

**Traditional Lifeways Curriculum:**  
**ENVIRONMENTAL HEALTH IN RURAL COMMUNITIES:**  
**Water Quality Science and Monitoring**  
**Upper Kuskokwim Region of Interior Alaska**  
**Junior High - Adult**



Alan Dick, Alaska Native Clipart

*Dina'ena tsaye ghinet tu hidinelghwts'*

*Jija huniya deno.*

*People are boiling water for tea  
While they are picking berries*

A Culturally-Based Curriculum Created by  
Telida Traditional Council's  
Indian General Assistance Program  
Environmental Protection Agency

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*Traditional language translations (Dinak'i) by Steven Nikolai Sr.*

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**These education lessons are dedicated to the next generation to help protect our traditional way of life.**



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# Traditional Lifeways Curriculum: WATER QUALITY

## Upper Kuskokwim Region of Interior, Alaska, Junior High School through Adult

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## Foreword

Telida Village has developed a series of environmental health education that will keep the tribal members healthy and the environment clean for the future generations, fulfilling the Indian General Assistance Program's objective to reduce the risk to human health and the environment.

The "Water Quality Science and Monitoring" education unit is composed of eight education lessons with a total of 43 activities. The place-based lessons focus on water quality science and how to monitor the water in rivers and lakes in rural Alaska. Education activities include Elders working with students to examine and solve environmental problems in the local community.

The education lessons meet the Alaska State Content Standards and Alaska Standards for Culturally Responsive Schools. The activities in the lessons are based on "Translating Standards to Practice: A Teacher's Guide to Use and Assessment of the Alaska Science Standards" developed by the Alaska Rural Systemic Initiative and "The Handbook for Culturally Responsive Science Curriculum" by Sidney Stephens.

## Curriculum Development Team



**Charlene Dubay** (Team Leader, Contributor) is the IGAP Environmental Director for Telida Traditional Council overseeing the development of the culturally-based Traditional Lifeways curriculum. Ms. Dubay has a Master’s Degree in Cross-Cultural Studies from the University of Alaska Fairbanks and a Bachelor’s of Science Degree in Wildlife Biology from the University of Massachusetts Amherst. Charlene has been integrating subsistence and language issues into preservation and outreach programs for 10 years. She can be reached at [charlenedubaya@hotmail.com](mailto:charlenedubaya@hotmail.com).



**Steven Nikolai Sr.** (Native Cultural Specialist) was born and raised in the Upper Kuskokwim region and is a First Speaker of Upper Kuskokwim Athabascan (UKA). Mr. Nikolai has taught bilingual classes at the Nikolai School in the Iditarod Area School District and is an experienced subsistence hunter, trapper and fisherman. Steven Sr. also worked with the Alaska Native Language Center. Steven Nikolai Sr. was Chief of the Telida Tribal Council for many years and has a heart for economic and social development as well as preserving traditional ways of living in the U.K. region. Steven provided UKA translations in the Series.



**Teresa Hanson** (Researcher, Contributor) holds a Masters Degree in Northern Studies and a Bachelors Degree in History from the University of Alaska Fairbanks. She currently consults curriculum development projects, as well as develops grant proposals for Alaskan cultural issues such as language preservation. Teresa homeschooled her four children and other small groups for over 15 years. Her Oral History collection Master’s thesis: “Homeschooling in Alaska” interviews are housed in the Oral History collection in the UAF Archives at Rasmuson Library. If you would like contact her about curriculum development or other educational consulting services, she can be reached at [teresaconsulting@hotmail.com](mailto:teresaconsulting@hotmail.com).



## **Acknowledgements**

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## Introduction to Traditional Lifeways Curriculum Series



Alan Dick, Alaska Native Clipart

The wisdom of any culture lies not in the monuments constructed or the books written but rather within the skills it gives to its children for their continued survival.

When a community teaches co-operation, sharing and respect for the natural world it insures that the earth will continue to provide the necessities to nurture both the body and spirit of its people. From their earliest years the children of the Upper Kuskokwim Region are taught respect for land, water and the creatures of the earth.

Young children are encouraged to watch what others are doing. In this way they are learning what to do for themselves. They are being taught to be self-sufficient and when necessary to improvise with what is at hand. This ability to make independent decisions may someday be necessary for their own survival or that of another person.

