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# Opportunities for Greenways Development in the South Wine Region of Ensenada, Baja California, Mexico

## **Cover Page Footnote**

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## Opportunities for Greenways development in the south wine region of Ensenada, Baja California, Mexico

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### Introduction

Ensenada has a winemaking tradition deeply rooted, as it is considered as the main wine-producing region in Mexico. The wine industry in Ensenada is developed in two regions: the northern region and the southern region. In recent years the tourism sector of Ensenada has seen a remarkable increase, particularly in the case of wine tourism in the north region. The Regional Development Programme for the Wine Region was created in 2006, to reach an optimal balance between economic and social activities and the sustainable development of the region; however, this programme only covers the north wine region. Recently, the interest for greenways and their application in landscape planning has grown internationally. According to Bischof, greenways can offer a way to unify several disciplines to move towards a commonality of purpose. Thus, considering this wine tourism scenario in Ensenada and the recent introduction of the greenway concept into regional planning, we identified the need for information that can be used for the creation of tools that support the development of the south wine region, as well as the enhancement of its tradition, through the identification of greenways with ecological, historical and cultural value.

### Background and Literature Review

According to the Environmental Programs of the United Nations (2003), the concept of sustainability is to meet the needs of current and future generations through integration of environmental protection, social progress and economic prosperity.

The *sustainable tourism* concept is promoted by the socio-economic and technological changes, which have modified the behavior of tourists and travel patterns. Thus, post-industrial tourism has emerged, commonly known as *sustainable tourism* (De Leon, 2011). The concept refers to a type of tourism that involves the search of experiences, preferences diversification, interest in differentiated products, more closeness to nature and culture of each place, its services and connections, as well as a greater awareness of their impact on the environment (De Leon, 2011).

During the landscape planning process, it is necessary to consider the spatial and temporal variation of landscape resources, as part of a whole. That is, the integration of abiotic, biotic and cultural resources to the planning process. The multifunctionality of the landscape is understood as the integration of ecological, historical, socio-cultural, economic and aesthetic functions (Brandt, 2000).

Andresen et al. (2007) documented the application of greenways concept in the region of Alto Douro, in northern Portugal, in order to maintain cohesion between the natural system of the Douro River and the different land uses, considering the cultural value that this region represents, as it is considered as the oldest controlled winemaking region in the world (Andresen, et al. 2007).

Greenways are defined by Fabos as “corridors of various widths, linked together in a network in much the same way as our networks of highways and railroads have been linked. The major difference is that nature’s super infrastructure—the greenway corridor networks—is pre-existent” (Fabos, 1995). According to Fabos, there are three types of greenways: ecological greenways and natural systems, recreational greenways, and greenways with historical heritage and cultural value (ASLA, 2007).

Firstly, ecological greenways and natural systems are usually along rivers, streams and ridgelines, which have the function of transporting matter and energy through ecosystems and providing habitat for species as well as connecting landscapes. Due to their attributes, greenways have the ability to function as recreational areas. Certain activities that may be performed in recreational greenways include walking, hiking, cycling and swimming, among others. (Fabos, 2004) “Many successful recreational greenways and green spaces, occur where networks of trails link with water-based recreational sites and areas” (ASLA, 2007).

The presence and quality of water in greenways is particularly important, as it keeps the natural ecosystem’s viability and availability of resources. Therefore, historically greenways have been recognized as an important resource for communities, as for example, the presence of archaeological remains of ancient civilizations located in the beds of streams. This type of evidence can provide historical and cultural value to greenways, which can be used to attract tourists, as well as to provide educational, scenic, recreational, and economic benefits. Greenways with historic and cultural value are usually found along roads or highways (ASLA, 2007).

