6 Sustainable Disaster Resilience? Tensions Between Socio-economic Recovery and Built Environment Post-disaster Reconstruction in Abruzzo (Italy)

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Abstract

Cities are the most resilient humans' artefact, and this is due to their socio-economic capacities to persist shock and stresses. However, sometimes cities do persist but at the cost of losing key functions and modifying their development trajectories. One of the challenges of disaster resilience is indeed to merge built environment reconstruction and socio-economic (re)development. This chapter aims to explore how to do that in the difficult circumstances of the territories which are losing populations, with ageing societies and economic stagnation. In order to do that, different municipalities of the Abruzzo region are taken as study cases. In 2009 the region was shocked by a severe earthquake, destroying L'Aquila city and surrounding 56 minor centres (44 of these been labelled from the Italian Government as "inner areas", definition that indicates towns that don't have a direct access to essential services such as secondary education or emergency care hospitals). The study analyses 18 post-earthquake

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reconstruction plans in the light of the legislative framework and the status quo 6 years after the disaster. Results emphasise a set of paradoxes and challenges in the application of the normative framework, which aims at the broadest, integrated, long-term socio-economic recovery, but at the same time limiting the space for innovation and actions beyond the built environment reconstruction. However, the out-of-ordinary opportunity offered from the reconstruction funds hides the still potential for building new patterns of development, that need to be tackled by addressing the tensions highlighted in this chapter.

6.1 Post-disaster Sustainable Reconstruction: Bouncing Back or Forward?

Disaster occurs because risk reduction thinking and measures have not been taken into account in the business as usual city management. However, once a disaster has occurred, there is one more challenge than building preventive adaptation or risk mitigation during the recovery phase: set a re-development strategy able to meet sustainable future scenarios. Simplistically speaking, three phases (mutually inclusive and multidimensional) of disaster management correspond to temporal and logical stages of the hazard: mitigation and preparedness (pre-crisis), response (during the crisis, emergency) and recovery (post-crisis) (Lettieri et al. 2009). Recovery consists, after having ensured shelter, medical care, rescue and property protection, of those actions that bring the damaged areas back to previous, or improved conditions. Post-disaster recovery plays a crucial role by linking (potentially) emerging technologies and learning processes, enabling more prepared people and built environments to future shocks, through the recovery process (MacAskill and Guthrie 2014; Yi and Yang 2014). However, from the literature on disaster resilience emerges that much of the work has been done on emergency planning, and less attention has been paid on Post-Disaster Reconstruction (PDR) (Lettieri et al. 2009), which indeed is a relatively new field which received increasing attention during the last decade, as indicated by Yi and Yang (2014). Research in PDR has mainly focused on identifying issues, understanding implications, evaluating impacts and performances rather than spending time on theoretical framing: "As researchers gain a better understanding and establish principles of PDR, they venture into more exploratory quantitative research and have produced some theoretical models (Gotham and Campanella 2011; Haigh and Sutton 2012) and decision-making frameworks (Pyles and Harding 2011)" (Yi & Yang 2014, p. 26). From these, 3 emerging clusters of research topics emerge, which are: (i) stakeholder analysis, (ii) reconstruction approaches and (iii) sustainable reconstruction. This last one is

emphasizing a deeper understanding of how integrated (re)development, sustainable (re)construction and embodied resilience (Yi and Yang 2014) are to be framed within PDR. When the metaphor of resilience is applied in real world practices, usually its meaning is referred to recovery (speed), adaptive or transformative capacities (Folke et al. 2010) with still not clear understanding of the huge difference which those very different perspectives imply, something which has been recently emphasized from different scholars (Chelleri et al. 2015; Elmqvist 2014; Matyas and Pelling 2015). The main difference indeed is expressed through the tension between the perspective calling for resistance (to change) and transformation (for change, hopefully toward sustainability paths). In disasters studies, resilience is indeed considered as a pattern, rather than a normative goal or series of activities (Haigh and Amaratunga 2010; Lengnick-Hall and Beck 2005; Longstaff 2005). Within this pattern, policies, plans and actions have to be framed accordingly two major conceptual approaches reflecting the above mentioned perspectives: (i) maximizing the speed for returning to pre-disaster conditions, or (ii) attaining the counterfactual state (Cheng et al. 2015). The first (bouncing-back) approach is based on a localised and isolated view of recovery intended as restoring the previous status quo, still alive in the memories of the people and with little consideration for alternative planning scenarios. Within this approach, speedy recovery aims to diminish and minimize interruptions to business operations, restore damages, and housing recovery is considered to be the priority (Bruneau et al. 2003; Rathfon et al. 2013). It implies reactive stance (rather than proactive) and a tension between the speed and the quality of recovery, and public participation could be compromised for the sake of speed (Cheng et al. 2015). By contrast, the counterfactual state approach uses the hypothetical counterfactual state (from regional science) in which a comparable location that resembles the affected context, but without disasters happened, set the stage of comparison.

> The first plan is that of the pre-existing city. This is the plan in people's minds, and the pieces are probably still in place: people, maps and human and economic networks. Everyone knows that this plan can work, but only if it is put back quickly while all the pieces are still close at hand. The second plan is the plan for the future. This might be a previous plan or a new recovery plan. It is the conflict between these two plans that must be resolved, and in a short time, so as not to lose the functional capabilities of the first plan and the mitigation and improvement possibilities of the future plan (Olshansky and Chang 2009, p. 207).