Within the Upper Kuskokwim Region subsistence is necessary for day-to-day living. Hunting, trapping, fishing, gathering and gardening are crucial activities for the majority of the native population. (State of Alaska Community Website, McGrath, Takotna, Nikolai, and Telida.) Understanding rural issues such as sanitation, healthy drinking water and responsible solid waste management are necessary for the health of the environment and the individual.

The curriculum provided is not intended to replace the training of the Elders but rather to provide a method that supports this training.

### **Pattern of Life** (Collins, revised, 2004.)

“The people of the Upper Kuskokwim area developed a pattern of life that was determined to a large extent by their environment. There were no permanent, year-round villages in the past. People had to move seasonally to harvest food and would winter in different locations to keep from depleting the resources such as food, fur, and firewood in any given place. As with other Athabaskans who reside near the head of a river system surrounded by mountains, they share a number of environmental constraints.

The climate is that of the Alaskan Interior with cold winters and relatively warm summers. The boreal forest provides a number of micro-environments. Black spruce and moss lie over areas of frozen ground that requires a hot fire to clear and thaw, thus allowing willow and birch to move in. The thawed ground along the rivers is covered with stands of white spruce and birch on the higher cut bank side of the river, with thick stands of willow and alder on the sandbars.

Cottonwood are found along the river and aspen on the higher ground. Cross-country travel is difficult in much of the lowland area because of numerous swamps and boggy areas drained by small streams that flow into the major rivers. The rivers are the main highways for travel both in summer and winter.

Food resources vary in type, quantity and habitat. Three species of salmon ascend the Kuskokwim streams: Chinook (King), Chum (Dog), and Coho (Silver). Whereas hundreds of thousands, and even millions, of salmon enter the Kuskokwim River, but by the time they reach the headwaters only a few thousand or even a few hundred are left to spawn in any given stream.

Until the late 1800's and early 1900's moose were absent in most of the area. The large animals most harvested were Dall sheep, caribou, Black bear and Grizzly bear. Dall sheep habitat is limited to the Alaska Range. Caribou also spend much of the year in the mountains, moving down to the lowlands primarily during the winter. Today, moose is widely hunted.

Small game species such as rabbits, grouse and ptarmigan are widely dispersed but their populations are cyclic and in some years they are very scarce.

Ducks and geese pass through the area by the thousands in the spring when the headwaters of the rivers first open, but most move on to nest elsewhere. During the fall migration, when there is plenty of open water, most fly over the area without stopping except for a brief rest.

### **Yearly Cycle of Subsistence Activities** (Collins, revised. 2004)

"A yearly cycle in one of these territories might begin with relocating to a fishing site in the late spring to take advantage of the fish runs that began moving upriver at breakup.

The original method for catching these fish was by constructing a fence and wire in a shallow side stream that was utilized for spawning. They were more difficult to catch in the main Kuskokwim River until the fishwheel was introduced in the 1900's, and large twine and nylon fish nets became available.

Nikolai and Telida were suitable sites for winter villages. Other sites that were used at times included East Fork, Big River and Vinasale. During the winter some families dispersed to trapline cabins. As trade goods and industry such as mining became more available at McGrath, Takotna and Medora, trapping began to play a bigger role in the yearly cycle.

## **Title: Water Quality Lessons**

**Authors:** Telida Village Council and the Indian General Assistance Program (IGAP)

**Grade Level:** Junior High school through Adult

**Context:** Late Spring, Summer, Early Fall

**ARSI Region:** Upper Kuskokwim Region



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### **Cultural Standards:**

- A.** Culturally knowledgeable students are able to build on the knowledge and skills of the local cultural community as a foundation from which to achieve personal and academic success throughout life.

Students who meet this cultural standard are able to:

4. Identify appropriate forms of technology and anticipate the consequences of their use for improving the quality of life in the community.

- B.** Culturally knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them.

Students who meet this cultural standard are able to:

2. Understand the ecology and geography of the bioregion they inhabit.

**Science Standards:**

**A. Science as Inquiry and Process:** A student should understand and be able to apply the processes and applications of scientific inquiry.

A student who meets the content standard should:

- 1) develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments;
- 2) develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review; and
- 3) develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues.

**B. Concepts of Physical Science:** A student should understand and be able to apply the concepts, models, theories, universal principles, and facts that explain the physical world.

