

Paola De Joanna, Dora Francese,
Antonio Passaro (edited by)

Sustainable Mediterranean Construction

**Sustainable environment
in the Mediterranean region:
from housing to urban
and land scale construction**



Ricerche di tecnologia dell'architettura
FRANCOANGELI



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Paola De Joanna, Dora Francese, Antonio Passaro
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Proceedings of the
1st International SMC – CITTAM Conference

**Sustainable Mediterranean
Construction**
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region: from housing to city and land scale
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Table of contents

Preface, D. Francese	pag.	13
<hr/>		
<i>Keynote</i>		
Sustainable environment in the Mediterranean region: from housing to urban and land scale construction, D. Francese	»	15
Traditional answers to bioclimatic habitat in Mediterranean countries, P. Casalunga	»	31
Lightweight constructions for the Mediterranean climate, N. Tsinikas	»	35
Sustainable conservation in Egypt: paradigm and issues, D. El Kerdany	»	41
<hr/>		
<i>Papers</i>		
Topic 1		
Ancient technologies of the material culture in the Mediterranean area		
Sardina's historic districts renovation manuals, C. Atzeni	»	51
The living project in the Etruscan culture, G. Ausiello	»	60
The vernacular architecture of the Tunisian oasis-cities: element of a specific cultural landscape, F. Ben Ali	»	72
Local identity and sustainability of middle age Italian towns, G. Duca	»	81
“Vale Dos Vinhedos” - Landscape and cultural heritage. Wood architecture created by Italian immigrants in the South of Brazil, M. R. Escorteganha Laner, M. Fumo, J. Bayon, A. Gonçalves Santiago	»	91
Rediscovering old truths, G. Mitrache	»	102
The wall, an element of identity and a structuring component of the Mediterranean architecture, B. Pau	»	112

Historic heritage: a model of sustainable development, <i>E. Petroncelli</i>	pag.	121
Traditional wooden buildings in Portugal. The Avieira house, <i>M. Silva, P. Mendonça, J. Branco</i>	»	129

Topic 2

Innovation within sustainable housing in the Mediterranean culture

The Galeb of southern tunisia: from tradition to innovation, <i>F. Ben Ali, F. Iucolano, D. Piscopo, M. Fumo, D. Caputo</i>	»	141
Approach to classification and evaluation of naturally cooled buildings and analysis of what impact passive cooling systems have on architectural design, <i>G. Cadoni</i>	»	149
Adaptive thermal comfort in mediterranean buildings, <i>G. Desogus</i>	»	160
Thermal performance of reflective insulation in mediterranean climate, <i>E. Di Giuseppe, M. D'Orazio, C. Di Perna</i>	»	169
Strategies for energy recovery in respect of quality: an example of rural architecture in Molise, <i>G. La Fianza, D. Fornaro</i>	»	181
Building technologies and eco-efficiency for urban retrofit, <i>M. Losasso</i>	»	190
The building envelope between process and product innovation, <i>M.T. Lucarelli, M. Mandaglio, D. Pennestrì</i>	»	196
Longlife Design. Integrated design for sustainable buildings, <i>K. Rückert, M. I. Kiefel, S. Michel</i>	»	207
“Abitare mediterraneo” database: an open system, <i>M. Sala, L. Boganini</i>	»	212
Technologies aimed at eco efficiency in the experimentation of mediterranean social housing, <i>F. Tucci</i>	»	219
Mediterranean architecture and building materials in modern Greece, <i>F. Vavili, M. Karantaki</i>	»	230

Topic 3
Sustainable urban design for the
Mediterranean city

The environmental quality of open spaces in the mediterranean area, <i>M. I. Amirante, M. Cannaviello, R. Franchino, C. Frettoloso, F. Muzzillo, A. Violano</i>	pag.	245
Cultural sustainability and urban quality, <i>N. Carrà</i>	»	258
Mediterranean vision for continental urban space, <i>A. M. Constantin</i>	»	265
Soft mobility in the consolidated city, <i>G. Critelli, A. Taccone</i>	»	275
A new eco-district in Barcelona, <i>J. M. de Botton y Halfon, F. Cocirio</i>	»	285
City as leaf nervation, <i>C. Fallanca De Blasio, M. Umbro</i>	»	290
Arezzo case study: the new model of industrial settlement in Tuscany, <i>P. Gallo, V. Gianfrate</i>	»	301
Urban form and city environment. a proposed methodology to understand sustainability, <i>M. Rigillo, M. Clemente, G. Esposito De Vita, S. Gilchriest</i>	»	312
What sloterdijk's foam city has to do with "open source" urbanism, and further, with the Mediterranean city? <i>G. Scripcariu-Ochiai</i>	»	325

