

## Qualitative assessment of the Mexicali Valley Landscape: residents and non-residents

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### Abstract

The assessment of landscape has been approached from different perspectives; one has been from their methods, quantitative and qualitative and the other, by experts responsible to carry out the assessment or by ordinary people. Thus, there have been developed numerous research tools to approach different aspects of landscape to get an integrated view, tools that have helped planners to deal with resource management. The research project, Cultural Landscape of the Mexicali Valley, has considered the use of several tools for the assessment at two stages: the first one consisted of the characterization of physical and visual landscape units and the historical evolution and dynamics of economic activity and population growth. Meanwhile the second one was focused on the characterization of qualitative landscape values by residents and potential visitors. This paper aims to show results of the second stage of the project, presenting three types of assessment applied to different kinds of audience: a qualitative assessment of landscape by residents taking into account textual analysis of three open-ended questions; cultural representations of landscape elements by residents based on the selection of representative photographs of the region and; preferences based on the selection of adjectives that describe landscape features and emotions by non-residents. Two types of analysis were carried out; textual and principal components by *Système Portable Analyse de Données* (SPAD). At the end, results show the definition of the valley and its values for residents and non-residents, and the differences between the two audiences.

*Keywords: landscape values, qualitative assessment, landscape preferences.*



## 1 Introduction

The integral study of the landscape implies various approaches through which it is possible to describe and assess it from its biophysical, visual, spatial and cultural attributes, with purposes of productive use or for the protection of its cultural heritage [1]. Its study requires gathering information from the natural processes that have shaped the landscape, as well as the human transformation processes that have subjected it over time and have allowed the creation of physical and affective ties with the territory, due to the daily coexistence as place of residence or place for temporary visits.

In the first case, the description of the landscape from its physical and biotic attributes requires a systematic and hierarchical classification that subdivides the territory in landscape units, according to the homogeneity of traits in its geology, topography, soils and vegetation [2].

The landscape can be thus described and assessed based on geography and ecology from the elements that make up its physical expression through the forms presented by its relief, which have been transformed by natural climatic processes: temperature, humidity, wind and weather; geology, represented by rock formations produced by historical tectonic activity and different types of erosion; surface and groundwater hydrology, represented by superficial water bodies: rivers, lakes, deltas, lagoons and springs; soils, produced by different types of geological, climatic and hydrological processes that show textures and colors through the soil according to the environment around them or the distant locations from where the materials were gathered; the vegetation and its particular characteristics due to geographical and environmental conditions of the location; finally, the land use which reflects human activity, its usufruct and its impact on the environment.

In the second case, we find the description and assessment of the landscape made both by those who live their daily lives there and those who eventually visit the place for a certain purpose. One part corresponds to the visual and spatial attributes of the landscape, while the other is related to the preferences that people have and what it represents and means culturally to them [3].

The Mexicali Valley Cultural Landscape project [4] has been developed in several stages that have considered three converging visions: the evolutionary, the visual and the symbolic perspective, which have considered both the natural processes that shaped the Colorado River Delta and the human processes responsible for the transformation of the delta, 110 years after its founding, into an agricultural region of high productivity and rapid settlement growth. The results herein presented have two purposes: firstly, to characterize the Mexicali Valley landscape from the perception of its residents in order to identify its values for the strengthening and protection of culture in the region, so it has an impact on the local management, and secondly, to examine the preferences of those external to the Valley, who live in the city but are unaware of the regional environment.



## 2 Methods

The gathering of information about the preferences for the landscape characterization was performed using several tools: the first consisted of a random survey in villages of the Mexicali Valley with over a hundred people. A sample of 512 houses was selected from a random multistage sampling, whose size was calculated considering a 20% error (not answered). The survey contemplated socio-demographic information, flora and fauna, myths and legends and stories related to the valley [3].

The characterization of the landscape by its residents was performed through quantitative analysis of the answers given to three open questions: a) How is the Mexicali Valley landscape? b) What parts of the valley do you like the most, and why? and c) With what parts of the valley are you identified? It was possible to identify in the answers the emotional values of the environment that have had an impact on the preferences of the people and how they relate them to some places in the region. The data processing was performed with the software *Système Portable pour Analyse de Données* (SPAD) v. 6.0, using the text analysis module.

After the application of the general questionnaire, it was possible to identify typologies useful for the qualitative analysis interviews about the representations of the landscape, where 10 residents were asked to select, among 25 photographs of the Mexicali Valley, those that best represented it and to explain the reasons for their selection. Afterwards, a surface analysis by landscape components was performed over the photos to compare it with the answers [5].

