3 DEFENSIVE ARCHITECTURE OF THE MEDITERRANEAN
XV to XVIII Centuries

Giorgio VERDIANI (Ed.)

DEFENSIVE ARCHITECTURE OF THE MEDITERRANEAN

XV TO XVIII CENTURIES

Vol. III

PROCEEDINGS of the International Conference on Modern
Age Fortifications of the Mediterranean Coast
FORTMED 2016

DEFENSIVE ARCHITECTURE OF THE MEDITERRANEAN

XV TO XVIII CENTURIES

Vol. III

Editor
Giorgio Verdiani
Università degli Studi di Firenze
Dipartimento di Architettura

PUBLISHED BY
DIDAPRESS

FORTMED 2016, FIRENZE

Atti del Congresso / Conference Proceedings / Colección Congresos UNIFI

Tutti i contenuti della presente pubblicazione sono stati soggetti a revisione da parte del Comitato Scientifico di FORTMED 2016, secondo il processo della “peer review”.

All the contents of this book has been reviewed by the FORTMED 2016 Scientific Committee according to the “peer review” process.

ISBN: [9788896080603] (OPERA COMPLETA)

Organization and commitees

Comitato d'Onore / Honour Committee:

Luigi Dei. Rettore dell'Università degli Studi di Firenze

Saverio Mecca. Direttore del Dipartimento di Architettura DiDA Università degli Studi di Firenze

Pablo Rodríguez-Navarro. Presidente FORTMED 2015 Universitat Politècnica de València

Giancarlo Paba. Presidente della Fondazione Giovanni Michelucci, Firenze

Comitato Organizzatore / Organizing Commitee

Presidente / Main Chair: Giorgio Verdiani. Università degli Studi di Firenze

Segreteria / Secretariat:
M. Teresa Gil Piqueras. Universitat Politècnica de València, Serena di Grazia. Associazione Culturale Maieutike

Membri / Members: Pablo Rodríguez-Navarro. Universitat Politècnica de València, Stefano Bertocci. Università degli Studi di Firenze, Anna Guarducci. Università degli Studi di Siena, Santiago Lillo Giner. Universitat Politècnica de València.

Comitato tecnico-editoriale / Technical and Editorial Commitee: Andrea Pasquali, Giancarlo Littera, Angela Mancuso, Paolo Formaglini, Filippo Giansanti, Anna Frascari, Tatiana Pignatale, Stéphane Giraudeau, Andrea Leonardi, Giulia Baldi, Ilenia Tramentozzi, Mirco Pucci Università degli Studi di Firenze.

Comitato Scientifico / Scientific Commitee

Direttori scientifici / Scientific Directors:
Pablo Rodríguez-Navarro. Universitat Politècnica de València,
Stefano Bertocci. Università degli Studi di Firenze

Membri / Members:
Andreas Georgopoulos. Nat. Tec. University of Athens. Greece
Alessandro Camiz, Girne American University. Cyprus
Alicia Cámara Muñoz. UNED. España
Anna Guarducci. Università di Siena. Italia
Anna Marotta, Politecnico di Torino. Italia
Antonio Almagro Gorbea. CSIC. España
Arturo Zaragozá Catalán. Generalitat Valenciana. Castellón. España
Concepción López González. UPV. España
Domenico Taddei, Università degli studi di Pisa. Italia
Faissal Cherradi. Ministerio de Cultura del Reino de Marruecos. Morocco
Francisco Juan Vidal. Universitat Politècnica de València, España
Fernando Cobos Guerra. Arquitecto. España
Gabriele Guidi. Politecnico di Milano. Italia
Gjergji Islami. Universiteti Politeknik i Tiranës. Albania
Giorgio Verdiani. Università degli Studi di Firenze. Italia
Per Cornell. University of Gothenburg. Sweden
Rand Eppich. Universidad Politécnica de Madrid. España
Rafael Soler Verdú. Universitat Politècnica de València. España
Sandro Parrinello. Università di Pavia. Italia
Santiago Varela Botella. Generalitat Valenciana. Alicante. España
Stefano Columbu, Università di Cagliari. Italia

Note / Notes
This conference was made in the frame of the R & D project entitled "SURVEILLANCE AND DEFENSE TOWERS OF THE VALENCIAN COAST. Metadata generation and 3D models for interpretation and effective enhancement" reference HAR2013-41859-P, whose principal investigator is Pablo Rodríguez-Navarro. The project is funded by the National Program for Fostering Excellence in Scientific and Technical Research, National Sub-Program for Knowledge Generation, Ministry of Economy and Competitiveness (Government of Spain).

