ABSTRACT

What are difficulties to develop a building or a new settlement in a desert area? Following three case studies will explain what are the real elements for projects in a dry landscape.

1. Breathing House
A building is considered sustainable according to how well it integrates with the natural elements of the surrounding landscape and with the habits of its inhabitants. This thought has been the springboard for designing a ‘house system’ in which the respect for privacy, the energy saving features of the building and the integration with the surrounding environment well blend together. The ‘breathing house’ concept not only refers to the exploitation of natural ventilation for the wellness of its dwellers, but also to the absorption – just as a lung - of the different though complementary energies present in nature (aeolian, solar and geothermal). The initial idea has been that of exploiting the local winds coming from north-east and north-west for the natural ventilation of the building. (…)

2. Qanat Villa (…)

3. Heart-Shaped Micro-City Masterplan (…)

sustainability, affordability, housing, saudi arabia, holcim awards.
A building is considered sustainable according to how well it integrates with the natural elements of the surrounding landscape and with the habits of its inhabitants.

The ‘breathing house’ concept not only refers to the exploitation of natural ventilation for the wellness of its dwellers, but also to the absorption – just as a lung - of the different though complementary energies present in nature (aeolian, solar and geothermal).

The initial idea has been that of exploiting the local winds coming from north-east and north-west for the natural ventilation of the building.

This thought has been the springboard for designing a ‘house system’ in which the respect for privacy, the energy saving features of the building and the integration with the surrounding environment well blend together.

The main entrance is located on the first floor: from here through a long suspended peripheral corridor one enters the two main rooms of the house, i.e. the male-guest room and the living-room (women-guest room).

The use of natural ventilation has been conceived as part of an ‘integrated system’. A wall-mounted coil unit provides both heating and cooling. In the summer the cooling system is driven with the electric current produced by a photovoltaic system positioned on the brise soleil of the whole building, while in the winter the system uses a geothermal (thermodynamic) heating system placed 60 cm under the floor of the internal courtyard.

And it is just such main corridor that works as the ‘wind collector’ designed to take advantage of the ‘Venturi effect’ (the acceleration of wind in a duct) and distribute fresh air inside the house. Moreover it also allows for the privacy of both dwellers and guests.

The latter exploits the calories accumulated on the ground and in the water of the swimming pool by irradiation during the day, and then transfers them to the building by means of a compressor. The integration of all these systems permits an energy saving of 75% compared to traditional systems.
The construction technology adopted is founded on a steel bearing structure that is assembled at a plant in order to reduce labour costs. The external panelling is based on a double skin façade ventilated by an interstitial air cavity. The external layer is in concrete, which can be natural, plastered or stone-covered, while the internal one, more breathable, is in plastered bricks. The steel-beam ceilings are covered by a concrete casting over a fretted sheet metal frame.

A further expansion of the building has also been conceived within the ‘breathing house’ concept, as the house - just as a lung - is subject to an increase in volume for vital needs.

In all cases there is no need to intervene on the bearing structure of the house. This House, conceived for a middle-income Arabic family, has been planned for seven members plus a housemaid and represent the prototype for a future way of life in Saudi Arabia, where tradition, privacy and modernity blend together inside an economic program focused on sustainability and affordability in the next years.

2 | Qanat Villa

The old oriental subterranean canalization system for the supplying of water, called Qanat, synthesises the concept of this villa better than any other.

As a matter of fact, the project developed from several essential points: a high degree of privacy towards the exterior, a marked hierarchical layout of the internal areas of the house, in accordance with local customs, and integration with the surrounding landscape.

For this reason, the figurative result is the direct consequence of mixing vernacular habits with natural ecosystems, integral to local Arab traditions of constructing, made of passive cooling and sustainable construction technologies.
The Villa develops on four levels, of which two are hypogea. These latter two are designed for the family and the female sphere, whereas the upper levels are for the male sphere and to be used as reception areas for guests. As for the family area, this distinction in the compositional order has been conceived by digging and eroding the rocks of the underlying ground (precisely as in the Qanat) and obtaining rooms and internal courtyards which are fully integrated into the landscape. On the contrary, the two emerging levels were intended as rocks positioned on the existing geological stratification that characterizes the lot with a difference in level of fifteen metres.

As for the family area, this distinction in the compositional order has been conceived by digging and eroding the rocks of the underlying ground (precisely as in the Qanat) and obtaining rooms and internal courtyards which are fully integrated into the landscape. On the contrary, the two emerging levels were intended as rocks positioned on the existing geological stratification that characterizes the lot with a difference in level of fifteen metres.

On account of its strong morphological and visual connotations, the landscape thus led, in a totally natural way, towards choices aimed at reinforcing the strong relationship between the Villa and the site.

Indeed, the view of the desert that can be enjoyed from the top of the rocks suggested placing the house in this position, devoting the underlying part of the lot to a garden and a recreational and wellness area. Consequently, a strong visual relationship with the surroundings was sought, preferring large fenestration and indispensable optical cones.