Finally, the analysis of the landscape preferences of non-residents was carried out [6], with a sample of 107 college students from different disciplines, aged 20 to 22, who had not had contact with the Mexicali Valley. 14 photos were shown to them with the different landscape components that shape the Mexicali Valley: Delta Plain, Colorado River, Hardy River Wetlands, Alamo River Wetlands, Volcano Lake, Sandy Plateau of Andrade, Sandbanks, Dunes, Alluvial Fans, Cucapa Mountains, Centinela Hill, Pilot Knob Hill, Mayor Hill and Cerro Prieto Volcano [7]. They were asked to qualify these landscapes with 14 bipolar adjectives (semantic differential scale). This information was processed through the SPAD v. 5.6 software, applying the principal component analysis to identify the areas with high preference and the adjectives that best described their features [8]. As in the previous case, a surface analysis by landscape components of each scene was performed to relate them to the answers.

## 3 Characterization of the Mexicali Valley

### 3.1 Analysis of textual answers

Table 1 shows a synthesis of the answers to the three questions posed to the Valley residents: the answers to the first one about the words used to describe the landscape do not provide information about its particular features [3]. What can be obtained from the answers is that the valley is “abundant”, a word that could convey the feeling of a large space with green fields, lots of trees, quiet and nice.



Even though this represents employment to them, the kind of work made by residents to keep it in such conditions demands a lot of very heavy work, especially in the summer season with temperatures above 40°C. Similarly, residents said the valley may be perceived differently, green or dry, depending on the season of the year.

Table 1: Expressions to describe and assess the landscape for Valley residents (Ortega-Villa *et al.*, 2013).

Landscape description	Preference for places	Reasons for the preference
✓ Abundant	✓ Kilómetro 43	✓ Due to the dam
✓ Nice	✓ Michoacan de Ocampo	✓ For the wells
✓ A lot of work	✓ The whole <i>ejidos</i>	✓ Trees
✓ Employment	✓ Lazaro Cardenas	✓ For camping
✓ Green fields	✓ The whole valley	✓ The dunes and raising events
✓ Many trees	✓ Ciudad Morelos	✓ For shopping
✓ Green and dry depending on the season	✓ City of Mexicali	✓ Because it is populated and for the services
✓ Quiet	✓ Algodones	✓ Nice parks and vegetation
✓ Very Hot		✓ Trees and quietness
		✓ The family
		✓ Because I live there
		✓ Nice
		✓ Peaceful
		✓ Solidarity among inhabitants

Regarding the second question about the sites and preferences, the inhabitants do not know all the towns, but only those that have certain particular characteristics that identify them. For example, Ciudad Morelos and Algodones stand out in the northeast part of the valley. Algodones stands out because of the Morelos Dam and the gateway or border crossing to the United States. In the case of Ciudad Morelos, there is a concentration of urban facilities and public utilities that supply the northern part of the valley. Meanwhile, the city of Guadalupe Victoria, better known as Kilómetro 43, stands out in the south of the valley for being a settlement associated with passenger rail stations, and for the public service facilities that cater a large number of villages. Another site is the *ejido* Michoacan de Ocampo, which has a historical significance linked to the agrarian movement for the distribution of land by President Lazaro Cardenas in the 1930s. The other place that stands out is the city of Mexicali, being the capital city of the state of Baja California, and providing regional public services to the Mexicali Valley and other cities in the state.



Regarding the third question about why these places are preferred, the answers allege point to the existence of landmarks such as the Morelos Dam, the wells zone in Mesa de Andrade, the dunes of Algodones and the racing events, the places that are inviting to camp or relax in a quiet environment under trees, or a visit to the parks of towns. Cities are also mentioned as elements where people can find commercial and entertainment services, or visit family members. Finally, the answers express that they enjoy the valley because they were born or have lived there, because it is nice, quiet, and people always help each other.

