Chapter 7
The Urban-Rural Continuum. The Bioclimatic Approach to Design, Between Past and Future

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Abstract  The rural built environment, as a multiscale whole of human transformations aimed at accommodating agriculture-related activities, prompts various reflections on the bioclimatic approach in architectural design. This contribution, firstly, highlights the theme of the urban-rural continuum (an intermediate and contradictory place, which epitomizes on-going contemporary transformations) in order to demonstrate that the contrast between urban and rural—although it has been used, since ancient times, on both analytical and design level—has not only been superseded, but is also, theoretically, inadequate for identifying the rural built environment. The link between agricultural and construction activities confirms the overcoming of this contrast; a reading in technological terms is proposed, with reference to the spheres of the product and the process, whilst recollecting its remote and deeply rooted cultural origins. The possible dual and contradictory character (vernacular or scholarly) of the rural built environment is illustrated with reference to the specificity of the bioclimatic aspects recognized in traditional buildings (“ante litteram sustainability”), highlighting how the relationship with the site-factor (microclimatic characteristics and local construction culture) was almost annulled in the twentieth century, also creating the basis for a widespread emergency for the quality of the buildings employed in agricultural activities. Touching upon the question of whether the rural building can be a typology distinct from other production buildings, this paper highlights the importance of the relationships with the socio-economic aspects of the agricultural sector, underlining the fact that the main identity for rural buildings in every age, in addition to the role that they play in the landscape, should be a stronger bond with the environmental elements, showing the centrality of the bioclimatic approach in updating the primordial interactions between agriculture and construction. Furthermore, the distinction between vernacular or scholarly character of the rural buildings prompted a reflection on the contemporary epistemological bases of the bioclimatic approach to general architectural design, which risks being
ineffective whether it remains on an empirical level or if it is confined to a hyper-
specialized niche. Finally, the bioclimatic approach is indicated as a common analyt-
ical and design methodological basis, useful for addressing the contradictory nature
of the urban-rural continuum, in the framework of contemporary challenges.

**Keywords** Rural built environment · Urban-rural continuum · Bio-climatic
approach · Tacit and explicit knowledge · Agriculture/Architecture

### 7.1 Beyond the Opposition: The Urban-Rural Continuum

Demographics in recent decades have confirmed the widespread belief that the
twenty-first century would be “the century of the city”. What had already happened
in the areas of the world touched by industrial production models in the previous two
centuries, occurred globally on 23rd May 2007: the earth’s population has become
more urban than rural (NCSU 2007). The “urban tipping point” has driven general
interest toward the city effect, resulting in a convergence of research and studies
regarding high density settlements, especially in view of the very critical conditions
caused by rapid and wide-scale urbanization: evidence of disparities and lack of
social inclusion; chains of violence; poverty; political exclusion; pressure on natural
resources; public health (an aspect dramatically highlighted by the emergency of
COVID-19). The 2030 Agenda for sustainable development of the United Nations,
with goal 11: “Make cities inclusive, safe, resilient and sustainable”, in 2015 under-
lined that 60% of the world population would be concentrated within a few years in
urban areas, especially in developing countries, accentuating the imbalance between
the 3% of land area occupied by cities and 75% of the global CO2 emission produced
by this type of settlement (UN 2015). It is too early to understand whether the long-
term effects of the COVID 19 pandemic, ratified by the WHO in March 2020, will
really affect the trend towards the wide-scale growth of high density settlements;
on the one hand, the demands for social distancing imposed by health precautions
will inspire new models of use for spaces, especially public ones; on the other, the
widespread critical financial conditions and consequent social tensions will affect
urban issues that are already very problematic (also regarding access to food).

In the context of prevailing uncertainty, however, the consolidation of a trend
that is already underway, geared towards overcoming the contrast between the rural
and urban spheres, is sure to emerge quickly. In fact, it has been shown that the
concepts of urban and rural, although they are still pervasive on the theoretical level,
are controversial because they do not correspond to the profound social and environ-
mental transformations of the last centuries and their contrast is less and less useful
in contemporary reality, characterized by interconnections rather than clear separa-
tions (Dymitrow 2018, 2019). However, it could be argued that these concepts are still
current and advantageous in their mutual interaction rather than contrasting, although
they can be traced back to obsolete settlement models, in which the margins between
urbs and rur were certain and clear. In fact, contemporary trends aim at an integrated,
polycentric and balanced development of the territory, leveraging on an urban-rural continuum, trying to smooth over the social, economic and territorial gap by reinforcing sustainable transport and mobility and technological and communication networks (Fig. 7.1).

These trends are grafted on to the fundamental question of the safety and sustainability of food resources; in fact, the production and responsible consumption of food are also linked to closer links between urban and rural areas (UN 2017, pars. 49:95). In addition, the orientation to encourage agricultural crops in urban and peri-urban spaces has now stabilized in much of Europe, becoming an opportunity for urban re-vitalization, while “enhancing a network of social, recreational and commercial activities, private and public space (especially neglected ones) revitalization, shared green spaces creation, integration between built environment and nature, awareness toward sustainable lifestyles, education, social cohesion and new possibilities for a green (productive) infrastructure boosting” (Gallo et al. 2016, p. 104). In order to have lasting and effective consequences, the concept of the urban-rural continuum “demands to be defined not only on a physical and functional level, but also on a cultural one, placing itself in a connection—both tangible and intangible—between tradition and innovation, between well-established knowledge and elements of new tangible cultures” (Losasso 2019, p. 55).
Within contemporary and future scenarios, one can recognize, in the orientation towards sustainability, an effective bonding agent for the urban-rural continuum, bearing in mind that, since very remote times and with continuity, the reference to the natural elements of the specific place was considered essential for the built environment in its links to agricultural activities. This reference, which is the basis for the general bioclimatic approach to architecture (Olgyay 1963), is summarized in its attention, inter alia, to the following elements and aspects: exposure to the solar path and to the dominant air movements; weather conditions; configuration and nature of the soil; vegetation; circularity of flows; passive solutions for well-being. For this reason, identifying and acting on the common basis of agricultural and construction activities today acquires a particular and incisive meaning, regarding the search for greater concreteness in the orientation towards sustainability.

