

Mo Show-Me Environmental Literacy Standards June 30, 2013 – Version 7

1. **Environmental Principles – Key ideas used as a basis for reasoning or a guide to action in recognizing, understanding and addressing environmental problems and their related issues**
 - a. **Dependence** – humans and their societies are dependent upon nature, its laws, its resources and its natural processes
 - b. **Limits** – the physical, chemical and biological limits to earth’s resources and to its ability to provide resources needed for the continuing welfare of humans, their societies, and other living organisms.
 - c. **Systems Thinking** – the relationship between humans, their societies and nature can be understood as a set of interacting systems which are affected by and which can affect each other in both simple and obvious, and complex and subtle ways
 - d. **Commons** – there are no permanent or impermeable barriers to the flow of matter between systems, so the use of natural resources and disposal of waste are, of necessity, the common interest and responsibility of all
 - e. **Collaboration**– developing effective solutions to environmental problems requires the participation of multiple stakeholders, including those causing the problem as well as those harmed by the problem
 - f. **Sustainability** – the responsibility to ensure nature’s capacity to provide critical resources for life and society in the same quantity and quality for future generations
 - g. **Justice and Equity** – the responsibility to create and maintain social mechanisms that promote and ensure the equitable distribution of the costs and benefits of natural resource use
 - h. **Precaution** – the potential for technology intended to improve quality of life to cause unforeseen problems when put into wide-spread use or applied in untested situations due to the complexity of the natural world and human society
2. **Systems and Processes of Nature – Natural and Applied Science ideas used as a basis for reasoning or a guide to action in recognizing, understanding and addressing environmental problems and their related issues**
 - a. **Matter and Energy** – how matter and energy operate at a molecular level explains the behavior of small scale processes like photosynthesis and oxidation, enables us to use natural resources in diverse ways to meet our needs and provides clues on how to use them wisely
 - b. **Spheres, Cycles and Flows** – how matter and energy operate at a mass level explains the behavior of large scale natural processes like erosion and weather, enables us to plan for or mitigate harmful natural events, and informs human use of resources so that we do not cause or worsen harmful events
 - c. **Living Organisms** – how individual organisms and their populations interact with and depend on matter and energy enables us to make predictions about their behavior in time and space, and informs our understanding of how human activity can benefit or harm them
 - d. **Communities and Ecosystems** – how matter, energy and living organisms interact with each other at local, regional and global scales, enables us to make predictions about their behavior at these scales and informs our understanding of how human activity can benefit or interfere with natural processes
3. **Systems and Processes of Human Societies – Social Science ideas used as a basis for reasoning about or a guide to action in recognizing, understanding and addressing environmental problems and their related issues**
 - a. **Governance** – how the founding documents, laws, and regulations of groups are interpreted and enforced, and what that shows about how about how each group views the relationship of humans to one another, to the group, of their group to other groups, of their group to nature, and of how the group can adapt to changing circumstances
 - b. **Change in Time and Place** – how individuals and the groups are shaped by the time and place in which they exist and by how the place changes over time socially, economically, physically and ecologically
 - c. **Economics** – the market forces, regulations, cultural influences and perceptions that affect the kind and rate of use of natural resources and related impacts on natural processes and their associated social and environmental costs
 - d. **Individuals and Groups** – how individuals are shaped by their experiences in informal and formal groups (social, religious, familial, educational, etc) and can in turn transfer beliefs, values, ideas and strategies from one group to others
4. **Environments and Resources – The major kinds of environments and critical resources, the roles they play, and how they may be affected by or cause environmental problems**
 - a. **Natural Environments** –terrestrial and aquatic communities and ecosystems that are not significantly transformed by human activity, and that play a major role in maintaining natural processes like soil formation, cleaning and storing of freshwater and preserving biodiversity
 - b. **Agricultural Environments** – semi-natural environments managed to produce high levels of a small number of critical renewable resources like food, fiber, wood and fuel for human consumption
 - c. **Industrial Environments** – mines, factories, dams, and similar constructions intended for the extraction and refinement of natural resources, and their manufacture into goods and services, the infrastructure and services that support them, their methods of construction, the ways they are distributed on the landscape and their impacts on their surroundings in the present and in the future
 - d. **Built Environments** –structures from houses to skyscrapers, the infrastructure and services that support them, their methods of construction, the ways they are distributed on the landscape and their impacts on their surroundings in the present and in the future
 - e. **Critical Resources** – fresh water, soil, biotic and genetic diversity, major crop plants, minerals, fossil fuels, etc., and consideration of their abundance, availability and accessibility in time and space, and the economic, social, political and environmental costs of their use

