

Requirements in an Inventory on Cultural Heritage in Morocco and Reflections on the Presentation of the Information

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ABSTRACT :

The CERKAS, an office of the Ministry of Culture and Communication of Morocco, assisted by the Institute of Photogrammetry of the EPFL, is building up an inventory of the historic monuments of the Drâa Valley of Southern Morocco. This inventory is based on orthophotos and field surveys. The data of the surveys are integrated into a geographic information system and are also analyzed there. The aim of the inventory is to document this unique rammed earth architecture, to show the social relations and to contribute to a revitalization of at least a part of these monuments.

The Moroccan Institution has the necessary infrastructure to collect and organize the data in its geographic information system (Intergraph-MGE). Within one and a half years, about 100 ksour have been surveyed and integrated into the database.

As the work is progressing, the analyses of the data and the presentation of the results are of major concern. While it is understood that information systems allow manifold and complex queries, they do however demand a certain effort and can only be handled by specialists. On the contrary, an average user of such a database expects easy handling and the possibility to analyze and combine data, texts, images and maps for his specific needs. Quick and well-ordered access to the data with the help of various keywords is important. This can only be achieved by widespread software, preferably on an Internet basis.

1. INTRODUCTION

A good part of our cultural heritage as well as our history represent the basis, the reference which will also decide our future. This might less concern testimonies of long past cultures but is an essential aspect of the cultural heritage of the more recent time being at least partially still actively used. Consequently, it is very important to capture not only the objects as such when doing an inventory of cultural heritage, but also to take into consideration the cultural historic framework and social and economic aspects. The CERKAS, an office of the Ministry of Culture and Communication of Morocco assisted by the Institute of Photogrammetry of the EPFL, is building up an inventory of the historic monuments of the Drâa Valley of southern Morocco. This concerns the wonderful castles and forts of rammed earth in the river valleys on the edge of the Sahara. These forts have been built up for the protection of the population against the invasions of the nomads, analogous to the medieval town fortification in Europe. A part of these historical forts is still inhabited and still maintained. However, we observe a strong trend towards emigration. The building substance is very weak and requires regular maintenance. When performing an inventory, we have to take into consideration various elements. On the one hand, one should capture the monuments in as detailed a way as possible in the form of construction plans and photographs. Furthermore, the arrangement of the settlements and the spatial context should be captured. In this way, one is only concerned with the constructive elements. It is clear that these are only understood if one also includes the social formation of the population, its living conditions and also its requirements in terms of protection. Especially in the past, the latter element influenced decisively the building substance of the settlements in the oases. In this way, we roughly defined the basic elements for the inventory. While the inven-

tory should also contribute to decision-making for revitalization, it is also necessary to include the development possibilities of the region and of the population.

2. DESCRIPTION OF THE DRAA VALLEY

The South of Morocco lies on the edge of the Sahara in an arid area. The region is mountainous and limited in the North by the Atlas, a mountain chain reaching an altitude of 4,000 m. Precipitation is rare, consisting mainly of a few heavy rainfalls in the northern part which decrease considerably towards the South. The river which originates in the Atlas formed basins along a narrow band reaching far into the country. The soil is very sandy and vegetation is sparse. Fertile soils developed only in former erosion basins from the alluvial materials of the rivers. One of the most important rivers of the region is the Drâa, which penetrates nearly 400 km to the South and then practically disappears, although the course of the river can be followed up to some 1,000 km further to the West until it reaches the Atlantic.

Already in ancient times, the region was inhabited by different social groups: on the one hand the Drawa, a negroid tribe which was sedentary and predominantly did farming; and on the other the Berber, mainly living from animal breeding using the broad arid areas. In the 6th century B.C., Jews immigrated when fleeing from the siege of Jerusalem and in the 7th and 8th centuries various Moslem tribes immigrated. In the Middle Ages and the beginning of the modern era, the valley was an important caravan route between Central Africa and Europe which brought a certain wealth to the area.

3. THE ARCHITECTURE IN RAMMED EARTH OF THE SOUTH OF MOROCCO

Wood and combustible material are in general rare in this region and consequently quite expensive. Burned lime also used as binding material is hardly available; however clay that is only air dried with small additions of straw is an excellent building material. On the one hand it can be treated as rammed earth or as air dried bricks. The rammed earth is treated much like concrete in building a framework. The space between two lateral boards is filled up with earth, using straw as binding material, which is then rammed and dried. After a few days, the boards are lifted up and one proceeds to the next layer. This method is mainly used to build the basement and the first floor, whereas the upper floors are constructed with dried bricks. However, it is important that these constructions are based on a solid stone foundation. In this way, people erected houses and defense installations consisting of three, four or even more floors.

