



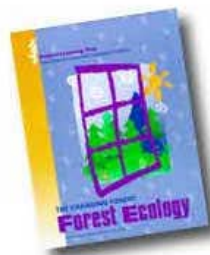
Project Learning Tree
Secondary Modules for Grades 9-12

Correlations to the
State of Minnesota

Science
and
Social Studies Standards



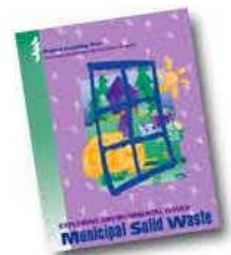
*Exploring
Environmental Issues:
Focus on Forests*



*The Changing Forest:
Forest Ecology*



*Exploring
Environmental Issues:
Focus on Risk*



*Exploring
Environmental Issues:
Municipal Solid
Waste*

Project Name: Exploring Environmental Issues: Focus on Forests

Activity Title: What's a Forest to You?

Page: 14

Activity Number: 1

Overview: Forests provide us with wood, food, rubber, medicines, paper, and many other products. They also contribute to our recreational, aesthetic, and spiritual needs. Forests help purify water, prevent erosion, and modify climate. In this activity, your students will have an opportunity to explore the role that forests play in their lives and to compare their thoughts to those of their classmates, friends, and family members.

Objectives: Students will 1) describe several ways in which people depend on forests, 2) design a survey to compare how their family members and classmates view the importance of forests, and 3) analyze and interpret the survey results.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	C	5		o

Project Name: Exploring Environmental Issue: Focus on Forests

Activity Title: Old-Growth Forests

Page: 17

Activity Number: 2

Overview: Do we have to choose between preserving an ecosystem and maintaining jobs and a supply of forest products? Is it possible to do both? The controversy over old-growth forests reflects many of the questions we currently face about the use of our public forests. Investigating old-growth issues can introduce your students to many of these tough questions and varying viewpoints. After completing this activity, your students will be able to use the skills they have developed to explore other complex environmental issues. They will also discover that there are no simple answers to such complex situations.

Objectives: Students will 1) analyze popular press articles written from different perspectives in order to learn about forest-resource issues, and 2) create a special edition of a newspaper containing article that explore the different viewpoints on old-growth forests.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	C	1	5	o
	9-12	III	A	1 (b)		X
	9-12	IV	C	1	1, 2, 3, 4	o

Project Name: Exploring Environmental Issue: Focus on Forests

Activity Title: Tough Choices

Page: 22

Activity Number: 3

Overview: We ask a lot of our forests. We expect them to provide beautiful surroundings for hiking and recreation, wildlife habitats, and steady supplies of wood and other products. As populations grow and more people use forests and wood products, it's getting tougher to meet all of their demands. In this activity, you students will read and discuss several short articles on issues related tot he demands we put on our forests. Students will propose solutions to some real-life dilemmas about forests.

Objectives: Students will 1) learn how to analyze and resolve environmental issues and 2) write an article that describes the competing demands people put on forests.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	III	A	1 (b)		X

Project Name: Exploring Environmental Issue: Focus on Forests

Activity Title: Who Owns America's Forests?

Page: 30

Activity Number: 4

Project Learning Tree Correlations to 2004 Science and Social Studies Academic Standards

Overview: Did you know that the American public owns 331 million acres (134 ha) of forests, almost half (45 percent) of the 737 million acres (298 million ha) of forests in the United States? (The American Forest Council, 1991-- pamphlet). In this activity, students will read maps and will figure out where forested lands are located around the nation and whether they are publicly or privately owned.

Objectives: Students will 1) understand the variety of management practices on forestland, and 2) analyze and make inferences about information on forestlands presented in charts and graphics.

Subject Areas:

Grades: 9, 10, 11, 12

Notes: Application of quantitative skills to scientific investigation

Project Name: Exploring Environmental Issue: Focus on Forests

Activity Title: **Balancing America's Forests**

Page: 34

Activity Number: 5

Overview: What's the difference between a national forest and a national park? Are park rangers and foresters the same? What guidelines exist for managing our public lands? It's clear that managing the nation's public forests is no easy task. The way that a forest manager tackles a problem may depend on what federal agency he or she works for. In this activity, your students will learn more about the people and agencies that manage our public forests, and will invite a panel of local experts to address them.