Lewis Mumford, asserting that the city of the dead would be born before the city of the living, linked the beginnings of construction with those of cultivation, fixing them both in the Mesolithic, an era of transition from nomadism to permanent settlements (Mumford 1961, Chap. 1). With this assertion, he indicated the suggestive hypothesis according to which burial places would attract relatives, allowing one to better observe the effects of seasonal cycles on the growth of spontaneous vegetation and creating the conditions for developing the long-term vision and awareness of the link between cause and effect. From these attitudes came the rooted settlement in a specific place, which marked the epochal shift from the cave to the hut, from hunting to breeding, from gathering of spontaneous berries to sowing. Mumford’s hypothesis helps to underline the fact that this transformation probably did not have utilitarian origins, but might have arisen from profound spiritual needs, since endearment to one’s relatives would have brought about settlement, a premise and a condition for agriculture and architecture, in which the improvement of man’s living conditions on earth certainly had its beginnings. Furthermore, certain well-known considerations by Martin Heidegger confirm the relationship between agriculture and construction on the basis of the profound cultural affinities between Building, Dwelling, Thinking. In fact, in the German language the word bauen, which indicates the act of building as erecting something new, also means cultivating, taking care of something that already exists (Heidegger 1954) (Fig. 7.2).

Therefore, after actually settling in a place, one might recognize in a continuous care, a second common basis of agriculture and architecture, the relevance of which is obvious, for the former in its immediacy and, for the latter, a more drawn-out time-span. A more prosaic relationship between the early development of agriculture and architecture has been argued on a technical level on the basis of archaeological evidence, regarding the use of permanent construction materials that have accompanied the progressive domestication of humans, animals and plants (Wilson 2007); for example, the beginnings of arboriculture were related, in particular, to the improvement in metallurgical and textile production techniques, which contributed to the formation of human settlements (Fuller and Stevens 2019).

In addition to the previous interpretations, a technological reading of the relationships between agricultural and construction activities may be even more incisive in demonstrating the role of the bioclimatic approach in the urban-rural continuum. In
terms of product technology, the results of the two activities (mainly food for the former and the built environment for the latter) are indispensable for the survival of human beings and they both reflect, at community and individual level, their sedimented cultural identity (roots of tradition) and evolutionary (modernity and—also innovative—trends). Product technology can also be traced back to the use, in construction, of cultivated produce or agricultural processing waste, frequent in the past and still the object of increasing interest in the field of bio-based solutions for building materials and components (Sandak et al. 2019), aimed at providing an alternative to building materials that erode non-renewable natural resources (Violano 2018). As far as process technology is concerned, one could emphasize the fact that it underlies both agriculture and construction. In fact, they are both, primarily, planned activities, evaluating the objectives to be achieved in relation to the available resources and operational constraints; then they are designed, defining all the aspects involved in the actual activities; then carried out, implementing them as soon as they have been planned and designed; finally practiced, during the consequent operating and management phase.

The procedural dimension is present in all forms of agriculture and construction, from the most complex to the simplest and most direct. For this reason, one
can easily find parallelism between the production processes of these two activities in certain aspects, including: (1) the similar evolution in the transition from pre-industrial tradition to industrialization, which has frayed the connection with the site factor, with which both activities were related, whilst leveraging their awareness of natural aspects (Fig. 7.3); (2) the contemporary trends in agriculture and construction, increasingly focused on environmental sustainability, through short supply chains and a circular economy; (3) the permanence of the artisan dimension.

**Fig. 7.3** Agricultural production has also lost many of the links with the site specificities in the transition from the pre-industrial tradition to industrialization. At the top, the old millstone space; on the left, millstone and oil mill dating back to the nineteenth century; on the right, a machine for pressing grapes in a rural building from the 1970s. Fontanarossa estate in Cerda (Sicily). Photo by courtesy of M. Botti and A. Lo Bello, 2010
of many processes, in which the manual component and the direct transmission of the rules of the art continue to prevail; (4) the coexistence of activities, sometimes conflicting or in contradiction, which are carried out in parallel, on the local and global level, in different ways; (5) the growing awareness of the incisive impact of agriculture and construction on individual and collective health; (6) the consequent importance of the regulatory sphere, from which issues such as monitoring, certification and qualification derive, which increasingly involve operational practices in the agricultural and construction field, with the exception of those falling within the amateur and hobbyism fields.

The urban-rural continuum was identified in the first half of the twentieth century as a research topic (especially focusing on the identifying elements of the two opposite poles) in the context of urban sociology studies (Dewey 1960). In Italy during the 1970s, the urban-rural continuum, in which pieces of the chipped city and of “de-ruralized” countryside coexist, was identified as a significant phenomenon in the evolution of the landscape and human settlements (Assunto 1973; Samonà 1976); it is still an important test-bench for contemporary research regarding the architectural design (Sciascia 2013) and territorial planning (Schroeder et al. 2016). By placing the emphasis on the bioclimatic approach, the perspective shifts from an urban-centric vision to a focus on the rural environment, due to a character that is connected more closely to the natural identity elements of the sites. Obviously, this does not mean seeking the irremediable lost virginity of Eden, with the ambition of ruralizing the whole territory, giving into bucolic chimera and ignoring the need for differentiating settlements with distinct vocations. In fact, the reference to natural elements is a necessary, but not sufficient, condition for fully understanding the bioclimatic approach as a tool of the sustainable design.

