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ENVIRONMENTAL AND ECONOMIC SUSTAINABILITY OF THE QUARRIES SYSTEM IN THE METROPOLITAN AREA OF BARI

Vincenzo Paolo BAGNATO, Giovanna MANGIALARDI & Alessandro REINA

Polytechnic of Bari - Department of Sciences of Civil Engineering and Architecture - Via Orabona, 4 - Bari, Italy
Corresponding author: bagnato@bdfarchitetti.it

EXTENDED ABSTRACT

Il caso studio oggetto del presente contributo si colloca nell'area metropolitana di Bari, Città Metropolitana tra quelle previste nell'ambito del disegno per il riordino delle Province così come programmato dalla Legge Delrio n. 56 del 07/04/2014 "Disposizioni sulle città metropolitane, sulle Province, sulle unioni e fusioni di Comuni", che immagina, per dieci città italiane, la costruzione di un processo d'innovazione amministrativa avente come fondamento lo sviluppo strategico del territorio metropolitano e come generale finalità istituzionale la "cura dello sviluppo strategico del territorio metropolitano; la promozione e la gestione integrata dei servizi, delle infrastrutture e delle reti di comunicazione d'interesse della città metropolitana e la cura delle relazioni istituzionali afferenti al proprio livello, ivi comprese quelle con le città e le aree metropolitane europee".

I nuovi "Enti Territoriali di Area Vasta" sono chiamati ad adottare e ad aggiornare il proprio piano strategico metropolitano curando la pianificazione territoriale in termini d'infrastrutture, sviluppando gestioni coordinate dei servizi pubblici, sistemi e strutture per la mobilità e la viabilità, coordinando la pianificazione urbanistica e promuovendo lo sviluppo economico e sociale del territorio.

La Città Metropolitana di Bari viene ufficialmente istituita l'1 gennaio 2015 quale nuovo ente di area vasta con un'estensione coincidente con quella dell'omonima nuova provincia risultante dalla divisione con la BAT (Barletta, Andria, Trani): una sistema definito da una robusta armatura urbana policentrica costituita da 41 comuni, di cui numerosi di significativa dimensione, disposti lungo due corone intorno al capoluogo, in rapporto di complementarietà con il sistema degli spazi aperti della campagna e della natura. Tale territorio risulta caratterizzato da una forte interazione socio-economica delle comunità che vi insistono e di ricchezza storico-culturale e paesaggistico-ambientale, sebbene in alcuni settori siano ravvisabili fenomeni di eccessiva diffusione insediativa (in particolare nell'ambito costiero e lungo le principali direttrici infrastrutturali) e consumo di suolo causati dalla tendenza alla saldatura tra i centri abitati contigui.

In questo complesso scenario territoriale vi è ormai la consapevolezza, di recente diffusasi tra i principali attori pubblici e privati, che sia necessario sostenere e incentivare con nuove modalità il processo d'innovazione rispetto ai diversi settori delle funzioni della regione urbana della Terra di Bari. Tale processo, secondo le nuove direzioni interpretative sia progettuali che gestionali, passa obbligatoriamente attraverso il miglioramento dell'efficacia delle politiche territoriali a fronte di scenari di mutazione sempre più veloci e di vantaggi localizzativi via via più bisognosi di interventi di valorizzazione, con la finalità di evitare la compromissione ulteriore della tradizionale qualità dei contesti locali a cui viene riconosciuta, seppur a livello potenziale, una forte valenza culturale.

La configurazione morfologica e paesaggistica di questo territorio costituisce pertanto una complessa quanto unica e peculiare struttura reticolare di sistemi ambientali, da quello urbano a quello periurbano, da quello infrastrutturale a quello agricolo, ecc., tra cui si inserisce l'arcipelago dei luoghi dell'estrazione (per la maggior parte costituito da cave abbandonate) che rappresenta attualmente uno dei pochi ambiti ancora non del tutto interessati da concrete strategie di rigenerazione, interne o esterne rispetto al processo produttivo: ciò a dispetto del ruolo assunto dall'attività estrattiva nell'economia regionale e dell'incidenza formale e ambientale delle cave e dei ravaneti (cioè degli accumuli dei residui di estrazione) nell'attuale configurazione del sistema paesaggistico regionale. Nonostante la sostanziale assenza di azioni volte al recupero delle cave abbandonate e al riuso dei materiali di scarto, è del tutto evidente il ruolo strategico del sistema delle cave per la definizione di innovativi criteri di sostenibilità economica e ambientale per l'intero territorio pugliese. Partendo da questa consapevolezza, il presente contributo intende fornire una nuova chiave di lettura delle questioni relative alla rigenerazione del sistema delle cave nell'Area Metropolitana di Bari attraverso un approccio critico che, cominciando dall'analisi delle potenzialità morfologiche e ambientali di questo complesso e delicato sistema ambientale e delle sue relazioni con gli altri sistemi del medesimo contesto geografico, possa individuare plausibili strategie atte a riattivarne nuovi cicli di vita attraverso azioni mirate al riuso, alla riduzione e al riciclo.

ABSTRACT

The case study is the Metropolitan Area of Bari, one of the metropolitan cities indicated by the reform of the italian provinces, as planned by Law nr. 56 of 7th of April 2014 "Dispositions on the metropolitan cities, provinces and unions or fusions of municipalities (Legge Delrio)", that imagines, for ten metropolitan cities in Italy, the construction of an administrative and institutional process that could innovate the metropolitan territories with a strategic development approach.

The new "Territorial Authorities of the wide areas" will need to take and actualize the Strategic Metropolitan Plan with a territorial planning looking more closely at infrastructures, coordinated management of the public services, development of mobility and viability systems and structures, coordination of urban planning, promotion of economic and social development, strenghtening the information and digital systems.

The Metropolitan City of Bari is a wide area with a strong polycentric weave constituted by 41 municipalities, some of them having a significant dimension, placed around the regional capital and organized in two coronas supplementary to the open spaces of the country side, sometimes compromised with a situation of sprawl and land consumption, due to the tendence of the urban center to join together.