Objectives: Students will 1) explore the functions of the federal agencies that are highlighted in this activity and that have responsibility for managing the nation's public forests, 2) describe each agency's goals, and 3) compare and contrast the activities allowed in national parks, national forests, and wilderness areas, and then determine how well these areas serve the public.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	III	A	1 (b)		X

Project Name: Exploring Environmental Issue: Focus on Forests

Activity Title: **Squirrels vs. Scopes**

Page: 37

Activity Number: 6

Overview: In Arizona Coronado National Forest, groups are at odds over the placement of an observatory in the habitat of an endangered species, the Mount Graham red squirrel. During the year of the controversy, local and national newspapers published editorials, articles, and letters to the editor expressing different views about the proposed observatory. By reading and discussing two editorials about the so-called "squirrel vs. scopes" issue, students can learn how to interpret biased information and how to frame an effective argument. This knowledge will help them to better express their own views on other forest-related issues.

Objectives: Students will 1) compare and contrast editorials on the same forest-use issue and look for bias, 2) describe how biased information can influence public opinion, and 3) discuss the pros and cons of coming to a compromise decision.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	III	A	1 (b)		o

Notes: Literary connections to science

Project Name: Exploring Environmental Issue: Focus on Forests

Activity Title: **Words to Live By**

Page: 42

Activity Number: 7

Overview: Throughout history people have seen forests in different ways, for example, as obstacles to agricultural progress, as havens for recreation and wildlife, and as a source of income from wood products. The writings of different authors reflect the views of their time periods, as well as their own personal feelings toward forests. In this activity, your students can express their own views about forests, and then can explore different perspectives by reading excerpts from the writings of different authors.

Objectives: Students will 1) learn how people's personal experiences affect their attitudes toward forests, 2) describe how people's views toward forests have changed over time, and 3) express their own views about forests.

Subject Areas:

Grades: 9, 10, 11, 12

Notes: Literary connections to science

Project Name: Exploring Environmental Issue: Focus on Forests

Activity Title: Take Action!

Page: 47

Activity Number: 8

Overview: Your students will learn about what one group of students in New Mexico did to help reclaim a state park, and then they will take part in a project to help forests in their own community.

Objectives: Students will 1) learn about problems and issues facing forests in and around their community, 2) find out how to become involved in forest-related issues, and 3) develop and carry out an action plan to help understand and resolve a local forest-use issues or problem.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	III	A	1 (b)		o

Notes: Service learning opportunity

Project Name: The Changing Forest: Forest Ecology

Activity Title: Adopt-a-Forest

Page: 16

Activity Number: 1

Overview: Forests support a diversity of plants and animals that vary according to the geographic location of the forest. In this activity, students will identify a section of a local forest or wooded area to study and investigate the types of plants and animals that live there. Through this investigation, students will identify the biological and structural diversity within a forest ecosystem.

Objectives: Students will 1) select an area of forest and develop a scientific methodology to study it, 2) learn about the ecological relationships in their adopted forest, and 3) explore the biological and structural diversity of their forest.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	IV	C	1	1, 2, 3	X
	9-12	IV	C	1	4	o

Project Name: The Changing Forest: Forest Ecology

Activity Title: Cast of Thousands

Page: 27

Activity Number: 2

Overview: Students will further explore the variety of life in their adopted forest and will discover the importance of this biological diversity. They will take measurements, in much the same way a forester does, to draw conclusions about the overall health of their forest. As an extension, students will compare the information they have collected with that of another class in a different region.

Objectives: Students will 1) make scientific measurements of their forest, 2) examine the relationships of organisms to their environment, and 3) determine the extent to which humans have an impact on forests in their region.

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	B	1	1, 2, 3, 4	X
	9-12	IV	C	1	1, 2, 3, 4	X

Notes: Application of quantitative skills to scientific investigation

Project Name: The Changing Forest: Forest Ecology

Activity Title: The Nature of Plants

Page: 50

Activity Number: 3

Overview: Through a series of experiments, students will learn the importance of photosynthesis and the elements needed for photosynthesis to take place. They will also discover the factors necessary for healthy plant growth and the detrimental effects of a variety of environmental stresses.

