History Thesis

Mapping urban diversity: vernacular, modernist and contemporary Matera

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Abstract

This thesis takes the Southern Italian city of Matera as a case study to analyse the role urban diversity plays in the growth of cities. The analysis focuses on tracking changes in intensity and distribution of urban diversity in representative moments of Matera's development, from the expansion of the vernacular neighbourhood of the *Sassi* with the 1950s introduction of modernist architecture, through the present-day. Whilst the historic center of the city, dating back to the Neolithic, has experienced remarkable economic growth and continues to thrive under the impulse of international recognition, the more peripheral modernist neighbourhoods are in decline, despite their widely acknowledged architectural and cultural value. Provided as a political answer to the lack of suitable and affordable housing after World War II, these often forgotten neighbourhoods are representative of the Italian re-construction efforts, guided by Adriano Olivetti's Community Movement and designed by a team of architects, lead by Ludovico Quaroni and Luigi Piccinato, under the theoretical framework of Friedrich G. Friedmann. Initially intended to recreate the forms of aggregations and social ties of the Sassi in modern forms of living, neighbourhoods such as La Martella, Borgo Venusio and Spine Bianche have experienced progressive decline, whilst the historic center of Matera has been object of public investment and continues to be a sought destination. This research will enquire the role urban diversity has played in this discrepancy in order to derive conclusions that might inform present and future urban planning policies. The Diversity Index Method developed by Dan C. Baciu and Callum Birchall (Baciu, Birchall, 2021) applied to primary historic records will be used alongside secondary literature to analyse the different urban configurations to find patterns that lead to urban density or isolation.

The preliminary argument is that diversity of both building uses and outdoor public infrastructure leads to growth and urban vitality, whereas mono-functional developments lead to isolation and decline.

Keywords

Matera, Urban diversity, city growth, urban development, vicinato, vernacular architecture, method, neighbourhood

Introduction

The notion that diversity in the built environment, defined with Jane Jacobs as a 'combination or mixture of uses' (Jacobs, 1961, p. 144), is a fundamental component of urban life is widely shared in the fields of architecture and urban planning. The rich history of Matera offers the opportunity to verify the validity of this statement as well as the extent to which diversity affects economic growth, a question that has already been addressed by an extensive body of literature with compelling results (Jacobs 1961, Quigley 1998, Baciu, Birchall, 2021). This paper expands existing literature by studying the role urban diversity has played in the phases of decay and renewal of the historic center and satellite neighbourhoods of Matera, in the years following 1952, that is after the first 'Special Law for the Sassi displacement' ('Legge Speciale per lo sfollamento dei Sassi') was enacted (Musatti et al, 1955).

The word 'Sassi', literally 'stones' in Modern Italian, refers to the oldest part of the historic center, dating back to the Neolithic, which takes its proper name from the two zones that can still be identified within its perimeter, namely *Sasso Caveoso* and *Sasso Barisano*. Together with the third zone of the *Civita*, these two areas made up the Sassi neighbourhood until the Fascist period, when the tripartite structure of the Sassi was unified into one neighbourhood, as it stands today (Toxey, 2011). Given their characteristic cave dwellings carved out of tufo stones, the name Sassi also becomes a vivid iconograph of their unique urban landscape. Given Sassi is now celebrated as UNESCO Heritage and is an increasingly popular tourist attraction for its exceptional architectural and cultural value, it is hard to believe this ancient cave city was deemed as national shame just over 70 years ago.

'Do you know what the "Sassi" of Matera are? Traveling today through our adored Italy, it is shocking to come across a spectacle such as this. Here, not in houses but in caves carved from the tufo of a mountain lie the other two-thirds of the population.'

(Aponte, 1930, as cited in Toxey, 2011)

This description by the journalist Salvatore Aponte in the popular Italian newspaper *Corriere della Sera*, eloquently summarizes the dominant public perception of Matera in the years preceding the ambitious programme of the *risanamento* [urban renewal], the government plan to provide new housing in substitution of the Sassi's traditional rural dwellings, deemed as inappropriate for decent living conditions (Musatti et al, 1955).

After Matera's election as UNESCO Heritage City and European Capital of Culture (2019) it seems all the more relevant to retrace its debated architectural history, particularly the years between 1953 and 1970, which have witnessed the concretization, and we will add the failure, of the modern city utopia and the start of political attention towards the Southern Question, the economic and social difference between the North and the South of Italy. Built around the vernacular historic center, the new rural villages would function as satellite 'towns within the town', and would be autonomous and complete of all necessary functions, including schools and churches (Musatti, 1955). Renown architects of the time, including Ludovico Quaroni, Federico Gorio, Carlo Aymonino, Plinio Marconi and Luigi Piccinato were called to realise the vision, funded by UNRRA-Casas (United Nations Relief Rehabilitation Administration) and the Marshall Plan, under the theoretical framework promoted by Friedrich G. Friedmann and Adriano Olivetti within his *Movimento*

Comunità [Community Movement]. If it is true that 'the problem of Matera was (...) a construction of modern thought mediated rhetorically' (Toxey, 2011, p. 101), it is also true that this second generation of modern architects differed from the previous one for their genuine ambition to let sociological analysis and empirical research inform their designs.

This paper will examine the role that diversity has played in shaping both the vernacular part of Matera, particularly its Sassi neighbourhood, and the new towns around it - La Martella, Spine Bianche and Serra Venerdì - deemed as exemplar manifestations of Italian post-war Neorealism.

Building upon Toxey's work on Matera, one of the very few Anglophone scholarly contributions to the study of Matera in the field of architectural history and preservation despite the city's international recognition, the present study contributes to fill a gap in literature by undertaking a systematic comparative study of the urban configurations which seeks to understand the complex relationship between diversity and urban growth. The first Chapter will provide a definition of diversity and describe the method; the second Chapter will illustrate the process of diversity mapping for Matera following the chronological order of the historical records, starting from the modernist expansion through the present-day; the first part of the third Chapter will validate the results through photographs and secondary literature whilst the second part will add a critical analysis of the outcome in the light of the modernist neighbourhood utopia; the fourth Chapter will compare the results to demographic data, adding a projection for the future and discussing the relevance of the findings in relation urban planning and policy making in contemporary Matera.

Figure 1. Photograph of hanging laundry in the Sassi, unknown. Reproduced from www.wikimatera.it

Figure 2. Photograph *vicinato*, unknown.

Chapter 1: Diversity mapping

1.1 Defining urban diversity

Following Baciu's Method for the study of urban diversity (Baciu, Callum, 2021), this is defined for the purpose of this paper, as the co-existence of multiple human activities occurring in a city, both inside and outside the boundaries of buildings. These activities, which in the case of historic Matera include endeavours such as walking to the local fountain to refill a family basket or going to the collective oven to bake bread (Musatti et al, 1955), require a certain kind of infrastructure to take place, like a fountain or an oven for the given examples. This allows us to study urban activity, and therefore diversity, by referring to the infrastructure recorded in historic and contemporary maps. Given that in contemporary Italian PRGs (General Regulatory Plans) the term relational space is often use to highlight relevant points of social aggregation outside building boundaries, this term is used throughout the research to indicate this type of urban places in contemporary as well as vernacular and modernist Matera.

1.2 Choosing the record

The primary historic record chosen for this research consists in neighbourhood scale plan drawings (Fig. 1-3) of the satellite modernist neighbourhoods, signed by the project architects themselves, as well as that of vernacular Matera PRG, which includes information regarding location of churches, palaces and gardens, as surveyed in 1986 (Fig. 1) for the start of the preservation plan (*Primo Programma Biennale di Intervento per la Conservazione ed il Recupero dei Rioni Sassi*, *Legge n. 771/86,* First Biyearly Programme for the Conservation and the Preservation of the Sassi, Law n. 771/86). Although this record does not explicitly describe human activities, it is possible to infer them from the buildings' architectural typology, following the argument that this represents the infrastructure for specific functions. Previous PRGs, such as the one by Luigi Piccinato in 1953, would be closer to the object of study but are not legible in their currently available scanned drawings. However, given the fact that in 1986 most of the original typologies and relative uses had been kept in their original vernacular set out (Toxey 2011), this record is considered appropriate for the object of research. Thanks to its existence, it is possible to perform a comparison between the vernacular and the modernist neighbourhoods of Matera. In addition to this, a subsequent PRG from 2005 (Fig. 15, p. 15) and Google Maps data from 2021 provide the record to study diversity in contemporary Matera. This data, coupled with secondary literature, allows us to take conclusions on whether diversity in Matera has changed through the present-day and whether this has had an impact on the city's growth and urban vitality. Alongside project plans and PRGs, as well as current Google Maps open data, the numerous pictures available (Fig. 10, p. 22) help us validate the results of the analysis and geographically locate some of relational spaces referred to in secondary literature, which would otherwise be difficult to identify on a map. Unfortunately these pictures often lack exact chronological information, however this can be often inferred through cross references with secondary literature.

1.3 Classification and granularity

Having defined diversity as the simultaneous presence of multiple uses within a neighbourhood, the analysis of the record consists in individually quantifying diversity for all the selected historic maps.

In order to do this, certain parameters have to be consistent throughout the analysis. Firstly, the classification system has been defined through the identification of different architectural typologies and urban infrastructure, such as a fountain or a collective oven, that enable different human activities, such as doing laundry or baking bread respectively. Since new functions are introduced in Matera throughout the period of time taken into consideration, the latest maps are used to set the widest classification system necessary to perform the analysis. Certainly, given that the object of analysis consists in historical maps, the type of record available has limited the classification system to the information recorded. This has been expanded using datasets provided by the municipality, for example for the location of fountains, which were not originally included in the plans. In the classification introduced by Lorenzo Rota and his Study Group, different housing typologies have been regarded as different categories and this is adopted in the classification with the argument that these would have hosted representatives from different economic and social backgrounds (Rota, 2011), which would have in turn determined different patterns in daily activities and appropriation of the city. The residential functions therefore comprise palaces, palaced houses, courtyard houses, rural architecture, and cave dwellings.

Similarly, the granularity has been specified according to the record available, which in this case coincides with the building block and with the single elements of urban infrastructure identified.

Finally, the diversity index has been determined for this case study as the number of different "items", both colours and symbols, in a unit of 100 x 100 m, adapting the original definition by Baciu and Birchall (Baciu, Birchall 2021), which only included colours in the analysis. The reason why symbols are used alongside colours is due to the fact that some of the urban infrastructure that enables human interaction, such as a wind mill or a fountain, is not located within the boundaries of defined buildings, even more so in the context analysed (Toxey, 2011). The 100 x 100 m unit is intended to achieve the maximum resolution whilst maintaining a significant spread amongst the results. Given that in the Post-war neighbourhoods analysed, in general, little or no spread is observed in any unit that is smaller than 100 x 100 m, this scale seems to be the most appropriate in order to obtain significant results.

After computing the analysis, the results are synthesized in a diversity map using 8 different colours to map diversity indexes from 0 to 8, corresponding to pixels displaying respectively from 0 to 8 different categories. The darker red pixels thus correspond to more diverse areas whilst the shades of yellow and orange correspond to less diverse areas (Fig 1, next page).

The following paragraphs present an illustrated explanation of this methodology as well as the diversity maps resulting from the analysis of their respective historical records, shown on the same page. These are presented in chronological order, from the modernist neighbourhoods, built between 1953 and 1970, to the preservation movement of the vernacular Sassi neighbourhood, started in 1986 with the 'First Special Law for the Sassi', through the present-day.

