Looking at a shared sky, through the lens of art

Adam Mann, *Science Writer*

Long ago, before recorded history, humans looked to the sky. They followed the movements of the sun, the phases of the moon, and the changes in the stars. They sought to track time, plan for rites, and mark when to gather and hunt. Often, they simply stared upward and told stories.

Modern-day astronomers have inherited this ancient tradition, but their endeavors have sometimes clashed with indigenous peoples. In the late-1980s, the San Carlos Apaches quashed plans for the Mount Graham National Observatory in Arizona. In 2005, the Tohono O'odham Nation prevented Kitt Peak Observatory from being built on their tribal reservation. Most recently, Native Hawaiians have protested the placement of the Thirty Meter Telescope (TMT) atop Mauna Kea, a volcanic mountain that many consider sacred. The rallies received worldwide attention and have, for the time being, shuttered construction of the next-generation TMT. Activists say they

aren't against research, they simply want their values respected.

Across the globe, in Australia and South Africa, astronomers are gearing up to build the Square Kilometer Array (SKA), which will become the largest radio telescope in the world. Here too, local indigenous peoples will be affected, as the astronomers aim to use their land. And in these two locations, as in Hawaii, the indigenous communities bear scars from centuries of colonial exploitation and mistreatment.

But thus far, the culture clash has proven much more disruptive in Hawaii.

To some extent, this is not surprising, as the TMT and SKA scenarios differ in important ways. Only in Hawaii would the construction impinge on a sacred burial ground, cause environmental degradation, and potentially reprise historical missteps. But both situations show

For the work “Ilgali Inyayimanha” (Shared Sky), the artists articulated the theme, which reads in part: “It doesn’t matter where we live on this barna (Earth). Nganha (we) are all sharing the same Ilgari (sky). Although we may see different Ilgarjiri (things belonging to the sky) we are looking up at the same stars and constellations.” Image courtesy of Yamaji Art Centre.*

*Artists: Margaret Whitehurst, Jenny Green, Barbara Merritt, Charmaine Green, Kevin Merritt, Sherryl Green, Tracey Green, Wendy Jackmarra, Susan Merry, Johnaya Jones, Gemma Merritt, Craig “Chook” Pickett, and Nerolie Blurton.

Indigenous artists in South Africa created this tapestry to recognize their collaboration with astronomers as part of Shared Sky. It's an imaginative representation of the meeting between the ancient and the contemporary. Image courtesy of First People Artists, Bethesda Arts Centre, 2016. Copyright © The Bethesda Foundation, Ltd. All rights reserved.

that modern astronomy can share fundamental questions with ancient cultures and collide with their sensibilities.

Swapping Stories

In the case of SKA, the interaction between scientists and native peoples used a crucial conduit of ideas: art. Starting in Australia, the SKA team made a point of building relationships between astronomers and the often disenfranchised people whose land they seek to use. This culminated in a traveling collaborative art exhibition, called *Shared Sky*, in which indigenous artists from both countries produced pieces celebrating ancient and modern stories about the cosmos.

"Romantically speaking, we have a window from two different continents looking at the same blanket of the heavens above," says Simon Berry, SKA director of policy development. "That's an interesting notion for these communities that have been interested in astronomy and space and humanity's place in the universe going back many generations."

Both the Australian aboriginal Yamaji and South African /Xam-speaking San people have traditional accounts explaining why the sky looks the way it does. For *Shared Sky*, artists interested in preserving these tales met with astronomers and swapped stories, enriching each other's understanding.

The roots of *Shared Sky* go back more than a decade, when artists from the Yamaji Art Centre in Geraldton, Western Australia, produced an exhibition called *Blue Sky Dark Night* in conjunction with an international SKA conference. "It was a mixture of Aboriginal and contemporary stories about the night sky," says painter Charmaine Green, a member of the center and descendant of Aboriginal Australians. Additional exhibits followed, and in 2014 Jerry Skinner, a SKA program planner who oversees stakeholder relations in Australia, and astrophysicist Steven Tingay

of Curtin University in Perth brought a group of artists and astronomers out to the remote Boolardy construction site where the radio telescope is being built.

"We spent a weekend telling each other stories," recalls astronomer Ray Norris of Western Sydney University and Commonwealth Scientific and Industrial Research Organization Astronomy and Space Science. "The artists painted and asked us about the telescope. They asked us to write some poetry, which was frankly embarrassing."

The conversation turned to a traditional constellation of sorts, called the Emu. Instead of a connect-the-dots star figure, the Emu is made from dark patches, such as the Coalsack nebula, that obscure the brighter Milky Way. The Aboriginal Australians said that when the Emu appeared in a particular orientation in the sky, it was a time for families to hunt for emu eggs. After learning about such celestial insights, the Australian SKA team began wondering if there was corresponding indigenous knowledge at their site across the Indian Ocean in South Africa. Skinner and others started to conceive of a project that could demonstrate unity across communities and continents.

The SKA team reached out to South African artists at the First People Centre of the Bethesda Arts Centre. "We were hugely excited," says poet Jeni Couzyn, who established the center to promote the art of /Xam-speaking people. "I personally think that art and science should meet, and where they meet important things can happen."

Both indigenous peoples suffered greatly from colonialism. Hunter-gatherer communities had been devastated in South Africa during the preceding centuries and the /Xam language driven to extinction. Some of the Yamaji artists were descendants of the Stolen Generations, Aboriginal children whom the Australian government attempted to "civilize" by forcibly separating them from their families and culture in the first half of the 20th century.