Objectives: Students will 1) test for the effects of lack of sunlight on plant leaves, 2) understand and articulate the process of photosynthesis, 3) determine the factors necessary for plant growth, and 4) measure and compare plant growth under a variety of environmental stresses.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	B	1	1, 2, 3, 4	X
	9-12	II	B	1	1, 2	o
	9-12	IV	A	1	1	X
	9-12	IV	C	1	1, 4	X
	9-12	IV	F	1	1, 3	o
	9-12	IV	F	1	5	X

Project Name: The Changing Forest: Forest Ecology

Activity Title: Home Sweet Home

Page: 59

Activity Number: 4

Overview: Species that are introduced into nonnative environment can be beneficial or detrimental to the ecosystem. In this activity, students will identify "exotics" that have already been introduced into the North American environment and will determine their effect. Students will also gather information about a selected plant or animal species within their adopted forest and determine its natural range.

Objectives: Students will 1) discuss the ways in which exotic species are introduced, 2) understand the harmful and beneficial ecological effects that occur when exotics are introduced, 3) research and then discuss possible remedies to some of the harmful effects of various exotic species, and 4) determine natural growing ranges for certain plants and animals in their adopted forest.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	III	A	1 (b)		o
	9-12	IV	C	1	1, 4	X

Project Name: The Changing Forest: Forest Ecology

Activity Title: Saga of the Gypsy Moth

Page: 63

Activity Number: 5

Overview: In this activity, students will become more aware of the effects of the gypsy moth. They will formulate management plans that deal with large-scale disturbances like the gypsy moth. Students will have the responsibility of advocating their specific management perspective.

Objectives: Students will 1) explore ecological and social issues related to the gypsy moth and 2) consider strategies for management of the gypsy moth.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	III	A	1 (b)		X
	9-12	IV	C	1	2	o
	9-12	IV	C	1	4	X
Social Studies	Standard Band	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	V	D	1	2, 3	

Project Name: The Changing Forest: Forest Ecology

Activity Title: Story of Succession

Page: 71

Activity Number: 6

Overview: By using their adopted forest as a guide, students will be able to identify the various stages of forest succession. Students will observe successional growth as it happens in three experimental test plots. In this activity, they will learn the ways succession is affected by wind, fire, disease, and human intervention.

Objectives: Students will 1) identify successional stages in various ecosystems on the basis of vegetation types, 2) draw conclusions about the process of succession on the basis of observing three test plots, and 3) recognize basic relationships between species diversity and ecosystem stability.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	B	1	1, 2, 3, 4	X
	9-12	III	A	1 (b)		o
	9-12	IV	C	1	2, 3	o

Notes: Literary connections to science

Project Name: The Changing Forest: Forest Ecology

Activity Title: Understanding Fire

Page: 82

Activity Number: 7

Overview: In this activity, students will explore the patterns of change brought about by fires in a forest ecosystem. They will also examine the environmental, social, and political factors that influence forest-use decisions. Students will develop a broad perspective on the nature of forest fires and how public and private sectors of society are affected by them.

Objectives: Students will 1) investigate the ecological significance of fire 2) study the frequency and scope of fires and their influence on patterns of forest succession, and 3) examine the controversial issues influencing decisions about controlling wildfires.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	B	1	1, 2, 3, 4, 5	o
	9-12	III	A	1 (b)		X
	9-12	IV	C	1	2, 4	o
	9-12	IV	F	1	5	o
Social Studies	Grade	Strand	Sub-strand	Standard	Benchmark	
	9-12	V	D	1	1, 2, 3	

Project Name: The Changing Forest: Forest Ecology

Activity Title: Fire Management

Page: 96

Activity Number: 8

Overview: Students will learn about the many interdependencies of forests and fire in healthy ecosystems. They will research plant and animal species that depend on fire, and will determine some of their relationships. They will also look at problems that occur when humans live in or near forested areas.

Objectives: Students will 1) research plant and animal species that depend on forest fire and will determine interrelationships and 2) examine controversial issues influencing decisions about controlling wildfires near the wildland-urban interface.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	III	A	1 (b)		X
	9-12	IV	C	1	4	X
	9-12	IV	F	1	5	o
Social Studies	Grade	Strand	Sub-strand	Standard	Benchmark	
	9-12	V	D	1	1, 2, 3	

Project Name: Exploring Environmental Issues: Municipal Solid Waste
Activity Title: Introduction to Municipal Solid Waste: The Waste Stream
Page: 16
Activity Number: 1

