

These educational materials were designed to accompany the video seminar “Of plants and people: From the past to the present” by Dr. Nokwanda P. Makunga (Associate Professor at Stellenbosch University, Department of Botany and Zoology), presented on December 9th, 2020 as part of a virtual Holden Forests & Gardens Scientist Lecture Series, Growing Black Roots: the Black Botanical Legacy. Learn more about the lecture series [here](#). Access the talk [here](#).

COMPREHEND & CONNECT – Learn about indigenous peoples around the world.

1. Listen to the talk to find out: Where is Dr. Makunga from? Who are the indigenous people in her region? Who colonized the area in 1652?
2. Find out about the indigenous ethnic/cultural groups around the world by visiting website maps. Explore the maps in places where you have been before and places that are unfamiliar to you.
 - a. Indigenous people of North America, South America, Northern Europe, and Australia: native-land.ca/
 - b. African indigenous people: worldmap.harvard.edu/africamap/
 - c. European tribes: historyfiles.co.uk/FeaturesEurope/Barbarian_Map52BC.htm
 - d. Asian ethnic groups: en.wikipedia.org/wiki/Ethnic_groups_in_Asia
3. Use the internet to search for more information about one of the indigenous peoples shown on one of the maps. What language do they speak? What are some traditional aspects of daily life for people of this culture? Can you find an example of how plants are used? Did they experience colonization of their homelands by people from other cultures? If so, who colonized the region and when did the colonization occur? Are the indigenous people still living as a distinct cultural group? What is daily life like now for people from this culture?

TO-DO – Learn about traditional knowledge systems and what role they play in daily life.

1. Listen to the talk to find out: How is “traditional knowledge” defined by Dr. Makunga and how does she use this in her daily life as a scientific researcher?
2. Read the excerpt from “**WHAT IS TRADITIONAL KNOWLEDGE?**” by the Alaska Native Science Commission. **How do Indigenous people define traditional knowledge?**
 - a. It is practical common sense based on teachings and experiences passed on from generation to generation.
 - b. It is knowing the country. It covers knowledge of the environment – snow, ice, weather, resources – and the relationships between things.
 - c. It is holistic. It cannot be compartmentalized and cannot be separated from the people who hold it. It is rooted in the spiritual health, culture and language of the people. It is a way of life.

- d. Traditional knowledge is an authority system. It sets out the rules governing the use of resources – respect, an obligation to share. It is dynamic, cumulative and stable. It is truth.
 - e. Traditional knowledge is a way of life – wisdom is using traditional knowledge in good ways. It is using the heart and the head together. It comes from the spirit in order to survive.
 - f. It gives credibility to the people.
3. Using the definition of traditional knowledge shown in the excerpt, find out about traditional plant knowledge in your own heritage. All cultures have knowledge about the human use of plants that has been passed down over generations, what traditional plant knowledge is part of your heritage?
- a. Identify a culture or ethnic group that is part of your own heritage. Note you can use the map tools from “Comprehend & Connect” section of this lesson to find out the names of indigenous cultures in different parts of the world. .
 - b. Conduct internet research to find out a piece of traditional plant knowledge within your own cultural/ethnic group – make sure to use reputable sources that include the voices of indigenous people such as non-profit organization, university, or government website.
 - c. Interview a relative or family friend, are they aware of this traditional knowledge? Are there other aspects of traditional knowledge that have been passed down in your family? Please note: no one should feel pressured to share their traditional knowledge with others, people should share as much as they feel comfortable sharing and hold their traditional knowledge in confidence as they see fit.

FOLLOW UP WORK – Explore the benefits and challenges of using traditional knowledge in science.

1. Listen to the talk to find out: Name one medicinal plant that Dr. Makunga has investigated, what are the medicinal properties, and where does this knowledge come from? What challenges were brought up in using this knowledge in scientific research?
2. Read more about a traditional medicinal plant of South Africa, Aloe ferox southafrica.co.za/aloe-ferox.html then answer the following questions:
 - a. Who discovered the medicinal properties of this plant?
 - b. What are the medicinal uses for this plant?
 - c. Is this plant used in the wider world, beyond South Africa?
 - d. Who profits from the manufacture and sale of the plant?
 - e. There is a lot more to learn about the scientific evidence and modern Western medical understanding of Aloe and other traditional medicines, but the reading materials in the subject of medicinal chemistry can be very difficult, and there are a very large number of inaccurate or inappropriate internet sites to be found when searching the web on this topic. WebMD provides summary written for approximately 10th grade reading level webmd.com/vitamins/ai/ingredientmono-607/aloe and the following scientific review is suitable for advanced high school readers “Herbal Medicine: Biomolecular and Clinical Aspects. 2nd edition, Chapter 3: Evaluation of the Nutritional and Metabolic Effects of Aloe vera” by Meika Foster, Duncan Hunter, and Samir Samman ncbi.nlm.nih.gov/books/NBK92765/