### 3.2 Scenes that characterize the landscape of the Mexicali Valley

As previously mentioned, during the interview residents were asked to select the photos that best described the Mexicali Valley. The answers were classified into two groups: the first set was composed of eight photographs depicting the Mexicali Valley (Figure 1); in them the presence of low vegetation and land surfaces is dominant, while the rest of the components have a subordinate rank: hills or mountains, built elements, the presence of people or animals. The vegetation component, expressed as “green” – regardless of the type of crop, color or texture shown – is definitive in the assessment. However, it is worth underlining the relevance of traditional crops of cotton, wheat, different types of grass for breeding and fattening of livestock, and numerous horticultural products, with which people are familiarized as a landscape they visually perceive and distinguish. Meanwhile, there are other non-traditional crops in small areas of the Valley that are not considered representative, such as dates, citrus, corn and grape, among others. Also, within the artificial or man-made elements, those interviewed identify rural housing and channels, meanwhile Cerro Prieto volcano is considered the only “natural” landmark that distinguishes the valley.



Figure 1: Landscapes representing the Mexicali Valley (IIS).

In contrast to the previous images, there are those scenes that, on the one hand, show built elements more typical of urban environments, such as hydraulic infrastructure, agribusiness activities, power generation, water used recreationally by people in channels, and ranches (Figure 2). Equally unrepresentative of the valley, the lower part of Figure 2 shows scenes of “natural” environments such as

the Hardy River and the desert shrubs of the Cucapa slope. The respondents said they ignored some places shown in the group of photos, which reflects a partial knowledge of the valley, depending on where they live.



Figure 2: Unrepresentative scenes of the valley (IIS).

### 3.3 Preferences for landscape units

The statistical analysis by main components gives different results: one is frequency analysis, which allows distinguishing four groups between the 14 scenes that characterize the landscape of the Mexicali Valley (landscape units), as shown in Figures 3 and 4, where each group can be described through positive or negative adjectives, as the value diminishes towards non-preferred. Thus, we have the first scene group represented by characteristic landscapes of two areas of the valley: one near the Algodones Dunes and the other near Cerro El Mayor at the bottom of the Sierra Cucapa and the landscape of the water body of the Xochimilco lagoon to the south of Mexicali. The descriptions used to characterize these landscapes are: neat, unique, pretty, secure, I like it, clean, friendly, bright, diverse, peaceful, fertile, green and fresh.

The second group of scenes shares some attributes, but they diminish in importance; here we have landscapes that tend to communicate more horizontality and depth than the previous ones.

The aspects they have in common are the presence of vegetation and, of minor importance in the composition are, water and hills, landscapes mainly considered quiet, clean, bright, rural and pleasant. From the third group on, changes in the perception of the landscape begin to manifest, pointing towards another assessment of the landscape surrounding the valley with no cultivated fields; thus, there are scenes of natural or semi-natural environments that begin to be described as hot, dry, arid, monotonous, gloomy and unpleasant. The fourth set of pictures is noticeable because it is not part of the previous set, yet it has a contrary connotation to what is called a valley. Paying attention, this could mean that the assessment is related to farmlands that are not yet green or cultivated, communicating expressions such as desolated, disordered, common, ugly, and dangerous; in short, unpleasant. In this sense, it is worth reviewing the comment made by one respondent on the importance of the season of the year in the appreciation of the landscape.

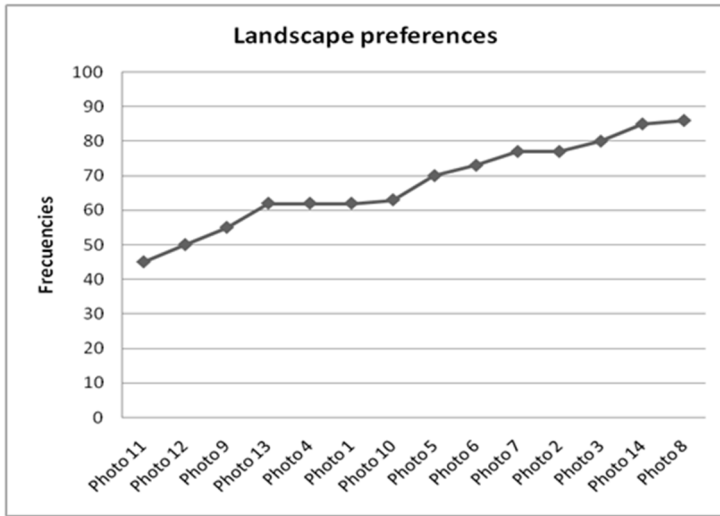


Figure 3: Landscape groupings according to preferences of the interviewed public.



Figure 4: Classification of landscape units according to preferences.

The principal component analysis yielded other information that supplements the above. The analysis of scenes by quadrant raises oppositions presented by scenes in the “X” (up and down) and “Y” (left and right) axis, and of those scenes that because of their relevance are on the periphery of the quadrants in Figure 5.