Key Words: *quarries, sustainability, technology, metropolitan area, wastes, Bari, Apulia*

NEW STRATEGIES AND APPROACHES FOR THE ENVIRONMENTAL AND ECONOMIC SUSTAINABILITY IN THE METROPOLITAN AREA OF BARI

The metropolitan city of Bari as a landscape interactive system

General framework

The Metropolitan Area of Bari is one of the metropolitan cities indicated by the reform of the italian provinces, as planned by Law nr. 56 of 7 April 2014 "Dispositions on the metropolitan cities, provinces and unions or fusions of municipalities (Legge Delrio)", that imagines, for ten metropolitan cities in Italy, the construction of a new administrative and institutional process that could innovate the metropolitan territories with a strategic development approach (Fig. 1)

In particular, The Delrio Law previews, for ten metropolitan italian urban contexts, always taking into account the institutional relationship between all the italian and european metropolitan cities, the construction, for each of them, of an administrative and institutionally innovative process: Bari, together with Turin, Milan, Venice, Genoa, Bologna, Florence, Naples, Reggio Calabria and Rome, as general statutory objectives, must have the responsability for the metropolitan territory's strategic development, for the promotion and management of integrated services, infrastructures and communication networks, and in general for all those aspects that could be points of interest for the whole metropolitan context.

In the complexity of this scenario, there is now a deep awareness on the relationship between the main public actors and the private ones, and on how could be necessary to support processes of innovation in different sectors and with different funcions in the entire municipality of Bari.

This new approach comes out from a strategy that wants to improve the effectiveness of the territorial policies following the rapidly changing scenarios and locational advantages with measures and actions able to prevent impairment in the traditional quality of the local mediterranean contexts, as the Metropolitan Area of Bari is: the new territorial authorities, called "Wide Areas", will need to take and actualize the Strategic Metropolitan Plan with a territorial planning that more closely looks at specific services and requirements such as infrastructures, coordinated management of public services, mobility systems and viability structures development, urban planning coordination, promotion of economic and social development, information and digital systems' strenghtening.

The Metropolitan City of Bari, officially established on 1 Jenuary 2015, is actually a wide area with a strong polycentric weave constituted by 41 municipalities, some of them having a significant dimension, placed around the City and organized in two coronas supplementary to the open spaces of the country side, and by a complex system of open spaces (nature and campaign). This system is marked sometimes by different forms of drosscapes, expecially along the coastline and the main infrastructural elements, becuause of the situations of sprawl and land consumption due to the tendence of the main urban centers to join together one to each other; but, in general, the whole territorial system is characterized by deep socio-economic interactions between the communities and by a common historical, cultural and environmental background (Berger, 2007).

According to the proposals of the New Landscape Plan of Apulia Region, approved with D.G.R. nr. 176 of 16 february 2015, the Metropolitan City of Bari has peculiar landscape characters, well defined by the landscape ambits of the PPTR (Regional Territorial Landscape Plan), that represents a regional land use planning in line with the national "Codice dei Beni Culturali e del Paesaggio" (c. 2 art. 135). The 11 ambits of the PPTR are landscape systems at a sub-regional territorial scale with specific relationships between the physical, environmental, historical and social components of all the elements defining a longstanding identity. Between them, for example, there is the ambit of "Central Apulia", characterized by the olive-growing plain of the North Barese, the Bari lock, the radial system of ravines and by the landscape of orchards; very important is also the ambit of "Alta Murgia", characterized by the Murgia High Plain, the Fossa Bradanica and the Saddle of Gioia del Colle (Fig. 2).