It is however worth mentioning that the difference among these approaches is smoothed by the fact that bouncing back is always a jump forward to a "new normal" after the disaster, giving the illusion of having bounced back to something which won't never be the same reality again (Alesch et al. 2009; Chang 2010;

Rubin Claire 2009). Because of this, the pragmatic difference between the above mentioned approaches regards the introduction of innovation and new development trajectories within the PDR processes. This implies reconstruction to bear in mind possible demolitions, new infrastructures and connections, alternative spatial and organizational patterns while setting the (normative) stage for the recovery process. The paper main research question is therefore "how can socio-economic post-disaster recovery and built environment reconstruction be integrated within a synergistic strategy of re-development, in a context characterized by been an "inner area"? In territories in which population is shrinking and economies stagnating, how to set up a sustainable (transformative oriented) post-disaster reconstruction? In many cases, disaster resilience is still framed as a metaphor for bouncing back to a new normal. Which are the barriers to frame resilience within a transformative pattern of development toward a socio-economic sustainable region, and how to overcome them?

As introduced in the next section, in order to address these research questions, we present a case study from Abruzzo region (Italy) which is currently under a huge reconstruction process after the earthquake of 2009.

6.2 The Abruzzo Region and the 2009 Earthquake

The Abruzzo region, even if geographically located in Central Italy, is considered belonging to the economically (under-performance) Southern Italy macro-region.[1] It is indeed one of the least populated Italian regions, counting with 1,307,309 inhabitants, equal to the 2.2% of Italian population (Data from Istat 2011 national population census). From another point of view, Abruzzo is also one of the richest Italian regions in term of natural landscapes (see Fig. 6.1 for a geographical location of the area). The western part is mainly mountainous, shaped by the Apennine chain's highest peaks (hosting the perennial glacial of Gran Sasso massif), while the eastern part is hilly, engraved by numerous riverbeds declining towards the Adriatic Sea.

The collision between the African and Eurasian plates, that shaped Italy's morphology, is the genesis of Abruzzo's frequent and strong seismic activity, documented since the XIV century. In this period of time, the region capital city of

[1]OECD defines Southern Italy as "a macro region whose economic under-performance has been since the Italian re-unification at centre stage in the political agenda and whose per capita GDP is still nowadays around 68% of the Italian one (that of Abruzzo is around 85%)" (OECD 2013, p.30).

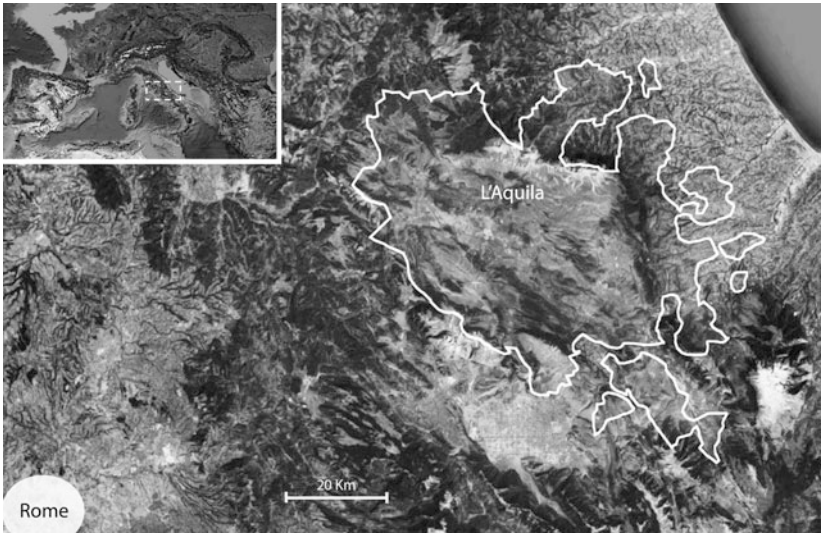

Fig. 6.1 Area highly affected by the 2009 earthquake, called "Seismic Crater" (*Source* elaborated by authors from Google Earth)

L'Aquila has been severely damaged at least 6 times (Bazzurro et al. 2009; Decanini et al. 2013a). The last dramatic earthquake happened on April the 6th 2009 (magnitude 5.9 Richter), hitting 57 municipalities in western and central Abruzzo and leaving 309 dead and 1600 injured people. The territory stricken has been defined as the "Seismic Crater"[2] (see Fig. 6.1). In 2008, just before the earthquake, around 144,000 inhabitants (half of which in L'Aquila) lived in this scattered and polycentric area. After the earthquake, and according to the last census (2011), the population counted for 138,000 inhabitants (still half living in L'Aquila municipality). Damage evaluations (as reported by the Civil Protection one year after the earthquake) revealed that, out of 73,000 damaged buildings inspected, 32.1% of private buildings, 21% of public buildings and 53% of cultural

[2]The seismic crater is constituted by municipalities affected by a MCS intensity equal to or higher than the VI degree, according to macro-seismic surveys carried out by the Department of Civil Protection with the National Institute for Geophysics and Volcanology (Decrees of the Designated Commissioner for Reconstruction no. 3 of 16th April 2009 and no. 11 of 17th July 2009).

heritage were classified as completely inhabitable.[3] Limiting the analysis to the city of L'Aquila, its reconstruction plan declared around 6000 completely inhabitable buildings, equal to the 30% of the damaged buildings of the city (Comune di L'Aquila 2011, p. 110). Data referred only to minor municipalities within the seismic crater (excluding the city of L'Aquila) enlightened the scattered effects of the earthquake, since more than 11,000 buildings have been damaged becoming completely inhabitable. However, in order to get a better understanding of the key socio-economic features behind the earthquake implications and the reconstruction process, it is also important to remark that only the 35% of the destroyed building dispersed along the seismic crater were principal homes, while the 65% of these were second/holidays homes. Also taking the last census of the province of L'Aquila, only the 55% of residential buildings were first homes, being almost the half of the residential building stock used as second houses or for tourism-related purposes. This tendency is descriptive in characterizing Abruzzo's population and economic dynamics, which have always been depending on Rome which represents a very considerable flow catalyst for a wide part of the seismic crater (OECD 2013). Indeed, looking to L'Aquila economic base, its employment is distributed around the industrial sector (31.2%, mainly micro-firms), tertiary sector (public and private services, 65%) and only a minor role played by agriculture (3.8%) (Calafati 2012; OECD 2013). This led to consider the city of L'Aquila as an "administrative city" (OECD 2013, p. 57), surrounded by natural parks and a scattered touristic local system specialized in high mountain and winter sports. After 20 years of constant declines in population (from 1951 to 1971), Abruzzo region slowly recovered, but it's worth noticing that regional differences exist, and the province of L'Aquila was the least populated, since the main population growth has been registered in the region coastal area. Its ageing society within these economic features should be taken in mind as pre-conditions characterizing the region before the earthquake happened, and highly influencing the recovery and rebuilding strategy.