Topic 4
Surveys and configuration in
Mediterranean architecture

Memory of an ephemeral architecture, <i>A. Davico, P. Mendonça</i>	»	335
Borgo-clima: energetic and environmental retrofitting of the historic fabric, <i>P. Davoli</i>	»	345
Interpretation of language decoded by pre-existing, <i>G. Foti, D. Iacono</i>	»	352

Interior partition walls in mediterranean climates: lightweight versus heavyweight, <i>P. Mendonça, M. Macieira</i>	pag.	363
About urban insertions and space discontinuities, <i>M. Mihaila</i>	»	371
New acquisitions on palazzo Marzano in Carinola, <i>F. Miraglia</i>	»	377
Living, relationships, forms e types, <i>S. Mocci</i>	»	383
Contemporary evolution of the local built-up areas in the Mediterranean, <i>F. Oggiano</i>	»	395

Topic 5

Sustainable materials, products and building processes in the Mediterranean area

Bioclimatic approach in urban open space retrofit intervention: the case of Prati area in Rome, <i>A. Battisti, L. Martinelli</i>	»	405
Strategies for sustainable development in romanian coastal zone of the black sea in use of renewable energies, <i>A. Florescu, G. Bandoc, M. Degeratu</i>	»	414
New dynamic building envelope systems for mediterranean area, <i>P. Gallo, R. Romano, M. Villalta</i>	»	422
Caractérisation mécanique in situ et au laboratoire d'un pisé d'âge saadien, <i>N. Gamrani, K. Rkha Chaham., F. Fratini, L. Rovero, U. Tonietti</i>	»	434
New sustainable building solutions in Sardinia, <i>A. Meloni</i>	»	438
Sustainability and architectural bio-compatibility, <i>A. Mitrache</i>	»	445
Converting a large scale brick plant to alternative/renewable fuels in an industrializing country, <i>F. Moedinger, F. Ast</i>	»	455
Improving buildings refurbishment through operative conditions evaluation, <i>S. Monteiro da Silva, P. Silva, M. Almeida, L. Bragança</i>	»	462
Support tools for building thermal rehabilitation, <i>A. Novais, M. Almeida</i>	»	472

Les remparts de Marrakech (Maroc): caractérisation géotechnique et minéralogique, <i>K. Rkha Chaham, N. Gamarani</i>	pag.	482
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Topic 6

Mediterranean sites: archaeological areas and settlements

Compatible use and environmental vivibility in the Acerra Castle, Naples, <i>C. Filagrossi Ambrosino, C. Balestra, L. Maglio, D. Petrone</i>	»	489
The urban park of aragon's wall in Naples, <i>C. Grimellini, B. Marenga</i>	»	500
Interactions between ancient herculaneum and modern Ercolano, L. Mollo, P. Pesaresi, C. Biggi	»	511
Heat islands and urban structure, M. Stanganelli, <i>M. Soravia, F. P. Migliaccio</i>	»	524
Design and technologies for integration of archeological resources in environmental design. the strategic plan of Marsala, A. Tartaglia, R. Riva, S. Chirico	»	535

Topic 7

Mediterranean landscape: paths works and water management

Identity of rural landscape. traditional constructions and hydraulic works in Cilento area, <i>P. De Joanna, A. Passaro</i>	»	549
From historical rural landscape to new urbanity in Sardinia, A. Dessì	»	570
Improving daylight quality in offices using fixed shading devices in hot climate region, <i>A. A. Y Freewan</i>	»	578
The cultural landscape of italian immigrant in rural historic sites, <i>V. Gomes de Luca, A. Gonçalves Santiago</i>	»	590

Study and proposal for the development of guidelines for areas subject to landscape bond (Molise) in view of energy conservation and improvement, <i>G. La Fianza, D. Fornaro</i>	pag.	597
Villages in the Interior of Portugal. The case of the Algarve, <i>C. Rodrigues</i>	»	606

AREZZO CASE STUDY: THE NEW MODEL OF INDUSTRIAL SETTLEMENT IN TUSCANY

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Abstract

Industrial ecologically equipped area model (APEA) has a key role to consolidate and attract businesses with a high level of technological content and, on the other hand, to contrast an indiscriminate occupational situation in productive areas based on logistics and heavy industry, which has a low added value and great environmental impact. APEA model aims to developed innovation in production, strengthening research and development already carried out by leading companies in the territory, focusing attention and using available resources to save energy and concentrate on renewable sources as an opportunity for a wide range of innovations not only linked to the energy field, by also to production processes, the civil sector and transport.