Overview: Students will develop an understanding of municipal solid waste (MSW) management and its importance to community health. Through historical examples, students will learn how people have managed waste throughout time and how it affected their lives. Students will discover connections between what types of natural resources are found in products and what is thrown away. They will also investigate the waste stream in their school by collecting, analyzing, and graphing data.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	A	1	1	o
	9-12	I	B	1	1, 3	o
	9-12	I	C	1	3, 5	o
	9-12	I	D	1	1, 2	o
	9-12	III	A	1 (b)		o
	9-12	III	A	1 (a)	2	o
	9-12	IV	C	1	4	o
Social Studies	Grade	Strand	Sub-strand	Standard	Benchmark	
	9-12	III	A	1	2, 4	

Notes: Application of quantitative skills to scientific investigation

Project Name: Exploring Environmental Issues: Municipal Solid Waste

Activity Title: Source Reduction

Page: 29

Activity Number: 2

Overview: Students will look at ways to prevent and reduce waste and will learn the connection between reducing waste and conserving natural resources. They will learn some of the factors used to determine the environmental impact of a product over its lifespan. They also will look at household hazardous wastes (HHW) and ways to reduce the use of toxic products at home.

Objectives: Students will 1) learn the terms "source reduction" and "waste prevention," 2) determine how waste and toxicity can be diverted from a landfill through source reduction, and 3) identify factors involved in a life-cycle analysis.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	C	1	5	o
	9-12	III	A	1 (b)		o
	9-12	IV	C	1	4	o
Social Studies	Grade	Strand	Sub-strand	Standard	Benchmark	
	9-12	VII	A	3	1, 2, 3, 4	

Project Name: Exploring Environmental Issues: Municipal Solid Waste

Activity Title: Recycling and Economics

Page: 42

Activity Number: 3

Overview: This activity is designed to familiarize students with recycling and the various economic factors that influence municipal solid waste (MSW) management. Students will conduct field research to determine the extent of recycled and recyclable products in their community. They will learn how supply and demand affects the recycling market.

Objectives: Students will 1) learn how to conduct a survey, 2) compute, graph, and analyze data gathered in the survey, 3) learn the concepts relating to supply and demand, 4) learn how markets affect recycling of various materials, and 5) discover the important role their individual actions can make in conserving natural resources.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	B	1	3	X
	9-12	I	C	1	1, 3	o
	9-12	II	A	1 (b)		X
Social Studies	Grade	Strand	Sub-strand	Standard	Benchmark	
	9-12	VII	A	3	1, 2, 3, 4	

Notes: Application of quantitative skills to scientific investigation

Project Name: Exploring Environmental Issues: Municipal Solid Waste

Activity Title: Composting

Page: 61

Activity Number: 4

Overview: This lesson will help students understand the chemical processes that occur in the decomposition process. By creating their own compost containers, collecting compostable organic waste, and creating actual compost, students will apply their knowledge in hands-on, practical experiments. They will record data and make observations pertaining to the decomposition process, thereby helping them understand the process and value of composting.

Objectives: Students will 1) identify organic items that can potentially be composted, 2) learn about the chemical processes involved in composting, 3) identify the different factors that influence the chemical reactions in composting, 4) create their own compost pile, collect data, record data, and make observations, and 5) learn about the different uses of compost.

Subject Areas:

9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	B	1	2, 5	o
	9-12	III	A	1 (b)		o
	9-12	III	A	1	2	o
	9-12	III	B	1	2	o
	9-12	IV	F	1	1, 4, 5	X
	9-12	IV	F	1	2	o

Project Name: Exploring Environmental Issues: Municipal Solid Waste

Activity Title: Waste-to-Energy

Page: 75

Activity Number: 5

Overview: In this activity, students will learn how a waste-to-energy (WTE) facility functions. Through a role-playing activity, they will participate in a democratic decision-making process and will discover the many factors involved when a community makes decisions regarding the development of new solid waste management facilities. After having considered the research, students will defend specific positions and learn from other class members who advocate different positions.

