

Proceedings

2016 **MAY 30-31**
MARRAKECH, MOROCCO

Sustainability of Territories in the Context of Global Changes

1st AMSR CONGRESS and 23rd APDR CONGRESS



ISBN 978-989-8780-04-1



Proceedings

1st AMSR Congress and 23rd APDR Congress

'Sustainability of Territories in the Context of Global Changes'

During the last four decades, the world is experiencing heavy pressures resulting from both human and natural driven forces, causing severe disturbances for territories and their natural and manmade assets. In terms of global climate change, the IPCC fifth report attested that the atmosphere and oceans have warmed, the quantity of snow and ice diminished, the level of the sea and the greenhouse gases concentration in the atmosphere have increased. It indicated as well that each of the three last decades was successively warmer more than the previous decades since 1850. The special report of the IPCC on the management of climate extreme events risks and disasters states that it is practically certain that the increase in the frequency and magnitude of the daily warm temperature extremes and the decrease in the extreme cold temperatures will take place globally in the 21st century. Climate change and the speed of its occurrence may risk conjuring up in the future a number of harmful environmental and socio-economic impacts on territories. Climate change can have impacts on several sectors at a time. It affects and interacts with the human and environmental systems, dictating consequently the need for adaptation in order to reduce vulnerability and increase resilience.

In the context of the preparation of Morocco for the organisation of UNFCCC COP 22, the Moroccan Association and of Regional Sciences, in partnership with the Portuguese Association of Regional Development, is organising its first congress in Marrakech under the main theme of Sustainability of Territories in the context of global changes. This event is approved as 'Certified Event' by the Steering Committee of the COP 22.

We wish you a good Conference!

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Papers

[01110] THE HYDRAULIC SPACE OF THE CONCA D'ORO OF PALERMO AS A PARADIGM OF THE MEDITERRANEAN WATER SENSITIVE CITY.

The hydraulicspace of the Conca d'Oro of Palermo as a paradigm for the Mediterranean water sensitive city.

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ABSTRACT

This paper submit an analytical reading on gardens Traditional Agricultural Landscape (TAL) of Conca d'Oro and, in wider terms, on Conca d'Oro landscape in light of Water Sensitive Urban Design (WSUD) paradigm. The orchards TAL on Palermo periurban countryside follows the Arab conception of hydraulic space. The concept of Hydraulic space combines several technologies to achieve the best use of water resources by differentiating agricultural productions in time and space and by connecting different functions (hydraulic, climatic and aesthetic) in a homogeneous system. This conception of space extends to the whole Conca d'Oro across the countryside to the heart of the historical town to the intimate domestic space in the end. During the Norman age the Zisa source used to refresh and embellish the interior of the castle before water slides towards the gardens; on the surface of Fawara-Maredolce lake "citrus fruits smiled to fish" as well as in the other agdal; quanat supplied water to the old town. Water was the fundamental matrix and the systemic element underlining to the whole landscape design anywhere. Water and management of the urban water cycle are the higher-level issues in WSUD emerging paradigm too. Water is superordinate and in keeping with all processes of urban planning and design in order to overturn the urbanistic conception of "forgetfulness waters" emphasizing its perception. WSUD is a land planning and design approach which integrates the urban water cycle, including stormwater, groundwater, wastewater management and water supply, into urban design to minimise environmental degradation and to improve aesthetic and recreational appeal. Nowadays there are many aspects that make the Arab-Norman's Palermo a case study of a precursor water sensitive city. Likewise there are many reasons to assume its landscape maid of citrus gardens as a WSUD device for the Mediterranean environment; his continuous flow of water chains through terraces, gebbie, vattali and saje (dialectal arabisms) the Mediterranean garden TAL can be taken as emblematic paradigm of aesthetic and perceptual WSUD instances.

In a city that taught to Europe the notion of hydraulic space, as Palermo did before, ancient streams run piped or dammed. Due to coastalization and thickening the city is in competition for water with neighbouring agricultural systems. Moreover in a widely impervious city surrounded by steep mountains last piece of Mediterranean garden is threatened by the agricultural crisis and insensitive to water and beauty urbanization.