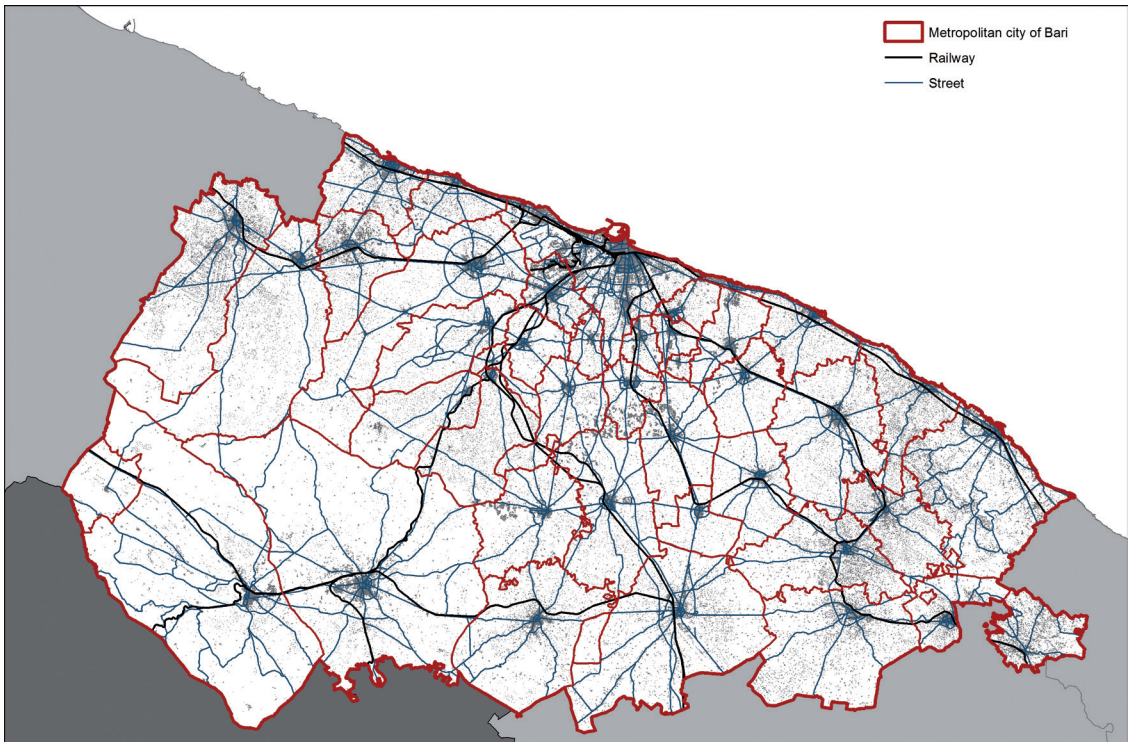

Fig. 1 - The Metropolitan City of Bari. Infrastructures

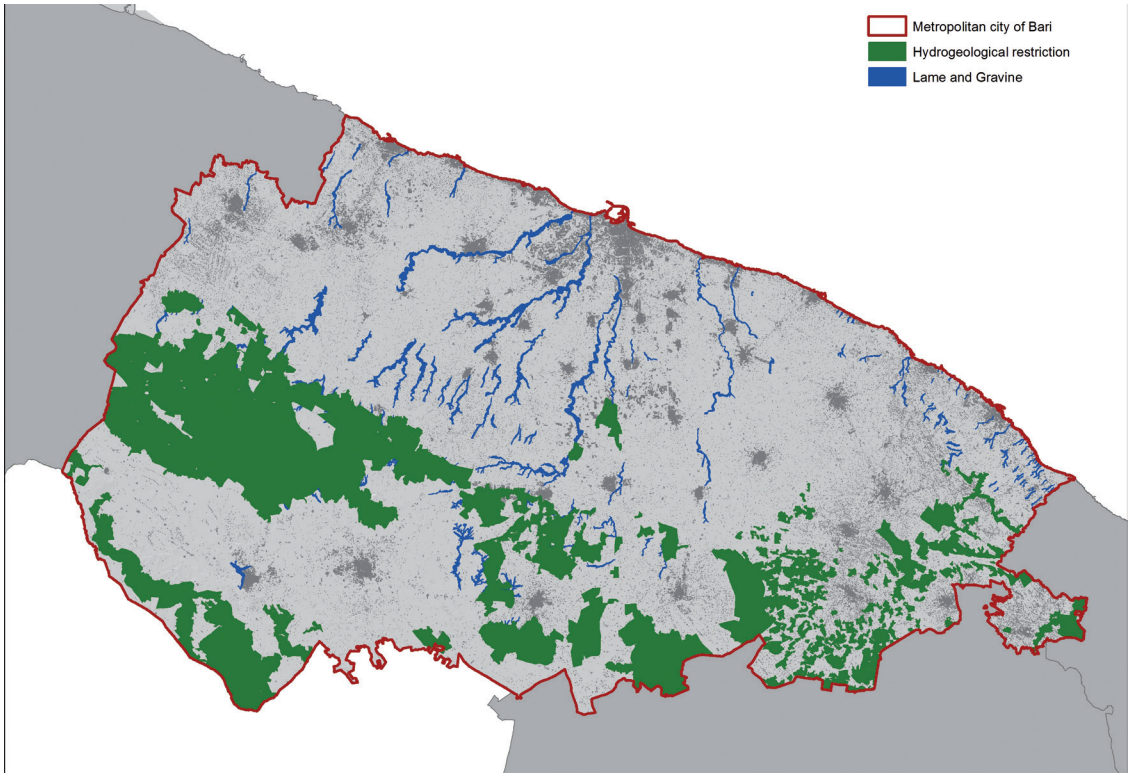

Fig. 2 - The Metropolitan City of Bari. Hydrogeological restrictions, lames and gravines

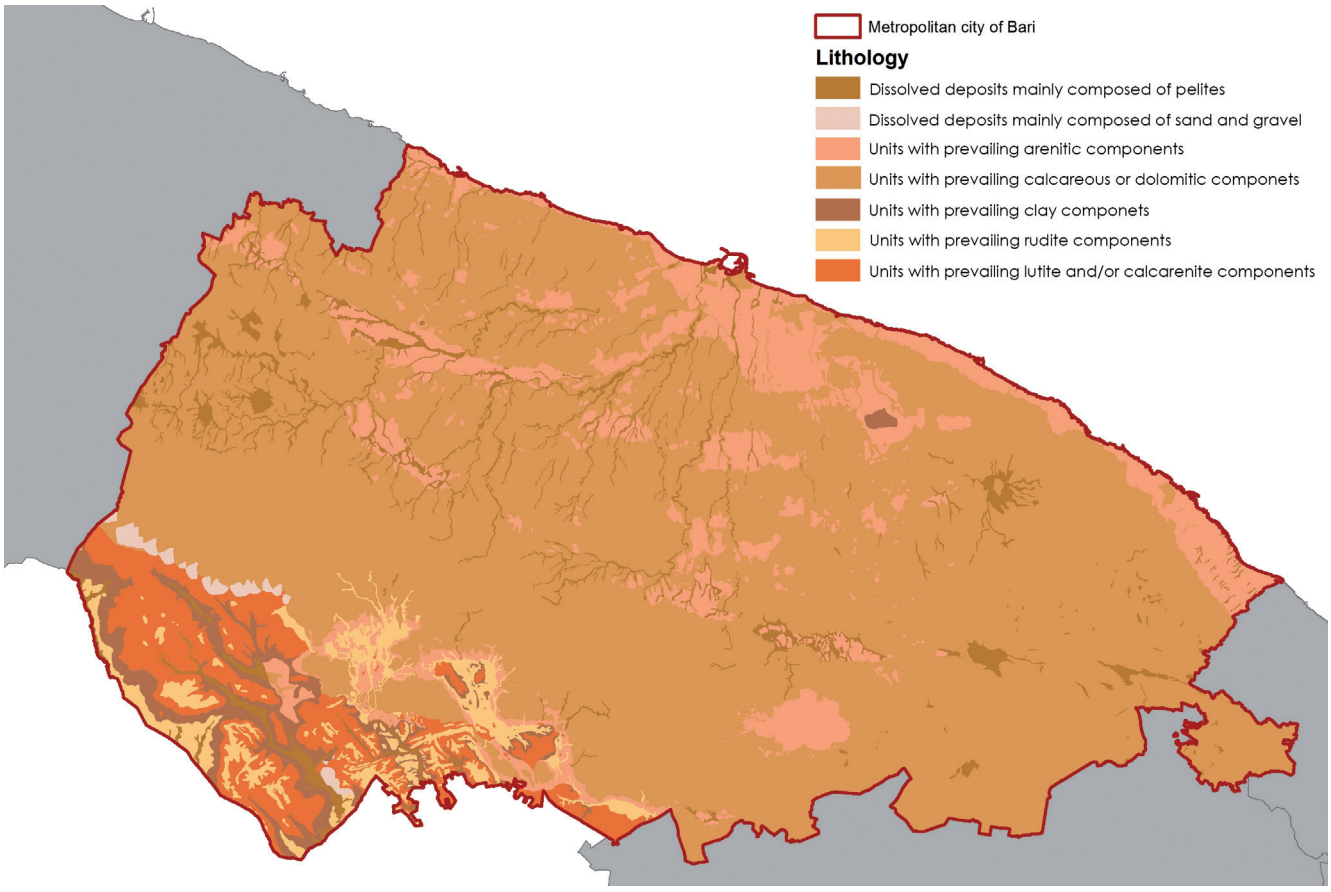

Fig. 3 - The Metropolitan City of Bari. Lithology

Morphological and environmental potentials in the metropolitan city

Other important characteristics of the metropolitan city come from the Deposit Chart of Apulia Region (based on the geological units at the surface of the entire region), a useful instrument for supporting the territorial analysis under a geo-morphological and structural point of view, configured by a dynamic informative territorial system, made of various informative layers constantly upgradables.

