Economics of Conservation Planning

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July 11 - 13, 2017



Student Book


National Employee
Development Center
Fort Worth, Texas

USDA NRCS Natural Resources Conservation Service

USDA United States Department of Agriculture

NRCS

National Employee Development Center
Fort Worth, Texas

Economics of Conservation Planning

Student Guide

Hal Gordon
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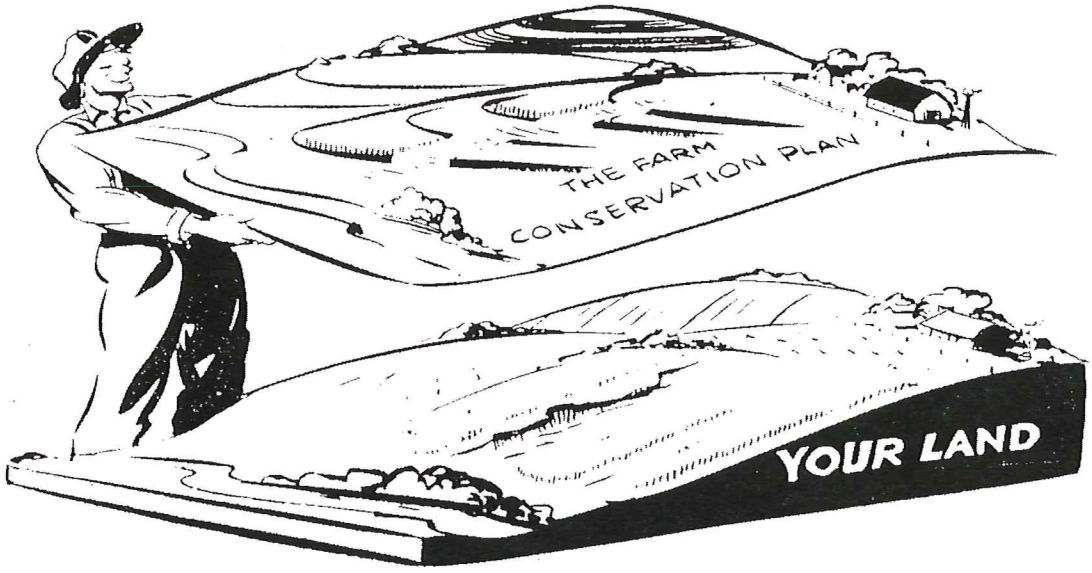
June



Helping People Help the Land

Section 1

Agenda

Day 1	Subject	Planning Step
8:00 a.m.	Introduction	
	Welcome	
	Course Purpose and Goals	
	Student Introduction	
	Instructor Introduction	
	Course Description	
9:00 a.m.	Case Study Introduction	**Identify Problem**
	Watershed Description	
	Resource Problems	
	Watershed Goals	
	Local Involvement	
	Case Farm Description	**Inventory Resource**
	Resource Problem Checklist	
	Inventory Farm Resources	
	Income and Expense Summary	
	Resource Planning	
	Effects	
	Identify Stakeholders	
	Significance of Farm to Watershed	
10:30 a.m.	Sociological Description	
	Farming Philosophy	
	Cultural Considerations	
	Adoption-Diffusion Model	
	Risk Assessment	
11:30 a.m.	Identify Farm Goals	**Determine Objectives**
	Students Identify Farm Goals	
	Personal	
	Economic	
	Environmental	
1:30 p.m.	Identify Opportunities	**Analyze Resources**
	Identify Potential Enterprises	
	Assess Farm Environment	
	High, Average, Low Yields & Prices	
	Farm Markets	
	Off-Farm Income	
	Discuss Farm Options	
3:00 p.m.	Tools to Evaluate Farm Alternatives	
	Scoping	
	Future With and Future Without	
	Conservation Effects (CED)	
	Break-even Analysis	
	Partial Budgeting	
	Marginality	
	Cost Effectiveness	

	Investment Analysis (Time Value of Money)	
	Financial versus Economic Analysis	
	Tax Considerations	
Day 2		
8:00 a.m.	Develop Effects	**Formulate Alternatives**
	Level One Effects Analysis	
	Select Preferred Options	
	Effects Analysis	
	Select Options	**Evaluate Alternatives**
	Farm Option and RMS's	
	Dry Cropland - Revise goals	
	Range	
	Irrigated Cropland	
	Income Enhancing	
1:00 p.m.	Implementation Schedule	**Make Decision**
	Make Decision	
	Develop Schedule of Installation	
3:00 p.m.	Analyze Farm Performance	
	Spin the Farming Wheel	
	Income Expense Statement	
	Forage Balance Sheet	
	Terminology	
Day 3		
8:00 a.m.	Implement Farm Plan	**Implement**
Plan		
	Spin Farming Wheel for Year 1	
	Complete Forage Balance Sheet	
	Complete Income Statement	
	Review Plan for Revisions	**Evaluate Plan**
9:30 a.m.	Spin Farming Wheel for Year 2	
	Complete Forage Balance Sheet	
	Complete Income Statement	
11:00 a.m.	Summarize Class Experience	
	Student Reports	
	Compare NRCS and Farmer's Points of View	
11:30 a.m.	Discuss Economic Tools	
	Field Office Technical Guide	
	Role of State Economist	
	Computer Programs	
	University & Extension	
	Professional Farm Managers	
11:45 am	Closing	

* Note the course agenda follows the "Planning Steps" which are bolded next to the appropriate course material.

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Analyze Farm Resources

Tools to Evaluate Conservation Alternatives

Develop Effects

Implementation Schedule

Implement the Farm Plan

Summarize Planning Experience

Other Economic Tools

Conclusion

Class Agenda

Day 1	Subject	Planning Step
8:00 am	Introduction Welcome Course Purpose and Goals Student Introduction Instructor Introduction Course Description Pre-Test	
9:00 am	Case Study Introduction Watershed Description Resource Problems Watershed Goals Local Involvement Case Farm Description Resource Problem Checklist Inventory Farm Resources Income and Expense Summary Assess Farm Environment High, Average, Low Yields & Prices Farm Markets Off-Farm Income	**Identify Problem** **Inventory Resource**
11:00 am	Spin Farming Wheel for Year I Complete Income and Expense Worksheet Feed and Forage Balance Worksheet	
1:30 pm	Sociological Description Farming Philosophy Cultural Considerations Adoption-Diffusion Model Risk Assessment	
2:30 pm	Identify Farm Goals Students Identify Farm Goals Personal	**Determine Objectives**

	Economic Environmental Analyze Farm Resources Discuss Farm Options	**Analyze Resources**
3:30 pm	Tools to Evaluate Farm Alternatives Scoping Future With and Future Without Conservation Effects (CED) Partial Budgeting Marginality Cost Effectiveness	
Day 2		
8:00 am	Tools to Evaluate Farm Alternatives (continued) Investment Analysis (Time Value of Money) Break-even Analysis Financial versus Economic Analysis Tax Considerations	
9:30 am	Develop Effects T-Chart Effects Analysis of all RMS's Cropland Grazing Land Income Enhancing	**Formulate Alternatives**
11:30 am	Select Options, Revise Goals	**Evaluate Alternatives**
1:00 pm	Implementation Schedule Make Decision Develop Schedule of Installation	**Make Decision**
2:00 pm	Analyze Farm Performance Spin the Farming Wheel for Year II Complete Income and Expense Worksheet Feed and Forage Balance Worksheet	**Implement Plan**
4:00 pm	Spin the Farming Wheel for Year III Analyze Farm Performance	

Day 3

8:00 am	Analyze Farm Performance (continued) Complete Income and Expense Worksheet Feed and Forage Balance Worksheet Review Plan for Revisions **Evaluate Plan**
9:00 am	Analyze Final Farm Performance Complete Final Income and Expense Worksheet Feed and Forage Balance Worksheet Update Final Net Worth Statement
10:00 am	Summarize Class Experience Student Reports Compare NRCS and Farmer's Points of View Course Review Post-Test
12:30 pm	Field Office Technical Guide Role of State Economist University & Extension Professional Farm Managers
1:30 pm	Demonstrate Economic Tools NRCS Economic Tools Website
4:30 pm	Closing

* Note the course agenda follows the "Planning Steps" which are bolded next to the appropriate course material.

Course Purpose and Objectives

This course enables non-economists to recognize and perform basic economic analysis during conservation planning. It also enables participants to become more knowledgeable of the role economics plays both from the landuser, decision maker viewpoint and from their roles as conservation planners.

To accomplish this goal, we will:

- Teach basic economic tools for field employees
- Demonstrate conservation farm planning techniques
- Present a landuser's and conservationist's perspective of conservation economics
- Demonstrate conservation effects
- Provide guidance on multiple resource decision making

Course Objectives

The course was designed to accomplish several objectives. Each student should be able to apply economic concepts at the field level, in a way that land users can understand, use and apply that information. Upon the successful completion of the course, the participants will be able to:

- Convey the importance of economic planning in achieving the agency's mission and goals.
- Integrate field level economics into conservation planning procedures.
- Improve our understanding of the landuser's perspective of conservation.
- "Talk" economics with landusers and provide economic information for Decision Making.

This course was developed to improve the economic skills of field planners. It reflects the current philosophy of planning conservation systems that address resource concerns on the entire farm that are economically feasible and acceptable to the land user.

Course Description

One reason for this course is that "NRCS employees often do not consider a producers financial situation when recommending conservation practices".

Over the next three days you will be given tools to help you get more conservation on the ground by using economic principles.

The course centers on "conservation farm planning". Each student is responsible for making all management decisions, and economic analysis, on a representative farm.

Each of you will be given an actual farm, from which to earn your livelihood. We encourage you to work alone or in teams of two.

The student will consider a broad range of resources and conditions. Relationships between resources will be identified and evaluated.

During the course each of you will be the farm decision maker, not a NRCS field person. Try to reverse your roles during the course if possible. You will assume the role of the decision maker, implement a farm plan you develop and manage the farm over five years.

The farm is currently under average management with several resource problems.

Students will receive several farm options, including Conservation Management Systems (CMS), to implement. The students will use economic tools to evaluate and select several farm options and one CMS to implement. A farm plan and implementation schedule will be developed.

Each year the crop prices and yields will be randomly selected (by spinning a wheel). Economic conditions such as farm policy and technology may also change. The students will learn economic principles and techniques which will help them in the field working with farmers and ranchers.

Don't be too critical of the "physical" farm data in the example, concentrate on the concepts being taught. The goal of the course is to learn the "concept" of economic farm planning.

The course will be very casual, speak up with questions anytime. If you need a break, take one. Formal breaks are scheduled each time the "wheel" is spun.

We encourage open discussion within the group, interruptions are expected and welcome. Once we get going, move around and see how others are doing. Feel free to discuss problems encountered with implementing economics in the field office.

Economics of Conservation Planning Process

Briefly discuss planning as a philosophy and why planning is important to implement a conservation plan.

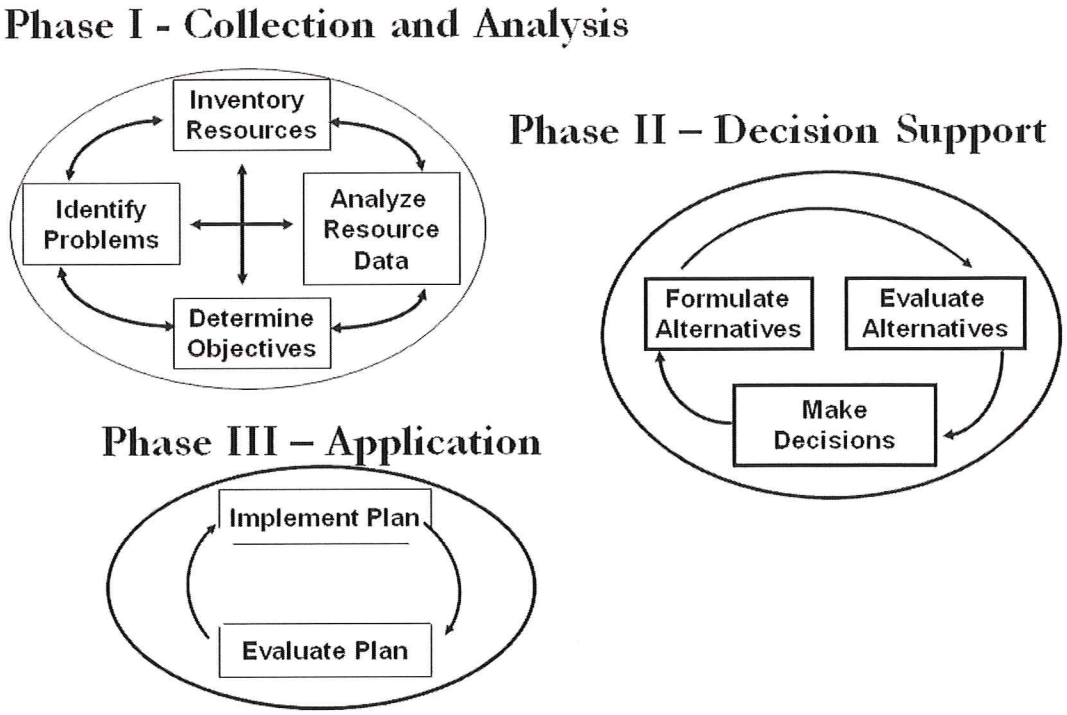
Refer to the National Planning Procedures Handbook as providing guidance for using the planning process.

Briefly review the 9-step, 3 phase NRCS planning process using the diagram on the following page.

The NRCS Planning Process

1. Identify Problems
2. Determine Objectives
3. Inventory Resources
4. Analyze Resource Data
5. Formulate Alternatives
6. Evaluate Alternatives
7. Make Decision
8. Implement Plan
9. Evaluate Plan

Conservation Planning



Areawide Planning

There are several reasons we as an agency do "areawide" planning. We want to:

1) Manage on-site as well as off-site effects
2) Don't "push" the resource problem downstream
3) Target funding, and use "resource money" efficiently
4) Identify effects from conservation systems

As planners, we must understand how the individual farm or ranch affects a larger area.

Case Study Introduction and Inventory and Analyze Farm/Ranch Enterprises

Objectives

At the close of this module, you will be able to:

- Identify the case study farm's resources including land, labor and capital.
- State the resource problems that have been identified on the case farm.
- Recognize how the farm fits into and affects the watershed.
- Complete a farm income and expense statement.
- Perform a simple livestock forage balance sheet.
- Identify farm risks such as changes in crop yields and prices, farm markets and off-farm income.
- Detailed review farm income and expense statement.
- Detailed review livestock forage balance sheet.
- Further discuss farm risks such as changes in crop yields and prices, farm markets and off-farm income.
- Introduce the CMS options for the case farm.
- Relate an understanding of basic economic terminology.

