

CENTER 15

# DIVINITY CREATIVITY COMPLEXITY

A DESERT LAND ETHIC:  
AESTHETIC RESEARCH

Álvaro Malo

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THE UNIVERSITY OF TEXAS AT AUSTIN  
**SCHOOL OF ARCHITECTURE**  
CENTER FOR AMERICAN ARCHITECTURE AND DESIGN

## CENTER 15

### A Desert Land Ethic: Aesthetic Research

by Álvaro Malo

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The life of the desert lives by adapting itself to the conditions of the desert...

And so it happens that those things that can live in the desert become stamped after a time with a peculiar desert character...The struggle seems to develop in them special characteristics and make them, not different from their kind; but more positive, more insistent.

– John C. Van Dyke<sup>1</sup>

#### SONORAN GEOLOGY

Since I arrived in Arizona, the brightness of the morning sky prompts me to get up early. At sunrise, I walk around my “garden” in the Catalina Mountains foothills—the notion of a garden here is different: mostly a fence or a wall erected to claim a portion of the desert as it is. Vegetation is sparse but evenly distributed, as the perimeter of the root structure establishes the water rights of each and every native plant. Yet under the low incident rays of the morning sun, it is the quality of the surface that is seductive to the eye.

Gravelly or stony *alluvial fans* spill out of the surrounding mountains through drainages or *canyons* and cover much of the surface of the Sonoran Desert. They vary greatly in color and texture, from sandy and porous, to rock hard and crystalline, from white and opalescent, to jet black and basaltic, with all the hues in-between. The frequency of mica and pyrite incrustations, mineral silicates, and sulfides common in igneous and metamorphic rocks, gives evidence of an active volcanic past, painting the surface with a shimmering quality, a silvery to golden glitter. Fool’s gold.

Geology challenges both reason and imagination. Biological cycles and life spans are fleeting when compared to geological cycles, which span millions of years. Hardly less provocative is the notion of geological space, as we wonder what caused mountains and plains to take their present form and what might become of them in the future. Although geological time and space may have little bearing on the utilitarian dimensions of our present undertakings, there are lessons to be learned from the geological processes. One definition I have consigned to hard memory: *tectonics*—the deformation of the earth’s crust, the forces involved in that deformation, and the resulting forms.

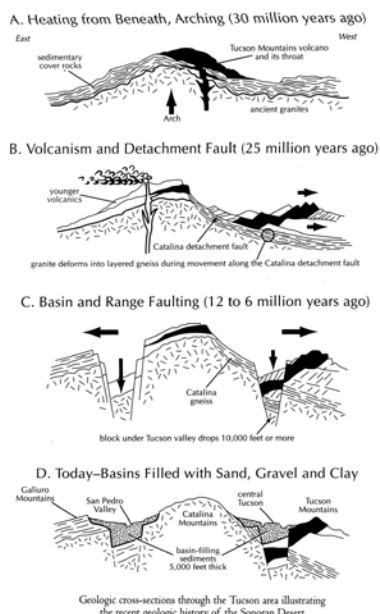
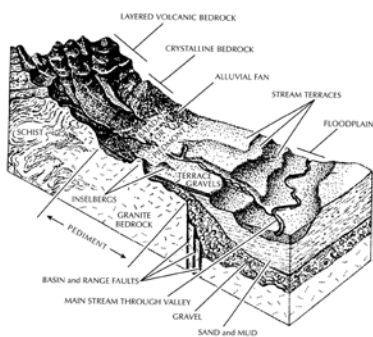
PRECEDING  
PAGE:  
Catalina  
Highway in the  
Santa Catalina  
Mountains.



## LAND

The land of the Sonoran Desert is configured as a broad shallow bowl surrounded by considerably high mountains. It displays nearly two miles of vertical relief, from sea level to 9500-foot high mountaintops covered with Evergreen forests. On the northeast, it is encircled by the Mogollon Rim, a mile-high escarpment of sedimentary rocks (from 30 million to 1200 years old) that cuts diagonally across Arizona and is fully exposed to view in the immense stratified walls of the Grand Canyon. On the north, it joins the Mojave Desert through a saddleback depression on the rim. On the west, it is bounded by the Sierra Nevada, the coastal Laguna Mountains in southern California and the Sierra San Pedro Mártir in Baja California composed mostly of cretaceous granites (140 to 80 million years old). On the southwest and south, the rim flattens out to the bottom on the Mexican Baja Peninsula and then is cut diagonally by the Gulf of California. The southeastern edge is defined by Mexico's Sierra Madre Occidental, a massive accumulation of volcanic rocks (30 million years old) exposed to view in the Barranca del Cobre (Copper Canyon) in the Mexican states of Sonora-Chihuahua.

RIGHT:  
Sonoran  
Desert Region,  
courtesy of the  
Arizona-Sonora  
Desert Museum.