The Deposit Chart, as well as being a tematic chart that, finding out the characteristics of the deposits, represents in general a support tool for the administrative activity, for example when becomes necessary to choose the right place to create a quarry, according to the previously identified mining vocations of the specific part of the metropolitan territory.

The mining activity is particularly important for the definition of the future management approaches in trasforming the territory. It's for this reason that in addition to the information about the deposits (unities, areas, places, etc.), the metropolitan city gets informations also from other planning/management tools such as Nature 2000, areas at risk from landslides or flooding, urbanistic, landscape, hydrogeological, forestry protection, etc., so to make possible to identity the most appropriate areas for any kind of activity. Otherwise, the Italian Geological Chart at scale 1:100.000 represents the basis, the starting point for all the further researchs because it's actually the only bibliographic font interesting the whole territory and officially accepted: considering the geological framework of Apulia, the most part of the regional territory is constituted by a calcareous and a calcarenitis substrate, locally covered by miocenic and plio-quaternary deposits with both marine and continental origin: this situation is represented in the geological chart through a system of units that, in addition to the lithological properties, is very important in terms of stratigraphic and sedimentary significance (Fig. 3).

THE ROLE OF MINING ACTIVITY IN THE METROPOLITAN AREA OF BARI

Apulia is one of the first italian region in the field of extraction and production of stone materials and in number of quarries, mostly disused and/or abandoned. Its role in the mining sector is linked

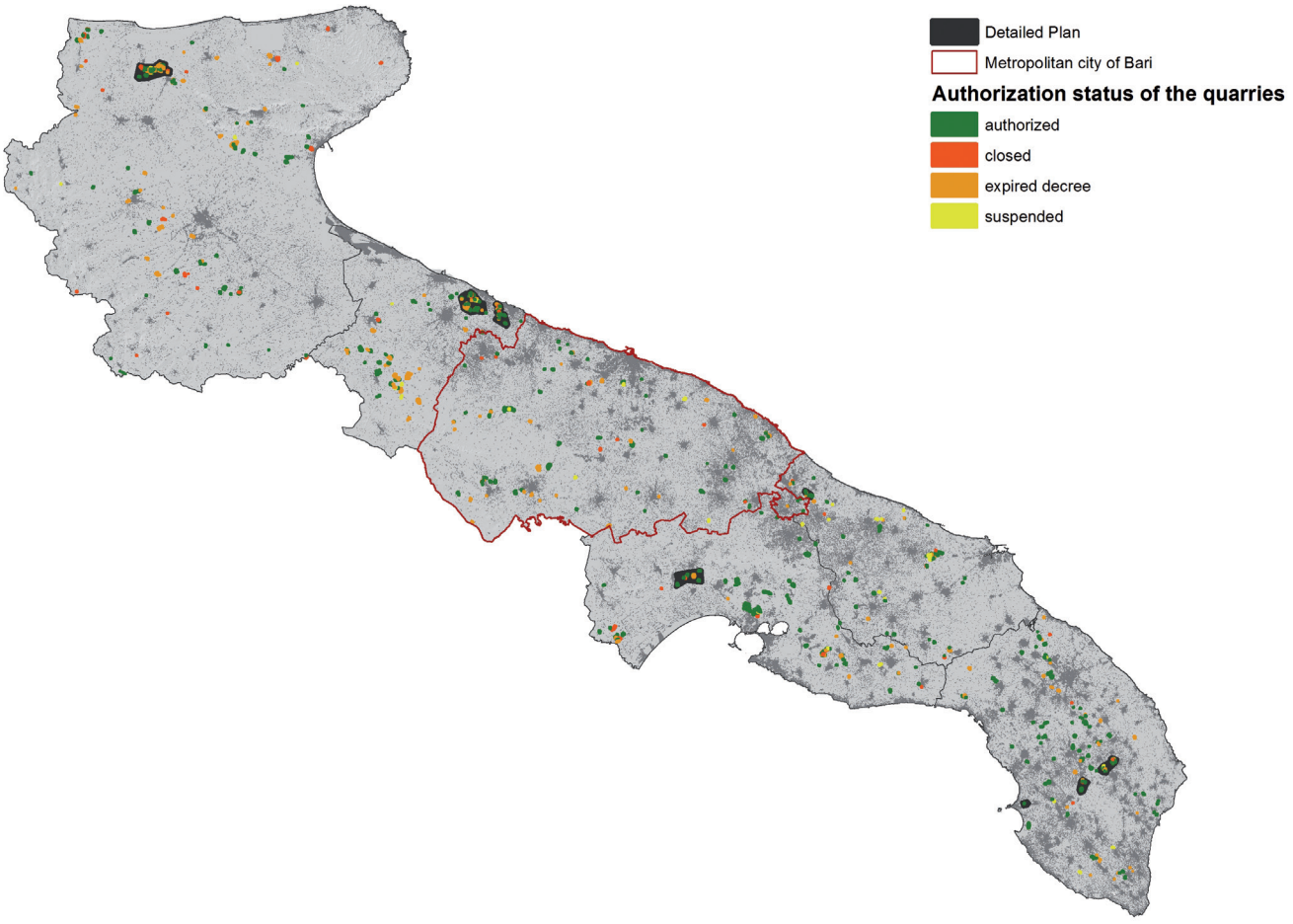

Fig. 4 - Authorized status of quarries. The Metropolitan City of Bari in the Regional context

to the geological nature of the territory that is perfectly suited to stone and aggregates exploitation for different uses. Although underground the regional territory of Apulia has an omogeneous structure characterized by the presence of a geological substratum made up of a rough calcareous stratified cluster, on the surface there is more differentiation in the lithological composition; this peculiarity is the reason why the quarries have such a different distribution and morphology in the territory: we can observe deep mines when there are stone materials and shallow but very large mines for the bulk materials (Fig. 4).

