



MOISTURE TWO

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THE GARDENS

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Virtually all cosmologies envisage an initial chaos out of which the cosmos emerged, one of the original meanings of cosmos was "order", that order is exemplified in many cosmologies by a myth of an undefiled place of unsurpassed peace and beauty- a garden or oasis – which, if one could but find it or reproduce it, would allow the seeker to live forever in perfect happiness.

--Clare Cooper Marcus



THE GARDEN AS METAPHOR

Some of the most compelling results from phase one of MOISTURE were the projects that stimulated the growth of new vegetation such as Bernard's experiment with shade cloth and rock mulch, and the growth around the fiberglass water receptacles that Claude and I installed. In keeping with our plan to work in subtle reflection to the desert environment we developed the desire to work on a project together that would promote small micro-climatic changes on our site.

The conditions that rule our site are harsh. The site sits at the elevation of 2,400 feet above sea level. Summer temperatures frequently reach above 115 degrees and in the winter they drop below 14 degrees. In 1983, 6.5 inches fell on a region usually receiving only 5 inches. This year of 2004 has seen some of the worst drought conditions recorded history, and it is looking like the Mojave might receive 2 inches or less.

The winds also are extremely harsh. At times they whip through the valleys at 30 mph, leaving sand in your pant cuffs and skin as rough as sandpaper.

The high alkyl soil measures at pH 8, and hardpan lines most of the soil at a depth of three feet. The hardpan makes it difficult for native desert tree roots to penetrate the earth deep enough to grab a drink. The intense competition, between plants, for water causes a condition found on our site called alleopathy. This condition, defined by plants secreting a chemical around the ground area where their leaves drop, prevents other plant growth and makes room for the root system to take whatever moisture it can find from the soil. This condition contributes to the uniform spacing found between the desert shrubs.

The MOISTURE site is shrub dominated, mostly *Atriplex confertifolia*, *Ribes velutinum*, *Artiplex torreyi*, *Ceratoides lanata*, and *Stephanomeria spinosa* are found there. All the vegetation that grows on our site looks uniform in appearance and gray in color, with small leaves and small flowers. All of the shrubs measure from 2 to 3 feet in height and width. *Creosote* bush (*Larrea Tridentata*) is found in the area but not on the MOISTURE site. You can see them lining the upper edges of the large arroyo about a half-mile north of the site. The area around the MOISTURE site is so shrub dominated that the closest Joshua Tree woodland is 11 miles east of our site.

A large arroyo cuts through the northeast corner of our property and runs towards Harper Dry Lake. Our water diversion system is positioned in a small dry wash about 4 acres down from the northern edge running to the large arroyo. Cattle grazed the land up until about 3 years ago reducing the variety of native vegetation to about 7 identifiable species of shrub. An open mine can be found a few yards from our site. It was in good working condition until one week before our escrow closed when the wooden walls and ladder were mysteriously burned. Was it a sign? We don't know what was being mined nor do we know what type of impact it might have had on the taxed eco-system.

The gardens are designed to promote small, micro-climatic change within our site's desert shrub community. Our plan is to grow gardens that function as a transitional desert woodland or as a comparative oasis for site visitors and inhabitants of all species. The configuration of gardens is based on the pattern of the little dipper as it appeared above the site at midnight on the first day of site construction. Seven 10-foot circular gardens reside just below the star position of the little dipper with the northern most garden (#1) crossing the dry wash and lying just under Polaris. The scale and shape of the center gardens echo both the circular cattle watering troughs (visible from the project site) and the fairy circle patterns of the natural desert shrub growth, that mystically appear when the site is viewed from the air. Two of the gardens will use captured rainwater from our water diversion system, and all of the gardens, but one, use Drewater to feed and establish the introduced native California vegetation.