[3]For further data: http://www.protezionecivile.gov.it/jcms/en/emergenza_abruzzo_unanno.wp?request_locale=en.

6.3 Setting the Stage for the Reconstruction: The Legislative and Institutional Framework

The emergency phase started the day of the earthquake, setting the ground for extraordinary procedures and exceptions to laws, and speeding up every administrative process. The Law no. 77/2009[4] and the Decree of the Commissioner for Reconstruction[5] no. 3/2010 set the bases for the normative framework of both the reconstruction process and the simultaneous "temporary housing" emergency programs (hosting part of the almost 49,000 people displaced after the earthquake while the reconstruction was taking place). Due to the extraordinary circumstances, the governance framework built for enabling an effective and coordinated management of emergency and reconstruction phases followed a structure that we have summarized in Fig. 6.2. This introduced new different offices with the aim of coordinating the extraordinary flows of resources involved within the two phases, bridging local administrations and national ones. This was a necessary step since the monetary flows exceed hundreds of times the usual yearly budget that the local administrations were able to manage. As shown in Fig. 6.2, during the emergency phase the Technical Mission Structure (Struttura Tecnica di Missione), which was established on December 2009, was the temporary emergency institution depending directly on the Presidency of the Council of Ministers and coordinating the works and plans of the 56 municipalities of the seismic crater and the city of L'Aquila. When the emergency phase was declared closed, on 31st August 2012, the return to the ordinary public administration saw the Technical Mission Structure been replaced at the local scale by two Special offices for the Reconstruction (one for the city of L'Aquila and another coordinating all the minor municipalities of the crater). These special offices provide technical assistance for public and private reconstruction and maintain the financial monitoring and implementation of interventions, on behalf of the central institutions.

Behind this administrative legal framework, during the emergency phase, while people were rescued and hosted in makeshift shelters and camps, the Executive Decree (O.P.C.M.) no. 3790/2009 of the President of the Council of Ministers (Art. 7) introduced the M.A.P. project (Moduli Abitativi Temporanei, standing for "housing temporary models"), consisting of small wooden buildings for temporary staying (to be built and then demolished). Across L'Aquila municipality 1250 of those units were built, while other 2200 sprawled through the minor municipalities

[4]Earlier Decree-Law no. 39 of 28th April 2009.

[5]The Commissioner for Reconstruction was the President of Abruzzo Region from 1st February 2010 (O.P.C.M. no. 3790/2009) to 31st August 2012 (Law no. 134/2012).

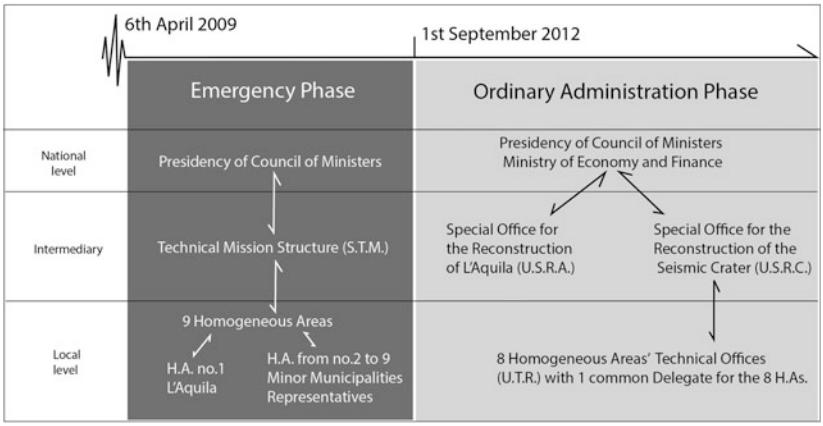

Fig. 6.2 Governance Framework for the emergency and reconstruction phases (*Source* by authors)

of the seismic crater. At the same time, the Law no. 77/2009 (Art 2) introduced a more ambitious project, named C.A.S.E. (Sustainable and Ecology-compatible Anti-seismic Complex). This program was conceived to provide longer term accommodations thanks to 185 new buildings, distributed through 19 sites hosting from 1000 to 1500 persons each, and spread only in the municipality of L'Aquila. These mini-settlements, full-equipped with proper infrastructures and used for temporary housing during the emergency phase, were declared to be re-usable for other scopes in the future, as a buffer for innovation and services for the municipality. In just a year, on June 2010, around 49,000 people were assisted in their accommodation needs, through the different temporary housing programs (18,600 people) or through benefitting a public subsidy to find an alternative housing solution autonomously (26,000 inhabitants chose this option).[6]

Simultaneously to that, the same Law 77 also defined the Reconstruction Plans, conceived as extra-ordinary planning instruments for guiding the reconstruction process for all the Crater's centres and towns damaged by the earthquake. The strategic guidelines for the post-disaster reconstruction were (Art. 14, 5-bis):

[6]On April 2014 data showed 23,000 people still assisted for their accommodation needs: 18,000 in L'Aquila and 5000 in the other municipalities. Data retrieved from: http://www.commissarioperlaricostruzione.it/content/download/1983/21073/file/Report%20popolazione%20post-sisma%2014_12.pdf; http://www.usra.it/wp-content/uploads/2014/05/SituazioneAlloggiativaAprile2014.pdf.