Questo convegno si tiene nel quadro del progetto di R & D intitolato "SURVEILLANCE AND DEFENSE TOWERS OF THE VALENCIAN COAST. Metadata generation and 3D models for interpretation and effective enhancement" riferimento HAR2013-41859-P, il cui coordinatore è Pablo Rodriguez-Navarro. Il progetto è finanziato dal Programma Nazionale per la promozione dell'eccellenza nella ricerca scientifica e tecnica, sotto-programma nazionale per la conoscenza generazione, Ministero dell'Economia e della Competitività del Governo Spagnolo.

ORGANIZZATO DA / ORGANIZED BY:

UNIVERSITÀ DEGLI STUDI FIRENZE
DIDA DIPARTIMENTO DI ARCHITETTURA

CON IL SUPPORTO DI / WITH THE CONTRIBUTION OF

GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

IN COLLABORAZIONE CON / IN COLLABORATION WITH:

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

ESCUELA TÉCNICA SUPERIOR INGENIERÍA DE EDIFICACIÓN

ESCOLA TÈCNICA SUPERIOR D'ARQUITECTURA

Fondazione Giovanni Michelucci

Autorità Portuale Livorno

SPONSORSHIP:

DRONETOOLS

AREA3D SUPPORTO ALLA PROGETTAZIONE

Table of contents

Defensive Architecture of the Mediterranean XV to XVIII Centuries / Vol. III Giorgio Verdiani (Ed.)
FORTMED 2016 10th-12th November – www.fortmed.eu

Torre Scampamorte on Lake Lesina. Half-light zones in the maritime defenses of the Kingdom of Naples

Michele Coppola

University of Florence (DIDA), Florence, Italy, michele.coppola@unifi.it

Abstract

The Scampamorte tower was built in the second half of the 16th century, on the strip of sand which divides the Lake Lesina from the sea. For more than three centuries it has been exposed to weather and earthquakes without having suffered significant damage. Its natural isolation helped to prevent contemporary additions and interferences. The investigation carried by the University of Florence (LARC) has provided the complete survey of the building. Typological and stratigraphic analysis clarified some construction sequences and technical features of the building's life stages. We also identified all materials (limestone, brick, mortar, wood) and launched a campaign of instrumental investigation for the evaluation of decay phenomena and the monitoring of their progress. The tower is located in an unique natural context. Whatever project aimed at the conservation and revitalization of this building should integrate the peculiarities of the environment and landscape of which it is part.

Keywords: maritime defenses, Kingdom of Naples, Mediterranean, towers.

1. Introduction

The Adriatic currents constantly carry southwards the sediment that the Apennine rivers flow into the sea, piling them on the north coast of Gargano. This process led to the formation of the land strips that created the Lesina and Varano lakes. Bosco Isola is the current name of the isthmus more than 20 km long, that separates Lake Lesina from the sea [Morsilli, 2011]. The action of the sea and the Fortore river has modified its configuration. Until the construction of the dam Occhito (mid 20th century) the river activity made frequent changes of mouth and floods even in the western part of the isthmus. This strip of land was crossed by canals connecting the lake to the sea, whose distribution and continuity of use changed over time. Currently the only two canals are Acquarotta and Schiapparo, both reworked between the 19th and 20th century. [Rosano, 1903]. A dirt road runs in the middle of Bosco Isola, linked to a network of trails. With the exception of a few agricultural settlements, the whole area is covered with trees and shrubs typical of this Mediterranean part, creating an environment of great natural interest. Since 1981 the eastern part of the lake is a nature reserve. At the centre of this unusual territory, as an island in the mainland,

