

PHOTOGRAMMETRIC SURVEY OF VERNACULAR FARM BUILDINGS FOR PRESERVING THE CULTURAL HERITAGE OF RURAL LANDSCAPES

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Abstract

Farm buildings play a central role on the sustainability of the rural environment. Conceived to host biological productions, the farm building constitutes indeed an unparalleled example in the wide epistemological constructions sector. Due to specific human interactions with the indoor and outdoor built environment, it raises architectural and technical issues different from other buildings. The role that these buildings have historically played is strictly connected indeed with the surrounding context, due to the need of the farmer to live in close contact with agricultural land and animal husbandry. Human activities have then strongly influenced the rural environment and the visual perception of its landscape. The increasing sensitivity about the concept of sustainable development of the built environment is currently stimulating the valorisation of farm buildings. In the present article, an analysis of some specific typologies of vernacular farm buildings more representative of the Basilicata region (Italy), has been performed through photogrammetric analysis. The final results showed that a simple close-range photogrammetry survey - tailored to the needs of the agro-industrial buildings sector, which does not require expensive or sophisticated equipment - enables to catalogue this important built heritage, paving the way to its recovery for public recreation and landscape protection.

Key words: Rural development; Built heritage; Close-range photogrammetry; Environmental sustainability; Landscape protection

Introduction

The architectural features of farm buildings are strictly connected with local traditions, always governed by the need to reduce construction and maintenance costs as minimum as possible [Cillis et al., 2020; Picuno P., 2016]. All over the World, a widespread heritage of vernacular farm buildings, synthesizing in their architectural expression the culture, traditions and ways of life of several generations of rural population, is currently present [Olisarova et al., 2018; Statuto e al., 2013]. Some of them are now abandoned, unfortunately showing a situation of structural and functional degradation that makes their restoration difficult and expensive. The survey of these buildings, finalised to a typological analysis of their main architectural characteristics, is therefore essential, even to pave the way to their restoration for protecting rural landscape and environment [Picuno et al., 2019; Scarascia-Mugnozza et al., 2008], as well as for new use of public recreation [Cillis et al., 2019; Statuto e al., 2019]. Several examples of vernacular farm buildings have been analysed so far, with reference to their typological characteristics and architectural solutions, as those for protecting animals in fenced spaces [Picuno C.A. et al., 2017] or for agro-industrial production, as flour mills, wineries, slaughterhouses, etc. [Picuno P., 2012; Fuentes et al., 2015; Ruggiero et al., 2019].

Terrestrial photogrammetric techniques may reveal a useful tool for surveying isolated farm buildings, mostly for those with an important historical value. Farm buildings have indeed particular characteristics that often require an alternative approach to graphic and metric documentation, quite different from those used for architecture in general. In this sense, a comparative study of traditional methods has led Arias et al. [2007] to conclude that they are not entirely suitable for surveys of farm buildings, since some are too complex and expensive and others are not enough accurate. So, these Authors designed a simple close-range photogrammetry survey tailored to the needs of the agro-industrial sector buildings, which does not require expensive or sophisticated or expert equipment. In the present paper, such an analysis has been performed in Italy, with reference to the Basilicata region, where some typological examples of rural building have been surveyed through photogrammetry.

Material and methods

The façade of some vernacular farm building (traditionally named: "*masseria*") located in Basilicata region (southern Italy), having a cultural interest and protected by specific regulations, have been surveyed through close-range (terrestrial) photogrammetric methods.

The photogrammetric shots were taken with a Zeiss TMK6 terrestrial camera, equipped with a wide-angle lens having a focal length of 60 mm. The image format has been 80x110 mm, particularly

suitable for architectural shots in environments with limited space, a situation often found in internal courtyards or for farm buildings facing other buildings located at a short distance.

The topographic support for the shots, necessary for the correct scaling and orientation of the photogrammetric model, was made by using an integrated total station Nikon DTM-1 type, consisting of a theodolite and an electronic wave distance meter, interfaced to an internal microprocessor. With this instrument, the methodology of spatial angular intersection was used to measure the three-dimensional coordinates of a suitable number of target-points marked on the object. The data, recorded online on a Nikon DR-1 portable recorder with permanent magnetic bubble memories, were finally downloaded into a PC with specific software properly designed, which enabled to obtain roto-translated coordinates in an absolute reference system.

