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Between Cape S. Alessio and Cape Scaletta: Urban Surveys

Fra Capo S. Alessio e Capo Scaletta: rilievi urbani

This study started in 2012 with the relief of the village of Mandanici located on the Straits of Messina, on the slopes of the eastern Peloritani, now includes the reliefs of: Forza D’Agrò 2013; Ali 2014; Fiumedinisi 2015 and Itala 2017. The villages were analysed in their entirety by evaluating the correlations between architecture, urban space and landscape. The research goals are many. The first is to test a survey protocol for a whole urban centre and provide complete documentation. The second concerns the analysis of these centres from a typological, formal, decorative and structural point of view. The third point is the definition of micro urban areas with specific risk factors related to soil morphology, abandonment of buildings, dimensional and structural typology of individual buildings.

In the end, the goal is to transcend all research, to increase the awareness of the architectural and landscape value of these places in the inhabitants, first custodians and keepers of these places, and in occasional users.

Questo studio iniziato nel 2012 con il rilievo del borgo di Mandanici collocato sullo Stretto di Messina, alle pendici dei Peloritani orientali, comprende adesso i rilievi di: Forza D’Agrò 2013; Ali 2014; Fiumedinisi 2015 e Itala 2017. I borghi sono stati rilevati nella loro interezza valutando le correlazioni fra l’architettura, lo spazio urbano e il paesaggio. Gli obiettivi della ricerca sono molteplici. Il primo è quello testare un protocollo di rilievo per un intero centro urbano e fornire una documentazione completa. Il secondo riguarda l’analisi di questi centri da un punto di vista tipologico, formale, decorativo e strutturale. Il terzo punta alla definizione di micro aree urbane, con specifici fattori di rischio legati alla morfologia del suolo, allo stato di abbandono dei fabbricati, alla tipologia dimensionale e strutturale dei singoli edifici. In fine l’obiettivo, trasversale a tutta la ricerca, l’incremento della consapevolezza del valore architettonico e paesaggistico di questi luoghi negli abitanti, primi custodi e manutentori di questi luoghi, e nei fruitori occasionali.

Keywords: survey protocol, villages, risk factors

Parole chiave: protocollo di rilievo, borghi, fattori di rischio

1. INTRODUCTION

Sicily, according to Guidoni, represents the most interesting and relevant region regarding the many topics of urban studies such as: "Islamic urban planning, civil military planning between the 16th and 18th centuries and the relationship between settlements and ca-

tastrophic earthquakes" [1]. The urban settlements in the region between Capo S. Alessio and Capo Scaletta have a Hellenistic origin but their full development is to be located in the complex historical period, between the IX and XII century, which sees in these territories the Byzantine, Arabic and Norman domains.

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Fig.1. The Sicilian Ionic coast. Localization of analysed centres.
Fig.2. Fiumedinisi, urban detail.

The region, therefore, is rich in history and architectural and urban testimonies. There are numerous Byzantine monasteries [2], Arab-Norman architecture [3] and fortifications belonging to the Spanish domination [4].

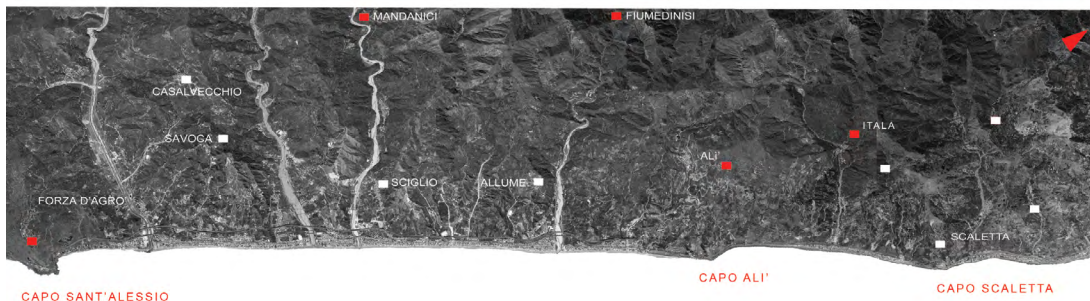
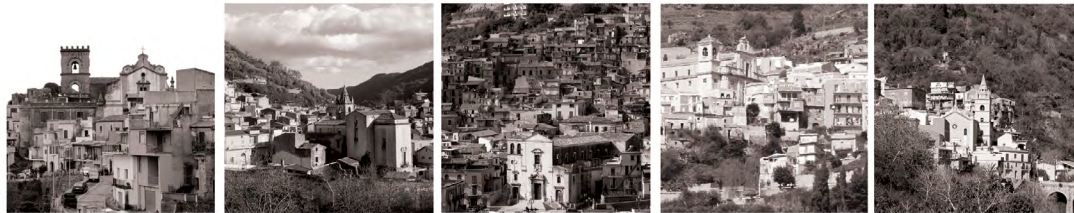
All the hill centres between Capo S. Alessio and Capo Scaletta have undergone a sharp demographic downturn in the last hundred years, fuelled by the lack of political strategies aimed at enhancing and safeguarding urban structures.

The region is a small portion of the territory of Messina and is not seen to be important due to the presence in the South of a well-known tourist destination, Taormina, and in the North, of the attraction and fame of the Aeolian Islands.

The geographic location and the modest size have made the small cities of the Ionian coast virtually invisible within the new media.

The region was also affected by two disastrous earthquakes: that of the Val di Noto in 1693, which also destroyed Messina; and the 1908 earthquake that shattered Messina.