Keywords: Mediterranean gardens of Conca d'Oro, Traditiona Argicultural Landscape, Water Sensitive Urban Design

1. A WATER ECLIPSE UNDER CITY LIGHTS.

Water and the city are two inseparable elements of geographic space. Even just a glance at a geological map reveals the relationship between settlements and surface groundwater. Flowing water in great rivers is the determining infrastructure for navigation progress and the subsequent commercial activity that was the basic requisite for the development of urbanisation of *Urbs* "Mumford (1961)" first amongst them all, the one which made the Mediterranean its sea. And yet this same water, river, sea, lake or lagoon, a fundamental resource which was the foundation of glorious mediterranean cities and greatly influenced their design, has gradually disappeared from the city scenario. The disappearance of drinking fountains, reservoirs, troughs and fountains that were vital parts of society and commerce, have marked the breaking point in the coevolutive equilibrium between man, water and environment of which the mediterranean city was, for centuries, a shining model.

Modern urbanism designs reinforces the loss of the relationship between water forms and that of the city "Di Carlo (2012)". For reasons of hygiene, safety and space, water became an absent presence in modern urbanism, an engineering trick – out of sight and, consequently, out of mind. Sanitised, canalised, covered, cleaned, piped – hidden. Urban water was absent "Shannon (2008)"; Rain and potable water used for domestic and industrial purposes is drained and sent away as fast as possible "Wong (2006)". Rivers and streams are adjusted, dammed, deprived of their hydric riparian vegetation; coastal dunes are systematically leveled and built, such as wetlands, and form a limit to city expansion "Bevilacqua (2003)" and are now being reclaimed. Worth noting is this last term, reclaimed, indicative of the antagonistic approach reserved for water perceived to be malarial, or worse, noxious. The organic and fluid space of a traditional pre-industrial city is emptied and moved under grids and eighteenth century lattices. The first of these is the sewer that makes the space indifferent to the territorial structure "Beguin

(1977)” and to the particular characteristics of cultural and symbolic nature, as well as indifferent to locally available resources, including water “La Cecla (1998)”. The salubrious, clean, hygienic, respectable and odourless city “Murard & Zylberman (1978)” concealing, with embarrassment, excrement subterraneously “Gleichmann (1977)” that was at the base of metabolic symbiosis surrounded by countryside. By contrast, the sewers pollute the natural water resources. Used to dispose of waste, it becomes an unreliable font of disease to reclaim. For the first time the inhabitants of a place are unable to drink from their own water source. This is how inhabitants are extracted from the ecological reality of their daily life “Lane (1967)”. The place is killed in its capacity to sustain the population and the memory of that possibility is hidden with the water. Hygiene and comfort mean: tubes, taps and toilets. Water arrives from a distance down a tube and is disposed of down a hole, towards faraway places “La Cecla (1998)”.

If it is shown that the lack of transparency of the natural and technological cycle of city water and its disappearance from the sight of man leads citizens to consumerist behavior towards drinking resources on which all major urban water uses are dependant “Troy (2008)” then such evidence is even more critical in light of the short-term projections. When you consider that, currently, 38% of the world’s population experience water scarcity. As the latest UN statistics state that 60% of the world’s city will face water shortage by 2025 “Dreiseitl (2012)” is the urgent need for a revision of this urban model: waterproof, dissimulator and water waster. The ecological poverty in water will be enhanced by climate change and, above all, from the competition of agricultural and urban uses between increasingly intensive peri-urban agriculture and ever more populous cities. But the climatic extremes will not lead only to increased aridity. Storms will be more violent with serious consequences in terms of floods and landslides and ironically many cities across the globe experience in parallel the devastation of flooding “Dreiseitl (2012)”. The latter phenomena is already chronic and more extreme from waterproofing the city and irrational management which is overbearing and insensitive to water.

2. WATER SENSITIVE URBAN DESIGN: A NEW APPROACH TO PLANNING AND WATER/CITY MANAGEMENT.

The modern approach to water planning in the city has produced unhappy results at various levels such as security reduction, environmental comfort, amenities, presentability and identity, biodiversity and ecological urban resilience. Therefore, since the 90s, the contemporary city has seen the emergence of disciplines such as Low Impact Development (USA), the Sustainable Urban Drainage System (Great Britain) and the Water Sensitive Urban Design WSUD (Australia) with the common objective of restoring the relationship, both functional and formal, occurring between water and city. The common denominator of these new approaches is the want to dismiss engineered systems for hydrologically efficient disposal and their substitution with a range of distributed, multifunctional elements “Segaran *et al.* (2014)” of green spaces which are mainly dedicated to absorbing functions, intake and filtering of water with the aim of ecological management of the resource.

