

http://www.naturalhistorymag.com/master.html?http://www.naturalhistorymag.com/1102/1002_feature.html

- The Agricultural Base of the Pre-Incan Andean Civilizations; Morris A.

<http://www.jstor.org/view/00846570/di980523/98p0130j/0?currentResult=00846570%2bdi980523%2b98p0130j%2b0%2cFFFFFF&searchUrl=http%3A%2F%2Fwww.jstor.org%2Fsearch%2FBasicResults%3Fhp%3D25%26si%3D1%26gw%3Djtx%26jtxsi%3D1%26jcpsi%3D1%26artsi%3D1%26Query%3Dandean%2Bsocieties%2Bmurra%26wc%3Don>

- Uphoff, N. “Institutional Capacity and Decentralization for Rural Development”, Cornell International Institute for Food, Agriculture and Development

- Country Studies: Peru - Family Life

<http://www.country-studies.com/peru/family-life.html>

- Andean Societies

<http://links.jstor.org/sici?sici=0084-6570%281984%292%3A13%3C119%3AAS%3E2.0.CO%3B2-I>

- Role of women in Agriculture

http://www.fao.org/docrep/V9651E/v9651e01.htm#P13_1137

- Gender and Natural Resource Management

http://www.idrc.ca/en/ev-6367-201-1-DO_TOPIC.html

- Women and Natural Resource Management in the Andes

<http://www.ncrcrd.iastate.edu/pubs/flora/presentations/women-natresmgmt-andes.pdf>

- Melting Glaciers threaten Peru (BBC)

<http://news.bbc.co.uk/1/hi/world/americas/3172572.stm>

- Qoyllur Festival

[http://www.ifeanet.org/publicaciones/boletines/11\(1-2\)/37.pdf](http://www.ifeanet.org/publicaciones/boletines/11(1-2)/37.pdf)

- The semiotics of Andean Terracing

[http://links.jstor.org/sici?sici=0004-](http://links.jstor.org/sici?sici=0004-3249%28198223%2942%3A3%3C200%3ATSOAT%3E2.0.CO%3B2-W)

[3249%28198223%2942%3A3%3C200%3ATSOAT%3E2.0.CO%3B2-W](http://links.jstor.org/sici?sici=0004-3249%28198223%2942%3A3%3C200%3ATSOAT%3E2.0.CO%3B2-W)

- Andean Culture and Sustainable Development in the Andes

<http://www.mtnforum.org/oldocs/96.doc>

- Cultural Politics, Communal Resistance and Identity in Andean Irrigation Development

<http://www.blackwell-synergy.com/doi/abs/10.1111/j.0261-3050.2005.00137.x>

- Mountain Peoples – adaptation and cultural persistence for a new century

<http://www.fao.org/docrep/004/y3549e/y3549e12.htm>

- An Environmental Epistemology of the Andean People of Peru

<http://www.psych.utah.edu/gordon/AndeanResearch/FullPaper.html#ChapterOne>

- Unseasonal Migrations

<http://www.jstor.org/view/00027294/ap020476/02a00670/0?currentResult=00027294%2bap020476%2b02a00670%2b0%2c03&searchUrl=http%3A%2F%2Fwww.jstor.org%2Fsearch%2FBasicResults%3Fhp%3D25%26si%3D1%26gw%3Djtx%26jtxsi%3D1%26jcpsi%3D1%26artsi%3D1%26Query%3DsChmink%2Bunseasonal%2Bmigrations%26wc%3Don>

www.derechoalimentacion.org/gestioncontenidosKWDERECHO/imgsvr/recofirma/doc/caso%20peru.pdf

- La Minería en el Perú: Riqueza de Conflictos y de Pasivos

<http://www.deudaecologica.org/modules.php?name=News&file=article&sid=137>

- Gran Minería en Perú: La lógica de los Ganadores y Perdedores

www.staepa-cajamarca.de/doku/jump.php?doku=vortrag_arana.pdf

- Canon Minero: Definición, Cálculo y Utilización

<http://www.minem.gob.pe/archivos/dgm/inversiones/exposiciones/CanonMinero.pdf>

- Canon Minero: Posibilidad de Inversión en el Turismo

www.mincetur.gob.pe/TURISMO/Producto_turistico/CANON_MINERO.pdf

- Southern Copper: Operaciones en Perú

<http://www.southernperu.com/Comunidad/Inversi%C3%B3nSocial/tabid/134/Default.aspx>