The seismic risk in this region is therefore very high and is increased by the widespread phenomenon of abandonment. The dense, compact urban fabric is dotted with areas where lack of maintenance generates the collapse or water infiltrations.



2. GEOGRAPHICAL FIELD

This study, started in 2012, deals with the small urban realities that dot the oriental slopes of the Peloritani between Messina and Taormina. The region has a strong geographic and landscape identity, in fact, it is characterized by a strong inclination of the ground towards the sea and by the rivers that, after a short tortuous stretch, pour into the coast loaded with debris. The slopes of the Peloritani draw true landscape chambers that define the space and overlook the Straits of Messina.

The geographic area is subject to seismic risk, and it was inserted into Seismic Zone 1 following the earthquake of 1908. Indeed, between Capo S. Alessio and Capo Scaletta, the earthquake of last century did not have the same effects as those recorded in Messina and Reggio.

The damage was limited and the small centres that dotted this area have preserved their architectural heritage intact [5]. The region has recently been affected by floods linked to hydrogeological problems due largely to the abandonment of the countryside [6].

At this historic moment the villages have to deal with the profound economic crisis of the region and the progressive and inexorable depopulation.

The small centres that have formed in this area are located at an altitude between 200 and 400 metres above sea level, and have a common Hellenic matrix. The modest dimensions and layout of the architecture make them real urban organisms: complex, compact, and in some aspects crystallized in the fruition and organization of architecture and territory.

Fig.3. Fiumedinisi. Panoramic picture.

Fig.4. Fiumedinisi, localization of scanner laser scans



3. STATE OF THE ART

The structure of the smaller centres and their importance in the Italian architectural and cultural landscape have led to the definition of Italy as a true “urban system”. Studies on the minor centres of the South of Italy are innumerable: from Manieri Elia to Guidoni [7], from Sanfilippo [8] to De Carlo [9].

The Sicilian settlement system is strongly linked to the local land structure [10]. Indeed in Sicily the interdependence between city and country has created a pattern called “urban polycentricism” [11], formed by a network of cities which are closer where the subdivision of the land is more dense.

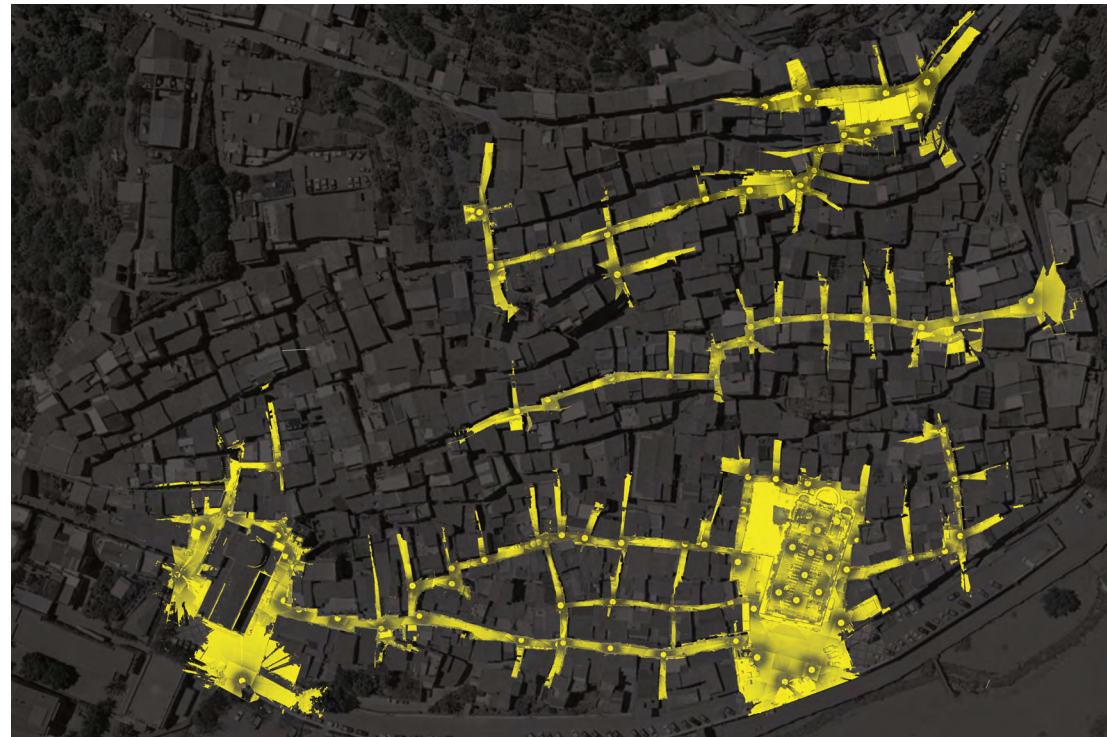
Thus, in the hinterland, where the latifundium and grain cultivation prevail, we find large urban agglomerations; while on the coast, especially the Ionian,

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where vines, olive trees, fruit trees and mulberry trees are grown, there is a dense network of small centres closely connected with landscape, territory and coast.

Most of the studies carried out on this subject are, however, of historical or urban character and specific surveys are followed seldom. In some cases, the centres have undergone a mapping but few have been analysed with a global approach [12], achieving overall surveys of the town centre, or analysis and documentation aimed at the prevention or reduction of seismic risk.

This research, on the other hand, focuses on the direct and instrumental approach of urban centres aimed at documenting the widespread quality of urban fabric and the analysis of the morphological aspects that characterize them.