Then, the restitution phase was carried out on a Galileo-Siscam "Digicart 40" analytical stereo-restitutor, finally producing and editing the three-dimensional optical model of the façade of each surveyed farm building.

Results

In figures 1, 2, 3 and 4 the façade – surveyed through the above-described close-range photogrammetry survey - of some important "masserie" of the Basilicata region are showed. They have been chosen as the most representative of some different areas – *i.e.*, mountain, hilly, flat, reclamation, coastal, *etc.* - in which these typical buildings are located over the regional territory.



Fig. 1: Photogrammetric survey of the façade of "Masseria La Marchesa".

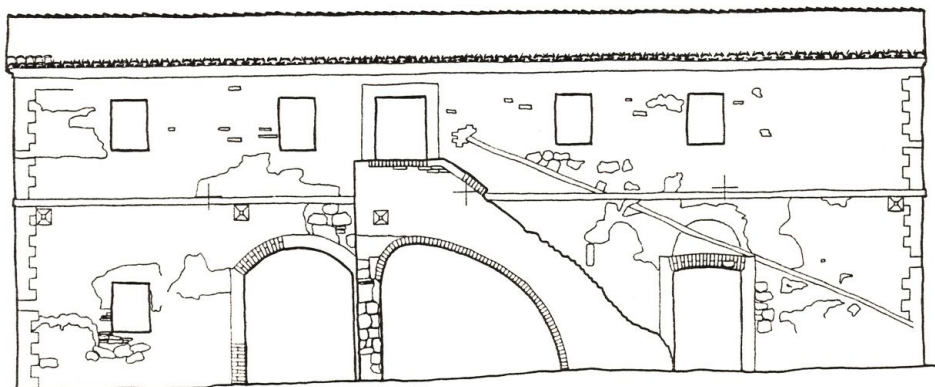


Fig. 2: Photogrammetric survey of the façade of "Masseria Giannini".

Many of these rural buildings currently appear to be in a state of high architectural or structural degradation, although in many cases recent physical/functional restoration works have been carried out, allowing new forms of use, such as cultural containers for public recreation, as well as for agri-tourism, eco-tourism or sport and leisure activities, *etc.*

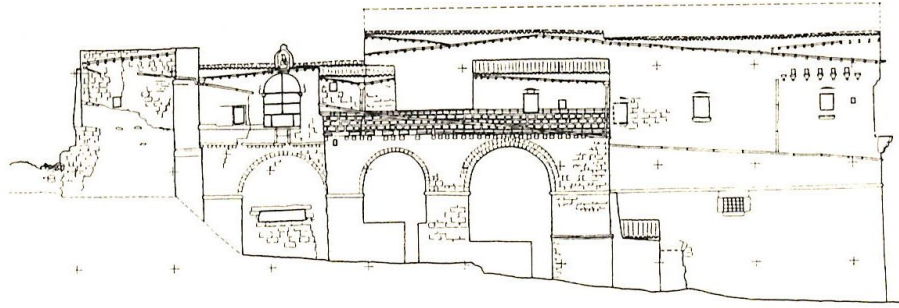


Fig. 3: Photogrammetric survey of the façade of “*Masseria Jesce*”

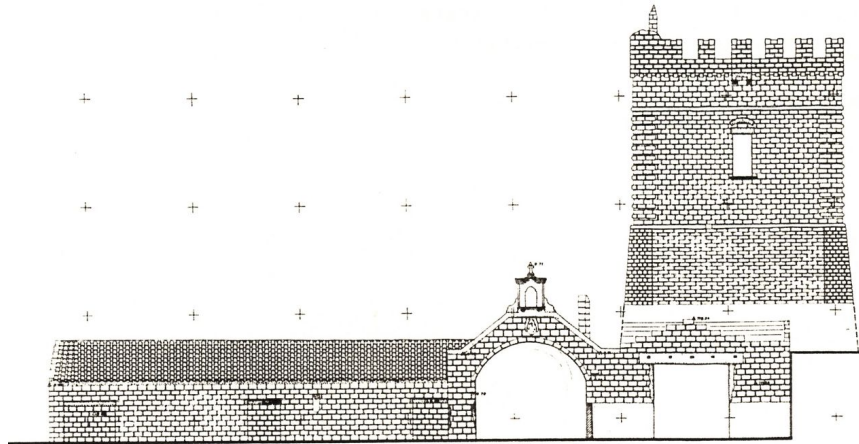


Fig. 4: Photogrammetric survey of the façade of “*Masseria Torre Spagnola*”