lies Torre Scampamorte, perhaps the only historic building ever built on the isthmus of Lesina. It stands on a dune about 6 m s.l.m. in defense of the S. Andrea canal, the old "Mouth of Lesina" [Fraccacreta, 1834], abandoned and covered up today. To get there you must follow the main road eastwards for 12 km from the canal Acquarotta, or arrive by the sea. The settlement vulnerability of this site reveals the decision-making power of those who have placed there a building, which decayed with the system that created it. The tower has been abandoned for decades, majestic, immersed in the natural silence. In this half-light of past and present attention, Scampamorte Tower holds a story waiting to be told. Its state of ruin keeps material traces with few recent interferences, providing optimal conditions for the reading of the construction techniques and materials. The ongoing investigation is conducted by the LARC in collaboration with MEMA and LAM of the University of Florence and the Laboratory Diagnostica e Analisi sui Materiali del Costruito (Politecnico di Milano). The aim of the research is to improve the knowledge of the construction history and the materials diagnosis, aimed to adequate conservation actions.

Fig. 1- The north coast of Gargano with the towers of the Spanish defense program.

2. The Spanish defense program

Between 15th and 16th century international conflicts for control of Italy made the southern Mediterranean unstable and the coasts of the Kingdom of Naples became vulnerable. Turkish fleets intensified attacks and looting, often in support of European powers at odds with Spain. The situation deteriorated to the point of requiring a reorganization of the maritime defenses. The plan launched in 1532 by the viceroy Pedro Alvarez of Toledo included the fortification of ports, the repair of existing towers and castles, adapting them to the new artillery, construction of new towers and establishment of a permanent garrison [Russo, 2009]. Soon however, the long times and the excessive costs did slow down the initiatives until the works stopped. New attacks urged the resumption of the program in 1563 with the edict of Pedro Afan Ribera [Starace, 2010]. All towers, both the command headquarters (*Capitane*) that those hosting small garrisons (*Cavallare*) were required to make a constant guard, raise alarm and immediately contrast the attacks [Cisternino, 1977]. The mutual visibility was decisive in the choice of sites. The towers number increased on convex and high coasts and decreased on concave and flat coasts.

Fig. 2- The tower from the lake side.

The visual function could be integrated by the garrison of strategic places such as springs or river mouths, which were strongly attractive

because of the supply of water and ease of penetration in the hinterland [Faglia, 1977].

Fig. 3- Plan of the first floor.

The Spanish defense program just mitigated the raids on the coasts that did not stop even after Lepanto [Sarnelli, 1680]. In fact the interests of Spain were increasingly addressed to the Atlantic, so no structural action was taken to improve the Mediterranean defenses. A report of 1579 described the Capitanata much vulnerable, especially the north coast between Peschici and Lesina. In 1594 the general survey of Carlo Gambacorta highlighted the critical conservation status of many towers due to unfinished or poorly executed work and abandonment. The subsequent government initiatives were limited to a minimum maintenance to ensure the survival of the system [Marino, 1977]. The scene described by the engineer Papa in 1685 is even more serious, with many towers partially collapsed or to be reconstructed. Only at the half of the 18th century the defense system became fairly comprehensive of active towers against Turkish raids and regularly inspected for maintenance [Cisternino, 1977]. The gradual dissolution of the risk of attacks from the sea culminated in 1785 with the peace treaty between Spain and the Regency of Tripoli [De Sariis, 1794]. The need for a coastal garrison dwindled and the function of the towers, especially the most isolated and vulnerable, began to decline.

3. The towers of Capitanata. Architecture, construction, materials

The typical tower of the Ribera's program was square, with the side of about 10-12 m with the lower part as a truncated pyramid and the upper one parallelepiped. The rooms at the two floors were barrel-vaulted. The ground floor, without openings, was used as a warehouse or tank and was accessible by the first floor through hatches in the vault.

