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PROPOSAL FOR A NEW HOUSING MODEL FOR THE INLAND AREAS REGENERATION. THE BIOVILLAGE 4.0

Emanuela D'Andria, Pierfrancesco Fiore, Enrico Sicignano

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Abstract

In addition to cities and metropolises, the European territory is made up of many small settlements, custodians of a vast material and immaterial heritage, very often of great historical, cultural and environmental value. In recent decades, these realities have undergone a significant demographic decline induced by the new requirements of contemporary life: the lack of job opportunities, inadequate infrastructure, and poor essential services have encouraged the population to move to the cities, starting a process of social, cultural and economic marginalisation of rural areas. However, the current environmental crisis and the problems of urban densification are encouraging the birth of a "new perspective" that considers the enhancement of inland areas and small towns as a possible driver for the sustainable development of territories and the definition of a new city-countryside relationship. Therefore, recovering inland areas is becoming an increasingly important necessity, which is leading to the drafting of many plans and interventions aimed at reversing the demographic decline trend. Among the most representative projects, two European strategies are based on the Ecovillage and Smart Villages models. Both models emphasise the role of local communities in deciding what action should be carried out to valorise small towns. However, the modalities and nature of the interventions and their methodological approach are substantially different.

In view of the above, and starting from the analysis of some emblematic case studies, the paper investigates the peculiarities of the Ecovillage and Smart Villages models, with the aim of highlighting their main criticalities and potentials. From the comparison between the two strategies, a new model for the recovery and valorisation of small towns is proposed, which is called BioVillage 4.0.

Keywords

Inner areas, Small towns, Smart Villages, Ecovillages, New regeneration model.

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1. INTRODUCTION

In recent decades, the changing housing and economic needs have favoured the demographic decline in small centres of inland areas which, from being key elements in the territorial organisation, have become "marginal" places. The main causes are the lack of job opportunities, the absence of adequate infrastructure and services, and the distance from urban centres, which have led to the rapid degradation of the local tangible and intangible heritage. Today, the environmental crisis and the current health emergency have encouraged a reconsideration of the role of inland areas, the enhancement of which can promote the sustainable development of territories, rebuilding the lost balance between man and nature and the reciprocal relationship between town and countryside. It is now a consolidated idea that small towns can represent valid alternatives to the models of living in cities and metropolises because they are characterised by healthier rhythms and lifestyles and offer a more organic distribution of anthropic activities throughout the territory. Moreover, these small realities host a vast cultural heritage, a palimpsest of collective identities and memories, which needs to be preserved as a still tangible testimony of the different Countries' history. In order to achieve this, it is essential to set up intervention models that assess issues linked not only to the new possibilities offered by digital technology but also to local traditions, territories' productive vocations, environmental protection, job opportunities for young people, services supply, etc. [1].

Based on these considerations, the paper deals with the issue of small towns regeneration, proposing the characterisation of a new housing model in the light of two strategies adopted in Europe. The contribution is structured in four sections: 1) a general overview of the actions implemented in Europe, with particular attention to the Ecovillage and Smart Villages models; 2) a comparison between the two models previously analysed, highlighting their criticalities and potentials; 3) proposal of an innovative valorisation model, resulting from the critical analysis of the strengths and weaknesses of both Ecovillage and Smart Villages; 4) conclusions that summarise what has been presented, outlining research developments.

2. STRATEGIES FOR THE VALORISATION OF RURAL VILLAGES

In recent years, Europe has been considering the role and potential of inland areas and small towns, proposing several models for their regeneration. Among these, there are: the Bioenergy Villages project, developed in Germany and based on the use of renewable sources for energy independence; the Albergo Diffuso (Widespread hotel), born in Italy in 2004 with the aim of reconverting villages into innovative accommodation structures, extended to the entire historic centre; the Borgo dell'accoglienza (Welcoming village) designed to host and integrate immigrants from different countries; etc. [2]. What is striking about some of these initiatives is the thematic specificity of the interventions. In fact, each project focuses on a single field of action, with aims that involve distinctly individual issues: social, cultural or environmental. Moreover, in most cases, these strategies are "imposed" from the top, without a proper "recognition" phase of the places and their vocations. The result is often not as successful as expected: funds are spent without looking at the real problems of the territories, leading to dissatisfaction with what has been achieved, especially by local communities.

