



SUSTAINABLE AGRISCIENCE

**A Lesson Plan
developed for
Teachers of Agriculture**

This lesson plan is designed to assist teachers in guiding the learning process in students as they learn more about sustainable agriscience. As with any lesson materials that are not prepared by the teacher who uses them, this lesson plan serves only as a guide. Teachers must adapt, supplement, and/or alter this suggested plan according to their expertise and to the local needs, interests, and expected outcomes of the students who are in that classroom. Only in this way will the instruction given meet the needs of the students, school, community, and state in which the students live and the teacher works.

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SUSTAINABLE AGRISCIENCE

Lesson Title: Developing a sustainable agriscience system

Terminal Objective: To implement the basic components of a sustainable agriscience system

Enabling Objectives: Given a lesson unit on sustainable agriscience, students will be able to:

1. define sustainable agriscience;
2. distinguish between renewable and nonrenewable resources;
3. describe the components of a sustainable agriscience system;
4. list the reasons why it is important to apply sustainable practices in the agriscience field;
5. give examples of sustainable practices; and
6. identify sources that fund sustainable agriscience projects

The teacher is encouraged to add his/her own enabling objectives that would take into account local situations or the need to add additional content information not provided within this lesson outline.

References, Equipment, Instructional Aids, and Related Web Sites

NOTE: *Teachers should use professional judgment in the selection and use of web sites. Web sites change over time and thus, the relevancy and accuracy of information contained on these sites will change as new information and research findings in the area of sustainable agriscience emerge.*

<http://www.nal.usda.gov/afsic/agric/agric.htm> - Alternative Farming Systems Information Center web site on sustainable agriscience resources

www.csrees.usda.gov/about/offices/pdfs/ecs_factsheet.pdf - Cooperative State Research, Education, and Extension Service web site for Economic and Community Systems (ECS) Sustainable Agriculture

<http://www.sare.org/publications/explore/explore.pdf> - Examples of sustainable systems in selected states

<http://www.ces.purdue.edu/sa/saglinks.html> - Examples of sustainable systems in selected states

http://www.nalusda.gov/afsic/AFSIC_pubs/srb9902.htm - Sustainable definition and terms from the National Agriculture Library

<http://www.sare.org> – Sustainable Agricultural Research and Education Program (SARE) web site. SARE works to increase knowledge about and help farmers and ranchers adopt practices that are economically viable, environmentally sound, and socially responsible. Program funded by USDA.

The Sustainable Agriculture Network (SAN) is a cooperative effort of university, government, farm, business and non-profit organizations dedicated to the exchange of scientific and practical information on sustainable agriscience systems. SAN is funded by the USDA's Sustainable Agriculture Research and Education (SARE) program.

<http://www.sare.org/htdocs/sare/funding.html> - SARE site for procedures seeking funding of sustainable agriscience projects

<http://www.eco-pros.com/renewableresources.htm> - Web site describing renewable and nonrenewable resources

<http://www.sare.org/search/search.asp> - Profiles of 50 sustainable farming systems

<http://www.sare.org/projects/> - Listing of projects funded by SARE

<http://www.ag.ohio-state.edu/~farmtour/index.html> - Listing of selected farms in Ohio that incorporate sustainable practices

<http://www.iatp.org/eurotour/publication.html> - Case studies on sustainable farming programs in Europe

<http://attra.ncat.org/attra-pub/PDF/sustagintro.pdf> - Article by Richard Earles, "Sustainable Agriculture: An Introduction"

<http://attra.ncat.org/attra-pub/PDF/Transition.pdf> - Article by Preston Sullivan, "Applying the Principles of Sustainable Farming"

Lesson Plan Color Code

GREEN – Suggestions to the teacher of teaching approaches, teaching techniques, instructional aids, or other ideas that the teacher might find helpful in teaching this lesson. Space is also adequate for teacher notes.

BLUE – Web sites that provide information, knowledge, or background that relate to the Enabling Objectives for the lesson. In some cases, the teacher can use the web sites to prepare for the lesson, in other cases; the students can go to the web sites for basic information or further reading.

RED – Questions a teacher can pose to the students or they can be used to guide the teaching process. Question numbers relate back to the number if the Enabling Objectives found at the beginning of the lesson.

Introduction: The following ideas are possible suggestions for introducing this lesson topic.