On the eastern edge, the rim consists of a series of high valleys and parallel ranges, including the Chiricahua and Pinaleno Mountains in southeastern Arizona.<sup>2</sup>

The Tucson basin is a broad valley at 2400 feet of median altitude, circumscribed by the Catalinas (north), Tucson (west), Santa Ritas (south) and Rincon Mountains (east). Long, long ago, intense heat rising from the earth's core melted the crust into a viscous fluid. This heated zone across Arizona responded to the pull-apart north-west movement of the adjacent Pacific Ocean tectonic plate by forming a huge fault zone. The Catalina detachment was one of several nearly flat faults. Once released by the faulting, these mountains rose and arched further due to heat and buoyancy. The detached edges of the Catalina *gneiss* (foliated metamorphic rock) then moved a considerable distance, ten miles or farther on either side, forming the San Pedro and the Tucson valleys, in a process that lasted a few million years.<sup>3</sup>

The lesson for today, as I dig in the foothills of the Catalinas, is derived from this picture of *force*. Intentionally, I forget the canons of beauty (which may turn me into 'a beautician') and go along instead with the Portuguese poet Fernando Pessoa's suggestion that one may formulate an aesthetic based not on the notion of beauty, but on that of *force*<sup>4</sup>—force not understood as violence, but as the transitive event between my body and the material I move. The search for expression goes directly through the choice of a material. Whether the material is tensile or compressive, the point is that your work must reveal the force—the line of inflection is actualized in the mind but realized in matter—paradoxically preferring of the Aristotelian notion of *energeia* over the Platonic notion of *idea*.

LEFT:  
Sonoran Desert  
Landforms,  
courtesy of  
the Sonora  
Desert Museum  
Press, 2000.

Tucson and  
San Pedro  
Basin formation,  
courtesy of  
the Sonora  
Desert Museum  
Press, 2000.

Once in his life a man ought to concentrate his mind upon the remembered earth, I believe. He ought to give himself to a particular landscape in his experience, to look at it from as many angles as he can, to wonder about it, to dwell upon it...I am interested in the way that a man looks at a given landscape and takes possession of it in his blood and brain.

– N. Scott Momaday<sup>5</sup>

## WATER

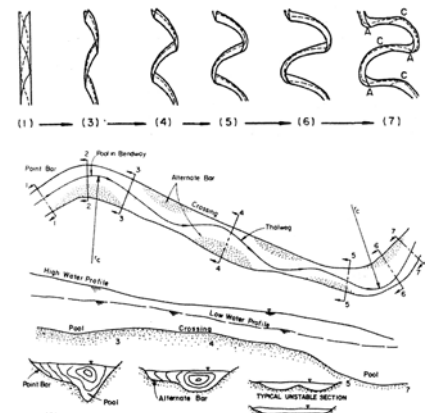
The word “Tucson” is derived from the original *Cuk Son* that in the language of the native Tohono O’odham (also called Papago or “Desert People”) means “at the foot of the black mountain.” The black mountain, now called “A” Mountain, is a volcanic lava cone that submerges deep below the surface and intersects the flood plain of the Santa Cruz River at the precise geographical location of modern downtown Tucson. Less than ten miles upstream alongside Interstate 19 is another lava cone called *Wa:k*, which means “the spring” and is located in the Tohono O’odham Nation San Xavier District, where the Jesuit missionary Eusebio Kino built the renowned Mission of San Xavier del Bac.<sup>6</sup> These rocky plugs inflected upwards the vector of underground water flow forcing it to spring to the surface, making of both Bac and Tucson the two places where Tohono O’odham native settlements, and the Hohokam for thousands of years ahead of them, prospered before the arrival of the Spanish conquistadors.

There is an unsettled discussion of the etymology and meaning of the name “Arizona.” It may have come from two Piman words, *ali* and *shonak*, which mean “small springs.” Or the Basque settlers of the region, descendants of Anza the Elder who founded Alta California, may have called the area *arritz onac*, or “rocky places.”<sup>7</sup> Whatever the linguistic origin that bequeathed the name, the phonetic coincidence of many languages seems to fit well most of the attributes of the territory. Today, people think intuitively that the name means “arid zone”—they are also right.

Arid zones, or deserts, are better understood in terms of the basic patterns of global climate and atmospheric thermodynamics. First, hot air rises, and cool air sinks; second, rising air expands and cools, while sinking air compresses and gets warmer; and, third, warmer air can hold more water vapor than cooler air. Hot equatorial air rises and spreads horizontally at high elevations. Air cools at high altitude and then sinks, flowing along the surface to replace the rising equatorial air and forming a circulation loop. The sinking occurs normally at 30° of latitude, north and south.