2.1. THE ECOVILLAGE MODEL: PRINCIPLES AND BEST PRACTICES

Among the strategies for enhancing and recovering small towns, the Ecovillage model is particularly significant. It stems from the studies [3–7] on the utopian city developed from the 16th century onwards, which saw collective wellbeing and cooperation between the inhabitants as the key elements for the development of a balanced and happy reality [8]. In parallel with these theories, considerations on the urban layout of the ideal city also emerged, which, in its formal evolution, acquired increasingly geometric and regular features [9].

This long process of theoretical, experimental and empirical studies is linked to the Ecovillage model, which adopts the paradigms of the utopian city, reworking them in a contemporary way with the influence of other theories and cultural movements, mostly oriental. In fact, even before the definition of a univocal and shared terminology of "Ecovillage" [10], the concept of "eco-sustainable community" was already hinged on the studies of the Indian philosopher Sri Aurobindo and the Frenchwoman Mirra Alfassa. The latter, in particular, in 1968, founded the "experimental city" of Auroville, India, with the aim of setting up a "universal city" based on hospitality and inclusion [11].

A significant turning point came in 1991, with the founding of the Global Ecovillage Network (GEN): an international network of ecovillages aimed at supporting and encouraging the evolution of sustainable settlements around the world through cooperation and sharing of experiences. The GEN states that the Ecovillage model is characterised by three main elements: intentionality (i.e., the conscious choice made by each inhabitant when choosing to live in a community with shared ideals), eco-sustainability (i.e., the adoption of low environmental impact lifestyles) and sharing (i.e., the communion of many services and earnings). Furthermore, the different realities can actively engage in agriculture, sustainable resource management and green building [12]. With regard to this last point, the Ecovillage model has developed, over time, two different intervention approaches. The first concerns the construction of new buildings; the second relates to the ecological recovery and reuse of the existing building stock. In this last case, a significant example is that of Torri Superiore, an Italian village recovered in 1983 by two private owners. The aim was to revitalise the old settlement and establish a new community based on the values of eco-sustainability, mutual respect and harmony [13]. To date, about 90% of the buildings in Torri Superiore have been recovered. Thus, dwellings and cultural, production and catering centres were created. All the interventions carried out - in many cases by the inhabitants themselves – have been particularly careful with the existing buildings, respecting the formal structure of the built heritage as well as the typological-constructive characteristics. The materials and technological solutions used are in line with the principles of eco-sustainability, exploiting local resources and renewable energy sources [14].

A different experience is that of the sustainable village of Agios, on the Greek island of Evia, where the Telaithrion project was launched in 2010 to establish a self-managed community that shares the ideals of solidarity, ecology and essentiality. Compared to what was done in Torri Superiori, in this small settlement, the houses were built from the beginning according to the local building tradition, which sees the *yurt* as a distinctive element, characterised by a circular plan and a removable and mobile structure. In fact, the *yurt*'s "foundation" usually consists of a wooden platform, on which a floor made of wooden boards is placed. The load-bearing structure is made up of wooden pillars, while the perimeter closures have different layers, characterised by a rhomboid wooden mesh, on which a cotton cloth, an insulating felt and a waterproof film are overlaid. Permaculture techniques – i.e., ecological methods applied to agricultural production systems aimed at preserving natural ecosystems – are used to manage all agricultural production, and there are courses in land rehabilitation and houses self-building.

The topic of "self-building" is a key element of the Ecovillage model. It concerns not only European examples (such as those already described), but also South American ecological villages. One example is the Argentinian village of Gaia, located near the city of Navarro. Set up by the Gaia Association in 1996, the village covers about 20 hectares of land, most of which is dedicated to permaculture activities while the other part is used for the houses, some of which are newly built, others recovered. The building technique used is that of the traditional *adobe*, i.e. bricks made from a mixture of sand, clay and dried straw, which is highly ecological and has a low environmental and landscape impact. The load-bearing structure is made of wood, while the curtain walls are made of adobe bricks, finished on the outside with a layer of slaked lime mixed with clay. As regards the principles of community life, they are perfectly in line with those already present in the villages of Agios and Torri Superiore, i.e. sharing, self-sufficiency and ecology [15].