Greenways provide both economic and ecological benefits, such as ecosystem functions and environmental services, including water resource protection and pollution abatement, riparian habitat enhancement and biodiversity, as well as flood hazard reduction, recreation, environmental education, noise attenuation, microclimate enhancement, among others (Platt, 1994). Within the aesthetic function, it is the ability to provide psychological benefits for users. “Greenways and green spaces have enhanced livability and quality of life” (ASLA, 2007). Therefore, when the greenway concept is applied, from a multifunctional approach in planning and landscape design, it can be used as an excellent tool to promote sustainable development in rural landscapes.

### **Goals and objectives**

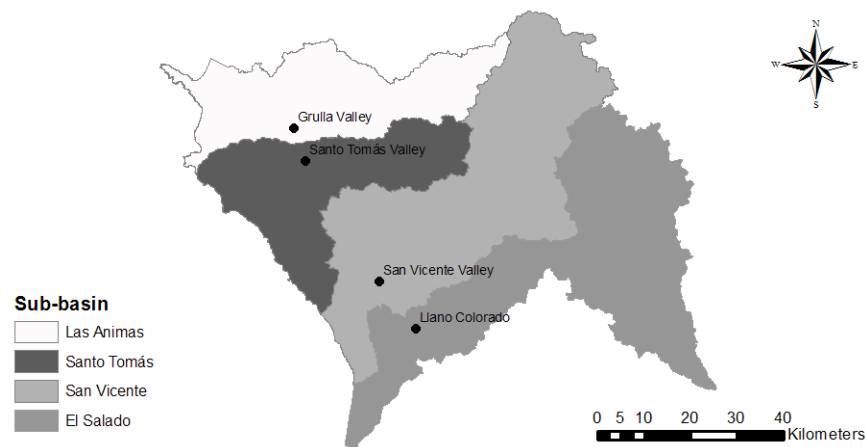
To demarcate the southern wine region of Ensenada Baja California, at different spatial scales, through the identification of permanent landscape features, as basic elements for a general land classification system, to support the creation of sustainable landscape planning proposals for the region.

### Specific objectives

- To demarcate the area of interest through the identification of watersheds.
- To demarcate within the watersheds, the fringe that contains the southern wine region.
- To characterize the natural and cultural context of the wine fringe.
- To analyze the spatial context, through the use of GIS, to provide a general proposal for the land classification system of the wine fringe. Determine the differences amongst the natural elements observed in each zone and identify greenways with ecological interest and with cultural -historic value.