Case Farm/Ranch Description

Review and discuss the case farm specific data.

1) Case farm description
2) Resource problem checklist
3) Land types and acres
4) Machinery
5) Net worth statement
6) Crop Budgets
7) Livestock Budget
8) Income/Expense Statement
9) Feed/Forage Balance

Discuss soil, water, air, plant, animal and energy resources as well as human considerations. Also discuss economic influences such as cash flow, machinery, and labor resources. Include a description of major resource problems identified on the farm and activities to address the problems.

Case Farm/Ranch Setting

Review and discuss the case farm. Discuss the general area (watershed) where the case farm is located and specific farm data. Discuss the social influences such as watershed groups and activities, major industries, population, demographics and cultural heritage.

Significance of the Farm/Ranch to the Setting

Discuss the impact of the case farm's activities on the entire watershed. Review concepts such as cumulative effects, point vs. nonpoint source pollution, sustainable agriculture, intensive land use and other similar concepts.

On/Offsite Effects

An important planning concept is on/offsite effects. Cause and effect relationships exist on farms and ranches. For example, crop residue management protects topsoil and improper animal waste management can damage water quality. Effects can be good or undesirable, depending on the impact to human values. Effects can be onsite or offsite. Fertilizer application on a field can have a good effect onsite by increasing crop yields and an undesirable effect offsite if it washes into a community's water supply. The "effects" of farm activities must be considered on both the farm and the watershed.

Stakeholders Affected by Resource Problems

People who are affected by resource problems in a watershed need to be identified. Stakeholders can make the necessary changes to solve the identified resources problems. They can provide labor, funds, and political support, and change activities on the land they have an interest in or own. Stakeholders may live inside or outside the watershed.

Farm Performance

Analyzing farm performance is critical to achieving the farm goals and selecting the most appropriate conservation management system. Farm performance is a function of income, expenses and balancing the farm's physical resources. Most land users are reluctant to adopt a conservation system unless it enhances their farm's performance.

Net Worth Worksheet

A net worth worksheet represents the farm's cash value for a particular year. It identifies the farm's assets and liabilities. Assets represent what the farmer "owns," such as land, buildings, machinery, livestock and cash. Liabilities represent "money owed" such as real estate, machinery, and operating loans. Subtracting the liabilities from the assets equals the farms net worth. Knowing the farm's net worth is one measure of farm profitability and is used to establish a credit line and estimate a debt load.

Conservation planners do not need to calculate net worth (farmers and ranchers know their net worth all too well), but do need to understand it.

Planners need to be familiar with the concept to understand why conservation practices are not installed all at once, or why bankers will not extend credit for some farm/ranch improvements even if they are economically feasible.

Enterprise Budgets

An enterprise budget represents income and expenditures from crop or livestock production. Budgets are a detailed account of farming activities, tillage operations, chemical applications, and machinery labor requirements. A budget has the following major components:

Income

Price times Units equals Gross Returns

Expenses

Operation

Date Fixed Costs

Ownership Costs Variable Costs Operating Costs Labor

Service Materials

Returns

Income less Expenses equals Net Returns

Income and Expense Statement

An income and expense statement represents the farm's profitability for a particular year. Income represents commodities sold off the farm. Expenditures represent the costs of production. Both income and expenditures are identified on enterprise budgets.

If available, conservation planners can use the information on the income and expense statement to develop and schedule conservation systems.

If enterprise budgets are not available, the landuser can be interviewed.

Many conservation systems can only be installed" a piece at a time" as the land owner can afford it. Also, an income and expense statement can be used to project the "effects" of adopting a conservation system on the entire farm or ranch.

An income and expense statement has the following major pieces of information:

Income and Expense Statement

Farm Sales

Enterprise _____

Crop & Livestock _____

Acres _____

Yield Unit _____

$/Unit _____

Returns _____

Farm Expenses

Enterprise _____

Variable Cost _____

Acres & Number _____

Labor _____

Machinery Loan _____

Real Estate Loan _____

Taxes, Insurance,

Utilities _____

Net Returns _____

Optimize Scarce Resources

One definition of economics is *"the optimal allocation of scarce resources among competing uses"*. Perhaps the most difficult challenge to farm/ranch planners is to optimize the farm/ranch goals, with the limited farm/ranch resources. Some of the most common resources land users try to optimize are nutrients, forage, and dollars.

Forage Balance

Livestock forage needs are compared to forage production on the farm. The closer forage needs and forage production come together, the more efficient the farm is utilizing forage resources.

Changes in farm activities, as a result of implementing a conservation system, will affect the amount of forage available to livestock.

A feed and forage balance chart has the following components:

Feed and Forage Balance Chart

Feed Source

Acres *times* Yield *equals* AUMs Produced

Carry-Over Hay

New Hay

Grazing Land

Cropland

Rangeland

Feed Use

Brood Cows *times* Months *equals* AUMs Needed

Carry-Over Hay

New Hay

Grazing Land

Cropland

Rangeland

Feed Balance

Spin the "Farming Wheel"

We are now ready to begin managing the financial future of the case farm. The farming wheel is used to randomly select high, average, and low yields and prices. It is used to teach the concept of risk and demonstrate the effect conservation has on economic activities. Spin the wheel for the first time and complete the worksheet below. At this time we have not selected any farm improvements, but are managing the farm under the existing management and conditions.

Land Use	Year 1		Year 2		Year 3	
	Yield	Price	Yield	Price	Yield	Price
Crop 1						
Crop 2						
Crop i						
Livestock 1						
Livestock i						

Complete Income and Expense Statement & Forage Balance Chart

Fill out the worksheets in the case study notebook. Complete the income and expense statement and the forage balance chart. **Discuss the results of the first "spin of the wheel" from the land users' and the conservation planner's perspective.** Develop the concept that land owners may be more willing to implement conservation systems with higher crop and livestock prices and yields.

Sociology Concepts

Sociology – Working with People

Objectives

At the close of this module, you will be able to:

- Recognize how individuals make decisions to adopt conservation practices.
- Explain how and why some farming decisions are made.
- Identify character traits of individuals that lead to the development of acceptable and implementable conservation plans.

Sociology Concepts

Conservation planners should be writing plans that land users want and need. Factors related to land users and conservation practices have been identified which are consistently associated with rapid and widespread adoption of new technology. These factors can be easily identified and used by conservation planners to draft plans which satisfy the needs of both the land user and the assisting agency.

To have a conservation plan accepted and implemented by a land user, the planner must understand how the land owner's personal background influences their conservation decisions. When writing a farm plan, the planner must consider the land user's farming philosophy, culture and risk tolerance.

Society is Constantly Changing

Agriculture – Farm size is changing, farms are relying on off-farm income, large farms are hiring consultants and increase in absent land owners.

Demographics – Immigration effects the culture of communities, minority populations are increasing, there are more women farmers and the age of the average farmer is getting older.

Communities – There is less public participation in civic, religious, political and workplace groups.

Farming Philosophy

Each person has a personal view of how things should be, because each of us was raised in a unique environment and carries with us traits and attributes from that environment. Each one of us has a limited amount of risk that is acceptable. To some, farming is a way of life. To others it is just a business, and to others it is somewhere in between.

Adoption-Diffusion Model

A model has been developed by sociologists that attempts to explain how and why people "try" new technology. There are several conditions that must exist before conservation systems can be accepted:

1. There must be a need for them.
2. They must come with instructions on how to build or manage them.
3. They must conform to the norms of the social system.
4. They must be affordable by the land user.

Five Factors in the Adoption-Diffusion Model are:

1. **Awareness**
   - — The systems must fit the socioeconomic characteristics of the client.
   - — The client should be able to pay for a conservation system and have the ability to install it.
   - — It must fit the personality of the client. Do they have the time and patience to try something new? Can the client understand the system and be taught how to adopt it into their farming operation?
   - — Can those promoting a system find clients who may use it?
2. **Interest**
   - — Does the system help the client meet their personal goals such as higher income, less labor or quality of life?
   - — Is the system compatible with the rest of the farm operation?
   - — How complex is the new system?
   - — Can the client test the system in small increments to determine if they want to fully adopt the practice?
   - — Can the client observe the results of the new system?
3. **Evaluation**
   - — Can the client see the system in use?
   - — The client either adopts or rejects testing the system
4. **Trial**
   - — The client implements the system.
5. **Adoption**
   - — The client accepts or rejects the new system based on their experience.

Reasons for Not Doing Conservation

Land owners do not adopt conservation technologies for two basic reasons: They are either unable or unwilling. These reasons are not always easily distinguishable from one another.

Sociology planning concepts, in its simplest form, amounts to developing a farm plan that landowners are both able and willing to adopt and implement. Using the "ability and willingness framework", planners can simplify the sociology reasons why people adopt or reject conservation systems:

Unable and Unwilling	**Able but Unwilling**
Unable but Willing	**Able and Willing**

While developing a conservation plan, determine which "box" you client fits into. Keep developing the plan until the client fits into the "able and willing" box. If we know why or why not clients are practicing conservation, that knowledge should help us write successful conservation plans.

Obstacles to Conservation Adoption

Farmers may not be aware of or understand:

- On-farm erosion problems, especially causes of erosion and recognition of such impacts as lost productivity and off-site impacts.
- Off-farm costs of erosion, such as water Pollution, and road maintenance.
- Benefits of conservation, such as short-term benefits of reduced tillage and long-term social benefits.
- Types and sources of available assistance, such as government programs and agencies and local programs.
- Variety of conservation systems.
- Nature of conservation plan, that is, voluntary implementation, custom designed to suit farmer's own needs, and range of sound alternatives.

Farmers may not have technical information on:

- Selection of specific tillage system (many options exist).
- Importance of residue for conservation tillage.
- Adaptation of conservation system or operation, such as for unique soil conditions and different cropping systems.
- Weed and insect control with conservation tillage.

Community Constraints:

- Absence of support from peers.
- Absence of community support, such as support from financial institutions.
- Peer pressure against certain practices, such as &'trash" on fields with no-till.
- Unequal access to financial and informational support.

Social-Psychological Characteristics:

- Traditionalism.
- Aversion to risk.
- Lack of necessary management skills.
- Independence.
- Negative attitudes.

Organizational Barriers:

- Insufficient cost sharing.
- Conflicting messages from different sources.
- Past reliance by agencies on walk-in clientele, so that those with less need may get most assistance and information.
- Farmers' confusion over the roles and responsibilities of various organizations.
- Farmers' belief they will encounter unnecessary run-around or red tape.
- Lack of coordination among agencies in terms of referrals and reinforcement.
- Lack of support from financial institutions and farm business.
-

Economic Obstacles:

- Lack of cash or credit for initial investment in reduced tillage or no-till equipment.
- Lack of cash or credit for farmers' share of cost for structural practices.
- No market for hay or no use for pasture.
- Heavy debt load.
  Landlord / Tenant Obstacles
- No communication about conservation.
- Each uses the other as a "convenient excuse".
- Some landlords are not experienced in farming and have little appreciation for conservation and the tenant farmer's situation.
- Cash rent encourages exploitation.

These obstacles may be more serious for certain groups of farmers. Overcoming these obstacles requires understanding the farmer or rancher's conservation adoption decision-making process and the ways to influence the process.

Individual Adoption Process

Researchers have identified a five-stage Personal adoption process. Individuals usually go through this process, whether they are deciding to adopt a new car, a computer, a conservation practice, or any other innovation. The process has been defined as follows:

Awareness - Recognizes a need for something new
Interest - Looks for more information
Evaluation - Sees it in use
Trial - Tries it out
Adoption - Accepts or rejects the new practice, adapts and customizes
Adaptation – Make modifications to meet site specific conditions

Awareness
At this stage an individual becomes aware of some new idea, such as conservation tillage. He or she knows about the existence of conservation tillage, but lacks details about it, such as what kind of equipment is needed, or bow it will affect the general farm operation.

Interest
At the interest stage, the individual wants more information about the idea or practice. He or she wants to know what it is, what it will do, and what its impact may be.

Evaluation
At this stage, the individual makes a mental application of the new idea or practice. He or she applies the information obtained in the previous stages to the specific situation. The farmer may ask: "Can I do it, and if I do it, will it do a better job than what I am doing now? Will it have an adverse effect on my yields or profits?"

Trial
If the farmer decides that the idea has some potential, he or she will try it. The trial stage is characterized by small-scale experimental use, if this is possible, and by the need for specific information such as: How do I do it? When do I do it? How does it fit into my farm management system?'

Adoption

In the adoption stage, a producer decides, usually because of a successful trial, that the practice is a good one and will be fully incorporated. A commitment is made to allocate resources to the "new" technology or practice. Field staff plays an important role by helping to assemble the necessary resources and acquire the needed management skills. Technical assistance and other types of educational programs are of key importance at this point.

Adaptation

The sixth and final stage is adaptation. It is the "customization" of the technology or practices. Even after an innovation is adopted, the producer needs ongoing confirmation that the adoption decision was correct. Additional changes in other practices and/or refinement of the innovation may be needed. Technical assistance should continue after initial adoption. If the producer runs into difficulty using the innovation, they will be tempted to quit using it and return to previous practices. That decision will depend, in part, on the level of investment already made in the innovation.

Characteristics of Conservation Adoption

Conservation practices are more readily implemented and maintained if they meet the criteria identified below:

Cost and Benefits
New practices that are high in cost generally tend to be adopted more slowly than less expensive ones. However, regardless of cost, practices that yield high returns for dollars invested tend to be adopted more readily than those that yield lower returns.

Complexity
New practices that are relatively simple to understand and use will generally be accepted more readily than more complex practices.

Visibility
The more visible the practice and its results, the more rapid adoption is likely to be.

Divisibility
A practice that can be tried on a limited basis will generally be adopted more rapidly than one that cannot.

Compatibility
A practice that is consistent with the ideas, beliefs, management style, and equipment of the farmer is more likely to be adopted.

Flexibility
A practice that can be adjusted to fit the management system of the farmer is more likely to be adopted.

Identify Client Objectives

Objectives

At the close of this module, you will be able to:

- Recognize how and why farm goals are made.
- Determine the goals of land users.
- Identify your farm goals for managing the case farm.

Goals and Objectives

Objectives are defined as "quantitative or qualitative statements of desired future conditions as determined by the client". Goals and objectives are only meaningful if we measure our success in attaining them.