2.2. EUROPEAN SMART VILLAGES

Another model, particularly prevalent in Europe, is that of "Smart Villages". Although the origin of the Smart Village concept dates back to 2014, when a few initiatives were implemented in Africa and Asia, in Europe, it emerged in 2016, when a number of stakeholders from rural contexts met in Cork to draw up the main development guidelines for inland areas and small towns [16]. In the light of the considerations raised during this event, in 2017, the European Commission presented the document EU Action for Smart Villages, in which it provided the first definition of "Smart Villages". This definition describes Smart Villages as «rural areas and communities which build on their existing strengths and assets as well as on developing new opportunities. In Smart Villages, traditional and new networks and services are enhanced by means of digital, telecommunication technologies, innovations and the better use of knowledge for the benefit of inhabitants and businesses [...]. The concept of Smart Villages does not propose a one-size-fits-all solution. It is territorially sensitive, based on the needs and potentials of the respective territory and strategy-led, supported by new or existing territorial strategies» [17, p. 3]. The EU Action aims to improve the quality of life in rural areas in order to tackle their increasing depopulation by coordinating a series of actions related to different EU policies, such as rural and regional development, mobility, renewable energy and ICT. In this regard, the document includes the Pilot Project Smart eco-social villages (later shortened to "Smart Villages") among the concrete actions for promoting and supporting the establishment of "smart" communities and small towns. Within this project, in 2018, two online consultations, accompanied by expert workshops, took place, which led to the modification of the previous definition of "Smart Villages" into «communities in rural areas that use innovative solutions to improve their resilience building on local strengths and opportunities. They rely on a participatory approach to develop and implement their strategy to improve their economic, social and/or environmental conditions, in particular by mobilising solutions offered by digital technologies. Smart Villages benefit from cooperation and alliances with other communities and actors in rural and urban areas» [18, p. 60].

In this framework, a key role is played by the European *Network for Rural Development* (ENRD) which, in 2018, established a working group on the topic of smart municipalities (the Thematic Group on Smart Villages). In addition, ENRD included the pilot project, called Smart Village, in the European programme Smart and Competitive Rural Areas. The idea is that of developing proposals and disseminating good practices by creating an open-access platform [19].

To date, there are many examples of "smart" projects that have been implemented, and, for this reason, the ENRD Thematic Group has divided the different initiatives into seven macro areas: Multiservices Hubs; Digital and ICT; Energy and Environment; Mobility; Health and Social care; Education; Culture and Tourism [20]. In each sector, targeted interventions are reported, including the Finnish project "Village Shop: A Meeting Point Of Private And Public Services", which, as part of the "Multiservice Hubs" macro area, involved 12 villages with the aim of innovating the traditional "village shop" by including multiple functions and services, both for residents and tourists.

For the Digital and ICT sector, an interesting example is the Incubating Technological Innovations in Dieuze, which is inserted in the French regional strategy Saulnois Innovation. The project aims to implement social and digital innovation to promote local entrepreneurship and employment. Currently, three lines of action are being developed: *Digital services*, which includes initiatives such as the Smart City Rural and the Lorraine Fab Living Lab; *Renewable energy* with the BioMethane action SAS Seille Environment; *Agro-industrial production*, in which the University of Lorraine drew up projects that are being carried out.

Germany is also developing innovative actions closely linked to the use of digital technology. This is the case of the Smart Countryside Lippe/Höxter initiative aimed at implementing basic services in 16 villages and promoting digital education in a further 26 municipalities. All interventions are decided by/with residents, favouring bottom-up participatory processes. The results saw the creation of a number of digital products: the Digital Village Platform, on which it is possible to order local food and other products, to access news or announcements about events; the "Caring Village", a service dedicated to volunteering; the "Faith Platform", intended for the organisation of religious life; the "Living Platform", for the "smart house"; and the "Digital Education", specifically for training, conferences and cultural activities [21].

3. THE TWO MODELS IN COMPARISON: STRENGTHS AND WEAKNESSES

From the experiences summarised in the previous paragraphs, it is possible to outline both analysed models' main strengths and weaknesses.

With regard to the Ecovillage, the first and crucial strength is the sense of community and sharing of the initiatives promoted by the model. This prerogative, if effectively managed, is a winning element in the enhancement of small towns, as the sense of belonging, closely related to the presence of common values and ideals, induces and motivates the preservation of local identities, producing development.

Another key factor is the "self-building practice", which is implemented not only for the reuse of existing architectural artefacts but also for the construction of new buildings. In both cases, this practice uses environmentally friendly materials and easily removable construction/recovery solutions. In particular, the reuse of the built heritage testifies the model's attention to the reduction of land consumption and the preservation of local morphological and typological-constructive characteristics. All this is supported by the respect for nature, tangible in the ways of cultivating the land, based mainly on the practices of permaculture, co-farming and self-sufficiency. In addition, there is the adoption of clean and renewable energy sources, which, combined with common service areas, guarantee significant economic savings. Also interesting is the joint education of the youngest and the shared care of the elderly. However, it has to be said that, in some cases, the application of the model has led to "closed" realities, with self-referred communities that are not inclined to accept new residents. In addition, the principles of sharing, proximity, self-sufficiency and self-management often give rise to decision-making differences as well as uncomfortable and tiring lifestyles. This is compounded by the lack of use of innovative technologies, which would improve the quality of life, involving both social issues, such as upgrading services, and economic ones, such as developing production activities.