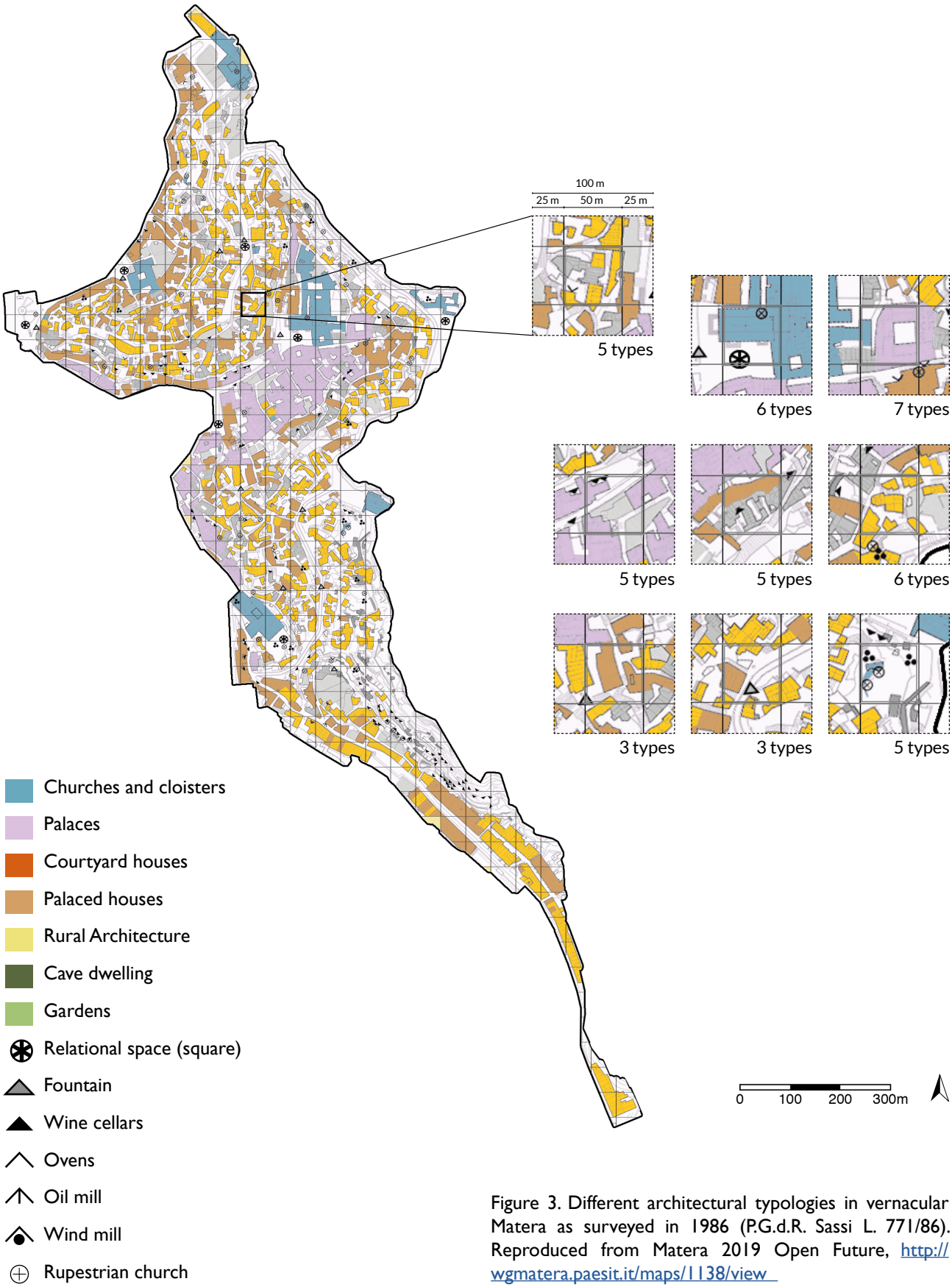
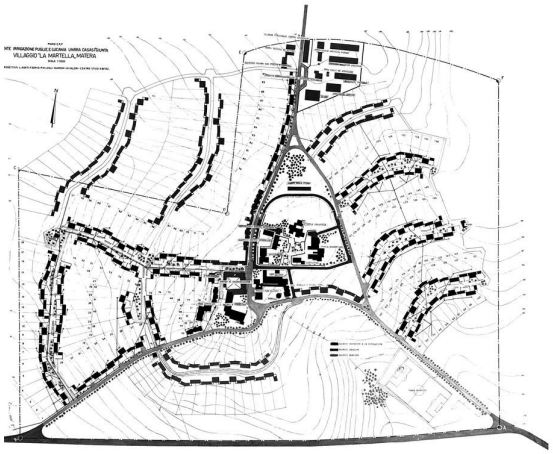


Figure 3. Different architectural typologies in vernacular Matera as surveyed in 1986 (P.G.d.R. Sassi L. 771/86). Reproduced from Matera 2019 Open Future, http://wgmatera.paesit.it/maps/1138/view

Chapter 2:
Performing the analysis

2.1 Mapping modernist Matera

The Modernist neighbourhoods built around the historic center have been mapped using the same classification system, granularity and diversity Index of their vernacular counterpart, in order to obtain comparable results. Google Maps has been used to interpret some of the information contained in the historical record, whenever ambiguities arise. In fact, the only historical records available are characterised by a black and white figure ground map (Fig. 1-3) which makes the mapping of different uses a challenging task. This difficulty was overcome thanks to the observation of the morphology of the different buildings, which often gives indication of their use, as well as through texts written by the architects for the Italian journal *Casabella*. Unlike the Sassi, where new building uses have been added for the past fifty years, with alterations to the original diversity index, the modernist neighbourhoods have remained seemingly unchanged through the present-day. Given that the physical urban configurations and the respective functional distribution of these modernist neighbourhoods has not been significantly altered since their initial construction and no uses have been added (if anything, some have been removed - such as the recent outdoor cinema demolition in La Martella), the original project records are still a good representation of what can be found, at best, in the neighbourhood today. For this reason, only one analysis is carried out per neighbourhood using the 1950s records, inferring that a very similar result would be obtained from an analysis of their current situations. Google Maps, videos of interviews to the residents and online datasets have been used to verify this assumption.



1.

2.

3.

Figure 1. Ludovico Quaroni, *Borgo La Martella, La Martella Village* (1952-1954). Reproduced from *Accademia nazionale di San Luca, Fondo Federico Gorio, http://www.architetti.san.beniculturali.it/architetti-portlet/showImage/fedora?pix=san.dl.SAN:IMG-00166429/DS_IMAGE_1/2013-09-04T12:21:21.191Z*

Figure 2. Carlo Aymonino, Quartiere "C" Spine Bianche, Spine Bianche neighbourhood (1954-1959). Reproduced from ArchidiAp, http://www.archidiap.com/opera/quartiere-spine-bianche-matera/

Figure 3. Luigi Piccinato, Quartiere "B" Serra Venerdì, Serra Venerdì neighbourhood (1953-1956). Reproduced from Archivio Luigi Piccinato, https://www.archivioluigipiccinato.it/?p=1365

Borgo La Martella: La Martella Village

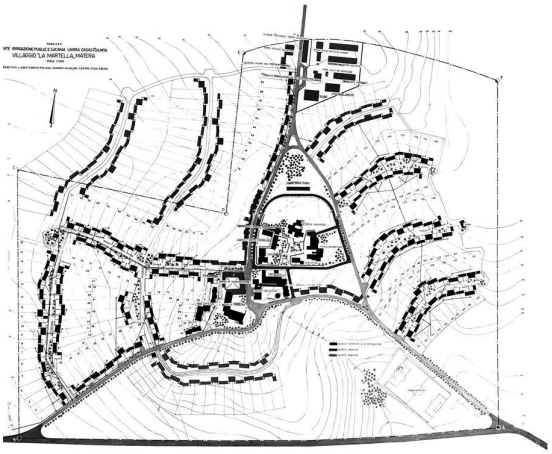
Project architect: Ludovico Quaroni, Federico Gorio

Years of realisation: 1951-1954

Overall Area: 574 762 sqm

La Martella is the first rural neighbourhood built within the programme of UNRRA CASAS and the Special Law 619/52 to provide new housing around the vernacular city in order to accommodate for modern living standards and find an ultimate solution to the unhygienic and overcrowded Sassi caves (Musatti et al 1955). Representative of Italian Neorealism and laboratory for the ideal modern city utopia, La Martella was designed by Ludovico Quaroni's team of architects, including M. Agati, F. Gorio, P.M Lugli and M. Valori. The project is located around 7 km from the center of Matera. This Post-was neighbourhood was intended to be fully autonomous and was therefore equipped with all necessary public services, including a school, a church, sports field and the town hall. Around this collective center, two and three storeys residential blocks are organically arranged around secondary roads to mimic the Sassi spontaneous development (Gorio, 1954).

From the analysis, it is clear that the residential use prevails over the others thus resulting in a predominantly mono-functional neighbourhood, with a single density center which does not exceed a diversity index of 3.



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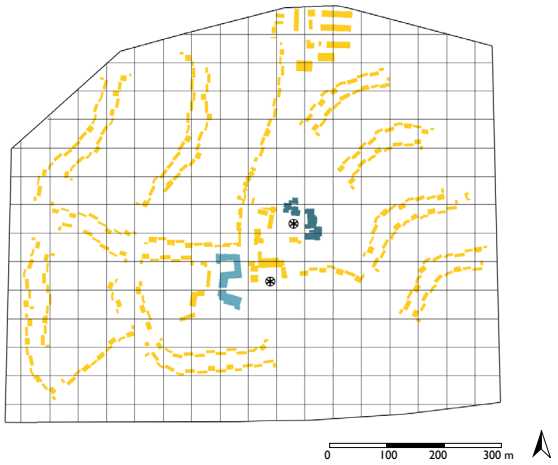

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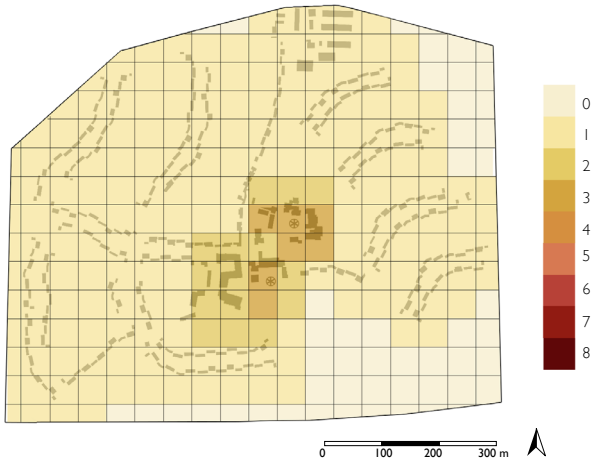


6.