- Publicaciones Atlas de Minería en Perú

http://www.minem.gob.pe/mineria/pub_public03.asp

- Potenciando la Participación Ciudadana en el Perú: Presupuesto Participativo y Consejos de Coordinación

http://www.lasociedadcivil.org/uploads/ciberteca/e_conterno.pdf

- Ley Marco del Presupuesto Participativo

www.transparencia.org.pe/documentos/ley_marco_del_presupuesto_participativo_28056.pdf

- Rapid Hydrological Analysis of the Los Negros Watershed in support of a Payments-for-Environmental Services (PES) Mechanism

http://www.cifor.cgiar.org/pes/publications/pdf_files/BRobertson0501S.pdf

- Fair Deals for Watershed Services in Bolivia

<http://www.iied.org/pubs/pdf/full/13536IIED.pdf>

- Prisma: Valoración y Pagos por Servicios Ambientales: Las experiencias de Costa Rica y El Salvador

www.prisma2.org.sv/contenidos/svrdocumentos/196.archivo

- PROCUENCAS: Protección y recuperación de microcuencas para el abastecimiento de agua potable en la provincial de Heredia, Costa Rica

www.rlc.fao.org/foro/psa/pdf/procuencas.pdf

- Payments for Environmental Services in Watersheds: Insights From a Comparative Study of two Cases in Central America

www.qeh.ox.ac.uk/dissemination/conference-papers/muradian.pdf/

- Foro Regional sobre Pagos por Servicios Ambientales

<http://www.rlc.fao.org/prior/reclnat/forodocs.htm>

- Bees and Barbed Wire for Water on the Bolivian Frontier

<http://www.perc.org/perc.php?id=846>

- Payment for Hydrological Environmental Services in Costa Rica

www.yale.edu/tri/pdfs/bulletin2006/019RedondoWelsh.pdf

- THE ECONOMIST, 2007 July 14th – 20th, *Climate Change in the Andes – When ice turns into water – Glacier melting poses potentially costly problems for Peru and Bolivia – Macusani, Perú.*

7 Glossary

The following entries must be understood in the context of this paper:

Ablation - The removal of ice or snow from the surface of a mass of ice. This may be through melting and runoff or evaporation and sublimation of ice, resulting in a thinning of the ice if it is not replenished by some other process.

Ablation zone – The zone of a glacier where ablation occurs.

Accumulation zone – The zone of a glacier where snowfall accumulates and exceeds the losses through ablation.

Administrative capacities – refer to ‘Capacities’

Altiplano – The name given to the extensive high plateau in the Andes. Its height averages more than 3,660 meters (12,000 feet) and occupies parts of Chile, Peru, Bolivia, Ecuador and Argentina

Alto Andino – The name given in the Andes to mountainous areas located between 3300 meters and 4500masl, including valleys, slopes and the high planes of the Altiplano

Ayllu – An extended kinship unit who are the principal units for landholdings. These groups are occasionally used as teams for public works (faenas). A community may also be organised between two moieties, within which a number of ayllu may exist.

Ayni – (Reciprocated labour) is the obligation of relations to assist one another whenever it is needed. There is then the obligation to return the labour that someone else has produced. It is especially rare for an ayni debt not to be repaid.

Bottom-up Approach - A process whereby development project organisers look to families in the field as the first entry point for socio-institutional contact, working together with them on an individual basis in order to gather and share knowledge. Working together with families informs the reorganisation and building of wider, existing social networks, or larger scale institutions which can better organise joint actions taken at the grassroots level. A bottom-up approach ensures that the institutions are structured in the most appropriate way for the service in question to be delivered, provided that it also coincides and works together with a top-down approach. (See Top-down Approach)

Camelids – Of the Camelidae family. An animal family that consists of the Lama genus (Llamas, Guanacos), the Vicugna genus (Vicuñas and Alpacas) and the Camelus genus (Bactrian and dromedary camels). All camelids except for camels are found in the South American Andes.