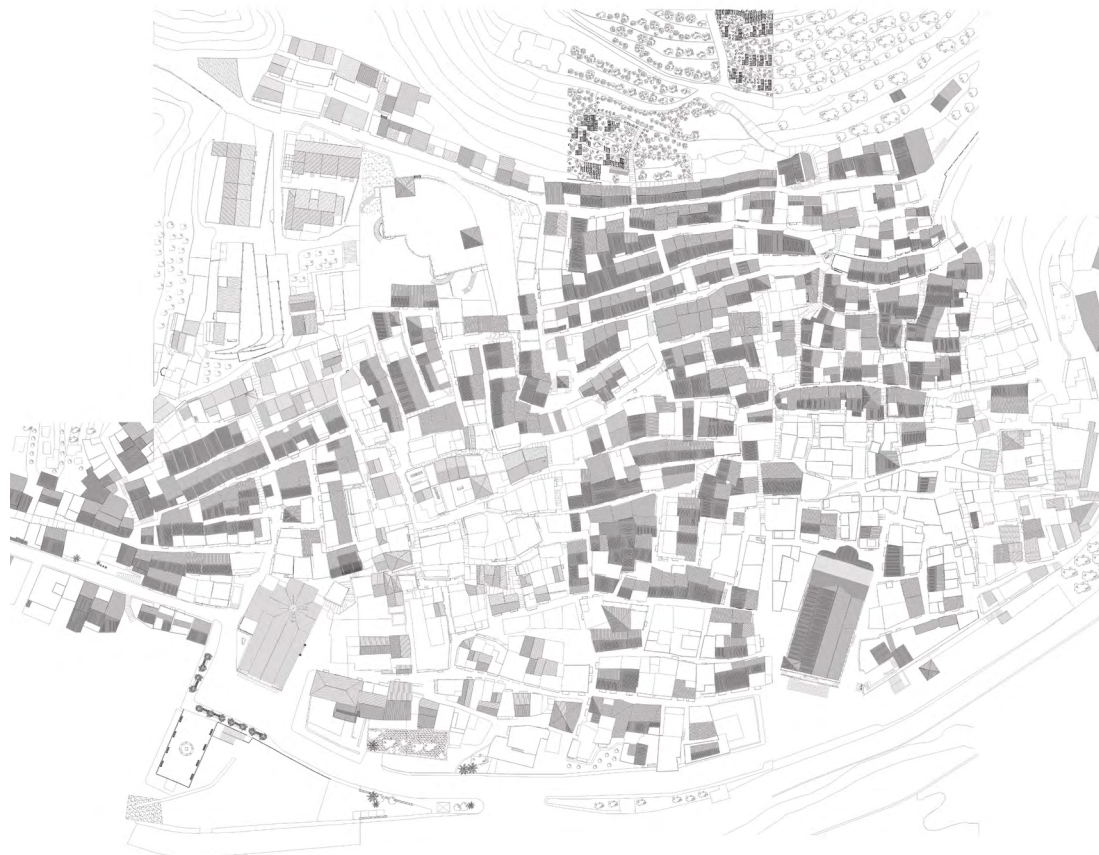


4. METHODOLOGY

This study, started in 2012 with the Mandanici survey and continued with Forza D'Agrò 2013, Ali 2014, Fiumedinisi 2015 and, finally, Itala 2017. The villages were taken in their entirety by evaluating the correlations between architecture, urban space and the landscape (Fig. 1).

The approach to the survey has three phases. The first one provides documentary knowledge of the centre

through aero photogrammetry, cadastral map and orthophoto. The intersection of the data thus obtained constitutes the first survey basis. The second phase concerns the subdivision of the centre into lots, 60/80 metres in length, oriented according to the main axis of the centre. The workgroups make a the direct survey of the land compartments and the elaboration of the data. For each building, a synthetic data sheet was developed for the identification of the shape of the roofs and for the survey of the outer facades. In Fiu-



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medinisi and Itala, with hundreds of scans carried out with the Faro Focus 3D Cam laser scanner, the main urban routes were detected. In addition, for each centre, laser scans have been made on the architectural highlights: the main church and the immediate adjacent areas. The third phase concerns the project of graphic communication of the acquired data. The discretization of the data obtained in order to optimize the comparability of the drawings was central at this stage. In addition, given the simplicity of architectural artefacts, it was considered that it was essential to pay particular attention to the reproduction of proportional relations between the parties; and to the identification of the characters of these vernacular architectures. For each surveyed centre, roof plans, three-dimensional navigable models, and section-elevations inside the urban itineraries, were made. The latter are real "architectural walks" able to tell the quality of the architecture of these sites and the relationships with the place.

5. AIMS

The research goals are many. The first is to hypothesize, and then to test directly, a protocol for a whole urban centre. The second is to provide comprehensive, and extensive, documentation on centres that are subject to different types of risk, the natural one: earthquakes; the anthropic one: hydrogeological factors and abandonment. The third concerns the analysis of these centres and their vernacular architectures, which allow the analysis of a large amount of data, that can provide precise and objective indications on the morphology of local architecture, from a typological point of view, formal, decorative and structural.

The analysis phase has been started for some of these centres and a future study hypothesis involves analysing the data obtained comparing the results of all five studied centres.

The ultimate goal, transversal to any research, is to increase the awareness of the architectural and landscape value of these places in the inhabitants, first custodians and keepers of these places, and in occasional users.