Preparing the gardens for planting required digging down two feet below the surface of the hard desert soil and turning gypsum (to lower the pH levels) uniformly into the soil, before returning the soil to each garden form. We constructed sections of fencing, out of chicken wire, to be placed around each center garden to prevent jackrabbits from devouring the plantings before they had a chance to establish. Garden #2 was a special case, as it was being fed from the underground cistern and needed to be on a grade 1% lower than the cistern. Gravity is needed to get water to flow through the pipes and into the garden's center. This put garden #2 at 4ft. below the desert surface. Upon its completion, it looked much like a small swimming pool. During the construction phase, we made the decision to feed the plants under the root system, at the 4ft. level and back fill up to the 3ft. level to plant on top of the irrigation. Just when we thought things couldn't be anymore difficult, we hit a wide area of hardpan at the 3ft. level that extended far beyond our 10ft diameter garden. Bernard, Claude, Mark, Adam, and Ryan took turns with a pick ax over the course of four days to get the garden down to the 4ft level. Digging further, we found more hardpan below the 4ft level down, but this was to work in our favor since water penetration beyond this level is almost impossible not to mention implantable. After we understood the garden's natural hardpan lining, we hoped for the decomposed rock soil to act like a sponge that would keep this subsurface garden a little moister than the other 6 gardens. Garden #2, which has since been named 'Bernard's Ball Buster,' became the central focus of our construction activities.

The deep drop to garden #2 presented conceptual and practical problems, so we decided to construct a terrace and plant native plants that could control erosion. To make a visual and physical transition from the surface layer to the low-lying garden area, Bernard designed a 2-foot wide terrace that bridges the two levels. Swales were constructed out of the remaining dirt that was pulled from garden #2, and was shifted around the surface level of the garden about 25 feet away.

If all goes as planned, water should easily flow from the swales to the trees (planted on the surface level), and then onto the terrace, with the last flows spilling into the lower garden. We may still find ourselves with a temporary swimming pool after a heavy rain, but in this time of drought that is the least of our worries. Creating small microclimates through the planting of trees, such as *Prosopis pubescens*, helps add nutrients and balances the pH levels of the soil. And the provided shade stimulates growth of small cactus and other plants. All of the trees planted on the MOISTURE site, are native to the Mojave Desert.

The trees were placed in a circular arrangement. They radiate out 25 feet from each center garden, mimicking fairy circle patterns. Over time, the shade of these trees will boost the growth of the shrubs that were planted 10 to 12 ft. from the center gardens. The 7 center gardens were planted with the seeds of annual wildflowers and grasses. Our preparation of the soil was intended not only to host more plant variation, but to stimulate existing seeds sleeping in the soil. On the whole, we tried to design levels in the garden that promoted healthy growth areas for the other vegetation to thrive on.

Planting trees and shrubs out in the Mojave requires some sort of irrigation to establish the plants. The plantings on the MOISTURE site are no different, but the water management system built around them only works when it rains, and was designed to only water the annuals and grasses in gardens #1 and #2. Unfortunately for us, we needed water to establish the trees and shrubs and the closest access to water was 11 miles away at our friends Jim and Julianne Perkins' ranch and it was there that we went during the initial phases of planting.

We needed some sort of supplemental irrigation or logistically our project to create small microclimatic change on our site would fail. When we researched Drewater, a water-gel supplement, it was determined that this product was the answer to our irrigation problem. Drewater's ability to micro-irrigate plants for up to 90 days meant that we did not have to drive the 3 hours from LA every week to hand water. Using DrWater also eliminated the numerous trips it would take us to drive to the ranch and fill our plastic tanks with enough water for 120 plants and trees.

To plant the trees we needed to dig each hole beyond the hardpan layer. We also needed to amend the high pH level in the soil with gypsum. Each hole was filled completely with water (4 to 5 gallons per hole). Once the water was absorbed by the soil we back-filled the hole to position our small 1gallon container trees at the proper planting height. We carefully scraped away at the soil to expose the root ball, and then evenly placed three to four 1 quart containers of Drewater so they were touching the root ball. We then back-filled the hole and moved on to the next plant. We watered each tree a second time using 1 to 2 gallons of water. Then we placed chicken wire fencing, 3ft high, around each tree to protect them from the bunnies. We only had enough wire to fence two thirds of the trees, and I thought that maybe the little critters wouldn't go after the unprotected trees seeing how they all had protective long thorns on them. We soon discovered that Jackrabbits like new growth since they seem to get water from these new plantings. Our lesson learned: thorns do not protect little trees from thirsty bunnies. The remaining trees have since been fenced.

The shrubs were all selected to happily exist in saline-rich soil so we didn't need to prepare the soil with gypsum. We also didn't have to dig past the hardpan for the shrubs since they already had a shallow root system. The rest of the planting procedure was the same as for the trees. We did not fence any of the shrubs, and many have unfortunately become treats for the critters. Selecting the plant material was a difficult task. We wanted to choose only plants native to the Mojave and to find enough resources of propagated plant material. All of this searching required lots of driving between Sunland CA and Palm Springs, where we looked not only for plants that would thrive on our site but that might be useful as sources of food or medicine. We were able to find a variety of 24 species that were available, and in stock, between The Living Desert Museum nursery (Palm Springs), the Theodore Payne Foundation (Sunland), and the Rancho Santa Anna Botanic gardens (Claremont). The staff members at all three institutions were extremely helpful.