Campesino – One who lives off the land; a peasant.

Canon – As defined by the Peruvian constitution, the canon itself is not a tax, but is a share of the taxes and rent paid by companies to central government in exchange for taking economic advantage of natural resources. The share, or canon, is then dedicated to the regional and local governments in whose jurisdictions this natural resource exploitation occurred.

Capacity/Capacities- (Of Municipalities) The concept of “capacity building” concerns itself with developing strategies and competences to maximise opportunities for programme effectiveness.

- **Administrative** – The ability to which an administrative unit does, or may perform or produce.
- **Political** – The total of characteristics that together work towards the performance and production of political action. As used in this paper, political capacity does not refer to

partisan related ideas, but rather, the participation of local populations in decision making processes.

- **Financial** – The performance level and ability of financial reserves. See also ‘High Quality Capital’
- **Institutional** - refers to a set of characteristics of public organisations that relate to the performance and the success of public policies. Some components of institutional capacity are, for example, the quality of civil servants, organisational characteristics, the intergovernmental relations and the style of interaction between government and its social and economic environment. The 3 above dimensions; administrative, financial and political capacities make up the components of institutional capacities. Decision-making, which includes planning and evaluation; resource mobilization and management; communication and coordination; and conflict resolution. The capacity of any organization, whether also an institution or not, depends on the successful performance of these tasks. (Uphoff)

CCT – See Conditional Cash Transfer

Chicha – Liquor made from maize used on especial occasion but also on traditional and other festivities as well as for daily life

Clientelistic - The exchange of votes for favors, politicians reward their supporters with public resources in return for electoral support.

Climate Change – A term attached to the phenomenon of the long term changing of climatic conditions and an unnatural inconsistency as a result of global warming, often attributed to man-made causes. Climate Change is evident in more extreme forms of weather, natural disasters, rising sea levels, melting glaciers and ice caps and an increase in some forms of diseases, for example.

Compradazgo – Ritual kinship (not biological) where families establish ties with a wealthier patron who they can turn to for various needs, in exchange for recognition of the patron’s status. This is similar to the idea of godparents however it is the relationship between parents and godparent, rather than between the godparent and child, that is the most important (literally co-parents).

Comunero – An officially registered member of the community who receives rights to communal land and who must remain committed to protecting their cultural heritage. Most people become comuneros through inheritance and marriage, usually with peoples from within the community¹³³. Comuneros divide into groups for faenas as well as for other kinds of activities¹³⁴.

Conditional Cash Transfer (CCT)- Programs that aim to reduce poverty by making welfare programs conditional upon the receivers’ actions. The government only transfers the money to persons who meet certain criteria. These criteria may include public school enrolment for children, regular check-ups at the doctor’s office or receiving vaccinations, among others.

Decentralisation - The process of dispersing decision-making and power closer to the point of service or action, i.e. towards local institutions/governments, and away from central government. Persons who make authoritative decisions are physically located closer to rather than farther from the people and situations that are affected by these decisions, and/or (b) that decision-makers are accountable to these persons through some kinds of constitutional, institutional or traditional connections, rather than solely accountable to the demands of higher government. (Uphoff)

Democratisation – The process of making a political system democratic, that is, answerable to the needs and wants of the whole population. In the Latin American context this refers to the transition from military dictatorships to democratically elected regimes. Refer to ‘Representative democracy’ and ‘Participatory Democracy’.

Desertification-

- **Social** - The abandonment of land by economically active peoples in response to social, economic and political factors.
- **Environmental** - The transformation of habitable, productive land into desert. This is the a rapid depletion in soil fertility and plant life and the erosion of top-soil leading to the inability of water to infiltrate the soil. This usually occurs through the destructive, over-exploitation of land; however, in the case of the Peruvian Andean plateau it is traditionally through man-made water capture techniques that the land becomes productive enough to support populations. Therefore, it is through the abandonment, or non-use, of these lands and neglect of terraces and other such water capture techniques that environmental desertification occurs.
- **Double Desertification Process** (Social/Environmental) – A cyclical process where social desertification and environmental desertification are inextricably linked. Socio-economic and political factors cause people to abandon land. In the Andean Altiplano this abandonment of land contributes to environmental desertification because in leaving the land, they also neglect to maintain the man-made water capture devices used to keep soil fertile and regulate water flow to other nearby areas within the Altiplano and below. This environmental desertification exacerbates economic decline, leading to a worsening of socio-economic problems in the area, and hence, further social and environmental desertification. As the two desertification processes function hand in hand, both socio-economic and environmental aspects must be dealt with when attempting to restore the rural/urban demographic and ecological balance to the region.