1. To ensure social and economic recovery
2. To promote urban redevelopment
3. To facilitate the return of inhabitants into their houses.

These aims were reinforced by the Decree of the Commissioner for Reconstruction no. 3/2010 (considered the legislative backbone of the reconstruction), which Art. 1 states: "general criteria for the reconstruction process support coordination and integration of initiatives fostering a territorial and inter-municipal vision" taking into account "functions and relations that are appropriate to establish, strengthen or modify between the capital city (L'Aquila) and other settlements of the surrounding area". This in order to "ensure the social and economic recovery, housing redevelopment and harmonic reconstruction of urban settlements and productive facilities in the areas affected by the earthquake", More pragmatically, in order to meet such integrated and strategic visions for the post-disaster reconstruction, it framed "the reinforcement of local territorial systems, identifying homogeneous areas in terms of strategic sectors of intervention" and highlighted the key role played by an "improvement of the environmental, historical and cultural networks; the rationalization of regional and urban mobility; capillarity and efficiency of infrastructure networks and services".

As illustrated in Fig. 6.3, "Homogeneous Areas" have been framed as optimal territorial and administrative entities to coordinate and synergistically address inter-municipalities reconstruction plans. The 56 municipalities of the seismic crater were organized in 8 homogenous areas through negotiations and agreements among the mayors. The administrative boundaries of the municipalities weren't affected by this re-organization, since homogenous areas represented a form of "temporary clustering" of municipalities with no normative authority as institutional bodies. Each of the 8 homogeneous areas has a leader municipality that represents the area and a dedicated technical office (U.T.R., as showed in Fig. 6.2). These new entities represented a significant innovation in the model of governance established to foster inter-municipality and regional coherence to the post-disaster reconstruction. Also, this was a chance to better coordinate the urban system regeneration at the regional scale, by linking the reconstruction of L'Aquila (which municipality has been assigned to represent 1 homogeneous area per se, apart from the other 8) and the minor municipalities of the seismic crater.

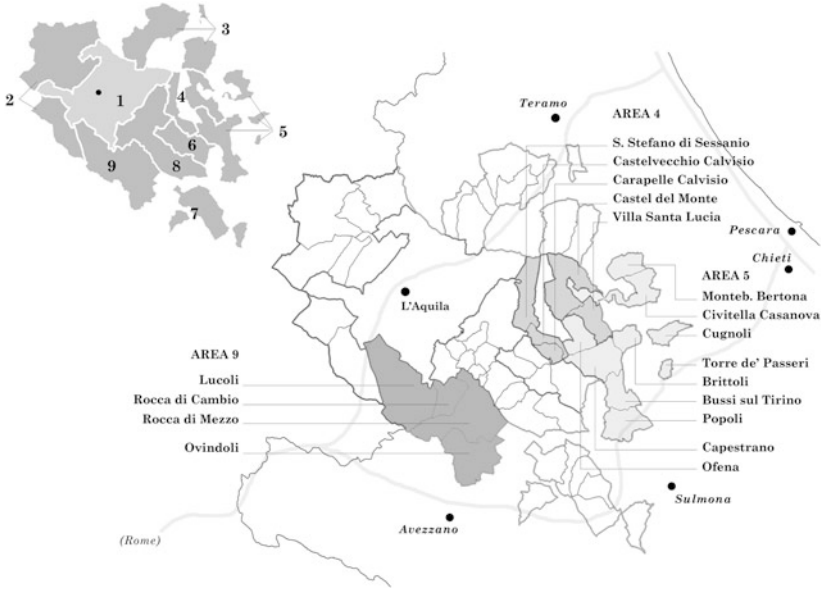

Fig. 6.3 Framing of the "Homogeneous Areas". On the *left*, the homogeneous areas and on the *right*, the municipalities belonging to areas 4, 5 and 9 (focus of this study) (*Source* by authors)

6.4 The Post-disaster Reconstruction Plans: Integrated Strategies, Ambitions and Guidelines from Different Areas of the Seismic Crater

6.4.1 Where to Plan?

The goals and aims of the Reconstruction Plans were established by the legislative framework, accordingly to the laws mentioned in the previous section. Looking to the pragmatic and practical side of the operationalization of those laws, it is key to notice where and how the reconstruction processes took place, after the seismic crater has been reassembled administratively through homogeneous areas. Indeed, notwithstanding the seismic crater identifies the most damaged municipalities, the reconstruction plans have to be designed within areas identified by specific "perimeters" (defined perimetrazioni), according to the Art. 1 of the Decree no.

3/2010. These perimeters were designed from the civil protection corps after a critical assessment of the post-earthquake built environment conditions (then revised and approved by every Mayor and the Presidents of Province and Region), and circumscribed the parts of the towns with particular historical, artistic and environmental values, and severely damaged by the earthquake. Most of the times, these areas were equivalent to the historical centres. The purpose of such delimitation of the plans was to guarantee a consistent planning process while recovering of the most valuable parts of the settlements, prioritizing investments. Outside these boundaries, so in the peripheral areas of the towns, the reconstruction process followed different and autonomous regulations. No plan was requested, and the reconstruction was fostered intervening on every built aggregate (or on every single independent building), according to technological, architectural and economic criteria assigned depending on the level of damage. Many criticisms against the necessity of putting in places the reconstruction plans (giving them a formal planning value) have been raised both from the city of L'Aquila and the minor towns. These plans were not recognised as necessary planning tools, and indicted of slowing down the speed of the reconstruction process. Indeed, six years after the earthquake, 9 out of 55 reconstruction plans have still not been approved by the city Councils (11 approved in 2012; 10 approved in 2013; 17 approved in 2014; 8 approved in 2015).