Churches and cloisters
Residential block
School
Town hall
Commercial buildings
Restaurants, markets, recreational
Square
Fountain

Figure 4. Ludovico Quaroni, *Borgo La Martella, La Martella Village* (1952-1954). Reproduced from *Accademia nazionale di San Luca, Fondo Federico Gorio,* http://www.architetti.san.beniculturali.it/architetti-portlet/showImage/fedora?pix=san.dl.SAN:IMG-00166429/DS_IMAGE_1/2013-09-04T12:21:21.191Z

Figure 5. Own drawing, Mapping different uses in La Martella

Figure 6. Own drawing, Diversity Index Map in La Martella

Rione Spine Bianche:
Spine Bianche neighbourhood

Project architect: Carlo Aymonino

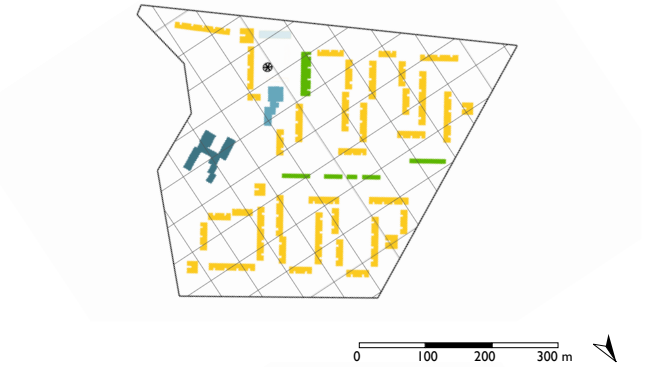
Years of realisation: 1954-1959

Overall Area: 152 790 sqm

Located in the North-West of Matera, Spine Bianche was built after the competition-winning project by C. Aymonino's team of architects, including C. Chiarini, M. Girelli, S. Lenci, M. Ottolenghi, and G. De Carlo.

The realised project, visible in its design in the plan to the right (Fig. 7), presents some deviations from the initial winning design, also due to later contributions of the rest of the bidding architects; if the first prize project, by C. Aymonino, had planned two commercial spines running along the opposite edges of the plan, the final design presented only one central line of buildings with a commercial use on the ground floor and residential use above, around which the exclusively residential clusters are located (Fig. 8). The linear residential blocks, arranged in repeated clusters to resemble the Sassi's *vicinato* unit vary in storey height, two or three storeys on average, depending on the architect in charge of their design (De Carlo, 1954); the only exception to this is the five storey tower designed by C. Charini (ArchiDiAp, 2017). Despite being designed by different architects, thus also resulting in slightly different blocks, the residential building typology was intended to host the same social group: previous Sassi residents that were primarily small farmers. For this homogeneity of users, the residential function has been mapped as one category, unlike the Sassi.

7.



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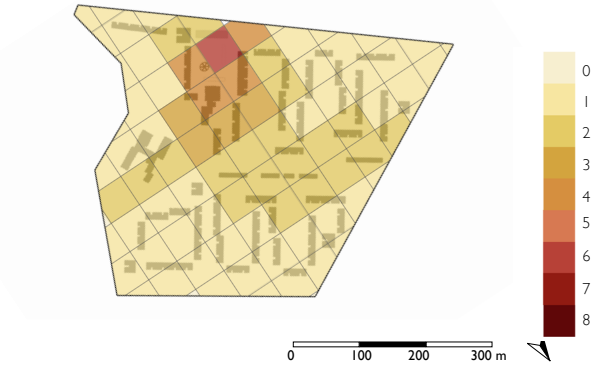


9.

Figure 7. Carlo Aymonino, Quartiere "C" Spine Bianche, Spine Bianche neighbourhood (1954-1959). Reproduced from ArchidiAp, http://www.archidiap.com/opera/quartiere-spine-bianche-matera/

Figure 8. Own drawing, Mapping different uses in Spine Bianche

Figure 9. Own drawing, Diversity Index Map in Spine Bianche

- Churches and cloisters
- Residential block
- School
- Town hall
- Commercial buildings
- Restaurants, markets, recreational
- Square
- Fountain

Rione Serra Venerdì:
Serra Venerdì neighbourhood

Project architect: Luigi Piccinato

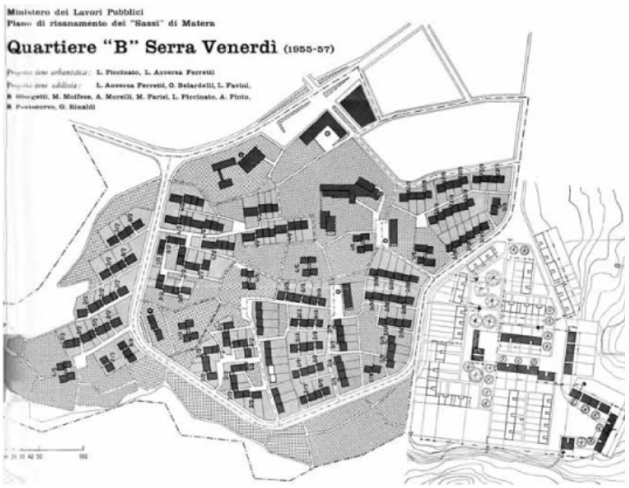
Years of realisation: 1956

Overall Area: 152 790 sqm

Serra Venerdì neighbourhood was already planned by Luigi Piccinato in his first General Regulatory Plan in 1953; it represented the North-West edge of the city and together with the hill of the cemetery, it characterised the image of the city that started to take shape in the 1950s. Despite being often considered a minor project, in comparison to the larger La Martella, Spine Bianche and Borgo Venusio, amongst the rural neighbourhoods Serra Venerdì is the only one that presents two relational spaces, an outdoor market space, as well as a fountain. The latter, not immediately visible from the site plan, was identified through further research and Google Maps imagery.

The neighbourhood is extremely compact and it is bordered by a large park, which is likely to have been designed on that edge to prevent further urban sprawl, for the presence of soil which is still prone to brakes.

With a slight variation from the other neighbourhoods, Serra venerdì shows not one but two centers of density, corresponding to the relational spaces that have been mapped out. Additionally, the two commercial buildings are located slightly further away and therefore result in higher density scores around the center, up until a score of 4.



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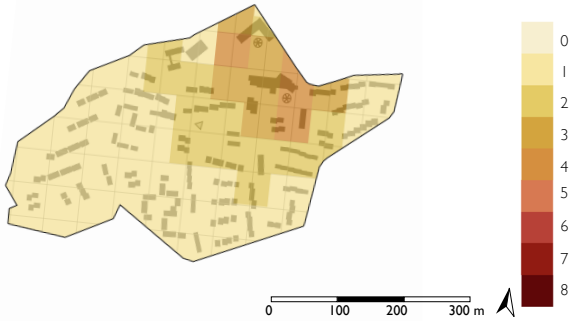


12.

- Churches and cloisters
- Residential block
- School
- Town hall
- Commercial buildings
- Restaurants, markets, recreational
- Square
- Fountain

Figure 10. Luigi Piccinato, Quartiere "B" Serra Venerdì, Serra Venerdì neighbourhood (1953-1956). Reproduced from Archivio Luigi Piccinato, https://www.archivioluigipiccinato.it/?p=1365

Figure 11. Own drawing, Mapping different uses in Serra Venerdì

Figure 12. Own drawing, Diversity Index Map in Serra Venerdì

2.2 Mapping vernacular Matera: as found in1986

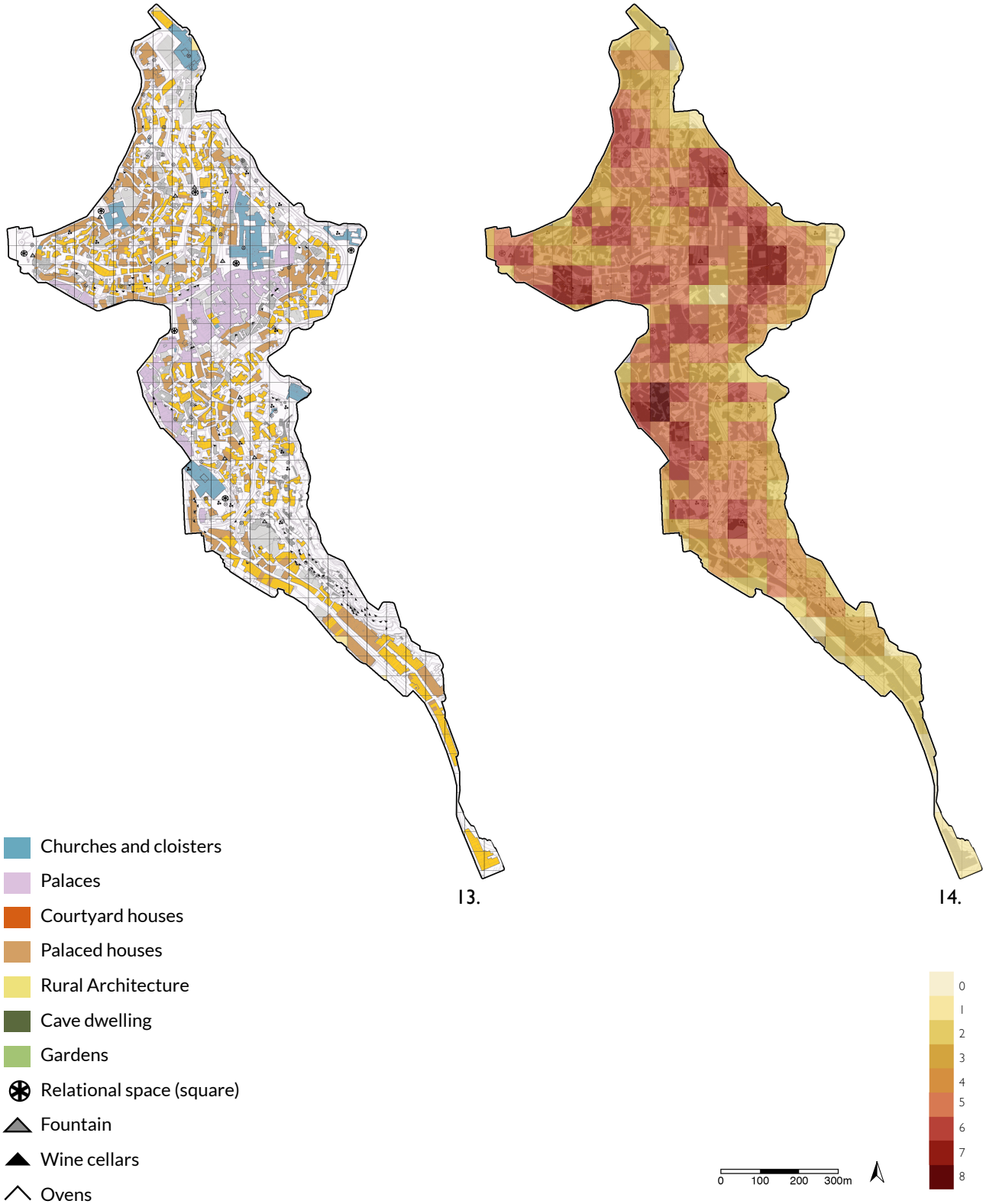
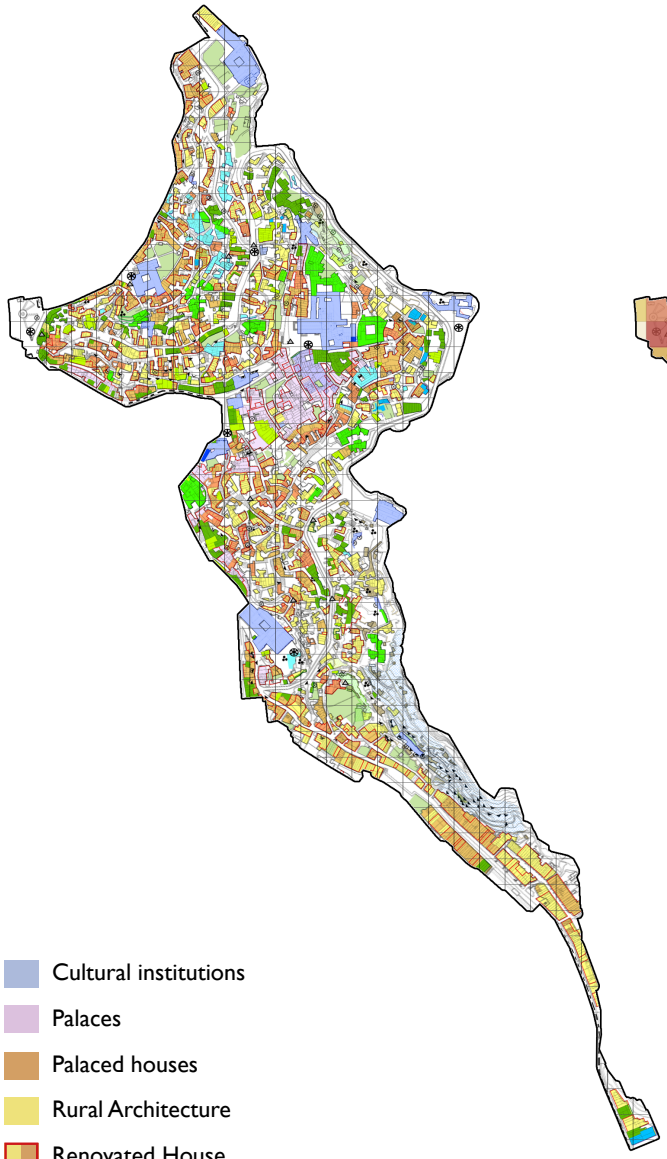
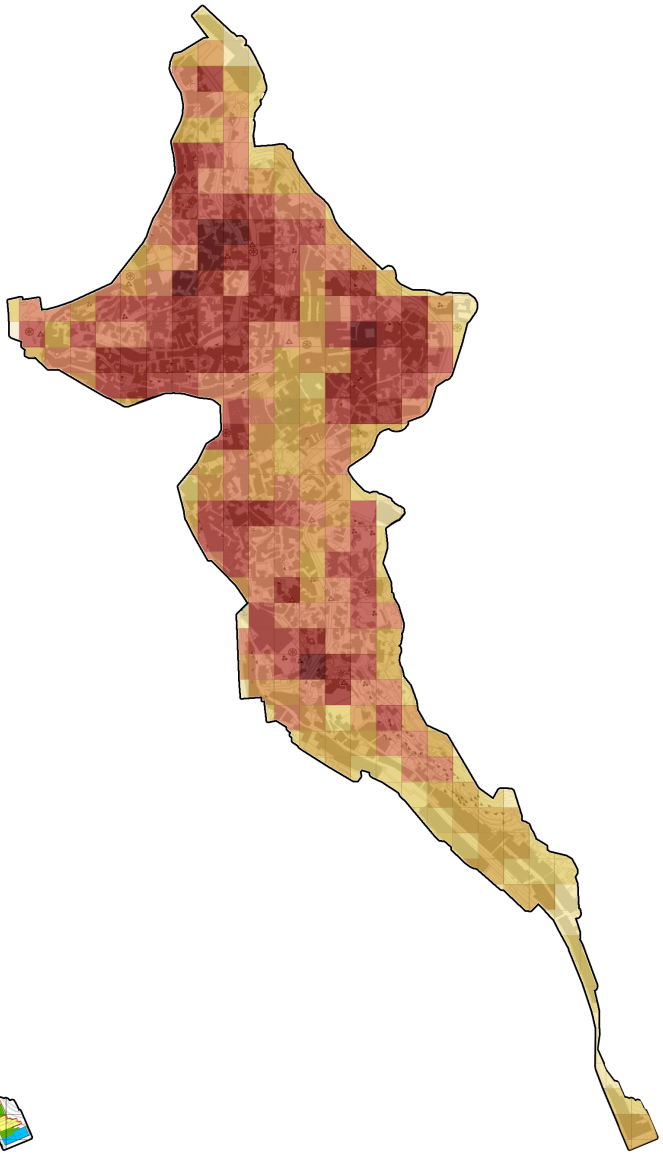