TAED department follows San Zeno industrial settlement regeneration project to obtain APEA "status" in observance of Tuscan Region Industrial equipped Area's Regulation

Keywords: Ecologically Equipped Industrial Area, Eco-efficiency, Industrial ecology, Environmental Indicators

1. Introduction

The challenge of Lisbon European Council of 2000, is to improve a new industrial competitiveness at European level, expressed in the economic abilities on a sustainable basis to ensure its population living standards and high growth and high employment rates (Lisbon 2000). So an appropriate change in industrial policy is urgent in order to respect and protect the environment and the welfare and that still need to ensure economic growth.

Eco-efficient Industrial areas are made by technical and management requirements that aims to minimize and manage, in integrated way, ecological footprint in order to start a knowledge process about legislation, economic and social aspects and technical and planning requirements, in order to identify a model of sustainable productive area compatible with the local industrial reality. According to Italian law, in force since 1998, industrial ecology seeks to find the appropriate balance between environmental, economic, and social needs of a system, so some regions have disciplined on that meaning the Ecologically Equipped Industrial Area (APEA - Aree Produttive Ecologicamente Attrezzate) an innovative productive area developed and managed as a real estate development enterprise and seeking high environmental, economic, and social benefits as well as business excellence.

The document describes the key component of APEA model in Tuscany Region, including information about planning, the main environmental challenges, creation of resources management plans, and provision of supporting policies. Moreover we provide details on which industrial areas should be called APEA, with description of indicators and criteria to reach the Regional quality of APEA. Finally the paper describes the TAED regeneration project of Productive settlement San Zeno, Arezzo, improving the environmental, social and economic performance of companies at each scale, through new services offered by APEA management.

2. The new Tuscan model of industrial settlements

The APEA (an acronym that means Ecologically Equipped Industrial Areas) has been introduced in the Italian Legislative Order by D.Lgs. n. 112/1998, Bassanini law, which expects that Italian Regions discipline, with their own laws, industrial areas and ecologically equipped areas, provided with infrastructures and systems necessary to ensure the protection of the health, safety and environment. The question is to organize the productive site so as to favour the individual settled firms on realizing their own environmental objectives, both economically and technically. Industrial Areas Ecologically Equipped have to be planned, realized and managed on the basis of "ecoefficiency" criteria, in order to ensure an integrated system of environmental aspects, management, reduction and prevention of air, water and soil pollution, the protection of the health and safety as well as a widespread environmental improvement of territory.

The goal of an APEA is to improve the economic performance of the participating companies while minimizing their environmental impacts. Components of this approach include green design of area infrastructure and plants (new or retrofitted); cleaner production, pollution prevention; energy efficiency and inter-company partnering.

To be a real Industrial Area Ecologically Equipped a development must be more than:

- An area with environmentally friendly infrastructure or construction
- A single by-product exchange or network of exchanges;
- A recycling business cluster;
- An industrial area designed around a single environmental theme (i.e., a solar energy driven area);
- A collection of environmental technology companies;
- A collection of companies making "green" products;

Although many of these concepts may be included within an APEA, the vision for a fully developed of this model needs to be more comprehensive.

The main objectives of APEA model are:

- The planning of new industrial estates, technologically and environmentally equipped in order to represent a strategic asset for local development.
- The transformation and conversion of existing industrial estates, through technological and management's actions. This will contribute towards ongoing business efforts to increase competitiveness in these areas.

Developers of an APEA have to make a deeper assessment of potential sites in locating the area. It's priority to consider the characteristics of the local and regional ecosystem, the site's suitability for industrial development, and potential constraints on the pattern of development. This ecological evaluation complements the usual evaluation of transportation, infrastructure, zoning, and other human systems.

The Industrial Area Ecologically Equipped is characterized by common infrastructures and services, managed by a single entity that pursues environmental performances, that positive influences final quality of total area. This new perspective, activated through cluster typical mechanism, allows combining a sustainable productive development with enterprises competitiveness improvement.

The ecological and environmental development of APEA areas are accompanied by a growth in the competitiveness of the production system, offering the companies which locate here economies of scale, jointly-used infrastructure and services, shared environmental management and a reduction in the costs of water and energy supplies.

