The Thirty Meter Telescope and Mauna Kea

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Peer Review and Comments:

Comments by my peers have been taken into account while writing the final draft of my thesis. Changes I have made to my thesis have been highlighted in gray. I'd like to thank the following people for their time and their contributions to my STS prospectus and thesis project.

Professor Michael Gorman helped me to clarify the STS frameworks I will be using to analyze the Thirty Meter Telescope protests. I am taking his advice and will be using the concept of a Trading Zone to analyze the current situation rather than using Actor Network Theory. Per his comments, I will also make sure to keep in mind what the minority will lose when using the Utilitarianism framework to analyze the problem. Professor Gorman also suggested looking into other telescope construction projects around the world and if there were any protests on those sites. I have looked in to it, but I have decided to leave it out of my prospectus. However, I think analyzing other cases may still be helpful and I may include a discussion of it in my thesis.

With regards to my thesis, Professor Gorman has been instrumental in ensuring that I was applying STS frameworks correctly and accurately to the Thirty Meter Telescope (TMT) situation. Discussions and lectures during class also led me to include a section about Anticipatory Governance in my thesis and Professor Gorman affirmed that it would be a good addition to my thesis. I have also addressed various comments regarding the clarity of some of my arguments. I have edited my thesis in hopes that my points are clearer for the reader.

My capstone professor, Michael Momot, has also contributed to my final prospectus. He has pointed out grammatical errors in my first draft that have now been fixed. I'd also like to acknowledge that the TMT has nothing to do with our technical topic.

While discussing the TMT with my astronomy professor, Shane Davis, he brought up an interesting point about how some astronomer's careers depend on being able to use the telescope for observation. I have added a section in my prospectus to discuss this. He has also helped me gain an astronomer's perspective on the issues surrounding the TMT.

During a presentation of my thesis project in class, a classmate and Professor Gorman asked about alternate sites for the TMT. I added a section in my thesis to discuss the planned alternate site in the Canary Islands. In regards to a discussion about winners and losers resulting from the TMT moving to the Canary Islands, the issue is not black and white. For example, the Native Hawaiians both "win" and "lose" if the TMT does not get built on Mauna Kea. They "lose" out on the economic benefits of the TMT, but they "win" in the sense that the TMT is not built on sacred ground. It is hard to explicitly quantify these gains and losses, so I decided to not try to do so. Rather, it is left for the reader to weigh these issues as they form their own opinion on the TMT.

My friend Tommy Landes reviewed my paper and helped me to understand how people without a technical background would receive and react to the arguments presented in my thesis. His feedback helped me to make sure the ideas and arguments presented were clear, concise, and understandable by a wider audience.

The Thirty Meter Telescope and Mauna Kea

Introduction:

In July of 2019, construction of the Thirty Meter Telescope (TMT) was set to begin after years of legal challenges and delays. Instead, construction crews were met with hundreds of activists who blocked the access road to the summit of Mauna Kea, a mountain in Hawaii, where the telescope is to be built. The goal of this paper is not to present an argument for or against the telescope. Instead, this paper will explore the benefits and consequences of building the TMT and examine the interaction between science and culture, specifically in the context of Mauna Kea. Various science, technology, and society (STS) frameworks will be used to analyze the current conflict over the TMT and provide possible ways forward to resolve the conflict.