The principle of drawing inspiration from natural self-regulation systems is justified by the hypothesis of biophilia as innate leanings in human beings towards other living organisms (Beatley 2011, pp. 45–46), and to the consequent need for continuous contact with nature (Wilson 1984); this takes place by naturalizing the built environment through increasing its plant component. This is connected to the numerous design experiments on the theme of Urban and Building Integrated Vegetation, as a tool for improving air quality and mitigating the heat island phenomenon (Akbari et al. 2016). The concept of biomimetics, in which the reference to living organisms becomes an even more persuasive model for artifacts, inspiring morphologies and processes (Chiesa 2010; Gruber 2011), summarizes more recent developments in the bioclimatic approach. However, by only focusing on the natural factor, paradoxically we remain anchored to the obsolete contrast “city vs country”, now surpassed by the urban-rural continuum. This phenomenon, however, suggests as preferable a bioclimatic approach that includes anthropic and artificial elements, based on the understanding of the complex and dynamic intertwining between natural and human systems, as already asserted back in the 1960s (Olgyay 1963). The bioclimatic approach can thus contribute to defining an analytical and design methodology aimed at positively governing the connections between urban and rural, ensuring food production and water management, with reference to the multiple dimension of sustainability through “Rural Design” (Thorbeck and Troughton 2016).
7.2 Rural Built Environment, Between Tacit and Explicit Knowledge

The rural built environment includes the results of the building interventions aimed at accommodating or facilitating agricultural activities (cultivation and breeding). A close relationship with the natural elements features this kind of built environment, because the individual buildings (intended for the storage or processing of products, the housing of animals or the dwellings of owners and workers), are interrelated with the orographic and hydro-graphic connotations of a wider environmental system: access roads and country roads, fences, rows of trees, hydraulic arrangements (canals and artificial lakes), retaining walls, etc. (Germanà 1999). In its multi-scalar, tangible (physical and material) and intangible (social, cultural, economic) dimensions, the rural built environment can be observed holistically, referring both to the building elements and materials and to the agricultural landscape, i.e. the form that man, in the course and for the purposes of his agricultural productive activities, consciously and systematically gives to the natural landscape [“quella forma che l’uomo, nel corso e ai fini delle sue attività produttive agricole, coscientemente e sistematicamente imprime al paesaggio naturale”] (Sereni 1961, p. 29).

A sort of preconception recurs in many approaches to the rural built environment, namely the fact that it is mainly characterized by being contrasted with urban settlements. In the analytical-cognitive and synthetic-design methodologies, this preconception has often produced a form of reductionism, pressing to circumscribe the rural in a “picturesque” dimension (Fig. 7.4), out of time and far from a precise place, towards which contemporaneity has often felt contrasting feelings: nostalgia (of the good old days) and repulsion (for isolation and backwardness).

The consolidation of the phenomenon of the urban-rural continuum in contemporary and future scenarios, is assisting in a distancing from this contrast, by seeking new approaches and methodologies. In fact, the reductionist tendency to consider the rural construction as “non-urban” and far from contemporary, seems to distinguish most of the studies devoted to the topic, and from which the following stages have been highlighted, with reference to Italy and especially to Sicily (Germanà 1999, par. II.2), summarily reported in chronological order:

1. the years following the unification of Italy (1861), during which the rural buildings became emblematic of the very poor conditions of peasant life and of social inequalities;
2. the decades around 1900, when anthropological-ethnographic studies highlighted the documentary value of the traditional built rural environment that already appeared endangered;
3. the period between the two World Wars, when the rural world became a political priority of the regime, while the architectural world recognized a character of essential functionality in the morphology of the rural buildings (Pagano 1935), which in the same period also became a design theme for new settlements, such as for example in the context of the “restocking” strategies of the Sicilian rural areas;
4. the second post-war period, when human geography studies scrutinized the typological aspects of rural houses throughout Italy, linking them to the evolution of the dominant crop forms (a period during which the dream of
“agrarian reform” was nourished in Sicily, which left visible traces in the hinterland, with the construction of rural villages, today mostly left derelict); (5) the last decades of the twentieth century, in which a clearer bifurcation between contemporary rural buildings and those inherited from tradition arose; on the one hand, the rural built environment relinquished the prerequisites for an important national issue, worthy of cognitive and planning commitment, while new constructions connected to agricultural activities were adopting industrial models, and abandoning all links with local tradition and site specificities (Fig. 7.5); on the other, the awareness of the landscape dimension of the rural building was growing, together with the conservational demand for traditional rural architecture, endangered by the abandonment due to “de-ruralization” or by interventions rather disrespectful of their identity (Fig. 7.6).

There has often been a misunderstanding that has led to confusing the traditional rural built environment with the “vernacular” one, due to the accentuation of certain recurring characteristics (coherence with the specific microclimatic conditions and preference for the available on-site building materials; marked adherence to needs; continuity with construction traditions and contribution to the cultural identity of communities; ICOMOS 1999), and this can be traced back to the same reductionist tendency. This misunderstanding threatens to blur the correlation to agricultural practices as the main and essential peculiarity of the rural built environment; the fact that
Fig. 7.5 Additions to a nineteenth-century “masseria” carried out in the 1970s due to the new needs of agricultural production. Fontanarossa estate in Cerda (Sicily). Ph. by M.L.G. 1987 (on the left) and 2003 (on the right).