Of these approaches WSUD distinguishes itself for employing water, in a holistic concept, as a trasversal element and ‘circulating solution’ to provide a broader framework for sustainable urban water management “Lloyd *et al.* (2002)”. In the WSUD approach all the empty spaces and cracks in structures are transformed to potential environmental displays to hold, slow and leak as much rainwater as possible to porous soils “Pettine (2016)”. WSUD is based on small actions which are widely connected, physically and functionally, in a water network. Public and private vegetation spots and various types of displays (small rain gardens, swales that underline infrastructure, big water mirrors of constructed wetlands) are assembled in a model of holistic management and integrated urban water basin aimed at recycling the resource, to limit consumption and value it ecologically but also, especially, perceptually. In fact, where also the other disciplines share the goal of minimizing water impacts, what most distinguishes the WSUD is the approach aimed at maximising the aesthetic playful aspects of the new urban water landscapes. From buried horizons, beneath a gray waterproof surface, the Hydriads emerge with a retinue of gardens. The WSUD philosophy aims at building aesthetics of landscapes that are demonstrative of the relationship between human activities and water flows: attractive and instructive “Wong (2006)”, perceptually accessible, easily readable, intelligible, recognizable. Landscapes aimed to form the thought of the community today and tomorrow “Bava (2010)” to correct the derivative consumerist behavior of the cycles of ignorance and unusual perception of water. From nuisance and risk by disposing of it via hidden infrastructures “Segaran *et al.* (2014)” the liquid becomes perceived as a resource and an essential part of the urban space, which can be loaded with all the emotional meanings the mirrors are able to reflect (see figure 1).

In Australia more than 10 years of drought produced a mutation in the aesthetics of designed urban landscapes as response to issues of water shortage and sustainable water management “Raxworthy (2010)” which brought forth more sensitive characters to water. They were also better suited to the equally different aesthetic perception of the inhabitants. The place where WSUD was born, Melbourne, still cultivates and fulfills daily the dream of a

complete conversion in sensitive water by 2050. But there are many other local manifestations of a trend which has become global. Singapore "city of gardens and waters" through its parks located simultaneous resolution, both to water supply problems as well as those containing the torrential rains "Rinaldi (2016)". The Californian metropolis see in WSUD the most economic and effective solution to the drought. In northern Europe the experiences of water sustainable neighborhoods are multiplied "Panzini (2010)".

The Water Sensitive approach will necessarily also be applied in an already unstable Mediterranean waterflow that soon will suffer from water poverty. But how to formally and technologically trickle down the WSUD philosophy without delaying the replication, *ubiquitous* and conforming to overseas projects?

In fact, technology is not only viewed as a cultural undertaking together with society but, to a certain degree, also as a reflection (mirror image) of society. Large scale technology like hydraulic engineering reflects to a high degree the certainties of a society, and not only in the form of obtained knowledge but also in the collectively shared imaginations, worldviews and unscrutinised convictions. As art is the antithesis of society "Adorno (1972)", technology can be seen as thesis of society "Parodi (2008)". To find a coherent language for our WSUD activities we can draw intelligently on the technological inheritance that history and civilization built on the banks of *mare nostrum*. We can conveniently refer to the wealth of models, glossaries and formal types preserved in the survival of cultural landscapes of our own hydraulic engineering, the best of all the agrarian landscapes the Mediterranean tradition produced over 300 generations of farmers "Aymard (1985)". Agriculture, as a cultural landscape, implies geometry. Retaining walls, pools or cisterns and irrigation canals, are also elements whose geometry demonstrates its artificial nature of human work agricultural landscape a fundamental reference, able to provide a set of morphological patterns for the new green urban landscapes "Igalada (2016)".