Rainfall in the Sonoran Desert averages three inches in Yuma, Arizona, to fifteen inches a year in the Arizona Uplands. The Tucson Valley, located in the latter, gets approximately twelve inches distributed primarily in two rainy seasons: a winter one in December and January, and a summer one in July through early September. Winter rains are typically gentle and steady. In contrast, summer rains can be torrential and abrupt, dumping several inches in a few hours. They arrive on the back of the summer winds called *monsoons*, which flow inland from the sea to fill in the vacuum created by rising air that has been heated by the summer sun.<sup>8</sup>

RIGHT:  
Normal annual  
precipitation in the  
Santa Cruz-San Pedro  
River Basins. Meander  
formation, from Luna  
Leopold, *Fluvial Processes*  
in *Geomorphology*  
(San Francisco,  
W.H. Freeman, 1964).





Water is the lifeblood of the Sonoran Desert. The rain that falls in the mountains and foothills and washes down the canyons to the alluvial valleys and aquifers sustains the riparian areas of the Sonoran Desert. The drainage pattern of the Tucson Basin is an infinitely diverse system of hydraulic geometries: deep mountain canyons, shallower foothill arroyos and broad valley washes, each exhibiting the typical wave patterns of horizontal meanders and braids and vertical riffles and ponds. The drainage basin, as delineated on a planimetric map

...provides a limited unit of the earth's surface within which basic climatic quantities can be measured and characteristic landforms described, and a system within which a balance can be struck in terms of inflow and outflow of energy.

– Luna Leopold<sup>9</sup>

Excessive pumping of water for agriculture, industry and human consumption in urban areas has lowered the water table well below the native plants' root zone.

Cottonwood and willow forests that once lined the riparian corridors of the Sonoran Desert, including the Salt, Gila, Santa Cruz, and Rillito rivers are now lost or disappearing. The aquifer underlying central Tucson has fallen more than 200 feet in the last fifty years. To supplement the deficiency, water from the Colorado River basin, several hundred miles north, has been diverted south by the enormous water transportation infrastructure of the Central Arizona Project.

Pumping fossil groundwater and importing water from other regions has delayed the inevitable need that people migrating into the desert have to moderate their habits of limitless consumption, this as they continue to reproduce the world that they have fled. The lesson that I am learning from the desert is that my mind is beginning to turn, to share nature's intentions. It is a lesson well inscribed by Joseph Wood Krutch: "...the desert is conservative, not radical." It encourages "...the heroism of endurance, not that of conquest." The desert is the last frontier, "...a frontier that cannot be crossed. It brings man up against his limitations."<sup>10</sup>

Water, water, water...There is no shortage of water in the desert but exactly the right amount, a perfect ratio of water to rock, of water to sand, insuring that wide free open generous spacing among plants and animals, homes and towns and cities, which makes the arid West so different from any other parts of the nation. There is no lack of water here, unless you try to establish a city where no city should be.

- Edward Abbey<sup>11</sup>

## AIR AND LIGHT

**M**y house sits on a ten percent southward incline on the Catalina foothills. It is a one-story affair of great simplicity: a spatial rectangle with floor-to-ceiling glass shaded by a 60-foot by 14-foot open, wood portico running lengthwise the entire southern façade. From this aerie, with my back to the Catalinas, I can see clearly the amplitude of the Tucson Basin framed by mountains on all sides: the Tucsons to my right, the Rincons to my left and the Santa Ritas straight ahead—and I imagine, not far beyond them the Mexican border and the rest of the Americas, all the way south to Tierra del Fuego.

How silently, even swiftly, the days glide by out in the desert...How “the morning and the evening make up the day” and the purple shadow slips in between with a midnight all stars!...And how day by day the interest grows in the long overlooked commonplace things of nature!...In a few weeks we are studying bushes, boulders, stones, sand drifts...And after a time we begin to take mental notes on the changes of light, air, clouds and blue sky.

- John Van Dyke<sup>12</sup>

The “deep blue” that overhangs the desert is most intense in the morning before sunrise, when it is a dark blue bordering on purple. By noon, it has crossed the spectrum through pale blue, yellowish, and lilac. By sunset, it has passed again through magenta, rose, and orange. After twilight, a warm purple veil has returned to envelope all things, seen and unseen.

Sunlight passes through the atmosphere relatively undisturbed, but occasionally a light particle, a *photon*, collides with an air molecule and bounces off it, a process called “scattering.” Colors, or more precisely light wavelengths, influence this process. Visible light is a mixture of all the colors of the spectrum, from

RIGHT:  
Giant Saguaro  
Cactus, photo  
by Greg Fink,  
printed with  
permission.