Social Objectives

Each person has a personal view of how they approach life. For example, they may be family orientated, prefer recreation over high income, value education or have other personal concerns such as their age, family status and financial history. When working with clients, we must assist them in developing a farm plan that meets their personal goals as well as our agency's directives.

Economic Objectives

Each of us makes financial decisions. Some want to maximize income, others minimize taxes. Each client will have different financial goals. Young farmers with dependents often have very different economic goals than farmers considering retirement.

Environmental Objectives

Some people have a strong land ethic and value a high quality environment. Most people make trade-offs between income and environment. Understanding the client's environmental perspective will help you develop a better farm plan that meets the client and agency conservation objectives.

Community Perspectives

When communities are faced with federal, state, or local government mandates on the environment, or if they perceive resource problems where they live, they often organize and set watershed goals. These goals are generally broad in nature and reflect a consensus of local opinions. If the local community group undertakes activities to solve resource problems, clients in the watershed are encouraged to comply with the group's requests. Community goals should be considered when working with landusers in that community.

Multiple Objectives

Often decisionmakers only consider their own objective and not others or societies. No group is right or wrong, it all depends on their individual perspective. To make large scale planning efforts work, such as watershed plans or coordinated resource management plans, consensus must be obtained among various groups. Consensus may be reached on some points, and not on others. Reaching consensus on one or two points out of dozens, where at least two parties benefit, is beneficial to the entire planning effort.

The follow example illustrates this principle with a water quality problem and three decisionmakers with differing objectives.

	Regulatory Agency	NRCS	FARMER
Capital Expenditures	Whatever it takes	Minimum cost	Affordable
Erosion	Control at any cost	Sustainable Levels	Control at an acceptable level
Profit	Not concerned	Maintain or Improve	Maintain or Improve
Solution	Solve problem	Conservation Management System	Structural or Management
T&E Species	Maintain or Improve Conditions	Maintain or Improve Conditions	Indifference or Improve

Goal Setting

Few things are accomplished without setting goals. Many goals are conflicting, and decision makers must prioritize their goals. Goals must be **written**, **specific**, **measurable**, and **have a time reference**.

Each land user has goals, or objectives, or as the NPPH calls them, "desired future conditions," which can be categorized into three basic areas:

1) Social
2) Economic
3) Environmental

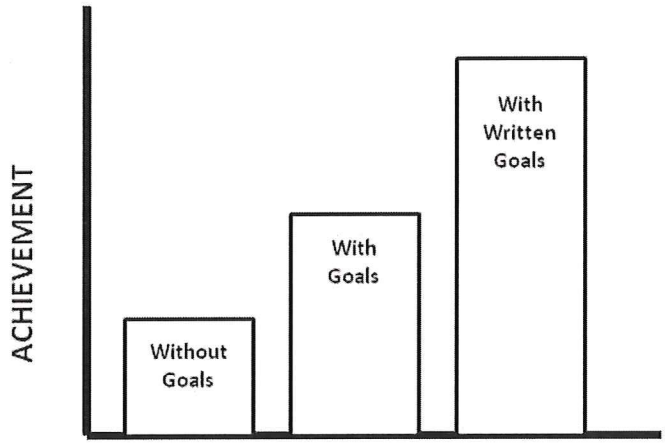
Goals must be:

Written—reduce" the chance for misunderstanding, provides a record for review at later dates.

Specific—to reduce soil loss to 5 tons per acre is better than to reduce soil loss. This allows you to determine when a specific goal has been reached. This provides a sense of accomplishment and a reminder that it is time to think about defining new goals.

Measurable—allows you to measure progress toward the goal.

Timetable—reduce soil loss to 5 tons in three years. Helps to focus on the goal and reduces the human tendency to procrastinate.



Often close and direct relationships exist between farm family and farm business. Personal business goals are often intertwined and hard to separate. They may also be in direct conflict with one another. There may be many goals and they have to be prioritized. This determines which goal to work on first and if the goals conflict you know which one to focus on.

Examples of client goals:

- Create a profitable enterprise within three years.
- Reduce debt load below 25% within five years.
- Increase farm net worth by 15% within ten years.
- Pay off farm mortgage before retirement.
- Expand the livestock operation by 20% and balance forage requirements within five years.
- Pass the entire farm on to the next generation.
- Take a two week leisure/adventure vacation every year.
- Meet soil tolerance loss (T) for at least half of cropped acres, in five years.
- Create three miles of cold water fish habitat within ten years.

Use the following format to write your goals for the case farm.

	Short Term	**Long Term**
Social **Economic** **Environmental**		

Analyze Farm Resources

Objectives

At the close of this module, the participant will:

- Identify farm and livestock operation opportunities.
- Recognize trade-offs between resources in multi-resource planning.
- Analyze the economic and market conditions of the case farm.

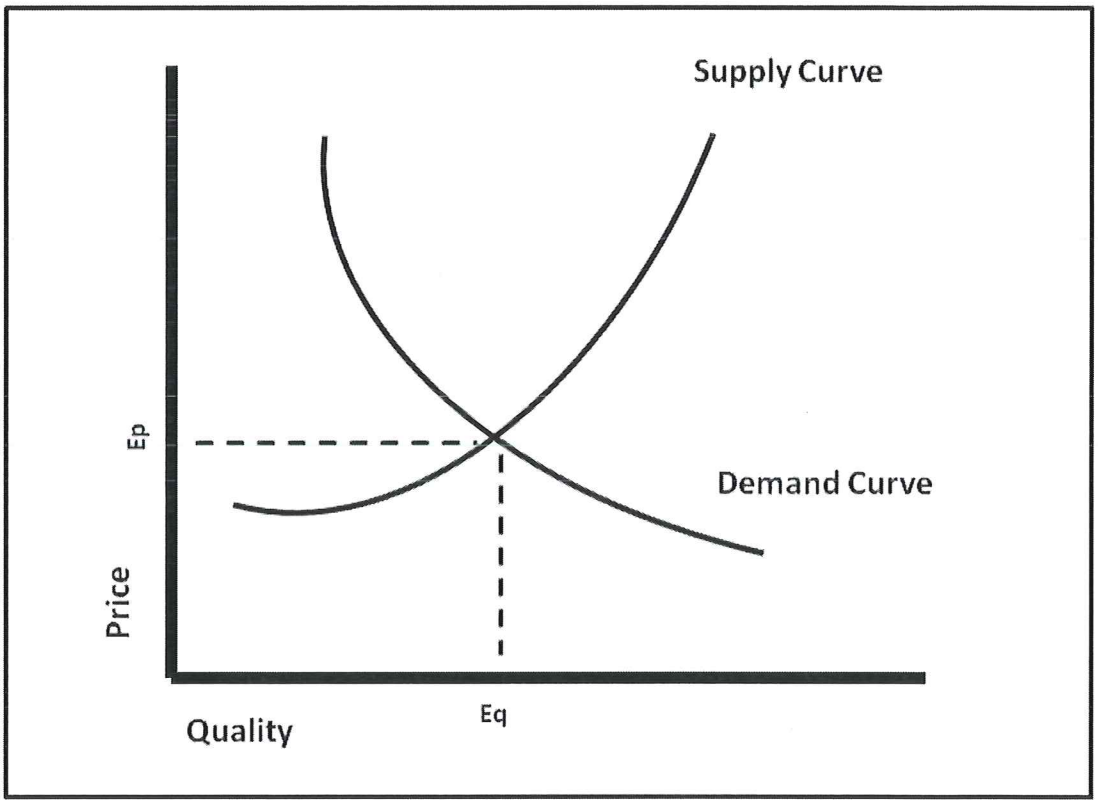
Analyzing and Identifying Farm Resources

Analyzing farm resources and identifying opportunities are critical to achieving farm goals and efficient resource management. Most land users know the opportunities available on their land, but they may have difficultly identifying all the risks and benefits associated with those opportunities. Enterprise budgets and a little knowledge about economics will help land users minimize the risks of agricultural opportunities.

There are many sources of information for farm opportunities, including other farmers or ranchers in the area, the Extension Service, trade publications, and state agricultural statistics.

The Farm Environment

When identifying farm opportunities, you must consider potential crop - yields and prices, which vary from year to year. The economic concept of "supply and demand" can explain this variability, and is illustrated in the following graph:



The equilibrium price is found where the demand curve intersects with the supply curve. Farm prices change as the demand or supply curves are shifted upwards, downwards or along the curve. Perfect knowledge and information are assumed with this type of analysis.

Examples of demand and supply curve shifters for the price of wheat include:

Demand Shifters

Price of Substitutes - corn, barley, rice
Price of Complements - yeast, sugar, oil
Consumer Tastes - prefer com bread or potatoes
Population - increase, decrease, or dominant culture
Income - rise or fall
Consumer Expectations - health, food, pesticides

Supply Shifters

Price of Inputs - machinery, fuel, land, labor
Technology - reduced tillage, reduced production costs
Government Policy - farm bill, regulation costs
Price of Other Products - corn, barley, rice
Weather - drought, floods
Number of Suppliers - monopoly, many producers

The Farm Markets

The farm location relative to where crops are sold influences farm opportunities. A producer should consider storage facilities, farm suppliers, customers and other agricultural support before deciding to produce a crop. For example, a farm that produces excess forage as a result of a conservation system (grassed waterway) may not be able to sell the forage if livestock producers are not in the area.

Conservation and Income Enhancing Options

Discuss the Conservation Management Systems (CMSs) developed for the case study. The local agency field office has been working closely with the former land owners on the case farm, and have developed several CMSs. You as the new manager of the case farm must select and implement one of the CMSs, or get out of the "Farm Program".

In addition to the CMSs, you have several other options from which to choose that may help you reach your social, economic or environmental goals

Tools to Evaluate Conservation Alternatives

Objectives

At the close of this module, the participant will be able to:

- Apply several economic tools for evaluating conservation management systems.
- Communicate basic economic terminology.
- Explain the difference between economic and financial analysis.

Economic Tools

Economics is a social science. It attempts to predict how and why people react to changes in economic conditions. Many economic principles are only a formal organization of common sense. This formal organization allows for a formal and uniform set of terminology, methods and a consistent set of rules. These rules can be used to predict how a person will respond to a change in economic conditions. Economic tools help us organize information for analysis and Decision Making. Remember the definition of economics is: "the optimal allocation of scarce resources among competing uses".

Economic analysis can only occur when coupled with physical data – soil, water, air, plant, animal (SWAPA) and similar resources. The economic/social effects of utilizing physical data are described as "human considerations".

Human - Economic and Social Considerations

Below are the seven human consideration categories and examples of questions to consider when implementing conservation activities to determine the effects on the human resources:

Land Use

A change in land use where the original farm enterprise will no longer be maintained or available for the original farm enterprise. May also include a change in equipment required (or no longer required) to implement a practice.

Is the present land use suitable for the proposed alternative?

Will land use change after practice(s) installation?

How will a change affect the operation? (e.g., Feed and Forage Balance Sheet)

Will the action affect resources on which people depend for subsistence, employment or recreation?

Will land be taken in or out of production?

Capital

The total investment costs associated with implementing the practice, including annual costs (costs that are expected to be incurred on an annual basis) and fixed costs (costs paid regardless if the equipment is used or not).

Does the producer have the funds or ability to obtain the funds needed to implement the proposed alternative?
What are the impacts of the cost of the initial investment for this alternative?
What are the impacts of any additional annual costs for Operation and Maintenance?
What possible impact does implementing this alternative have on the client's future eligibility for farm programs?

Labor

The number of farm workers or hours of work needed to preform farm operations.
Does the client understand the amount and kind of labor needed to implement, operate and maintain the proposed practice(s)?
Does the client have the skills and time to carry out the conservation practice(s) or will they have to hire someone?

Management Level

The time required to investigate, plan, oversee and record farm activities.
Does the client understand the inputs needed to manage the practice(s) and the client's responsibility in obtaining these inputs?
Does the client understand their responsibility to maintain practice(s) as planned and implemented?
Is it necessary for the client to obtain additional education, or hire a technical consultant, to operate and/or maintain the practice(s)?

Profitability

Profitability describes the relative benefits and costs of the farm or ranch operation, and is often measured in dollars. An activity is profitable if the benefits are greater than the costs.
Is the proposed alternative needed and feasible?
Do the benefits of improving the current operation outweigh the installation and maintenance costs (positive benefit/cost ratio)?
Is there a reasonable expectation of long-term profitability/benefits for the operation if implemented?
Will crop, livestock, or wildlife yield increase/decrease?

Risk

Adverse risk is the potential for monetary loss or damage to resources or the environment including crop and livestock yield.

Will the proposed alternative aid/risk client participation in USDA programs?

What are the possible impacts due to a change in yield?

Is there flexibility in modifying the conservation plan at a future date?

What issues are involved with the timing of installation and maintenance?

What are the cash flow requirements of this alternative?

What, if any, are the hazards involved?

Public Health and Safety

Adverse risk is the potential for physical harm or injury.

What effect (both positive and negative) will the action have on the client and community with regard to public health and safety?

What are the off-site effects?

Scoping

Scoping is the process of identifying all the problems and opportunities and focusing on those that will be considered in the planning process. During the problem identification process, mandated items (cultural resources, threatened and endangered species, highly erodible land, water quality, wetlands, etc.) and producer identified problems, are documented. The scoping process can be compared to a funnel. Many problems are identified, but only a few are furthered considered in the planning process.

The purpose of scoping is to:

- Identify significant issues to address.
- Provide a record of issues that were considered, but found not to be significant for further consideration in the planning process.
- Provide a record of NEPA compliance.
- Reduce the number of alternatives.

Scoping considers the evaluation criteria the decisionmaker will use to make decisions. If leisure time or low cost is of great concern to the decisionmaker, they should be considered when alternatives are developed.

Scoping reduces the number of alternatives that are developed for the decisionmaker. In the case farm/ranch, there is a fixed number of acres used to produce crops and livestock. There is an infinite combination of crops and livestock that could be produced for the present situation given the physical constraints of production. This is called a production possibility curve. With improvements to the resource base, new production possibility curves are possible until full resource development has taken place. Many combinations of crop and livestock are possible between the present production possibility curve and the full resource development curve. Working with the decisionmaker, the infinite combination of possibilities is reduced through scoping. One thing to note, as you move closer to full resource development, the risk to the decisionmaker increases. There is more opportunity for things to go wrong because everything will be producing at full capacity.

Develop Alternatives

Develop alternatives that will achieve the objectives of the client, solve the identified resource concerns, take advantage of opportunities, and prevent or lessen the possibility of additional problems occurring.