As in the Ecovillage, the analysis of the Smart Villages model highlighted the decisive role of the population in the choice of the valorisation actions that need to be undertaken. Although in both models, the conception, definition and implementation of any intervention are established with local communities, the nature of this participation is different. A first gap can be seen in the fact that, in the Ecovillage, the inhabitants consciously choose to move to a specific place, creating a new reality. In the Smart Village, it is the resident population that takes action to create a "smart" change. This triggers an initial awareness among residents, which, however, results in mostly "narrow" solutions related to one single issue or field of action. Very often, in fact, the outcome of the collected ideas takes the form of mobile phone applications to menage services, the installation of digital connections for first aid, and the technological-digital upgrading of education and mobility. One of the strengths of Smart Villages is the use of innovative technologies to improve the quality of life and the attractiveness and knowledge of territories. It has to be said that this advantage, while on the one hand providing the opportunity to accelerate any development choice, on the other hand, requires the population to be continuously updated on the latest IT/technological possibilities. Also important is the opportunity to establish reciprocal and cooperative relationships between several public authorities or between public and private entities in order to optimise both the allocation of funding and the management of services and infrastructure. Nevertheless, it often happens that in the concrete implementation of such collaborations, conflicts arise between the different administrations or stakeholders involved. In addition to this, the costs of the interventions to be carried out (e.g., large-scale upgrading of digital connections and home automation) are usually higher than those realised in an Ecovillage, where most of the actions are self-made and therefore financially sustainable.

In the light of these considerations, Table 1 summarises the main potentials and criticalities of both models.

	ECOVILLAGE	SMART VILLAGE
Strengths	Strong sense of belonging and community	Bottom-up participatory processes
	Recovery of the existing built heritage	Awareness of the community about the potentials and critical- ities of its territory – "Places awareness"
	Use of materials, technologies and design solutions compati- ble with existing architecture and environment	Active communities aimed at spontaneously identifying local needs, rather than simply chasing available funding
	Use of eco-friendly materials	Use of digital technologies
	Bioclimatic and self-built architecture	Use of energy from renewable sources
	Recovery of traditional activities	Development of local enterprises
	Self-management	Public-private partnerships
	Use of energy from renewable sources	Inter-municipal management of basic services
	Energy saving	Recovery of the existing built heritage
	Consortia for the management and coordination of common services	Accelerating development choices
	Contact with nature	
	Adoption of permaculture practices	
	Adherence to common values and ideals	
	Priority of community interests over those of the individual	
Weaknesses	Tendency to ghettoisation	Mostly "sectoral" interventions
	Difficulties in integrating into the community	Constant updating of the population on new development pos- sibilities and new technologies
	Internal conflicts in community life	Risk of knowledge loss of the most appropriate enhancement goals for the local resources
	Difficulties arising from practising agriculture in a mostly ar- chaic way	Conflicts between the different administrations or stake- holders
	Discomfort due to the lifestyle	Higher implementation/adaptation costs
	Lack of use of innovative technologies	

Tab. 1. Strengths and weaknesses of the Ecovillage and Smart Villages models.

4. AN INNOVATIVE REGENERATION MODEL: THE BIOVILLAGE 4.0

In view of the above, it is clear that both of the analysed models, although widely used, are characterised by a number of critical points: on the one hand, the difficulty of finding a broad consensus within the communities involved in the definition of the actions to be implemented; on the other hand, the need to adopt organic strategies that contemplate systematic interventions in several areas (social, economic, environmental, cultural). It is often the case that, in order to respond to a problem that emerges most strongly, other needs are neglected, which, over time, may acquire greater importance and become real barriers to the development of places. Therefore, it seems useful to structure a model which, based on a careful analysis of the experiences already carried out, highlights their strengths, critically reviewing the actions and detecting the achieved targets. In this sense, it is essential to preserve the community policy of the Ecovillage, together with the co-design process typical of Smart Villages. The population's active participation, well-informed and ready for change, is the starting point for offering real growth prospects. From this awareness, the BioVillage 4.0 model takes form, which, referring to the Ecovillage and Smart Villages models, is characterised by the union of their strengths, thus capturing their potentials and neglecting their disadvantages, as summarised in the following graph (Fig. 1).



Fig. 1. Characterisation of the BioVillage 4.0 model.