Figure 13. Own drawing, Mapping different uses in the Sassi from different architectural typologies in vernacular Matera as surveyed in 1986 (P.G.d.R. Sassi L. 771/86)
Figure 14. Own drawing, Diversity Index Map on uses map as surveyed in 1986

2.3 Mapping Contemporary Matera: 2005





15. 16.

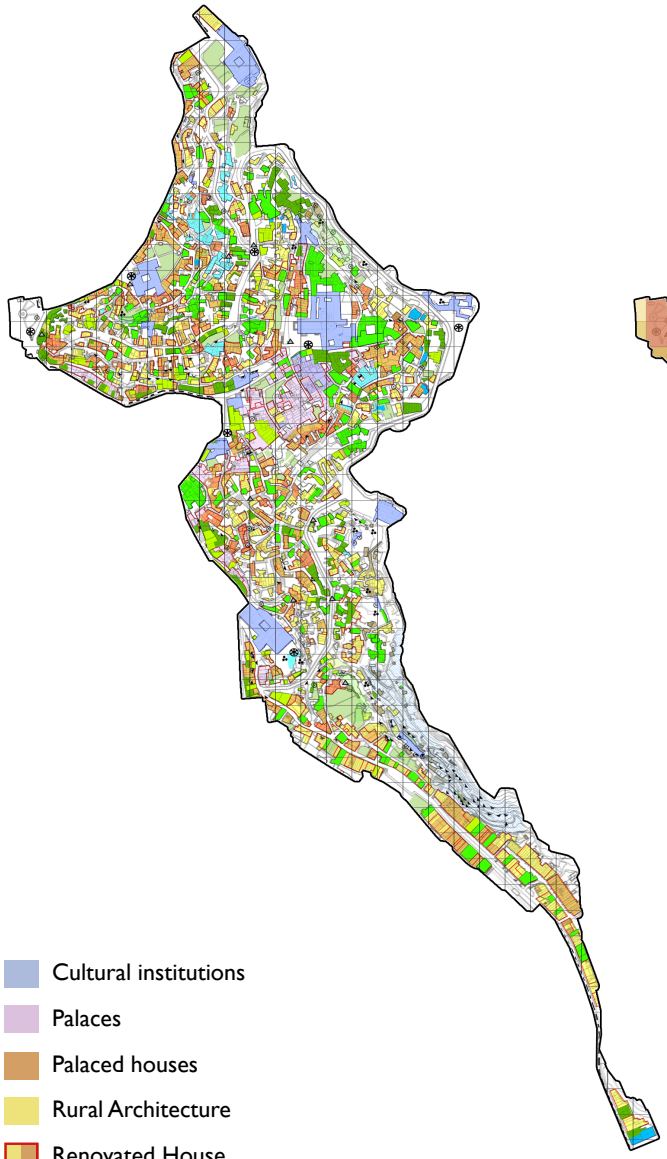
Cultural institutions
Palaces
Palaced houses
Rural Architecture
Renovated House
Productive activities
Artisan ateliers
Hospitality (Hotels, B&Bs, room rentals)
Restaurants, cafes, pubs
Cultural associations
Relational Space (square)
Fountain
Wine cellars
Ovens
Oil mill
Wind mill
Rupestrian church

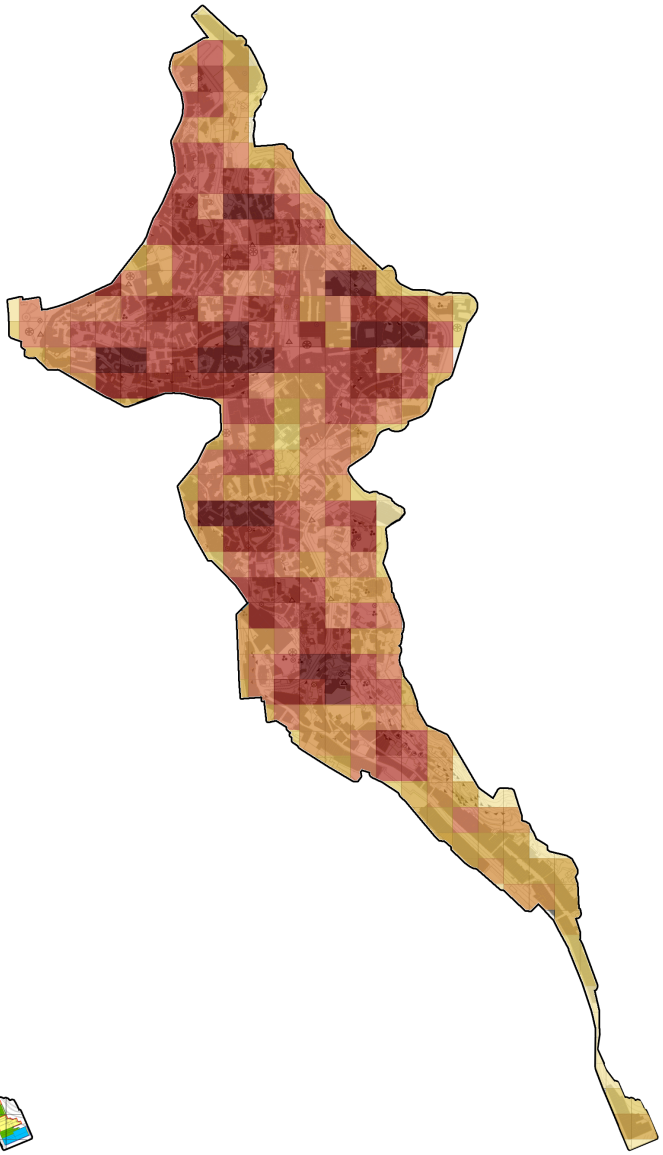
0 1 2 3 4 5 6 7 8

0 100 200 300m

Figure 15. 2005 PRG Map (P.G.d.R. Sassi L. 771/86).
Figure 16. Own drawing, Diversity Index Map on 2005 PRG Map (P.G.d.R. Sassi L. 771/86).

2.4 Mapping Contemporary Matera: 2021





17.

18.

Cultural institutions
Palaces
Palaced houses
Rural Architecture
Renovated House
Productive activities
Artisan ateliers
Hospitality (Hotels, B&Bs, room rentals)
Restaurants, cafes, pubs
Cultural associations
Relational Space (square)
Fountain
Wine cellars
Ovens
Oil mill
Wind mill
Rupestrian church

0 1 2 3 4 5 6 7 8

0 100 200 300m

Figure 17. Own drawing produced overlaying current Google Maps 2021 data on the 2005 PRG Map (P.G.d.R. Sassi L. 771/86).

Figure 18. Diversity Index Map on 2021 uses map

Chapter 3: Historic Validation

2.1 Historic validation: Sassi

After performing the analysis, it is important to validate the results with other historical records in order to confirm that the method is reliable for the identification of density clusters and areas of isolation. This is done through comparison with historical pictures and secondary literature.

'It is a continuous variety of light and shade, a picturesque game of color, a medley of streets, parapets, arches, window sills, gables, balconies, corbels, and galleries in which it is useless to seek symmetry, alignment, or order whatsoever. … In this very beautiful and varied frame, human activity adds an even more beautiful tune.'

