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G. B. Cornucopia

Chaco's Night Lights

Approximately 100,000 people a year are willing and eager to drive a rough and lengthy washboard road to visit Chaco Culture National Historical Park in northwestern New Mexico's San Juan Basin. When asked why, most say that they want more than anything to "get away from it all." With the nearest city that offers food and services—Farmington, New Mexico—an hour-and-a-half drive away, Chaco certainly seems to fill the bill.

Visitors are often surprised and excited to find that part and parcel of "getting away from it all" includes being treated to some of the most spectacular views of the dark night sky available anywhere in America.

Once, several years ago, while I was on duty at the front desk, a young woman who had camped the night before approached me and excitedly reported she had seen 'something in the sky last night' and wanted to know what it was. I readied myself for a discussion about UFOs, but she continued, 'It was like a lane of white powder that stretched from one horizon all the way across the sky to the other horizon!' It then became my great joy to report to her that for the first time in her life she had actually seen the 'Milky Way'—a term she had heard before, but had never witnessed!

— *G. B. Cornucopia, park ranger*

Sometimes, way out in the distance, along the horizon, visitors can also spot small, linked domes of light. When they express curiosity about these domes, they are told that these are the skyward-facing lights of distant cities and towns, which are reflected in the earth's atmosphere.

Sometimes the light reflected from the domes is bright enough to make it difficult to see the stars in the sky. This competition between townlight and starlight raises questions that have provided the staff of Chaco Culture with the perfect opportunity to weigh in on an issue of increasing concern in communities throughout the USA, as well as in many developed countries around the world—that of light pollution, and the diminishment of the natural darkness of the night sky.

Chaco Culture National Historical Park was created by Congress primarily to protect the remains of the area's rich prehistory—antecedent to the cultures of today's Pueblo peoples, who still live and flourish in the arid Southwest environment. A thousand years ago, a complex civilization reached its apex in Chaco Canyon, producing some of the grandest and most complex prehistoric structures ever

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found in what is today the USA. Spectacular, multistoried “Great House” structures sometimes cover more than three acres and contain between 500 and 800 rooms—but their purposes remain shrouded in mystery. Sherds of ancient pottery litter the ground, sometimes in mounds several feet high. Whole and fragmentary stone tools used for daily chores and special events are also in evidence. Chaco’s sandstone cliffs bear myriad mysterious pecked and painted drawings, perhaps representing clan symbols, offering clues about activities taking place: celebrating lifeways, planning seasonal ceremonies, or planting crops. Some—of particular relevance to this article—appear to depict celestial bodies or astronomical events such as eclipses, solstices, and equinoxes.

Although overshadowed somewhat by the fame of Chaco’s cultural wealth, the park’s natural history is also rich, and integral to its archaeology. Indeed, the night sky at Chaco has long been recognized as a precious natural resource—one that is in more and more danger of being lost as we spend more and more of our energy on developments that are lit to such a degree that they literally outshine the stars in the sky in terms of brightness. Chaco’s managers have responded by placing shields and motion sensors on lights that are required in the park, and, wherever feasible, by simply doing away with lighting altogether. By designating

the night sky as a natural resource in its general management plan of 1993, Chaco has become an inspiration and role model for other national parks, institutions, and communities throughout the USA. Indeed, New Mexico advocates seeking to justify night sky legislation pointed with pride to Chaco as a way of gaining support.

Much of the ceremonial life of many of the peoples here on earth may be timed to the events seen in the heavens above. It has long been known that many New World cultures have amassed large bodies of knowledge concerning astronomy. Sometimes agricultural practices make use of seasonal patterns reflected in the sun’s movement, or of constellations in the night sky, to time activities such as planting or harvesting. The observational powers of people who lived intimately connected to all aspects of their natural environment are known to be acute and multifaceted. In 1970, researchers called “archaeo-astronomers” began bringing their unique perspective into Chaco Canyon, hoping to reveal the astronomical secrets of the ancient builders. Many sites in Chaco Canyon have been selected by such researchers as places that offer examples of ancient knowledge of astronomy. Some researchers go as far as asserting that the architecture found in the great buildings of Chaco is especially aligned to solar and lunar

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events—not only the individual buildings themselves, but even alignments between buildings that cannot easily be perceived.

While many of these ideas remain controversial, what cannot be questioned is the extreme degree of darkness that today characterizes Chaco Canyon's night sky.

Chaco's active concern about preserving its night sky has had a big impact on the park itself. Because of the extremely high quality of the dark sky visible at the park, groups of amateur astronomers have long been drawn to Chaco during the darkest moon phases of the year for what are traditionally known as "star parties." Often large groups show up, bearing a dizzying array of astronomical equipment with which to fulfill their main obsession in life: peering as long as they can into the darkness of the universe to see everything they can. Astronomical non-profit organizations such as The Albuquerque Astronomical Society (TASS), Rio Rancho Astronomical Society, and International Dark-Sky Association also relish opportunities to indulge their night sky passions and share their observations with park visitors and each other.

There is some friendly competition involved. You know, who can show the 'coolest stuff' in the sky to the most people, or who can tell the best night sky stories. It is great to come to Chaco and share something I love to do with people who have never had the chance to see something like ... planets in a telescope. They are amazed that they can actually count some of the moons that sur-

round the planet Jupiter. The reward of seeing people's eyes widen is reward and payment enough for me.