Objectives: Students will 1) explain how a WTE facility works 2) list the positive and negative merits of WTE technology, 3) research, develop, and communicate an argument to represent a specific point of view regarding an issue, and 4) participate in a democratic decision-making process.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	A	1	5	o
	9-12	I	C	1	5	o
	9-12	II	C	1	2, 4, 7	o
	9-12	III	A	1 (b)		X
	9-12	III	B	1	4	o
Social Studies	Grade	Strand	Sub-strand	Standard	Benchmark	

Project Name: Exploring Environmental Issues: Municipal Solid Waste

Activity Title: Landfills

Page: 87

Activity Number: 6

Overview: Students will create "miniature landfills" to simulate the movement of leachate in a landfill and to demonstrate the importance of liners. Students will experiment with different soil types and liners to discover the most effective barrier. In addition, students will learn about the many considerations that must be taken into account when identifying a landfill site.

Objectives: Students will 1) learn the importance of liners in landfills for pollution prevention, and 2) discover the various social and environmental factors involved with the siting of a landfill.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	B	1	1, 3	o
	9-12	I	C	1	2, 4, 5	o
	9-12	I	D	1	1	o
	9-12	III	A	1 (b)		X
	9-12	IV	C	1	4	o
	9-12	IV	F	1	1, 2, 4	o
	9-12	IV	F	1	5	X
Social Studies	Grade			Standard	Benchmark	Level of correlation
	Band	Strand	Sub-strand			
	9-12	VII	A	3	1, 2, 3, 4	

Project Name: Exploring Environmental Issues: Municipal Solid Waste

Activity Title: Where Does Your Garbage Go?

Page: 98

Activity Number: 7

Overview: This activity will familiarize students with the practical terminology and issues of municipal solid waste (MSW) at the community level. Students will consider the solid waste program of a municipality, then will study their own community's program. Through exchanging data with students in another community, they will gain additional insight into the management of MSW.

Objectives: Students will 1) discover how their community manages its solid waste, 2) collect and analyze data pertaining to the amount and type of garbage their community processes, and 3) exchange and compare data with students in other communities regarding their community's waste stream.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	B	1	3	o
	9-12	I	C	1	2, 4, 5	o
	9-12	I	D	1	1	o
	9-12	III	A	1 (b)		X
Social Studies	Grade			Standard	Benchmark	Level of correlation
	Band	Strand	Sub-strand			
	9-12	VII	A	3	1, 2, 3, 4	

Project Name: Exploring Environmental Issues: Municipal Solid Waste

Activity Title: Take Action: Success Stories and Personal Choices

Page: 106

Activity Number: 8

Overview: Students will develop an understanding of the great strides municipal solid waste (MSW) management has made through source reduction, recycling, and composting programs. In addition to finding ways to improve waste management in their school, students will analyze and try to improve their own waste generation habits.

Project Learning Tree Correlations to 2004 Science and Social Studies Academic Standards

Objectives: Students will 1) learn about the great strides made in MSW management and explore success stories in this area, 2) discuss ways their school can improve its reduction, reuse, and recycling of waste, and 3) develop and implement a plan of action to reduce waste.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	B	1	1	X
	9-12	I	B	1	3, 4	o
	9-12	I	C	1	2	o
	9-12	I	D	1	1	X
	9-12	III	A	1 (b)		X
Social Studies	Grade			Standard	Benchmark	Level of correlation
	Band	Strand	Sub-strand			
	9-12	VII	A	3	1, 2, 3, 4	

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: What is Risk?

13

Activity Number: 1

Overview: We encounter many types of risks every day. What is meant by the term risk? What types of risks do we encounter daily? Are all risks equally likely to occur? Are they all harmful? Why are we willing to take some risks but not others? Is anything really 100 percent risk free? In this activity, students will work together to explore these and other questions as they discuss, develop, and refine their definition and concept of risk and risk assessment.

Objectives: Students will 1) develop a definition of risk and risk assessment, 2) become familiar with the concept of probability, 3) begin to explore the idea that there are different kinds of risks and that risk is perceived differently by different people, and 4) understand that hazards and risks exist in our daily lives.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	III	A	1 (b)		X
Social Studies	Grade			Standard	Benchmark	Level of correlation
	Band	Strand	Sub-strand			
	9-12	IV	A	2	1, 2	

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: Things Aren't Always What They Seem

Page: 21

Activity Number: 2

Overview: Students will identify their perception of the relative degree of risk associated with technologies, environmental hazards, and everyday activities. They will also have the opportunity to share their ideas as they compare and contrast their perceptions with those of others, including experts and lay people.