The "APEA" will be entrusted to a managerial company responsible not only for planning the integrated services and improving production cycles, but also for the planning and development of avant-garde systems and infrastructure, for the right environmental management of the area, with the involvement of all the companies operating here to assist in the attaining of the objectives and, finally, a dialogue with local bodies and communities.

In fact APEA model permits environmental and economic advantages for Enterprises, through adoption of common infrastructures (collective waste platform, energy production plant from renewable fonts, collective water treatment plant, collection of rain water, landscape mitigations) and management solutions (common emergency management, centralized management of green areas and common spaces, purchase groups for energy supply, waste recycle stock exchange, centralized logistics, environmental training area Environmental Management System). Advantages are as follows:

- energy and water consumption reduction
- waste treatment costs reduction
- costs reduction (energy, water, matter)
- maintenance costs reduction
- administrative simplifications and incentives for enterprises
- safety conditions improvement
- image improvement

In addition, some common business services may be shared by firms in Industrial Areas Ecologically Equipped: these may include shared waste management, training, purchasing, emergency management teams, environmental information systems, and other support services. Such industrial cost sharing could help APEA members achieve greater economic efficiency through their collaboration.

Small and medium size firms often have a problem in gaining access to information, consultation and know-how. This integrative approach can support such enterprises in overcoming these barriers and gain access to investments they may require to improve performance.

3. APEA regulation in Tuscan Region

The Tuscan Region is an important stakeholder in this commitment and plays key roles in promoting APEA development in its territory, through more aspects as decision making, creating policies, issuing laws and

regulations, organizing pilot activities, providing financial incentives, encouraging innovations in technology and systems, fostering new markets and promoting both education and academic research partnership.

The new Tuscan Regulation (R.T. 2 dicembre 2009, n. 74) clarifies and updates the APEA concept as: “an industrial, craft and mixed use areas, included in multifunctional contests, equipped with pollution and emission control system; APEA are characterized by an integrated and unitary management of infrastructure, services to protect environment, security and health of operators and communities” (Art. 2).

This legislative document, realized in scientific collaboration with University of Florence, Architecture Technology Department (TAeD) and S.Anna Superior School of Pisa (SSSUP), enhances the relationships between different actors – including municipalities, businesses and the local community – and aims to optimize the sustainable use of resources in industrial areas.

The work, lasted three years, aims first of all to define the main features of APEA as follow:

- Sustainable urban planning and design of technological and mobility networks.
- Implementation of synergies between enterprises, through a unit management of centralized technological systems, common spaces, and common services.
- Closed production cycle that aims at the re-use of waste streams, and industrial symbiosis.
- Provision of barriers and other systems for the reduction of any kind of pollution.
- Use of renewable or low impact energy sources.
- Setting up of ecological platforms for waste collection, for water treatment, etc.

The Regulation makes difference between new industrial areas, and restoration of existing ones and gives to decision making bodies (Region, Provinces and Municipalities) specific skills in APEA planning and management, including regional financings to promote APEA diffusion on Tuscany territory.

For existing area it's important reviews strategies that includes a baseline assessment for the area as a unit. The Regulation explores strategies and method through which managers of existing productive areas can gain the right to call their properties APEA. A complete vision of area and a strategic planning process, drive site managers and their tenants to evaluate the benefits of participating in a regional APEA network and by product exchange as well as other means of improving their performance.

The team have elaborated guidelines of these processes and resources to support new industrial areas and existing ones, improving the environmental, social and economic performance of companies at each scale, through new services offered by APEA management.

Moreover the document explains also procedures for checks and acceptance and for performance assessment.

This Regulation, in detail, offers a rich menu of individual facilities, and shared support services, design options, including ideas for site and infrastructure design; moreover also cover strategies for achieving environmental performance and management.

The companies in an APEA need a range of general services indirectly related to their production systems. These include governmental relations, dining facilities, purchasing of common supplies, information access, and many others. By acting in common to procure these services, they can reduce indirect operation costs (especially important for smaller companies). By coordinating satisfaction of these tenant needs, the APEA management company can increase its revenues. Sharing services will increase opportunities for communication among employees of different companies and build the community spirit of APEA.

4. Regional qualify of APEA: the criteria

A full evaluation framework for an ecologically equipped area combines economic, technical, social, and environmental objectives into a whole system. This means that APEA project can seek a design that optimizes objectives in these four domains as a whole, not separately.