### Study Area

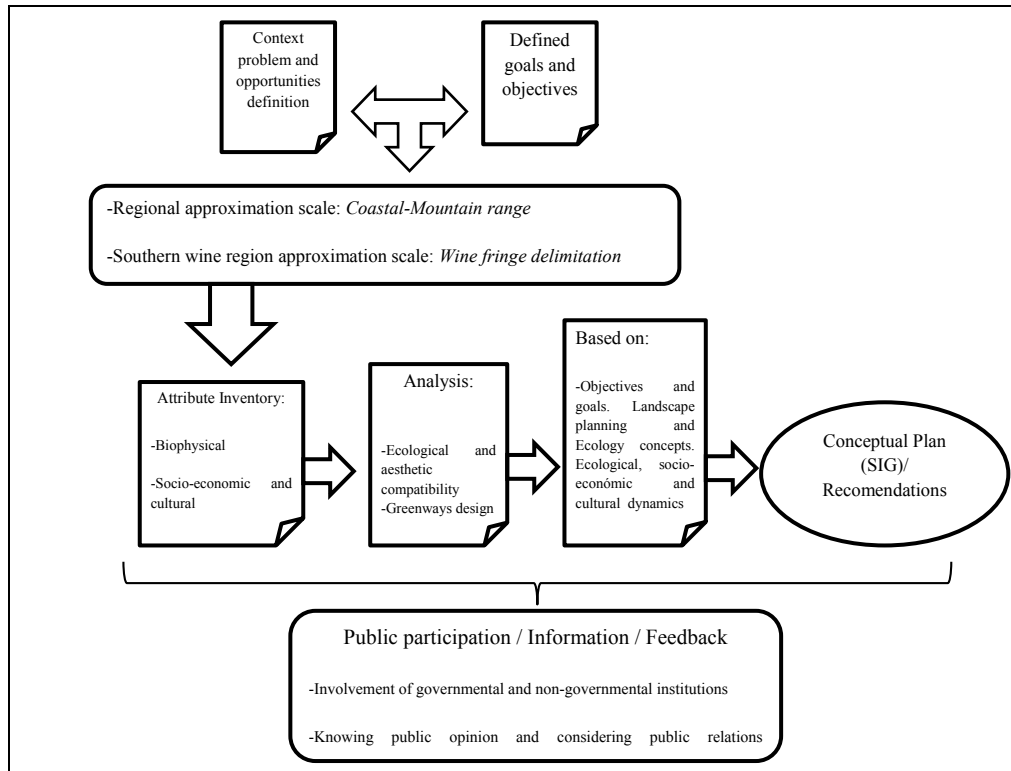
The southern wine region is located some 50 km south of the city of Ensenada in Baja California, Mexico. The region covers four areas of interest, known as: Grulla valley, Santo Tomas valley, San Vicente valley and the Llano Colorado. These four areas are within the watershed called “Animas-Santo Domingo”. Each area is located in a different sub-basin (Fig. 1). The Grulla valley is located in the sub-basin called “Las Animas”, Santo Tomas valley is located in the sub-basin “Santo Tomas”, San Vicente Valley is located in the sub-basin “San Vicente” and the Llano Colorado in the sub-basin “El Salado”.



**Fig 1. General study area location map.**

### Methods

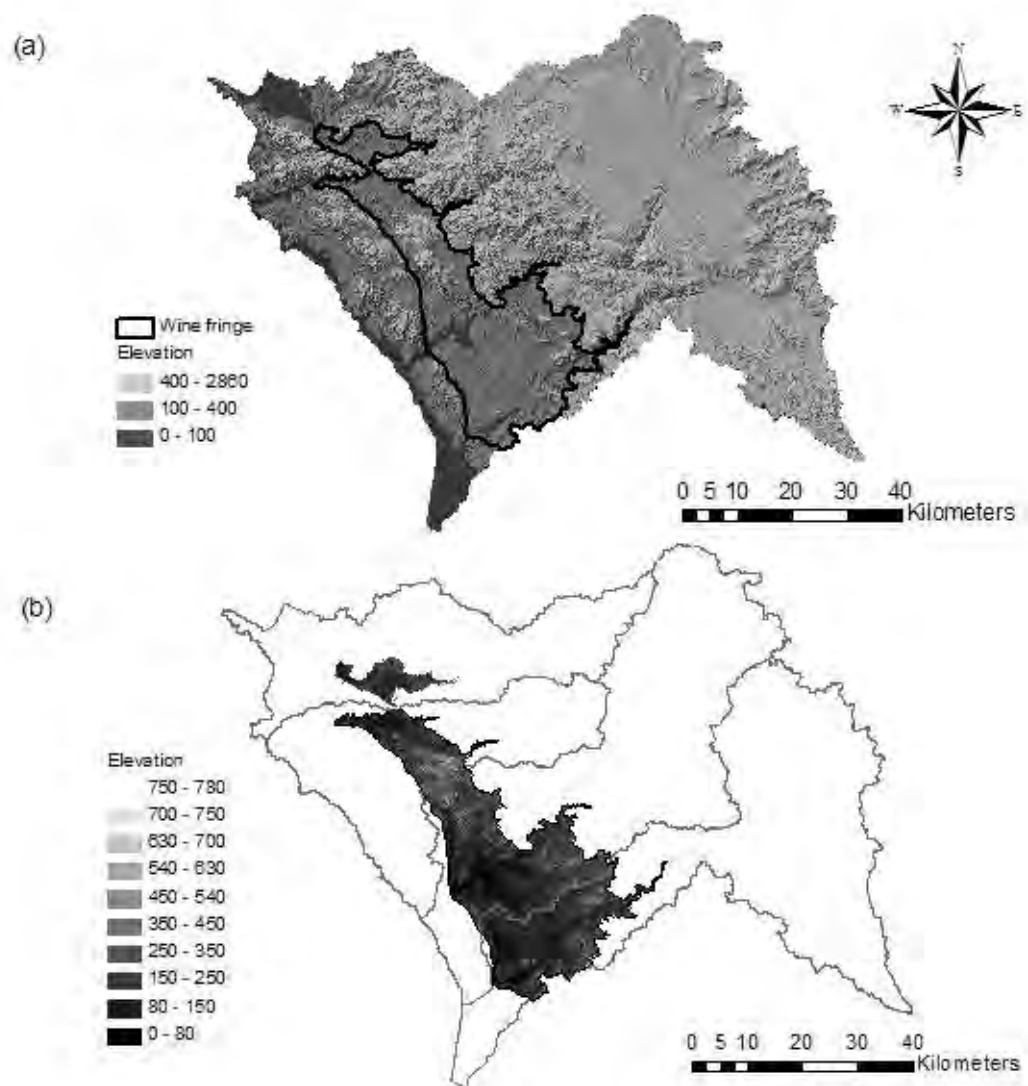
We used a landscape planning model process to design greenway corridors at two different scales (Fig. 2). The first scale at a regional level, corresponded to the four sub-basins within the study area. At this level, a land classification system was developed including the evaluation of the different land cover types, both natural and anthropogenic, in a gradient which ranges from the coastal zone to the mountain range context. And secondly, at a local scale corresponding to the demarcation of the wine fringe, at this stage biophysical and cultural attributes were analyzed to identify ecological greenways, as well as greenways with historical-cultural value and with recreational interest. An important aspect to consider, during the plan formulation phase, is the community involvement, considering the public information and participation.