In the case of the Metropolitan Area of Bari, there are a lot of calcarenite and limestone quarries (cut stone or aggregates), big in number and dimensions, that represent almost the 17.6% of the entire regional mining system. The analysis of the economic and performance indicators shows a relevant dynamism that clearly changes year by years: in the last five years, infact, there has been a reduction in the number of approved quarries in the province of Bari, decreased by 14.45% (from 83 quarries in 2009 to 71 in 2013). The 57.8% of the quarries in the ambit of the Metropolitan City produces limestone for aggregates, the 29.6% produces cut stone and just the 12.6% is characterized by the extraction of sand, gravel and clay. Together with a decrease in the legal quarries, it is noted that the extension of the quarries in the whole regional context is going to decrease as well; in particular, the quarries of the Metropolitan City of Bari have been affected by a reduction of 6.41% in terms of dimension that, on the other hand, has shown, in 2011-2012, a growth of 2.2% in the quantity of excavations: compared to the other provinces of the regional system, that of the Metropolitan Area of Bari represents the only positive data realised during those two years. In general, the situation is on a declining trend for some years now (Latouche, 2009). Particularly relevant is the production decrease in the Province of Bari (-33%): if in 2009 the extracted materials were like 1.944.188 cubic meters per years, in 2013 has been producted material for about 1.300.955 cubic meters. While the quantity of waste produced in the mining activity is about 1% of the whole extracted material, for the quarries of the Metropolitan City of Bari it's about 8.5% of the total regional production: a very important data if compared

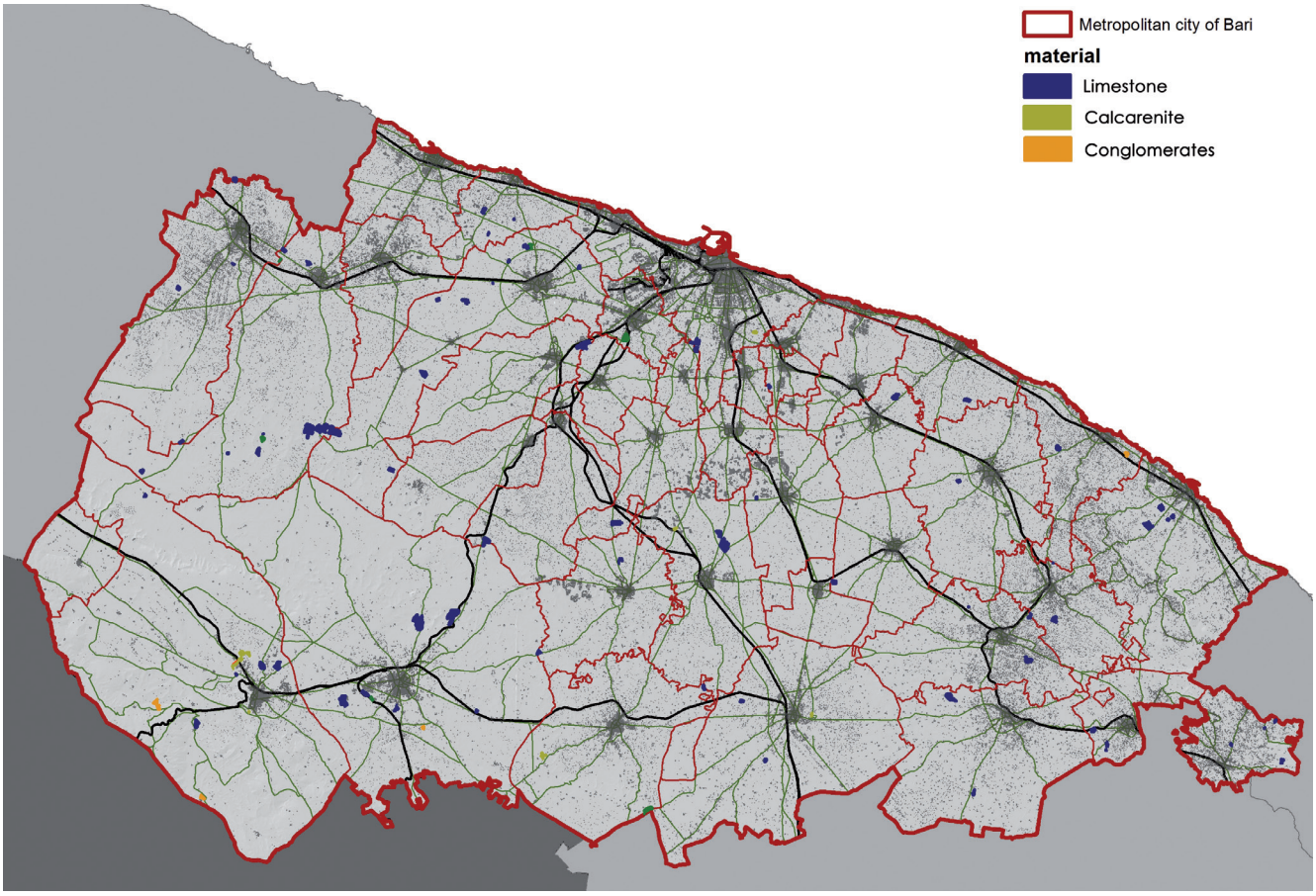

Fig. 5 - The Metropolitan City of Bari. Quarries and Materials

to the wastes produced in other provinces, e.g. Foggia, whose mining system produces the 45% of the whole regional waste. Another peculiarity of the mining territories of the Metropolitan City of Bari is the location of the quarries, whose condition is to be widespread within the territory: is infact not possible to recognize well-defined mining poles, probably because of the deep presence of limestone quarries for aggregates whose deposits are rather accessible and disseminated (Fig. 5).

The Apulia Region, by adopting the PRAE – Regional Plan for Minig Activities (D.G.R. nr. 580 of 15 May 2007) and subsequent revisions (D.G.R. nr. 445 of 23 February 2010), has not yet concrete detailed plans for any part of the Metropolitan Area of Bari. However, this does not exclude the possibility to find out critical elements specifically related to the mining activity: even if the mining basins are not clearly identified, by analyzing the satellite photos, is possible to see how the quarries are located really close to the urban centers (e.g. Bitetto, Palo del Colle, Acquaviva delle Fonti) and in some cases we can note the presence of some quarries inside the urban structures, like for example the "Cava di Maso" in Bari (Fig. 6) or the quarries in the municipalities of Gravina and Altamura. This factor does not represent a negative element but an opportunity for the design activity of urban spaces, and a point of discussion on how these productive spaces could nowadays coexist with the other urban spaces and be integrated in processes of re-use which take into account infrastructures and service requirements (Greco *et alii*, 2006).