1. What examples of waste or resource destruction can you identify in our local community? Which of these examples apply or are related to agriscience?
2. What would you do if tomorrow morning you woke up and found out that no water was available in your community from that point forward? If you lived in a neighboring community, how eager would you be to share your water with others, knowing that the future of your water was unknown?
3. If aerial photographs are available of your county or a section of the local area over time showing where forests/farmland once were but now there are housing/mall developments or shopping centers, what do you think the county or area will look like 50 years from now?

As a transition into this lesson, the teacher might take the students on a field trip to observe first hand areas in the community that were lost to agriscience due to urban sprawl, erosion of soil, deforestation, chemical spills, toxic landfills, or other examples of lost natural resources.

TEACHING OUTLINE

Methods/hints/aids
Teacher notes

Technical/subject matter content

1a. What is sustainable agriculture?

Assign students to go to one of these websites and come back with a definition.

<http://www.nal.usda.gov/afsic/agric/agric.htm>

www.csrees.usda.gov/about/offices/pdfs/ecs_factsheet.pdf

http://www.nalusda.gov/afsic/AFSIC_pubs/srb9902.htm

<http://attra.ncat.org/attra-pub/PDF/sustagintro.pdf>

A general **definition** applied to agriscience is:

Farming systems that are capable of maintaining their **productivity** and **usefulness** to society **indefinitely**

Have students discuss, “Is it possible for anything to go on indefinitely?”

Discuss with the students environmentally perceptions of what each of these three things mean

Place on board, overhead

Other people have defined it centering on the **three components** of a system that:

is **economically viable**, is

friendly, and is **socially acceptable**

In the 1990 Farm Bill, Public Law 101-624, Title XVI, Subtitle A, Section 1603, **sustainable agriculture** was defined as:

An **integrated system** of plant and animal production practices having **site specific** application, that will over the **long term**:

satisfy human food and fiber needs;

enhance environmental quality and the natural resource upon which agriculture depends;

make the most efficient use of nonrenewable resources and on-farm resources;

where appropriate use biological cycles and controls;

sustain the economic viability of farm operations;

enhance the quality of life for farmers and society as a whole

1b. What should be the goal of a sustainable agriscience system?

Realizing that it is **difficult** if not impossible to practice and/or achieve **ideal** systems, then the following goals could serve as **guides** for action.

Place on chalkboard,
overhead or powerpoint

Primary goals of a sustainable agriscience system include:

providing a more profitable farm income,
promoting environmental stewardship, including
protecting and **improving** soil quality,
reducing dependence on nonrenewable resources,
minimizing adverse impacts on safety, wildlife, water quality, and other environmental resources
promoting stable, prosperous farm families and communities

2a. What are the differences between renewable and nonrenewable natural resources?

<http://www.eco-pros.com/renewableresources.htm>

Renewable resources are capable of being **replaced** by natural ecological cycles or sound management practices

Renewable natural resources can be **used** and **replaced** after use, if **proper care** is taken and time is allowed for replacement. Examples are:

Trees
Soil
Plants
Animals
Water

Nonrenewable natural resources once used **cannot** be replaced.
Examples are:

Fossil fuels, oil/gas/coal
Minerals
Uranium

2b. When do renewable resources become nonrenewable resources?

When **plants** and **animals** become **extinct**

Fresh water can become nonrenewable if ground water is **used up** and no rainfall occurs, or the existing ground water becomes **contaminated**

Forests, if in the harvesting process the soil is not protected and **erosion** occurs to the point that the remaining natural environment **prohibits** regrowth

Oxygen/clean air, if trees are **cut** and **not replaced** or plants do not exist

Soil, if the land is overgrazed or eroded enough that the **nutrients cannot** be **reintroduced** for many, many years

Biospheres, if specific areas are harmed to the point that it changes the **natural balance** of things in that area such that they can **never recover**. e.g. toxic spills, nuclear accidents

3. What are the major components of a sustainable agriscience system?

Assign students to go this website and determine what are the major components

<http://attra.ncat.org/attra-pub/PDF/Transition.pdf>

Literature points out **different** opinions on what it takes to be a sustainable system. But **key elements** would be the following.