I called a number of nurseries in Southern California that carry native plants, but none had the varieties or quantities that we needed. The good news was that there are more propagators out there willing to propagate hard to find native plants if enough interest is expressed. I had several good conversations with Glenn Huntington, the curator of horticulture at the Living Desert Museum, about high desert trees and shrubs that would work well for our project. He gave much needed advice, however it has been difficult to find many of his suggested plant materials readily available. The Museum has published a list of high desert plants (most native to California) with each plant's temperature tolerance listed right next to the name. We have used this guide with great success. The Theodore Payne Foundation has a considerable archive of seeds in addition to a nice range of plants native to the Mojave. This fall, we plan to propagate, from seed, some plants that nursery growers do not currently grow. These we would like to introduce to our site even though the plants my not be ready to transplant for over a year. But, we are at ease with this slowly evolving project and with the understated pacing of the activities associated with it.

LIST OF PLANTS USED IN MOISTURE PROJECT

Annuals (from seeds)
Lasthenia Glabrata 'Gold Fields'
Layia Platyglossa 'Tidy Tips'
Phacelia Campanularia 'desert bluebell'

Grasses (one gallon containers)
Amount / Name
6 / *Boutiyoua Gracilis*
10 / *Sporobolus Alkildgrass*
8 / *AchnathferumPerennials* (from seeds)
Penstemon Barbatus
Baileya Multiradiata 'desert marigold'
Accent Plants (one gallon containers)
Amount / Name
5 / *Yucca Whipplei*

Small Shrubs (one gallon containers)
Amount / Name
3 / *Atriplex hymenelytra* 'desert holly'
5 / *Calliandra Californica*
3 / *Chrysothamhus nauseosus*
5 / *Artemisia Tridentata*
11 / *Atriplex Canescens* 'fourwing salt bush'
12 / *Atriplex Lentiformis* 'quail bush'
4 / *Atriplex Polycarpa*
9 / *Baccharis Sarothroides* 'desert broom'
5 / *Olneya Testoa*

Small trees (one gallon containers)
Amount / Name
6 / *Larrea Tridentata* 'creosote' (5 gallon containers)
3 / *Acacia Greggii*
9 / *Cercidium Floridum* 'blue palo verde'
9 / *Prosopis Pubescens* "skrew bean masquite"
3 / *Yucca Brevifolia* " joshua tree"
2 / *Olneya Testoa*

Garden observations will continue through the seasons of this first year and for several more to come. During the second week in March the desert was in full bloom. The *Phacelia Campanularia* were about 3 weeks behind in their peak bloom. This first Spring found center gardens #1,2,3,4,5, and 6 full of annual wildflower and grass growth more vigorous and concentrated than the outlying areas of our site. All of the gardens were a beautiful blend of existing annuals, that had just awoke up from a dormant nap, and the newly introduced native plants.

The most vigorous species of the seeds we planted was the *Phacelia Campanuliria*, and of the grasses, *Sporobolus Alkildgrass* has acclimated best to the conditions. By March, it was clear that none of the *Calliandra Californica* survived the winter months. We will replace them with something else this Fall. Garden #7, the closest to the wash, struggles the most will all plantings and natural growth. We are planning to take soil samples sometime in July to find out what the mineral and PH differences are between the soils of each garden.

The first trees to bud were the *Prosopose Pubescens*, next was *Acacia Greggii*. Three of the *Circidium Floridium* look like they are really struggling to survive however they all show signs of growth at the time of this writing. There are many obstacles for the young trees and shrubs to overcome, and survival for each plant is not certain. The plants and trees still have a long way to go before we can confidently say that they have established themselves on the site.

Jackrabbits attacked the shrubs in late May forcing us to construct domed covers out of dried *Atriplex* in an effort to camouflage and protect the tender new growth. Sometime in June or early July, those pesky critters dug up some of the Drewater protective plastic sleeves. In the Mojave there is desperation for survival, and the Drewater might just provide an easy meal. We still have to asses the situation and determine whether there has been a significant loss of plant life over the past month. For more timely information on how the trees and shrubs are doing, please check the MOISTURE blog.

--D.C.
July, 2004

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