A student who meets the content standard should:

- 1) develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior;
- 3) develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems; and
- 4) develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.

**C. Concepts of Life Science:** A student should understand and be able to apply the concepts, models, theories, facts, evidence, systems, and processes of life science.

A student who meets the content standard should:

- 3) develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

**D. Concepts of Earth Science:** A student should understand and be able to apply the concepts, processes, theories, models, evidence, and systems of earth and space sciences.

A student who meets the content standard should:

- 1) develop an understanding of Earth's geochemical cycles;
- 2) develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth.

**E. Science and Technology:** A student should understand the relationships among science, technology, and society.

A student who meets the content standard should:

- 1) develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events;
- 2) develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits.

**Math Standards:**

**A.** A student should understand mathematical facts, concepts, principles, and theories.

A student who meets the content standard should:

- 1) understand and use numeration, including a. numbers, number systems, counting numbers, whole numbers, integers, fractions, decimals, and percents; and b. irrationals and complex numbers;
- 2) select and use appropriate systems, units, and tools of measurement, including estimation;
- 3) perform basic arithmetic functions, make reasoned estimates, and select and use appropriate methods or tools for computation or estimation including mental arithmetic, paper and pencil, a calculator, and a computer;
- 4) represent, analyze, and use mathematical patterns, relations, and functions using methods such as tables, equations, and graphs;
- 5) construct, draw, measure, transform, compare, visualize, classify, and analyze the relationships among geometric figures; and

- 6) collect, organize, analyze, interpret, represent, and formulate questions about data and make reasonable and useful predictions about the certainty, uncertainty, or impossibility of an event.

**B.** A student should understand and be able to select and use a variety of problem-solving strategies.

A student who meets the content standard should:

- 1) use computational methods and appropriate technology as problem-solving  
1. tools;
- 2) use problem solving to investigate and understand mathematical content;
- 3) formulate mathematical problems that arise from everyday situations;
- 4) develop and apply strategies to solve a variety of problems;
- 5) check the results against mathematical rules;
- 6) use common sense to help interpret results;
- 7) apply what was learned to new situations; and
- 8) use mathematics with confidence.

**C.** A student should understand and be able to form and use appropriate methods to define and explain mathematical relationships.

A student who meets the content standard should:

- 1) express and represent mathematical ideas using oral and written presentations, physical materials, pictures, graphs, charts, and algebraic expressions.

**D.** A student should be able to use logic and reason to solve mathematical problems.

A student who meets the content standard should:

- 1) analyze situations;
- 2) draw logical conclusions;
- 3) use models, known facts, and relationships to explain the student's reasoning;
- 4) use deductive reasoning to verify conclusions, judge the validity of arguments,

and construct valid arguments; and

- 5) use inductive reasoning to recognize patterns and form mathematical propositions.

### **Geography Standards**

- A.** A student should be able to make and use maps, globes, and graphs to gather, analyze, and report spatial (geographic) information.

A student who meets the content standard should:

- 1) use maps and globes to locate places and regions;
- 2) make maps, globes, and graphs;
- 3) understand how and why maps are changing documents;
- 4) use graphic tools and technologies to depict and interpret the world's human and physical systems; evaluate the importance of the locations of human and physical features in interpreting geographic patterns; and
- 6) use spatial (geographic) tools and technologies to analyze and develop explanations and solutions to geographic problems.

- C.** A student should understand the dynamic and interactive natural forces that shape the Earth's environments.

A student who meets the content standard should:

- 1) analyze the operation of the Earth's physical systems, including ecosystems, climate systems, erosion systems, the water cycle, and tectonics;
- 2) distinguish the functions, forces, and dynamics of the physical processes that cause variations in natural regions.

- E.** A student should understand and be able to evaluate how humans and physical environments interact.

A student who meets the content standard should:

- 1) understand how resources have been developed and used;
- 2) recognize and assess local, regional, and global patterns of resource use;
- 3) understand the varying capacities of physical systems, such as watersheds, to support human activity;
- 4) determine the influence of human perceptions on resource utilization and

the environment;

- 5) analyze the consequences of human modification of the environment and evaluate the changing landscape; and
- 6) evaluate the impact of physical hazards on human systems.

**F.** A student should be able to use geography to understand the world by interpreting the past, knowing the present, and preparing for the future.