'Future With' versus 'Future Without'

This section could also be called "present condition" and "future condition". The need for conservation planning is based on the notion that something is currently, or is expected to be, at a condition that is less than desirable. This may be a resource problem or an opportunity. In conservation planning we are trying to find ways to make things better both now and in the future after considering all effects. The gauge to determine whether things will be better, and how much, is the comparison of effects (gains and losses). Effects, both now and in the future, without taking any action, are compared to those expected with implementation of an action.

The 'benchmark' condition is the reference point from which effects of all alternatives will be compared. The ideal situation is to keep all things constant and only vary one thing (yield, power requirements, and labor). Then you know what effect this one change caused. If a number of things change the effects can still be evaluated, but the change is due to the combination of activities and the individual effects of each thing changed cannot be sorted out.

Conservation Effects for Decision Making (CED)

We have collected large amounts of resource information. We have also analyzed this information. We now to need a process to record and organize this information in a way that will help the client make the necessary decisions.

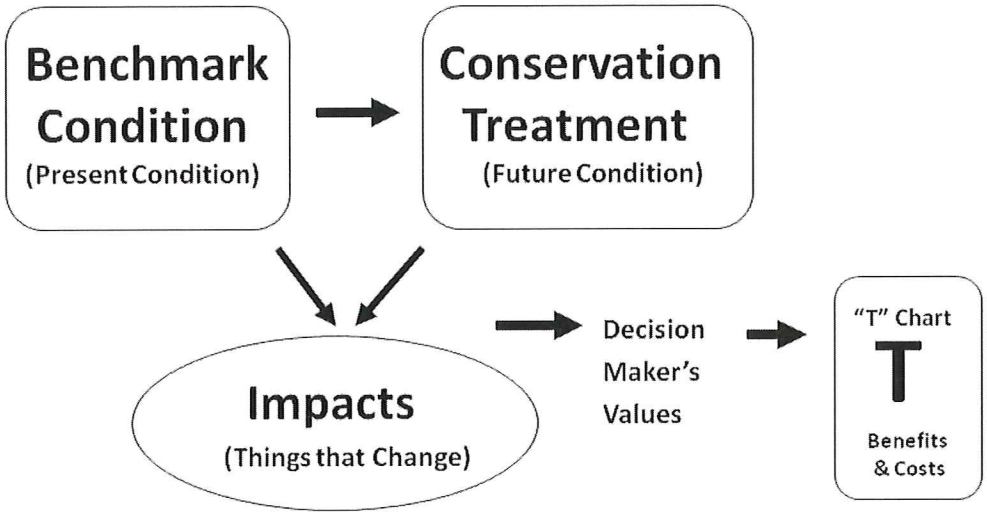
But how do we do it so the client easily understands?

We have a process called Conservation Effects for Decision Making (CED). CED provides us with a logical way to present, compare, and discuss the environmental, social, and economic effects of the benchmark situation to any number of proposed options.

CED is the framework for the planner to help clients make informed decisions in solving natural resource problems.

CED focuses on the client as the decision maker. This focus on the client defines the type of information needed and the kinds of tools used to get that information. It is a process focused on the exchange of information between the planner and the people who make decisions about their operations.

Conservation Effects for Decision Making



T-Chart Definitions:

Benchmark — The present condition or situation that is used as a point of reference to measure change in resource conditions resulting from conservation treatment. A written statement of the benchmark condition should include a description of the current conditions, crops, soils, major resource problems, etc., including conservation practices installed that meet technical standards and those that do not.

Also included in the benchmark is an assessment of the effects expected from continuing the Benchmark system.

Effect — is the measure of the result of the existing or current treatment (benchmark). They are also the anticipated or experienced results of applying one or more conservation treatments on a planning unit. Effects may be expressed in ecological, economic, or social terms.

CMS Option — is a description of the conservation management system proposed to correct the problems noted in the benchmark.

Impact — is the difference that exists between the effects of the benchmark and the effects of the proposed alternative. Keep in mind that effects are outcomes or results. They may be expressed in monetary, physical, or narrative terms.

Values — are the whole of a client's ideals, intuitions, and concerns used to judge whether an impact is favorable or unfavorable.

Planning efforts should always first identify the benchmark condition.
The planner and decisionmaker work together to develop a picture of existing conditions, trends, problems, opportunities, and objectives. The kinds, amounts, and timing of actions are recorded for the benchmark as well as the alternatives that are developed. For example, the number of times over a field, when and with what, kind of equipment, yield or number of AUM's produced, or chemicals applied. The actions translate into effects. Knowing the crops planted, the sequence of operations, and the crop rotation will determine the soil loss.

When we compare the difference between the benchmark condition and each alternative we are determining the impacts of installing the alternative. For example, there may be a reduction in the erosion rate or a change in number or kinds of tillage operations. The impacts, differences in effects between the benchmark and the proposed alternative, serve as a basis for the landowners to make a decision. The decisionmaker makes an evaluation as to the positive or negative effect for each impact that has been identified. This process is repeated for each alternative developed.

The impacts or differences between the benchmark and an alternative can be analyzed at different levels of detail. The first level would describe the positive and negative impacts in a narrative form. The second level would assign numbers/units to these impacts. The third level would show the change in net farm income as a result of implementation of the alternative.

Benefit Cost Analysis

The goal in conservation planning is for benefits to be greater than costs. Economic analysis requires four simple steps:

1. Estimate Costs
2. Estimate Benefits
3. Convert to "Like Terms"
4. Compare Costs & Benefits

Conservation Practice Costs

Costs include: 1) "Additional costs" such as purchasing equipment, materials or hiring more labor) and 2) "Reduced revenue" such as taking land out of production and losing a crop. There are various sources for practices costs. Talk with your state economist, who can direct you to the most current information. Most practices will be broken down into components, and the cost of each component identified. Remember to include both monetary and non-monetary costs.

Conservation Practice Benefits

Benefits include: 1) "Additional revenue" such as increased crop yields, hunting fees and 2) "Reduced costs" such as fewer passes over the field or less management. Conservation benefits are typically estimated by the physical resource specialists, so talk to your agronomist, forester, grazing specialist, engineer and other technical specialists. Benefits can also be monetary and non-monetary.

Benefit-Cost Ratios

All "effects" must be classified by the decisionmaker as benefits or costs. The B/C ratio measures the benefit of some activity per cost. Simply divide the benefits by the costs. If you are calculating a B/C ratio over time, make sure the benefits cover the same period as the life of the practice or system. If the benefit is greater than the cost, the project is economically worth doing; if it's less, then it isn't.

This technique is easy to do if benefits and costs are both in "dollar" units. If we spend $10/acre/year on a pasture improvement and the forage benefits are $ 13/acre/year, the B/C ratio is 1.3.

If benefits are not in "dollar" units, the B/C ratio can still be calculated. For example, for each dollar spent on wetland habitat improvement, we receive 1.2 ducks, the B/C ratio is 1.2 ducks.

Benefits and costs do not have to be accounted for in terms of "dollars"

Cost Effectiveness

Cost effectiveness is an appraisal technique used when benefits cannot be reasonably measured in monetary terms.

Select the least cost alternative to obtain a fixed level of benefits.

> **Producer Example:** "If we need 200 tons of hay to feed livestock what is the least cost method to get the hay?"
>
> **Agency Example:** "What is the least cost method of installing level terraces or "What is the least cost alternative to reach a specified level of water quality?"

Marginal Analysis

Marginal analysis looks at the rate of change in one variable when a small change is made in another variable. Usually the analysis is looking at the amount of change in production as a result of a small change in one input with all other inputs held constant.

A good example is looking at the change in crop production that result from equal incremental changes in fertilizer. By looking at the marginal change in fertilizer to the marginal change in yield, you can determine the optimum amount of fertilizer to apply.

Production Function

A production function is a graphic display of the output that results from a set of inputs. As one of the inputs is increased with all other inputs remaining the same the change in output moves through three stages. Stage I has output increasing at an increasing rate for each unit of change of the input. In Stage II, output continues to increase but the increase is at a decreasing rate. The final stage, Stage III is when output actually decreases with each unit increase in the input.

Production functions relate physical units of input to physical units of output. A value needs to be assigned to the cost of the units of input and to the returns from the units of output. With the assigned values, benefits and costs can be evaluated. The economic tool used to evaluate these benefits and costs is marginal analysis.

Partial Budgeting

Partial budgeting is one of the most useful tools available for conservation planning. Partial budgeting is a tool that systematically displays the benefits and costs of an alternative. Only the benefits and costs that change are considered. This technique simplifies data collection while examining how benefits and costs stack up next to each other to determine the change in net farm income.

For example, if you want to consider the effects of a conservation alternative using the partial budgeting technique, you would look at the cost of installation (including operation and maintenance costs) versus the effects of the alternative rather than gathering information about the whole farm or the enterprise that was affected.

On the partial budget worksheet, the negative effects from the alternative are entered on the left side of the worksheet. Negative effects can be in the form of additional costs or reduced revenue. The positive effects of the alternative are entered on the right side of the worksheet. These positive effects can be additional revenue or reduced cost. Adding the two columns up and subtracting the costs in the left column from the returns in the right column gives the net change in income from the alternative being evaluated.

Investment Analysis

Investment analysis measures "what is given up today with the hope of future benefits". It evaluates the benefits and costs from making capital improvements. This analysis compares several alternatives to the existing situation.

> **Producer Example:** "Should we buy a new combine, buy one five years old, lease a combine, hire custom work or continuing to use the existing combine?"
>
> **Agency Example:** "Should we promote sediment basins to address water quality problems of should we continue to promote no-till?"

Time Value of Money

The value of an item depends on when you receive it. The old adage "a bird in the hand is worth two in the bush" is certainly true. Most of us would prefer $100 today than $100 next year. If we had $100 today, we could invest it and receive "interest" and have more than $100 next year. We may also not trust someone to pay us the $100 in one year. Only five pieces of information are necessary to answer "time value of money" questions:

Time (payment) Period	Years
Discount Rate	Interest Rate
Present Value	Installation Costs
Future Value	Value in the Future
Payment	Annual Benefits or Costs

To solve for one of these items, only three of the other variables must be known.

Break-even Analysis

Economic evaluation of alternatives produces information that can be used by decision makers to determine feasibility and/or the most desirable alternative. In any evaluation, four variables must be considered:

1. Cost of installation including operation and maintenance
2. The time period which the alternative will be evaluated
3. Interest rate used for the evaluation
4. Benefits from the alternative

If all four variables are known, the benefits from the alternative can be compared to the cost of installing the alternative. If three variables are known the fourth variable can be calculated. This is called ***break-even analysis***. If, cost is unknown you are solving the question: "How much can I afford to spend?" If the time period is unknown you are answering the question, "How long will it take to get my money back?" If the interest rate is unknown you are asking the question, "What rate of return will I get on my money if I install the alternative?" Lastly, if the benefits are unknown you are asking the question, "How much net gain do I need to justify spending the money to install the alternative?"

Break-even Analysis Problems

Example 1 - Break-even Cost

How much can a rancher afford to spend for a stock water development if the trough life is 20 years, the interest rate is 12 percent and the value of the increase in AUM's produced each year is $140?

Example 2 - Break-even Time

How long will it take to recover the cost of an alternative costing $1,000, within 8 percent interest rate, and the value of the increase in crop yield each year is $120?

Example 3 - Break-even Interest Rate

What is the return on an investment for an alternative that costs $1,000, over 20 years, and the reduced machinery cost is $180 per year?

Example 4 - Break-even Value

What must a ton of soil be worth to justify spending $1,400, over 20 years, with an interest rate of 11 percent?

Financial Analysis versus Economic Analysis

Financial and economic analysis are different. Economic analysis investigates profitability while financial analysis considers affordability.

Economic analysis compares the benefits to the costs of an alternative, over the alternative's life.

Financial analysis compares the benefits over the alternative's life to the costs of an alternative over the loan period.

Because the costs are expected to be paid off sooner in financial analysis than the economic analysis, some alternatives may be economically feasible, but not financially feasible. This is an important consideration in conservation planning. The conservation alternative must pay for itself over the loan period, or the land user must have financial assistance. If the alternative does not pay for itself over the short run, there are several financial incentives available (such as cost share) for funding conservation activities.

The following example demonstrates this concept:

Should we borrow money to purchase farm equipment, costing $20,000 and lasting 20 years for use on 20 acres? The interest is 8% and the bank wants the loan paid off in 5 years. The hay yield on the 20 acres will increase 2 tons/acre/year and be worth $75 per ton.

Economic Analysis:

$20,000, 8% Interest, 20 Years
Annual cost = $2,037
Annual benefit = $3,000

Financial Analysis:

$20,000, 8% Interest, 5 Year Loan
Annual cost = $5,009
Annual benefit = $3,000

It appears that the purchase of farm equipment is a good economic investment, benefits exceed costs. If we can pay off the loan in five years, with money from other sources, it is a good financial investment. Years 6-20 are clear profit.

Economic Data

Developing a conservation plan includes collecting economic data that is useful to farmers or ranchers. It is more important to know "where" to get economic data, than to "have" economic data. Economic data changes so rapidly it is difficult to stay current. You should know who to call, which periodicals to research and bookmark websites to obtain current economic information.

Develop Effects

Objectives

At the close of this module, the participant will be able to:

- Apply conservation effects analysis.
- Demonstrate the concept of "Conservation Effects for Decision Making."

Effects Analysis

All physical activities have a "cause and effect" relationship. Systemically evaluating this relationship will help clients make better decisions. When conservation activities are proposed, the planner should develop a list of "level one" effects of those activities. The "effects" may be classified as "positive" (good) or "negative" (bad) by the decisionmaker, based on their values, not the planner's values.

Benchmark Condition: Alternative Condition:	
Positive Effects	Negative Effects

Select the Preferred Options

After each farm option has been analyzed the option the land user is most interested in implementing should be selected. Next, the effects analysis for "level two" (physical units) and "level three" (monetary values) should be completed. The results are important to the decision making process. Also, planners can use the "effects" and decision making process to improve the conservation plan.

Implementation Schedule

Objectives

At the close of this module, the participant will be able to:

- Compare and select the preferred options that most closely fit your farming philosophy and goals.
- Incorporate the farm options into the existing farm plan through an implementation schedule.

Implementation

An implementation plan must be developed to incorporate the farm options and selected CMS into the existing farm operation, with minimal disruption to cash flow, labor and risk. Considerable thought and preparation should be given to creating a feasible implementation plan. Planners should be aware of how the conservation system will be incorporated into the existing farm or ranch operation.

Make a Decision

Using the results of the effects analysis, select which farm options to implement. The participants should select A, B or C for each land use:

A. Get out of the Farm Program
B. Stay in the Farm Program
C. Additional Income Enhancing Options

Develop Schedule of Installation

After selecting farm options, incorporate them into the farm plan. Prepare an implementation schedule over five years.