Objectives: Students will 1) develop an understanding of the differences in risk perception between lay people and experts (as well as among their classmates), 2) identify what characteristics influence people's perceptions of risk, and 3) learn about different environmental risks.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	B	1	2, 3, 4, 5, 6	o
	9-12	I	C	1	5	o
	9-12	I	D	1	3	X
	9-12	IV	C	1	4	o
Social Studies	Grade			Standard	Benchmark	Level of correlation
	Band	Strand	Sub-strand			
	9-12	VII	A	3	1, 2	

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: Chances Are...Understanding Probability and Risk

Page: 33

Activity Number: 3

Overview: The concept of probability, or chance, plays an important role in risk assessment. In this activity, students will conduct a series of experiments, such as tossing coins, to develop an understanding of probability. They will then apply their knowledge of probability to a scenario about the potential risk of using cellular phones.

Objectives: Students will 1) learn how to calculate simple probabilities, 2) develop definitions for discrete random variable, continuous random variable, binomial distribution, and normal distribution, 3) learn to use graphs to visually represent binomial and normal distributions, and 4) develop an understanding of the relationship among probability calculations, uncertainty, and estimation of risk.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	B	1	3	X
	9-12	I	B	1	4, 5, 6	o
	9-12	I	C	1	2	o

Notes: Applications of quantitative skills to scientific investigation

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: Risk Assessment: Tools of the Trade

Page: 46

Activity Number: 4

Overview: When attempting to determine the degree of risk associated with an event, experts conducting risk assessments rely on a variety of *tools of the trade* to generate a risk estimate. In this activity, students will learn about the applications of some of these tools, interpret information generated from using different tools, and understand how the information can be used to set priorities and make decisions.

Objectives: Students will 1) investigate four different ways to assess risk, 2) explore the use of fault trees to assess a risk, 3) understand how toxicological and epidemiological research is used when studying risk, and 4) communicate and defend a debate position.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	B	1	3, 4, 5, 6	o
	9-12	I	C	1	1, 2, 4, 5	o

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: Communicating Risk

Page: 61

Activity Number: 5

Overview: Understanding risk is an integral part of the risk management process. It is critical that risk information is communicated effectively to all concerned parties. This activity allows students to explore how timely and responsible communication among experts, the media, and lay people can lead to improved decisions about risk management.

Objectives: Students will 1) investigate the importance of communication in risk assessment and risk management, 2) identify guidelines of effective risk communication, 3) acquire a sense of scale using concentration analogies, and 4) communicate a local risk to their community.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	B	1	3, 4, 5, 6	o
	9-12	I	C	1	2, 4, 5	o
	9-12	III	A	1 (b)		o
Social Studies	Grade Band	Strand	Sub-strand	Standard	Benchmark	
	9-12	VII	A	3	1, 2	

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: Weighing the Options: A Look at Tradeoffs

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Activity Number: 6

Overview: Managing risk includes deciding which option is best at reducing risks. The process requires incorporating the data obtained from risk assessments plus the social, ethical, cultural, economic, and political values of the time. In this activity, students will explore the risk management process for personal choices while "grocery shopping." They will also debate the use of cost/benefit analysis for making public policy decisions using the protection of endangered species as an example.

Objectives: Students will 1) investigate their own ability to balance costs and benefits when making decisions, 2) understand that making decisions depends on multiple factors, and 3) debate the use of cost/benefit analysis for making decisions regarding the management of environmental risks.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	B	1	3, 4, 5, 6	o
	9-12	I	D	1	3	o
	9-12	III	A	1 (b)		o
	9-12	IV	C	1	4	o
Social Studies	Grade			Standard	Benchmark	Level of correlation
	Band	Strand	Sub-strand			
	9-12	V	D	1	1, 2, 3	

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: Decision-Making: Ecological Risk, Wildfires, and Natural Hazards

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Activity Number: 7

Overview: In this activity students will develop and apply decision-making skills to various environmental risk scenarios including wildland fires, natural hazards, and threats to coral reefs and mangrove swamps.