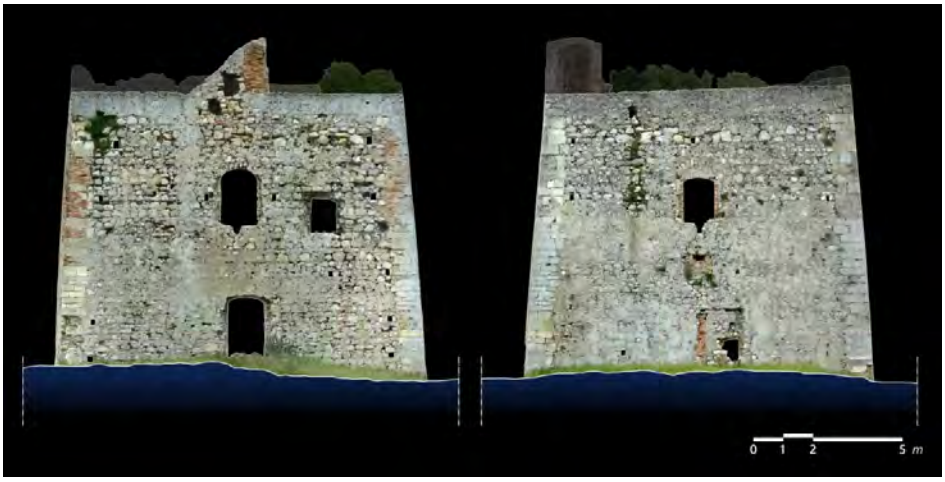

Fig. 4- East (on the left) and North (on the right) elevations.

The first floor was an accommodation with a fireplace and a small window facing the sea. It had a raised entrance, facing the hinterland, reachable through ladders. On the upper part there was a battlement and a protected walkway provided with machicolations [Mammarella 1993].

Fig. 5- Sections of the tower.

The number of machicolations per side conventionally defines two variations on the main type of tower: small towers with 3 machicolations and large towers with 5. The most common changes of later times are the additions of masonry stairs for the main access or in the thickness of the walls for the vertical connection [Ferrara, 2008]. In Capitanata the construction of about twenty towers between Termoli and Manfredonia occurred mainly in the period 1568-70 under the supervision of the architect Liberato Lucido [Starace, 2010]. Almost all of them are of the minor type, with 3 machicolations (9-14 m of side length) and only 3 towers of the major type with 5. Many of them have no battlement on the top (always documented by Gambacorta) which probably was never built to simplify the project and reduce costs. In some cases, (Monte Pucci) Gambacorta remarks that the machicolations system wasn't rebuilt after the collapse of the top [Marino, 1977]. Unlike the towers of Abruzzo where the use of brick prevails, in Capitanata limestone, available in the vicinity, was mainly used for masonry: stones and pebbles or regular large blocks from small extraction sites. The works were directed by an supervisor (often in two adjacent sites like Scampamorte - Mileto, Campomarino - Sinarca) or contracted to a ledger. Specifications of the government were aimed at ensure quality standards for building techniques and materials, providing penalties for negligent builders [Faglia, 1977]. However the frequent frauds (soil, sand, sea water, lots walls poorly executed) produced a poor build quality that accelerated the collapse of the structures and the degradation of materials.

4. The history of the tower

The coastal defense of the Lesina lagoon, before the Spanish intervention, was entrusted to the tower at the mouth of Fortore (15th century). [Troccoli, 1975] Torre Mileto was built at the opposite end, on the tip between the two lakes. Torre Scampamorte in the middle of a 25 km beach, provided an intermediate visual control between the first two. Its construction started in 1568, in the vicinity of S. Andrea canal, which at that time was the main mouth of the lake. The director of the site of both towers was Pietro Oger [Faglia, 1977]. Called *Torre di Lesina* in the list of 1569, it is described already accessible [Pasanisi, 1926]. In 1594 Gambacorta described it well done, attaching a drawing of a section and a view from the sea, as he did for the other towers [Marino, 1977]. It appears as *Torre della Foce di Lesena* in the list Mazzella 1601, as *Torre alla Foce di Lesena* in the Alemanno list of 1611 and as *Torre della Foce* in the famous map of Mario Cartaro made in 1613 [Faglia, 1977]. Its continuity of use is confirmed by the presence of guardians (torrieri) in 1573, 1577, 1583, 1610, 1616

[Cisternino, 1977]. The tower has suffered the effects of the great earthquake and the consequent tsunami of 1627 [Poardi, 1627], the most powerful ever recorded in this region, and in 1646 [Baratta, 1901]. The presence of a guardian in 1662 [Cisternino, 1977] would seem to document the use of the building a few decades later. However, according to the report of the 1685, torre Scampamorte was the only one on the north coast of Gargano to be rebuilt from the ground, twenty feet away from the canal (S. Andrea). The report recommends the same solution even for the tower on the Biferno river, now disappeared [Starace, 2010]. We are not able to state whether the irreversible damage was caused by the canal or by the earthquakes. At the moment the evidences seem to be not enough to determine whether the displacement of the tower has been put in place. In a 1777 manuscript it is described as a ruin but as seat of a keeper and in 1842 the tower is preserved for use by guards and telegraph [Faglia, 1977]. It is unclear whether this state is the result of repairing the damage of 1777 on the original building or on that already shifted after the damage of the 17th century. Its decline is associated with that of the canal S. Andrea, regularly used until 1882, then fallen into disuse up to silt up at the end of the century [Rosano, 1903]. The absence of vehicular roads in Bosco Isola has contributed to the abandonment of the canal and the tower in favor of the canals closer to the road system and towns. The IGM map of 1957 indicates the tower as an abandoned ruin, as it is today.