"A Semi-subterranean City" (Calamonico, April 1927)

Reading this passage by Calamonico found in the Italian newspaper *Le Vie d'Italia* in April 1927 (Toxey's Trans., 2011, p. 21), one can vividly imagine the astonishing variety of architectural typologies and the human activities associated with them. The 'beautiful and varied frame' is that of the Sassi neighbourhood, with its multiple housing typologies, its churches, squares and fountains. It is thanks to the numerous photographers of the time, including the renown H. Cartier Bresson and Mario Carbone. Although most of these photographs lack geographical data, this can be derived by cross-referencing the fountain locations and other key infrastructure as surveyed in 1986 (P.G.d.R. Sassi L. 771/86) with current Google Maps Street View images, thus being able to attribute exact geographical locations to each photograph (Fig. 9, p. 21). The outcome of this study is then compared with the Diversity Index Maps to validate the results. The photographs shows that the spontaneous growth of the neighbourhood lead to multiple centers of density, which by definition would correspond to clusters of urban activity and - we expect - of diversity. Overlaying the mapped photographs' locations with the Diversity Index Map in 1986 (Fig. 9), the former seem to often coincide with the diversity areas independently highlighted, and particularly with the presence of squares and fountains. These, introduced in 1931 to replace the intricate cistern system (Toxey, 2011), represented an important gathering point for people, for the majority women, that were not allowed to be outside the premises of their house on their own without a specific reason (Tentori, 1955). Doing the laundry or collecting water at the fountain was indeed an occasion to escape the dark and small cave dwellings and meet neighbouring women. The very fact that renown photographers of the time focused a lot of their subjects around these urban features, is in itself an indication of their remarkable urban role, which again is a validation of our argument.

The only exception to the correspondence between the high diversity index pixels and the location of selected photographs is the evocative picture taken by Henri Cartier Bresson (Fig. 2a), located through trial and error in the generous public staircase within the Malve cemetery. Despite the density and urban vitality recorded in the photograph, its respective pixel shows a diversity index below 2 (Fig. 9, p. 21). This can be explained by the proximity of the staircase to Santa Lucia alle Malve, a church which was probably a common destination for most of the Sassi residents. For this reason, although churches count as one point towards the diversity index in the present study, it is suggested that in future mapping in similar contexts their aggregation potential is taken into account in the mapping.

1a.

1b.

2a.

2b.

Figure 1a. Fountain in Piazza San Pietro Barisano, U.S.I.S., Reproduced from Matera 55 (Musatti et al, 1996)
Figure. 1b Fountain in Piazza San Pietro Barisano today, Google Maps Street View 2021
Figure 2. Mario Carbone, 1960. Reproduced from https://www.basilicata.beniculturali.it/i-sassi-di-matera-viaggio-in-lucania-con-carlo-levi/
Figure. 2b Malve Cemetery today, Google Maps Street View 2021

3.

4.

5.

Figure 3. Fontana Ferdinandea. Reproduced from MUV Matera, http://www.muvmatera.it/aspfoto/scheda-detail.asp?id=88

Figure 4. Sassi residents collecting water from the fountain (1930s-1950s). Reproduced from MUV Matera, http://www.muvmatera.it/aspfoto/scheda-detail.asp?id=88

Figure 5. Screenshots from video footage De Gasperi a Matera, 1953. Reproduced from Istituto Luce, patrimonio.archivioluce.com/luce-web/detail/IL3000088621/1/de-gasperi-matera.

6.

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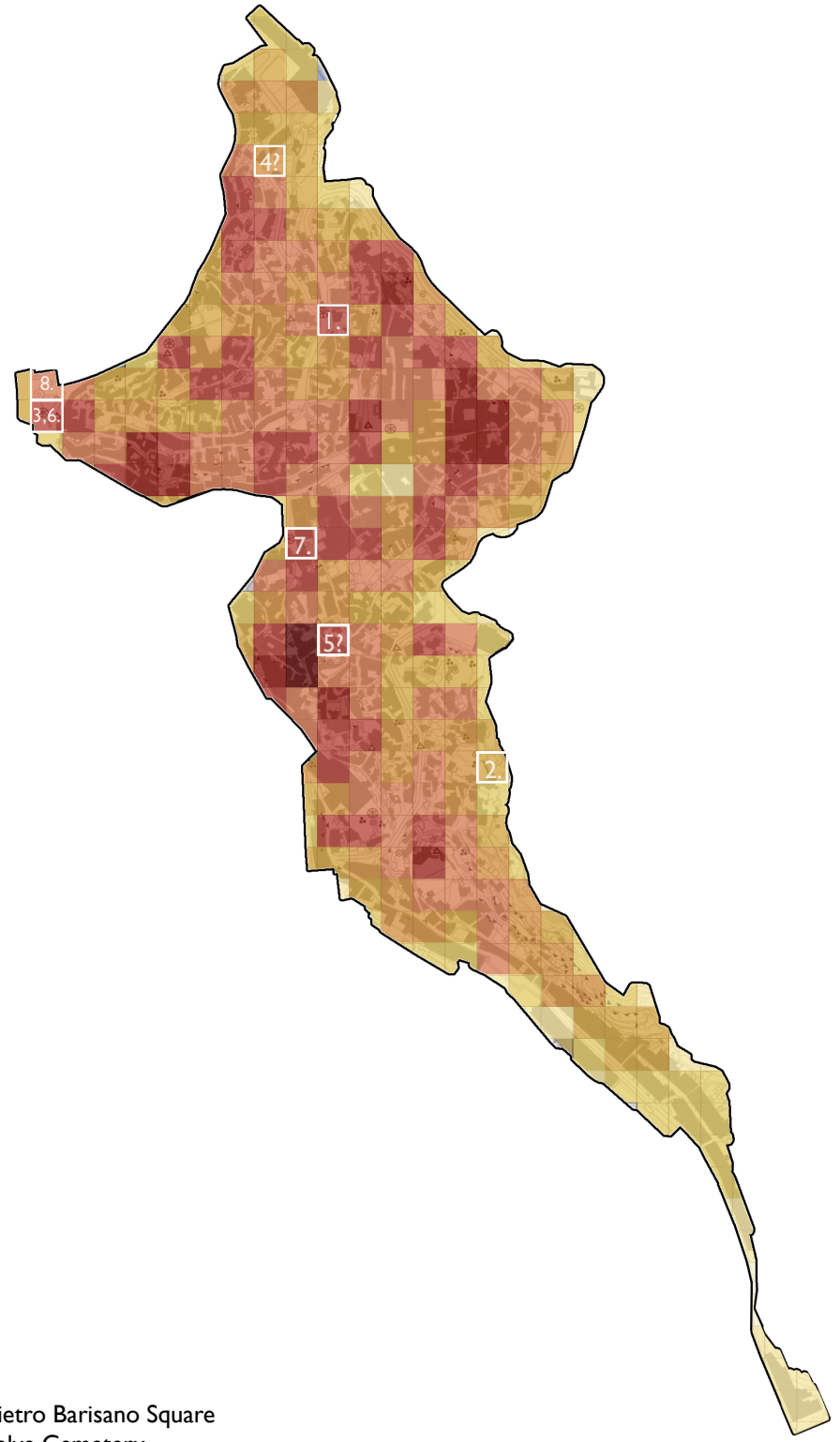
Figure 6. Piazza Vittorio Veneto. Vittorio Veneto Square. Reproduced from MUV Matera, http://www.muvmatera.it/aspFoto/scheda-detail.asp?id=132

Figure 7. Piazza del Sedile. Sedile Square. Reproduced from MUV Matera, http://www.muvmatera.it/aspFoto/scheda-detail.asp?id=85

Figure 8. Il passeggio domenicale. H. Cartier - Bresson. Reproduced from Matera 55 (Musatti et al, 1996)

2.1 Historic validation: I Sassi



1. Fountain in San Pietro Barisano Square
2. Public stairs at Malve Cemetery
3. Fountain Ferdinandea in Vittorio Veneto Square
4. Fountain in Vico Santa Cesarea?
5. Fountain in Vico San Clemente?
6. Fountain Ferdinandea in Vittorio Veneto Square
7. Sedile Square
8. Banco di Napoli in Vittorio Veneto Square

Figure 9. Own drawing. Mapping photographs over Diversity Index Map 1986 using Google Maps Street View 2021

1.

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3.

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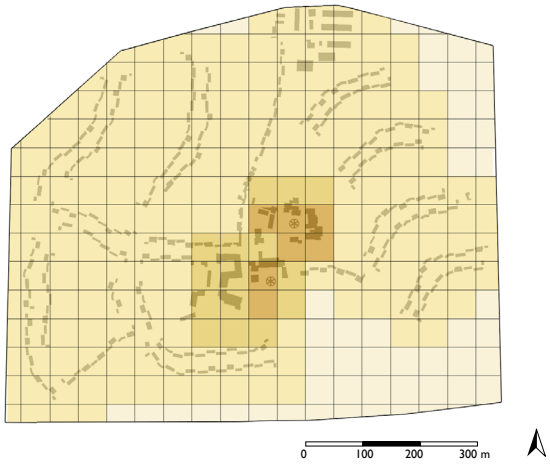
Figure 10. Historic photographs catalogue (Fig. 1-8)

3.2 Historic validation: modernist Matera

As regards the modernist neighbourhoods, the quantification of density here unequivocally shows low density, with most indexes scoring below 2 in most pixels and with a single density center generally below a score of 3. In order to verify the diversity mapping through an independent source of data, primary and secondary literature is used in this case to derive information on the distribution of diversity in the modernist neighbourhoods. From one of the project architects, Federico Gorio, we read that these rural neighbourhoods were originally meant to function as an 'organic whole, at the service of the city', and therefore they were supposedly designed with all necessary public functions, located in the *'centro di quartiere'* (center of the neighbourhood). This is identified in all projects by a central square around which the church, the school and city hall are usually located (Gorio, 1959). Around this center, the residential units are distributed in repetitive configurations, which are far from the variation and the intimacy of the Sassi, despite the efforts of their authors to replicate some of the organic qualities of the vernacular city (Musatti et al, 1955).This confirms the distribution of diversity obtained by all three maps, with a single center of density around which the mono-functional configurations are distributed.



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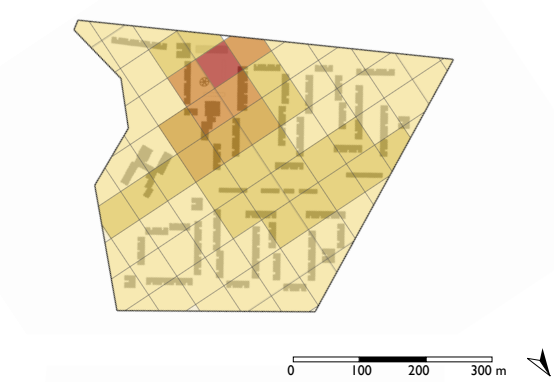

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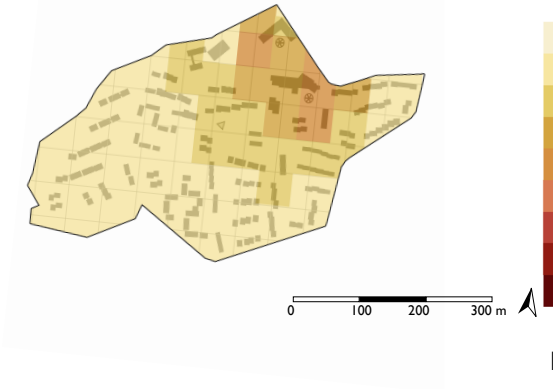


13.