Fig. 7.6 The art of getting by has very often justified interventions that have used inexpensive building materials, unsuitable for maintaining the original identity. Baite Cisterna Val Sassina, Barzio (northern Italy). Photo by courtesy of A. Doda, 2020

“Non-Pedigreed Architecture” unifies “vernacular, anonymous, spontaneous, indigenous, rural” (Rudofsky 1964, Preface: page not numbered), may have contributed to increasing the lack of distinction between rural and vernacular.

Similar ambiguity can be dispelled by emphasizing the intangible and procedural aspects of the rural built environment, which—as well as any artifact—is always a cultural expression representative of whoever has produced it (on an individual and social level) (Germanà 2005, p. 460). This clarification is pertinent, considering both the existing (pre-industrial and subsequent) buildings and new buildings. Whenever connected to agricultural practices limited to family sustenance and whenever the
agricultural produce is not intended for sale, the rural built environment can be traced back to the vernacular category (Guillaud 2014, p. 33). On the contrary, when connected to more complex activities, with an economic impact and supported by the agronomic sciences (“primary” productive sector), the rural built environment—as a whole—takes on a character that differs from the free-range vernacular, through being “scholarly” or “learned”. This is because it goes beyond local specificity and derives from a more advanced design intention, based on dedicated technological knowledge and precise cultural references (traditionally, the “Art of building”; today, technical and professional knowledge).

Both on the analytical level (aiming to study the existing traditional or contemporary rural buildings), and on the design level (aiming to define new construction interventions connected to the agricultural activities, from scratch or through recovery) it is essential to distinguish between the vernacular and scholarly natures of the rural buildings, understanding to what extent, depending on the case, they might contrast or coexist. This is necessary, because it helps to understand that the rural building, seen as the result of a production process, may express different epistemological bases. In fact, if the vernacular nature prevails, it can be said that the production process was guided by “tacit knowledge” (Polanyi 1966, Chap. 1), implicitly transmitted through direct experience, within traditional organizational models and linked to specific local contexts. By comparison, if the scholarly nature of the rural building prevails, the signs of an “explicit knowledge”, codified and transmitted in formalized forms, will be identified as the consequence of an effort of objectification, simplification and sharing (Nonaka 1994, p. 16). Regardless of the field of application, understanding how far you can (or should) refer to implicit or rather explicit knowledge, is also important for dealing with the operational aspects of the bioclimatic approach (see the following par. 7.4).

7.3 Bioclimatic Approach to the Traditional and Contemporary Rural Built Environment

The bioclimatic approach is one of the pillars of sustainable architectural design and has been connected to energy aspects, given that—by favouring the use of climatic resources such as sun and wind and exploiting passive systems that leverage only natural physical phenomena—allows one to achieve the well-being of the users of the built environment, minimizing or reducing the mechanical equipment (see for example the “Three-Tier Design Approach” in Lechner 2015IV, p. 9).

In addition to the centrality of the specific place, there are two interrelated conceptions at the basis of this approach: the built environment seen as a “system”, namely a series of mutual interacting intertwined elements (Morin 1977), to be considered “open”, given that the system interweaves dynamic relationships with other systems (the users and the surrounding environment); the built environment seen as an “organism”, organized and structured as a constantly evolving living being (Laborit 1971).
These conceptual foundations are particularly consistent with the field of application of the rural built environment, due to: its adherence to place, its multi-scale identity and its connection to agricultural practices, which are intrinsically focused on living organisms. For this reason, the bioclimatic approach can be applied profitably, adapting to the possible articulations of the theme, starting from the distinction between the existing rural built environment and the new one.

The rural architecture inherited from the pre-industrial tradition has offered numerous insights for focusing the potential of the bioclimatic approach, providing various examples of ante litteram sustainability, despite its deriving from a time when the very idea of sustainability was intrinsically foreign (Germanà 2005; Niglio 2018). In cases where the rural building has a vernacular nature, numerous studies have shown that there are multiple and multidimensional antecedents of today’s orientation towards sustainability (see, for example, the summary of the “Wheel of environmental, socio-cultural and socio-economic sustainable principles” in Carlos et al. 2014, p. 27). The recurring insistence on environmental and bioclimatic characteristics has been indicated as one of the most frequent “shortcomings” in the numerous studies on the vernacular construction, with: the “technological bias”, which has led to the loss of the link between tangible and intangible dimensions; the “romanticized approach”, which prompted insistence on the banal contrast with contemporary constructions; the “essentialist representation”, with the tendency to generalize conclusions regarding circumscribed realities (Vellinga 2014, pp. 4–6).

The bioclimatic approach is an irreplaceable cognitive tool, also in cases where scholarly nature prevails in the rural buildings. In fact, the works of the treatise writers that aimed to provide specific indications on how to design and to build rural constructions and their pertinences, demonstrate that “explicit knowledge” includes numerous references to principles that we would define today as sustainability, which at the time were merely considered to be common sense. The treatises from ancient times contain numerous indications on the best orientation for the various parts of the rural buildings, based on their specific destination (distinguishing between houses, stables, barns, warehouses, etc.), geared towards healthy conditions for humans and animals and for the best conservation of products (for example, cellars in the north and olive oil warehouses in the south) (Micheli 2016). The treaties in the Renaissance period move in the same vein, focusing greater attention to the hierarchization of spaces and emphasizing a different morphological characterization for rural buildings from that in the urban area (Germanà 1999, par. II.1).