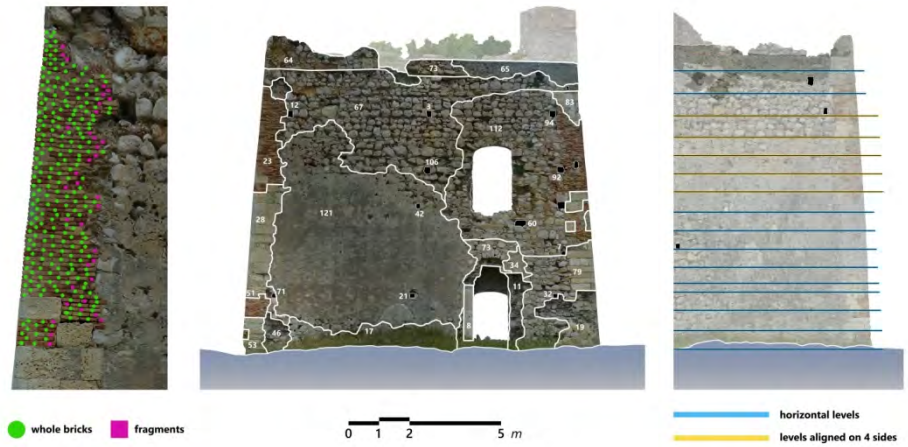

Fig. 6- Stratigraphic and typological analysis of the elevations.

5. The architectural investigation

The general survey of the tower is the basis to stratigraphic and typological analysis for the knowledge of its the constructive history. The study has focused on materials for a better understanding of each phase of the building and of the on-going degenerative phenomena. The tower is squat, with a height of about 9.50 m, smaller than the dimensions of the rectangular plan (11.80 x 12.50 m). It can be included in the minor viceroyal type provided with 3 machicolations per side, documented by Gambacorta [Starace, 2010], but no trace remains. No doubt the tower has undergone many renovations and repairs. It seems improbable the hypothesis of a simplification of the project under construction, because the elimination of the machicolations defense from towers on flat beach would have been risky. The comparison with towers where they are still on place can be helpful, such as Portonuovo, smaller but leaner. We could assume that the tower was higher, but the presence of machicolations even on squat towers like Sinarca or the near Torre Mileto,

suggests that the tower proportions have not changed over time. The rooms of both floors have an identical plan (560 x 600 cm) and are covered with barrel vaults orthogonal between them, which are parallel in Gambacorta's drawings. In the North wall thickness there's a compartment with a tank on the bottom, directly accessible from an opening at the first floor. The connection between the two floors is a passage in the South wall thickness, with no stairs (maybe provided of a wooden ladder). Two windows in the north and east walls at the first floor, seem embrasures enlarged. The west wall is occupied by a fireplace of 230 x 250 cm and 170 cm deep. The opening in the south wall was probably the main entrance, not in central location as many other towers.