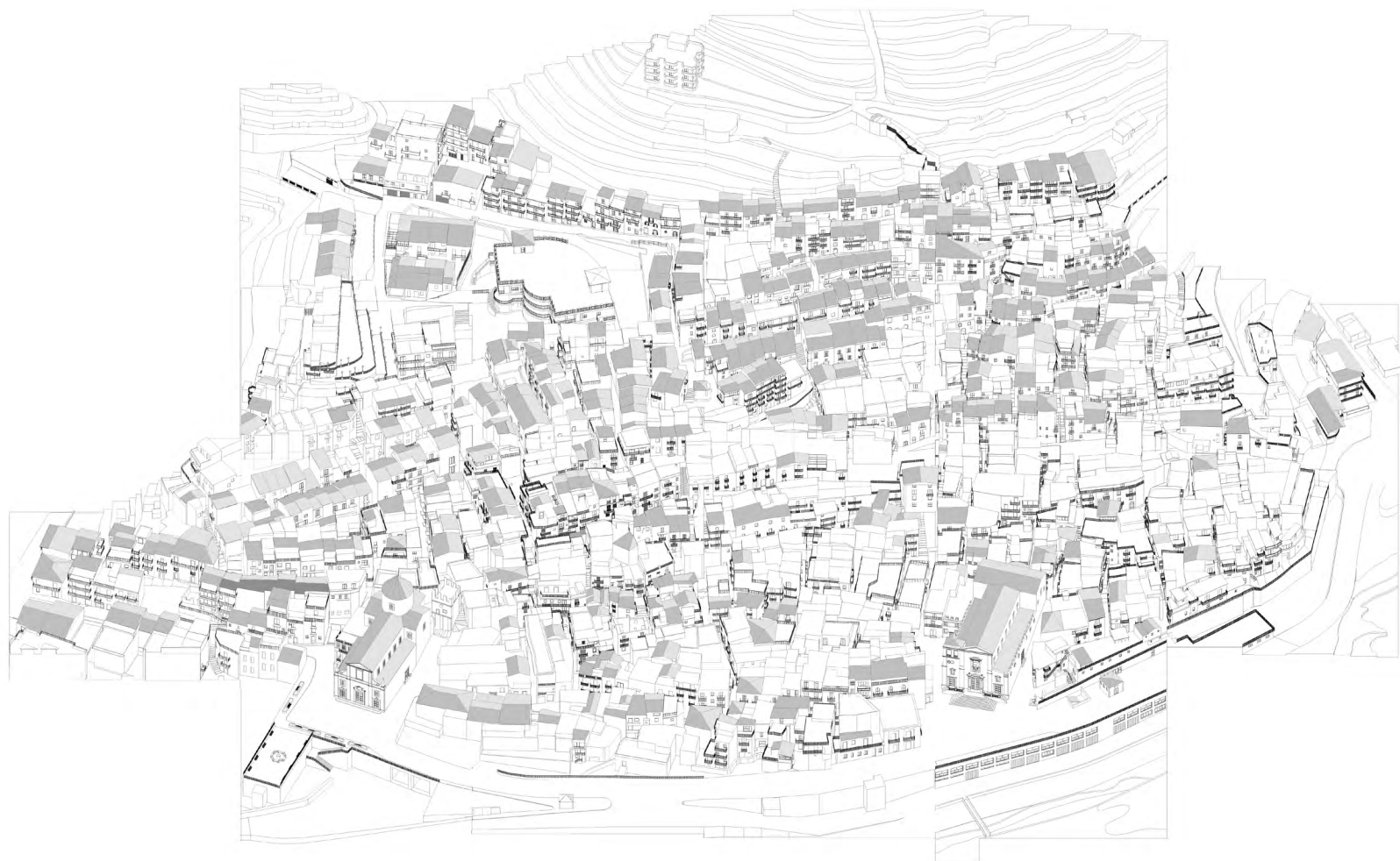
Fig.5. Fiumedinisi, roof plan

6. A CASE STUDY: FIUMEDINISI

Fiumedinisi, the ancient Nisa, founded in the 7th century BC, rises on the banks of the Nisi stream, during the Norman period it is named Flumen Dionisi. The centre rises on the slopes of Monte Belvedere and develops at an altitude of between 190 metres and 300

metres s.l.m. The present morphology dates back to the 16th century. The Cathedral, Maria SS. Annunziata founded in 1308, was expanded in the first half of the fifteenth century.