Enterprise/ Improvement	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Crop 1						
Crop 2						
Crop 3						
Livestock						

Implement the Farm Plan

Objectives

At the close of this module, the participant will be able to:

- Implement the farm plan with randomly selected prices and yields.
- Complete the Income and Expense Statement, Forage Balance and other worksheets.
- Compare the results of the original farm plan with the new farm plan.
- Understand how risk (random changes in yield and price) affects farm profitability and the adoption of conservation.

Planter Loan Terms

Planter Loan

Amount Borrowed	$10,000
Loan Period Years	5
Interest Rate	10%
Annual Payment	**$2,638**

Yr	Beginning Balance	Interest Payment	Principle Payment
	Total	$3,190	$10,000
1	$10,000	$1,000	$1,638
2	$8,362	$836	$1,802
3	$6,560	$656	$1,982
4	$4,578	$458	$2,180
5	$2,398	$240	$2,398

Real Estate Loan Terms

Real Estate Loan

Amount Borrowed	$500,000
Loan Period Years	30
Interest Rate	8%
Annual Payment	**$44,414**

Yr	Beginning Balance	Interest Payment	Principle Payment
	Total	$832,412	$500,000
1	$500,000	$40,000	$4,414
2	$495,586	$39,647	$4,767
3	$490,819	$39,266	$5,148
4	$485,671	$38,854	$5,560
5	$480,111	$38,409	$6,005
6	$474,106	$37,929	$6,485
7	$467,621	$37,410	$7,004
8	$460,617	$36,849	$7,564
9	$453,053	$36,244	$8,169
10	$444,883	$35,591	$8,823
11	$436,060	$34,885	$9,529
12	$426,532	$34,123	$10,291
13	$416,240	$33,299	$11,114
14	$405,126	$32,410	$12,004
15	$393,122	$31,450	$12,964
16	$380,158	$30,413	$14,001
17	$366,157	$29,293	$15,121
18	$351,036	$28,083	$16,331
19	$334,705	$26,776	$17,637
20	$317,068	$25,365	$19,048
21	$298,020	$23,842	$20,572
22	$277,448	$22,196	$22,218
23	$255,230	$20,418	$23,995
24	$231,234	$18,499	$25,915
25	$205,319	$16,426	$27,988
26	$177,331	$14,186	$30,227
27	$147,104	$11,768	$32,645
28	$114,458	$9,157	$35,257
29	$79,201	$6,336	$38,078
30	$41,124	$3,290	$41,124

Straight Creek Farm - Yields, Prices and Costs

YIELDS				
Product	**Units**	**High**	**Average**	**Low**
Corn (Fields 1-4)	Bu	200	135	65
Corn (Fields5-6)	Bu	150	115	50
Soybean (Fields 1-4)	Bu	70	45	25
Soybean (Fields5-6)	Bu	60	40	20
Hogs	Ea	275	250	225
Tomatoes (.3 Ac Hoop House)	Lb	3,500	2,750	2,000

PRICES				
Product	**Units**	**HIGH**	**AVE**	**LOW**
Corn	Bu	$6.00	$5.00	$4.00
Soybean	Bu	$10.00	$6.25	$2.25
Hogs	Lb	$0.96	$0.90	$0.87
Tomatoes	Lb	$1.50	$1.20	$1.00
Interest Rate	%/Yr	10%	8%	6%

Operating Expenses (Budgets)	$/Ac
Corn - Conventional	$203
Corn - No-Till	$196
Soybean - Conventional	$144
Soybean - No-Till	$138
Hogs - Confined	$165
Hogs - Hoop	$161
Tomatoes (.3 Ac)	$1,627
Corn – Continuous	$223

Straight Creek Farm – Potential Conservation Practice List

Crop
Nutrient Management 590
Pest Management 595
Cover Crop 340
Filter Strip 393
Field Border 386
Contour Farming 330
Contour Orchard and Other Fruit Area 331
Grass Waterway 412
Terraces 600
Seasonal High Tunnel 798

Headquarters
Waste Storage Facility 313
Manure Transfer 634
Waste Utilization 633
Roof Runoff Structure 558
Waste Water Treatment Strip 635
Surface Drainage, Field Ditch 607

Straight Creek Farm – Potential Farm Improvements

Do Nothing
Non RMS

Crop Operation
Crop/Terrace RMS Option #1
Crop/No Till RMS Option #2
Crop/Cover Crop RMS Option #3
Crop/No-Till Grass Waterway RMS Option #4
Crop/Land Conversion to High Tunnel RMS Option #5

Swine Operation
Swine/Animal Waste Storage RMS Option #1
Swine/Waste Treatment Strip RMS Option #2
Swine/Convert or Expand Existing Swine Operation to Hoop Structures Option #3
Swine/Increase Hog Production to 6,000 Head/Year Option #4
Swine/Composting Manure Option #5
Swine/Injecting Manure #6

Straight Creek Farm – Resource Management Systems (RMS)

Do Nothing

Not selecting a conservation management system results in losing "farm program" benefits: The "farm program" protects from low crop yields and prices and crop failure - The average price or yield is substituted for low price, low yield or crop failure. Water quality and soil erosion/sedimentation concerns will continue. You may be fined up to $10,000 for water quality violations.

Cropland

Present Situation

The current crop rotation is "conventional" corn-soybean, and yields could increase with better management. Soil tests have not been taken for some time. Crop fertilizer rates are based on local co-op and university standard recommendations. Animal waste is applied to crop land when the waste storage pit is full, and is not managed for plant productivity. Only anhydrous nitrogen is applied in the fall.

Fields 1 and 2 have been in a corn-soybean rotation for about 35 years. Corn is planted into soybean residue using spring mulch tillage leaving 10% residue and soybeans are planted into cornstalks using fall mulch tillage leaving 20% residue. The predominant slope is 7% with slope length of 200 feet. Sheet and rill erosion is 13 tons/acre and sediment deposition fills up about one mile of road ditch with 75 tons sediment each year. It costs the road department about $15.00/Ton to remove and dispose of the sediment. Ephemeral gullies are starting to form in the late winter.

Fields 3 and 4 have been in a corn soybean rotation for about 35 and 20 years, respectively. Tillage is the same as fields 1 and 2. The predominant slope is 5% with slope length of 200 feet. Sheet and rill erosion is 9 tons/acre. Ephemeral gullies are present with a moderate to severe ephemeral gully in the east end of field 3, and if not controlled in the next few years, about 2 acres of cropland will be lost to gully erosion and sediment deposition.

Fields 5 and 6 have been in a corn soybean rotation for about five years. It was converted to cropland from pasture after John's father sold his cow-calf operation. About five acres between the two fields had flooding in two of the five years. Tillage is the same as the other crop fields, but both fields are farmed cross-slope and grass waterways were left when the pasture was converted, but do not meet NRCS practice standards. The predominant slope is 9% with slope length of 150 feet. Sheet and rill erosion is 15 tons/acre.

There is an opportunity to sell tomatoes to the local farmer's market. Currently there are few tomato growers in the area because of the relatively short growing season, but it may be possible to grow tomatoes in a hoop house. There have been several workshops in the area to test local interest in tomato production.

Crop/Terrace RMS Option #1
Mulch Till (329)
Terraces (500)
Contour Farming (330)
Filter Strip (393)
Nutrient Management (590)
Pest Management (595)

Mulch tillage will cost $7/Acre/Year more than conventional tillage. Terraces cost $2.00/Foot, about 3,000 feet are needed for a typical 40-acre field, last 20 years, and fields can be worked two weeks earlier in the spring. Contour farming requires a few more turns and increases fuel and labor costs about $.28/Acre/Year and reduces farm equipment maintenance costs by $500/year. A filter strip will prevent most the sediment and excess nutrients from entering the waterways, costs $100/Acre to install, $25/Acre/Year to maintain, lasts 5 years and will take about 1 acre out of crop production in each 40-acre field. Nutrient and pest management will cost $3/Acre/Year. Option #1 will increase crop income about 10% per year resulting from improved soil tilth and reduced agricultural chemicals and fertilizer use. 75 Tons of sediment will be kept out of the county ditch, which costs $15/Ton to remove each year. Use 8% interest rate.

Crop/No Till RMS Option #2
No-Till (329)
Contour Farming (330)
Field Border (386)
Nutrient Management (590)
Pest Management (595)

No-till will reduce fuel, oil and labor costs by $7/Acre/Year more than conventional tillage, but the no-till equipment will cost $35,000 and can be financed over 7 years at 8%. Contour farming requires a few more turns and increases fuel and labor costs about $.30/Acre/Year and reduces farm equipment maintenance costs by $1,000/year. A field border will prevent some the sediment and nutrients from entering the waterways, costs $75/Acre to install, $5/Acre/Year to maintain, lasts 5 years and will take about 1 acre out of crop production in each 40-acre field. Nutrient and pest management will cost $4/Acre/Year. Option #2 will increase crop income about 15% per year resulting from reduced labor, improved soil tilth and reduced agricultural chemicals and fertilizer use. Use 8% interest rate.

Crop/Cover Crop RMS Option #3
Mulch Till (329)
Cover Crop (340)
Contour Farming (330)
Field Borders (386)
Nutrient Management (590)
Pest Management (595)

The winter cover crop will cost $40/Acre/Year. Mulch tillage in continuous corn will cost $12/Acre/Year more than conventional tillage. Contour farming requires a few more turns and increases fuel and labor costs about $.28/Acre/Year and reduces farm equipment maintenance costs by $500/year. A field border will prevent some the sediment and nutrients from entering the waterways, costs $75/Acre to install, $5/Acre/Year to maintain, lasts 5 years and will take about 1 acre out of crop production in each 40-acre field. Nutrient and pest management will cost $4/Acre/Year. Option #3 will increase crop income about 15% per year resulting from improved soil tilth and reduced agricultural chemicals and fertilizer use. Use 8% interest rate.

Crop/No-Till Grass Waterway RMS Option #4
No-Till (329)
Grass Waterway (412)
Nutrient Management (590)
Pest Management (595)

No-till will reduce fuel, oil and labor costs by $21/Acre/Year more than conventional tillage, but the no-till equipment will cost $35,000 and can be financed over 7 years at 8%. A grass waterway will prevent most of the sediment and nutrients from entering the waterways, costs $300/Acre to install, $6/Acre/Year to maintain, lasts 15 years and will take about 2 acre out of crop production in each 40-acre field. Nutrient and pest management will cost $4/Acre/Year. Option #4 will increase crop income about 15% per year resulting from reduced labor, improved soil tilth and reduced agricultural chemicals and fertilizer use.

Crop/Land Conversion to High Tunnel Option #5
Seasonal High Tunnel (798)
Micro Irrigation (441)
Nutrient Management (590)
Pest Management (595)

Converting cropland to high tunnel may increase net income over time, but will require an investment of $5,570 to build each structure, install irrigation system and build planting beds. The building is 20 feet by 68 feet, about .3 Acre. Nutrient and pest management are included in the system. Operating and maintenance costs are $913/structure/year. The structure will last 10 years and you can borrow money for 8% interest. You can build up to three structures based on the demand for tomatoes. There is financial assistance that pays $1,000/hoop house.

Swine

Present Situation

The swine enterprise is a confined grower/finisher open-lot operation. There are currently 900 head grown per year over two cycles. Each of 7 lots holds about 60 head of hogs, and lots measure 12 feet by 50 feet, with 25 feet of roofed area and 25 feet of outside lot. The lots drain manure and rainwater to a concrete apron and a settling area that holds most of the solids. Most years the settling area overtops before the manure can be spread. The storage capacity is only 80% of the needed capacity. Liquid and solid manure is applied to the surface of field 4 in the spring or fall, and occasionally tilled into the soil. Each hog requires 5-10 bushels of corn and ½ hour of labor. Use 8% interest rate.

Manure is available to be applied to cropland and can provide the following nutrients:

		Pounds/Unit			
Manure Source	Production/Sow	N	P_2O_5	K_20	Unit
Liquid Manure	1.2 gallons/day	50	42	30	per 1,000 Gallons
Solid w/Bedding	2.05 tons/year	14	9	11	per 1 Ton

Crop Nutrient Needs:

	Pounds/Acre		
Crop	N	P_2O_5	K_20
Corn	150	100	110
Soybeans	0	80	80

Swine/Animal Waste Storage RMS Option #1

Waste Storage Facility 313
Manure Transfer 634
Waste Utilization 633
Roof Runoff Structure 558
Manure Transfer 634

Improvements to the waste storage facility will cost $20,000, and require an additional $500/year operation and maintenance over 20 years. Solid manure will be applied to cropland following a nutrient management plan, or hauled and treated off site. Manure transfer and waste utilization will cost $500 each year. The new facility will keep the manure out of surface and groundwater. Use 8% interest rate.

Swine/Waste Treatment Strip RMS Option #2
Roof Runoff Structure 558
Waste Water Treatment Strip 635
Surface Drainage, Field Ditch 607
Waste Storage Facility 313
Manure Transfer 634
Waste Utilization 633
Roof Runoff Structure 558
Manure Transfer 634

Improvements to the waste storage facility will cost $10,000, and require an additional $200/year operation and maintenance over 20 years. A ditch and vegetative treatment strip will be used to control any waste water that leaves the improved storage facility at a cost of $2,000 to install, $250/Year to operate and maintain and will last five years. Solid manure will be applied to cropland following a nutrient management plan, or hauled and treated off site. Manure transfer and waste utilization will cost $500 each year. The new facility will keep the manure out of surface and groundwater. Use 8% interest rate.

Swine/Convert or Expand Existing Swine Operation to Hoop Structures Option #3
Maintain or increase existing herd size. The investment in hoop structures will be $55/head, and last 15 years. One hoop structure will house 300 hogs/structure/year (150 hogs over two cycles). The hoop structure will allow the manure to be collected with the straw, composted and applied to cropland. Additional straw bedding and manure management costs will be $2/Head/Year. Manure management costs will be reduced by $2,500 each year. Use 8% interest rate.

Swine/Increase Hog Production to 6,000 Head/Year Option #4
Build a new confinement facility which contains 1,000 head/facility/year (500 hogs over two cycles). The building is 8,000 square feet, on 3 acres, will cost $250,000 to build and last 20 years. It will cost $25,000 to remove the existing swine structures. Manure storage, management and transfer facilities will cost an additional $100,000. Hauling excess manure solids offsite will cost $25/Head/Year. The current swine operation facilities operation and maintenance is about $75/Head/Year. Use 8% interest rate.

