

Indigenous Plant Knowledge vs. Scientific Plant Knowledge

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The topic Cullen and I have researched really emphasizes the importance of indigenous knowledge, especially in the plant world. Indigenous people have such a great understanding of plants compared to how scientists see them. Indigenous knowledge has been passed down through many generations and it offers great alternatives to how we can care for plants! Their perspective on certain things should also be valued by the public because this can emphasize how to effectively use agricultural practices.

The problem, or unknown, that Cullen and I are evaluating is how indigenous knowledge can compare to scientists that are focused on Westernized practices. Westernized practices lack on including the use and knowledge of indigenous holders. The use of this knowledge is so important because the way they live is uniquely different and shows a great perspective of community.

One fact that the audience needs to know to understand our topic is that indigenous knowledge is a great tool that can be used to analyze the care of plants. It is proven that indigenous land grows better than westernized land because of their practices. Indigenous people live a holistic life which means they count on the ecosystems, animals, humans, and plants to all be interconnected. This is great for conservation because it proves that it promotes biodiversity.

Our question was: “How did Indigenous people manage or cultivate the care of plants compared to scientists?” This relates to us because the research found all relate to the significance of Indigenous Knowledge and how to care for the ecology. We hypothesize that Indigenous plant knowledge is better off than scientific plant knowledge because the Indigenous communities have thrived for many years with the knowledge that they have known.

Review paper 1-Evitt Nashed

Role of Traditional Ethnobotanical Knowledge and Indigenous Communities in Achieving Sustainable Development Goals

Kumar, A., Kumar, S., Komal, Ramchiary, N., & Singh, P. (2021, March 11). Role of traditional ethnobotanical knowledge and indigenous communities in achieving Sustainable Development Goals. MDPI. <https://www.mdpi.com/2071-1050/13/6/3062>

This article goes into detail about the vital role ethnobotanical knowledge plays in achieving sustainable development goals. Ethnobotanical knowledge also plays a role within indigenous communities and the way they use this knowledge to conserve their land. The way these indigenous communities develop this knowledge is by physical interactions with nature and the land they use. The author argues that if you apply traditional ethnobotanical knowledge to modern practices, then you will achieve a greater use of environmental sustainability.

The article talks about key sustainable development goals where indigenous knowledge and traditional knowledge can help in certain areas. For example, the author talked about the poverty levels that indigenous people have. These indigenous tribes count on plants for their food, medicine, etc. It also talked about some other practices indigenous people use. For example, agroforestry and non-timber forest product management helps them conserve these resources for long term effects.

Another key sustainable development goal the author talks about is how indigenous people do not have to worry about having no food. They use certain practices like crop diversification and soil fertility management to help maintain the security of these plants. These kinds of plants compared to the plants you'd find in groceries stores often offer a higher nutrition factor.

Even though indigenous knowledge helps sustainable practices, there are sometimes threats and challenges they must face. Modern practices are starting to rise which is leading to a decrease of indigenous knowledge. This knowledge also doesn't get the recognition it deserves due to no acknowledgement. Climate change is obviously another threat to indigenous communities because it alters their weather patterns and agricultural cycles.

To conclude, the integration of indigenous ethnobotanical knowledge is important in achieving sustainable goals. This type of knowledge promotes conservation methods, food security, biodiversity, and environment resilience. However, challenges like land degradation and appropriate acknowledgement should be faced and taken care of for traditional knowledge to succeed.

Review paper 2-Evitt Nashed

Biological diversity, indigenous knowledge, drug discovery and intellectual property rights: creating reciprocity and maintaining relationships

King, Steven R., et al. "Biological Diversity, Indigenous Knowledge, Drug Discovery and Intellectual Property Rights: Creating Reciprocity and Maintaining Relationships." *Journal of Ethnopharmacology*, vol. 51, no. 1, Apr. 1996, pp. 45–57. ScienceDirect, [https://doi.org/10.1016/0378-8741\(95\)01349-0](https://doi.org/10.1016/0378-8741(95)01349-0)

This review article introduces the importance of indigenous knowledge especially in drug discovery. These indigenous people can benefit scientific management on medicine by providing information on how they use these plants. The author argues that having a reciprocal relationship between indigenous people and researchers will help preserve their culture while benefiting scientific work.

Indigenous knowledge on medicine has many uses and benefits that scientists and researchers use. The author goes into detail about how there should be legal actions taken for the scientists that use this indigenous knowledge without their recognition. This is called biopiracy which means using traditional resources in an unfair way. This can hurt indigenous communities because they don't necessarily have the right resources to protect their culture.