The necessity of defense required a very compact way of construction and the erection of town walls and defense towers. Furthermore, the extreme temperatures, very hot summers and cold winters, required special construction measures in order to create a bearable living climate. The most important characteristics in this respect are the central courts of the houses with large galleries on the upper floors and hardly any windows on the street side. The rich decoration of the façades and the artistic formation of the central courts with arches and galleries are both special features of the houses of the region. The palm oases and the fortresses and castles called 'ksour' and 'casbahs' are extremely picturesque and typical of the southern valleys of Morocco. In the Drâa valley alone, between Agdz and Zagora, lie about 200 or more such ksour. On achieving independence, Morocco was also able to pacify the South and the traditional forts have since lost their significance. The narrow construction and the relatively demanding maintenance (the wall crown and the façades have to be renovated practically yearly or after each heavy rainfall) and the strong development of dust in the rooms caused the population to leave their traditional buildings and to move into houses built of concrete erected around the ksour. However, when these ksour are abandoned, they deteriorate very rapidly. The question thus now arises whether it will be possible to conserve at least a number of these testimonies to this exceptional architecture for the future generations, as well as whether they should be systematically surveyed and documented.

4. TASK, CONCEPTION AND EXECUTION OF THE INVENTORY

It was mainly the architect Hans Hostettler, one of the initiators of the inventory of cultural heritage of Switzerland, who committed himself strongly to initiating an inventory of the ksour and casbahs of southern Morocco. As already mentioned, this inventory should contribute to the documentation of the architecture in rammed earth and furthermore supply a decision-making aid for the revitalization of at least a part of these monuments.

4.1 Geometric Information and Degree of Detailed Description

Very quickly, one recognizes that it is necessary to distinguish between various levels of detailing for the different descriptions. On the one hand, it should be possible to present the individual buildings in scales about 1:200; on the other hand for the representation of a whole ksar it is useful to use scales between 1:1,000 and 1:2,000 and representations of the whole

valley should refer to scales in 1:50,000 and even smaller. It is understood that this concerns mainly the representation of the information; if one uses an information system for the storage of the information, it is possible to summarize the cartographic information in an appropriate way. MGE (Modular Geographic Environment) by Intergraph was used as information system with MicroStation as a graphical module. MicroStation is one of the few systems allowing 3D-presentations to be dedicated to architectural features. Essentially 2 degrees of detailing are used, the representation of the ksour and the detailed representation of the individual buildings.

The geometric data of the first degree of detailing are concentrated on the survey of the characteristic elements of the ksour; these are the surrounding walls with the towers, the entrance, the street network, the mosques and other sacred buildings, the individual living quarters and the peripheral elements (cf. Fig. 1). Meanwhile, the 2nd degree of detailing represents the individual buildings specially surveyed such as mosques and other sacred buildings, individual typical houses as well as the casbahs and elements of the defense structure. These buildings are also shown in general form in the lower degree of detailing.



Fig. 1. Orthophoto of a ksar with its defense walls, the central part of the village (dark = abandoned) and the new surrounding constructions (grey = inhabited)

LEGENDE CONCERNANT LES AFFECTATIONS DES Ksour, ECHELLE 1:2'000

SECTEURS D'HABITATION		Nombre d'habitants	BATIMENTS SPECIFIQUES	
	BON ETAT HABITE	45 %		MOSQUEE
	BON ETAT OCCUPE	4 %		SYNAGOGUE
	BON ETAT ABANDONNE	0 %		MARABOU
	A RENOVER HABITE	11 %		CASBAH
	A RENOVER OCCUPE	4 %		ENTREE
	A RENOVER ABANDONNE	2 %	ZONES PERIPHERIQUES:	
	EN RUINE HABITE	1 %		CIMETIERE
	EN RUINE OCCUPE	0 %		AIRE DE BATTAGE
	EN RUINE ABANDONNE	28 %		NOUVELLES CONSTRUCTIONS
	RUELLES NON COUVERTES			ROUTES D'ACCES
	RUELLES COUVERTES			PISTE DE ROUTE
				CHEMIN

Fig. 2. Legend for the orthophotos and the coloring (reproduced here in black-and-white)

The line information is complemented by the existing map information (map 1:100,000) and by orthophotos from aerial photographs in the scale 1:20,000 and 1:7,000. In this way, we obtain a continuous presentation of the region without the necessity of a complete line mapping.