Figure 11-13 Own drawing, Diversity Index Maps of La Martella, Spine Bianche and Serra venerdì overlayed on their uses map

3.2 The 'neighbourhood unit': failure of the modern utopia

Critically evaluating the results in relation to the reality of the modernist rural neighbourhoods, one can not avoid to notice a great disparity between the ideological ambitions of the programme and the shortcomings of the design and the built plans.

Despite the allegedly thorough social and urban studies carried out in the Sassi with the international contribution of Friedrich G. Friedmann prior to the design and realisation of the modernist neighbourhoods (Musatti et al, 1955), it appears as though the authors failed to capture the importance of concentration and diversity in the spontaneous settlement of the Sassi. They reduced the design to a nostalgic and distorted representation of the ideological notion of the *'vicinato'*, or neighbourhood unit. *'Vicinato'* is the word that is often used in the context of the Sassi to describe a group of families whose houses are located around a certain collective area, often around a water well. The main functions of the vicinato were those of social gathering, reciprocal support and social control. Family life, as we saw, was closely related to that of the vicinato, particularly for women, whose strict social conventions only allowed them outside in their neighbours' company. (Tentori, 1955)

"Quanti urbanisti e quanti sociologi cercano invano la pietra filosofale dell'unità di vicinato, cioè di quell'ideale nucleo di più famiglie che l'affiatamento sociale, oltre che il destino della convivenza, tiene in sesto"

[How many urbanists and sociologists aimlessly look for the Philosopher's Stone of the neighbourhood unit, which is that ideal ensemble of multiple families that are kept together by social bonds, other than their common neighbouring destiny;] (Gorio, 1954, p. 139)

Storia di un'inchiesta

Matera, città contadina

di Riccardo Musatti

Sergio Lenci

Esperienze nella progettazione del quartiere Spine Bianche a Matera

Concorso Nazionale per il quartiere Spine Bianche a Matera

Figure 14. Screenshot of journal article, 'Matera, città contadina', Musatti , R. , *Comunità*, n. 33, 1955. Reproduced from Fondazione Adriano Olivetti

Figure 15, 16. Screenshot of journal article, 'Esperienze nella progettazione del quartiere Spine Bianche a Matera', Lenci, S. Reproduced from http://www2.unibas.it/architettura/CORSI/LOSASSO/Casabella%20Continuita_n231_1959.pdf

Despite their declared, and most probably genuine intentions to foster 'human relations [through...] collective spaces (working, recreational, political and cultural activities)' (Lenci, 1959, my Trans.), independent sources contribute to acknowledge the inevitable failure of these ambitions. Amongst these, Giancarlo De Carlo provides a lucid analysis of the reasons behind the failure of the modernist regulatory plan. He attributes this negative outcome to the negligence in acknowledging that it is impossible to control phenomena of associated life without extending the action to the totality of the environment that this is embedded in (De Carlo, 1954, p. 150).

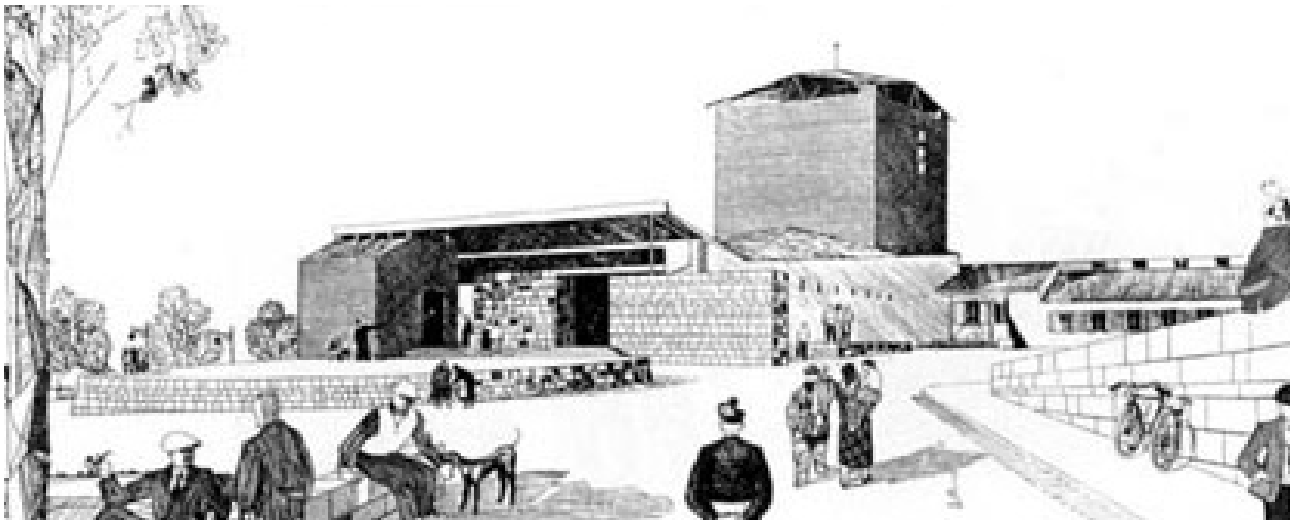
On the other hand, it would be unfair to critically look at the modernist laboratory of Matera without mentioning the political and economic challenges faced by the authors. In fact, as we learn from Gorio himself, the reality of the plan did not come without complexities; changes in political decisions caused this modern experiment to never actually be completed, with La Martella being left devoid of the originally planned number of residences and public functions, such as the productive building specifically allocated to the agricultural activity, containing all the necessary machinery and fertilisers (Gorio, 1959).

Today, these architecturally relevant examples of Italian Neorealism continue to stand as a reminder of the ambitious attempt to recreate the same community that had been displaced during the Sassi programme. La Martella, Borgo Venusio, Spine Bianche and La Nera beg for attention, humiliated by repeated episodes of vandalism, sporadic demolitions and years of neglected maintenance (Saito, 2020).

Although this analysis can not prove that the history of modern Matera would have had a different outcome had it been planned with a mixture of uses, the evidence provided and confirmed by historic validation, so far contributed to defend the thesis that diversity is correlated to growth and urban vitality, whereas mono-functional areas are destined to impoverishment and decline.

Figure 17. Screenshot from 'A proposito di la Martella', De Carlo, G., 1954, Reproduced from Fondazione Adriano Olivetti

Figure 18. Screenshot from 'Il villaggio La Martella' cover. Reproduced from Fondazione Adriano Olivetti

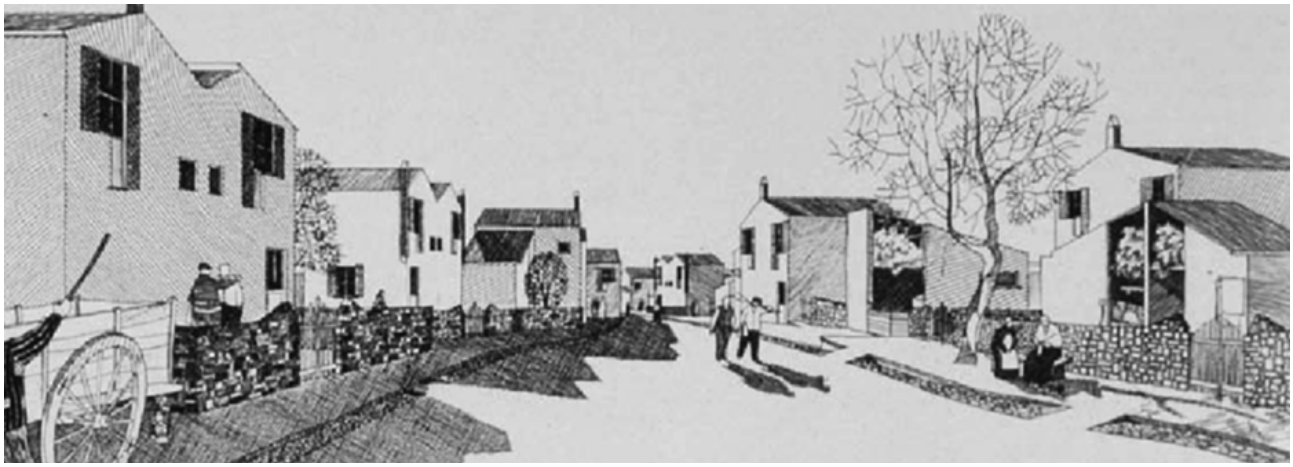


19.

20.

Figure 19. La Martella Church, Ludovico Quaroni. Reproduced from http://architettura.it/books/scelti/2002120701/index.htm

Figure 20. La Martella Church. Reproduced from http://banchedati.chiesacattolica.it/cci_new_v3/allegati/23076/de_paoli_sintetica.jpg



21.

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Figure 21. La Martella Church, Ludovico Quaroni. Reproduced from http://architettura.it/books/scelti/2002120701/index.htm
Figure 22. La Martella Church. Reproduced from http://banchedati.chiesacattolica.it/cci_new_v3/allegati/23076/de_paoli_sintetica.jpg

Chapter 4: Diversity and growth

4.1 Consequences of diversity

The idea that diversity brings urban vitality and economic growth finds a great wealth of supporting literature and empirical research, from Jane Jacobs (Jacobs, 1961) and John M. Quigley (Quigley, 1998), to more recent contributions by Dan C. Baciu in his article 'Cultural Life', which expands the relationship between diversity and growth to the broader framework of cultural life as a whole (2020).

The reason behind the correlation between urban diversity and economic growth is to be found, as Jacobs eloquently explains in 'Death and Life of Great American Cities' (1961), in the increased potential of diverse streets to attract an 'interweaving of *human* patterns, [...] of people doing different things, with different reasons and different ends in view'. In economic terms, Quigley refers to cities with this quality as 'human-capital-rich', reporting empirical research and economic models that confirm that cities attracting people are also more likely to experience economic growth and increased productivity. Following these theories, it is possible to derive that areas and streets with a stable or increased number of residents over time are more successful than those with a declining number of residents. In fact, the former generally results in increased land value whilst the latter leads to a decrease in land and rental value, for a simple offer and demand principle.