**Fig 2. Plan formulation phase, based on the landscape planning process (Kiemstedt et al. 1998)**

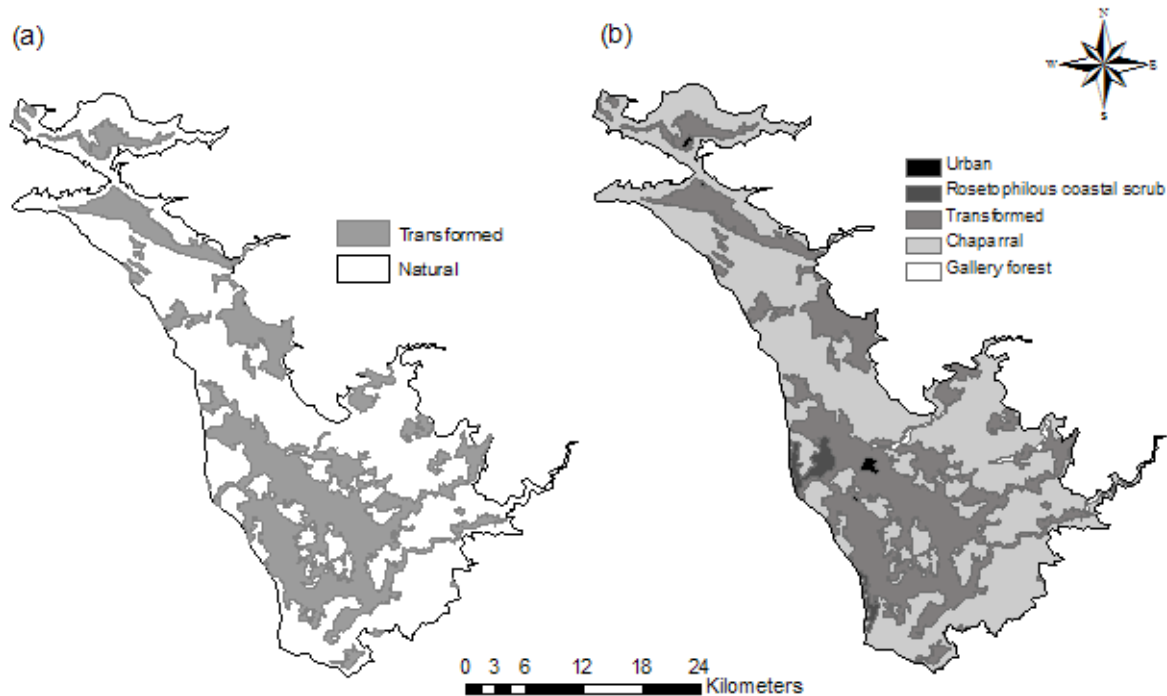
## Results

The total area at the regional level is 5,757 Km<sup>2</sup>, of which the natural component covers 4,868 Km<sup>2</sup>(84.5%) corresponding to marshes, coastal dune vegetation, coastal scrub, desert scrub, gallery forest, chaparral, oak forest, juniper forest and pine forest. The natural land cover type dominating is chaparral. On the other hand, the anthropogenic component covers 889 Km<sup>2</sup> (15.5%) of the total region, corresponding mainly to agricultural cover, as well as animal husbandry (both were classified as “transformed” cover type) and urban cover in the minor proportion. The highest elevations we found, at the regional scale, are up to 2860 meters above the sea level. We used the DEM at the regional level, to demarcate the wine fringe along the 100-400 meters range. The highest elevations within the wine fringe are up to 780 meters above the sea level and the lower height range can be found along streams and valleys (Fig 3). The scenic component was determined by a demarcation with eastern boundaries at 580m, and to the west by the boundary of the sub-basins.



**Fig 3. DEM reclassification at regional scale for the determination of the wine fringe (a). DEM at local scale, corresponding to the wine fringe demarcation (b).**

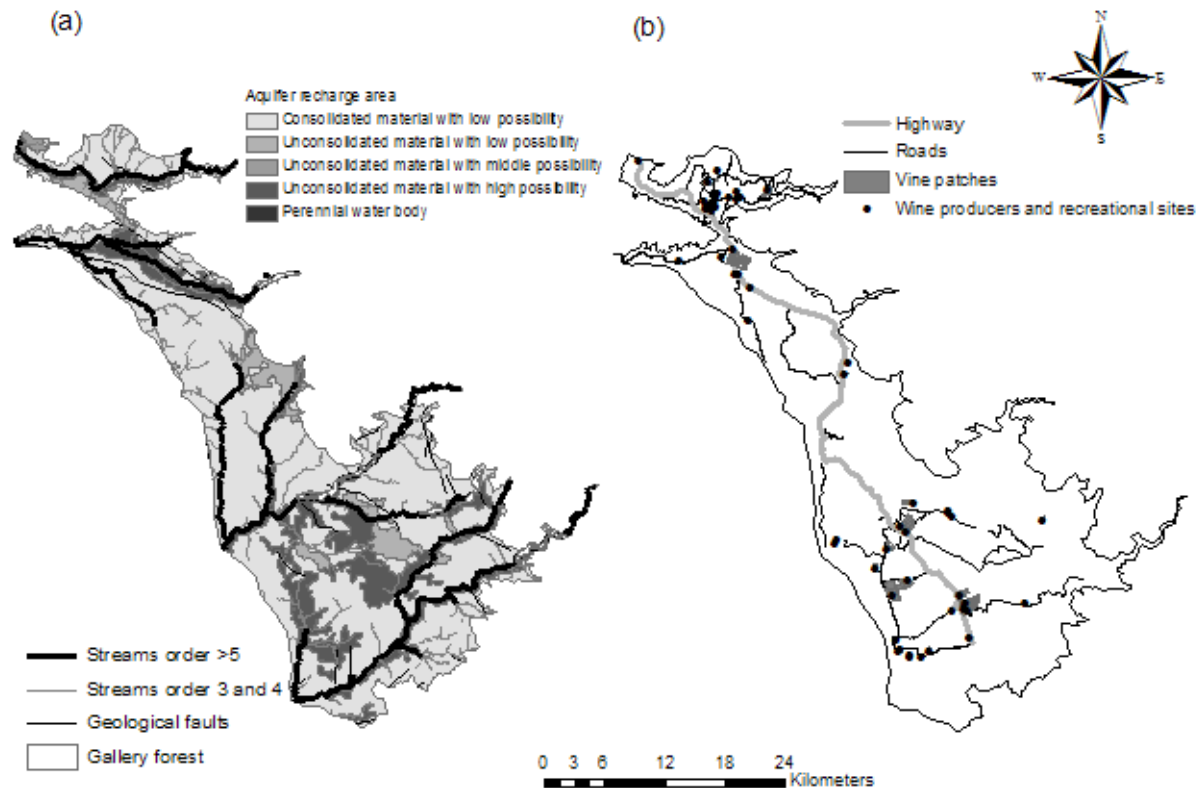
The fringe is approximately 938 Km<sup>2</sup>. The natural component of the wine fringe covers 612 Km<sup>2</sup> (65%) and is composed by coastal scrub, chaparral and gallery forest, with dominance of chaparral. The anthropogenic or transformed component corresponds to a 35% of the wine fringe and it is dominated by agriculture, which covers 271.5 Km<sup>2</sup> and in less extent for urban use (Fig 4).