4.2 Thematic Information

The geometric information is complemented by the thematic information which is stored in a relational database. This concerns information referring to the ksar as a whole such as its political status, its name, its topographic position, as well as specific folklore features and handcraft activities of the inhabitants. The information concerning infrastructure, water supply and sewage, electricity supply and many others also refer to the whole ksar. The state of the buildings and the usage and the social status of the inhabitants are registered with respect to the living sectors; an attempt is also made to capture socio-economic information. Finally, a detailed building description is done for the individual buildings surveyed.

4.3 Information Survey

The sketched data catalogue requires an intensive field survey which is performed in two phases. In the first phase, one proceeds to reconnaissance of the general state of the ksar which might require about an hour. One then decides whether a detailed survey is necessary. The currently available aerial photographs of 1977 and 1987 allow to recognize the respective villages with all their elements. For the detailed surveys, orthophotos are used as a basis on which the characteristic elements are sketched out and one attempts to gather the attributive elements by questioning inhabitants. Furthermore, there are various buildings surveyed in a detailed manner. This activity requires 2-4 hours/ksar for a group of 3-5 persons and is executed by the CERKAS under its own responsibility.

4.4 Photographic Documentation

Beside maps, plans and descriptive elements, photographic images are of great importance for the documentation of architectural monuments. The CERKAS employs a professional photographer who systematically documents the ksour. Architect Hans Hostettler, has suggested adopting a systematic approach similar to a tour through the village. In a first phase, one should capture the exterior view of the village with its fortifications and the entrances. Then follows the documentation of the entrance itself and the interior views of the village, meaning the squares and streets and finally the sacred buildings and the dwellings. For these, one should proceed in a similar way and for example the mosques should be captured first by the façade, followed by the entrance, the vestibule, the cleaning rooms and finally the prayer room. The images were initially taken on both black-and-white and color in, while we prefer direct digital image recording.

5. PROCESSING AND PRESENTING THE INFORMATION

One quickly recognizes that in this way an extensive documentation of the historic monuments of the South of Morocco will be elaborated. The CERKAS is equipped with the necessary computer facilities in order to store the information and to process it in an information system. However, the information processing requires considerable expertise and also a certain amount of time if complex questioning procedures are necessary. The information as a whole might require about 50-100 Gbytes or even more. These are not good conditions to enable

general access to the information and to provide a base for the presentation of the monuments and various possibilities for analyses with respect to a new vitalization. It is understood that there are plans to publish a summary in the form of a book. This is however only possible when the work is finalized and will be limited to a selection of documents. In order to already obtain a document which can be easily circulated, the plan is to continuously update a CD-Rom on which the essential information will be summarized and which will also enable interactive queries. This interactive working mode will be made possible by building up an image database and a slide panorama and by incorporating webmapping facilities. It is understood that the most current requirements regarding data analysis have to be anticipated and it will be necessary to elaborate corresponding summary maps. These presentations are complemented by various descriptions.

5.1 Presentation of Synthesis of the Ksour

The results of the terrain survey take the form of plain signature maps of the ksour with indications concerning the state of the buildings (good, requires renovation, or ruins) and their usage (inhabited, other usage, or abandoned). Such maps supply the desired information but do not allow any additional analysis to determine which types of buildings are still inhabited. This information is obtainable by the orthophotos, but the direct relation is difficult to establish. On the other side, superimposition of orthophotos with surface symbols leads to maps which are difficult to read. A solution for this problem is the presentation of the orthophotos in pseudo-colors; in this case, the coloring corresponds to the above-chosen criteria. A critical analysis of the coloring shows however that there are only a few colors available and they should suggest in some way or the other the effective usage: red = ruins, brown = habited, green = sacred building etc. (cf. Fig. 1). In order to avoid exceeding an A4-format, meaning the full printed page, it is advisable to choose a scale of 1:2,000 for the presentation of the villages with their surroundings. The villages themselves might only require a scale of 1:1,000. Enlargements are necessary if the plot of the building should be presented (cf. Fig. 3).