ENSO (El Nino Southern Oscillation) is a global coupled ocean-atmosphere phenomenon. It refers to important temperature fluctuations in surface waters of the tropical Eastern Pacific Ocean. The effect on climate in the southern hemisphere is profound, ENSO is the most prominent known source of inter-annual variability in weather and climate around the world and is responsible for extreme weather conditions and natural disasters.

Environmental desertification – refer to ‘Desertification’

Exit Strategy – A strategy that considers and sets up the conditions for the eventual exit of project initiators from an area, making sure that in doing so the project can be handed over to and maintained sustainably in the long term by the beneficiaries of such a project.

Faenas (Phayna) – Communal work for the communal benefit, such as road maintenance, building a school or cleaning irrigation canals. It is obligatory for all comuneros to contribute; failing to do so incurs a sanction which compensates the work lost through non-attendance. The organisation of workers always ensures that the work is not only divided by task, but according to the degree of effort required both physically and financially for the different tasks, the number of people taking part on a given day, for example if one ayllu is much smaller than another, and in relation to the benefit a particular party or individual will receive from the completion of a project.

Food Security - Food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

Food Sovereignty - Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods and their right to define their own food and agriculture systems.

Free Trade Agreement (FTA) - An FTA exists where a group of countries import each other's products, be it services or goods, tariff free but maintain their own tariffs on products imported from non-members. Free trade is a market model where government trade barriers such as taxes, tariffs and quotas are lifted.

Glacier – A large, slow moving river of ice, formed from compacted layers of snow. Glacier ice is the largest reservoir of fresh water on Earth and second only to oceans as the largest reservoir of total water.

Globalisation – A term that describes the continuing process of the facilitation of global interconnectivity which has occurred in modern times through physical infrastructure and technologies such as internet and radio waves. These advancements in technologies allow for a faster and more efficient sharing of information, ideas, knowledge and culture with peoples across the world. The movement of people had also been greatly facilitated. Not everybody is yet included in this process and there still exists a digital divide. Globalisation also describes the homogenisation of economic and political systems, prices etc. across the world, as well as an increased interdependency between nations.

Global Warming – The recent increases in the average temperature of the earth's oceans and near-surface atmosphere. The unusually rapid increases are often attributed to man-made causes such as the burning of fossil fuels.

Institutional Capacity – refer to “Capacities”

High Quality Capital – Municipal government revenues that are directly received from monies [not necessarily government revenues] generated by local peoples through economic initiatives, that are then spent and circulated locally. This is in contrast to ‘Low Quality Income’ where monies in an area are received from central government or a financial institution.

Land Tenure – Land tenure systems determine who can use what resources for how long and under what conditions. Land tenure is the relationship, whether legally or customarily defined, among people, as individuals or groups, with respect to land. (For convenience, “land” is used here to include other natural resources such as water and trees.) Land tenure is an institution, i.e., rules invented by societies to regulate behaviour. Rules of tenure define how property rights to land are to be allocated within societies. They define how access is granted to rights to use, control, and transfer land, as well as associated responsibilities and restraints.

Mink'a – Voluntary communal work where family works side by side with relatives and neighbours, whilst the hosts often provide music as well as plenty of food and chicha. Like the faenas, ayni and most other collective activities mink'a is not just about work, but enjoying oneself as you work with help of chicha, music and gossip.

Moieties – A Moiety is one of two kinship groups into which a tribe or community is divided on the basis of unilateral descent.

Municipality – An administrative entity composed of a clearly defined territory and its population. It is a general-purpose district, providing a broad array of services and it is the smallest governmental administrative subdivision to have its own democratically elected representative leadership. The mayor and the councilmen are the main community workers for their municipality. In Peru the participatory democracy allows civilians to also access municipality proceedings. Unlike other Latin American countries, municipalities in Peru have mandate not only over urban but also over rural territories.