Because of such peculiar framework for the reconstruction plans, we selected 3 Homogeneous Areas (namely Areas 4, 5 and 9) because these have been the only areas that commissioned the design of the plans for the entire homogenous area to the same external consultor agency (or university).[7] This selection should help us in guaranteeing the analysis of coherent territorial strategies, designed for different municipalities belonging to the same area. On the contrary, in other areas all the municipalities' plans have been commissioned to different consultants, generating a less organic thinking in shaping recovery strategies at the mid-scale level.

[7]The groups to whom the plans have been commissioned are: Area 4 to a consortium made from the University of Padua and National Council of Research, with the collaboration of Polytechnic University of Milan and Sapienza University of Rome for Area 4 (exception: the town of Carapelle Calvisio designated a group of professionals); University of Chieti-Pescara for Area 5 (exception: the town of Capestrano designated a group of professionals); Sapienza University of Rome for Area 9.

6.5 Understanding Previous Conditions: Socio-economic Features Behind the Physical Damages

It seems relevant for the purpose of this chapter, to outline the socio-economic features characterizing the selected areas in order to better understand the implication of the reconstruction processes on the development trajectories of these territories. The 3 selected areas are not neighbouring (as shown in Fig. 6.3). While Areas 4 and 5 are on the east side of L'Aquila, foothills between the mountains Gran Sasso and Majella, Area 9 is south of L'Aquila and it is mainly a mountain area. The villages of Area 4 lie below the Gran Sasso Mountain (set between 850 m of elevation above sea level and 1300), while Area 5 is composed of five hilly villages and only two valley settlements. Southern L'Aquila, the villages of Area 9 are split within two plateaus (at 1400 m of elevation) and a valley, only recently connected with a tunnel in order to foster further development and better connection among difference municipalities. In general, the most of the municipalities of the seismic crater are characterized by an already small population (see Table 6.1), which declined strongly after the Second World War. The municipalities of Area 5 are the most populated (4 of the 7 municipalities have more than 1500 inhabitants) also due to their connections with the coastal urban systems. As reported in Table 6.1, the population data make sense also of the ageing Index (which we calculated dividing people >60 years and young people <18): we highlighted the obvious decrease in population and increase in its ageing before and after the earthquake, with the exception of some municipalities hosting special services which contributed to maintain or to increase the population after the disaster.

The presence of two National Parks contributed to contain villages development around the historical centres, and to encourage touristic activities. Differences are minimal among the 3 selected homogenous areas, been the most of the villages characterized by small centres living on (winter) tourism, sheep breeding (production of wool, cheese and meat) and the cultivation of some geographically protected origin crop (small and medium size enterprises dedicated to olive oil, wheat, lentils or wine). Among these, Santo Stefano di Sessanio (Area 4) is one of the very few cases in which several foreign investments have supported the restoration of the village's historical centre in order to increase tourism in connection with sustainable agriculture practices. On the contrary, only a few municipalities belonging to the Area 5 present a more urban nature, thanks to the presence of manufacturing activities near to the main mobility infrastructures. In

Table 6.1 Population and ageing index for Homogeneous Areas 4, 5 and 9

	Before the earthquake 2001		After the earthquake 2011	
	Population	Ageing Index	Population	Ageing Index
Homogeneous Area 4				
Carapelle Calvisio (now Area 6)	95	171%	85	236%
Castelvecchio Calvisio (now Area 6)	198	500%	159	300%
Castel del Monte	527	498%	447	670%
Santo Stefano di Sessanio	118	540%	111	500%
Villa Santa Lucia degli Abruzzi	206	1389%	141	1517%
Homogeneous Area 5				
Brittoli	415	381%	335	345%
Bussi sul Tirino	2977	188%	2636	261%
Civitella Casanova	2057	214%	1875	231%
Cugnoli	1669	135%	1590	180%
Montebello di Bertona	1120	214%	1023	268%
Popoli	5566	163%	5450	183%
Torre de' Passeri	3161	136%	3174	148%
Capestrano	960	420%	895	399%
Ofena	611	409%	527	465%
Homogeneous Area 9				
Lucoli	944	296%	1019	206%
Ovindoli	1200	166%	1190	246%
Rocca di Cambio	447	310%	504	348%
Rocca di Mezzo	1426	301%	1468	295%
Reference value for **Abruzzo** Region				158%
Reference value for **Italy**				144%

Source Elaborated by the authors using ISTAT data from the two national population Census (2001 and 2011).

fact, only in Bussi sul Tirino and Montebello di Bertona (Area 5) the secondary sector is the pillar of the economic base due to the presence of a proper industrial pole. Many villages of Area 9 are characterized by well-maintained historical centres as well as by diffused hotels and holiday homes in the surroundings. This kind of urban development was mainly due to winter tourism and sports, diffused in the area since the second half of the last century.

Looking to the damages suffered by these municipalities, in order to think about which implications and consequences could have had the earthquake on the local economies, the effects are very diversified. In some cases, only a few extreme damages occurred, concentrated in particularly vulnerable built aggregates or urban fabrics. In Castel del Monte or Santo Stefano di Sessanio the earthquake damaged mainly worship places and towers, symbols of the city.[8] In the historical centres of Brittoli, Bussi sul Tirino and Civitella Casanova the damages were severe but concentrated in areas with pre-existing hydrogeological criticality. In Ovindoli and Rocca di Mezzo the percentage of extremely damaged buildings is less than 25% of all the built heritage involved in the plans. On the contrary, in other centres, the damages were spread, like in Rocca di Cambio, Lucoli or Castelvecchio Calvisio, with more than 40% of buildings seriously damaged. Other heavily damaged villages are Cugnoli, Montebello di Bertona, Ofena, Popoli. However, the damages to underground infrastructures and pipeline networks (mainly water and drainage systems) have been dramatically contributing to the need of re-thinking how the built environment was supported by obsolete infrastructures and services.

