ARCHETYPES IN THE ARID LANDSCAPE

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In the United States, we have too often tried to ignore the difficult fact of aridity. This applies as much to people living in dry regions as it does to others - perhaps even more.

The inescapable fact is that about 40% of the American landscape is arid or semi-arid. This includes most of the region west of the Rocky Mountains. The sizeable exceptions are the high mountain areas and a narrow coastal strip in the northwest corner of the country. This vast dry region is extremely varied in character. It has an expansive, austere beauty of its own, but it also has a forbidding inhospitable quality that speaks to the human spirit but does not invite long-term residency. Crops grow here only if they are given water beyond that provided by rainfall.

Most early settlers failed to come to terms with these conditions. The Mormons, who followed the Indians as early pioneers of irrigation in the West, were among the exceptions, but few followed their example. As a result, they left a trail of abandoned cabins and farms and scarred land. Scars last a long time in dry places and many of those left by the pioneers are still there.

Following the first of the great water diversion projects just after the turn of the century, water became available for both agriculture and urban growth in places where it had not been before, and the West began turning from browns and greys to bright green. Settlers tried to create lush water-rich landscapes like those of their former homelands in the eastern states and Europe. Cities became green with exotic plants brought from humid zones and supported by irrigation. Such artificial landscapes require enormous quantities of water usually brought hundreds of miles through pipes and channels. They also

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AN OASIS IN THE SAHARA DESERT IN CHAD. SOME ARCHETYPICAL FORMS OF THE DRY LANDSCAPE INCLUDE THE WASH, OR WADI; THE DRY LAND RIVER, AND THE OASIS.
require large inputs of chemical fertilisers and pesticides. Whereas natural landscapes are our major basic producers of energy and materials, these chemically and mechanically supported landscapes are net consumers of energy and materials. Furthermore, they offer little support for native wildlife populations and they emit quantities of water into the air, bringing about local climate change. Clearly, such landscapes are unsustainable. In fact, by consuming energy and materials year after year and returning only wastes in forms that are difficult to reuse, they represent the very essence of unsustainability.

In recent years, recognition of these problems has grown. The Xeriscape movement was developed by landscape professionals and water managers in Denver, Colorado, during a drought in the 1980s to solve a common problem-water wasted in the landscape. It has promoted use of drought-tolerant plants, and interest in native plants has become widespread. In a number of projects, landscape architects have planted communities of natives with beautiful and sustainable results. However, the use of local natives has its limitations. They provide a limited selection and cannot provide for all the functions and amenities that humans require in arid lands—for example, shade. Many dryland natives are hard to propagate, grow slowly, and often they are expensive to install.

My design work in the arid and semi-arid landscape has been based on an approach that is both more analytical and subjective. If we can understand nature’s evolved responses and adaptations to conditions of aridity and if we can observe and comprehend the landscape forms that derive from those adaptations, then we might use these as basic archetypes for arid and semi-arid regions. Such a vocabulary might achieve both sustainability and a visual and ecological fit with its naturally evolved context. These archetypal forms might also serve as bases for design expressions to connect the human psyche with the larger arid landscape. To explore this approach further, I want to look at a few archetypal forms of the dry landscape and the processes they represent.
One universal dryland form is the wash, or wadi, as it is called in the Middle East. Washes collect water and convey it to a river or sink. There is a special type of wash that forms at the foot of the rugged San Gabriel Mountains in semi-arid southern California where steep-walled canyons meet the valley floor. Water flowing from the mountains collects in the wash and is held there for a time. A major portion of it soaks into the soil then moves downward to replenish the groundwater in this critical zone where mountains and coastal plain meet.

In my own garden, which is also at the base of the San Gabriel Mountains, the small abstracted wash plays a similar role; that is, it collects water and allows it time to infiltrate the underlying soil and rock. While the garden wash collects only water draining from the roof of the house and from the surrounding paved or planted areas, the basic function is the same, and the basic materials - rock, gravel, and a few scattered plants - are the same. In the form, I have tried to recall the natural wash, not to imitate it in literal terms but to suggest its essential qualities, to establish a kind of symbolic correspondence.

Next, let’s consider the adaptations of plants in dry landscapes. Most of them share certain characteristics of form specifically related to lack of water, to high levels of solar radiation, and strong winds. The plants grow low and spread wide, and their leaves are small, often spiky. Thus, they present a low profile to the wind and smaller surfaces for emitting water through evapotranspiration. Furthermore, they tend to point upward, more or less towards the sun and thus minimise surfaces exposed to desiccating solar rays. They also tend to be greyish green rather than the bright emerald green typical of plants in wetter regions. And, in the semi-arid landscape of southern California, as well as in the surrounding desert, many of the native plants produce brilliant displays of flowers following the winter rains - but only for a short time. As the summer sun gets hotter, the flowers fade and the plants return to their muted colours and low profiles.
In my garden, each member of the community of plants features most or all of these characteristic adaptations. A few are native to the area, but not all or even most. Many of them come from similar climate zones in other parts of the world. All of them seem at home in this setting. They use no chemical fertilisers or pesticides and little water. And they attract a great many birds and beneficial insects.

Let us turn our attention to a project in the rocky, rugged, mountainous region of southeastern Arizona where the Sonoran and Chihuahuan deserts meet. Here, the plants are sparse and far apart, except in a few small areas where water concentrates due to indentations in the land. The Indians who once inhabited this area developed a number of simple ways to augment and amplify these places of concentration and in some locations to create concentrations for their own purposes. Their means was the careful placement of small rocks. A typical example was the check dams they built within narrow drainageways to hold back small volumes of water.