Background Information:

British explorer Captain James Cook first made contact with the people of Hawaii in 1778. Since then, Hawaii was seen as strategically important for many European nations as well as the United States in the era of imperialism. This culminated with the overthrow of the Hawaiian monarchy in 1893 and subsequent annexation by the United States as a territory.[1]

The first telescope was built on Mauna Kea in 1970. For the first twenty years there was little opposition to the telescopes on the mountain.[2] However, beginning in the 1990s, the rift between astronomers and the local community began to grow setting the stage for the conflict on the mountain today. 1993 marked 100 years since the overthrow of the Hawaiian monarchy and

[1] Hawaiian Monarch Overthrown; Territory of Hawaii. (n.d.) Retrieved from https://www.nvlchawaii.org/hawaiian-monarchy-overthrown-territory-hawaii
[2] Ciotti, J. E. (2011). Historical Views on Mauna Kea: From the Vantage Points of Hawaiian Culture and Astronomical Research. *Hawaiian Journal of History*, *45*, 147–166. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=67629184&site=ehost-live&scope=site

activism in regards to Hawaiian sovereignty issues began to emerge. Soon after, President Clinton signed an apology resolution, which formally apologized for the overthrow of the monarchy and annexation of Hawaii. Environmental groups also began to oppose the telescopes as they disrupted an environment home to countless endangered species. The biggest blow came from an audit of the management of Mauna Kea in 1998. The audit states,

> We found that the University of Hawaii's management of the Mauna Kea Science Reserve is inadequate to ensure the protection of natural resources. The university focused primarily on the development of Mauna Kea and tied the benefits gained to its research program…The university's control over public access was weak and its efforts to protect natural resources was piecemeal. The university neglected historic preservation, and the cultural value of Mauna Kea was largely unrecognized.[3]

When Hawaii was annexed, the lands of the Hawaiian Monarchy were ceded to the US government. After statehood, these lands were transferred to the control of the government of the State of Hawaii. In 1968, UH was granted a 65-year lease on the summit of Mauna Kea.[4] These lands were supposed to be used to support the betterment of native Hawaiians. The 1998 audit made it clear that the University of Hawaii (UH) had failed to use Mauna Kea in a way that served the native Hawaiian community. It gave the public the perception, deserved or not, that UH was putting the economic and scientific benefits of Mauna Kea before cultural and environmental preservation. Since then, UH's image as the administrator of Mauna Kea has not significantly improved despite attempts to create new rules and regulations for the management of Mauna Kea.

[3] State of Hawaii. The Auditor. (1998). *Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve: A Report to the Governor and the Legislature of the State of Hawai'i.* (98-6). Office of the Auditor
[4] Ciotti, J. E. (2011).

Case For and Against the TMT:

As the name implies, the TMT is a very large telescope with a thirty-meter diameter mirror. Telescopes with larger mirrors are able to see objects that are farther away and are better able to resolve images. According to project supporters, this will allow the TMT to produce images with twelve times the resolution of the Hubble Space Telescope.[5] The telescope will allow astronomers and physicists to better understand star and planet formation, as well as the history of the universe.

TMT organizers are also considering a secondary site in the Canary Islands if the project cannot be built on Mauna Kea. The main issue with observing the stars from the ground is water vapor in the atmosphere. Water vapor and turbulence in the atmosphere impacts the image quality produced by the telescope. Adaptive optics can correct for turbulence somewhat, but sites with low water vapor and a stable atmosphere are the best sites for telescopes. Mauna Kea is generally regarded as more favorable than La Palma due to its higher elevation and atmospheric conditions.[6] Chile is also a good place to build telescopes due to its dry climate and high elevation, but astronomers need telescopes in both hemispheres to be able to fully observe the universe. The TMT consortium has continued to expressed a desire to build the TMT on Mauna Kea but is also considering the site in the Canary Islands if the conflict with activists cannot be

[5] About. (n.d.) Retrieved from https://www.tmt.org/page/about
[6] Astronomers Refute Claim That Canary Islands Comparable for TMT. (2019, September 5) Retrieved from https://www.bigislandvideonews.com/2019/09/05/astronomers-refute-claim-that-canary-islands-comparable-to-mauna-kea-for-tmt/

resolved.[7] However, environmentalists in the Canary Islands have already pledged to oppose construction of the TMT there.[8]