Swine/Composting Manure Option #5
The liquid and solid manure will no longer be surface applied, but will be composted with bedding material or other organic matter and spread on the field and incorporated into the soil following a nutrient management plan. The composting facility will cost $40,000 and last 25 years. Field application costs will be the same as the existing manure spreading costs. If the Hoop Structure are used there will be no increase in straw costs, if the existing facilities are used, straw composting costs will be $3/Acre/Year. Crop yields are expected in increase 7% and the manure odor will be significantly reduced. Use 8% interest rate.

Swine/Injecting Manure #6

The liquid manure will no longer be surface applied, but will be injected following a nutrient management plan. The new injection equipment will cost $15,000 and last 25 years. The field application cost will increase $2/Acre over the current manure spreading costs. Crop yields are expected in increase 3% and the manure odor will be significantly reduced. Solid manure will continue to be surface applied and tilled in when possible. Use 8% interest rate.

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Straight Creek Farm – Site Specific Practice Effects Worksheet

Candidate Practice List

Practices	Soil Erosion - Sheet and Rill Erosion	Soil Erosion - Classic Gully Erosion	Water Quality Degradation - Excess Pathogens and Chemicals from Manure, Bio-solids or Compost Applications in Surface Water	Water Quality Degradation - Excess Pathogens and Chemicals from Manure, Bio-solids or Compost Applications in Groundwater	Air Quality Impacts - Objectionable Odors	Degraded Plant Condition - Undesirable Plant Productivity and Health	Fish and Wildlife - Inadequate Habitat - Cover/Shelter
Terrace 600	5	2	2	-1		2	1
Solid/Liquid Waste Separation Facility 632			2	2	4		
Residue and Tillage Management, No Till 329	4		1			2	2
Filter Strip 393			3	1		5	2
Cover Crop 340	4		1	2		2	2
Composting Facility 317			2	2	3		

Crop #4
Swine #6

Straight Creek Farm - Farm Planning Worksheet

Product	Present	Year 1	Year 2	Year 3	Year 4	Year 5
Farmstead (Each):						
Existing Swine Structure	1	-	-	-	-	-
Expand Existing Swine Structure		-	-	-	-	-
Hoop Structure		-	-	-	-	-
Waste Storage Facility-Existing		-	-	-	-	-
Composting Facility		-	-	-	-	-
Manure Injector		-	-	-	-	-
Waste Treatment Strip		-	-	-	-	-
Hoop House (tomato)		-	-	-	-	-
Fields (Acres):						
Corn (Fields 1-4)-Conventional	80	-	-	-	-	-
Corn (Fields5-6)-Conventional	20	-	-	-	-	-
Corn (Fields 1-4)-No-Till		-	-	-	-	-
Corn (Fields5-6)-No-Till		-	-	-	-	-
Soybean (Fields 1-4)-Conventional	80	-	-	-	-	-
Soybean (Fields5-6)-Conventional	20	-	-	-	-	-
Soybean (Fields 1-4)-No-Till		-	-	-	-	-
Soybean (Fields5-6)-No-Till		-	-	-	-	-
Tomatoes (.3 Ac)		-	-	-	-	-
Terrace (Feet)		-	-	-	-	-
Cover Crop		-	-	-	-	-
Grass Waterway		-	-	-	-	-
Hogs (Head):	900	-	-	-	-	-

Straight Creek Farm – Goals/Objectives

2% each

Economic:

Profitable – net worth 20% increase – 5 years

maintain a debt load percent 10-20% - 5 years

Social:

Develop a watershed plan – habitat index & sediment reduction

Reduce odors from fields & farmstead

Environmental:

Reduce sheet/rill to < 5 Tons

by 328/329/~~345~~/~~350~~ 5% - 3 years

Reduce ephemeral to zero - 3 years

750

4% 30

Blank Planning Worksheets

CONSERVATION TREATMENT EFFECTS INFORMATION

CONSERVATION MANAGEMENT UNIT -

CONSERVATION TREATMENT:	**RESOURCE PROBLEMS:**
POSITIVE +	**NEGATIVE -**

CONSERVATION TREATMENT EFFECTS INFORMATION

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CONSERVATION TREATMENT:	**RESOURCE PROBLEMS:**
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CONSERVATION MANAGEMENT UNIT -

CONSERVATION TREATMENT:	**RESOURCE PROBLEMS:**
POSITIVE +	**NEGATIVE -**

Straight Creek Farm – Yields/Prices

YIELDS				
Product	**Units**	**High**	**Average**	**Low**
Corn (Fields 1-4)	Bu	200	135	65
Corn (Fields5-6)	Bu	150	115	50
Soybean (Fields 1-4)	Bu	70	45	25
Soybean (Fields5-6)	Bu	60	40	20
Hogs Ave weight	~~Ea~~	275	250	225
Tomatoes (.3 Ac Hoop House)	Lb	3,500	2,750	2,000

Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
	135	200			
	50	50			
	25	70			
	40	20			
	275	250			
	—	3,500			

PRICES				
Product	**Units**	**HIGH**	**AVE**	**LOW**
Corn	Bu	$6.00	$5.00	$4.00
Soybean	Bu	$10.00	$6.25	$2.25
Hogs	Lb	$0.96	$0.90	$0.87
Tomatoes	Lb	$1.50	$1.20	$1.00
Interest Rate	%/Yr	10%	8%	6%

	5	6			
	10	10			
	.90	.90			
	—	3,500			
	10%	6%			

Operating Expenses (Crop Budgets)	$/Ac
Corn - Conventional	$203
Corn - No-Till	$196
Soybean - Conventional	$144
Soybean - No-Till	$138
Hogs - Confined	$165
Hogs - Hoop	$161
Tomatoes (.3 Ac)	$1,627
Corn – Continuous	$223

Straight Creek Farm - Income and Expense Statement, Year 1

Income	Acres/No/Year	Price	Yield	Returns
Corn (Fields 1-4) (Bu)	80	5	135	54,000
Corn (Fields5-6) (Bu)	20	5	50	5,000
Soybean (Fields 1-4) (Bu)	80	10	25	20,000
Soybean (Fields5-6) (Bu)	20	10	40	8,000
Market Hogs (Ea)	900	.9	275 #	222,750
Tomatoes (Lb)				
Other				309,750
Total Income				

Operating Expenses	Acres/No/Year	Cost/Unit	Expenses
Corn	100	~~202.69~~ 203	20,300
Soybean	100	~~144.42~~ 144	14,400
Hogs	900	165	148,500
Tomatoes	—		
Cover Crop	—		18,000
Hired Labor	18,000		
Other			
Other			
Other			201,200
Total Operating Expenses			

Other Annual Costs		
Annual Production Loan	201,200 x .10	20,120
Real Estate Loan		44,414
Planter Loan		2,638
New Loan		0
Taxes		15,000
Insurance		6,000
Family Living		30,000
Total Other Costs		118,172
Net Farm Income		-$9,622
Savings Account Balance		

.05

Straight Creek Farm - Income and Expense Statement, Year 2

Income	Acres/No/Year	Price	Yield	Returns
Corn (Fields 1-4) (Bu)	~~80~~ 76	6.00	~~200~~ 206	~~96,000~~ 91,200
Corn (Fields5-6) (Bu)	~~20~~ 19		505 1.5	~~6,000~~ 5,700
Soybean (Fields 1-4) (Bu)	~~80~~ 76			~~56,000~~ 53,200
Soybean (Fields5-6) (Bu)	~~20~~ 19	10.00	~~70~~ 72.1	~~4,000~~ 3,800
Market Hogs (Ea)	900	.90	~~20~~ 20.6 250	202,500
Tomatoes (Lb)		1.20	3,500	
Other Planter — $10,000				~~369,500~~
Total Income				~~356,400~~ 366,400

Operating Expenses	Acres/No/Year	Cost/Unit	Expenses
Corn	95	196	18,620
Soybean	95	138	13,110
Hogs	900	165	148,500
Tomatoes			
Cover Crop			
Hired Labor			
Other Grass Waterway 10ac		$300 3.69	369.00
Other Drill	190		
Other			
Total Operating Expenses			

Other Annual Costs			
Annual Production Loan			
Real Estate Loan			
Planter Loan			
New Loan .179 x 35,000			6,265
Taxes			
Insurance			
Family Living			
Total Other Costs			
Net Farm Income			
Savings Account Balance			

$15,000

Straight Creek Farm - Income and Expense Statement, Year ___

Income	Acres/No/Year	Price	Yield	Returns
Corn (Fields 1-4) (Bu)				
Corn (Fields5-6) (Bu)				
Soybean (Fields 1-4) (Bu)				
Soybean (Fields5-6) (Bu)				
Market Hogs (Ea)				
Tomatoes (Lb)				
Other				
Total Income				

Operating Expenses	Acres/No/Year	Cost/Unit	Expenses
Corn			
Soybean			
Hogs			
Tomatoes			
Cover Crop			
Hired Labor			
Other			
Other			
Other			
Total Operating Expenses			

Other Annual Costs	
Annual Production Loan	
Real Estate Loan	
Planter Loan	
New Loan	
Taxes	
Insurance	
Family Living	
Total Other Costs	
Net Farm Income	
Savings Account Balance	

Spin the "Farming Wheel"

Select a student to spin the wheel and another student to record the results. Spin the wheel.

Complete Income and Expense Statement & Forage Balance Chart

Complete the forage balance chart and income and expense statement. Review the results of applying the farm options and CMS each year after they were implemented. Discuss the farm's labor and capital resources and how they were affected by the farm options selected.

Revise Installation Schedule if Necessary

Prepare a new implementation schedule if changes are made to the farm plan. If others in the class did better than your plan, feel free to adjust your plan. Use all the information available to you. Revise your goals, objectives, target values and indicators as necessary.

Repeat Spinning the "Farming Wheel" and Implementing the Plan

Repeat spinning the "farming wheel," completing the forage balance chart and income and expense statement and adjusting the farm plan for at least two more years (four total spins of the farm wheel).

Summarize Planning Experience

Objectives

At the close of this module, you will be able to:

- Summarize the results of your farm plan.
- Present your findings to the class.
- Demonstrate the use of economic tools taught in the course.
- Discuss the lessons learned in the course.

Write a Summary Report and Discuss Results

Use the following format to summarize findings:

Farm Name: _____

Goals: (Economic, Social and Environmental) _____
_____
_____
_____

Summary Plan: (CMS's)_____
_____
_____

Year	Net Returns	Excess AUMs	Net Worth
1			
2			
3			

Lessons Learned:_____
_____
_____

Evaluation

The last step in conservation planning is evaluation. After a conservation system has been adopted it should be evaluated periodically to ensure that the goals and objectives of the land user are being met.

Other Economic Tools

Objectives

At the close of this module, the participant will:

- Gain awareness of selected economic tools.
- Know your state economic contact and the services they can provide.

Instructors will demonstrate several current economic tools. Tools developed for use by NRCS are found at the NRCS Economics Tools website. Additional tools are found at university, Extension Service, other agency and conservation partners' websites.

Conclusion

Objectives

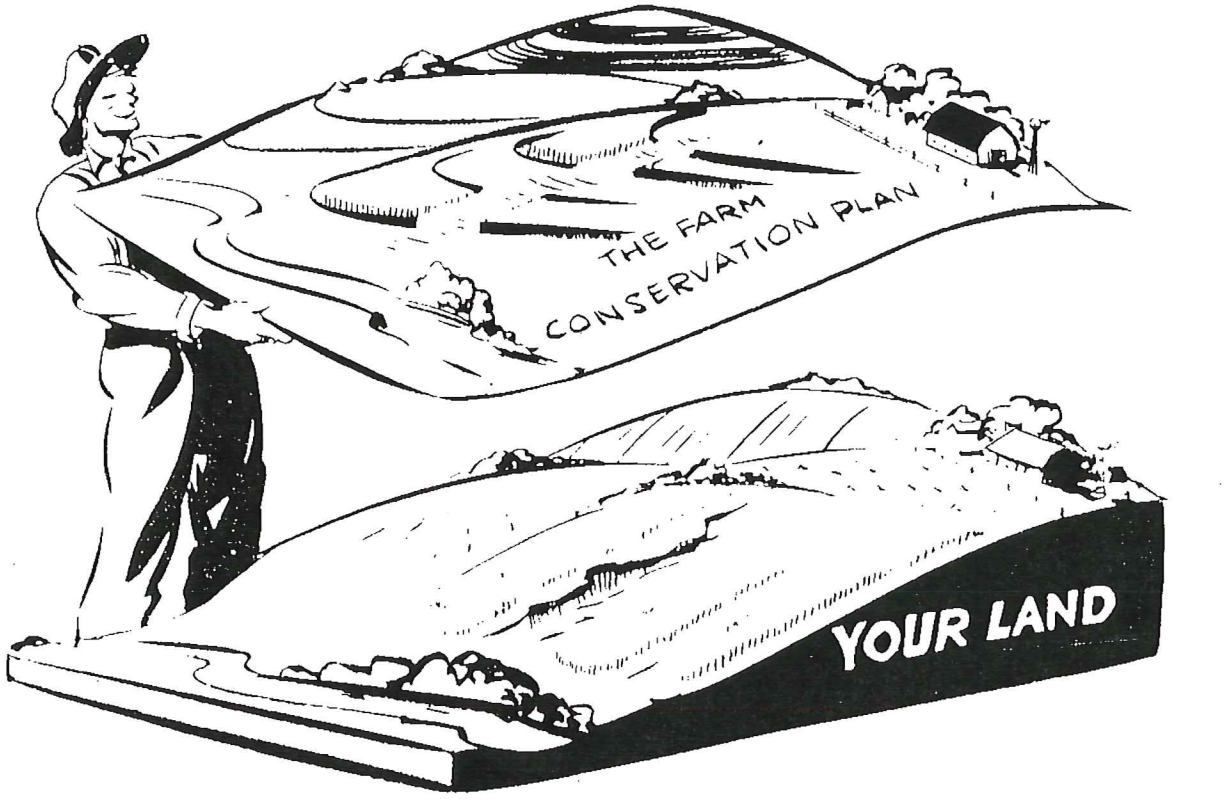
At the close of this module, the participant will:

- Ask questions and participate in discussion.
- Complete posttest.
- Close course.

Economics of Conservation Planning

Student Workbook - Straight Creek Farm

Natural Resources Conservation Service



"Economics … the Optimal Allocation of Scarce Resources among Competing Uses"

ECONOMICS OF CONSERVATION PLANNING

Table of Contents

Course Outline

The Economics of Conservation Planning Course is a new course designed to provide basic field office tools for use in tandem with the Field Office Technical Guide and the National Planning Procedures Handbook.