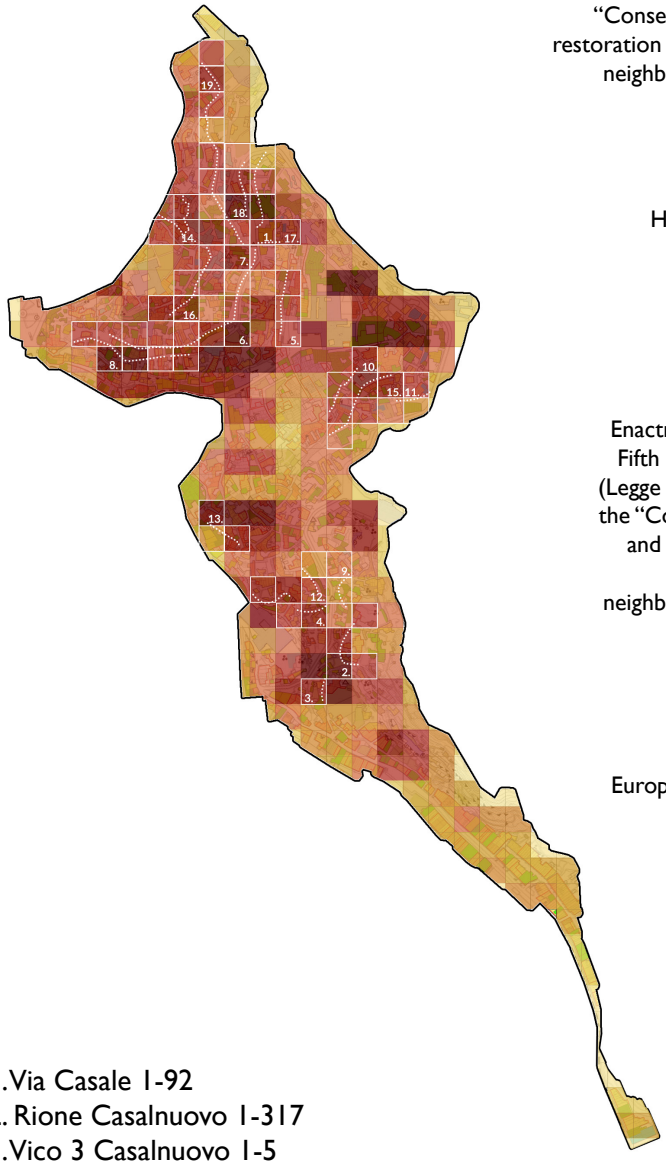
When looking at the data made available by the municipality of Matera on the number of residents living in the Sassi neighbourhood for the period between 1994 and 2019 (OpendataMatera, 2019) it is possible to map the streets that have experienced a stable or increased number of residents and overlay the results on the diversity map previously presented. It is then possible to highlight the pixels that are crossed by the streets with an increased or stable number of residents. The results of the analysis show that 94% of the pixels highlighted (65 out of 69), where the residents have either increased or been retained in the same number, show a diversity index above 4 in the 2021 diversity map, displaying a clear correlation between diversity areas and ability to attract or retain residents. Given, as previously explained, that this quality is often a connotation of economic growth, it is possible to derive that diversity is also closely related to economic growth of cities.

A limitation to this argument is that although the highlighted streets show a stable or increased residents' number, this does not necessarily ensure residents' retention, meant as the ability to keep the same residents over time, thus reducing turnover.

However, for the purpose of this thesis this additional information is not necessary to infer the quality just described. In fact, whether the same people or new ones reside in particular streets of the *Sassi*, following Quigley's argument these will in both scenarios contribute to maintaining 'human-capital-rich' areas.

In addition to the residents data, another factor used to track economic growth is the expansion of the hospitality sector in the Sassi, which is reported by Toxey (2011). If only five lodging establishments were to be found in the Sassi in 2000, these increased to 108 in 2011, and today Matera can count as many as 623, with most of them being located in the Sassi. 'These numbers do not necessarily reflect demand, but they do reflect availability of private funds for investment, strong economic optimism, and growth in the tourism industry.' (Toxey, 2001, p. 336).

Overlaying 'human-capital-rich' streets over the 2021 diversity map



1. Via Casale 1-92
2. Rione Casalnuovo 1-317
3. Vico 3 Casalnuovo 1-5
4. Via Confalone 1-12
5. Via Gradoni Duomo 1-28
6. Via Fiorentini 1-31
7. Via Fiorentini 32-263
8. Via Lombardi 1-58
9. Rione Malve 1-85
10. Via Muro 1-60
11. Via Ospedale Vecchio 1-12
12. Via del Purgatorio Vecchio 1-21
13. Via San Bartolomeo 1-47
14. Rione San Biagio 1-98
15. Via San Giacomo 1-58
16. Via San Giovanni Vecchio 1-116
17. Gradelle San Nicola del Sole 1-29

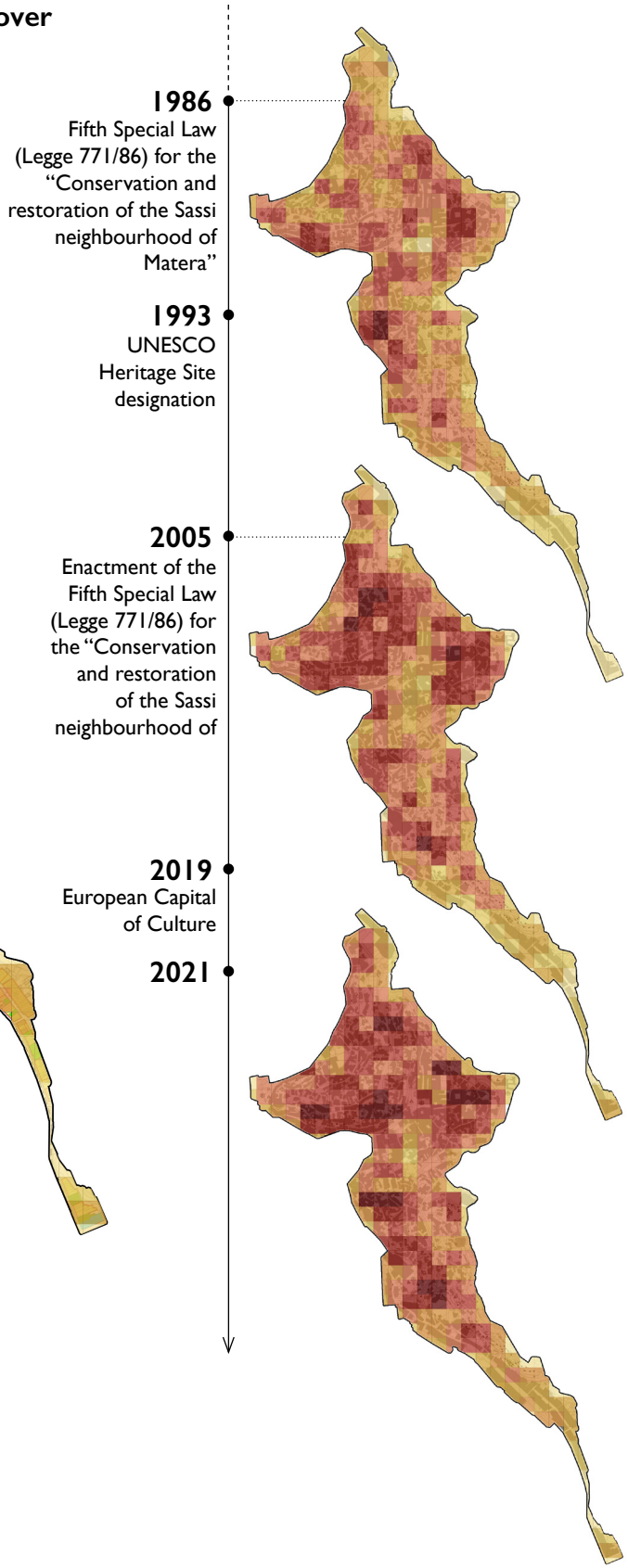


Figure 1. Popular streets overlayed on the 2021 diversity map

Figure 2. The process of diversification analysed in 1986, 2005 and 2021

4.2 The self-destruction of diversity

It is clear from the analysis just presented that urban diversity is far from being a fixed connotation and instead it changes throughout time, resulting in what Baciu and Birchall describe as a process of diversification in their article 'Mapping diversity: From ecology and urban geography to urbanism and culture' (2020).

The gradual increment in diversity that one can clearly observe from the diversity maps for the Sassi neighbourhood (Fig. 2, p. 29), corresponds, as it was shown, to a progressive economic growth of the area, in a mutual reinforcement which closely follows Jacobs's theory: the increase in the number of uses in a given area attracts people which in turn brings economic value and further supports diversity.
However, as Jacobs eloquently anticipated in 1961, this process does not come without complexity, as *'The duplication of the most profitable use is undermining the base of its own attraction, as disproportionate duplication and exaggeration of some single use always does in cities'*. (Jacobs, 1961, p. 245)
In other words, a few more competitive functions will tend to prevail over less competitive ones, replacing them over time. Because of this, some categories of use will gradually disappear, thus reducing the urban diversity index of the areas they originally belonged to. The result of this is alternating cycles of growth and diversification with impoverishment and decay.

In the case of the Sassi, examples of this loss were already acknowledged in 2011, when Toxey reported the public disappointment caused by the conversion of two old flour mills - *Mulino Andrisani and Mulino Padula* - into apartments and a large shopping mall, the former designed in 1987 by Carlo Aymonino, the same architect involved in the 1950s modernist developments around Matera. Named after the functions they replaced, Piazza Mulino and Ex-Mulino Padula, these developments were allowed despite the resistance of the residents, and were partially closed soon after because of their failure to attract people and the consequential acts of vandalism. When Toxey uses the word 'vacuum space' when referring to the shopping mall one can not refrain to relate this connotation to Jacobs' concerns expressed around 'border vacuums' (Jacobs, 1961). Intended as barriers, constituted by either large roads or extensive single uses, these are considered to be detrimental to the attraction of people as well as inherently more

Figure 3. Mulino Padula being dismantled. (Toxey, 2011)
Figure 4. Pierangelo Laterza Fotografo, The shopping mall that replaced the old flourmill, Mulino Andrisani, by Carlo Aymonino, 1987

dangerous than smaller scale, multi-functional areas.
The process of competitive selection in the Sassi was paradoxically intensified by the election as European capital of Culture in 2019, which determined the need to increment the hospitality offer of the Sassi, with hotels and room rentals slowly replacing owner-occupied residential premises (Toxey, 2011). This process has been supported by governmental policy, which enabled in 2016 (39 LR n.5/2016) the conversion - in theory - of any building in Matera, Sassi included, into a hotel, unless specifically removed from the list within 120 days after the disposition. Although most of the Sassi buildings have been removed for their architectural and cultural value from the application of this article, the majority of the other buildings in the historic center outside the Sassi can in theory be converted into hotels without major restrictions.

Whilst increasing the number of hotels does until a certain point result in higher urban diversity indexes, as the diversity maps confirm for the Sassi (Fig. 8, p. 33), past a certain quantity - which depends on the number of existing categories in each location and the size of the newly introduced function- this competitive category starts to replace some of the weaker ones, as explained by Jacobs theory. Although the results of the diversity index analysis for the Sassi suggest that the diversification increase has not changed its trend yet, a question can be posed as to whether the cycle of diversification is closed to reaching its peak and will soon start to decline again, unless strategic policy is introduced to counteract this cycle. What would happen, for example, if next to each hospitality function another one was added, replacing whatever function was previously there? To answer this question, a map was created from the current 2021 uses map, and a new hospitality function was added to the first building to the south of an existing hotel, room rental or B&B. This means simply doubling the hospitality uses. The resulting map is then analysed with the same diversity mapping method used previously. The outcome of this speculation is clear: doubling the number of hospitality buildings starts to reduce the diversity (Fig. 6, p. 32). Where only few uses were originally present, such as along Sasso Caveoso, adding hospitality uses that were not previously there actually increases the diversity of those areas, as it is expected. Despite this, it is still possible to notice the same medium to high diversity clusters within the map that are observed throughout the historic analysis and have been previously highlighted as 'human-capital-rich' areas.