6.5.1 The Reconstruction Plans: What and How

We have analysed the 15 plans of the municipalities belonging to the 3 homogeneous areas. Notwithstanding specific features of the plans, common themes structuring the reconstruction process and re-development trajectories are outlined in this section. Such common aspects can be due to numerous commonalities that these territories share, or because of the institutional and legislative framework put in place after the earthquake, as well as due to forms of policy mobility or because all the plans were designed by consortiums of university research groups.

All the plans propose a multidisciplinary and multiscale approach, notwithstanding been normative only within the before mentioned perimeters ("perimetrazioni") within

[8]It is believed that the collapse of the Medicea Tower of Santo Stefano di Sessanio was due to 20th century renovations on the tower's observation platform: the original wooden deck was replaced by a structure made of reinforced concrete.

the town centres. Responding to the requests of the legislative frameworks and of the Technical Mission Structure, the core elements of the plans are groups of prescriptive documents (technical reports and maps) indicating categories of interventions on building units, open spaces and infrastructures, regulatory standard for implementation, budget estimates. In addition to the prescriptive documents, the plans contain pilot projects or proposal of regenerations generally dedicated to the entire town, as well as strategic visions elaborated for the entire homogeneous area (or wide parts of it) interpreted as a unitary territorial system.

However, one of the main goals of the plans is to answer the third aim of the reconstruction process according to Law no. 77/2009, which is "the recovery of built heritage according to the most adequate anti-seismic standards[9] and the reduction of overall urban risk". The restoration of damaged historical urban fabrics is associated with the definition of a system of safe routes and areas ("lifelines") to improve the performance of urban and territorial systems in case of emergency (Decanini et al. 2013b; Di Venosa 2012). All the plans indeed refuse an approach oriented only to the restoration of pre-existing conditions: the reconstruction process should represent a moment of both conservation and recovery of local peculiarities, both as moment to meet the necessities of contemporary living introducing transformations and enhancement in technological and ecological terms (Caravaggi 2013; Clementi 2012; Università degli Studi di Padova et al. 2012b). Coherently, all the plans propose an enhancement of technological networks, both to repair damages and improve their functionality, both to foster a necessary overall technological reorganization and upgrade, because infrastructural fallacies augment social and economic marginality.

The will of exploiting the intervention on buildings, networks and open spaces as occasion to promote general urban redevelopment (second principle of Law 77) is openly affirmed in all the plans. This goal has lead mainly to shift from the restoration of the most valuable built heritage to the restoration of broad urban morphologies of these ancient centres, together with projects of revitalization and re-design of public spaces, often tiny and abandoned (Imbroglini 2013). The projects aim at recovering spaces and objects together with the introduction of new uses, in a difficult balance between conservation of the historical centres and transformation to make these places more comfortable and accessible for all. For instance, areas planned as emergency management sites are open urban green

[9]To coordinate the improvement of safety measures and energy efficiency of building units with the restoration of listed buildings reinterpreting local building traditions has been a challenge for the reconstruction in the entire crater.

spaces or places for social gathering "in times of peace", so to guarantee their maintenance and ordinary liveability.

The themes related to the first principle of Law 77 ("ensure social and economic recovery") have been translated mainly as general realm of interventions: promoting naturalistic tourism, improving the relations between settlements and surrounding landscape encouraging agriculture. All the plans advocate the necessity for structural policies to reach such a broad goal, starting from a deeper inter-municipal coordination to re-balance the fragilities of single municipalities, up to a reflection about the general relations among L'Aquila area, Rome and Pescara. The inadequate level of services offered to companies and citizens make these places less and less attractive for investors and future inhabitants. For improving the quality of life, especially of current elderly population, different plans propose a reinforcement of local welfare to be accomplished by integrated systems of services at over-municipal scale. Tourism and sustainable agriculture are stated as interconnected key sectors addressed by the plans in terms of relaunching the economic base of these places, based on the idea of sustaining "a territory of high quality" embedding the reconstruction also of "cultural values" (Caravaggi 2014; Università degli Studi di Padova et al. 2012a). The richness of these landscapes makes these places particularly suited to naturalistic tourism, as it already exists in these areas. In all the plans, the relation among these little and isolate towns and their landscape plays a basilar role in characterizing the reconstruction processes (Angrilli 2012; Imbroglini 2014). The plans suggest to strengthen and develop tourism and decrease the existing seasonality of it by proposing more contemporary models of tourism. This is particularly evident in the plans for Area 9: in this area winter tourism and skiing activities are still core elements of the local economic base, but the necessity of offering a wider touristic offer is strongly affirmed. The plans of these three homogenous areas suggest exploiting the reconstruction phase to improve accommodation facilities and local marketing, for instance through specific projects of conservation and recovery of the historical heritage, stressing the local specificities of these medieval settlements. To enhance landscape fruition and accessibility to parks exploiting the strategic location of the towns is a common goal of the projects. On the other hand, sustainable agriculture oriented to strengthen local traditional products seems to represent an opportunity to reduce hydrogeological instabilities, maintaining biodiversity and landscapes. Proposals of promoting forestry and farming don't have a relevant role in these strategies, except for some example in Area 9 dedicated to specific activities of this kind, while the crater has a huge availability of woods and grazing lands (Commissario delegato per la ricostruzione Presidente della Regione Abruzzo—Struttura Tecnica di Missione 2010, pp. 28–30, 36). Only Area 5

proposes stronger actions on manufacturing sectors, due to former and existing activities in Bussi sul Tirino and Popoli areas and the presence of important mobility infrastructures helping connections with coastal areas.