The Tuscany Regulation establishes requirements to qualify Industrial Area Environmentally Equipped and foresee a score system points in order to evaluate them: each criteria have a specific score to add in order to reach the APEA qualify. There are two kinds of requirements:

1. Minimum requirements: their satisfaction is necessary to obtain APEA status;
2. Flexible requirements: it's possible to choice requirements functional and compatible with the territory, to obtain threshold necessary to obtain APEA status.

Several basic strategies are fundamental to developing an APEA; individually, each adds value and together they form a whole greater than the sum of its parts so, the criteria of Tuscany Regulation to satisfy in order to reach APEA status are articulated in:

- urban, about planning and design of Industrial Areas Ecologically Equipped
- infrastructural, about innovative technologies and services
- management, about organizational requirements.

In detail, urban and infrastructural criteria provides with technical requirements directed to diminish and to manage the pressures on environment in an integrated way, applied to buildings, industrial facilities and common areas, bought in, have the ambition and the aim of transforming the entire area in a body to serve its users. Infrastructures (for sustainable mobility, energy saving and production, for water management, lighting, waste management, access control, the web server, WiFi access points, video surveillance, irrigation, etc..) will be centralized, and they are characterized by simplicity available to all actors involved. The APEA planning aims that buildings and infrastructure are designed optimizing the efficient use of resources and minimizing pollution generation. It's essential to minimize ecosystem impacts by careful site preparation and environmentally sensitive construction practices. The whole area will be designed to be durable, maintainable, and readily reconfigured to adapt to change. The realization of Industrial Areas Ecologically Equipped will be a tool for local governments and for the entire areas to support the economic and social development, which, since the implementation phases will generate jobs, and opportunities for the construction industry, and support socio-economic area.

5. Regeneration project of Productive settlement San Zeno, Arezzo,

TAED Department have a collaboration with Arezzo Municipality for a participation to the 2010 Tuscan Region APEA Call, addressed to Public entities, to allocate funds to regeneration projects of industrial settlements located in Tuscany. Arezzo project is one of the winners. The project is about San Zeno Industrial Area: a settlement of industrial and craft activities, especially of gold sector. San Zeno Area presents a lack of environmental infrastructure, of system of pollution prevention, and problems about mobility and safety.

This settlement presents some criticalities as follows:

- environmental and landscape protection
- network shortages and obsolescence
- enterprises services deficiency
- security and health problems.



Figura 1 Layout of the project

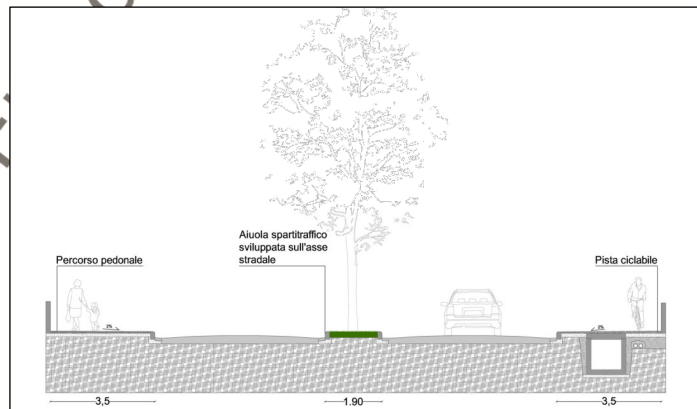


Figura 2 Road section type

The project is articulated around environment respect follows sustainable development, in accordance with the principles of pollution control and prevention, to reach high environmental quality. The project covered the following themes:

- sustainable mobility, limiting the flow driven, promoting public transport, and bicycle and pedestrian flows. Through a phisycal separation between access flow and penetration one. The two main street of San Zeno area, will have a speed limit of 50 km/h, while the other streets inside the settlement will foresee a speed limit of 30 km/h.. To complete the road safety plan, it will be created a velocity restraint device with a system of median strips planted with trees. This solution implement also environmental quality of the area. The project includes positioning of speed detection panels. Cycle network runs above the multipurpose tunnel, on the other side of the foot path. The requalification project foresees three new parking areas strategically located like saturation of the residual areas. The project foresees also fueling station for ecological vehicles.
- Ecology station to manage with ICT provision of waste separation collection in the area.
- habitat and landscape protection, increasing green areas, rows of trees along the roads, etc. All new parking areas in project will be realized with permeable and drainage paving, to better action of penetration of rain water.
- acoustic environmental through the use of sound-absorbing asphalt