Drawing on the forms and processes of Traditional Agrarian Landscapes (TAL) of the past to design future landscapes (from the City Park, the urban and peri-urban agricultural park to the open agricultural landscape country) would be convenient for two main reasons. First, the TAL are the result of a slow co-evolution between society and location, the result of a long vernacular dialogue between men, useful plants, water and environmental data, which was abruptly interrupted by industrial agriculture "Barbera *et al*, (2014)". Therefore, they can be studied as highly efficient ecological production systems to be taken as models, in dialogue with tradition, implementable and able to generate retro-innovation, to be applied in precisely those landscapes. The patterns derived from the TAL can be applied in urban and peri-urban landscapes to which the constantly expanding city, aiming to become water-sensitive and food-sustainable, will necessarily have to adopt in order to guarantee citizens the local supply of traditional products, ecosystem services but also amenities. In fact, in the expanding city (which denies its inhabitants the physical and perceptual accessibility of countryside which is more and more distant) the use of a formal language derived from the traditional agronomic, even in urban parks, can be an expedient recomposition, at least perceived, of the antithesis between town and country. The use of this is all the more appropriate when the parks are in former agricultural areas, the memory of which should be preserved.

The second argument in favour of the convenience of the TAL forms is their being '*iconemi*' strictly adhering to '*coremi*' "Turri (1998)". These are in fact among the few spaces that still represent the conditions of their place, that have escaped the homogenisation of industrial agriculture. Further, the TAL may be studied as a highly figurative *gestalt* format to take as formal models. They are in dialogue with local semiosis, repeatable, and are able to be reinterpreted while being susceptible to making new identities in new landscapes in water-sensitive cities, whether agrarian or not.

Consider, finally, that recalling, even only formally, types, vocabulary and local models of the traditional landscape could initiate an emotional transfer between the population and the landscape project. Many authors stress the educational capacity of the project with regards to the environment and the importance of behavioural feedback that it triggers. Some of them come to identify water management with managing people, whether individually or collectively in households, firms, communities and cities "Dovers (2008)".

In conclusion it is their multiple skills in the provision of ecosystem services, *amenities*, which assist the identity and empathy that an interpretive reading of the traditional Mediterranean agricultural landscapes proposes as a potential technological and formal reference model for the design of urban and peri-urban parks, (agricultural or not) for the contemporary water sensitive city.

3. ARAB HYDRAULIC SPACE: WATER SENSITIVE ANTE LITTERAM.

Amongst the multiple forms taken from traditional agriculture in that landscape of Mediterranean landscapes "Braudel (1985)", TALs derived from the application of the concept of Arab hydraulic space are among those that best represent the technological demands and aesthetic perception of WSUD. The Conca d'Oro has received the hydraulic space imprinting since 831 aC, the year of Palermo's conquest by the Arabs. In those years, Sicily became

one of the most important terminals of the slow spread of people, goods, technologies and ideas, expanding from the sixth century under Islam, from the deserts and grasslands of the Arabian Peninsula. The island became the protagonist of a great civilization, and sciences and agricultural techniques developed by the Islamic civilization are, for the same Islamic world, for the Western world and for future centuries, a legacy of extraordinary and innovative value. A real agricultural revolution. Hydraulic technologies and irrigation come from the experience gained in the driest regions of the East and the Maghreb. The great novelty brought by the Arab revolution is, therefore, represented by the integration of technologies that capture, distribute, and use the water for crops and achieving high productivity. In this hydraulic space, as well as in that of the water-sensitive city, the various technologies (machines and hydraulic structures, accommodation of the soil, rotations, intercropping and crops) agree in using the water resource in the best way, in a system connecting the various irrigation, energy, microclimate and aesthetic functions. Moreover, this spatial conception recognizes that water and nutrients in the Mediterranean are limited resources whose agronomic use must be optimised through recycling and preservation “Barbera (2004)”. This definition demonstrates in a nutshell all the salient principles of WSUD: the holistic approach, the sensitivity to recycling and rational utilisation as well as the recognition of the aesthetic value of water. Finally the stenomediterranean area of the Arab hydraulic space expands the possible geographic areas of research and application of original models, while its very cultural hybrid nature makes it, at this time of intercultural and interreligious conflict, a very interesting subject for consideration by the multiethnic urban societies of the Mediterranean.