Fig.6. Fiumedinisi, axonometric view



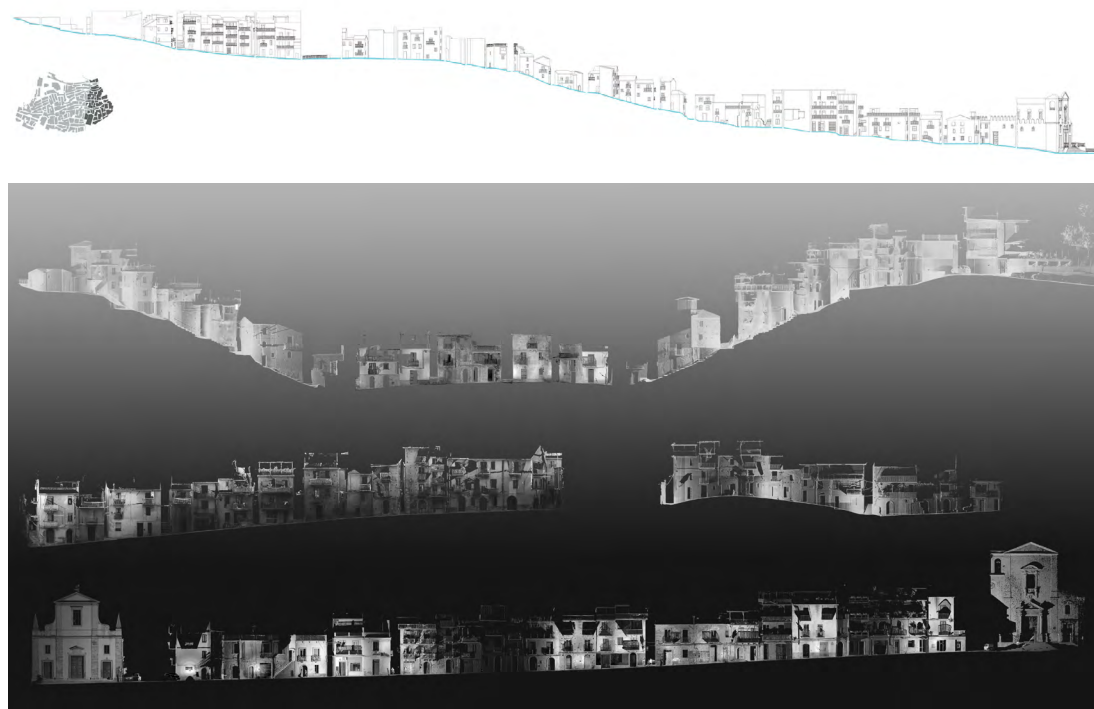
7. MORPHOLOGY

The net that define the structure of Fiumedinisi (Fig.2) adhere to the soil's morphology and draw a pattern of streets parallel to the level curves and to the course of the river. The transverse paths are so steep and narrow that is impossible to overlook the watercourse. In fact the streets are often interrupted or covered by underpasses. These transverse paths often have steep flights of steps to allow a pedestrian passage. Maybe some of the transverse paths have been left open to allow the flow of rainwater, while others paths have been embedded in the building fabric. Buildings constructed in the last thirty years, thanks to centre's morphology, have not changed the overall layout. The interior lots, in fact, are useless for building replacements due to the extension of the land parcels and the very narrow roads.

So the most intensive interventions are concentrated along the boundaries. The east boundary, close to the stream, allowed the expansion of the Cathedral in the first half of the 15th century, enlarging the site of the church with an artificial terrace. An extension of the latter, built in the 1980s, houses the municipal headquarters. The lower edge of the centre, formerly characterized by gardens and homes descending toward the bed of the creek, is now clearly marked by a flyover street. In the upper part of the centre, a big building dedicated to local handicrafts has been constructed in the south east. The north edge is defined by a carriageable road that connects the lower part of the centre with the upper part, while the south side is connected to the access street and has several new constructions. The Cathedral of Mary SS. Annunziata and the Church of San Pietro, rise with the same orientation, having a

mass comparable by size and material, and characterize strongly the urban front. The smaller building fabric is arranged according to the level curves and determines the trend of the streets, the main street Umberto I, connects the square of the Matrix with the side of the church of St. Peter. At the upper boundary the church of S. Maria del Carmine, built during the 18th century can be found. Inside the centre there are many underpasses created by the spontaneous expansion of buildings, by the reduced road dimension and by the specific social structure of the site.

Fig.7. Fiumedinisi, prospective views
Fig.8. Fiumedinisi, urban sections
Fig.9. Fiumedinisi, urban sections made by Laser Scanner Faro Focus 3D
Fig.10. Fiumedinisi, architectural detail



The squares, little empty urban spaces, are directly connected with religious buildings. The square in front of the church of S. Nicola of Bari and that of the church, now demolished, of SS. Salvatore, measure 6/8 metres.

8. THE SURVEY OF URBAN SPACE

The survey, in this research, invests urban space in its entirety. The urban vacuum is a fracture-free continuum. It starts from the monumental dimension of a large sunny square, overlooking the Peloritani mountains, and goes inside the funnel of a flight of steps, covered with moss, that does not allow the point of arrival to

be seen (Fig. 3). The survey allows the discovery of the flow of the roofs that descend hiding, but actually revealing, the soil morphology.

De Carlo argues, during an interview, that the development of historic centres in Sicily appears as a natural process where, between one architectural emergency and on other, the slow adjustments allow a continuity useful for the birth of new emergencies. It could be added that urban fabric is the right backdrop to architectural emergencies and drive them to finding the right location as an iconic measure of the anthropic landscape.

Fiumedinisi is a city made up of seven hundred small

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constructions. Each particle is a house, a story, a roof, a diaphragm between private and public life. Its centre has been captured in its entirety, marking a net boundary between the historic nucleus and the new, modest, urban sprawl. The survey was conducted for a large part through direct detection. All the city's fronts, common areas and the overall morphology of each building within the perimeter were found. In addition, about one hundred scans (Fig.4) were made along the main streets of the centre and inside the Mother Church of the SS. Maria Annunziata.

Fig.11. Fiumedinisi, Chiesa Madre SS. Maria Annunziata



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The definition of a privileged axis for the representation, able to emphasize the orographic morphology of the centre, was one of the preliminary operations of the survey, along with the usual collection of cartographies and cadastral data.