The course is designed to meet your individual needs, for the most part you will determine what is covered in the course and your questions will direct the discussion on what is covered. You can make the course as challenging or as simple as you wish.

The course also responds to the justified criticism "NRCS employees often do not consider a producers financial situation when recommending conservation practices."

The course is based on making financial decisions that affect conservation planning. Each student will manage an actual farm, over several years, and make all the farm decisions. The success or failure of the farm depends on the student. Economic tools will be discussed and used in the process.

The students will develop a plan to implement conservation practices on the farm. While managing the farm the student will face uncertainty for both crop and livestock prices and yields. High, average, low and bankrupt situations will be randomly selected for each year and farm enterprise.

Farmers want conservation plans that make economic sense. This is your chance to improve your conservation planning skills. This course will be both challenging and fun.

Straight Creek Farm

John and Marge N. O'Vera have a grower-finisher swine operation and 200 acres of cropland. In addition, they are considering growing tomatoes for a local farmers market to add more diversity to their operation. The farm is predominately composed of silty clay loam soils with slopes in the 5 to 9 percent class which lend to erosion and water quality problems. Sheet and rill erosion can exceed 7 Tons/Acre/Year. Gullies are beginning to appear.

Cash grain production is the dominant crop in the county as well as the region. The soils are well suited to cultivated row crops. Corn and soybeans are the dominant crops with some of the county's acreage devoted to hay and pasture. The number of farms with livestock has steadily declined during the last 30 years. The last 10 years has seen a resurgence of swine production in the region with large confinement operations. The trend in the county for swine production has been to either get bigger or get out. The O'Vera's sell about 900 hogs each year (2 batches of 450 pigs). The farm has less than 120 days waste storage.

The farm received the designation of a Century Farm two years ago. John O'Vera's great grandfather purchased the farm in 1900. His family was one of the earlier breeders of the Landrace breed in the area.

John and Marge met in college and married the summer after getting their degrees in animal science and horticulture. They have an eight-year-old son and a five-year-old daughter. John and Marge took over the farm when his parents retired and moved to town three years ago. Dad still comes out to help with planting, harvesting and the swine operation. John's mother provides child care when needed. John's parents go to Texas after Christmas and return by Easter. Marge works part time at a local greenhouse and John has worked part-time at the local co-op.

The watershed surrounding the farm has a lot of tourist traffic throughout the year. The village two miles from the farm is the largest rural Danish settlement in the U.S. The community was settled by early Danish immigrants and many of the small homes represent traditional Danish architecture. The village draws over 70,000 people a year to its spring and fall festivals with an estimated economic impact of $10 million. A small state park within a mile of the farm was established to preserve an old Indian village. It is common to find flint tools as well as campsites adjacent to streams in the area. John's father has found arrowheads on the farm and believes there is a campsite by the stream. "Pheasants Forever" has encouraged them to develop brooding and nesting upland bird habitat.

The farm is part of a watershed that supplies water to an urban center of 200,000 people. The City water board has been working with local groups to formulate a water system management plan the EPA says they have to have done within two years. The Conservation District and Chamber of Commerce are very active in promoting conservation issues. A recently formed "Watershed Steering Committee" is addressing several water quality issues with the City. The state environmental agency and state legislators are under tremendous pressure to enforce and/or pass more stringent regulations for livestock confinement operations.

The O'Vera's want to continuing farming and become less dependent on off-farm income. They would like to maintain their current standard of living. As their children get older, they would like to be able to attend their school and sports activities. They want their children to get college educations and hopefully pass the farm onto to one or both of them. Eventually, they want to be debt free.

The O'Vera's have an excellent line of credit with the bank and have notes with John's parents for real estate and machinery. They also have open accounts with the local co-op.

John and Marge have some difficult decisions to make that will greatly impact the future viability of their farm. Should they greatly expand their swine enterprise? Or can they buck the "mega hog trend" and maintain or reduce the number of hogs marketed, but go to lower cost hoop structures? How can they best address their cropland erosion? Should they venture into tomato production? After several sleepless nights, John and Marge decided they can't handle these stressful decisions. They have decided to go to Kenya to manage a wildlife safari. You inherit the Farm! As part of the agreement, you must manage the farm for five years. However, you must assume all debt.

After settling into your new surroundings, one of the first letters you receive is from your local District Conservationist welcoming you to the county, and includes several conservation plan alternatives for you to review and select.

Good Luck!

Straight Creek Farm – Farm Enterprises

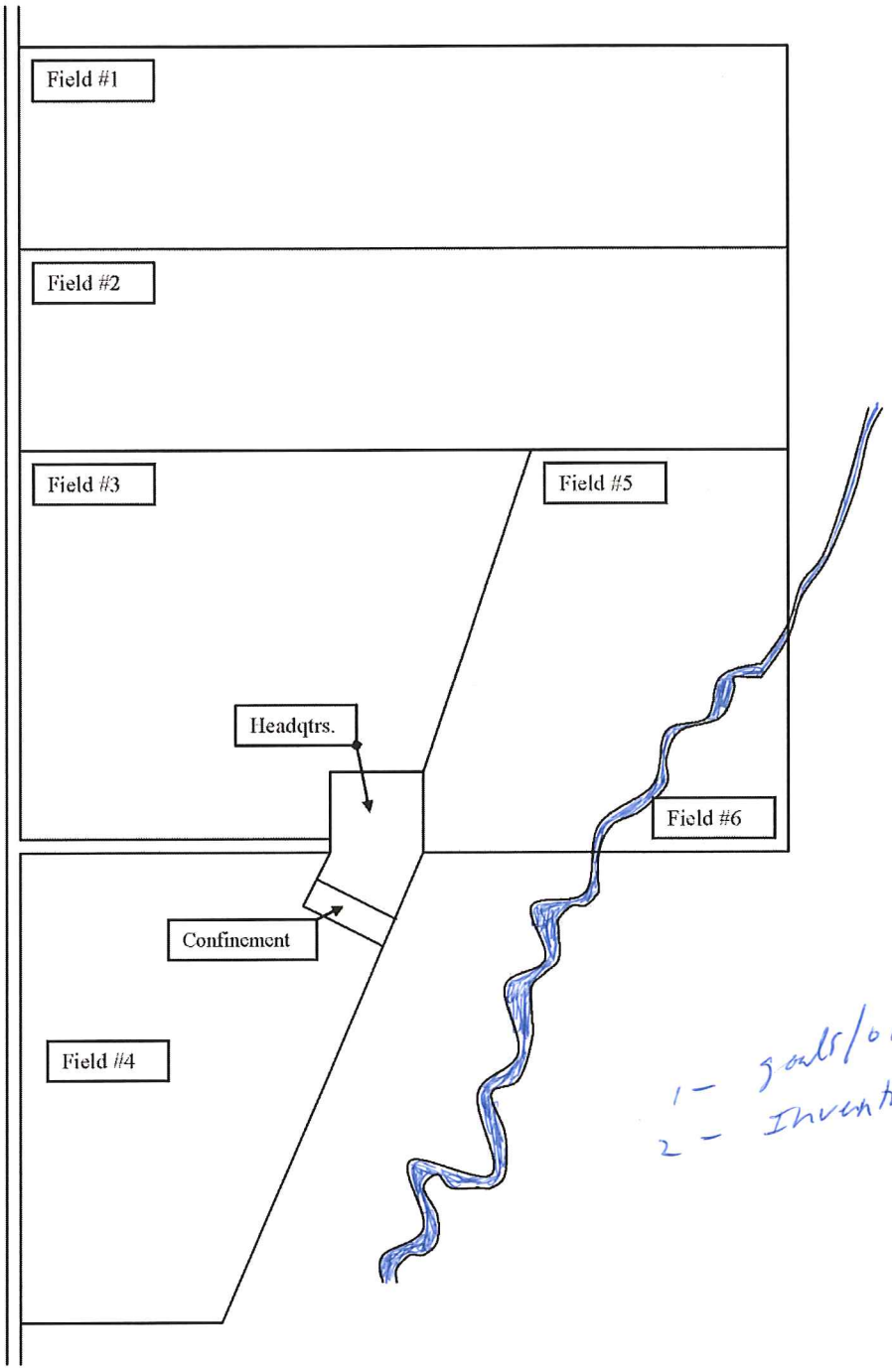
Corn
Soybeans
Swine

Straight Creek Farm - Land Types

Land types

Headquarters with swine confinement facility:		9.0 Acres
Natural Areas, Stream & Riparian Area:		1.0 Acres
Cropland:		
	Crop Rotation	
Field 1	Corn, Soybeans	40.0 Acres
Field 2	Corn, Soybeans	40.0 Acres
Field 3	Corn, Soybeans	40.0 Acres
Field 4	Corn, Soybeans	40.0 Acres
Field 5	Corn, Soybeans	35.0 Acres
Field 6	Corn, Soybeans	5.0 Acres
		200.0 Acres
	Total:	210.0 Acres

Straight Creek Farm – Land Use Map



1 – goals/objectives
2 – Inventory resources

Straight Creek Farm - Resource Problem Checklist

Soil Erosion
- Sheet and Rill Erosion
- Wind Erosion
- Ephemeral Gully Erosion
- Classic Gully Erosion
- Streambank, Shoreline, Water Conveyance Channels

Soil Quality Degradation
- Organic Matter Depletion
- Compaction
- Subsidence
- Concentration of Salts or Other Chemicals

Excess Water
- Seeps
- Runoff, Flooding, or Ponding
- Seasonal High Water Table
- Drifted Snow

Insufficient Water
- Inefficient Use of Irrigation Water
- Inefficient Moisture Management

Water Quality Degradation
- Pesticides in Surface Water
- Pesticides in Groundwater
- Nutrients in Surface water
- Nutrients in Groundwater
- Salts in Surface Water
- Salts in Groundwater
- Excess Pathogens, Chem, Manure, etc, in Surface Water
- Excess Pathogens, Chem, Manure, etc, in Groundwater
- Excessive Sediment in Surface Water
- Elevated Water Temperature
- Petroleum, Heavy Metals/Pollutants Transported to Surface Water
- Petroleum, Heavy Metals/Pollutants Transported to Groundwater

Air Quality Impacts
- Emissions of Particulate Matter (PM) and PM Precursors
- Emissions of Ozone Precursors
- Emissions of Greenhouse Gases (GHGs)
- Objectionable Odors

Degraded Plant Condition
- Undesirable Plant Productivity and Health
- Inadequate Structure and Composition
- Excessive Plant Pest Pressure
- Wildfire Hazard, Excessive Biomass Accumulation

Fish and Wildlife
- Inadequate Habitat - Food
- Inadequate Habitat - Cover/Shelter
- Inadequate Habitat - Water
- Inadequate Habitat - Habitat Continuity (Space)

Livestock Production Limitation
- Inadequate Feed and Forage
- Inadequate Shelter
- Inadequate Water

Inefficient Energy Use
- Equipment and Facilities
- Farming/Ranching Practices and Field Operations

Human

Labor + management

Financial

Immigration

opportunities to improve their lives

We get 100 ~~$50~~,000 credit line

Straight Creek Farm

Net Worth Statement - Current Year

ASSETS	Description	Age	Condition	Value
Farmstead, Shop, Swine Operation	9 Acres			$200,000
Cropland	201 Acres			$700,000
House	24X40	1948	Fair	$100,000
Hogs*	300			$67,500
Feed and Supplies				$15,000
Tractor	200 HP	1990	Good	$90,000
Cultivating/Harvest Equipment		1980	Fair	$200,000
Planter	4 Row	2010	Excellent	$10,000
Farm Cash/Checking/Savings				$5,000
Accounts Receivable				$0
Prepaid Expenses				$0
Total Assets				**$1,387,500**

LIABILITIES	Years	Age	Interest Rate	Value
Real estate Loan	30	2011	8%	$500,000
Planter Loan	5	2011	10%	$10,000
Total Liabilities				**$510,000**

NET WORTH		**$877,500**
Credit Line	$100,000	6, 8, or 10%
Debt Load	37%	

* Assuming 3 hog rotations per year and 1 on the farm at any given time.

10 - 20% is best.

Straight Creek Farm - Potential Farm Enterprises

Cropland
Conventional Corn-Soybean Rotation*
No-Till Corn-Soybean Rotation
Continuous Corn
Hoop House Tomatoes High Tunnels

Swine
Confined Grower/Finisher Swine Operation* No breeding or farrowing
~~High Tunnel~~ Grower/Finisher Swine Operation → Straw bedding + compost
Hoop House
Expand Pig Operation

* Present Farm Enterprises

#3 Inventory

Straight Creek Farm – Crop Budget Summary ($/Ac/Yr)

	SB-Corn		C-Soybeans		C-Corn		SB-NT Corn		C-NT Soybeans		Tomatoes (.3
Yield (Bu/Acre)	115	135	40	45	100	120	115	135	40	45	2,750
Price ($/Bu)	$5.00	$5.00	$6.25	$6.25	$5.00	$5.00	$5.00	$5.00	$6.25	$6.25	$1.20
Revenue ($/Acre)	$575.00	$675.00	$250.00	$281.25	$500.00	$600.00	$575.00	$675.00	$250.00	$281.25	$3,300.0(
Variable Costs ($/Acre)	$145.84	$145.84	$95.95	$95.95	$162.24	$162.24	$145.42	$145.42	$100.45	$100.45	$913.09
Fixed Costs ($/Acre)	$56.85	$56.85	$48.47	$48.47	$61.13	$61.13	$50.28	$50.28	$37.28	$37.28	$714.26
Total Cost ($/Acre)	**$202.69**	**$202.69**	**$144.42**	**$144.42**	**$223.37**	**$223.37**	**$195.70**	**$195.70**	**$137.73**	**$137.73**	**$1,627.3(**
Net Returns ($/Acre)	$372.31	$472.31	$105.58	$136.83	$276.63	$376.63	$379.30	$479.30	$112.27	$143.52	$1,672.64

Straight Creek Farm – Crop Budgets

Corn following Soybeans

	Fixed	Variable
Preharvest Machinery 1/	$15.43	$6.00
Seed, Chemical, etc.	**Units**	
Seed @ $1.00 per 1000 k.	22,000	$22.00
Nitrogen @$0.21 per lb.	100	$21.00
Phosphate @$0.25 per lb.	45	$11.25
Potash @$0.13 per lb.	35	$4.55
Lime (yearly cost)		$6.00
Herbicide		$31.00
Crop Insurance		$6.00
Miscellaneous		$6.00
Interest on preharvest variable costs (8 months @ 7.5%)		$5.69
Total		$113.49
Harvest Machinery		
Combine	$12.47	$8.36
Haul	$2.30	$1.15
Dry (LP Gas @ $0.85/gal.)	$4.60	$16.29
Handle	$1.25	$0.55
Total	$20.62	$26.35
Labor		
2.6 hours @ $8.00	$20.80	
Land		
Cash rent equivalent	$0.00	
Total fixed, variable		
Per acre	$56.85	$145.84
Total cost per acre	$202.69	

1/ Apply N, tandem disk, field cultivate, plant, cultivate, and spray.