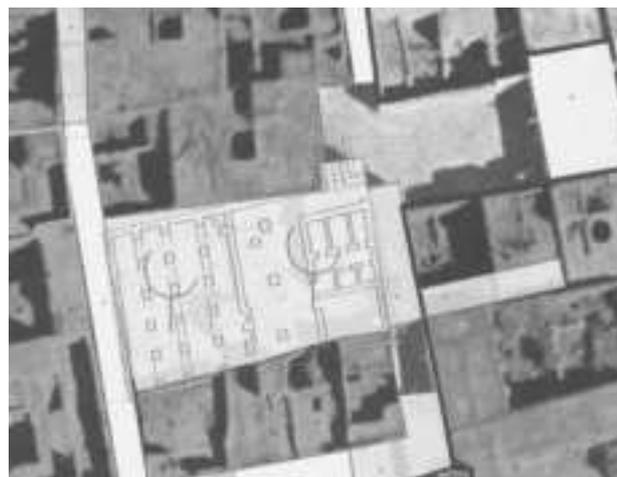


Fig. 3. Enlarged orthophoto with the plot of the mosque superimposed

5.2 Overview Presentations

The above-described presentations allow an analysis of the individual ksour. However, it is difficult to establish a relation to their surroundings and their mutual relations. To fulfill this objective, smaller scales such as 1:50,000 or even less are nec-

essary. In such scales, orthophotos lose their readability and it is more efficient to use topographic maps as background. In this way, signature maps have been elaborated which show the ksar as point symbols and the colors correspond to the degree of occupation. In a similar way, the most important ethnic groups which have lived in the ksour are shown (cf. Fig. 4). It is remarkable to realize that for example ksour with arabophile inhabitants are much stronger fortified if in the neighboring villages we find a berberophile population. Very often the main ethnic groups are Drawa, but which adopted Arabic on the one side and the Berber language on the other. The maps are presented with the means of MicroStation and MGE, but were however elaborated with a special computer program in Visual Basic after the corresponding queries from the MGE databank. It is obvious that a great number of presentations can be elaborated in this way, which is not yet exhausted by far.



Fig. 4. Location of the ksour with indications of the ethnic origin of the population

5.3 Slide Show and Image Database

As already indicated, the photographic documentation of the historical monuments is of great importance for the inventory. In this context it is relatively easy to create a slide show with the help of HTML, the standard Internet language. Although such a predefined show might appear at a first glance to be quite worthwhile it proves not to be very useful for detailed and comparative analyses. For such analyses, one wants to call up the different images according to well-defined queries, implying the use of a database. Furthermore, an individual image does not help very much if one cannot simultaneously see the surroundings of the photographer's standpoint as well as some written explanation. These requirements can be met quite well using an Internet browser and Javascript.

We initially conceived a standard layout for the image presentation (cf. Fig. 5) which not only shows the photographic image itself, but also a plot of the ksour completed with the route of the photographer which also enables one to recognize the neighboring objects along with the images. All locations from which images were taken are indicated and can be clicked on. Furthermore, we show the orthophoto of the ksour and, in the case of buildings, their plot. Considerable attention is also devoted to the description of the image content, while thematic

corresponding images are shown as thumbnails in a lateral field. The goal is to create in this way an image documentation that matches the various requirements.



Fig. 5. Layout of the slide show with additional information about the photographer's stand point and the neighboring images

6. CONCLUSIONS

The elaboration of an inventory of cultural heritage is a very important step towards a better understanding of a culture and promotes the conservation and the revitalization of these testimonies of the past. In principle, such an inventory may appear to be a purely technical operation, since the management of the data in a modern geographic information system allows one to visualize the data and to perform the necessary analyses. However, such an approach would mean that access to the information of the inventory would be limited to a small circle of experts. Access is relatively difficult and hardly fulfills the function of providing a large circle of professionals with the opportunity of contributing to the conservation and revitalization of the monuments. Neither would the knowledge on the possibility of the interconnection of information help very much. It is much wiser to place simple means at the disposal of interested users so that they can easily use the inventory to visualize data and images and draw their personal conclusions. For the presentation of the inventory of the historic monuments of Morocco, we developed a simple mechanism enabling queries from the database and visualization of the images by simply storing the data on CD-Rom and using an Internet browser to operate it. The approach currently being developed appears liable to satisfy these demands. It is however clear that further discussions are still necessary to refine its final form.