- public illumination with remote control systems, and high efficiency lamps. The project foresees the substitution of actual lighting poles with new ones powered with led technology. This solution will allow a total energy absorption of 9 kw, with a energy safe of 54% compared to existing. To limit exercise and maintenance costs of the settlement public lighting, it will be realized a remote control system to manage light intensity, lamps durability and substitution, failure analysis, etc. with a reduction of costs between 30% and 50%.
- realization of a multipurpose tunnel for networks allocation. The tunnel will allow:
 - a better hydrogen distribution (necessary for gold's productive cycle) for San Zeno enterprises.
 - The installation of cogenerator of hydrogen energy (of 5kw) armed with monitoring system to verify environmental and energy benefits derived from hydrogen introduction.



Figura 3 Multipurpose tunnel

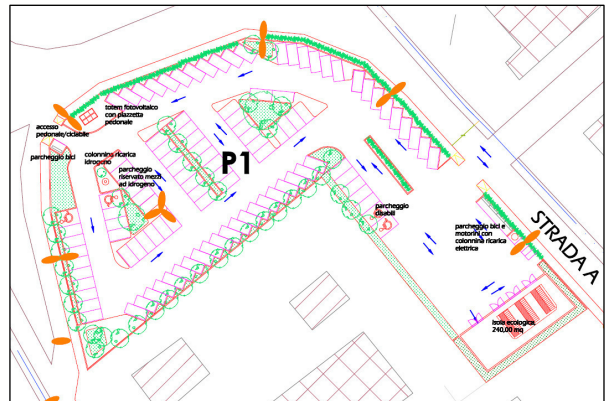


Figura 4 Requalification of parking area

6. Conclusion

APEA model is compatible with Tuscan Region productive and industrial structure, characterized by local systems highly specialized in production sector (paper mills, tanneries, steel, textile) and by small and medium enterprises presence. In fact the model:

- facilitates sme to reach an improvement of their own environmental performance, through common infrastructural and services equipment, characterized by high quality, impossible to achieve and to manage individually
- allows control and reduction of cumulative environmental impact, generated by all the enterprises of the settlement
- facilitates and exempts enterprise by obtaining environmental permission when issuing and renewing
- applies postulate of pollution prevention, precaution and reduction

The direct beneficiaries of the activities are:

- Local Public Authorities, in order to innovate and experiment new urban planning rules, and to support competitiveness in the respect of International rules, about environment and resources saving.
- SMEs, to obtain simplification and facilities, thanks to coordination and cooperation management, and to better their repute in local and International contest.
- Communities involved in hearings conducted by planning agencies, to benefit by strengthening economic development planning, mobilizing educational resources to help the community's businesses and government operations increase energy efficiency and pollution prevention.

In any case, this new approach has the presumption of encourage productive areas managers to improve their economic performance, environmental quality and social development.

The Application of Arezzo Case Study, permits to verify APEA proceedings in relation to local context and territory's features, in fact the project was set up with the aim of creating proper infrastructure to supporting and promoting the development of companies and by offering new services and opportunities to the territory where they operate.

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The Cittam (Centro Interdipartimentale di ricerca per lo studio delle Tecniche Tradizionali dell'Area Mediterranea) has always been dealing with the great subjects of the architecture, landscape and urban design within the Mediterranean region, through a number of different studies about the traditional technologies and strategies employed by the populations inhabiting this so rich cultural basin.

This international conference has the aim of investigating about the reflection – over the sustainable development strategies and the ecological approach – of a number of principles, already present and rooted in the Mediterranean traditional culture, such as the bioclimatic response of buildings, the local resource employment and the social and cultural factors involved in the human activities. In fact, following the Meridian Thought, the dialogue, the communication, the fertility and the nomadism of ideas and people, and last but not least the slowness set against the frantic life, can be taken as re-found

ded values for the Mediterranean common culture. As far as contemporary architecture is concerned, and thus new application of city and land configuration, the teaching lectures learnt from the aforesaid principles, included in the Mediterranean tradition, will provide a large and deep aid to the actions and design items aimed at reducing the ecological footprint and at respecting the existing landscape.

The challenge of this Cittam conference is the enhancement of the cultural connection between the architecture, the infrastructures and the XXI century city configuration, all of which had contributed to the whole process – from the big works of the 19th century, till the nowadays innovation in material and product employment; by means of comparison and discussion about examples, theories, ideas and studies, the relationship between the various scale design and the sustainable development approach within the Mediterranean region will be faced.

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La passione per le conoscenze