— *Steve M. Johnson, amateur astronomer*

Interest in Chaco's dark night sky accelerated and expanded well beyond park boundaries in 1995, when the seeds of what would become Chaco's popular dark sky observatory were sown with the arrival in the Southwest of amateur astronomer John Sefick. In search of dark skies under which he could create a facility where he and others could conduct research into astronomical phenomena such as supernovae, comets, and asteroids, Sefick envisioned an observatory that was both a source of research and education in astronomy and a place to interest people in preservation issues relating to the rapidly disappearing night skies. In the course of his search, Sefick hooked up with members of TASS, who introduced him to Chaco Canyon. After spending several years researching at Chaco, and growing more and more impressed by the interpretive night sky programs the park offered to the public, Sefick knew that he had at last found a home for his observatory. Armed with sufficient resources and an impressive generosity, he approached Chaco Superintendent Charles Wilson with a package he wished to donate to the park that contained several telescopes, a CCD (digital) camera, associated computers, and a modest dome housing a 25-inch reflector telescope. Wilson enthusiasti-

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cally supported Sefick's efforts, and in short order chose a site near the visitor center, allocated funds for construction, and lined up volunteers, mostly from TASS, who were clamoring to use such a facility. Soon the observatory was a reality—and in May 1998, it was dedicated at a TASS "star party."

Ever since that dedication, a cadre of volunteers have hosted park visitors at a night sky presentation several times a week. They are generous people dedicated to supporting preservation of Chaco Canyon's night sky resources, and attracted by the Night Sky Program's sense of purpose and by the opportunities to enhance their amateur astronomical knowledge and skills and forge close connections to their audiences. These night sky volunteers come from many countries, backgrounds, and age groups, and include everyone from students seeking to expand their astronomical knowledge or to teach people having diverse levels of understanding, to retired people searching for creative outlets

As a volunteer, I have been privileged to help visitors connect themselves to Chaco. People from all over are filled with the raw beauty of the nature they find here. The surroundings hook them into a sense of timelessness; a feeling that they are seeing something uncorrupted by 'progress.' For example, the sandstone mesas, relics of an ancient sea, are striking in the daylight; but in the velvet dark of a Chacoan night, their bold silhouettes frame a sky filled with brilliant stars. It is a sea of ancient star light, the same sea of stars that would have

enthralled the Chacoans of long ago. Visitors are excited as we explain that the night sky here is an official natural resource, and thus protected. The dark they find here is important to them. What they experience here is so deeply moving that it becomes something that they take back home with them. Some may never experience a night sky as dark as they see in Chaco again. Many more say they will return.

— *Liz Churchill, astronomy volunteer*

The success of the Chaco Canyon observatory program is most clearly shown in the visiting public's reactions as they become introduced, perhaps for the first time in their lives, to clear views of the vast universe (always there, but rarely accessible): "Wow!" "Beautiful!" "Fantastic!" "Majorly cool!" "I never knew the night sky could be so bright with stars!" These are only a few of the reactions from visitors of all ages who have never before looked through an amateur telescope—least of all looked up above them to see a truly dark night sky.

The real thrill for most Chaco visitors is sometimes just having constellations pointed out in the dark sky above. And there is nothing like seeing a young child climb up a ladder, peer through a telescope eyepiece at the Andromeda galaxy for the first time, and have his imagination explode, and his jaw hit his chest. This is why places like Chaco are so important to so many people.

— *Sandy Martin, South Dakota amateur astronomer*

As an educational tool, a small-scale observatory such as Chaco's may actually offer advantages over larger institutional facilities.

Late one evening, while I was running the 25-inch telescope, the crowd had dwindled down to two people—a young couple. So I

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decided to take the opportunity to get to know them a little better, and I asked where they came from. They told me they were from Iowa and were on a two-month road trip here in the Southwest. They had just come from Arizona, where they attended the astronomy program at a prominent observatory. They said they waited in a line of fifty people to look through one telescope. The city lights were so bright that they could only see three things in the sky. They were thoroughly impressed with our program—not only did we have many telescopes to look through, but the sky was amazingly dark and pristine—and it was ‘free.’ They were having a great time, and said they would be back.

— *Angie Richman, park ranger*

Research is another value of Chaco’s observatory. Through partnerships with the nearby University of New Mexico and the ever-active TASS, an exciting federally funded project is currently under way to accurately quantify the darkness of Chaco’s sky. And about to unfold during the coming winter is a search with a robotic telescope for supernovae in distant galaxies.

For many people, seeing a truly dark night sky for the first time is thrill enough. For others, the added knowledge that they are looking up into what is essentially the same sky that was seen by the Chacoans a thousand years ago provides a direct and almost spiritual link between our modern world and the time of the ancients. All who view Chaco’s night sky find it fascinating and confirming to realize that even though we may be using new methods and tools such as telescopes and computers to view the night sky today, we are looking to the heavens for at least some of the same reasons that our forbears did: to better understand the nature of the larger world around us, and our place in it. And the awe that these perspectives awaken in visitors provides the main impetus behind continuing efforts at Chaco Canyon National Historical Park to preserve the glory of its dark night sky.

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