The community value, rooted in the link with places, is an essential element of the model to be considered a priority because it is a key component in rebuilding local identities and a sense of belonging. Thus, BioVillage 4.0 starts with a "shared approach", whereby residents work together to achieve common goals. Furthermore, in considering the cornerstones of sustainable development, it seems significant to refer also to the ideals of ecology and low environmental impact typical of the Ecovillage. In this respect, this model includes the use of renewable energy and the reuse of existing buildings to ensure less land consumption. Hence the concept of self-building is valid for both architectural recovery and new constructions. With regard to the first action, special attention is given to the reversibility of the interventions, i.e. the possibility of restoring the original state of the building at any time. The materials used for recovery must be local, highly ecological and recyclable. The respect and preservation of the typological-constructive and formal characteristics of the architectural artefact are essential prerogatives for any type of operation. Even in the case of new constructions, the BioVillage 4.0 model includes buildings made with local materials and construction techniques. In addition, the model is based on the willingness to build new development scenarios starting from young people, directing funding towards the creation of new enterprises and start-ups aimed at testing the combination of traditional practices and digital systems. In particular, the latter can be an integral part of any activity involving the service sector (health, education, mobility) and the production one (agriculture, crafts, etc.), inspired by the Industry 4.0 principles. Innovative technologies can also be used in the residential field, providing home automation and "smart house" solutions. At the same time, it is essential to invest in the generation of renewable energy, both for productive and domestic use.

All the prerogatives described so far outline the layout of the new valorisation model, based on the most relevant elements of the two examined strategies, structured and organised according to the principles of sustainable development. The methodological approach of the BioVillage 4.0 starts by considering the state of places, collecting, both through archival sources and with the help of specific living labs with stakeholders, all the data necessary to build the profile of opportunities and needs to be assessed. Therefore, the model's methodological process can be outlined in 5 steps:

- data collection (direct and indirect sources, living labs, listening and participation workshops, etc.);
- re-elaboration of the collected information, useful for framing problems, needs, potentials, shared imaginaries, collective development trends;
- definition of intervention fields and related funding;
- choice of organic actions working in the selected fields;
- implementation of the identified projects in some pilot areas, with the support and collaboration of local enterprises and cooperatives.

5. CONCLUSIONS

For many centuries, small towns in Europe's inland areas played a crucial role in the organisation of territories, representing the main defensive bastions and strategic nodes of economic exchange. With the industrialisation processes of the 19th and 20th centuries, the exodus from the countryside to the cities became significant, intensifying especially in recent decades, with the manifestation of a considerable demographic decline in inland areas, induced by the new demands of contemporary living. However, more recently, the problems linked to climate change and the increased awareness of health and hygiene issues (see Covid-19 pandemic) have led to a rethinking of man's position on the territory in view of new settlement balances. In this context, small towns in wider areas play a key role, as they are extremely livable, located in places with large green spaces and high environmental quality. Therefore, there is no doubt about the importance of protecting and safeguarding these realities, which are crucial for rebuilding balanced and fair territorial scenarios. For this reason, the European Union and part of the scientific world and institutions are implementing actions and plans aimed at enhancing the inland areas, with a view to protecting resources and promoting the territories' development. A variety of strategies have been adopted, but what emerges is the widespread difficulty in undertaking organic and structured intervention approaches [22]. The need arises to "rethink" places through the ideas of those who live there, equipping them to achieve what they really envisage. This is the premise behind the BioVillage 4.0 model, which establishes resident listening as the starting point for an effective growth strategy. This concept, taken in part from the Smart Villages approach, is integrated here since it is related to the Ecovillage concept of "community making". In fact, the copresence of the listening and community-generating needs leads the inhabitants to "recognise the places" and rebuild their local identities to provide solutions that fully meet their aspirations while overcoming divergent opinions and internal conflicts. Furthermore, there is the need expressed by the model to investigate the reasons behind the depopulation of each specific case, starting from the idea that in order to plan well for the rebirth, it is necessary to understand the decline. In this scenario, the role of new technologies is crucial because, if intelligently addressed, they can be the bridge between the past material and immaterial heritage and the modernity requirements.

In the light of these considerations, the work analysed two emblematic models for the valorisation of small towns, highlighting their potential in order to use them in the characterisation of a new approach: the BioVillage 4.0. This latter, building on the strengths of Smart Villages and Ecovillage and taking into account the sustainability principles, considers the co-design processes and the building of resilient and equitable communities as key elements. Research developments, which are currently being defined, will concern the improvement of the model and its application to case studies.

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