The article addresses that there should be more actions taken care of for indigenous communities to show respect. One solution they addressed in the article would be biocultural rights. This means that indigenous people would have control over their knowledge and would have the ability to consent to it.

The author also empathizes the meaning of reciprocity and how we should show more efforts to it for indigenous communities. For example, Benefit Sharing Agreement is an act used between researchers and indigenous communities to show reciprocity between them when giving out information, so they don't feel taken advantage of. Maintaining the relationship between these communities can also help them feel more heard.

Challenges still can arise when trying to take legal action for these communities. For example, different countries have different rules which can make it difficult to get information from them. Another example would be the economic pressure scientists face which can cause them not to give these communities the recognition they deserve. To conclude, creating mutual respect for both scientists and Indigenous people can help facilitate collaboration between the two.

Research article 1- Evitt Nashed

Indigenous agricultural knowledge: A neglected human based resource for sustainable crop protection and production

Melash, Anteneh Agezew, et al. "Indigenous Agricultural Knowledge: A Neglected Human Based Resource for Sustainable Crop Protection and Production." *Heliyon*,

vol. 9, no. 1, Jan. 2023, p. e12978. *ScienceDirect*,
<https://doi.org/10.1016/j.heliyon.2023.e12978>.

This research article emphasizes how indigenous agricultural practices are crucial to modern practices especially in crop production. Indigenous agricultural knowledge is defined as practices that are passed down through generations by communities that are involved in farming. The author argues that this knowledge doesn't get the recognition it truly deserves, and it gets overlooked. They think that integrating indigenous knowledge with modern knowledge can help with food security, crop yields, and provide sustainability.

The goals of this study were to:

- * Integrate indigenous agricultural knowledge to crop production and protection.
- * Understanding the potential that can be gained when combining Indigenous agricultural knowledge with modern science.

The methods that were used for this experiment included conducting surveys and interviews with farmers from indigenous lands. These interviews and surveys included questions about soil management, pest control methods, etc. Other methods that were used was participant observation which included the role of observing how these farmers go about their day using these conservation techniques. These researchers also took the time to review readings and literature on indigenous knowledge to better understand their techniques.

The results of this study included finding effective methods for pest control and diseases. These researchers found out that these indigenous tribes would use eco-friendly materials for their crops to be pesticide free. Other results included how they adapt to climate change. The strategies they use to adapt to climate change are crucial in their way of living because it shows how they make their decisions.

This study concludes that it is important to recognize indigenous agricultural practices within crop production and protection because of their essential resources. This article helps us understand that integrating traditional knowledge with modern can sustain the environment. This article proved that indigenous methods are a lot more useful than modern methods.

Research article 2-Evitt Nashed

Diversity of use and local knowledge of wild and cultivated plants in the Eastern Cape province, South Africa

Maroyi, Alfred. "Diversity of Use and Local Knowledge of Wild and Cultivated Plants in the Eastern Cape Province, South Africa." *Journal of Ethnobiology and Ethnomedicine*, vol. 13, no. 1, Aug. 2017, p. 43. *BioMed Central*, <https://doi.org/10.1186/s13002-017-0173-8>.

This article really highlights the diversity of Eastern Cape, that holds local and wild plants species. These local communities pass down traditions and cultural heritages so then others know the importance of these plants. This study goes into detail about the plants that are used in these local communities for medicine, food, and other resources. The goal is to document certain plants in South Africa and to understand the depths of this knowledge.

The methods that were used included:

- Ethnobotanical interviews and surveys were conducted around the area to understand how these people use their plants. These interviews helped them collect useful data.
- Plant collection was used to collect certain plants to further analyze the structure and use of plants.
- Data analysis was also used to collect information on the different plants, how they were used, and the demographic factors of them.

The results of this study were that these scientists found out that a wide range of these plants, about 150 specimens, live in that province and are used for medicine, food, and other purposes. They also found out the most popular or important use of these plants was by medicine. About 70% of the plant species documented were for medicinal properties. Some of these plants were also used for spiritual purposes. These scientists found out that some of the plants they were documenting were used for rituals, ceremonies, or healing methods.

Threats and challenges still appear for these indigenous tribes. Traditional plant knowledge could be threatened by urbanization or even using modern medicine more than indigenous medicine. Using more modern medication could cause these tribes to decrease some of their plant remedies. Younger generations of this tribe could lose interest in these traditional practices as well.

To wrap this up, this research article discusses the importance of maintaining traditional knowledge because losing it can turn into a destruction of local resources.

Protecting and promoting this knowledge can help conserve biodiversity and conservations as well as strengthen cultural identity.