In the texts on rural buildings produced after the advent of the capitalist model in agricultural production, attention to bioclimatic factors continues to be present. Given the more recent nature of these literary sources, their interest increases thanks to the possibility of connecting them to contemporary rural buildings and the subsequent ones still existing. For example, this comparison was debated with regard to the “masseria”, a form of rural building widespread in the internal areas of western Sicily especially after the Unification of Italy (1861), linked to wide-scale cultivation and bearing testimony to a decisive historical phase in the agrarian history of the island (Germanà 2005). In the numerous nineteenth-century Sicilian “masserie” (one hundred and fifteen of which have been counted in the Madonie area alone;
D’Amore (2020), some characteristic elements occur that can today be appreciated for their bioclimatic aspects, starting from the articulation of the spaces around one or more courtyards, basically square in shape and often paved with cobblestones. This peculiar spatial layout (in addition to facilitating control of the productive activities and reducing construction costs), offers the possibility of greater protection from external (natural or anthropic) agents, consenting utilization of the spaces and taking into account the shady conditions during daylight hours (Fig. 7.7). The courtyard of the “masseria” can be assimilated to the empty spaces (atrium, patio) around which there revolve typologies recurring in the Mediterranean area since ancient times (Rajapaksha et al. 2018); the consequent, beneficial effects on one’s well-being have been amply demonstrated, in terms of the bioclimatic action of air movement activated by the differential exposure to solar irradiation and by day-night alternation (Sartogo and Calderaro 2008, p. 124).

Contemporary technical literature highlights other elements of the “masseria” connected to the bioclimatic approach, which shift the focus from the vernacular nature of the rural built environment to the scholarly one. In 1871 the Società

**Fig. 7.7** Daylight and shadow within the courtyard of the “masseria”. Fontanarossa estate in Cerda (Sicily). Photo by courtesy of M. Botti, 2010
di Acclimatazione e di Agricoltura di Sicilia [Sicilian Acclimatization and Agriculture Society] made an announcement for the best practical manual that would indicate to the owners the cheapest construction of rural factories needed to build a complete “masseria”, taking into account the conditions of the various districts of Sicily [“miglior manuale pratico che additerà ai proprietari la costruzione più economica delle fabbriche rurali indispensabili a comporre una completa masseria, avuto riguardo alle condizioni delle varie contrade della Sicilia”] (Basile 1873, pp. 1–2). The winning treatise was the one presented by Giovanni La Mensa (La Mensa 1880), who together with others (Tirrito 1881) outlined a series of suggestions in which it is possible to identify certain ideas of ante litteram sustainability (Fig. 7.8). Among these, those that we would today call bioclimatic are listed below: (1) regarding the criteria for the location within the agricultural holdings, the Sicilian manualists highlight proximity to water sources (springs and wells) and salubrity (recommending ventilated sites, well exposed to solar irradiation, protected from the danger of floods and, in the case of proximity to places infested with malaria, safeguarded by a higher altitude and the interposition, not too close to the buildings, of plant barriers—in the suggested form of poplars, linden, mulberry and eucalyptus); (2) as regards the distribution of the spaces according to their specific function, the orientation criteria follow the advice of the ancient treatises, suggesting, for example, locating the warehouses in basements facing east, not subject to sudden temperature changes, which would compromise the conservation of products; (3) regarding indoor environmental conditions, with reference to both humans and animals and the conservation of agricultural products, Sicilian manualists propose solutions appropriate to specific needs and always geared towards low cost and ease of management: in order to remove the moisture from the ground, both in existing buildings and in new ones, it is suggested that a perimeter trench should be dug, deeper than the foundations, sloping down towards a suitable disposal site; (4) in order to obtain adequate ventilation in the buildings, it is suggested that multiple-exposure openings should be provided, to procure controllable air-movement; for the ventilation of the stables, where strong draughts could harm the animals, activation of “cross ventilation” is proposed, with windows opening on two opposite sides (to be opened alternately during the seasons) and vents to be placed lower down (at least two for each window) and also ventilation shafts (La Mensa p. 55 and foll.; Tirrito, p. 41 and foll.).

The bioclimatic approach to the traditional rural built environment offers an important opportunity for a more complete understanding of the reasons that guided original construction; in fact, it shows that the recurring characteristics are not accidental, in aspects attributable both to tacit and to explicit knowledge; it contributes to the environmental performance of this form of architectural heritage, while simultaneously assuming the significance of testimony to the technological culture of the past.

The theme of the recovery of traditional rural buildings in recent decades has been studied in various and wide-ranging aspects, including for example: the need for the definition of specific intervention criteria (Germanà 1999, par. V.1); the formulation of design approaches that can be shared within homogeneous territories, based on knowledge of local construction and architectural aspects (Musso and Franco
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The effectiveness of regional programming (Bosia and Savio 2014); opportunities for enhancing homogeneous typologies on a large scale, integrated with cultural and experiential tourism (D’Amore 2020). Therefore, the bioclimatic aspects are part of a much broader framework of issues to be taken into account in interventions on traditional rural buildings, which are largely associated with reuse, due to the functional obsolescence determined by the evolution of agronomic techniques.

The attention to these aspects does not only concern interventions on rural buildings, but should inspire any building intervention, starting from a preliminary and accurate analysis of the site, with the following precautions: to avoid waterproofing neighbouring land; to encourage all forms of integrated vegetation; to attribute a

Fig. 7.8 Some of the tables accompanying the treatise on the ideal Sicilian “masseria” by Giovanni La Mensa (La Mensa 1880)
correct orientation of the functions; to leverage passive solutions for well-being; to aim to restrict energy consumption with insulating envelopes and shields; to use renewable energy sources; to reduce the use of water during construction and utilization phases; to prefer local materials and durable and maintainable solutions. For the rural built environment of preindustrial origin specifically, the interventions should also bear in mind the way in which the constructive culture that produced them, both in implicit and explicit form, took into account the bioclimal aspects in updating them, rather than deleting them because of careless design choices (Germanà 1999, 2008).