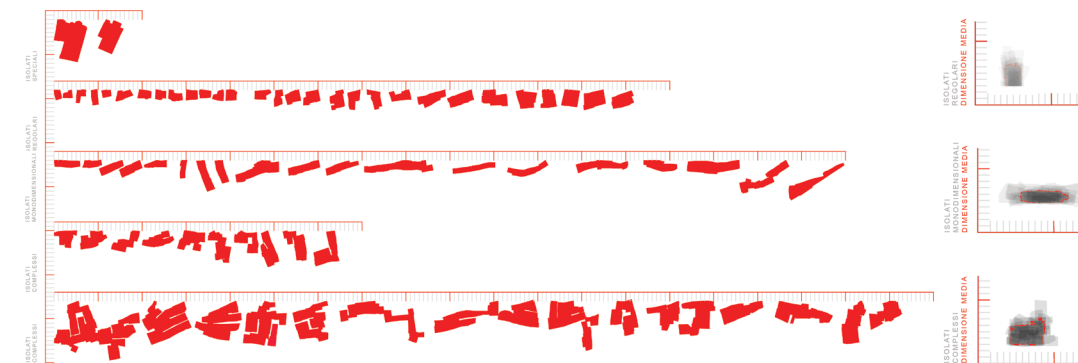
The centre, with a surface area of 60,000 square metres, has a shape similar to a fan that, from 247 metres ASL, near the Carmine church, descends to the bed of the Nisi stream at 187 metres ASL. The largest side is 300 metres (parallel to the level curves) and the minor one is 194 metres.

The drawings of the survey take shape in the roof plan (Fig.5) and in the axonometric view of the centre (Fig.6). Information obtained with direct survey and scans were the basis of a three-dimensional model of the entire centre designed for optimal performance at a 1: 200 scale. To simplify the overall model and to make it more homogeneous and readable several discretization operations were made (Fig.7).

The centre has been investigated in its overall morphology with a series of transverse and longitudinal sections that represent true “architectural walks”.



Fig.12. Fiumedinisi, terrace houses
Fig.13. Fiumedinisi, pitched roof
Fig.14. Fiumedinisi, gradient slope
Fig.15. Fiumedinisi, levels
Fig.16. Fiumedinisi, partially or totally abandoned buildings
Fig.17. Fiumedinisi, urban blocks and average shape.



Indeed, since the objective of the survey was the urban void, the sections follow the paths, without cutting the architectures to reveal the reciprocal relationships, the morphology of the fronts, and the relationship between architecture and site (Fig. 8, Fig. 9).

In each lot, particular attention has been paid to one or more buildings by providing detailed drawings of the fronts and reconstructions of decorative styles.

The cathedral, in the centres of the Ionian coast, is often the only true architectural emergency. Fiumedinisi has two great churches, St. Peter and SS. Maria Annunziata (Fig.10), placed on the lower edge of the village; Their mole is a real off-scale to the urban fabric as demonstrated by the section obtained through laser scans (Fig. 11).

The surveys and the drawing of the centre have a dual purpose. On the one hand they show the urban structure as a whole, illustrate the morphology, the emergencies and the comparison between the elements; on the other hand, they are a mighty tank, for analysis and different considerations.

9. ANALYSIS AND INFOGRAPHIC DOCUMENTATION

The analyses in this article are just some of the ones that have been carried out and could still be carried out on the basis of the done surveys.

In fact, the first strategy for the processing of acquired data aims at synthetically defining the morphology of the centre, by graphical exemplifications, underlining the typology of the houses or the system of roof co-

verings. Other analyses are important for assessing factors that can increase seismic damage: clinometry, height of buildings or the abandonment. In the end some analyses on the average size of the blocks and on the censorship subdivision linked to the structures of the facades have been carried out.

From field surveys we can say that more than 80% of Fiumedinisi's homes are terraced (Fig.12), this often involves a marked depth of the building and the absence of a window on the side facades. The terraced houses are widespread and, at the lower part of the centre, where the streets are wider and flat, there are other types of houses. The houses with a gabled roof, made of Sicilian tiles or other materials (Fig. 13), are 50% of the buildings. It should be emphasized that many of the modifications or alterations, to the actual state, are related to the morphology of the roofs. In large part, there are overhangs, precarious withdrawn roofs.

The centre of Fiumedinisi, as mentioned above, has an altitude difference of 60 m between the downstream and the upstream. Integrating the aerophotogrammetry data with those obtained from the scans, six slope classes represented by as many grey tones have been identified. The classes range from the one with a slope greater than 50%, the darker grey; to a slope less than 10%, the lighter grey; intermediate classes represent 10% shots (Fig. 14). The buildings that make up Fiumedinisi's urban fabric are on average quite high, 3-4 floors. The height of the buildings, added to the awareness that most of these have been raised and overlook on narrow roads, is considered to be one of the major risk

factors for an earthquake (Fig. 15). The tallest buildings, located in areas with a strong slope, are concentrated in the neighbourhood of the SS. Salvatore Church. Buildings completely abandoned or uninhabited are scattered throughout the territory of Fiumedinisi; the largest percentage are found in the high quarters, between the church of San Nicola that of Carmine and the site of the church of SS. Salvatore (Fig. 16).

9. MORPHOLOGICAL ANALYSIS

The analysis of the centre of Fiumedinisi continues with the morphological evaluation of its components: the structure of the blocks. Fiumedinisi has only 76 blocks; excluding special ones which are churches, 29 have a regular morphology, 19 are rectangular, with one side predominant on the other, and 26 have a complex morphology. The latter are generated by the urban saturation phenomenon; the closure of some street and the presence of numerous "cul de sac". The blocks with complex morphology are very large: some measure up to 100 metre and, in my opinion, they are the most characteristic element of this centre. To see what is the shape and size of regular blocks many elaborations were made. The regular blocks oscillate between 14 metres in front and 17 in depth, the single-dimensional blocks have an average width of 35 by 8 metres (Fig. 17).