Research article 3- Cullen Krieg

Huntington, Henry P. "USING TRADITIONAL ECOLOGICAL KNOWLEDGE IN SCIENCE: METHODS AND APPLICATIONS." *Ecological Applications*, vol. 10, no. 5, Oct. 2000, pp. 1270–74. DOI.org (Crossref), [https://doi.org/10.1890/1051-0761\(2000\)010\[1270:UTEKIS\]2.0.CO;2](https://doi.org/10.1890/1051-0761(2000)010[1270:UTEKIS]2.0.CO;2).

In this research paper the authors' area of research is exploring how Traditional Ecological Knowledge (TEK) can be implemented into current scientific research tactics. Huntington wants to try to have a collaborative bond between indigenous individuals and scientists to implement better ecological understanding of a certain topic and the decisions that are made to conclude. The hypothesis made in the research paper is traditional ecological knowledge can enhance current scientific research.

In this article Huntington used a variety of different methods to come to a concise conclusion. Huntington implements the use of interviews, collaborative research, and integration of Traditional Ecological Knowledge (TEK). Using interviews Huntington can find similarities and differences of what the indigenous individuals and scientists speak about. This tests the hypothesis because when Huntington can find a difference, he could try to implement that into either side to see if the product changes. The use of collaborative research will allow Huntington to get both parties together to share ideas and work to find a shared conclusion or possibly create new ideas with the shared mindset. This method will test the hypothesis by using both parties to find the best way to enhance the research and product of TEK. Finally, Huntington uses Integration of TEK with scientific data to have again both parties work together but, in this case, to perform different field approaches. This will test the hypothesis by implementing the work that has been done and research into live tests producing products.

The results that were confirmed in the article show that the use of TEK in scientific research and studies will lead to a better understanding of TEK in the scientific form.

To conclude, Huntington has found that using TEK and current scientific research will allow for a huge enhancement of the knowledge known about the certain topic being studied. By using different methods Huntington has found that he can gain more knowledge from both parties. Huntington's next steps will include making sure that the TEK from the indigenous communities will be implemented into the scientific studies.

This article helps us by providing that if both scientists and indigenous individuals come together to share ideas it will have a great impact on the indigenous communities.

Research article 4- Cullen Krieg

Citation for the article: Reyes-García, Victoria, et al. "Evaluating Indices of Traditional Ecological Knowledge: A Methodological Contribution." *Journal of Ethnobiology and Ethnomedicine*, vol. 2, no. 1, Apr. 2006, p. 21. *Springer Link*, <https://doi.org/10.1186/1746-4269-2-21>.

In this research article Reyes-Garcia's purpose is to develop methods for quantifying TEK. The goal that Garcia is chasing is to enhance the knowledge of TEK that can be applied to different studies. The hypothesis that was used within the article was that TEK can be measured using different indices. With these indices it will be easier to

implement into current studies of ecology. Aswell the indices will be able to provide valuable information regarding TEK.

In this research article different methods were used. Literature Review and Conceptual Framework was used in the article to start with a understanding of what has already been found and developed. Secondly, Development of Indices is a method that was used to quantify TEK. Third, Fieldwork and Data Collection was used to gather data from the indigenous communities. Within the fieldwork they did interviews and surveys to collect information. Finally, the last method was Comparative Analysis this method just makes connections amongst different indigenous communities. The results that were gathered from the methods concluded that the indices that were developed are important for quantifying TEK. With these indices TEK is a viable option and needs to be implemented in scientific research.

The overall conclusion that was provided was that the indices are a significant way to quantify TEK and that it needs to be integrated into scientific studies. The next steps that were outlined in the article involve trying to better the indices of TEK to provide better information and applying them to real-world problems.

This article helps by providing that the use of indices is a great way to make sure that TEK is being used in scientific research.

Research article 5- Cullen Krieg

Dahlberg, Helena, et al. "Ecological Caring—Revisiting the Original Ideas of Caring Science." *International Journal of Qualitative Studies on Health and Well-Being*, vol. 11, no. 1, Jan. 2016, p. 33344. DOI.org (Crossref), <https://doi.org/10.3402/qhw.v11.33344>

The purpose of Dahlberg's research article is to expand the concept of science by adding an ecological spin on ideas. The hypothesis that Dahlberg had come up with is that by integrating ecological caring into science it can help the understanding of individual and ecological as a pair.