In the emerging part, the nature of the materials in the intervention leads back to the formal choice of considering the volumes as masses which recall the underlying rocks. Therefore, the use of stone and Corten steel seemed the most appropriate for the proiect.

The sculptural final mass is characterized by dominant figurative elements, where the plasticity, the essentiality and the dynamism of forms, mark both the appearance that the functional composition, in keeping with the nature of the surrounding landscape. The asymmetrical shape, will permit, with the passing of seasons and according to the points of view, to perceive the building in a different and unique way, making this vision a unique experience at sensory level.
So, how can an urban block transform itself into a neighbourhood? By becoming a self-contained micro-city.

The strategy can only be that of formally and uniquely characterizing each place, corner, square or park where residents spend every day. In fact, urban spaces become distinctive at the very moment of being recognised and when it is possible to get one's bearings, thus avoiding dangerous forms of alienation, which are often caused by monotonous repetition.

Even production in series can become a particular element when a blend of dwelling typologies and different materials is created by placing them one alongside the other, just as in this case.

The project therefore chose to obtain the high residential density requested whilst keeping wide spaces available for the residents' communal activities, in such a way as to induce them to live their residential area as a micro-city, where everything is present to satisfy their everyday necessities.
Those who wish to experience and discover these places have to enter this micro-city and go around the inside, even on foot, and not simply skirt it in a car. The idea is to create a "vibrant heart" away from the main traffic routes, where it is also possible to spend one's free time. There are three access points with roundabouts enabling vehicles to reach this urban block, all of which are along the three least busy roads, while there is a tree-lined filter-road separating it from Al-Khair Road. The internal secondary road network is characterized instead by one-way road loops and by neighbourhood ground-level car-parks.

Following this line of planning, the proposed residential units, with the exception of A (detached) and E (town-houses), are typological hybrids which cannot easily be traced back to pre-established standard case histories, in that they can be classified as compromise between semi-detached and terraced houses. However, they are always characterized by interior courtyards, a highly functional hierarchy and great privacy, just as in the old residential inhabited areas of the city. This particular type of homes are also designed to minimize the size of lots, so it can preserve precious amount of land for using it to public areas and green spaces. The choice of densify has been made also to produce a low vertical impact on landscape, as in the local housing tradition.

In the drafting of the layout plan, it was chosen to create a typological blend of housing units, able to create that variety to make one's own street, one's own house, the neighbouring houses, the nearby mosque and the semi-public areas liveable and unique, so that it is possible to be acquainted with the neighbours.
Natural resources are part of a strategy that aims towards real sustainability and from this point of view water, green and sunlight are integral parts of the urban structure. The choices are intended to maximise public and private green spaces, both in the horizontal dimension of urban parks as well as in the vertical dimension of hanging gardens. The outcome will ultimately involve the creation of a network of pedestrian-cycle paths, rendering people's daily lives less dependent on infrastructures and cars. The equation less roads equal more green space is one that we need and must follow. The simple settlement approach of the system will render intelligible and perceptible a structure where nature and public spaces prevail and where quality of life is the guiding principle.

If you live in Riyadh today you must be able to create occasions for meeting people. The existence of socialisation places plays a fundamental role in the perception of the liveability of a neighbourhood or of an urban space in general, a consideration that inspired us to conceive a "central plaza". The "central plaza" produces extended and extensive accessibility seamlessly linked to the surrounding spaces as part of an overall vision aimed maximising the fluidity of pedestrian and social flows. It holds stores, offices, residential units, conference centres, cinemas, restaurants, coffee shops, exhibition spaces together with every activity contemplated by our daily modern lives. The square, in this case, will take up the classic definition of this typical public space and decline it, innovating its meaning and morphology, and directly interrelating and almost conflating with the near two large roads.

For a real sustainability, all the buildings in the area will be equipped with photovoltaic/geothermal energy systems and solar panels to reduce the settlement’s energy consumption. The Master Plan requires a base performance achieving a minimum of 75% energy autonomy and offers the possibility of tax relief and construction bonuses the closer one gets to 100%. Also planned are advanced telematic networks for teleworking. The reuse of rare meteoric water in collection tanks (as in the old ages) is one of the processes promoting the awareness of the surrounding environment. A global awareness-raising processes will take place by means of single development projects involving the urban fabric.

4 | Conclusions

The experiences made design in hot climates of desert type, showed that the resource of water, often hard to find in natural quota, can and should be used in alternative ways, timely and optimized. Combined active and passive systems are the right way for energy sustainability but the cultural one is not less important. In order to develop a new urban sustainable planning philosophy in new or sedimented cities, we need to take a closer look at the local culture. The importance of an urban settlement’s history should not be forgotten nor underestimated. Culture and tradition belong to the intellectual sustainability that is necessary for the growth and informed development of new settlements.