According to TMT organizers, the project has held public meetings and engaged in "open dialog and meaningful discussions with community members and stakeholders to better understand the island's issues as well as the cultural and natural significance of Mauna Kea." The TMT has also pledged $1 million per year for STEM education in the community. The construction will also create 300 jobs and the telescope will employ about 140 employees.[9]

According to the International Astronomical Union (IAU), the study of astronomy is important as it leads to advances in technology and STEM education. It also states that astronomy is about answering fundamental questions such as, "What is the fate of the universe?". It goes on to say that, "pursuing these questions is a fundamental part of being human."[10]

Shane Davis, a professor in the UVA Department of Astronomy, agrees saying that he believes the study of astronomy is important because it has practical implications for humanity, among other things. While Professor Davis said his work focuses on theoretical astrophysics, he does have colleagues whose works depends on using telescopes to observe the universe. Failing to build the TMT would hinder the work these astronomers do. Finally, Professor Davis said that while he respects the rights of Native Hawaiians and that they should have more say on the management of Mauna Kea, as an astronomer, he doesn't want to see science trumped by religion.[11]

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[7] Ancheta, Dillon. TMT Spokesperson: Mauna Kea Remains Preferred Site, No Plans to Back Out. (2019, July 21) Retrieved from https://www.hawaiinewsnow.com/2019/07/22/tmt-spokesman-mauna-kea-remains-preferred-site-no-plans-back-out/

[8] Saupe, Jonathan. Environmentalists in Canary Islands Gear Up for a Fight Against TMT. (2019, August 7) Retrieved from https://www.hawaiinewsnow.com/2019/08/07/environmentalists-canary-islands-gear-up-fight-against-tmt/

[9] The Process. (n.d.). Retrieved from https://www.maunakeaandtmt.org/tmt-process/

[10] About the IAU. (n.d.) Retrieved from https://www.iau.org/administration/about/

[11] S. Davis, personal communication, November 26, 2019.

In an article titled Historical Views on Mauna Kea, the author writes,

> The astronomers' clinical view of the summit's use was pragmatic and altruistic. It was couched in academic idealism. Surely, such a pure, intellectually-minded endeavor was evidence enough to persuade all of the summit's strategic value. Besides, the summit's astronomical discoveries mirrored the explorations of ancient Polynesian navigators. From the vantage point of the astronomers, the horizon is a barrier to be pushed back—beyond which new frontiers lie. Certainly, all people share astronomy's noble quest—to discover our origins and place in the universe.[12]

This view is not necessarily wrong, but it leads to conflict with local communities, who often have other priorities. Activists shared three key arguments against the TMT: environmental impact, cultural impact, and lack of prior and informed consent.[13]

According to the same article,

> In contrast, the community's cultural view of the mountain was steeped in heritage and spirituality. It was charged with the latent resentment of a disputed overthrow. Surely, such long-held, culturally minded beliefs were enough to exhort all of the mountain's sacredness. Besides, the summit's pristine majesty reflected the unspoiled, untouched wonders of outer space. From the viewpoint of the Hawaiian culturalists, the horizon is an embracing shelter within which heritage is safeguarded. Certainly, all people are mindful of traditions—to preserve our origins and genealogical connections with the sky.[14]

It is important to not mistake being against the TMT for being against astronomy, science, and technology. An activist interviewed for a Nature article says, “We are fighting for the rights of the mountain. I have nothing against astronomy, just don’t put it [the TMT] up there [on Mauna Kea].”[15] Marie Brown, a professor in the UH Department of Religion notes that, “Unlike adherents of Christianity or other major world religions, we [Native Hawaiians] are asked to

[12] Ciotti, J. E. (2011).
[13] Martin Lopez, Alejandro. (2018). Peoples Knocking on Heaven’s Doors: Conflict Between International Astronomical Projects and Local Communities. *Mediterranean Archaeology & Archaeometry, 4, 461-468.*
[14] Ciotti, J. E. (2011).
[15] Witze, A. (2015). The mountain-top battle over the Thirty Meter Telescope. Nature, 526(7571), 24–28. https://doi.org/10.1038/526024a

justify our beliefs, demonstrate the authenticity of our traditions, and prove that (it) is a valid religion."[16]