Hospitality forecast 2030

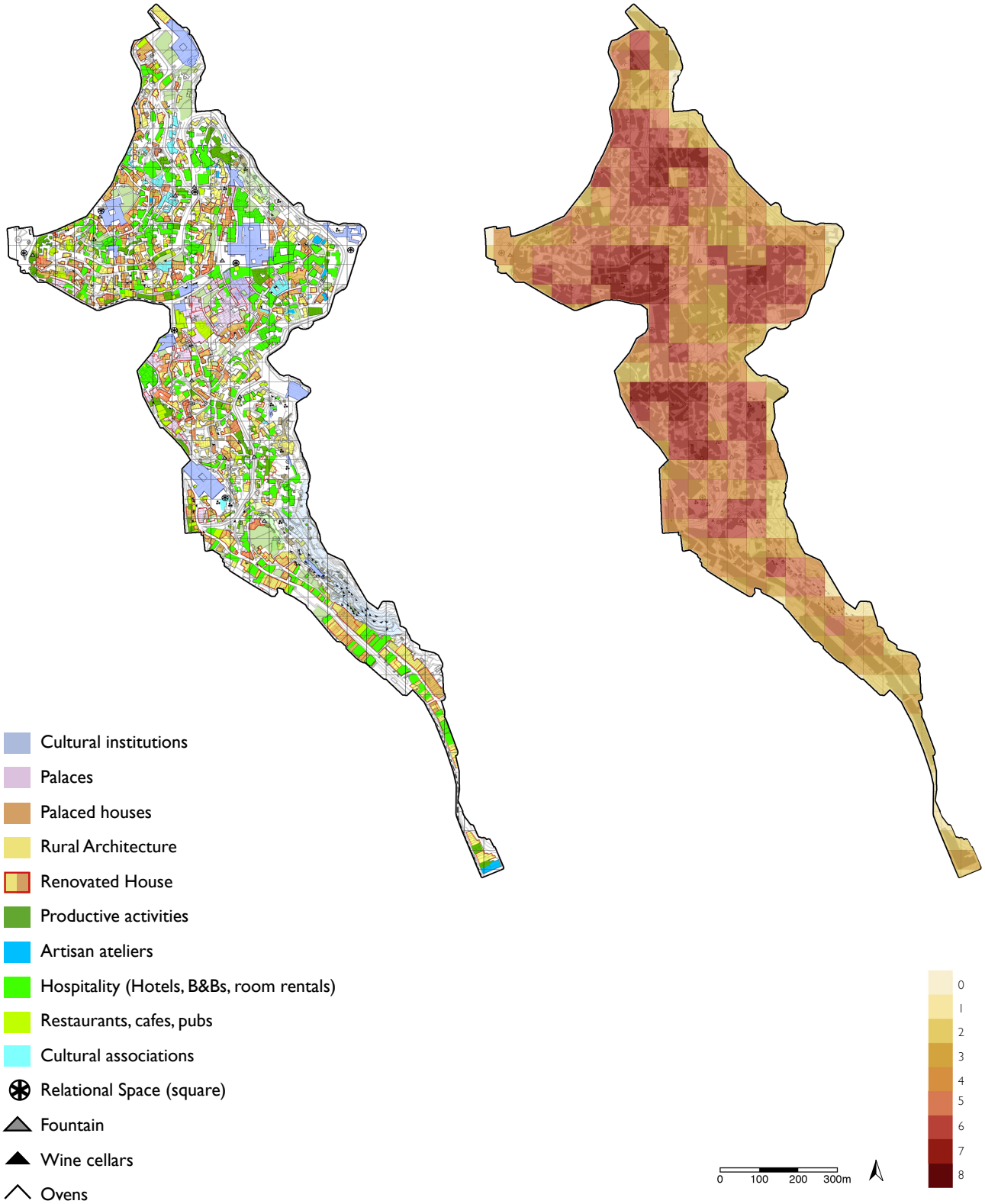
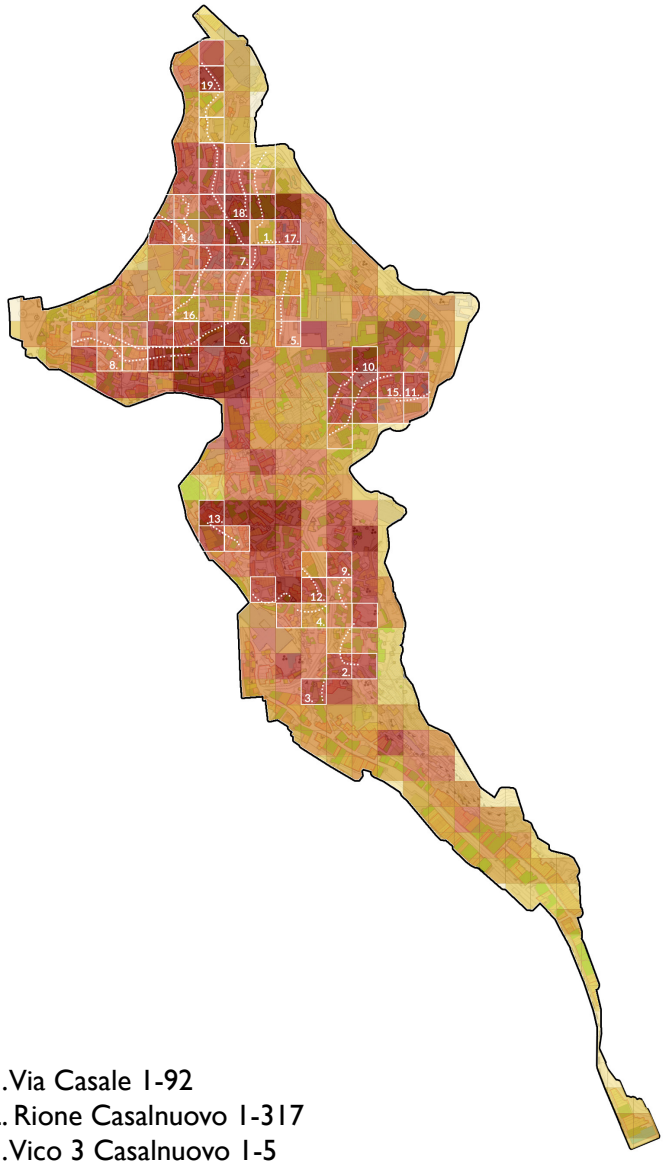


Figure 5. own drawing produced overlaying current Google Maps 2021 data on the 2005 PRG Map (P.G.d.R. Sassi L. 771/86).

Figure 6. Diversity index map 2030 Projection

Overlaying 'human-capital-rich' streets (2019 record) over the 2030 projection diversity map



1. Via Casale 1-92
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17. Gradelle San Nicola del Sole 1-29

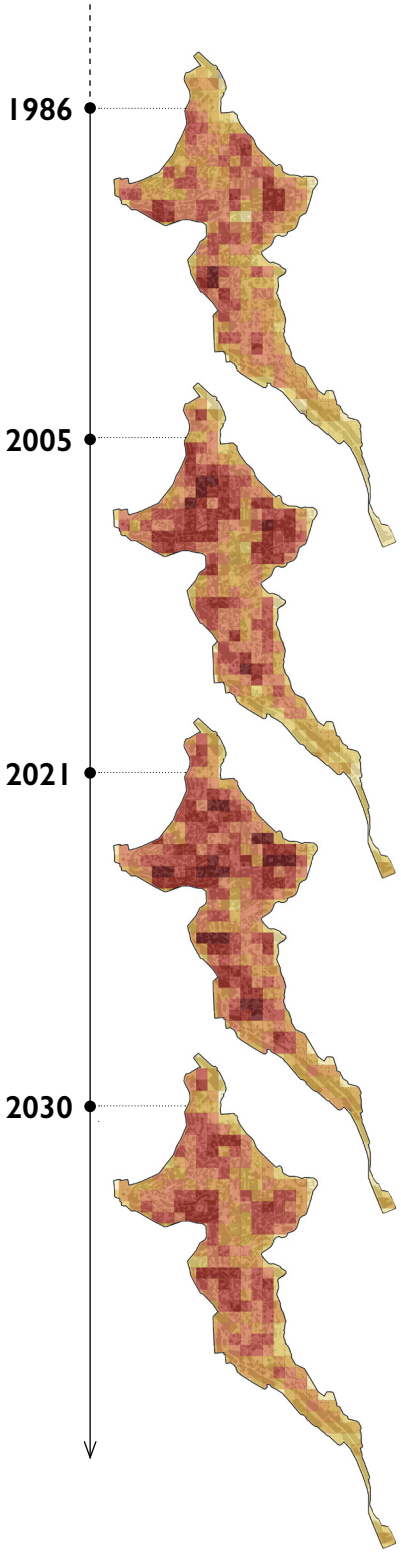

Figure 7. Popular streets overlaid on the 2030 projection diversity map

Figure 8. The process of diversification analysed in 1986, 2005, 2021 and 2030

Conclusions

This paper has tracked changes in distribution and intensity of urban diversity in relation to Matera's areas of growth and decline, to enquire whether there is a correlation between the urban diversification process and economic growth.

The Diversity Index Method presented by Baciu and Birchall in their article (2020) has been used to track diversity in some of the modernist neighbourhoods built around the vernacular city from the 1950s as well as in the Sassi neighbourhood itself, from the start of the preservation movement in 1986 through the present-day. After performing the analysis, the results have been validated through primary and secondary literature as well as historic pictures which confirm that the diversity method is reliable for the identification of diverse and mono-functional areas.

From the results of the research it is clear that the Sassi have experienced progressive increase in diversification from 1986 onwards, whilst the modern neighbourhoods show negligible diversity indexes from their inception.

Although the modernist architects' intention was to retain the qualities of the vernacular urban fabric, they clearly failed in achieving a degree of urban diversity comparable to that of the Sassi.

This might be amongst the factors that have determined their failure to fulfil the example of Italian modernist utopia they were originally intended to and might even be the reason why some of the families refused to move to the modernist blocks, despite the promise of improved living conditions (Potrandolfi, 2002).

Contrary to the modernist Post-war developments, the older vernacular Sassi have progressively grown to represent the city of Matera as a whole in the public perception and they are attracting more and more visitors as well as new investors and young entrepreneurs (Toxey, 2011).

The recent efforts to better integrate the Sassi with the rest of the city, realised through the introduction of productive functions in the Sassi that were previously only present in the Piano (P.G.d.R. Sassi L. 771/86), have been successful in increasing the diversity even in Sasso Caveoso, which has historically been more isolated, as shown in the diversity maps. The same can not be concluded for the modernist heritage, which is more and more at risk of impoverishment and decline, despite its architectural and cultural value.

We hope that this research can be used as a design tool to highlight the areas of Matera that can benefit from the introduction of new functions and those that need to be safeguarded for their rich urban diversity, which often dates back to the Sassi's vernacular set out. Made out of millennia of spontaneous layering of buildings and their in-between spaces, this diversity is heritage of a collective past which speaks of the 'complex order' (Jacobs, 1961) of Matera and of the varied human activity flourishing inside its caved structures.

Figure 9. Typical vicinato structure, 1951, Henri Cartier Bresson from www.sassitour.it

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Figure 18. Screenshot from 'Il villaggio La Martella' cover. Reproduced from Fondazione Adriano Olivetti

Chapter 4

Figure 1. Own drawing.Popular streets overlayed on the 2021 diversity map
Figure 2. Own drawing. The process of diversification analysed in 1986, 2005 and 2021
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Figure 6. Own drawing. Diversity Index Map 2030 Projection
Figure 7. Own drawing. Popular streets overlayed on the 2030 projection Diversity Index Map
Figure 8. Own drawing. The process of diversification analysed in 1986, 2005, 2021 and 2030
Figure 9. Typical vicinato structure, 1951, Henri Cartier Bresson from https://www.sassitour.it/il-vicinato-1-ricordo-della-vita-nei-sassi-tra-nomi-e-immagini/

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