Fig. 18. Fiumedinisi, houses, pitched roof and flat roof; single, double and multiple openings (overlooks)



The individual housing units, identified with the plot of cadastral particles, are 500. The particles have been catalogued, by first, distinguishing between gabled roofs and flat roofs. Later they were put in order according to the openings: single, double or multiple. This last category actually refers to particles that have windows on adjacent sides (Fig. 18).

Particles with gabled roofs have been listed according to the morphology: square or rectangular; and depth: less than 5 metres, between 5 metres and 7 metres, between 7 and 11 metres. The average size found in the respective categories is: 5 by 5 metres; 5 by 7 metres, and 5 by 9 metres. The prevailing average surface area of real estate units oscillates between 25 square metres (of the smallest particles) to 35 square metres (Fig. 19).

Particle with gabled roofs and double street facing facade have been listed with the same criteria as the first in three categories: depths less than 7 metres, between 7 and 10 metres, more than 10 metres. Those with square morphology in two categories: less than 7 metres and between 7 and 10 metres.

The average measurements obtained for rectangular morphology particles are: 4.8 by 7 metres; 4.5 by 8 metres.

While the average size for square morphology is: 6 by 6 metres; 7 by 8 metres. Again in this case the average surface of each real estate unit is 35 square metres (Fig. 20).

Other analyses are related to the facade morphology. For example, for assessing seismic risk, it may be useful to know the ratio between the wall and the windows in the facade. Fiumedinisi, as we have said repeatedly, rises along the valley of the Nisi torrent, the orographic shape of the soil and the morphology of the centre, with narrow and deep streets, make the homes dimly lit. Many buildings have altered facades, overhangs or substantial modifications and, over the time, have expanded the glass surfaces.

Analysing the full/empty ratio of the facades, we can notice that in the older buildings, perfectly preserved, the percentage of windows is between 11% and 18% of the facade surface, such as in the Zecca Palace. The reworked buildings have a full/empty ratio of 27%, excluding the elements on the last level (Fig. 21).

The composition of the façades in addition to the wall structure [13], which is not always in a good state of

conservation and poorly connected with the transverse walls, is one of the principal risk factors.

The synthesis of all data can lead to the elaboration, for each micro-urban area, of a specific risk factor that takes into account the morphology of the soil, the state of abandonment of the buildings, the dimensional and structural typology of the buildings.

10. CONCLUSIONS

On a very small centre like Fiumedinisi you could still do many others reflections, investigating the morphology of the decorative apparatus [14], the building typology and constructive techniques.

Small centres, as well as cities, are made up of multiple aspects that often render them difficult to show in their entirety and complexity. The techniques and strategies for the survey and representation of the architectural good are constantly evolving and often the multiplication of the data is not aimed at the understanding and synthetic communication of the structural and peculiar aspects of a site.

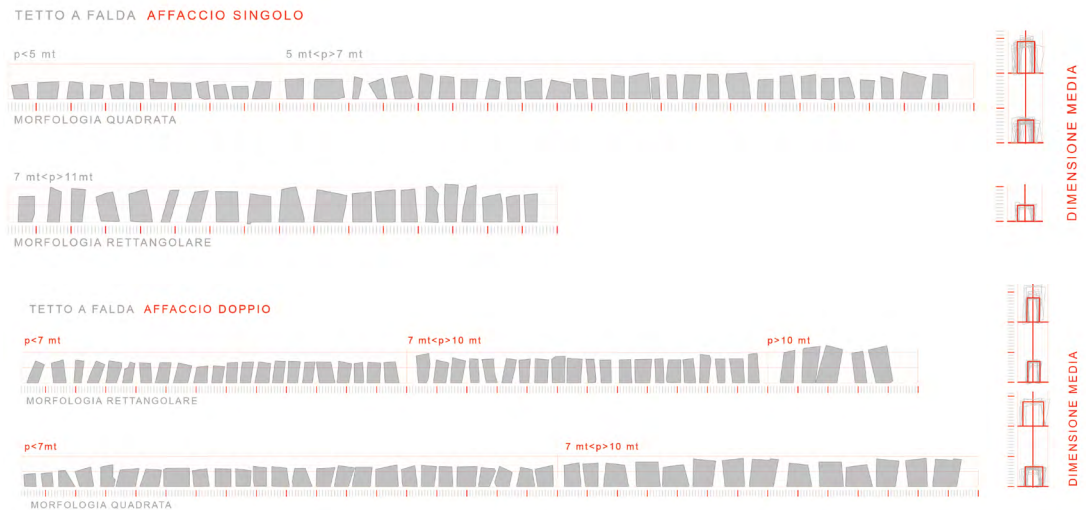
The research tries to identify some objective data that, in a synthetic way, allow us to synthesize the quality,

form and nature of these sites to support it.

In the long run, it is planned to analyse transversally all detected centres of the Ionian coast to develop a common intervention strategy and to build a comprehensive data base.

The goal is to get a complete image of these places. An image made of mimetic and abstract representations, extensive data and synoptic exemplifications. An image that is, at the same time, the cultural structure of memory, the palimpsest of the history, and an antidote against any threatening events.

Fig. 19. Fiumedinisi, houses, pitched roof; single openings; average dimension
Fig. 20. Fiumedinisi, houses, pitched roof; double openings; average dimension



NOTES

[1] In Aricò N. (a cura di) (2000). *Sicilia. Centri storici minori o piccole città. N.3.* Messina, IT: Sicania.

[2] Monastery SS. Maria Annunziata in Mandanici

[3] Churches of SS Pietro and Paolo in Casalvecchio and Itala, Church of S. Maria in Mili, and others exempla.