The buildings, considered as a whole, attributable to agricultural activities, in addition to the rural buildings inherited from tradition, include constructions built in recent decades, reflecting the superimposition of the industrial model on agriculture, to the extent of justifying the statement that there no longer exists, if it ever existed, a ‘rural world’, but only an economic and social sector not different from the ‘urban’ one if not for the distribution of the population in the territory, the particular technology and the specific working environment (“non esiste più, se mai è esistito, un ‘mondo rurale’, ma soltanto un settore economico e sociale non diverso da quello ‘urbano’ se non per la distribuzione della popolazione nel territorio, la particolare tecnologia e lo specifico ambiente di lavoro”) (Daneo 1972).

With continued reference to Sicily, this type of built environment is consistent with almost all the buildings constructed in the second half of the twentieth century, because it reflects building production standardized on the various levels of poor architectural quality. As containers without any contextual connection and devoid of cultural identity, these largely prefabricated buildings epitomize significant general problems, in terms of: energy inefficiency; presence of dangerous building materials (asbestos); conditions of advanced degradation due to lack of maintenance, caused by a devastating mix of managerial and financial difficulties. These considerations can be applied to the entire country, and there was no shortage of alarm bells regarding the fact that Italian rural buildings were becoming an undifferentiated amalgam, indifferent to regional traditions, which would soon create a widespread qualitative emergency (Assunto 1973; Maldonado 1977).

In order to resolve this lack of quality, today there is no shortage of technical solutions, supported by an adequate methodological and operational background (redevelopment and maintenance processes, with particular attention to the energy aspects of retro-fitting and integration of renewable energy source systems). What are actually missing, in general are the social, economic and financial preconditions indispensable for a productive and sustainable agricultural reality. The size and seriousness of the issue are summarized by a single data-item, indicative of the radical reorganization of the primary sector: the number of agricultural workers, as a percentage of the whole active Italian population, went from 70% in 1871 to less than 10% in 1994 (Fanfani 2004, p. 135).

The contemporary economic trends involving the primary sector are associated with the theme of newly-built rural constructions (considering only productive buildings and excluding extra urban residences or accommodation facilities), for which there is no shortage of well-known examples, such as the Dominus Winery in Napa
Valley, California (http://dominusestate.com/the-estate/architecture). Completed in 1997 on a project by the architects Jacques Herzog and Pierre De Meuron, the building, after many years, has maintained a seminal value in testifying to the high aesthetic and environmental quality that can be achieved thanks to an architectural design that is attentive to the specificity of the place; it has become iconic owing to the solution of the facade with gabions filled with basalt rocks from the nearby canyon. This technical solution, seen from the outside, contributes to successful insertion into the landscape; seen from the inside, it filters the light and the view towards the surrounding vineyards, as well as contributing to protection from external temperatures. Here it should be stressed that the project is consistent with a corporate philosophy entirely oriented towards sustainability, through a focus on biological aspects, a philosophy that can be applied in contexts beyond the single building: in the control of the natural habitat of the stream that crosses the property; in the adoption of dry-farming techniques; in using “cover crops” to prevent soil erosion and encourage biodiversity, avoiding the use of pesticides; in the predisposition of places for the nesting of birds of prey to oppose the rodents that damage the vineyards (Fig. 7.9).

Within the limits of its particularity, the Dominus Winery is a significant example of the general trend towards sustainability that can be recognized in the most recent rural productive buildings coherently with the actual agricultural practices, but which cannot be considered a specific identifying characteristic. In fact, the use of renewable energy sources with integrated systems, passive solutions for heating, cooling and ventilation, a preference for durable materials and prefabricated elements, are technical solutions that have taken hold globally in almost all new buildings, regardless of function, in the last ten years. The choice of frugal, exposed materials, which might be connected to a “rural” dimension, in search of morphological and functional essentiality, can also be found in numerous contemporary examples, regardless of place and intended use.

This consideration could suggest that the autonomous development of the rural building, which has distanced it from urban models, making it a category in its own right (Gambi 1964, p. 448), has now come to an end; in addition, it could demonstrate how sterile the question is if there is still a “typology” of rural production building, within a more general “typological question”, made problematic by the ever more rapid changes in the forms of use of the built environment (Koch 2014). However, widening our scope from building typology to the role of the rural building in the contemporary landscape, a distinct trace of identity can still be found in buildings playing host to agricultural activities, in which, often in conflictual manner, traditional and more recent buildings come together. For example, precisely by leveraging this common identity, a unitary project was formulated with guidelines geared towards quality as regards salvage operations, the replacement and enlargement of rural buildings in a large area of northern Italy hit by the earthquake in 2012; one criterion among several determined the positioning of buildings with regard to the
Fig. 7.9 The Dominus winery in California is a seminal example of a holistic approach to sustainability, which unites winery design (by Jacques Herzog and Pierre De Meuron) and vineyard management. Images from http://dominusestate.com/the-estate/architecture

orientation of the sun and winds, underlining the importance of this criterion both for sustainability and for adhering to the natural order of the landscape (Marangoni ed. 2013, p. 37).
Although the degree of denaturalization of some agricultural activities is dramatically high (for example, in greenhouses or intensive farming), the need to orientate agriculture towards sustainability is now widely shared by technicians and consumers. The bioclimatic approach will, therefore, play an increasingly central role, adding an item to the evolving picture of the affinities between agricultural and construction activities, which will find tangible expression precisely in the rural built environment taken as a whole.

