A study on the conservation and regeneration of Andean cultural landscape
Ollantaytambo village as a case study

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1. Introduction

In the last decades, historical heritage conservation has taken a major place within international organizations projects: UNESCO World Heritage Convention has pointed out the important task that is to protect human heritage all over the world. However, historical heritage usually refers to archeological remains and architectural buildings, and just in 1992, cultural landscapes(1) became subject of protection. In Japan, conservation policies for cultural landscapes had been implemented in 1873, and the nationwide conservation policies were introduced in 1930's(3). In 1960's, Historical Landscape Preservation Law was implemented and in 2004, Landscape Law was established(3). In Peru, it is urgent to create the strategies and implement the policies for the conservation of cultural landscape. Andes mountains in South America are the cradle of an original culture in the world: due to different altitudes, from the Pacific coast, up to 6,700 m.a.s.l., the Andean region has a large diversity of microclimates favoring the diversity of cultural landscapes. The better-known Andean cultural landscape in Peru is represented by the Inka heritage (13th century–16th century), made paradigmatic by Machu Picchu Citadel. However, Inka culture is a result of thousands of years of the co-evolution between inhabitants and this particular environment(2). Consequently, this paper aims to study the transformation of Andean cultural landscape during the last century, in Ollantaytambo village, located in Urubamba river valley, by analyzing its features and values.

Archaeologists, anthropologists, architects and historians had largely studied Andean culture. The archaeological research undertaken by Prof. Hiram Bingham in Ollantaytambo(3) developed an archive composed by surveys, maps and drawings that are useful to observe the transformation of the village during the 20th century. Jean-Pierre Protzen’s research and survey in Ollantaytambo(3) can clarify the state of conservation of the historical heritage before tourism increased in the 1990’s. The Inka village and its surroundings have been studied from the architectural point of view by Salazar and Elorrieta(4) who rediscovered the concepts of the Andean worldview as applied to landscape planning. Moreover, several anthropological studies have been carried out on Andean culture. Some of the most important studies were made by Flores Ochoa, Nuñez del Prado, Rowe and Zuidema(4), who studied the relationship between Inka planning, environment and the Andean worldview. Nowadays, several NGO are working on the development and preservation of Andean communities in Ollantaytambo (ARARIWA, ANDES). During 2007, Kevin Luthi undertook a study on the development of local tourism in Ollantaytambo, presenting the current situation in the town(5). However, historical heritage and tourism potential have only been studied as separated topics, leaving aside, the cultural landscape and its value. Rapid urbanization and increasing tourism process developed since 1990 are putting the landscape planning legacy at risk. Therefore, the purpose of this paper is to clarify the landscape structure of this village as an asset and to find ways for preserving it as a whole. First, we analyze the landscape structure and its components, then we evaluate them and their state of conservation in order to propose guidelines for the conservation and regeneration of the cultural landscape while the urban development proceeds. The methodology of this research is based on the analysis of maps, aerial photographs of the village and fieldwork for the survey of the existing conditions. We study the changes of Ollantaytambo village between 1915 and 2008 by comparing maps in order to evaluate and detect the areas in transformation.

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2. Study Area
2.1. Urubamba river valley
The Urubamba river is a main axis of human settlements, starting from the glacier mountains where it is born as Vilcanota river in the Ausangate Peak, running through the valleys, and reaching the Amazon rainforest where it joins the Ucayali river, shaping the Vilcanota-Urubamba river watershed. The Urubamba river valley in Cusco contains many Inka villages. This area was called “Sacred Valley” by the Inkas because of its particular environmental conditions that make it a very productive valley: a large diversity of grains, tubers and fruits were and still are cultivated in this area. Andean culture is deeply related with the agricultural development. Therefore, Andean agricultural technologies have been a major influence in the transformation of the landscape. By and large, the Urubamba river valley is composed of several towns, small villages and communities containing Inka remains, older settlements (Killke, Wari) as well as Spanish colonial architecture, vernacular earthen architecture and vast agricultural fields and terraces.