Sky Islands  
from the  
Catalina  
Mountains.

red through violet. The blue-violet end of the spectrum scatters more than the orange-red, and as a result, to our eyes, the sky appears to be blue. In humid climates, water vapor condenses in microscopic airborne droplets that equally scatter light of all colors, diluting the blue. In the dry and relatively pure desert air, nearby volcanic rocks, blossoming Palo Verde trees, Saguaros, and Sand Verbenas show a remarkable variety of vibrant hues—red, orange, yellow, green; but in the distance, the more the air intervenes, the more everything here seems to have a bluish glow. Blue skies, blue mountains, and blue birds, all seem to compress the aerial perspective into a thin shimmering veil.



On the mountain ranges, the cooler and more humid regions of the upper elevations are ecologically as well as optically separated from one another. As they seem to float on seas of hot air, uplifted by conjured up “lakes,” or arid habitats in the open desert. They are called “sky islands”—both the product of distinct ecological communities and aesthetic reveries. As the night falls, I see the city lights below through the southern glass wall and the image doubled on the northern glass across the room, creating the illusion of a mountain saddle or a sky island of my own.

With the dawn we face the sunrise.  
We face it with all our humility.  
We are mere beings.  
All we can do is extend our hands toward the first light.  
In our hands we capture the first light.  
We take it and cleanse ourselves.  
We touch our eyes with it.  
We touch our faces with it.

We touch our hair with it.  
We touch our limbs.  
We rub our hands together, we want to keep this light with us.  
We are complete with this light.  
This is the way we begin and end things.

– Ofelia Zepeda<sup>13</sup>

#### LAND ETHIC—AESTHETIC RESEARCH

**T**he Spanish architect Juan Navarro Baldeweg, who is also a painter and begins his projects through painting, has reminded us that the analysis of energies, turbulence, hot air, the sun, light, or the wind in landscapes also appears in architecture. They are things that he calls “the coordinates within which we move.” The different variables that intervene in the physical situation that surrounds us have a form of expression that through different combinations makes up the order of reality—a reality of which we inevitably become a part.

Vittorio Gregotti advises architects to begin their work on a geographical scale, to ensure that the built frame institutes a network of connections that structure or modify the “shape of the territory.”

Beyond the built frame there is the site, but beyond that still, there is the outside. Geography is not the surrounding of the building, but rather the impossibility of its closure...Geography is not the field next door, nor even the neighboring district, but a line that passes through our objects, from the city to the teaspoon, along which there is an absolute outside.

– Bernard Cache<sup>14</sup>

Geography is not just a territory that awaits mapping and subdivision—a *resource* to be developed. It is also a field of forces whose vectors await experiencing—a *source* of sensibility. The Norwegian philosopher Arne Naes opens us up, through his concept of *ecosophy*, to the notion that we may partake of the nature of the stone in the wash, the brittlebush in the mesas and the falcon that soars in the air currents. Having undergone successive migrations from the Andean highlands of South America, to the lowlands of the Everglades of Florida, to the uplands of the Sonoran Desert in Arizona, I am prepared to say that the vector of inflexion linking geography to geometry internalizes the surface of the land, or rather, that it extends the surface of our body onto the landscape, offering a continuity that prolongs the very nature of things.

The experience that recognizes natural things, including inanimate and animate bodies, by the effects that they induce on each other is the foundation of what is today called *ethology*. Here, the body is a boundary, a selective surface of exchange of perceptions, actions, and reactions linking together the individual and the world, “The interior is only a selected exterior, and the exterior, a projected interior.”<sup>15</sup>

The ‘natural composition’ between things is defined by the capacities for affecting and being affected that characterize each thing. It is a question of “whether relations can compound directly to form a new more *extensive* relation, or whether capacities can compound directly to constitute a more *intensive* capacity or power.” Borrowing the terms from geography we would define a body neither by its form, nor by its organs and functions, but rather by *longitude* and

*latitude*. In this schema, longitude is the set of mechanical relations of extension and orientation in space, and latitude is the set of motive, or emotive, forces and intensive states in time. Thus, we may construct the map of a body, “forming a natural geometry that allows us to comprehend the unity of composition of all of Nature and the modes of variation of that unity.”<sup>16</sup>

Not unlike the play of tectonic forces on the earth’s crust, the primary relationship of my body to the ground is the transaction with gravity. Standing up, walking, climbing, leaping, and all other countless movements may be defined as geometrical diagrams traced on the datum of the ground against the force of gravity.

The recognition of gravity prepares the geometrical act of grounding, making the ground ready to raise screens to other forces: light, wind, and rain. My experience is that this usually begins, and in most cases ends, with excavation:

But where is the surface of a hole? I once believed that the surface of a hole is level with the surface of the ground around it. From observation I have come to realize that this is not true...A hole has only sides and a bottom from which it extends infinitely upward, like a shaft of light: and as the earth revolves, it moves with great care and precision between the stars. ✱

– Richard Shelton<sup>17</sup>

#### ENDNOTES

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