Those who follow the spiritual beliefs of Native Hawaiians believe Mauna Kea is home to the goddess of snow and that the mountain serves as a connection between heaven and Earth.[17] One important point that Native Hawaiian activists make is that there does not need to be a structure, such as an altar, to make land sacred. [18]Native Hawaiians consider all of Mauna Kea sacred, not just certain parts of it. This is a different mindset than that of western culture, where individual places are considered sacred. Although the TMT consortium has planned for the TMT to not be built on the summit in an effort to avoid building on sacred land, this does not address activists concerns that the mountain is sacred.

Another point often brought up by critics of the TMT is mismanagement of Mauna Kea by UH. The Office of Hawaiian Affairs (OHA), a public agency responsible for improving the well-being of Native Hawaiians, filed a lawsuit arguing UH breached the terms of its lease of Mauna Kea.[19] The lawsuit is still ongoing, but in March 2019, a judge dismissed one of the two claims made by OHA, but the lawsuit was allowed to proceed on the other claim.[20] While the lawsuit may not succeed in ending UH's lease, it underscores UH's mismanagement of Mauna Kea.

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[16] Brown, M. A. (2016). Mauna Kea: Ho'omana Hawai'i and Protecting the Sacred. *Journal for the Study of Religion, Nature & Culture, 10*(2), 150–169. https://doi.org/10.1558/jsrnc.v10i2.27795
[17] Hiraishi, Ku'uwehi. (2019, August 5). Exploring the Native Hawaiian Belief in the Sacredness of Mauna Kea. Retrieved from https://www.hawaiipublicradio.org/post/exploring-native-hawaiian-belief-sacredness-mauna-kea#stream/0
[18] Hiraishi, Ku'uwehi. (2019, August 5).
[19] Mauna Kea. (n.d.). Retrieved from https://www.oha.org/maunakea/
[20] Callis, Tom. (2019, March 16). Judge dismisses One of Two Claims in OHA Suit over Maunakea Management. Hawaii Tribune Herald, Retrieved from https://www.hawaiitribune-herald.com/2019/03/16/hawaii-news/judge-dismisses-one-of-two-claims-in-oha-suit-over-maunakea-management/

There are many benefits and detriments to building the TMT. The issue is not as easy as weighing the benefits and detriments to determine the way forward. The next section will attempt to analyze the current situation from various STS frameworks.

STS Frameworks:

Utilitarianism

Utilitarianism is the view that the morally right action is the action that produces the most good. One aspect of utilitarianism is that a decision is not acceptable if it results in a net increase in harms of any sort, even to a small number of people.[21] In this case, it is very difficult, if not impossible, to attempt to quantify the harm of building the TMT on land considered sacred.

Another important aspect of utilitarianism is figuring out who gets to make decisions. In this case, the state and UH have decided to go ahead with the project. This is one of the many complaints Native Hawaiian activists have. They feel as if they have been excluded from the process of decision making and that since the state and UH are ultimately in control, the decision to build the TMT was already made before the public hearings, permit issuances, and court hearings.

Interestingly, a poll conducted in August 2019 showed that 64% of registered voters in Hawaii support building the TMT on Mauna Kea. However, the same poll shows that 48% of people who are Hawaiian by ethnicity oppose the TMT while only 44% of the same group of people support it.[22] Governor Ige cited poll numbers indicating majority support for the TMT, the legality of the TMT, and the scientific and economic benefits as reason for the State to

[21] Gorman, Michael, E., Mehalik, Matthew, M., Werhane, Patricia, H. (2000). *Ethical and Environmental Challenges in Engineering.* Prentice Hall.
[22] Blair, Chad. (2019). Civil Beat Poll: Strong Support for TMT but Little Love for Ige. Retrieved from https://www.civilbeat.org/2019/08/civil-beat-poll-strong-support-for-tmt-but-little-love-for-ige/

continue to support building the TMT.[23] It seems as if the governor has taken a utilitarian approach and has decided that sacrificing a part of the sacred lands of Mauna Kea are worth the scientific and economic benefits of building the TMT. The utilitarian approach to building the TMT has failed and will not resolve the current conflict.