3. View this short documentary about the Aloe Harvesting Trust to learn about how the Aloe industry delivers this plant product to global market [youtube.com/watch?v=AOF_mZkFFbY](https://www.youtube.com/watch?v=AOF_mZkFFbY)
 - a. Who made this documentary, and why is wildlife conservation important to consider in the harvest of Aloe ferox?
 - b. What are the medicinal uses for this plant?
 - i. How might this be beneficial to the world at large?
 - ii. How might this be positive for the local ecosystem and local communities?
 - iii. How might this be damaging for the local ecosystem or negatively impact people in local communities?
 - c. Who owns the land where the Aloe leaves are harvested? Who profits from the harvest?
 - d. What is a “tapper”, and where is this skill learned?
4. Consider the ethics of conducting research on traditional knowledge of indigenous peoples, such as the use of Aloe ferox. View the short video “TRUST – Protecting San Indigenous Knowledge – From A Research Contract to a San Code of Ethics” [youtube.com/watch?v=HOdw3mv7JSo](https://www.youtube.com/watch?v=HOdw3mv7JSo), and read the excerpt from the “SAMPLE CODE OF RESEARCH ETHICS” as adapted by the Alaska Native Science Commission from the Kahnawake Schools Diabetes Prevention Project nativescience.org/html/Code%20of%20Research%20Ethics.html.

Principles of Research Ethics for studies of traditional knowledge in indigenous communities:

- a. The community must be involved as a full partner in all aspects of the research. Continuous consultation and collaboration should characterize the partnership.
- b. The strengths and culture of the community, including community researchers and staff as well as material resources, must be respected and utilized whenever possible.
- c. Written permission must be obtained from the partners before beginning the research projects.
- d. Permission from all individuals participating must be obtained prior to collecting personal information.
- e. The confidentiality of all individuals must be respected. If necessary, the community involved may choose to remain anonymous when reporting the results.
- f. All research results, analyses and interpretations must first be reviewed by the partners to ensure accuracy and avoid misunderstanding.
- g. All data collected belongs to the community and must be returned to the community.
- h. The partners must all be involved in making decisions about the publication and the distribution of all or parts of the research results.
- i. The community must agree to the release of information.

Based on the video and reading excerpt, consider the following:

- i. What are “research ethics”?
- ii. Why are the San people concerned about research on their traditional knowledge?

- iii. What benefits do the San get for participating in research on traditional knowledge?
 - iv. Do you see evidence that the Principles of Research Ethics (as described in the excerpt) are being considered in the video? Which principles are addressed by the San Council?
 - v. Thinking back on the video of Aloe harvesting. Is there evidence that the principles of research ethics are being followed? Are people who hold traditional knowledge about Aloe involved as full partners? Are they recognized and respected? Considering who benefits from Aloe Harvesting, how does this practice support community goals of the “tappers”?
5. Conduct your own study on the medicinal properties of plants. Conceptually, testing the antimicrobial properties of plants (i.e., their ability to kill microbes like bacteria or fungi) is as simple as taking a piece of a plant or swab of plant extract and placing it onto a petri dish with nutrients and microbial colonies, then measuring how much the growth of the microbes is inhibited.
- a. **Safety:** The activity requires growing bacteria, and we strongly suggest that you source a teaching strain of bacteria from a biological collection, rather than cultivating unknown bacterial strains from the environment. Instructors should also carefully consider if their students have sufficient maturity to maintain safe handwashing practices after handling bacterial plates.
 - b. **Protocol:** The following provides instructions for conducting in-depth work investigating the antimicrobial properties of garlic, but you can substitute any plant part for the garlic bulbs. Dr. Makunga investigated pomegranate peels, among other plants, what plants do you think will have antimicrobial properties?
online.ucpress.edu/abt/article/73/6/342/92498/Natural-Antibiotics-A-Hands-on-Activity-on-Garlic

NOTE TO INSTRUCTORS: To maintain best practices when researching and teaching on the topic of traditional knowledge it is important to avoid sources that misrepresent indigenous culture, instead seeking to use sources created by indigenous people themselves, or in consultation with cultural experts, for example non-profit organizations or government agencies. As an entry to the subject, we suggest you read these guidelines for respecting cultural knowledge
ankn.uaf.edu/publications/knowledge.html