7.4 Future Scenarios for the Urban-Rural Continuum: The Bioclimatic Bonding Agent

A useful reflection regarding the operational consequences of the bioclimatic approach to architectural design may derive from focusing attention on the rural built environment, taking into account its multidimensional and multi-scale features and—above all—its possible, vernacular or scholarly, character. In fact, in the bioclimatic approach reference can be made to two distinct epistemological bases: one definable as a “vernacular basis” because it is intuitive, empirical, bordering on obviousness and is taken for granted (there is no designer that ignores the theoretical indications as regards the best orientation, except to disregard them at the first design difficulty). The other is definable as a “scholarly basis”, which is reflected in scientific methods formalized decades ago, recently supported by more and more qualified tools (for instance, Chiesa and Grosso 2019); this, however, risks remaining confined within a niche of hyper-specialism, without affecting wider professional and administrative practice. In particular, knowledge of the environmental components of the site, as a precondition of each design action, is often rejected, so as to justify the expression “knowledge gap”, as an obstacle that prevents a wide practical application of the bioclimatic approach (Germanà 2016, p. 276). Due to the interruption in the pre-industrial tradition, uniquely empirical knowledge has now been lost; therefore it is necessary to apply greater leverage on the scholarly dimension, overcoming the barriers between experts and users that prevents any fully technological practice (Pacey 1983) and implementing appropriate actions in the field of education, training and dissemination.

Despite all forecasts, it is not at all certain that the twenty-first century will be the “city century”; instead, it is more likely that it will be the “urban-rural continuum century”. Leaving behind a vision of the “empty world”, a container of unconditional human actions, and finally applying, in practice, the “responsibility principle”, invoked theoretically for decades for technological processes of any nature (Jonas 1979), we have understood that in a sustainable built environment, “built capital” must integrate with “social capital” and “natural capital” (Elmqvist et al. 2013). It is no coincidence that an architect-theorist such as Rem Koolhaas said that the countryside is today the place where future civilization is taking shape in the most radical way and where the pressing questions posed by global issues such as
climate change, migration and conservation of nature may find answers (Koolhaas 2020). This affirmation is deeply rooted in the thoughts of a designer who, after years of disinterest, recognized an increasing new interest in the countryside: “a world formerly dictated by the seasons and the organisation of agriculture is now a toxic mix of genetic experiment, science, industrial nostalgia, seasonal immigration, territorial buying sprees, massive subsidies, incidental inhabitation, tax incentives, investment, political turmoil, in other words more volatile than the most accelerated city. The countryside is an amalgamation of tendencies that are outside our overview and outside our awareness. Our current obsession with only the city is highly irresponsible because you cannot understand the city without understanding the countryside” (Koolhaas 2014).

The urban-rural continuum, with an elusive physicality that goes beyond the previously consolidated categories of thought, condenses the transformations that are taking place in the contemporary world, offering a test bench for all fields of knowledge and for all technological disciplines, as demonstrated by the effort to define a set of integrated “Guiding Principles” for urban-rural linkages (UN-Habitat 2019). Much more than the material aspects, it is the intangible ones that connote this intermediate and contradictory place (such as the effects of digitalization) so decisively. For this reason, a common paradigm such as sustainability may serve to address its contradictions and, in particular, the bioclimatic approach might be considered as both a sort of theoretical and operational bonding agent, because it contributes to creating a common methodology, suitable for tackling many diverse contemporary challenges.

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References

Akbari H et al (2016) Local climate change and urban heat island mitigation techniques—the state of the art. J Civ Eng Manage 22(1):1–16. https://doi.org/10.3846/13923730.2015.1111934

Assunto R (1973) Il Paesaggio e l’estetica. Giannini, Napoli

Basile M (1873) Il caseggiato delle aziende rurali. Trattato agronomico con mescolanze morali e politiche. Tipografia D’Amico, Messina

Beatley T (2011) Biophilic cities: integrating nature into urban design and planning. Island Press, Washington

Bosia D, Savio L (2014) Actions and tools for the conservation and valorisation of rural architecture and landscape. Techne. J Technol Architect Environ 7:87–93. https://doi.org/10.13128/Techne-14536

Carlos GD et al (2014) Research method and operative approach. In: Correia M Dipasquale L Mecca S (eds) VERSUS. Heritage for tomorrow. Vernacular Knowledge for Sustainable Architecture. FUP, Firenze, pp 23–31. Available at https://issuu.com/dida-unifi/docs/versus_fup_google

Chiesa G (2010) Biomimetic: tecnologia e innovazione per l’architettura, English edition (2017) Biomimetics technology and innovation for architecture. CELID, Torino
Chiesa G, Grosso M (2019) A parametric tool for assessing optimal location of buildings according to environmental criteria. In: Sayigh A (ed) Sustainable building for a cleaner environment. Innovative renewable energy. Springer, Cham, pp 115–129. https://doi.org/10.1007/978-3-319-94595-8_11

D’Amore A (2020) Conoscere per conservare e valorizzare. Le masserie quale elemento di sviluppo del territorio delle Madonie. Ph.D. Thesis Università di Palermo

Daneo C (1972) Agricoltura e sviluppo capitalistico in Italia. Einaudi, Torino

Dewey R (1960) The rural-urban continuum: real but relatively unimportant. Am J Sociol 66:60–66. Available at www.jstor.org/stable/2773223

Dymitrow M (2018) Rural/urban: laying bare the controversy. Geographia Polonica 91:375–397. https://doi.org/10.7163/GPoli.0126

Dymitrow M (2019) The concept of ‘Rural’ as a psychosocial process: From concept attainment to concept unlearning. Quaestiones Geographicae 38:15–28. https://doi.org/10.2478/quageo-2019-0036