5. **Environmental Problems – The major causes of environmental problems or the kind of harms they can cause**
 - a. **Waste** – the large scale solid and/or liquid by-products of human domestic or industrial consumption which may contribute to pollution
 - b. **Pollution** – the liquid, particulate, gaseous, radioactive or microbial by-products of human domestic or industrial consumption that can, even in small amounts, contaminate air, water or soil in ways that harm health, reproduction, development, life or natural processes
 - c. **Resource Depletion** – using resources at rates much greater than their rate of renewal so that the resource is may no longer be available for other species or for future humans
 - d. **Species Introductions** –the introduction of non-native plants, animals, fungi or microbes, whether intentional or accidental, and their impacts on local organisms, habitats and system processes
 - e. **Human Population Growth** – local, regional and global increases in human populations that underlie many local, regional and global environmental problems
 - f. **Habitat Degradation or Loss** – the disappearance of habitats due to loss of key species, invasion by non-native species, extraction of resources, pollution, climate change or conversion to other use
 - g. **Biodiversity Loss** –the decline or disappearance of genes, species, or communities naturally present in an ecosystem due to waste, pollution, resource depletion, species introductions, habitat loss, or other human activity
 - h. **System Effects**- significantly altered natural regional or global cycles, flows and systems due to waste, pollution, resource depletion, species introductions, habitat loss, or other human activity
 - i. **Human Health or Social Effects** – significant negative impacts on human health or socio-economic systems due to resource depletion, habitat loss, pollution or other human activity

6. **Recognizing, Investigating and Solving Environmental Problems – The skills and abilities to recognize or anticipate environmental problems, to use evidence and reasoning to uncover their causes, and to develop and implement effective solutions**
 - a. **Recognizing and Anticipating Environmental Problems** – using knowledge of environmental principles, of systems and processes of science and society, and of historical environmental problems to recognize or anticipate potential environmental problems
 - b. **Investigating Environmental Problems**– using reliable, quantitative information, surveys, and/or experiments to develop system models to understand cause and effect relationships of environmental problems and then testing, revising and strengthening the case for a given cause and effect relationship
 - c. **Solving Environmental Problems** – using cause and effect models to identify places to intervene to prevent or reduce a problem, considering the range of possible solutions (education, persuasion, economics, technology, regulations and/or other approaches), comparing costs of solutions (in time, social capital, money and opportunity cost) and their potential effectiveness, and then choosing solutions based on cost and effectiveness
 - d. **Planning and Implementing Solutions** – identifying and collaborating with stakeholders to choose the most effective solutions, and then to identify key steps, when steps have to happen, who needs to do them and the resources needed to accomplish them
 - e. **Evaluating Effectiveness of Solutions** – identifying the environmental changes that would show a solution is effective, devising a way to track or measure those changes, and then using the results to modify the solution to increase its effectiveness or reach or reduce the costs of implementation

7. **Environmentally Responsible Behavior – The ability to recognize a personal stake in environmental problems and related issues and the motivation to develop and use the skills needed to solve them**
 - a. **Taking Responsibility** – the understanding that only humans have the capacity to recognize and accept responsibility for the effects of their actions on the environment and the health and well-being of others
 - b. **Perception of Problems and Issues** – the understanding that perceptions, world views, locus of control and a sense of efficacy are shaped by beliefs, values and past experiences, but that new experiences can change these
 - c. **Seeking Knowledge and Experiences** – an interest in seeking out and engaging in outdoor, nature, environmental or stewardship activities to foster an attachment to nature and an in depth understanding of natural processes and environmental problems
 - d. **Self Efficacy** – the belief in one’s ability to make a difference and the ability and skills to identify and carry out the appropriate actions in a particular case
 - e. **Taking Action** – in response to a deeper understanding of environmental conditions, taking action as appropriate to change personal behavior, change economic behavior, persuade others to take action, use the political process, and/or use legal avenues to improve those conditions