The two artists' groups were interested in reviving and continuing ancient practices. The Yamaji pieces for *Shared Sky* were done in a traditional dot painting style, which has its origins in Aboriginal rituals, whereas the South African needlework tapestries incorporated visual motifs that stretch back to antiquity.

Working together, the artists and scientists realized the extensive overlap between their descriptions of the night sky. In a traditional San story, the stars are sung into being by the Great Star !Gaunu, which is actually Vega in contemporary astronomy, notes Couzyn. "And the astronomers told us that Vega was used as a baseline for measuring other stars' [brightness]. I found that very interesting." One of the Yamaji Centre artists, Kevin Merritt, painted Venus trailed by a brilliant beam of light. In Aboriginal tales, the creator spirit Bamumbirr (Venus) flies over the world tied to her sisters via a celestial rope. To modern astronomers this faint line is known as the zodiacal lights, and it arises from sunlight reflecting off dust in the plane of the solar system.

Shared Sky opened to great fanfare at the John Curtin Gallery in Perth, Australia in September 2014. It then traveled to the Iziko South African National Gallery

in Cape Town, and from there to the United Kingdom. Its latest stint was at the Manchester Central Library, and the SKA team hopes to soon display the exhibit in Spain and other member countries.

Heavens and Earth

Even as Shared Sky captured viewers' attention, a heated dispute was erupting in Hawaii. On October 7, 2014, demonstrators interrupted the TMT's groundbreaking ceremony. Resistance to development on Mauna Kea's summit goes back decades, and astronomers initially thought these new protests might blow over. Instead they intensified, with hundreds showing up in April 2015 to blockade construction crews, resulting in arrests and international press. Late last year, the Hawaii Supreme Court revoked the telescope's building permits, ruling that due process was not followed in issuing them.

The roots of resentment stretch back to 1778 when Captain James Cook landed in Hawaii, bringing diseases that whittled down the native population by 90%. English was made the island nation's official language shortly after a United States-sanctioned overthrow of the Hawaiian monarchy in 1893. Teachers often disciplined Hawaiian children for speaking their native tongue, leading to a steep decline in its use until a renaissance in the 1970s.

In the mid-20th century, astronomers discovered that the cool dry summit of Mauna Kea was an excellent place to view the stars. Telescope after telescope went up, often with little regard for Native Hawaiian's historical and spiritual connection to the place. A 2005 environmental impact statement found that 30 years of astronomical activity on the mountain had a substantial and adverse cumulative effect on its cultural and natural resources.

The TMT board announced plans to use Mauna Kea as the location for their new telescope in 2009, and the initial opposition began shortly after. "The mountain was set aside for conservation," says Native Hawaiian cultural practitioner Joshua Lanakila Mangauil. "And this was kind of like the straw that broke the camel's back."

That conservation designation, by Hawaii's State Department of Land and Natural Resources, meant development there had to adhere to eight rules, including one stating that construction cannot cause substantial degradation to existing natural resources and another that the area's beauty be preserved or improved upon. Protestors didn't see bulldozing an eight-acre swath for the TMT site as meeting these criteria; they worried that astronomers were ignoring other impacts, such as the plight of endemic species and potential wastewater spillage.

Both sides quickly became entrenched in their thinking, and a fair amount of mudslinging ensued. "They called us backward-looking extremists," says Kealoha Pisciotta, who helped found Mauna Kea Hui, the group that brought the suit against TMT. Meanwhile, the protests caught the attention of the Hawaiian sovereignty movement, says astronomer Doug Simons, executive director of the Canada–

France–Hawaii Telescope that also sits on Mauna Kea. "That's a more vocal and strident movement, which tends to see this as a symbolic way of making their grievances known."

Both sides agree that astronomy and indigenous practices aren't inherently at odds; Simons points out that Polynesians such as the Native Hawaiians ruled the Pacific Ocean for 1,000 years or more, largely because of their star-based navigational abilities. But the activists, says Mangauil, are tired of being talked down to and told that their best interests will be served by allowing construction to go forward.

In October, the Hawaii Supreme Court heard testimony to decide whether to allow TMT construction to proceed. It may be that the megaproject has to abandon this site; the consortium behind TMT has already identified a back-up site in the Canary Islands. The consortium would like to start building somewhere by April 2018.

Mutual Understanding

Some still see hope for an outcome that can satisfy both the astronomy community and all Native Hawaiians. "I'm absolutely convinced that not only can they co-exist, but they must try to in each other's presence," says Simons. But this may still be a tall order considering

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—Charmaine Green

the long history of exploitation in Hawaii and scientists' part in it. "The interest in discovery is a noble endeavor and we support that," says Pisciotta. "But it can't live in an ivory tower removed from humanity."

At least in this regard, the South African and Australian situations are trying to get things right from the start. "The communities around the site are critically impoverished people," says Lorenzo Raynard, communication manager at SKA South Africa. "So we are being very careful with how we're addressing expectations, and making sure that local communities can own the project and be inspired by its potential to have a positive influence on young people and their appreciation of science."

Art exhibitions like Shared Sky can serve as important tools for such engagement, reminding everyone that the heavens above have inspired peoples of all colors and creeds since time immemorial. "With colonization there's been a lot of disruption. But what they couldn't disrupt was the sky," says Green. "You can't mine the sky; you can't move people from the sky. So sky stories remain very strong."

We are all simply "trying to understand where we are in this huge firmament round," says Berry. "If you have a soul in any shape or form . . . that touches you in some kind of way."