A stone staircase, built into the East wall thickness goes to the terrace. The absence of machicolations on the top, the changes in the thickness walls, the opening of new windows, the likely rotation of the upper vault, can be considered as important transformations occurred in the upper part of the tower, maybe rebuilt after a collapse. The matter, however, has not an immediate solution since the lack of evident differences in the masonry fabric may contradict this hypothesis or suggest that transformations were more extensive. The ongoing investigations will help to establish a chronology of building actions such as the openings on the ground floor. The reading of the surface of the walls highlights a main homogeneous constructive action on which the subsequent additions overlay. The building technique is based on the placement of regular blocks at the corners, connected by rows of hewn blocks and pebbles on abundant mortar beds, with a large use of fragments. In this kind of masonry there are no bricks. Horizontal levels can be observed at regular intervals of about 60 cm, at the same height on the four sides of the tower, but almost perfectly aligned in the upper part. The position of putlog holes indicates that each level of scaffolding had always three supporting beams: two near the corners and one in the center. Scaffold beams were placed on these horizontal levels. Independent putlog holes, related to punctual interventions, are rare, but we have to remark that the original holes, look to have been used even for later additions. The barrel vaults are made of the same stone masonry, without bricks. A large collapse near the fireplace show that the filling of the vaults is an inconsistent material. The bricks, with slight fluctuations, constitute a fairly homogeneous group (195 x 115 x 45 mm). They have been used to integrate the lost blocks of the corners, in the jambs of openings, in the vaults and the door of the staircase on the top. The repair of the corners proceeded from the outer edge towards the inside border, along which we always find cut bricks. Brick fragments are incorporated into a plaster in some areas of the outer walls surface. Some pictures of the 70's, show some additions on the north corner of the top but today only their tracks remain on the roof decking [Faglia, 1977].

Fig. 7- Weathering of plaster.

6. Materials and decay phenomena

Since the isthmus is only composed of sand and silt, all building materials were sourced in the hinterland. Pebbles and rough-hewn blocks of limestone were collected from the surface or from near rocky outcrops. The large rectangular blocks are of hard limestone or more soft arenaceous or organogenic limestones, with fossils. They probably came from quarry sites on the reliefs behind the lake [Morsilli, 2011]. The most resistant elements keep traces of a toothed chisel (6 teeth). The bricks are compact and durable, with color variations (from deep red to leather, to yellow) due to the composition of the clay or to the

firing. Sand and brick fragments can be easily observed in section. Mortar and plaster are all based on carbonatic binder with aggregate of fine silica sand and fragments of carbonatic rocks. The presence of charcoal and ash in some plasters seems not casual, probably used to give the binder some slight hydraulic properties.

Fig. 8- Toothed chisel traces on stone blocks.

Fragments of pottery and brick in the conglomerate of the interior paving had the same function. The study of materials was carried out for samples. As possible we collected fallen fragments of unequivocal origin for analysis and characterization in laboratory. For the analysis we used optical microscopy on polished and thin sections, XRD, wet chemistry methods and SEM-EDS. The decay of materials is mostly erosion, more strong on mortars and soft limestone, caused by temperature changes, mechanical action of the wind, salt weathering of marine aerosols and washing away of the rains. In Mediterranean areas seasonal and diurnal variation of relative humidity create high frequencies of salt mobilization and crystallization cycles. Some laboratory tests have been addressed to identify penetration depth of NaCl [Doehne, 2002]. Crystals of salt have been detected only on the outer exposed surface of the bricks [Lubelli, 2004]. In the porous limestone the concentrations are greater. Sodium chloride is found up to 3 mm depth, often associated with the presence of calcium chloride. This explains the strong alveolization affecting the soft stone [Theoulakis, 1999]. A similar phenomenon is observed on mortars and plasters, especially outside. On two plaster samples coming from the outside and from the inside of the first floor, NaCl has been detected throughout the thickness (about 2 cm). The greater porosity may have favored the penetration but is not to exclude the possibility that sand or sea water have been used. It appears quite evident that the chemical attack of marine aerosol is diversified on materials and that its corrosive action on $CaCO_3$ is concentrated at the surface, while the material regresses inward.

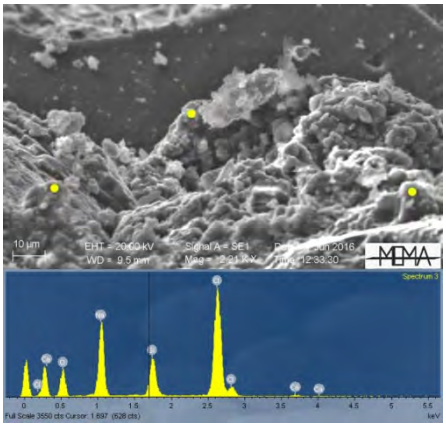

Fig. 9- Salt crystals found in a mortar sample.