Trading Zones

A trading zone describes how two groups of people who speak from vastly different theoretical, cultural, or practical perspectives can come together and have a meaningful interaction and dialogue.[24] Therefore, a trading zone is almost necessary to resolve the current impasse over the TMT. Peter Galison's concept of a trading zone implies a mutual benefit for both parties by engaging in a trading zone. The benefits for astronomers and scientists are clear. Yet the benefits for activities is not quite as clear. Identifying how to protect and preserve Mauna Kea while still building the TMT will be key for a successful trading zone. Native Hawaiians have generally felt that they come out of engagements like these as the "losers". Seeing that Native Hawaiians will tangibly benefit from the TMT and mitigating their perceived "losses" are key to its future success.

According to the TMT consortium, organizers "have engaged in open dialogue and meaningful discussions with community members and stakeholders to better understand the island's issues as well as the cultural and natural significance of Mauna Kea."[25] As a result of

[23] State of Hawaii, Office of the Governor. (2019, August 29). *Finding a Way Forward on Mauna Kea, TMT* [Press Release]. Retrieved from https://governor.hawaii.gov/featured/finding-a-way-forward-o-mauna-kea-tmt/
[24] Gorman, Michael, E., & Werhane, Patricia, H. (n.d.) Using Trading Zones to Prevent Normalized Deviance in Organizations. 245-264.
[25] Our Story in Hawaii. (n.d.) Retrieved from https://www.tmt.org/page/our-story-in-hawaii

this, the TMT has committed to fund $1 million per year for STEM education on the Big Island of Hawaii.

Even with this community outreach, construction crews were still met with protests. Gunther Hasinger, the director of UH's Institute for Astronomy, said, "This large wave of protest has really surprised us."[26] Many Native Hawaiians want UH and the TMT to actually commit to protecting Mauna Kea. In light of the 1998 audit, many feel that UH and the state of Hawaii have still not lived up to their commitment to protecting and preserving Mauna Kea. While $1 million per year for STEM education is great, the money does nothing in terms of protecting and preserving Mauna Kea.

In 2015, Governor David Ige announced a 10-point plan for the future of Mauna Kea that focused on improved stewardship of the mountain. Before the release of his plan, the governor consulted with many different groups including Native Hawaiians. Even after this trading zone, however, the governor said, "My review found that the TMT project took the appropriate step and received the approvals needed to move forward. The project has the right to proceed with construction, and the state will support and enforce its right to do so…"[27] Even after listening to Native Hawaiians on the issue, the governor was still focused on the legality of the TMT, which of course is legal. The protests however, are not about whether the TMT has the right to be on Mauna Kea, they are about whether the TMT *should* be on Mauna Kea. This is an example of a failed trading zone, in which the governor was not listening to the concerns voiced by Native

[26] Loomis, Ilima. (2016, March 15). What's Astronomy's Future in Hawaii. Hawaii Business Magazine. Retrieved from https://www.hawaiibusiness.com/whats-astronomys-future-in-hawaii/
[27] State of Hawaii, Office of the Governor. (2015, May 26). *Governor David Ige announces major changes in the stewardship of Mauna Kea* [Press Release]. Retrieved from https://governor.hawaii.gov/newsroom/news-release-governor-david-ige-announces-major-changes-in-the-stewardship-of-mauna-kea/

Hawaiians. The protests in June 2019 should not have been a surprise to the governor and past efforts to reach a compromise through dialogue have failed.