The state of the art of the design practice already includes several examples of water sensitive urban parks, which have identifiable (more or less explicit) references and awareness of the Arab hydraulic space. A recent study identified and described systematically some interventions for the Valencia case study, starting with the project to the respective reference agrarian accommodation “Igalada (2016)”. This research aims to do the reverse for the Conca d'Oro of Palermo case study; to identify, analyse, interpret and categorise the various forms that water takes in the traditional Mediterranean garden landscape. This is in order to provide a schedule of design solutions for reference for the water-sensitive device design, as well as to verify the current efficiency or potential of these existing traditional arrangements.

4. THE CONCA D'ORO OF PALERMO. BRIEF SIGNS OF URBAN EVOLUTION: FROM HYDRAULIC SPACE TO IMPERVIOUS SURFACE.

The decision to concentrate on the Palermo case study is based on two basic considerations, of equal strength and opposite sign. While there is the extraordinary interest of Palermo city of water “Di Piazza (2008)” literally immersed in the hydraulic space of its Arab Conca d'Oro (in its historical structure surviving until the early decades of the twentieth century) on the other there is the application of water-sensitive emergency interventions imposed by the current city conditions.

Right in the middle, in the center of gravity of that Mediterranean water infrastructure “Braudel (1985)” on the banks of a great natural gulf, Panormus rises. The name of “tutto porto” is clear evidence linking its foundation to its unquestionable nautical qualities “Columba (1906), “Ziegler (1949)”, “Purpura (1999)” to the crossroads of maritime routes. Immediately behind the coastline the city enjoyed a fertile plain, rich in rivers and springs, so the water is establishing the fortune of the city in its various concentrations, from the salt trade to the sweet water of agriculture.

The first settlement is located between the Kemonia and Papireto with a plant attributable to a flower, hence its earlier name Ziz, that grows in a harmonious relationship with water of other rivers that surround it (the Gabriele, the Oreto and the Maredolce), as well as many streams that run through the rich plain catchment area. The peculiar morphological and hydrogeological conditions of the Conca d'Oro, characterised by a rather wide and shallow aquifer, ensured that the population, from ancient times, was able to access water emerging from the Gabriele sources (from the Arabo to the Garbal, flushing cave). However, the Arab government of Sicily provided to the Conca d'Oro that ‘imprinting hydraulic space that is the subject of our study. A Paradigmatic example of progressive fortunes derived from the symbiosis between water, location and Arab culture, is the park of the Genoardo (Arabic Heaven on Earth), for the amusement of the Norman kings destined to “rest and leisure stays, pleasantly immersed in lush gardens surrounded by fish ponds, artificial lakes and water features” “Zalapi (1998)”.

The most obvious elements of aquatic presence under the cities are small castles, that some authors date back to the Arab domination. There were issues of water towers emerging on the skyline, both in the city and the countryside where, along with the water machine spires, successive water landmarks were written into the landscape manuscript of the 19th century. That was the century of the citrus fruit, towering as unique vertical elements in a carpeted plain of gardens until three hundred million cubic meters of concrete reached very different

heights. Where the Arab origin of the small castles still seems doubtful, the underground system of the Persian Arab *quanat* that cross the city is not. This is a dense system of tunnels that intercepts the water table and, using a slight slope, leads the water to the surface, even over considerable distances with a comfortable and economic system. It allowed at the same time drainage and uptake of liquid as well as its transportation and fall to the place of use "Di Piazza (2008)". Just as certain is the Arabic origin of the irrigation system of the traditional agrumiculture of Palermo and Sicily which, even today, uses ancient Arabic. Flowed from a source (*favara, fawarra*) or taken from a water wheel (*senia, saniya*) placed on a high embankment permitting, in his fall, the spilling into a large tank (*gebbia, gabiya*). The water is conducted, after being poured into a *gibbiuni* that allowed it to dose through wall channels (*saja, saqiya*) and pipeline made in terracotta (*Catusi, Qadus*), in the basins that contain trees and which are separated by embankments called *vattali* (*batil*) "Barbera (2007)" (see figure 2). Palermo has lived for centuries in a state of dynamic, but resilient, equilibrium with water, marked by cyclical flooding. The first rupture of this balance came with the *Kemonia* deviation, the founder element of the city, towards the *Oreto*. Subsequently both the *Kemonia* that *Papireto*, were entombed, erased from the geography and perception of the city in the name of safety and hygiene. Still in the name of health, in 1761, the *Gabriele* fountains were covered as evidenced by an inscription in the bricked structure protection.