2.2. Ollantaytambo village
Ollantaytambo village is located on the way from Cusco city – around 90 km. – to Machu Picchu in the Urubamba river valley, at 2,886 m.a.s.l. This village is important because the train to Aguas Calientes – the town at the base of Machu Picchu – stops there and it is also where the highway ends. Ollantaytambo is a district composed by an urban center and 13 rural communities. Sheltering 9,828 inhabitants, the area of Ollantaytambo covers 645.25 km2 including the valley and mountain area. Twenty-three percent of its population is urban, concentrated in the small town developed around the main Plaza - Plaza de Armas - and the main Inka archaeological remains. The village is located at the meeting point between Urubamba river and Patakancha river coming from Veronica Peak (or Willka Waq’a Apu)(5). It is bound on the East side by the mountain Pikuylluna – where “qollqas”(6) are found – and in the West side by the Bandolista mountain where the ceremonial center, called the “Fortress”(7) is located.

3. Ollantaytambo village structure
Ollantaytambo’s location is strategic in the Valley. It reaches different ecosystems and it is the border between the mountains and the rainforest (MAP-1). The date of the first occupation of this site is not known, but it is well known that this site was inhabited before the Inka period. However, Inka people built the urban structures that we can see today, transforming the landscape.

3.1. Ollantaytambo in 1915
The original shape of the town is revealed by MAP-2(5), surveyed by Hiram Bingham’s team in 1915. As we can observe, the structure of the town is based on Inka planning: the ceremonial center in the mountain, the old Inka village between the mountains in the valley of Patakancha river and the agricultural fields and terraces connecting the town with the riverbank of Urubamba river. The open spaces, Plaza de Armas and Plaza Manyarike, can be identified on this map as well as the terraces at the entrance of the town. The railroad tracks and the highway were not built yet, thus, the village was difficult to access at the time.

3.2. Analysis of existing conditions in 2008
The survey of the existing conditions of the village is based on the digitization and analysis of aerial photographs of the study area (Google Earth 2008) and fieldworks between 2002 and 2007. There are three features of the structure of the landscape that we survey: the historical and cultural heritage (architecture and communities), the settlement structure (water system and agricultural fields) and the land use, as they are
being affected by the urbanization.

3.2.1. Historical and cultural heritage

The village is composed mainly by Inka heritage and Spanish colonial heritage. Spanish heritage is a layer over the Plaza de Armas and around Plaza Manyarikhe (at the foot of the Bandoista mountain) formed by Colonial earthen architecture and the Spanish church constructed over Inka foundations and with stones taken from Inka buildings. Inka heritage is the base structure of Ollantaytambo, not only in its urban composition but also in the conformation of agricultural fields and terraces. There are two important types of Inka architectural heritage in Ollantaytambo: the architectural structures – ceremonial and housing - and the agricultural terraces – “andenes” –. (MAP-3) Moreover, cultural heritage is also important in this village because it is still possible to find traditional rural earthen architecture and local cultural values that are the way of life of Ollantaytambo’s communities’ inhabitants.

3.2.2. Settlement structure

Ollantaytambo’s structure is composed by two major systems: the water system and the configuration of agricultural fields. Together they create the matrix of the town.

- **Water canals system:** Water (“Yaku” in quechua) is sacred in the Andean worldview: it gives and maintains life. Ollantaytambo belongs to a sub-watershed inside the Urubamba watershed, whose axis is the Patakancha river nourished by the glacial peaks in the Urubamba mountains. It is thought that the water brought through the canals to the terraces and the architectural sites comes from these glaciers and underground sources. Inka people used the topographic features and extensive knowledge of hydraulic engineering oriented not only to the functional aspect but also to the aesthetics of fountains, canals and waterfalls. Patakancha river is also the source of water for the canals in the Inka village where they are still working as well as in the archeological area along the Patakancha West riverbank. However, some of the canals in the ceremonial center, terraces and in some parts of the town are dry.

- **Agricultural fields:** The agricultural fields -“chacras”- in Ollantaytambo are an important feature of the landscape, designed to represent figures referred in Andean legends. The boundaries between different fields are created using walls made of stone -“pirca”- or using trees and bushes -“cerco vivo”-. The aim of these separations is not the distinction between crops, because the “chacra” is based on the diversity of crops sharing the same soil, but it may be used to protect the area from soil erosion and animals’ intrusion. Now this disposition of agricultural fields is becoming the base of new development that maintains these historical boundaries despite the transformation of the land use.