Again, in this article there were many articles that were used to produce results. The first being literature review, by reviewing articles providing information about caring science and ecological issues they are able to analyze different ideas and get a better understanding of each idea before starting physical experiments. The second is synthesis of existing ideas, by doing this Dahlberg is able to see what has been found previously. This will allow him to implement that work into his work to find a newer outcome. Finally, the last is the reflection on the work done. With this method Dahlberg is able to take a step back to see all the work done to see if a different route is needed to find a better conclusion or if work had been passed over the first time. In summary Dahlberg mentions that both caring science and ecological caring both uses human and environmental health, and that this should be used in science to promote a sustainable development.

Dahlberg's conclusion is that ecological caring should be used in caring science to connect to the human relationships that care for the natural environment. The next steps are to implement it into different studies to see if there can be any more information obtained.

This article helps our question because finding out how individuals take care of plants differently will allow us to find a solution to who does it better.

Research article 6- Cullen Krieg

Siahaya, Martha E., et al. "Traditional Ecological Knowledge on Shifting Cultivation and Forest Management in East Borneo, Indonesia." *International Journal of Biodiversity Science, Ecosystem Services & Management*, vol. 12, no. 1-2, Jan. 2016, pp. 14-23. DOI.org (Crossref), <https://doi.org/10.1080/21513732.2016.1169559>.

The purpose of this research article is to document the value of TEK in land management. The hypothesis that Siahaya had come up with is that indigenous communities use TEK that help to maintain the sustainability of land-use practices.

There were many different methods used in coming to a conclusion of TEK and land management. The first being fieldwork, this again is scientists working in communities to observe in person. The second method is interviewing, by interviewing looked to understand the community individual about their environment. The third method is documenting traditional knowledge, this allows the scientists to see the methods that were used in the past and how they are still used today. The final method is comparative analysis, this shows the advantages of TEK and its effects on land management. The results showed that TEK plays a very critical role in the land management practices.

The conclusion that was summed up was that TEK plays a key role in sustaining good land management. The need for groups to come together is important and needed. The next step is to make sure that this is a long-term outcome and not something short.

This helps us because it shows that TEK has been a viable use to both scientists and indigenous individuals.

Science communication 1- Evitt Nashed

Indigenous Peoples and the Collaborative Stewardship of Nature

Ross, Anne, et al. Indigenous Peoples and the Collaborative Stewardship of Nature: Knowledge Binds and Institutional Conflicts. Routledge, 2016, <https://doi.org/10.4324/9781315426617>.

This book goes into detail about the wonders of indigenous communities and the way they manage their resources. The author describes that indigenous knowledge, and modern knowledge can go hand in hand with some of their management practices. The audience is based on people that are interested in indigenous studies or political science. The author also argues that challenges could arise when collaborating with both indigenous communities and modern science. Both have different worldviews and practices they live by that could get in the way. The book goes through certain case studies to analyze the pros and cons of collaborating.

The bias of this book can be that it is very Pro-indigenous. The author clearly states that integrating indigenous knowledge to ecosystem management would be beneficial.

Some key themes the book talks about would be the stewardship to nature that these indigenous people foster. Their knowledge is holistic which means they count on interconnectedness within nature to fully understand it. Their environmental management is rooted in spiritual, traditional, cultural, and social practices. These indigenous communities focus their job on protecting the land so that future generations can benefit from it.

Another theme the book talks about would be the institutional and governmental conflicts that could arise. Indigenous communities could face threats when the government decides to act on conservation methods. This could lead to indigenous knowledge being misused or devalued.

Although these conflicts can cause harm to their community, ecomanagement between scientists and indigenous people are still being used. The book gives examples of how scientific approaches are integrated within indigenous knowledge. The context is that recognizing these indigenous people as partners and letting them be heard can help us sustain good resource management.

The book included many case studies from outside resources including the US National Park Service and Native American Tribes. This study talks about the collaborations of indigenous tribes in the National Park Service. Another study would be Forest Management

in Canada which included indigenous people working with governmental people within co-management efforts for forest resources. This action has helped logging practices as well as protection to sacred sites.

Science communication 2- Cullen Krieg

IUCN, International Union for Conservation of Nature. (2017, April 21). The importance of indigenous rights and knowledge in conservation [Video]. YouTube.