In Palermo, the first draft of the *Giarrusso* plan (1885) already provided for the formation of brick embankments for the humble river *Oreto* "Inzerillo (1981)" and its latest version (1895) undertook to provide an adequate sewerage system for an increasing population. The next planning tool posed a stretch of road cover on the already intubated *Oreto* River. The 1962 Plan became an accomplice of massive urbanisation of the territory, in all directions with his reckless and often illegal implementation "Cannarozzo (2009)". The modern and contemporary city has grown to saturate 70% of the territory. Instead of the orange gardens around Palermo, concrete agglomerations sprung up for which no classification is negative enough -with the loss of a landscape that- anyone who knew it can not help but feel the regret of a light that goes out in the world "Assunto (1981)".

Today the soil of Palermo is inflexible and necrotic, under an impervious surface the rivers are intubated or dammed. The risk of floods and landslides is very high and the green spaces are minimised. To remedy a bleak and unsustainable situation little has been done so far. Only between '99 and 2002 an agreement between the municipalities falling within the catchment area was drafted (Palermo, Monreale and Altofonte). A feasibility study for the "Oreto Park" is done. That park aims to the recovery of the landscape and environment and gave rise to a general redevelopment project whose realisation, however, he remained only on paper. A variation on the General Plan of 1962, approved in those years, attempt to reverse the damage done until now but the application of the *Cervellati* plan is too slow. Planning instruments are distant from water cycle issues. One of the very first steps taken by the planning towards a more water sensitive city consists in the Palermo 2025 plan. In its strategic programs the theme of the regeneration of the town water appears, but we are still some way off the use even just of the acronym *WSUD*.

5. THE CASE-STUDY OF THE MEDITERRANEAN GARDEN OF THE CONCA D'ORO.

Among the numerous agronomic models which have applied the Arab concept of hydraulic space, we chose the Mediterranean garden as a case study for certain reasons. The Citrus gardens of the *Conca d'Oro* are an agricultural ecosystem that embody a perfect fusion between beauty and utility. This is also a fundamental concept for the *WSUD*. Referring to the great amount of water springs of the water displays, to the fields connected by *saje* and *vattali*, full of *gebbie* and *gibbiuni*, it is clear that this is a model which highlights more than others, in all its aesthetic and playful values, the water from a perception point of view. A beauty created artificially by combining the perennial green, the sound, the illusion, the freshness of the water and eventually the interaction due to the possibility of navigation, as in the case of the great reservoir of the *Agdal* "Bresc (1984)".

Furthermore, the Mediterranean garden is a recurring *topos* along the "*Mare Nostrum*" coastline, from Liguria to Amalfi, from Sicily to Andalusia. The presented methodology of analysis and results could be replayed and adapted to many of those contexts. Beginning with an analysis of the Mediterranean gardens, this work investigates all the anthropogenic forms that water takes in the hydraulic space of the *Conca d'Oro*. For all of these, an initial phase of analysis and catalogue is followed by an interpretative study in order to provide an abacus of elements useful to generate *Imageability* "Lynch (1960)" to integrate the water sensitive devices in the contemporary Mediterranean city. The cross-scale quality of the potential models originated by the combination between the Mediterranean gardens and the *WSUD* could be the focus of the next phase of this research. From the rural park, the urban park, the square, to the courtyard and the patio there are many design suggestions derivable from history that can inspire an abacus of possible contemporary cities. The conclusion of the work will consist of an assessment of the current or potential performance of some permanent Arabic hydraulic devices in two case studies: the gardens of Favara