**Fig 4. Wine fringe natural and transformed land classification (a). Land cover types identified within the wine fringe (b)**

To determine the location of greenways with ecological interest at a regional and local scale, a series of criteria were specified. At a regional level, the criteria corresponded to the identification of: streams with order higher than 5, geological faults and potential wetlands. At a local scale, the criteria corresponded to: streams with order higher than 3, geological faults, gallery forest and aquifers recharge area. For this last criteria (aquifers recharge area) the consolidated material with low recharge possibility covers 713.5 Km<sup>2</sup> while the non-consolidated material, with high recharge possibility covers 168 Km<sup>2</sup>, non-consolidated with medium recharge possibilities covers 2.5 Km<sup>2</sup> and non-consolidated material with low recharge possibility cover 53.7 Km<sup>2</sup>. To determine the greenways with historical and cultural value as well as recreational interest, we identified 270 vine patches, 50 wine producers, 4 recreational sites and the location of roads and the main highway that connect the region (Fig 5).





**Fig 5. Greenways with ecological interest, proposed in the wine fringe (a). Greenways with cultural and historical value founded in the wine fringe (b).**

### Discussion and conclusion

The regional level includes a higher degree of naturalness than the local level, because of the wine making activity within the southern wine region, which is highly perceived at a local level. The only cultural connection available within the wine fringe is the 74 km long highway, which provides the facility to travel along the southern wine region. The tendency of development in the wine fringe is the fragmentation of natural habitat and the loss of the landscape functions. The wine production sector enhances the idea of greenways design, however it is important to consider other sectors, including the urban zone and the incorporation of the aesthetic quality concept for the towns within the wine fringe. To maintain the landscape character of the areas it is important to plan at different scales with the local community participation and key actors. The alternative we argue, at the wine fringe region and for more located scales, is that of the multifunctional landscapes, where economic activities, social wellness and natural landscape functions conservation could be together. For this reason we found that the greenway concept, when applied to the southern wine region of Ensenada becomes a solid and effective landscape planning tool for the sustainability of the zone and its wine making tradition.

## Acknowledgments

We would like to thank to Municipal Institute of Planning and Investigation team work and special thank to the community that support us in fieldwork.

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