7. Conclusions

The first results of this survey offer a complex picture about the building history of the tower and its transformations, but also about the events related to the defense of this part of the Italian coast in the modern age. The study of materials and weathering phenomena can be developed to define appropriate intervention methods. A depth knowledge can and should be support for action to safeguard this architecture of great documentary value. Moreover, its location in the heart of a unique environmental context of its kind and the proximity to the Lake Lesina Nature Reserve, can be a significant incentive to preserve and revitalize the tower, integrating its re-use with the naturalist tourism activities.

References

Poardi G. (1627). *Nuova relatione del grande e spaventoso terremoto successo nel Regno di Napoli, nella provincia di Puglia, in venerdì alli 30 di luglio 1627*. Ed. Grignani. Roma

Beltrano O. (1644). *Breve descrittione del Regno di Napoli. Diviso in dodeci provincie*. Napoli

Sarnelli P. (1680). *Cronologia de' vescovi et arcivescovi Sipontini*. Stampa Arcivescovale. Manfredonia, pp. 388-390

De Sariis A. (1794). *Codice delle leggi del Regno di Napoli. Libro II.* Ed. Orsini. Napoli, pp. 254-261

Fraccacreta M. (1834). *Teatro topografico, storico, poetico della Capitanata e degli altri luoghi più memorabili e limitrofi della Pugl*ia*. T. IV.* Ed. Coda. Napoli, pp. 47, 76

Rosano P., Zaccagnino D., Majolo D. (1903). *La laguna di Lesina e le sue quistioni. Volume I, parte speciale*. Ed. Giannini. Napoli

Baratta M. (1901). *I terremoti d'Italia.* Ed. Bocca. Torino

Pasanisi O. (1926). *La costruzione generale delle torri marittime ordinata dalla Regia Corte di Napoli nel XVI secolo. Studi di Storia Napoletana in onore di Michelangelo Schipa.* Ed. ITEA. Napoli

Cisternino R. (1977). *Torri costiere e torrieri del Regno di Napoli (1521-1806). Castella 15.* Istituto Italiano dei Castelli. Roma

Faglia V. (1977). *Visita alle torri costiere di Capitanata (1594-1976)*. Istituto Italiano dei Castelli. Roma

Troccoli M. L. (1975). *"Le torri di Puglia – Le torri costiere" in De Vita, R. (ed.). Castelli, torri ed opere fortificate di Puglia.* Ed. Adda. Bari

Marino L. (1977). *La difesa costiera contro i Saraceni e la visita del marchese di Celenza alle torri di Capitanata*. Ed. Enne. Campobasso

Mammarella L. (1993). *Piazzeforti e torri costiere d'Abruzzo, Molise e Capitanata.* Borgia Ed. Roma

Theoulakis P., Moropoulou A. (1999). *Salt crystal growth as weather mechanism of porous stone on historic masonry in 'Journal of Porous Materials', vol. 6.* Springer Publishing .NY, pp. 345-358

Doehne E. (2002). *Salt weathering. A selecting review* in Siegesmund *S., Weiss T., Vollbrecht A. (ed.) Natural Stone, Weathering Phenomena, Conservation Strategies and Case Studies*. Geological Society. London, pp. 51-64

Lubelli B., Van Hees R. P. J., Groot C. J. W. P. (2004). *The role of sea salts in the occurrence of different damage mechanisms and decay patterns on brick Masonry in 'Construction and Building Materials', vol. 18*. pp. 119-124

Russo F. (2009). *Le torri costiere del Regno di Napoli: la frontiera marittima e le incursioni corsare tra 16° ed il 19° secolo.* Ed. ESA. Napoli

Starace R. (2010). *Torri costiere della Capitanata. L'ispezione del Marchese di Celenza*. Ed. Sudest. Manfredonia

Morsilli M. (2011). *"Introduzione alla geologia del Gargano" in Tarantini M., Galiberti A. (ed.). Le miniere di selce del Gargano, VI-III millennio a.C.* All'Insegna del Giglio. Firenze, pp.15-25

Defensive Architecture of the Mediterranean XV to XVIII Centuries / Vol. III Giorgio Verdiani (Ed.)
FORTMED 2016 10th-12th November – www.fortmed.eu


FLORENTINA STUDIORUM UNIVERSITAS
UNIVERSITÀ
DEGLI STUDI
FIRENZE
DIDA
DIPARTIMENTO
DI ARCHITETTURA

DIDAPRESS