TECHNOLOGY, DESIGN AND LANDSCAPE RECYCLING

The latest development in landscape recycle thinking have been introducing, within the consolidated triad Reduce/Reuse/Recycle, some new terminologies that matches equally new strategic management directions in the landscape tranformations. Between them, the concept of "behaviour", intended as an actitud expressing economic-cultural models based on a "doing less" approach better than "doing better", has enshrined a condition in which the interest for recycling actions in the mining areas has moved from the moment of their disposal to the period of their full activity, putting an end to the traditional conceptions of "rehabilitation", "fitting-out", "restoration", "renaturalisation", etc. (Petzet & Heilmeyer, 2012).

This approach, that leads to actions on the "process" rather than on the "physical configuration", on one hand can make the management of the transformation processes easier, on the other hand may permit a better integration of these responsible and fragile places with the other landscape systems: urban, natural, turistic, infrastructural, etc. (Del Gaudio & Vallario, 2007).

Unlike stone quarries, the aggregate quarries of the Metropolitan Area of Bari are substantively interested by technological innovations, both in the phases of reduction (Reduce), and recovery (Reuse) of the waste materials: actually, infact, the technologies used to reduce wastes in mining activities (expecially in the phases of grinding and selection), can significantly limit the total quantity of wastes that finnaly go to landfills and, at the same time, reuse the recovered material even if just for secondary uses (road works, building foundations, embankments, up to around 90%).

If the contribution of technology as a discipline has pointed a plausible way to define a new dialogical relationship between sustainable mining activity and construction industry (both in civil and building ambits), in the case of Bari the relationship with urban context and with architecture is still an open question: in this perspective, the reduction in the number of quarries, beside a systematic course of action of recovering construction and demolition wastes (CDW) is undoubtedly a first strategy of ethically reconstructing the lost relationship between extraction, technology and urban landscape (Bagnato *et alii*, 2014)

Quarries recycling

If we recognize a value for the quarry under a geomorphological point of view, we accept the idea that it is not a "waste" but, instead, a great asset for landscape being a symbol of human activities linked to the environmental cultural dimension and also being a place where experimenting new sustainable technological models for alternative energy production (Ciorra & Marini, 2012). The morphological (depth, dimensions, orientation) and climate aspects (location, exposure, insolation, windiness) constitute an identity for the quarries in the Metropolitan area of Bari (Fig. 7), whose improvement focuses on the following socially shared strategies for the recycling actions: morphological re-definitions, i.e. landscape design actions together with the compaction of quarries' fronts making them safe; re-naturalizations, intended as interventions of naturalistic and vegetational re-integration of the quarries' fronts with the environment; creation of new public spaces through the inclusion of new activities for culture and free time in a single quarry or creation of integrated systems of public accommodation facilities at territorial levels (Fig. 8).

Materials reusing

The mining basins of Apulia Region and specifically of the Metropolitan Area of Bari have nowadays a positive trend

Fig. 6 -\ Ex quarry "Cava di Maso", Bari (Italy)

Fig. 7 - Ancient roman quarry in the port of Egnazia, Bari

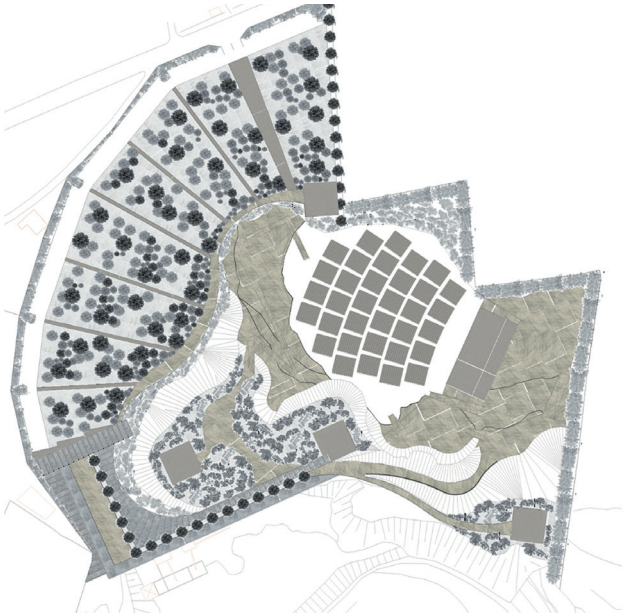

Fig. 8 - Ricerca&Progetto, Orpheus Theatre and environmental recovery of the SELP Quarry, Bari (Italy), 2006

Fig. 9 - bdfarchitetti + A&F + Ricerca&Progetto, San Girolamo Urban Garden, Bari (Italy), 2010

in export of stone blocks for markets at a global scale, but they are not sufficiently concerned with the transformation of raw materials in end products; this takes away the relationship between mining and construction, yet undermined by the new building technologies acquired by architecture in form of new aesthetic and constructive models and by the reduction in costs of transport in the total budget of the building yard. These processes determine situations of cultural, social and economic decline for the entire territorial system that can only be effectively combated through a recovering of the aesthetic and constructive potentialities of the extracted materials (technical, mechanical and aesthetical benefits) improving a more rational use of them, according to the development criteria of the constructive culture of the environment (Bagnato & Paris, 2013). In this context, the design strategies pass through new approaches that make the materials available for innovative solutions (masonry structure systems, building envelopes, etc.), for the construction of low cost collective houses, for high quality accommodations and for public works in the urban context (Fig. 9).

Waste reducing

The mining landscape represent in general a source of wealth for the territory they belong to, not only for the extracted materials, but also for the huge slack of the "residue": if the "waste" is what really finally goes to landfill, the "residue", on the contrary, is an element that can be re-used within and outside the same productive process. The technological systems' modernization occurred in the last number of years, especially in the phases of mining and cutting, has effectively reduced the quarries' residues and has developed systems of transforming them into "secondary raw materials" for road and building sectors (components in concrete production, roadbeds, waterproofing, etc.) (Baiani & Valitutti, 2008). On the other hand, is more difficult to find "cultured" ways of reuse the residues in architecture, design or furniture, even though some recent constructions at international level have demonstrated how it could be possible to exalt their potentialities as constructive elements, in the following forms (Pavan, 2010): as design elements; as constructive elements re-used in loco beside the traditional stone blocks in "analogical" ways; as architectural elements in new constructive techniques; as architectural elements in low cost building coverings.