Case study of a local farm or school farm

Need to look at the **whole** farming system since many of the parts are **interrelated**

Production practices will **vary** by farm/ranch, thus decisions made by management must be site specific, taking into account **all** inputs

Practices must **contribute** to the economic **viability** of the enterprise
Practices must **preserve** the nonrenewable resources and if used, use them **efficiently** and **effectively**

Greater use made **of biological** cycles and controls

Outcomes should **enhance** the business and **quality** of life for the farmer/business/owner and for society

Practices that **typify** sustainable systems include:

covering soil throughout the year

avoiding moldboard plowing

increasing biodiversity through crop rotation

intercropping

using sod or cover crops

practicing farmscaping

using integrated pest management

applying animal manure or compost

diversifying enterprises

integrating animal and crop enterprises

minimizing tillage of the soil

minimizing use of fertilizer

minimizing use of pesticides

buying supplies locally

employing local people

including quality life practices for yourself

Ask students if they can add to this list

The **ultimate goal** is that the farm/ranch enterprise is a **sustaining unit**, one that can continue to operate over the **years**

The **focus** is on **long-term solutions** to the problems and challenges faced in a farming/ranching situation in a contemporary society, **not short-term** fixes for symptoms of problems

4. What is the value or benefit of implementing a sustainable agriscience system?

Current enterprise(s) are **not profitable**, find **alternatives**

Reduce risk by diversifying

Make use of **unused** family labor
(different enterprises need different skills)

Even out cash flow

Make use of underutilized resources

Opportunity for **young people** with limited resources to **transition** into business

Different people like to do **different things**

Opportunity for adding **value-added** aspects to the products produced

Diversification of products produced expands the potential customer base in an area

Personally satisfying to play a role in environmental stewardship

See if students can add to this list

5a. What are some examples of sustainable agriscience systems?

The teacher could assign different students to search different web sites for descriptions of sustainable systems. Reports back to class, topics for public speaking contests, short papers

5b. Were any sustainable systems found for our state? If so, what were they and where were they?

<http://www.sare.org/publications/explore/explore.pdf>
<http://www.ces.purdue.edu/sa/saglinks.html>
<http://www.sare.org/search/search.asp>
<http://www.sare.org/projects/>

<http://www.ag.ohio-state.edu/~farmtour/index.html>
<http://www.iatp.org/eurotour/publication.html>

6a. If you had an idea for a sustainable farming/ranching operation, where might you search for funds to help you in this transition?

<http://www.sare.org/htdocs/sare/funding.html>

6b. What is the Sustainable Agriculture Research and Education Program?

<http://www.sare.org>

SARE works to **increase** knowledge about -- and help farmers and ranchers adopt practices that are **economically viable, environmentally sound and socially responsible**. To advance such knowledge nationwide, SARE administers a competitive grants program first funded by Congress in 1988.

6c. How do you apply for a funded project?

Step 1 – Obtain copy of SARE proposal guidelines for your region

6d. What are the SARE regions and which one are we in?

ncrsare@unl.edu

North Central

nesare@zoo.uvm.edu

North East

groland@gaes.griffin.peachnet.edu

Southern

wsare@mendel.usu.edu

Western

Step 2 – Determine the deadline for proposals

Step 3 – Contact potential collaborators, generate ideas, seek commitments, ask SARE for past successful proposals

Encourage students/parents to develop and submit proposals. Share examples of proposals with class

Step 4 – Develop proposal by deadline

Summary

1. The teacher is encouraged to summarize the major points of the lesson at the close of each class. Emphasis should be on the content covered for each enabling objective for that day.
2. Short quizzes could also be used.

Plans for Application

1. If the school or agriscience program has a school farm, this area could become a project for the entire agriscience program. This would involve the entire spectrum of a sustainable farming system, from environmental inventories, to planning, to implementing, and to follow up and evaluation of practices employed. Revision of plans could be made for the next cycle or programs planned.
2. Students with farms/ranches/businesses could develop a sustainable system for their operations. With parents/owners approval, practices could be implemented over time.
3. Teachers could also assign students with hypothetical or real case studies for developing sustainable practices. Field trips to these locations would help to relate theory to practice.

Evaluation

1. Quizzes and examination centering on the enabling objectives could be developed and used.
2. Assignments to review examples of sustainable farming systems could be made, with the student reporting the nature of the program, what made it sustainable, and if reported, the effectiveness of the program and/or recommendations for the future or for others considering similar programs.