Anticipatory Governance

Generally, the government reacts to problems once they occur. In his book titled Anticipatory Policymaking, Rob DeLeo states, "Government should therefore embrace a proactive approach to policymaking, as opposed to responding to issues after they have emerged and blossomed into significant ills."[28] Hindsight bias is real, but it seems as if UH and the state government should have anticipated resistance to the construction of the TMT in 2019 given that protests had been occurring for at least three years prior.

Shortly after the protests erupted on Mauna Kea, Governor Ige declared a state of emergency due to reports of unsafe conditions as well as alcohol and drug use without visiting the protest site for himself. Visits to the protest site by other politicians, including the lieutenant governor, directly contradicted the governor's claims of misbehavior. As a result, Governor Ige's emergency proclamation was widely criticized and only inflamed tensions among protestors. To make matters worse, law enforcement officials began to arrest native Hawaiian elders and remove them from the protest site. While it isn't illegal for law enforcement to arrest people at the protest site, it doesn't build trust between the Native Hawaiian community and the state. Governor Ige pledged to build trust with the Native Hawaiian community, but his actions and the actions by the state have not done that.

Anticipatory governance policies that are not well thought out can cause harm or damage as the governor's initial response to the protests did.[29] Going forward, the governor must

[28] DeLeo, Rob A. (2016). *Anticipatory Policymaking.* New York, NY: Routledge.
[29] DeLeo, Rob A. (2016).

anticipate not only how to proceed with reconciliation, but also anticipate how his efforts will be received. Anticipatory governance can go a long way toward resolving the current conflict and rebuilding trust with the Native Hawaiian community, but it must be done correctly.

Future of Mauna Kea:

UH's lease on Mauna Kea expires in 2033. Given the current political current situation regarding telescopes on Mauna Kea, it remains to be seen whether UH's lease will be extended and how long it will be extended for. With uncertainty surrounding the lease, it becomes increasingly difficult for scientists to invest in upgrading old telescopes or building new ones. Mauna Kea remains the premier site for telescope observations in the Northern Hemisphere, but faces increased competition from sites in Chile, which has a more astronomically friendly political climate. Mauna Kea will always be a desirable site for telescopes, but only if Native Hawaiians want it.

While the future of the TMT on Mauna Kea remains cloudy, steps can be taken to reduce conflict with protestors over any future telescope construction. Firstly, the state of Hawaii must recognize the breach of trust with the Native Hawaiian community. UH and the state already acknowledge this lack of trust, but it must be reflected in government policy going forward. The government must approach this with an anticipatory mindset rather than a reactive one. Rather than announcing initiatives that will be immediately shot down by Native Hawaiian activists (i.e. reconciliation commission), coming up with a new management plan for Mauna Kea that takes into account Native Hawaiian priorities would be a good example of anticipatory governance.[30]

[30] Lawmakers Back Native Hawaiian Reconciliation Commission After TMT Protests. (2020, February 11). Retrieved from https://www.hawaiinewsnow.com/2020/02/11/lawmakers-back-native-hawaiian-reconciliation-commission-after-tmt-protests/

Reactive government does not build trust and can seem out of touch if reactive steps are not well received.

Currently both sides of the debate are at an impasse over the future of the TMT on Mauna Kea. Daniel Kahneman, a professor emeritus of psychology at Princeton, argues that human beings are loss averse, that is losses loom larger than gains. He writes, "Loss aversion creates an asymmetry that makes agreements difficult to reach. The concessions you make to me are my gains, but they are your losses; they cause you much more pain than they give me pleasure. Inevitably, you will place a higher value on them than I do."[31] The principle of loss aversion looms large in the TMT situation. From the point of Native Hawaiians, the principle of losing sacred ground is steeper than the principle of astronomers losing access to observe the stars and vice versa.