PERSPECTIVES

Energy and landscape revitalisation

The Apulian mining sector, is economically characterised by small businesses with a small turnover (less than 2 millions of Euros), by a raw materials'production higher than the national average, very low profitability levels in the european market besides a very high profitability outside Europe, and by a low number of patents and registered trademarks (because of the poor investments into marketing and research); otherwise, the costs of recovery are about 8-10% of the profits, but the new strategies of the regional regulatory and management system for the Metropolitan Area of Bari has made it possible to maximise profits and minimise costs through a new approach that involves the stakeholders from the beginning of the mining process, whose phases are now clearly divided into the following steps: definition of needs, planning, design, production driven by the environmental recovery, functional recovery that now has become one of the main goals of the mining action system. On the other hand, this new approach goes also towards simplifying the bureaucracy, fast authorisation procedures, smaller quarries and more local to the customers, short-term solutions, more moderate financial investments, simpler and faster functional renewals.

At a local level, the Municipality of Bari has recently signed a memorandum of understanding on defininig and implementing projects of environmental exploitation and economic development (experimentation 5G). In particular, between the sectors involved in the program, the mining activity is interested in an organic and integrated process of increased knoledge and innovative services strictly linked to environmental protection and cultural empowerment (Industry 4.0).

With regard to the abandoned quarries and landfills present in the regional territory, the new local strategies are becoming defending them as opportunities for landscape integration experiences in terms of complex projects and energy or naturalistic strategies: the abandoned quarries occupy about 3.375 hectares in the territory of Apulia and their total number

is about 1994 (as detectable in the orthophotos and in the hydro-geomorpholigic chart) and 240 with expired authorising decrees (as indicated in the Quarry Registry Classification). Comparing the information coming from the Quarry Registry and those of the Hydro-Geomorphologic Chart, is possible to have a first clear idea of the composition of the abandoned quarries and landfills in the territory and their phisical relationship with other landscape systems: it's easy to understand how they could get a huge potential in trasforming the territory in an ethical way: the quarries cannot be deleted in order to re-establish the original natural conditions but, on the contrary, they can be transformed into a new productive organism, saving its potential as economic, energy and touristic resource. Otherwise, the quarries are also important historical signs and crucial poles of the territorial spatial network because they belong to the morphological and social life of the territory itself; in this sense, the systems of quarries (even if abandoned) could re-start a revitalisation of the entire regional system (Cherubini *et alii*, 2011).

One key to interpreting this concept of "revitalisation" is the energy conversion of the quarries, expecially in a climatic context as that of the Metropolitan Area of Bari. In recent years, in mediterranean contexts like Apulia is, the renewable energy devices, offered by the latest technological innovations, started to occupy, widely and sometimes improperly, many parts of the territory, especially removing so much surface from the agricultural soils: this is the starting point to reconsider how technologies and new forms of energy sourcing, correctly developed and integrated with new approaches in planning and architectural design, could be an occasion to activate recycling and reusing processes. This is undoubtedly an objective to be achieved but a deep analysis and careful studies on the real territorial contidions with its sub-systems and existing cycles (not always clearly and readly recognisables), could lead to discover new concrete opportunities for the mining areas so to enrich the cultural identity of the whole regional context (Livadie & Ortolani, 1998).

The critical sustainability approach

In the line with the most innovative experiences in the international context, the rediscovery of the quarries' potentialities and those of the stone materials, together with the reduction of wastes and the reuse of residues, leads to a dialogical recycle approach in which the project, with an attitude that is ethical and not aesthetical, becomes critical action of revising the entire production process in "sustainable" terms, starting from a deep analysis of the environment with its peculiarities and its individual specificities (Battaino, 2000). Actually, the design disciplines (landscape design, architecture, technology, engineering, etc.) are not really interested in dialoguing with territory, and the reason is that, in general, there are no shared ethical values. If it's true that the ethical aspect of each design action, intersection between identity, creativity and method (or interpretation), has a subjective dimension because of the fact that it's naturally linked to critical choices, is also true that these choices should start from elements with an objective significance, under a historical, social and cultural point of view (Fig. 10).

Through a new recycle strategy, is possible to find a deep convergence between human actions and protection of territory, because a dialogical behaviour made of complex, programmatic and multi-disciplinary perspectives, could more easily lead to re-design the territory not more "phisically" but "ethically", according with two main criteria: in a normal and ordinary way, not necessarily depending on exceptional circumstances; with the aknowledge of a "value", a "sense" and a "meaning" for the community, prior to a correct an everyday use of territory itself. The action of recycling the (or in the) landscape, seen as a "project of process" finds its ethical legitimacy in its "necessity" and in its capacity to re-activate physical and social processes that could bring back to territory its role of "actor", as a place, in the human system of actions and those of the contemporary urban context: as a matter of fact, is the human action that can be able to transform a "space" into a "place", giving it a past, a present and a future; in turn, the space of territory, which has become a place, rebuilds the bridge between man and history through the dimension of "landscape", whose main values have to be mostly intended in relationship with the anthropological substrate of the economical, social and cultural aspects of the local community (Fig. 11).

The Metropolitan Area of Bari, with its natural, morphological and productive characteristics structuring a system of active and also inactive cycles, has a strong identity standing on a "potential" dimension: this situation needs a dialogical design system of action that, leaving behind any kind of assertive stance, could recover the latent identity of each different part of the territorial context (actually with a spatial and temporal wide between them), taking the intrinsic aesthetical value of landscape into a condition of "reality" (Assunto, 1994). In this perspective we can find a concordance between the idea of "territory" and the concept

Fig. 10 - Fabrizio Bellomo, Cavatrulli Village. Sculpture in Apulian Stone, 2017

Fig. 11 - Alles Wird Gut, Recycle of the quarry of St. Margarethen (Austria), 2005

"design" through strategies that include active processing of the results, efficient potentialities detections, coherent distributions of goods and services, innovative managements of processes (Corboz, 1983).

Behind the individuation of design strategies, the analysis of the mining systems in the metropolitan context of Bari leads us to study and identify, in the mark of the Strategic Plan, possible regulatory means that could first of all give us useful, flexible and adaptable management tools that could activate innovative processes in the mining sector of the quarries, systematically.