Discussion

The results coming from the survey of the vernacular farm buildings most representative of the Basilicata region has confirmed how important is the correct restoring of this important heritage, even intended for public recreation, in the framework of rural landscape conservation. The characteristic appearance of cultural and natural landscapes is indeed under serious threat in many rural areas. The responsible building authorities at local level often lack the capacity and expert knowledge to ensure certain quality standards in planning and construction of new buildings, as well as in the reconstruction or revitalization of existing buildings. New strategies have to be found to raise the awareness of officials and local population to ensure respect for traditional buildings and the landscape, advising persons requesting a building permit.

Our heritage – both in its tangible and intangible forms of plazas, villages, landscapes, customs and traditions – is in a constant state of change. Monuments decay, buildings are demolished or adapted to new uses, agricultural fields are abandoned or aggregated, traditions and customs evolve or are forgotten. This is especially important in rural communities, where this change has been accelerating in recent decades as transportation becomes easier and less expensive, urban areas offer more attractive opportunities for young people and globalization reaches into every corner. All of these changes impact the communities that hold their cultural heritage, making places unique, tying people together, finally creating communities with distinctive identities.

Conclusion

Rural communities everywhere are often susceptible to long slow declines, if agriculture is no longer economically viable and younger generations move to cities in search of better opportunities. Rural heritage is a very important aspect of one Country’s identity. The characteristic appearance of cultural and natural landscapes in rural areas is shaped by the traditional building culture of the specific region. However, the traditional building styles are often no longer respected by modern, rapid construction techniques and materials. Their proper restoring seems a crucial way to protect the rural landscape, together with new opportunities to enhance the public recreation of these areas, joining the rural development with the preservation of their cultural heritage.

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Souhrn

Hospodářské budovy hrají ústřední roli pro udržitelnost venkovského prostředí. Hospodářská budova, která je koncipována jako hostitel biologické produkce, představuje skutečně jedinečný příklad v širokém epistemologickém sektoru pozemního stavitelství díky svým architektonickým a technickým problémům odlišným od ostatních stavebních odvětví. Originalita toho, co se děje uvnitř budovy farmy, odpovídá tomu, co se děje venku. Role, kterou budovy historicky hrály, je ve skutečnosti striktně spojena s okolním kontextem, a to z důvodu potřeby farmáře žít v těsném kontaktu se zemědělskou půdou a chovem zvířat. Tímto způsobem lidské činnosti často silně ovlivňovaly zemědělské prostředí a vizuální vnímání jeho krajiny. Rostoucí citlivost konceptu udržitelného rozvoje zastavěného prostředí v současné době stimuluje valorizaci hospodářských budov a jejich přínos pro formování venkovské krajiny. V tomto článku je uvedena analýza širších příležitostí, které umožňuje implementace fotogrammetrických technik blízkého dosahu pro průzkum některých hospodářských budov v oblasti Basilicata (jižní Itálie). Konečné výsledky, kterých bylo dosaženo, ukázaly důležitou roli, kterou tyto hospodářské budovy hrají díky své pozoruhodné kulturní hodnotě. Zkoumané budovy však trpí vážnou úrovní chátrání s důsledky, které mohou být závažné, jako je ztráta historické hodnoty, vysoké náklady na obnovu a dokonce i ztráta památky. Jejich řádná obnova se proto jeví jako zásadní způsob ochrany venkovské krajiny, umožnění nových příležitostí k posílení veřejné rekreace i v těchto oblastech, připojení k rozvoji venkova a zachování jejich kulturního dědictví.

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