6.6 Discussion: Paradoxes and Challenges Within the Post-disaster Reconstruction Process

As up-packed in the introduction, disaster resilience deals with different complementary facets (Folke et al. 2010), in which short-term priorities should be merged with longer term recovery goals, aiming at local and regional sustainability (Matyas and Pelling 2015). This tension between conservative versus transformative resilience approaches (Chelleri et al. 2015; Elmqvist 2014) highlights the challenge in operationalizing disaster resilience through regional sustainability, rather than the mere recovery of the damages within the physical reconstruction processes. The need of addressing this issue is emerging also from the scientific literature, which demonstrates that within the phases of disasters management (preparedness/mitigation, response and recovery), post-disaster reconstruction (in which the transformative pattern could take place) only recently received the deserved attention (Yi and Yang 2014). Learning processes, for instance, are essential elements for a long-term sustainable recovery (as illustrated by MacAskill and Guthrie 2014; Oliver-Smith 1991; Smith and Wenger 2007), but are the most neglected aspects within disasters management studies (Lettieri et al. 2009). In this chapter, we emphasize the opportunities for learning, reviewing and adjustment respect to the reconstruction process in order to meet a sustainable recovery path. From the results of the analyses of different reconstruction plans different tensions emerge, and are discussed in this section.

The legislation issued after the earthquake entrusted the reconstruction process of broad purposes, both short-term and long-term goals. Despite the broad scopes, namely "strengthening local and regional systems, improving environmental, historical and cultural networks; rationalizing regional and urban mobility; enhancing capillarity and efficiency of infrastructure networks and services" (Decree 3/2010), the same legislation limited the reconstruction plans to specific areas ("perimetrazioni"), classified as "areas A", which corresponds to the historical centres according to the Italian planning legislation (Fioritto 2013). Consequently, the reconstruction plans are binding only inside these boundaries, notwithstanding the ambitions of presenting multi-scale and inter-municipal strategies of re-development (as guideline for future development). The long-term integrated and transformative purposes of the plans have been strongly influenced

not only by these perimeters, but also by the need of containing the public expenditure and the cost of reconstruction. Indeed, the budget estimation for the reconstruction was guided mainly by the damage levels and consequent standardized costs for the respective restorations, and by the absolute priority of reconstructing private houses. This normative mainstream rule of "causality nexus"[10] between damages and compensations sets the ground for what (and where) the reconstruction budget could be employed. Few case-by-case exceptions have broken this causality nexus role, mainly for underground and street infrastructures. The need of strategically combining reconstruction funds with other funds-programs or public-private partnership for long-term transition has been generally stated also by the plans' designers (Caravaggi 2013; Clementi 2012). However, here we find the main challenges of post-disaster sustainable reconstruction in depressed areas: how should we operate within inner areas (losing population, with a dramatic ageing index and without the potential and capacities to attract investors and coordinating international or European funding) with a reconstruction budget strictly related to defined perimeters and framed within a causality nexus? How could longer term and integrated redevelopment strategies boosting socio-economic recovery be put in place?

The inter-municipality cooperation established with the introduction of homogeneous areas represents the opportunity for innovative governance processes and for reducing planning fragmentation. The "obligation (and right) to take joint decisions, and provide lists of priorities" (Caravaggi 2013, p. 29) have been an element enhancing inter-municipal long-term cooperation in the light of the principle of a socio-economic recovery (Commissario delegato per la ricostruzione Presidente della Regione Abruzzo—Struttura Tecnica di Missione 2010, p. 79; OECD 2013, p. 12). This kind of institutional cooperation has a very weak tradition in Italy: the organization in homogeneous areas was controversial, in practice, as demonstrated by areas in which every municipality assigned the designing of its own plan to different professionals or researchers.[11] Furthermore, since homogenous areas have no normative authority as institutional bodies but are only unions of different municipalities joined for temporary necessities, the development projects proposed for large territorial scales have to be considered only scenarios and guidelines without any mandatory role.

Although all these challenges in applying what the legislative framework defined as "ensuring socioeconomic recovery", the laws' more detailed

[10]See Law no. 77/2009, Art. 1.

[11]Caravaggi defines the homogeneous areas as "an apparatus capable of bringing out possible alliances and unavoidable contrasts" (Caravaggi 2013, p. 29).

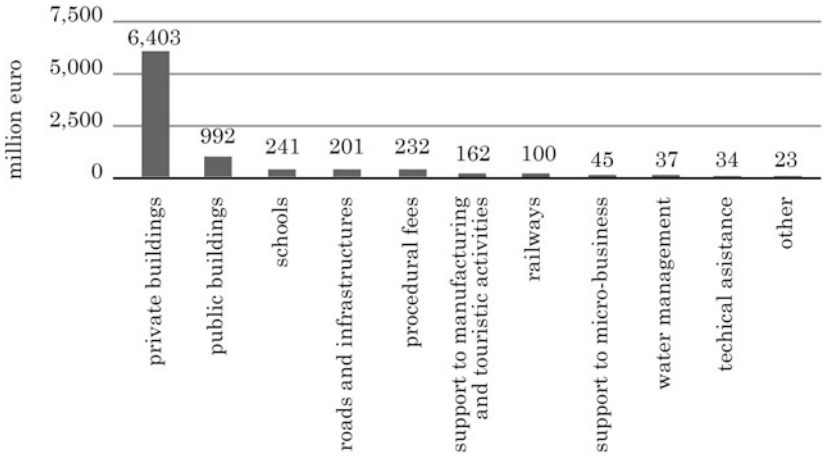

Fig. 6.4 Reconstruction funds divided for intervention sector between April 2009 and December 2015 (*Source* elaborated by the authors from the Assignments of the Inter-ministerial Committee for Economic Planning for Post-earthquake Reconstruction in Abruzzo. http://www.programmazioneeconomica.gov.it/2015/12/30/ricostruire-labruzzo-3/)