Mapping out new guidelines that could at the same time deal with the problem of the waste recycle but also with the management aspects in the mining processes and quarries' recovering, it will be possible to move some visions of the Strategic Plan towards the experimentation of new virtuous development processes that could ensure more effective decision-making and strategies of intervention for the future transformation of the entire Metropolitan City of Bari (Annese *et alii*, 2015). With the elaboration of guidelines, it will be possible to continue the experimentation already carried out by other active levels of planning in the territory of Apulia Region (PTCP of BAT Province, approved by the Provincial Council Deliberation no. 11 of 15 June 2015; PPTR Apulia, approved with Deliberation no. 176 of 16 February 2015), so to define dialogical, cooperative and participatory procedures of sustainable land use management.

REFERENCES

Annese M., Bagnato V.P., Loi M., Pagnelli T.P. & Reina A. (2015) - *Il sistema delle cave nell'area metropolitana di Bari.* Problematiche e prospettive di riciclo. Working papers. Urban@it on line review, **1**: 1-12, Bologna, Italy.

Assunto R. (1994) - *Il paesaggio e l'estetica*. Novecento, Palermo, Italy.

Bagnato V.P. & Paris S. (2013) - *The quarries' landscape: environmental and productional valorization, between extraction and building.* Techne, **5**: 123-128.

Bagnato V.P., Loi M. & Reina A. (2014) - *Il valore ambientale del recupero delle risorse estratte e accumulate nei territori delle cave.* In: Pavia R., Secchi R. & Gasparrini C. (2014) - *Il territorio degli scarti e dei rifiuti.* Collana Re-Cycle Italy, **08**: 185-189, Aracne Ed., Rome, Italy.

Bagnato V.P., Mangialardi G., Milella S. & Mundo M. (2014) - *Technology and productive process: minig rejections from waste to sustainable resource.* In: Lazarevic E.V., Krstic A., Dukic A. & Vukmirovic M. (2014) - P*roceedings of First International Academic Conference on Places and Technologies*. University of Belgrade. 549-556, Faculty of Architecture of Belgrade, Belgrade, Serbia.

Bagnato V.P. (2017) - *I bacini estrattivi pugliesi. Tra riciclo del paesaggio e riuso degli scarti.* In: Fabian L & Munarin S. (2017) - *Re-Cycle Italy.* Atlante: 184-189. Letteraventidue, Siracuse, Italy.

Baiani S. & Valitutti A. (2008) - *Tecnologie di ripristino ambientale.* Alinea Ed., Florence, Italy.

Battaino C. (2000) - *Extrascapes. Oltre le cave.* Ed. Della Laguna, Gorizia, Italy.

Berger A. (2008) - *Designing the reclaimed landscape.* Tylor & Francis, London, UK.

Berger A. (2007) - *Drosscapes: wasting land in urban America.* Princeton Architectural Press, New York, USA.

Cherubini C., Reina A., Sollitto D. & Visicchio F. (2011) - *La carta giacimentologica del Piano Regionale delle Attività estrattive della Puglia*. Engineering, Hydro, Environmental Geology, **14**: 55-60, Bari, Italy.

Ciorra P. & Marini S. (2012) - *Re-Cycle. Strategies for architecture, city and planet.* Electa, Milan, Italy.

Corboz A. (1983) – *The land as palimpsest.* Diogenes, **31**: 12-34, Paris, France.

Del Gaudio A. & Vallario A. (2007) - *Attività estrattive: cave, recuperi, pianificazione.* Liguori Ed., Naples, Italy.

Gasparrini C., Pavia R. & Secchi R. (2014) - *Il territorio degli scarti e dei rifiuti.* Aracne Ed., Rome, Italy.

Gisotti G. (2008) - *Le cave. Recupero e pianificazione ambientale.* Dario Flaccovio Ed., Palermo, Italy.

Greco V., Reina A. & Selicato F. (2006) - *Principi metodologici per azioni di recupero delle cave abbandonate.* Giornale di Geologia Applicata, **4**: 246-252, Media Print Ed., Livorno, Italy.

Latouche S. (2009) - *La scommessa della decrescita*. Feltrinelli, Milan, Italy.

Livadie C.A. & Ortolani F. (1998) - *Il sistema uomo-ambiente tra passato e presente.* EdiPuglia, Bari, Italy.

Mangialardi G. & Selicato F. (2013) - *I nuovi paesaggi dell'energia. Strategie di valorizzazione delle risorse paesaggistiche.* Monograph.it, **5**: 165-167, LISt Lab, Trento, Italy.

Mangialardi G., Marocco F. & Martinelli N. (2014) - *Nuovi processi di riciclo per i paesaggi estrattivi come brownfields*. In: Pavia R., Secchi R. & Gasparrini C. (2014) - *Il territorio degli scarti e dei rifiuti.* Collana Re-Cycle Italy, **08**: 191-197, Aracne Ed., Rome, Italy.

Marini S. & Santangelo V. (2013) - *Recycle Italy. New lifecycles for architecture and infrastructure of city and landscape.* Aracne Ed., Bari, Italy.

Martinelli N. (2013) - *Il riciclo dei paesaggi estrattivi della Puglia.* In: Marini S. & Santangelo V. (2013) - *Viaggio in Italia.* Collana Re-Cycle Italy, **03**: 85-89, Aracne Ed., Rome, Italy.

Cuccia E., Piazzalunga A., Bernardoni V., Brambilla L., Fermo P., Massabò D., Molteni U., Prati P., Valli G. & Vecchi R. (2011) - *Carbonate measurements in PM10 near the marble quarries of Carrara (Italy) by infrared spectroscopy (FT-IR) and source apportionment by positive matrix factorization (PMF)*. Atmospheric Environment, **45**: 6481-6487.

Mininni M., Guastamacchia L. & Pagnelli T. (2013) - *Il riciclo del paesaggio estrattivo. Un'opportunità di sviluppo.* Planum. The Journal of Urbanism, **27**, Planum Association, Rome, Italy.

Muntañola J. (2000) - *Impacto fisico, social y cultural de la arquitectura.* Edicions UPC, Barcelona, Spain.

Pavan V. (2010) - *Architetture di cava*. Motta Architettura, Milan, Italy.

Petzet M. & Heilmeyer F. (2012) - *Reduce Reuse Recycle*. Architecture as Resource, German Pavilion 13th International Architecture Exhibition La Biennale di Venezia 2012. Hatje Cantz, Ostfildern-Berlin, Germany.

Puppala A., Saride S. & Williammee R. (2012) - *Sustainable reuse of limestone quarry fines and RAP in pavement base/subbase layers.* Journal of Materials in Civil Engineering, **24**: 418-429.

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