Municipal Capacities – refer to ‘Capacities’.

Natural (Population) Growth – Natural growth, or increase, is the difference between the birth rate and death rate of a country's population in one year, expressed as a percentage. It does not take into account migration. i.e. it is the percentage at which a country's population is naturally growing each year.

Participatory Budget – A process of democratic decision-making in which the constituents take part in deciding how to allocate part of a municipal budget. Community members identify spending priorities and elect budget delegates to represent different communities, among other tasks. In Peru this is now constitutional law in the framework of decentralisation.

Participatory Democracy– A government system which emphasises and encourages the broad participation of its constituents in decision-making processes and most specifically, budgetary allocations, which influence the direction and operation of political systems. Indeed, the law of participatory budget has greatly strengthened participatory democracy.

Participatory Policy Formulation– Process of discussing and deciding upon policy modifications. Discussions include inputs from and consultation with the public as well as from all levels of governance concerned. This process enables messages to be carried from local institutional strata through higher levels and up to central government (i.e. the Municipal chain).

Paylla– Work for food

Payment of Environmental Services (PES) – The commoditisation of environmental conservation, where local inhabitants are paid by the local authorities (their client) either in cash or in in-kinds for an environmental conservation service. (It is a scheme that has been revived and promoted in recent years.)

Plateaus – Large highland area of fairly level land. In the case of the Andean Altiplano these plateaus are separated from surrounding land by steep slopes and endorheic basins (or internal drainage systems), watershed areas that allow no outflow of water. Refer to 'Altiplano'.

Poverty Cycle – Social phenomenon cycle where poverty is maintained and perpetuated across generations due to a lack of the necessary resources, such as an education and access to financial capital required to develop individually and exit the poverty cycle. Poverty tends to lead to other disadvantages such as severe illness which contribute to the continuation of poverty. The Poverty cycle is sometimes referred to as the 'development trap' that continues unless positive intervention occurs.

Representative Democracy – A government system, founded on the principles of popular sovereignty, where democratically elected individuals represent the collective interests of the nation-states people. These representatives have the responsibility to act in the people's best interest but do not necessarily have the responsibility to act according to the people's wishes, nor do they always do so. Sometimes, representatives also have the power to elect other representatives themselves. Citizen participation is limited to voting whilst actual governance is carried out by the representatives, or politicians.

Slash and burn agriculture– Form of agriculture in which an area of forest is cleared by cutting and burning and is then planted, usually for several seasons, before being left to return to forest.

Social capital – This concept refers to the collective value of social networks due to the trust in relationships and acquaintances. A breakdown of social networks results in a loss of the social capital, i.e. trust, which many social and economic arrangements are based around. Strong social capital requires strong social networks which aids development and democracy.

Social Desertification (The Social Process of Desertification) – refer to 'Desertification'.

Sustainable Development – Development which aims to meet the needs of people in the present while not compromising the ability of future generations to meet their own needs. Sustainability encompasses environmental, economic, social and political sustainability.

Terraces – Horizontal cuts in slopes that are levelled off to create a series of massive ‘steps’ up a mountain side. These flat planes slow down the speed of surface run-off and hence aids water storage, as well as crop production. The importance of terraces lies in their production potential, their contribution to reducing soil erosion and their role in enabling water to percolate the soil.

Top-down approach – Process of deciding upon the best organisation and mandates that concern and influence actions on a grassroots level but are dictated by central government where consultations on the issue in question begin. Decisions made by central government are relayed to lower levels of government who ensure actions are carried out according to the way in which central government deems most appropriate. Using ONLY a top-down approach is does not work to its optimum efficiency in that what is deemed the most appropriate institutional infrastructure is decided by higher forms of government who are far removed from the realities on the ground and therefore lack a thorough understanding.

Water Holding Capacity (WHC) – Quantity of water retained by soil that can be absorbed by plants, between the times of full saturation and when at it is lowest amount. WHC is usually measured within the topsoil, up until a depth of around 30cm.

Watershed – Ridge of high land dividing two areas that are drained by different river systems, i.e. the boundary of a water catchments area characterized by all runoff within it being conveyed to the same outlet.