Objectives: Students will 1) develop an understanding of ecological risk, 2) apply various decision-making methods to environmental risk reduction options, and 3) try making decisions under conditions of uncertainty.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	B	1	2, 3, 4, 5, 6	o
	9-12	III	A	1	3, 4	o
	9-12	IV	C	1	4	o
Social Studies	Grade			Standard	Benchmark	Level of correlation
	Band	Strand	Sub-strand			
	9-12	V	D	1	1, 2, 3	

Notes: Application of quantitative skills to scientific investigation

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: Special Topic: Electromagnetic Fields

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Activity Number: 7 (a)

Overview: This activity is designed to help students understand how electric and magnetic fields (also called electromagnetic fields, or EMFs) are produced, the potential effects of EMFs on human health, and the controversy surrounding those potential effects. Students will conduct a survey, learn how to measure the strength of EMFs, and discuss EMP legislation through a role-playing exercise.

Objectives: Students will 1) learn about electromagnetic fields (EMFs) and their potential risk to human health, 2) measure various sources of EMFs, and 3) evaluate the advantages and disadvantages of EMP legislation.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard			Standard	Benchmark	Level of correlation
	Grade	Strand	Sub-strand			
	9-12	I	B	1	3	X
	9-12	I	B	1	4	o

Project Learning Tree Correlations to 2004 Science and Social Studies Academic Standards

9-12	I	C	1	2, 4	X
9-12	II	C	1	3, 4, 5, 7, 9	o
9-12	II	E	1	1	o
9-12	III	A	1 (b)		X

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: Special Topic: Chlorine

Page: 145

Activity Number: 7 (b)

Overview: Many of the risks we take are "balanced" by the benefits they offer. Chlorine, used in many ways around the world, is an example of a substance whose use presents potential benefits and risks to human health and the environment. This activity helps students learn about chlorine and gives them an opportunity to consider the tradeoffs associated with a variety of its uses.

Objectives: Students will 1) understand the physical and the chemical properties of the element chlorine, 2) explore the risks and benefits of using chlorine vs. not using chlorine for specific uses, and 3) learn to identify tradeoffs when making decisions about various risks.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	C	1	2, 4, 5	o
	9-12	I	D	1	1	o
	9-12	II	A	1	6, 9	o
	9-12	II	B	1	1	o
	9-12	III	A	1 (b)		X
	9-12	III	B	1	4	o
	9-12	IV	C	1	4	o

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: Special Topic: Plastics, Risk/Benefit Analysis and Environmental Legislation

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Activity Number: 7 (c)

Overview: In Part A, students explore their personal use of plastic products and try to conduct a simplified risk/benefit analysis for a plastic product they commonly use. They also explore the use of risk/benefit analysis for making both personal and societal decisions. In Part B, students learn about various national and international regulatory efforts that address the improper disposal of plastic and other items in the aquatic environment. Students then research other legislation that has been enacted to reduce various risks to human health and the environment.

Objectives: Students will 1) conduct a simplified risk/benefit analysis, 2) investigate the influence of personal decisions on the environment, and 3) research and learn about environmental legislation that is designed to reduce risks to human health and the environment.

Subject Areas:

Grades: 9, 10, 11, 12

Science	Standard Grade	Strand	Sub-strand	Standard	Benchmark	Level of correlation
	9-12	I	B	1	1	o
	9-12	I	B	1	3	X
	9-12	I	C	1	2	o
	9-12	I	C	1	4, 5	X
	9-12	III	A	1 (b)		X
	9-12	III	B	1	4	o
	9-12	IV	C	1	4	o

Project Name: Exploring Environmental Issues: Focus on Risk

Activity Title: Taking Action: Reducing Risk in You School or Community

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Activity Number: 8

Overview: Students will apply the knowledge and skills they have acquired from the activities and special topics as they identify a risk in their school or community. Once the risk is identified, they will develop a plan to assess the risk, decide the best way to reduce the risk, educate others, and, if feasible, implement their plan.

Project Learning Tree Correlations to 2004 Science and Social Studies Academic Standards

Objectives: Students will 1) identify and discuss ways their school or community can reduce a risk, 2) identify and analyze alternative options for reducing a risk, and 3) learn how to develop and implement a plan of action to reduce the risk they have identified.

Subject Areas:

Grades: 9, 10, 11, 12

Science		Standard				Level of correlation
	Grade	Strand	Sub-strand	Standard	Benchmark	
	9-12	I	B	1	2, 3, 4, 5,	o
	9-12	III	A	1 (b)		X
Social Studies		Grade				
	Band	Strand	Sub-strand	Standard	Benchmark	
	9-12	VII	A	3	1, 2, 3, 4	
	9-12	VII	C		2	

Notes: Service learning opportunity