The landscapes representing what is common in the valley are close to the “X” axis, images 2 and 3, showing the domain of farmland bounded by a low border of sands.

The landscapes to the left side of the “Y” axis represent various manifestations of what the valley is, while the landscapes to the right side represents non-agricultural scenes which are considered natural or mountainous.

It is possible to identify five scenes in the quadrants: 12, 11, 14, 8 and 4 located on the extremes, which represent unique conditions; the presence of hills or mountains, water bodies and green or land areas stands out in them.

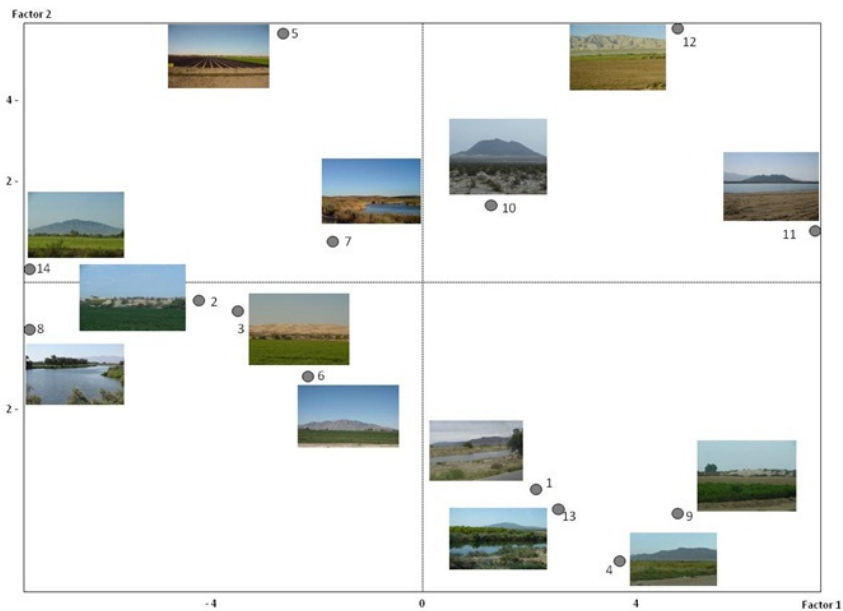


Figure 5: Identification of groups of landscapes, where scenes representing the valley stand out on the left side of the “Y” axis as opposed to the right side.

## 4 Conclusions

The Mexicali Valley landscape is fairly homogeneous when perceived as a vast territory, with the domain and relevance of its “green” vegetation cover in its definition, its horizontality, its limited accessibility and spacious visuals, which cause its residents to have only a partial knowledge of it. However, it has internal elements that bring diversity but get lost as tiny patches in its large surface, for example the areas of non-traditional crops, water bodies, or elements of the physiography such as dunes, hills and mountains.

The current trend of sustainable rural development is oriented to the economic diversification of the land, which involves the transition to changing land uses,



such that already exist but have not been perceived yet by its residents as part of the new rurality. Among the strategies that could be implemented, the conservation of green areas should be emphasized, as it is the value that gives character to residents and visitors.

There are areas of the valley that have potential to promote new productive activities from the point of view of landscape resources. An example of this is the case of the “desert” natural environment and its relationship and interface with the cities, as areas that appear with a negative connotation to the residents and general public.

Water is a resource that sustains life in the desert, countryside and cities; it is nevertheless an element of the landscape that goes unnoticed because of its limited accessibility and visibility in the region. Mountains, hills and dunes are in a similar situation, as visual resources that, combined with green fields and water, make the places attractive and get high preference among the public.

Finally, the comparison between different participant groups allows establishing similarities and differences. In the first case, both groups characterized the valley as a big flat space, simple, with a cultivated vegetation cover, and the domain of horizontality over verticality. They also coincide on the use of adjectives to describe the valley as beautiful, green, fresh, fertile, clean and quiet. In the second case, the differences are focused in that the people of the valley assign values to specific sites because they mean something for them, while for the other group, they are only images. The people of the valley classified images in three types of environments: valley, desert and city; while in the second case, the images were classified into valley and different from valley, where the negative connotations in both cases were assigned to landscapes not representing the valley. The only natural element that identifies the valley is Cerro Prieto, while responses of the other group placed five landscapes based on their high preference, places which show environments of greater diversity of landscape elements and, contrasts between the horizontal and the vertical plane; places that in the future could have a meaning of their own.

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