A student who meets the content standard should:

- 2) compare, contrast, and predict how places and regions change with time;
- 3) analyze resource management practices to assess their impact on future environmental quality.

### **History Standards**

**C.** A student should develop the skills and processes of historical inquiry.

A student who meets the content standard should:

- 1) use appropriate technology to access, retrieve, organize, and present historical information;
- 2) use historical data from a variety of primary resources, including letters, diaries, oral accounts, archeological sites and artifacts, art, maps, photos, historical sites, documents, and secondary research materials, including almanacs, books, indices, and newspapers;
- 3) apply thinking skills, including classifying, interpreting, analyzing, summarizing, synthesizing, and evaluating, to understand the historical record; and
- 4) use historical perspective to solve problems, make decisions, and understand other traditions.

### **English/Language Arts Standards**

**A.** A student should be able to speak and write well for a variety of purposes and audiences.

A student who meets the content standard should:

- 1) apply elements of effective writing and speaking; these elements include ideas, organization, vocabulary, sentence structure, and personal style;

- 2) in writing, demonstrate skills in sentence and paragraph structure, including grammar, spelling, capitalization, and punctuation;
- 3) in speaking, demonstrate skills in volume, intonation, and clarity;
- 4) write and speak well to inform, to describe, to entertain, to persuade, and to clarify thinking in a variety of formats, including technical communication;
- 5) revise, edit, and publish the student's own writing as appropriate;
- 6) when appropriate, use visual techniques to communicate ideas; these techniques may include role playing, body language, mime, sign language, graphics, Braille, art, and dance;
- 7) communicate ideas using varied tools of electronic technology; and
- 8) evaluate the student's own speaking and writing and that of others using high standards.

**C.** A student should be able to identify and select from multiple strategies in order to complete projects independently and cooperatively.

A student who meets the content standard should:

- 3) select and use appropriate decision-making processes;
- 4) set high standards for project quality; and
- 5) when working on a collaborative project,
  - a. take responsibility for individual contributions to the project;
  - b. share ideas and workloads;
  - c. incorporate individual talents and perspectives;
  - d. work effectively with others as an active participant and as a responsive audience; and
  - e. evaluate the processes and work of self and others.

**D.** A student should be able to think logically and reflectively in order to present and explain positions based on relevant and reliable information.

A student who meets the content standard should:

- 1) develop a position by:
  - a. reflecting on personal experiences, prior knowledge, and new
  - b. information;
  - c. formulating and refining questions;
  - d. identifying a variety of pertinent sources of information;
  - e. analyzing and synthesizing information; and
  - f. determining an author's purposes;

- 2) evaluate the validity, objectivity, reliability, and quality of information read, heard, and seen;
- 3) give credit and cite references as appropriate; and
- 4) explain and defend a position orally, in writing, and with visual aids as appropriate.

### **Assessments**

- Learning logs
- Survey
- Graphs
- Number of Elders included
- Number of Investigative walks around the community
- Number of new project needs identified in the community

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[http://en.wikipedia.org/wiki/Water\\_quality](http://en.wikipedia.org/wiki/Water_quality) [http://creativecommons.org/licenses/by\\_sa/3.0/](http://creativecommons.org/licenses/by_sa/3.0/)

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Wikipedia [http://en.wikipedia.org/wiki/Trace\\_element](http://en.wikipedia.org/wiki/Trace_element)

[http://creativecommons.org/licenses/by\\_sa/3.0/](http://creativecommons.org/licenses/by_sa/3.0/) (accessed July 16, 2011)