3.2.3. Land use

Inka planning of Ollantaytambo is still visible: the ceremonial center in the mountain and the urban center in between the two mountains. Around the centers, terraces and agricultural fields connect them with the Patakancha river and the Urubamba river by canals and terraces. The development axis is concentrated where the land was used for agriculture and it is being transformed for tourist services. This situation is also occurring around the Plazas and the train station, which are the main focus of new occupation and land use transformation. There is no presence of industry because it is a rural area where it is possible to find villages dedicated to agriculture and craftwork, so the land is used for cultivating, housing and now for the tourist industry. It is also possible to find forests along the river and in the mountains.
3.2.4. Conservation policies and governance

Conservation policies are managed by INC (Peruvian National Institute of Culture). INC-Cusco manages, protects, preserves and restores historical heritage in the Inka sacred valley. INRENA and PROFONANPE protect natural areas. MINCETUR is a state institution in charge of tourist policies that are coordinated with INC. The management of the region is in charge of the Regional Government of Cusco and the municipality of Cusco. At the local level, the municipality of Urubamba province and the municipality of Ollantatyambo district are in charge of the application of policies determined by the state institutions. NGO’s work directly with communities in a local capacity focused on the conservation of specific cultural assets more than the conservation of the cultural heritage as a whole.

4. Evaluation

Tourism and modernization are the main drivers of change in Ollantaytambo, transforming the landscape, affecting environment, historical heritage and the preservation of local culture.

4.1. Tourism and historical heritage management

Even if tourism can be positive for the economic development of Ollantaytambo, it can be negative when the tourist resources become the center of life for the village. Urban sprawl as a consequence of tourism (immigration and spontaneous and uncontrolled land use change) is causing environmental problems due to irregular waste management and overuse of soil and water, transforming the landscape, and affecting the heritage.

4.2. Modernization, environment and urban planning

Modern way of life and new technologies are changing the face of Ollantaytambo causing the loss of traditional constructive systems, the erosion of the culture and the damage as a whole. This situation is caused because of a lack of urban planning and a lack of local culture protection policies.

4.3. Rurban landscape

The result of the problems of modernity and tourism – economic development confronting cultural heritage, local culture, and environmental preservation – is the transformation of the Andean cultural landscape characterized by the Inka landscape planning into a rurban landscape where the historical features are invaded by pollution, non-ecological constructions, population surcharge and cultural erosion. In order to solve these problems and to control the transformation of the landscape, in order to preserve a heritage, rich in environmental values, it is important to determine its state of conservation and to improve the existing policies that protect it. As we can see by comparing Maps 2 and 5, the land use is changing without a development strategy and it is already affecting the heritage: agricultural fields that seem not to be part of the historical heritage are being sold and used for the construction of hotels, housing and other uses related with the tourist industry that is still in process.