Elmqvist T, Redman CL, Barthel S, Costanza R (2013) History of urbanization and the missing ecology. In: Elmqvist T et al (eds) Urbanization, biodiversity and ecosystem services: challenges and opportunities: a global assessment. Springer, Dordrecht Heidelberg New York London, pp 13–30. https://doi.org/10.1007/978-94-007-7088-1_2

Fanfani T (2004) La ricostruzione in Italia nel secondo dopoguerra. Provvedimenti e linee guida per la ripresa dell’agricoltura. Rivista di Storia dell’Agricoltura XLIV: 125:154. Available at http://rsa.storiaagricoltura.it/scheda.asp?IDF=119&IDS=6&IDP=1

Fuller DQ, Stevens CJ (2019) Between domestication and civilization: the role of agriculture and arboriculture in the emergence of the first urban societies. Veg Hist Archaeobotany 28:263–282. https://doi.org/10.1007/s00334-019-00727-4

Gallo P, Casazza C, Sala M (2016) Performances and potential of a productive urban green infrastructure. Technè J Technol Architect Environ 11:104–112. https://doi.org/10.13128/techne-18408

Germanà ML (2005) La sostenibilità inconsapevole del costruito rurale tradizionale: l’esempio della masseria siciliana. In: Mecca S, Biondi B (eds) Architectural heritage and sustainable development of small and medium cities in South Mediterranean Regions. Results and strategies of research and cooperation. ETS. Pisa, pp 459–467. Available at http://hdl.handle.net/10447/3207

Germanà ML (2008) Ruolo delle tradizioni costruttive nella salvaguardia del costruito rurale storico. In: Dell’Acqua A, Degli Esposti V, Mochi G (eds) Linguaggio edilizio e sapere costruttivo. Edicom, Monfalcone (GO), pp 733–745. Available at http://hdl.handle.net/10447/35612

Germanà ML (2016) Criteri per la sostenibilità ambientale degli interventi nel centro storico di Modica. In: Trombino G (ed) Modica. Contributi per il recupero e la riqualificazione del centro storico. 40due Edizioni, Palermo, pp 273–292. Available at https://iris.unipa.it/retrieve/handle/10447/201137/342884/Germana_Modica.pdf

Gruber P (2011) Biomimetics in architecture. Architecture of life and buildings. Springer, Verlag Wien

Guillaud H (2014) Defining vernacular architecture. In: Correia M, Dipasquale L, Mecca S (eds) VERSUS. Heritage for tomorrow. Vernacular knowledge for sustainable architecture. FUP, Firenze, p 33. Available at https://issuu.com/dida-unifi/docs/versus_fup_google

Heidegger M (1954) Vorträge und Aufsätze. Neske, Pfullingen. English transl. Hofstadter A. Building dwelling thinking. In: Krell DF (ed) (1993) Martin heidegger: basic writings, revised and expanded edition. Routledge, London, pp 217–65

ICOMOS (1999) Charter on the built vernacular heritage. Available at http://wp.ciav.icomos.org/wp-content/uploads/2019/04/charter-vernacular-en.pdf
Sartogo F, Calderaro V (2008) The Mediterranean: a cool temperate climate. In: Hyde R (ed) Bioclimatic housing. Innovative design for warm climates. Earthscan, London, pp 117–147

Schroeder J, Carta M, Ferretti M, Lino B (eds) (2016) Territories. Rural-urban strategies. Jovis Verlag, Berlin. Available at https://www.jovis.de/en/books/product/territories-rural-urban-strategies.html

Sciascia A (2013) The rough edges of the “expanding town” projects between Palermo and Partinico. FAMagazine 23:42–47. https://doi.org/10.12838/issn.20390491/n23.2013/5

Sereni E (1961), (second edition 1982) Storia del paesaggio agrario italiano. Laterza, Bari. English edition: 2014, Princeton University Press, Princeton

Thorbeck D, Troughton J (2016) Connecting urban and rural futures through rural design. In: Maheshwari B et al (eds) Balanced urban development: options and strategies for liveable cities. Water science and technology library 72, pp 45–55, https://doi.org/10.1007/978-3-319-28112-4_4

Tirrito R (1881) Norme pratiche di architettura rurale per l’agronomo. Tipografia Lo Casto, Palermo

UN United Nations (2015) The 2030 agenda sustainable development goals, goal 11: make cities inclusive, safe, resilient and sustainable. Available at https://www.un.org/sustainabledevelopment/cities/

UN United Nations (2017) Quito declaration on sustainable cities and human settlements for all, in “New Urban Agenda”. Available at http://habitat3.org/the-new-urban-agenda

UN-Habitat United Nations Human Settlements Programme (2019) Urban-rural linkages: guiding principles. Framework for action to advance integrated territorial development. Available at https://urbanrurallinkages.files.wordpress.com/2020/03/url-gp-framework-for-action_english.pdf

Vellinga M (2014) Vernacular architecture and sustainability: two or three lessons. In: Mileto C et al (eds) Vernacular architecture, Towards a sustainable future. CRC Press Taylor & Francis Group, London, pp 3–8

Violano A (2018) Beyond materials: the experimentation of biobased grown materials from mycelia. Techne J Technol Architecture Environ 16:299–307. https://doi.org/10.13128/Techn-e-23029

Wilson EO (1984) Biophilia. The human bond with other species. Harvard University Press, Harvard

Wilson PJ (2007) Agriculture or architecture? The beginnings of domestication. In: Cassidy R, Mullin M (eds) Where the wild things are now. Domestication reconsidered. Bloomsbury Academic Berg, Oxford, pp 101–122. https://doi.org/10.5040/9781474215954