Given this, a trading zone where both sides can talk openly and frankly about their positions and are willing to compromise could also be helpful in bridging astronomers and the local community. The TMT and future telescopes must not only benefit astronomy, but also the local community. Community outreach will also be important to facilitating dialogue between astronomers and the local community. The 'Imiloa Astronomy Center exists for this specific purpose. Its mission is to "honor Maunakea by sharing Hawaiian culture and science to inspire exploration."[32] Ka'iu Kimura, executive director of 'Imiloa, said, "'Imiloa provides a safe, informal, non-confrontational venue for people to gather and air their differences, and this is proving more fruitful than the contentious atmosphere felt at adversarial public meetings."[33] Going forward, trading zones between astronomers, lawmakers, UH, and the native Hawaiian

[31] Kahneman, Daniel. (2011). *Thinking Fast and Slow*. New York. Farrar, Straus and Giroux.
[32] About 'Imiloa. (n.d) Retrieved from https://imiloahawaii.org/new-page
[33] Ciotti, J. E. (2011).

community should be in informal settings, where all parties feel comfortable sharing their grievances.

It is also important to note, however, that trading zones are not effective if one or both sides are unwilling to compromise and as Governor Ige pointed out, "If the activists say there is no compromise, then it leaves the state with few options."[34] To reach a resolution regarding the TMT and future telescopes, both sides must keep an open mind to the issues at hand.

Decisions about the construction of the TMT and future telescopes from a utilitarian point of view may not be effective in providing a way forward. Currently, a utilitarian decision on telescope construction would likely come from the state or UH, since the have authority over Mauna Kea, and would not help restore trust with the Native Hawaiian community. It would be unwise for Governor Ige to continue to make decisions regarding the TMT and future telescopes from a utilitarian perspective.

Going forward, Native Hawaiians must feel like they are being represented and that their voices are being heard. Perhaps adding Native Hawaiian voices to the TMT project's management board could be a starting point. The protests are not against scientific discovery. Native Hawaiians are fighting to protect what is sacred and fighting to have a say in the process. No action will please everyone, but the state of Hawaii and UH could take steps to accomplish this through informal trading zones and well-executed anticipatory governance. Addressing the underlying issues with the Native Hawaiian community will go a long way to coming to a resolution regarding the TMT and Mauna Kea.

[34] State of Hawaii, Office of the Governor. (2019, August 29).

Suggestions for Future Research:

Since the conflict over the TMT on Mauna Kea is ongoing, the conclusion to this story is still unknown. However, more work can be done with regard to the analysis of issues presented in this paper. One area where more work can and should be done is policy proposals with regard to reconciliation with the Native Hawaiian community. Successful efforts at reconciliation have been accomplished in New Zealand, for example, and it would be worthwhile to explore if similar policies could achieve similar results in Hawaii.

If and when the conflict over the TMT is resolved, future research could focus on the process of coming to a resolution. That would most likely involve analyzing which strategies worked and which didn't and whether those efforts included any of the strategies discussed in this paper.

Conclusion:

The protests and hurt feelings over the TMT on Mauna Kea did not spring up overnight. Decades of mismanagement of Mauna Kea by the University of Hawaii and the state of Hawaii have done little to build trust between the scientific community and the Native Hawaiian community. Adding in feelings of resentment due to the overthrow of the Hawaiian monarchy and the loss of their land, all the ingredients are present for the activism we see today.

No one, not even activists, deny the scientific and economic benefits of building the TMT. Instead activists are fighting so that their voices are heard and to ensure that their culture is respected. There is still a way forward for the TMT and future telescopes on Mauna Kea, but lawmakers and scientists must reframe the way in which they view Mauna Kea. The mountain is more than just a place to build telescopes; it is a sacred place in need of protection and

preservation, but protecting Mauna Kea and scientific discovery are not mutually exclusive. The future of the TMT may be uncertain, but there is a way forward for astronomy on Mauna Kea.

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