specifications about "returning home and enhancing urban quality" have been more easily integrated and developed into the plans, by addressing the microscale risk reduction in ordinary planning through safer urbanistic codes and design measures (Di Venosa 2012; Fioritto 2013). The priority given to these objectives can be easily deduced out from the funding scheme for the reconstruction (summarized in Fig. 6.4): from April 2009 to December 2015 the Italian government allocated more than 8.4 billion euros for the reconstruction, of which 76% were allocated for the reconstruction of private buildings and 12% for public buildings. Only a remaining 12% has been allocated among school building, streets and infrastructures, sustain to industry and research, railways and technical supports.

On the other hand, the lack of specific policy guidelines, economic planning tools and strategic visions dedicated to the overall system of the seismic crater has affected even more the potential role of the reconstruction plans of each homogeneous area. Even when the local plans have sustained institutional, technical and scientific ambitions to promote transformative projects and the introduction of new urban functions (refusing the logic that the reconstruction could be just the sum of interventions), the actual possibilities of implementing long-term transformative visions were weakened by these paradoxes (causality nexus—narrow perimeters of intervention—lack of shared overall projects).

Notwithstanding these challenges, the reconstruction plans here analysed have tried to reinforce local existing resources and ongoing tendencies proposing more sustainable or efficient development paths. In their sections dedicated to economic recovery, the plans focus mainly on sustainable agriculture and natural-based tourism. However, the foundations and sustainability of those engines for development presents rooted weaknesses, since historically agriculture didn't find very suitable conditions in these mountain areas (not adequate soil, adverse climatic conditions) and tourism is part of the economic base of only some villages, which cases suffer from a very seasonal and therefore unsustainable revenues.

6.7 Conclusion

This chapter introduced the challenges in operationalizing a sustainable post-disaster resilience approach. Taking a sample of 15 municipalities' reconstruction plans out of the 56 minor municipalities affected by the dramatic 2009 earthquake in Abruzzo the study outlines the limits, on the ground, of the reconstruction strategies in meeting a socio-economic relaunch of the area.

As mentioned in the introduction, resilience in its metaphorical meaning does not guide its application in the real world practices, which are biased from different (sometime conflicting) approaches, oriented toward conservation or transformation. Disaster resilience literature contains indeed two major conceptual approaches to measuring recovery, reflecting this existing tension between conservation and transformation: (i) returning to pre-disaster conditions; and (ii) attaining the counterfactual state (Cheng et al. 2015). The first approach aims at rebuilding the pre-existing city as in people memories. The second approach outlines a plan for the future, which could embrace different degrees of change. As Olshansky and Chang remark, "it is the conflict between these two plans that must be resolved, and in a short time, so as not to lose the functional capabilities of the first plan and the mitigation and improvement possibilities of the future plan" (Olshansky and Chang 2009, p. 207). The tensions between the first and the second approaches are but the ones between the concepts of reconstruction (re-building actions) versus re-development (catalysing higher returns to investment in innovation, technology transfer, better practices and institutional strengthening for long-term sustainability). Also, from Olshansky and Chang's quote, the key issue of timing emerges. After the earthquake, people and institutions shared willingness to plan for a better future asking to act "promptly but rightfully" (as noticed in many other post-disaster cases through the literature, see Clementi 2012). However, if such timing is delayed by postponing the design and implementation of the plans (as

happened in several municipalities of the crater) new stresses and lack of energy, interest and trust in the institutions are the natural consequences, negatively influencing the possibility of merging development and rebuilding.

In this chapter cases the diverging trajectories of the development potential and the physical rebuilding have to be justified through a series of challenges, and paradoxes, once the legislative framework for the reconstruction was put in practice on the ground. As discussed in the previous section, one inconsistency could be seen within the delimitation of the areas where the plans have normative power (and budget) versus the broadness of the goal of the Law no. 77/2009 and Decree no. 3/2010, mentioning to ensure socio-economic recovery. In line with this, the causality nexus, between the damage suffered because of the earthquake effect and the budget for reconstruction, did not facilitate to set a re-development strategy. Finally, there has been a lack of an overall strategy (for the whole seismic crater) driving and integrating the homogeneous areas' plans. That said, even if addressing such paradoxes and challenges, the most still unresolved issue is how to better merge re-development and reconstruction in a shrinking territory. In this case study indeed, the municipalities present an ageing index up to 10 times the Italian and regional score, and unfortunately demonstrated an insufficient entrepreneurial spirit and institutional capacities to deal with complex issues. If from one side indeed, it has been critical the role played from the analyzed plans, in providing longer term and integrated development strategies and guidelines (notwithstanding the causality nexus and delimitation of the areas), from the other side the need of complementing the reconstruction funds with other resources, to be found outside the system, requires a set of capacities which these territories lack. Finally, a high risk is represented from mismatching the economic recovery (economic performance) due to the "recycling" of activities and labor forces into the construction sector, that is currently the wealthiest economy due to the reconstruction process itself and that will last for a decade. This chapter has contributed with a descriptive and qualitative approach to explore the "on the ground" causes which inhibit longer term sustainable reconstruction processes. However, much more work has to be done in order to understand which strategies, tools and regulation could assist shrinking territories in setting up sounding and sustainable re-development post-disaster trajectories.

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