Maredolce and the area of Ciaculli and Croceverde district. The first case analyses the garden of the castle of Favara Maredolce, synonymous with the Agdal park type. As historically described, the element of greatest emphasis of the garden was an artificial lake. “Branches of gardens seem to push themselves out to look at the fishes and to smile to them” (Ibn Luyun) and moreover “the magnificent orange trees of the small island seem to be planted into the water” (Ibn al Awwam), from which the alternative name of Maredolce “Barbera (2004)”. Currently the basin is drained, and the park surrounded by the Brancaccio neighbourhood and very densely populated (see figure 3). The intention is to assess the benefits for the city where the lake is recovered as constructed wetland, a new method able to slow down the water and providing many other ecosystem services to the neighbourhood. Similarly, the second aim is to examine the potential of the terraced gardens system and the hydraulic lines of Ciaculli and Croceverde district as crucial extensive protection device from the hydrogeological risk. This last strip, which retains the character of the Conca d'Oro (see figure 4) and is still threatened by development and neglect of the countryside “La Mantia (2007)”, can find a new reason for being in its usefulness as a means of sustainable food and water. On a final note, in a historical moment in which the world's cities are attempting a conversion to water sensitive, Palermo boasts a great historical heritage of formal and technological models. Models to study, implement and replicate to achieve the WSUD adapting to the Mediterranean context. This town has potential water sensitive devices already operative or to reactivate with a low amount of costs broadly justified by the economical, social, ecological, environmental and aesthetic benefits.



Figure 1: Parc de Billancourt. Project by Agence Ter. Photo by L.L.Pettine



Figure 2: Elements of ancient Arab hydraulic systems in Conca d'Oro. Photos by S.Savelli



Figure 3: The Favara Maredolce estate

<http://www.artribune.com/2015/03/vestigia-di-castelli-e-giardini-arabi-a-palermo-il-parco-maredolce-la-favara-vince-il-premio-carlo-scarpa-della-fondazione-benetton-successo-per-la-sovrintendenza/20-affaccio-del-palazzo-verso-il-bacino-Il-fbsr/>

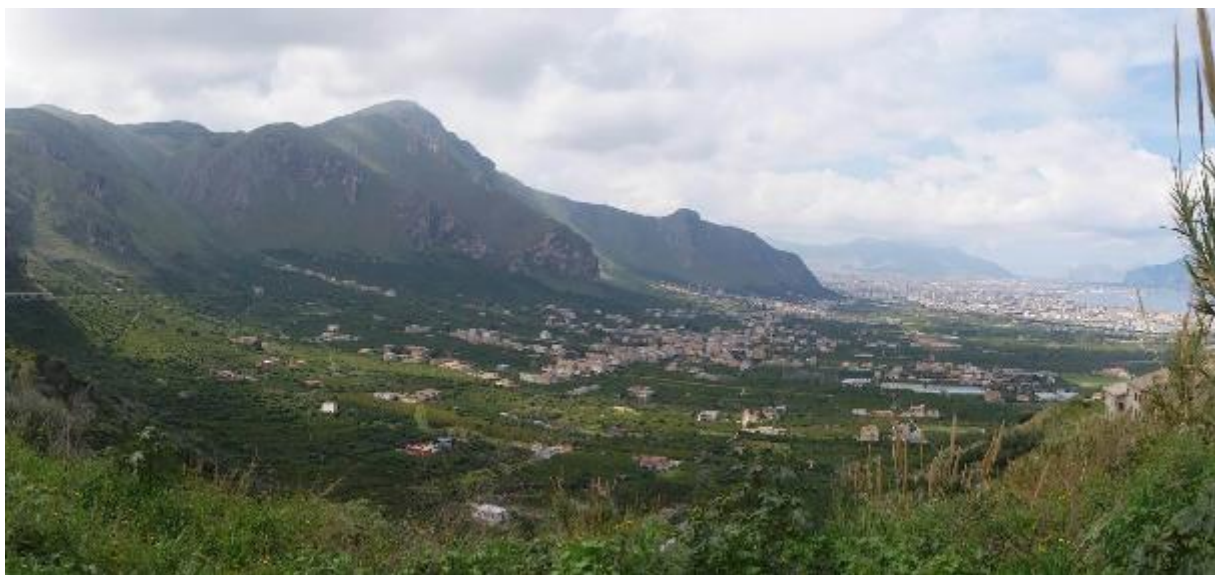


Figure 4: View of Ciaculli and Croceverde district. Photo by L.L.Pettine

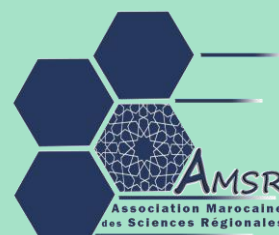
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