Spark Questions and A Learning Experience for Science 14

project AGRICULTURE Activity	SCIENCE 14
	CONCEPTUAL KNOWLEDGE
SPARK LEARNING SOURCE Why is balance important for sustainable ecosystems? Agriculture and sustainability go hand in hand. Agriculture affects and is in turn affected by the natural environment. **LEARNING SOURCES** How can agricultural environments contribute to sustainability? What are sustainable agroecosystems?	**Unit D: Investigating Matter and Energy in the Environment** 1. Describe how the flow of matter in the biosphere is cyclical along characteristic pathways and can be disrupted by human activity • Explain the role of living systems in the cycling of matter in the biosphere (e.g., food chains) • Describe, in general terms, how water, carbon, oxygen and nitrogen are cycled through the biosphere • Explain why the flow of energy through the biosphere is linear and noncyclical 2. Analyze a local ecosystem in terms of its biotic and abiotic components, and describe factors of the equilibrium • Define ecosystems in terms of biotic and abiotic factors (e.g., common plants and animals, latitude, altitude, topography) • Explain how biotic relationships can be explained in terms of the movement of matter and energy, using food chains, food webs and energy pyramids • Describe the relationship between land use practices and altering ecosystems (e.g., swamp drainage, slash and burn forestry, agriculture) Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues (e.g., insist on evidence before accepting a new idea or explanation for waste reduction; insist that the critical assumptions behind any line of reasoning be made explicit, so that the validity of the position taken can be judged) Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment (e.g., examine their personal role in the preservation of the environment; make personal decisions based on feelings of responsibility toward less privileged parts of the global community and toward future generations; participate in the social and political systems that influence environmental policy in their community)

The SPARK learning source can be used to introduce and "spark" discussion and investigations about food chains and the flow of energy. Encourage students to explore the INVESTIGATE MORE questions for further research. Students can be asked to focus on agricultural environments as ecosystems and how sustainable food production practices maintain and improve equilibrium.

The LEARNING SOURCE and BUILD COMPETENCIES activities can meet specific learning outcomes in the Science 14 curriculum and can provide a follow up of these concepts.

project AGRICULTURE Activity	SCIENCE 14
	PROCEDURAL KNOWLEDGE
BUILD COMPETENCIES Sustainability practices  Ecosystem cycles 	**Unit D: Investigating Matter and Energy in the Environment** Ask questions about relationships between and among observable variables, and plan investigations to address those questions • Identify questions to investigate arising from practical problems and issues (e.g., develop questions related to recycling, ozone depletion or introduction of exotic species) • Define questions and problems to facilitate investigation (e.g., develop questions to guide investigations on composting, recycling, impact of farming practices on local ecosystems) • Select appropriate methods and tools for collecting data and information to solve problems (e.g., plan and conduct a search for environmental projects, using a wide variety of electronic sources) Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data • Organize data, using a format that is appropriate to the task or experiment (e.g., analyze the biotic and abiotic data collected in an ecosystem study, and present this information in a written or graphic format or in an oral presentation to peers) • Select and integrate information from various print and electronic sources (e.g., research the influence of a specific living organism—nitrogen bacteria, sulfur bacteria, sea birds, mollusks— on the cycling of matter through the biosphere, and communicate information in the form of a clearly written report; create a database or use spreadsheets to convey information on populations) Analyze qualitative and quantitative data, and develop and assess possible explanations • Compile and display data, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, bar graphs, line graphs and scatterplots (e.g., analyze population growth curve graphs; communicate information on the flow of energy through the biosphere, using a diagram or flow chart)