4.4. Zoning map and chart

The creation of zones described in the zoning map (MAP-6) and chart (Table-1) is based on the following criteria: a. The location and type of historical and cultural heritage found, its influence area and its state of conservation, studied in section 3, as they should be protected and preserved in different manners; b. The differentiation between the areas that are protected, non-protected and the ones that are in danger or safe from tourism or modernization damage; c. The transformations and drivers of change that influence the area, as studied in section 4.1, 4.2 and 4.3. The guidelines (Table-1) are devised evaluating the current conservation policies applied in these zones, proposing guidelines for preserving the non-protected areas, giving value to heritage that is not being considered as an asset and mentioning the importance to the community’s participation. We have defined four types of strategies depending on the zone’s characteristics: Type 1-Protected areas (Zones 1, 5): Guidelines need to focus on the improvement of the access and the integration with community for the conservation. Protected by INC but affected by tourist overuse, they have a restricted access: zone 1, by the use of a ticket fee and Zone 5 because of the difficult topography. Type 2-Areas in danger (Zones 2, 3, 7, 8, 9, 12): Guidelines need to focus on the restriction in the land use change encouraging community’s participation in the preservation of the heritage and landscape. Zones 2 and 3 have already been damaged by the spontaneous land use change, while Zones 8 and 9 are flat areas of agricultural fields easily occupied by tourist facilities. Zones 7 and 9 are axes of development (access roads to the central town); consequently, they are major victims of urban sprawl. Zone 12 is being affected by informal commerce and by
inappropriate waste management that are generating a chaotic entrance to the town by the train station. **Type 3**-Areas for revaluation (Zones 10,11): Guidelines need to focus on the revaluation and protection of these areas containing important historical heritage that is not being considered neither by the local government nor the tourist agencies. These agricultural fields contain physical heritage related with Inka identity and origins, now threatened by lack of knowledge and by the spontaneous urbanization. Parts of the riverbanks are composed by terraces and open areas that connect the river with the town. **Type 4**-Safe areas (Zones 4,6): Guidelines need to focus on the implementation of local community’s participation in the preservation and restoration of these areas that are in less danger because of their location on the North side of the town, where the access is not easy and there is lack of interest from tourism. Inka remains and the natural forest located there, should be protected because of its cultural and natural value for the biodiversity of the area.

Table 1: Evaluation table of Ollantaytambo village

<table>
<thead>
<tr>
<th>ZONES</th>
<th>HISTORICAL HERITAGE</th>
<th>IMPACT</th>
<th>POLICIES</th>
<th>GUIDELINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZONE 1 BANZOLISTA MOUNTAIN</td>
<td></td>
<td></td>
<td>NC - RESTRICT</td>
<td>PROTECT NC AS NATIONAL HERITAGE</td>
</tr>
<tr>
<td>ZONE 2 CENTRAL TOWN</td>
<td></td>
<td></td>
<td>PRIVATE OWNERS</td>
<td>PROTECT PRIVATE OWNERS</td>
</tr>
<tr>
<td>ZONE 3 OLD TOWN</td>
<td></td>
<td></td>
<td>MAINTENANCE</td>
<td>MAINTENANCE</td>
</tr>
<tr>
<td>ZONE 4 FOREST</td>
<td></td>
<td></td>
<td>NC - RESTRICT</td>
<td>PROTECT NC AS NATIONAL HERITAGE</td>
</tr>
<tr>
<td>ZONE 5 PUKLLAYUNA MOUNTAIN</td>
<td></td>
<td></td>
<td>PRIVATE OWNERS</td>
<td>PROTECT PRIVATE OWNERS</td>
</tr>
<tr>
<td>ZONE 6 AGRICULTURAL FIELDS NORTH-SE</td>
<td></td>
<td></td>
<td>MAINTENANCE</td>
<td>MAINTENANCE</td>
</tr>
<tr>
<td>ZONE 7 ENTRANCE TO TOWN</td>
<td></td>
<td></td>
<td>NC - RESTRICT</td>
<td>PROTECT NC AS NATIONAL HERITAGE</td>
</tr>
<tr>
<td>ZONE 8 AGRICULTURAL FIELDS EAST-SE</td>
<td></td>
<td></td>
<td>PRIVATE OWNERS</td>
<td>PROTECT PRIVATE OWNERS</td>
</tr>
<tr>
<td>ZONE 9 AGRICULTURAL FIELDS WEST-SE</td>
<td></td>
<td></td>
<td>MAINTENANCE</td>
<td>MAINTENANCE</td>
</tr>
<tr>
<td>ZONE 10 RIVER BANKS</td>
<td></td>
<td></td>
<td>NC - RESTRICT</td>
<td>PROTECT NC AS NATIONAL HERITAGE</td>
</tr>
<tr>
<td>ZONE 11 RIVER BANKS</td>
<td></td>
<td></td>
<td>PRIVATE OWNERS</td>
<td>PROTECT PRIVATE OWNERS</td>
</tr>
</tbody>
</table>