[4] There are remains of Spanish fortification in Sant'Alessio, Forza D'Agro, Savoca, Roccalumera, Fiumedinisi and Ali.

[5] At Forza D'Agro, the bell tower of the church of Santissima Annunziata (restored in 1920 was heavily damaged and a wing of the cloister of the Augustinian monastery was damaged.) In the other neighbouring countries only the cornices and parapets fell. Officially, however, there were not victims due to the earthquake.

[6] Risk planning, first of all hydrogeological and seismic, "has an impact on many features of the anthropogenic environment, creating a sort of substrate." In Imbesi, prefazione a Fabietti W. (1993). *Progetti mirati e pia-*

nificazione strategica. ... Il recupero dei centri storici di Rosarno e Melicucco. Roma, IT: Edizioni INU.

[7] Guidoni E. (1980). *Introduzione al volume, Inchiesta sui centri minori, Storia dell'arte italiana, Inchiesta sui centri minori.* Torino, IT: Einaudi Editore

[8] Sanfilippo E. D. (1983). *Le ragioni del recupero dei centri minori meridionali.* Roma, IT: Officina.

[9] De Carlo G. (2008). *Questioni di architettura e urbanistica.* Milano, IT: Maggioli.

[10] The Sicilian land structure and land-use systems, the so-called agricultural patters, have developed a settlement system that tends to thicken the peasant population within urban settlements. The classic division of Sicilian territory into two major areas: the Sicily of the tree, in contrast to that of the grain, is at the origin of the different structure of the urban network. "Species in the Messina, the women of the Sicily of the tree often went to work in the countryside. (...) the rural population tended to distribute more extensively in the territory by populating the countryside or focusing on small cities and villages. The distance

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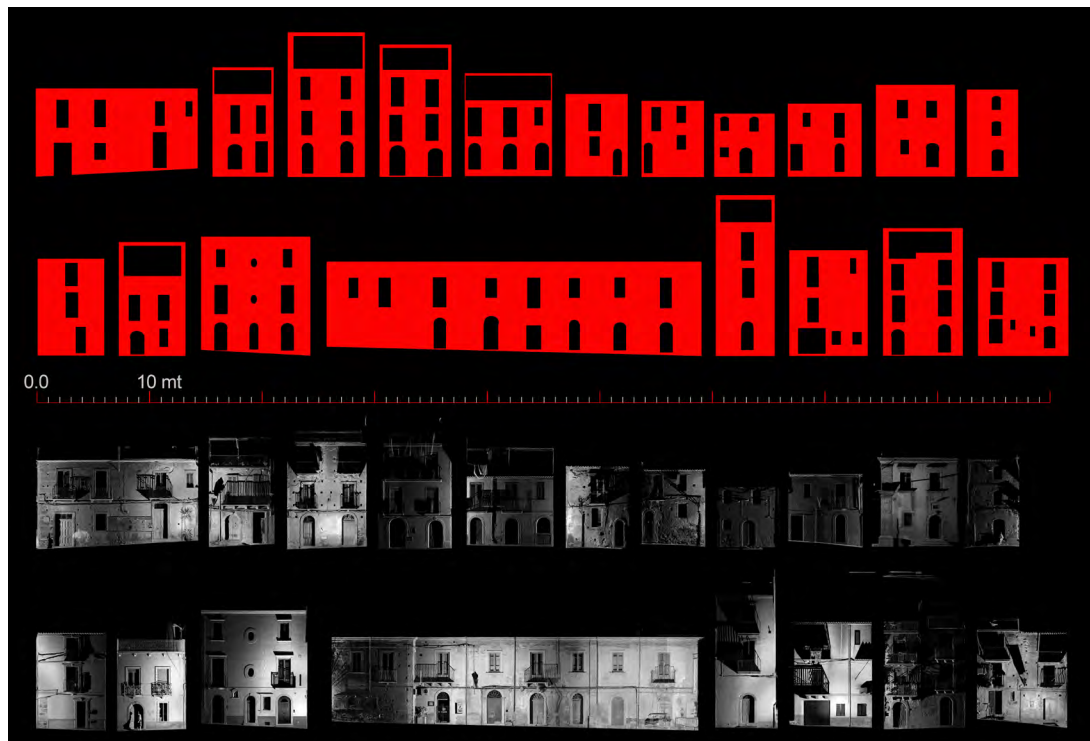
between cities and countryside was therefore less pronounced and the relationship between smaller towns and rural centres reduced." S. Laudani, Agricoltura e commercio fra sette e ottocento. In Aricò N. (a cura di) (2000). *Sicilia. Centri storici minori o piccole città. N.3.* Messina, IT: Sicania.

[11] cfr. Di Gregorio P. *I municipi*, in Benigno F. Gianrizzo G. (a cura di) (2003). *Storia della Sicilia 2.* Roma, IT: Editori Laterza.

[12] See Aricò N. (a cura di) (2000). *Sicilia. Centri storici minori o piccole città. N.3.* Messina, IT: Sicania.

[13] The wall structure which is mostly made of limestone, with variable in size, is often integrated with brick fragments. .

[14] Fiandaca O. *In che senso il contesto è esposto al tempo. Cronaca di un viaggio nei risvolti materici di una Piccola-Grande Sicilia*, in Aricò N. (a cura di). (2000). *Sicilia. Centri storici minori o piccole città. N.3.* Messina, IT: Sicania.



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Fig. 21. Fiumedinisi, full / empty ratio on some facades