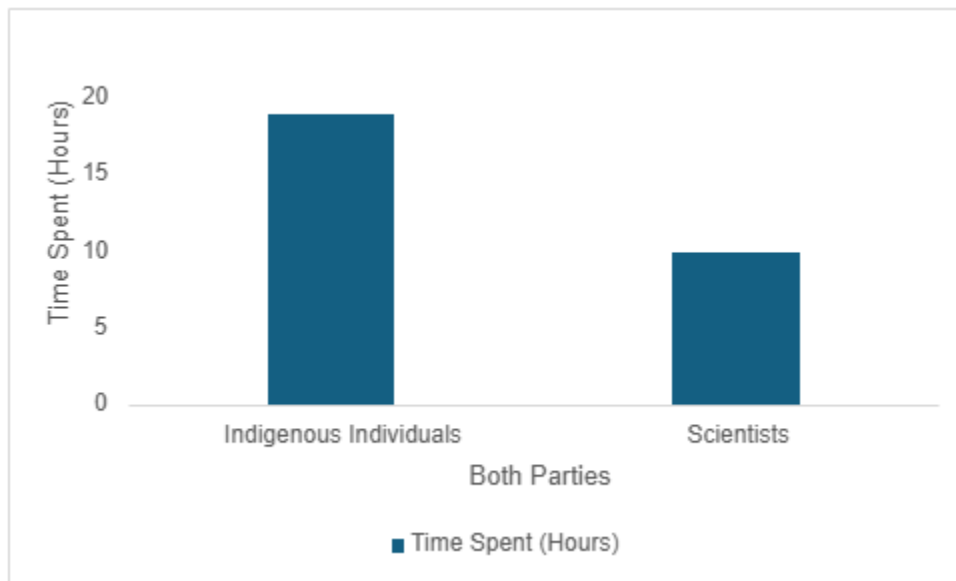
<https://www.youtube.com/watch?v=agQDKkueT-c>

The purpose of this video is to make the indigenous rights aware to the watcher. It highlights the importance of TEK to be able to sustain conservation.

The audience is for anyone. This is a topic that needs to be shown around the country to help individuals understand the importance of TEK and how it will ultimately positively affect the world. It is a informational video that shows the importance of indigenous rights and TEK that provides so much knowledge on how to keep conservations clean and healthy. This video is not biased because it's merely trying to teach the listener how important these topics are to learn about and study.

This helps us because it shows that both indigenous rights and TEK are important in the world to continue to make it thrive.

Proposed Experiment



This graph shows the hours spent weekly. Indigenous people show more effort and care into plants than modern scientists.

Independent: Indigenous individuals and Scientists

Dependent: Time taken care of plants

Control: The Plants

Summary and Reflection

The findings that Cullen and I have conducted was to see how indigenous knowledge on plants compare to the knowledge of regular scientists. We found out that Indigenous people evolve their whole lives around plants and time plays a big part within it. Their knowledge is tied within seasons and traditions that makes time interconnected. The seasons are key marks for indigenous people to determine the time of harvesting or blooming of the plants. Indigenous people often rely on long term observations of these plants for them understand their environment better.

Time is seen as a reciprocal relationship within indigenous people compared to scientists. The land plays a role in providing plants for indigenous people and indigenous people provide timely care for these plants, so they don't die. For example, harvesting plants at a certain time is a way of listening to the plant's needs and respecting it.

Some of these articles went into detail about the stewardship that indigenous people foster within their land. They prioritize their land more than these scientists do. They don't take advantage of the world, instead they make sure the environment is also benefiting from their works. For example, these indigenous people foster precise care for these plants so then their future generations can flourish.

The next steps that Cullen and I should address would be how can these scientists integrate indigenous knowledge in their modern practices? First step would be that these scientists need to see indigenous people as collaborators and not just sources! Respecting their traditions and practices can foster a deeper relationship with indigenous people. Indigenous knowledge can really help in certain areas like fire management, wildlife management, agricultural management, etc. Integrating indigenous knowledge with modern science isn't easy but it can develop a deeper meaning of scientific research!

While reflecting on this research project, we have learned such interesting information! One example would be that indigenous people would consider plants as a broad concept. They don't just see plants as something that grows from the land. Instead, they usually reflect on plants in a spiritual meaning. They listen to the needs of the plants. Indigenous people really emphasize the roles that these plants play within the land itself, providing the ecosystem with harmony!

This project overall changed our idea of science. We saw science as something that is empirical, meaning gathering data from specific work. This research altered how we thought of science and now we think of it as a holistic way, meaning the interconnectedness of nature. Holistic science can give us greater insights into plant knowledge and how we can maintain a beneficial relationship with the environment! It's important that the public starts to think of science in a holistic way so then we can foster a greater meaning in plant life.

Some skills that we have learned through this project would be how we analyzed figures and data. We learned that we don't have to read the whole article to get the full meaning of it. First, you should check if there's abstract writing in the article. That shows a great summary of what this article will dig into. Next step would check if there were any methods or results used within the article. This can show that a research experiment was being conducted. The figures can also foster great visual information to get a better understanding of the article. Overall, this project has benefited our writing skills and how we go about the process of science.

7. Reference Page

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