Legend: NC = WATER CANALS, TE = TERRACES, AF = AGRICULTURAL FIELDS, M = MUNICIPALITY, AP = ARCHITECTURE
5. Conclusions
In Ollantaytambo, the landscape structure developed for thousands of years by Andean civilization have succeeded up until today. Therefore, it is possible to study and understand the knowledge of sustainability of Andean cultural landscape. However, the transformation of the cultural landscape, being caused by the economic change in the village formerly sustained by agriculture, is leading to a tourism-sustained village. Thus, it is essential to introduce conservation and revitalization methods. First, this research starts with the study of the landscape structure. We analyze three components: the historical and cultural heritage; the water and agricultural system, and the land use, finding its value and need of conservation. Thus, we find out that the Inka heritage is more than the archaeological remains usually visited by tourists: the inherited land use, structured by the agricultural patterns and the water system, are not only significant for the Andean cultural identity but also a fundamental feature for the economical and environmental sustainability of this town.

Therefore, we consider that it is vital to include these assets in the conservation policies and in the urban planning strategies. Hence, we evaluate these assets in order to find out the impacts on these areas. As a result of the evaluation, we create a zoning map that classifies them according to the criticality of the existing conditions. Based on this zoning map we propose guidelines and implementations on the present conservation conditions, in order to consider them for future urban development plan: we identified four strategies depending on the present impacts and levels of danger in the zones. Type 1 considers the areas already under protection (Zones 1,5) where it is necessary to improve current policies; Type 2 considers the areas in danger (Zones 2,3,7,8,9,12) where it is necessary to create new policies; Type 3 considers the areas with assets that need to be revalue (Zones 10,11) where it is necessary to create policies and local inhabitants intervention for revitalization; Type 4 considers the areas with less danger (Zones 4,6) where it is necessary to create conservation policies and encourage local community’s participation.

Finally, we consider that the importance of the protection of cultural landscapes as a source of lessons about environment’s sustainability is becoming evident and the role of institutions like UNESCO is essential. However, UNESCO’s main focus is on the value of a specific area as a result for declaring it subject of protection. However, we think it is necessary to extend the protection by implementing inhabitant’s consciousness of their cultural landscape values and regulations for conserving local cultures. The knowledge of cultural landscapes is contained in people and we consider that the scope of the cultural landscape is not limited to a resulting area but it is also a system that can be found spread as in the Sacred Valley of the Inkas. Japanese Landscape Law instead, has implemented the consideration of rural areas, representing a systematic relationship between inhabitants and environment being neglected by modernization and development projects, as cultural landscapes that need to be protected for the conservation of biodiversity. In this task, inhabitant’s participation is being essential in promoting the assets of the cultural heritage and how to regenerate sustainable habitats for the future.

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6. Notes
(1) Cultural landscapes represent the “combined works of nature and of man” (Article 1 of the World Heritage Convention-UNESCO, 1992), illustrating the “evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.”
(2) Anthropologist John V. Murra (1977) “vertical archipelago” economical model proposed that Andean culture has been in constant evolution in a continuous adaptation to the territory, Inka civilization as the last step reached in this evolution.
(3) Peruvian Expedition funded by the National Geographic Society and Yale University in 1915.
(4) Flores Ochoa and Nuñez del Prado, Peruvian anthropologists, are main references in the studies of Andean culture, as well as American archaeologist John H. Rowe. Dutch anthropologist Tom Zuidema researched Inka territorial system studying the concept of “Ceques” (The Ceque System of Cuzco: the Social Organization of the Capital , Leiden, Brill,1964), ritual lines coming from the capital, Cusco directing to the four regions of the Inka Empire.
(5) Veronica peak is the name used for the Snow Peak in the Urubamba mountains called Willqa Waq’a in Quechua language during Inka times.
(6) “Qollqas” is the quechua name for the storage rooms for tubers and grains made of stone by Inkas, preserving food for long periods of time.
(7) “Fortress” was the name that archaeologists gave to the archeological remains in Bandolista mountain, because it was thought to be a defensive castle.
(8) The concept of “revaluation” understood as the fact of giving the value this cultural heritage deserves and that is not given in the present.

7. References
(4) Elorrieta and Salazar (1992)”Estructuras andinas de poder, la pirámide de Pacaritanpu”. Sociedad pacaritanpu Hatha.