## Skills and Knowledge:

- Students will learn about the forces of the earth that shape the region they in which they live;
- Students will learn geomorphic landforms shapes and names;
- Students will learn watershed dynamics;
- Students will learn the how man made activities can affect the land and water;
- Students will learn how tectonic occurrences and erosion forces can affect the land and water;
- Students will learn how water quality is classified based on where it occurs or flows from;
- Students will learn what natural conditions of the water are;
- Students will learn about: 1) *Bacteria* that comes from the waste of wildlife, including waterfowl; 2) *Metals* resulting from natural mineral deposits; 3) *Nutrients* that come from background soil, vegetation or wildlife sources; 4) *Sediments* from natural stream morphology processes or organic matter; 5) *Temperature* due to seasonal shifts and other natural processes, and; 6) *Dissolved oxygen* due to seasonal shifts and other natural processes and how they affect all aquatic life.
- Students will learn what water quality parameters are;
- Students will learn how water quality affects subsistence resources;
- Students will learn about insects and their relationship to water quality;
- Students will learn what a QAPP is and how to write one;
- Students will learn how to monitor water quality;
- Students will learn how to take water samples;
- Students will learn how to use technology to take water samples;
- Students will learn how to read and analyze water sampling data;
- Students will learn how to input water quality data into appropriate software;
- Students will learn how to make graphs, charts and other visual representations;
- Students will learn how to write a technical report;
- Students will learn how to write a non technical report;
- Students will learn how to present themselves and their findings;
- Students will learn how to work with Federal, State, and Tribal agencies and entities

## **Elders in the Classroom by Roby Littlefield**

All students can benefit from inter-generational contacts. In Alaska Native cultures, grandparents were held in high regard as they contributed to the community by passing on knowledge and skills. Children learned by listening to and watching Elders and often didn't realize they were in training. Bringing grandparents in to share personal knowledge when studying subjects like nutrition, customs, plants, biology, and history can benefit the entire class.

To get started, first look to your class members. Send home a note or survey expressing your desire to include parents, grandparents, and Elders in your lessons. Get referrals for possible speakers from organizations that work with Natives and/or the Elderly.

The way to ask Native American Elders for help is different from Western customs. Initial and subsequent contact should be subtle. Visit with them, allowing time for the conversation to wander. Allow for extended pauses, giving them time to think and decide. If their hearing is poor, sit on the side of their better ear and make sure your lips can be seen. Direct eye contact should be limited. Standing or sitting at an angle can increase an Elder's comfort level. Keep your questions basic and specific.

Begin the request by telling a little story about your class and how the Elder could help. If you are not sure if the Elder is interested, hint strongly that you would like to have their help and ask if she or he knows of someone who might be willing to participate. Custom teaches that it is rude to give someone a frank "no" to a request for help, so you need to recognize that a noncommittal response might mean "no," or it might mean that the request is being considered. If at some point the Elder changes the subject more than once while you are explaining your request, you should be aware that she or he might be trying to say "no." Don't force a response; if it is clearly not a "yes," let it go, or suggest they can contact you after they've thought about it.

It is important to ask before a meeting for permission to make audio or video recordings. Don't show up with the equipment; you may force consent and cause bad feelings. Permission to listen to or tape a story or lecture does not give you any right to rebroadcast or write the story with you as author.

If an Elder has agreed to participate in a classroom, suggest an activity or topic outline so they know what you are expecting. Provide them with optional dates and the logistics. It is helpful to explain the routine, consequences for students' misbehavior, and possible options if problems come up during the lesson. It is your responsibility to ensure discipline is maintained. Be aware, however, that Elders generally do not support strict discipline in a public setting. Discuss how to make a smooth transition to help the Elder leave the class. Agree on some visual signs and ground rules.

When the Elder arrives, properly introduce her or him so the Elder understands your respect for them. The teacher should be alert for visual cues from the Elder during the visit and be prepared to give unspoken signals back. The teacher should stay in the room.

Give the Elder a chance to use traditional discipline. Be prepared to move a child to sit by an adult who can role model how to listen respectfully. If you have problems with students

degrading or ignoring an Elder, have a teacher's aide or adult Native quietly intervene. Most traditional stories are like a round, crocheted pot holder. The story teller goes round and round the subject until it all comes together and finally comes to the lesson or point. Be patient; allow the Elders to share their culture in their own way. Your students are learning how to listen. Students should refrain from interrupting to ask questions. There will be a proper time to ask questions.

As a thank-you, Elders usually appreciate students and teacher letters, pictures, and story booklets, which are treasured and shown to friends and relatives. This may also encourage other Elders to participate in classroom projects.

Sometimes you will find a resource person who is available for a wide variety of subjects and projects. If you use an Elder more than once, the school should provide some type of stipend in appreciation of the energy and knowledge the Elder is contributing. Be careful not to burn out your Elders. Whenever you make a request, be sure the Elder understands she is not obligated. Keep your lessons flexible in case the Elder can't come at the last minute. Once an Elder has agreed on a time to come into your classroom, avoid changing or postponing the visit.