This principle of occasional concentration is applied in the design of the landscape of the Quinn residence located in the Sonoran desert.
It is still under development; progress is slow in the desert. The house is a small structure adapted to the climatic extremes of its setting. Its walls are constructed of straw bales, a waste material with extremely high insulation value. It is passively solar heated and naturally cooled with roof forms that reach upward for light and heat and to guide warm air out of the building. South of the structure, a system of shallow swales traps runoff water moving downward and northward. Some of this water soaks into the ground while a portion follows the slight slope of the swale into a small drainageway on the eastern edge of the site. Some trees native to the area, primarily oaks, will be planted in the drainageway where water concentrates. Some of the water is diverted to a small vegetable garden while the rest continues moving downhill. Lower down, a series of check dams, similar to those built by the local Indians, traps small volumes of water, primarily to create a gathering place for wildlife. Nearer the house on its south side is a series of small, semi-circular water traps made of stone with cottonwood trees located to use the water. Adjacent to the house will be three circular basins designed to catch and hold water running off the roof. These will function like the vernal pools common to many parts of the West. A rich and dense mix of flowering native...
desert plants visible from inside the house and from the outside terraces is taking shape in these depressions. So far, no planting has been necessary. In the desert, where conditions are right, especially those related to water, the plants will find them. Thus, for at least a few weeks in the spring the view out to the desert will be framed in vibrant colour. These basins also provide infiltration to ground water.

Other than these small areas of concentration, the landscape of the Quinn residence will remain in its natural state, minimally altered. The natural plant cover is simple and scattered with a varied sculptural character.

My next archetype is larger in scale and plays a larger role in the overall pattern of desert ecology. This is the dryland river, a ribbon of life in a landscape otherwise sparsely populated by plants and animals. These rivers usually collect little water from the lands through which they flow. They serve primarily to move water from mountain watersheds with higher levels of rainfall to the sea. Historically, dryland rivers like the Tigris and Euphrates, the Indus, the Nile, and the Colorado have been important to the development of civilisation. Some of the world’s first cities flourished on their banks over 5,000 years ago.

In the American West, we have treated rivers with a disdain they do not deserve, especially the smaller ones and most especially where they flow through cities. Typically, we encase them in concrete to prevent flooding, thus killing the ribbon of life.

The Santa Clara River is the last free-flowing unchanneled river in Southern California. But with its course winding through the rapidly suburbanising area north of the city of Los Angeles, its future is seriously threatened. What I want to discuss next is a plan for the Santa Clara where it flows through the newly incorporated (and mostly newly developed) city of Santa Clarita. Most of the people of Santa Clarita want to see the river remain in its natural state, and
they commissioned the California Polytechnic University 606 Studio to shape a plan to accomplish this.

Like most desert rivers, the Santa Clara is relatively shallow and its water levels vary greatly through the course of a year as well as from year to year. Often it spills over its banks in the spring and dries up entirely in the late summer. Since this erratic behaviour is the main reason for channelisation, it is essential that any plan to avoid channelisation recognises the process and the pattern it produces, which can be characterised in terms of floodway (frequently flooded) and floodplain (infrequently flooded). The floodplains form a sequence of spaces through the city, which can easily be developed into a linear park system. The floodways are hazardous places for developed parks but are suitable for some recreational use through most of the year and also provide rich wildlife habitat and corridors. By acquiring floodway and floodplain as parkland, the city can avoid concrete channels and provide a beautifully cohesive park system serving every neighbourhood in Santa Clarita. The cost is only a little more and for its money, the city gets both parks and a living river instead of an ugly, inert band of concrete.

Dryland rivers like the Nile, here at Aswan, moving water from mountain watersheds to the sea, collect little water from the lands through which they flow, have been important in the development of civilisations.
The dynamic, adaptive forms of the river also help to shape the forms of the parks. When the water is flowing, the river is an ever-changing, ever-moving pattern of braiding, interlacing movement that produces sandbars with characteristic narrow, pointed forms. This pattern is the basis of the design for the first parks in the system, over-lapping floodway and floodplain to give expression to the dynamics of the river. The trees planted in the park will be the species that once inhabited each zone: cottonwoods in the floodway and coast; live oaks in the floodplain.

The last dryland archetype that I want to discuss is the one that has made human habitation possible through history even in the driest deserts, and frequently the subject of fable, legend, and dream. This
is the oasis, a well-watered island, usually created by wells or natural springs. In modern times, oases are more often cities where water has been brought, for better or worse, by artificial means. Once it is there, urban dwellers usually ignore the natural aridity of the environment and use water in prodigious quantities. This pattern of use produces volumes of once-used wastewater, which is commonly viewed as a disposal problem. The Centre for Regenerative Studies at California Polytechnic University at Pomona works with regenerative processes for using and re-assimilating water and other materials for both liveability and sustainability. In dry regions, even where a great deal of water is available, it is important to use it sparingly and to good purpose and to cycle it continuously in ways that follow the patterns of natural systems. Too much water in the wrong place can pose greater ecological problems than too little.

At the Centre, partially treated wastewater from the nearby Pomona Sewage Treatment Plant is given advanced treatment by aquatic plants in open ponds. Following this treatment the water is used very sparingly for aquaculture and irrigation before it is filtered through the soil into groundwater storage. The irrigation system uses the drip or trickle principle for minimum water consumption and the plants watered are mostly food crops mixed with a few species that follow the pattern of dryland adapted species mentioned earlier. It is a human oasis with carefully managed water flows, and the landscape reflects that character.

It is important to say at this point that in the long term, all of these landscapes are experiments. We do not know yet if this approach, or any other, can result in true sustainability in arid lands. The record of the past is not encouraging. All of the great dryland civilisations have eventually declined to small numbers of people living at subsistence levels. The long-sustained desert societies are mostly nomadic and poor. Perhaps our knowledge and technical skills will allow us to adapt more successfully with grace and beauty, and perhaps not.