Soybeans following Corn

	Fixed	Variable
Preharvest Machinery 1/	$15.97	$6.19
Seed, Chemical, etc.	**Units**	
Seed @ $15.00 per 50 lb.	1.2	$18.00
Phosphate @$0.25 per lb.	30	$7.50
Potash @$0.13 per lb.	60	$7.80
Lime (yearly cost)		$6.00
Herbicide		$31.00
Crop Insurance		$3.15
Miscellaneous		$6.00
Interest on preharvest variable costs (8 months @ 7.5%)		$4.28
Total		$83.73
Harvest Machinery		
Combine	$11.65	$5.43
Haul	$0.80	$0.40
Handle	$0.45	$0.20
Total	$12.90	$6.03
Labor		
2.45 hours @ $8	$19.60	
Land		
Cash rent equivalent	$0.00	
Total fixed, variable		
Per acre	$48.47	$95.95
Total cost per acre	$144.42	

1/ Chisel plow, tandem disk, field cultivate, plant, cultivate, and spray.

Corn following Corn

	Fixed	Variable
Preharvest Machinery 1/	$18.66	$7.53
Seed, Chemical, etc.	**Units**	
Seed @ $1.00 per 1000 k.	22,000	$22.00
Nitrogen @$0.21 per lb.	120	$25.20
Phosphate @$0.25 per lb.	40	$10.00
Potash @$0.13 per lb.	30	$3.90
Lime (yearly cost)		$6.00
Herbicide		$31.00
Insecticide		$14.00
Crop Insurance		$6.00
Miscellaneous		$6.00
Interest on preharvest variable costs (8 months @ 7.5%)		$6.58
Total		$130.68
Harvest Machinery		
Combine	$12.47	$8.36
Haul	$2.00	$1.00
Dry (LP Gas @ $0.85/gal.)	$4.00	$14.17
Handle	$1.20	$0.50
Total	$19.67	$24.03
Labor		
2.85 hours @ $8	$22.80	
Land		
Cash rent equivalent	$0.00	
Total fixed, variable		
Per acre	$61.13	$162.24
Total cost per acre	$223.34	

1/Chisel plow, tandem disk, apply N, cultivate, plant, cultivate, and spray.

No-Till Corn following Soybeans

	Fixed	Variable
Preharvest Machinery 1/	$11.26	$4.55
Seed, Chemical, etc.	**Units**	
Seed @ $1.00 per 1000 k.	22,000	$22.00
Nitrogen @$0.21 per lb.	100	$21.00
Phosphate @$0.25 per lb.	45	$11.25
Potash @$0.13 per lb.	35	$4.55
Lime (yearly cost)		$6.00
Herbicide		$32.00
Crop Insurance		$6.00
Miscellaneous		$6.00
Interest on preharvest variable costs (8 months @ 7.5%)		$5.72
Total		$114.52
Harvest Machinery		
Combine	$12.47	$8.36
Haul	$2.30	$1.15
Dry (LP Gas @ $0.85/gal.)	$4.60	$16.29
Handle	$1.25	$0.55
Total	$20.62	$26.35
Labor		
2.3 hours @ $8	$18.40	
Land		
Cash rent equivalent	$0.00	
Total fixed, variable		
Per acre	$50.28	$145.42
Total cost per acre	$195.70	

1/ Apply N, plant, cultivate, and spray for corn. Drill and spray for soybeans.

No-Till Drilled Soybeans following Corn

	Fixed	Variable
Preharvest Machinery 1/	$10.38	$3.47
Seed, Chemical, etc.	**Units**	
Seed @ $15.00 per 50 lb.	1.4	$21.00
Phosphate @$0.25 per lb.	30	$7.50
Potash @$0.13 per lb.	60	$7.80
Lime (yearly cost)		$6.00
Herbicide		$35.00
Crop Insurance		$3.15
Miscellaneous		$6.00
Interest on preharvest variable costs (8 months @ 7.5%)		$4.50
Total		$90.95
Harvest Machinery		
Combine	$11.65	$5.43
Haul	$0.80	$0.40
Handle	$0.45	$0.20
Total	$12.90	$6.03
Labor		
1.75 hours @ $8	$14.00	
Land		
Cash rent equivalent	$0.00	
Total fixed, variable		
Per acre	$37.28	$100.45
Total cost per acre	$137.73	

1/ Apply N, plant, cultivate, and spray for corn. Drill and spray for soybeans.

Hoop House Tomato Production

House size: 20 feet by 68 feet (1,360 square feet, .3 Acre)
Crop frequency: One per year

Variable Costs					
	Unit	**Price**	**Quantity**	**Value**	
Plants	Plant	$0.60	128	$76.80	A
Water	1,000 Gallons	$1.75	14.5	$25.38	B
Pesticide				$10.00	C
Mulch Film	Linear Foot	$0.04	250	$10.00	D
Fertilizer	Pound	$0.50	20	$10.00	E
Compost	40-lb. Bag	$2.20	24	$52.80	F
Tiller Rental	Day	$45.00	1	$45.00	G
Labor	Hour	$6.00	108	$648.00	H
Operating Interest	4.00%			$35.12	I
				$913.09	

Fixed Costs				
-				
Building	**Amount**	**Depreciation (Yrs)**	**Value**	
Structure	$3,000.00	10	$300.00	J
Windbreak Curtains	$300.00	10	$30.00	K
Plastic Film	$400.00	3	$133.33	L
Raised Beds				
Lumber (Treated)	$250.00	10	$25.00	M
Soil (16 yards)	$225.00	10	$22.50	N
Equipment				
Drip Irrigation	$450.00	10	$45.00	O
Irrometer	$50.00	10	$5.00	P
Tomato Cages	$235.00	5	$47.00	Q
Cage Support	$90.00	10	$9.00	R
Back Pack Sprayer	$570.00	10	$57.00	S
Interest Charge	$673.83	6%	$40.43	T
Land Cost			$0.00	U
Total			$714.26	
Total Installation Cost:	**$5,570.00**			

Production	Unit	Price	Quantity	Value
Tomatoes	Lbs	$1.20	2,750	$3,300.00
Total Costs				$1,627.36
Net Returns				**$1,672.64**

Annual Net Returns for Different Prices and Production

	Prices Received Per Pound				
Produced (Lbs)	$0.50	$0.75	$1.00	$1.25	$1.50
2,000	-$627.36	-$127.36	$372.64	$872.64	$1,372.64
2,250	-$502.36	$60.14	$622.64	$1,185.14	$1,747.64
2,500	-$377.36	$247.64	$872.64	$1,497.64	$2,122.64
2,750	-$252.36	$435.14	$1,122.64	$1,810.14	$2,497.64
3,000	-$127.36	$622.64	$1,372.64	$2,122.64	$2,872.64
3,250	-$2.36	$810.14	$1,622.64	$2,435.14	$3,247.64
3,500	$122.64	$997.64	$1,872.64	$2,747.64	$3,622.64

Footnotes:

A. Use large transplants, i.e. 4-inch pots

B. Commercial rate for treated water

C. Asona® for worms and Kelthane® for mites

D. Six-foot wide mulch works best on 40-inch wide beds

E. Primarily 34-0-0

F. Annual application improves tilth and supplies micro's

G. Use rear tine tiller for quick results

H. See "Labor Allocation"

I. Steel structure, hoops spaced on 4-foot centers, storm doors, removable end-walls.

J. Roll-up curtains made from 50% shade fabric. Needed in spring for wind abatement.

K. 6-mil greenhouse poly, 3-year warranty.

L. Beds constructed of 1- by 6-inch treated lumber, 40-inch wide beds on 5-foot centers.

M. The ideal soil type: fine sandy loam

N. Price includes hard hose emitter line and Dosmatic® fertilizer injector.

O. Necessary for taking moisture readings under plastic mulch.

P. Fifteen-inch by 60-inch tall cages constructed of 6-inch concrete reinforcing mesh.

Q. 4-foot long pieces of 5/8-inch rebar or sucker rod.

R. For superior coverage, use mist blower type sprayers.

http://www.noble.org/ag/horticulture/hooptomato/

Straight Creek Farm – Swine Budget Summary ($/Ac/Yr)

Confined Feeder-to-Finish Operation — One Pig

		Total
INCOME a/		
Market hog (250 lb x $.90 per lb)		$225.00
VARIABLE COSTS		
Feeder pig (50 lb)	$37.00	$37.00
Interest @ 7.5% for 121 days	$0.00	$0.00
Corn @ $5.00 per bushel	9.6 bu	$48.00
Supplement/minerals @ $0.15/lb	132 lbs	$19.80
Feed Additives		$4.00
Veterinary and medical		$1.60
Fuel, repairs, utilities		$8.00
Marketing, miscellaneous		$4.00
Interest on feed & other costs 7.5%	2 months	$25.00
Labor @ $8.00 per hour	0.50 hours	$4.00
TOTAL VARIABLE COSTS		$151.40
FIXED COSTS		
Machinery, facilities		$13.60
TOTAL OF ALL COSTS		**$165.00**
INCOME OVER ALL COSTS		**$60.00**
Break-even selling price $/Lb		$0.66

a/ Assumed death loss is 5 percent.

2 Batches / year

Hoop Finishing Feeder Pigs — One Pig

		Total
INCOME a/		
Market hog (250 lb x $.90 per lb)		$225.00
VARIABLE COSTS		
Feeder pig (50 lb)	$37.00	$37.00
Interest @ 7.5% for 121 days	$0.00	$0.00
Corn @ $5.00 per bushel	9.6 bu	$48.00
Supplement & minerals @ $0.15/lb	132 lbs	$19.80
Feed Additives		$4.00
Bedding		$5.00
Manure/waste Management Costs		$15.00
Veterinary and medical		$1.60
Fuel, repairs, utilities		$7.00
Marketing, miscellaneous		$4.00
Interest on feed & other costs @ 7.5%	2 months	$0.00
Labor @ $8.00 per hour	0.50 hours	$4.00
TOTAL VARIABLE COSTS		$145.40
FIXED COSTS		
Machinery, facilities		$15.20
TOTAL OF ALL COSTS		**$160.60**
INCOME OVER ALL COSTS		**$64.40**
Break-even selling price $/Lb		$0.64

a/ Assumed death loss is 5 percent.

Most Important One Year

Straight Creek Farm - Income and Expense Statement

Income	Acres/No/Year	Price	Yield	Returns
Corn (Fields 1-4) (Bu)	80.00	$5.00	135	$54,000
Corn (Fields5-6) (Bu)	20.00	$5.00	115	$11,500
Soybean (Fields 1-4) (Bu)	80.00	$6.25	45	$22,500
Soybean (Fields5-6) (Bu)	20.00	$6.25	40	$5,000
Market Hogs (Ea)	900.00	$0.90	250	$202,500
Tomatoes (Lb)	0.00	$1.20	2,750.00	$0
Other				
Total Income				$295,500

Operating Expenses	Acres/No/Year	Cost/Unit	Expenses
Corn	100.00	$202.69	$20,269
Soybean	100.00	$144.42	$14,442
Hogs	900.00	$165.00	$148,500
Tomatoes	0.00	$1,627.36	$0
Cover Crop	0.00	$60	$0
Hired Labor	1.00	$18,000	$18,000
Other			
Other			
Other			
Total Operating Expenses			$201,211

Other Annual Costs			
Annual Production Loan	$201,211	8%	$16,097
Real Estate Loan			$44,414
Planter Loan			$2,638
New Loan			$0
Taxes			$15,000
Insurance			$6,000
Family Living			$30,000
Total Other Costs			$114,149

Net Farm Income	-$19,860
Savings Account Balance	$0

Straight Creek Farm - Income and Expense Statement, Year ___

Income	Acres/No/Year	Price	Yield	Returns
Corn (Fields 1-4) (Bu)				
Corn (Fields5-6) (Bu)				
Soybean (Fields 1-4) (Bu)				
Soybean (Fields5-6) (Bu)				
Market Hogs (Ea)				
Tomatoes (Lb)				
Other				
Total Income				

Operating Expenses	Acres/No/Year	Cost/Unit	Expenses
Corn			
Soybean			
Hogs			
Tomatoes			
Cover Crop			
Hired Labor			
Other			
Other			
Other			
Total Operating Expenses			

Other Annual Costs
Annual Production Loan
Real Estate Loan
Planter Loan
New Loan
Taxes
Insurance
Family Living
Total Other Costs
Net Farm Income
Savings Account Balance

Straight Creek Farm - Income and Expense Statement, Year ___

Income	Acres/No/Year	Price	Yield	Returns
Corn (Fields 1-4) (Bu)				
Corn (Fields5-6) (Bu)				
Soybean (Fields 1-4) (Bu)				
Soybean (Fields5-6) (Bu)				
Market Hogs (Ea)				
Tomatoes (Lb)				
Other				
Total Income				

Operating Expenses	Acres/No/Year	Cost/Unit	Expenses
Corn			
Soybean			
Hogs			
Tomatoes			
Cover Crop			
Hired Labor			
Other			
Other			
Other			
Total Operating Expenses			

Other Annual Costs	
Annual Production Loan	
Real Estate Loan	
Planter Loan	
New Loan	
Taxes	
Insurance	
Family Living	
Total Other Costs	
Net Farm Income	
Savings Account Balance	

Straight Creek Farm - Income and Expense Statement, Year 3

6%

Income	Acres/No/Year	Price	Yield	Returns
Corn (Fields 1-4) (Bu)	76	4.00	67	20,368
Corn (Fields5-6) (Bu)	19		119	9,044
Soybean (Fields 1-4) (Bu)	76	10.00	72	54,720
Soybean (Fields5-6) (Bu)	19		41	7,790
Market Hogs (Ea)	900	.90	250	202,500
Tomatoes (Lb)				
Other				294,422
Total Income				

Operating Expenses	Acres/No/Year	Cost/Unit	Expenses
Corn	95	196	18,620
Soybean	95	138	13,110
Hogs	900	165	148,500
Tomatoes			
Cover Crop			
Hired Labor			60
Other Grassway Maintna	10	6	1900
Other manure application	190	10	
Other			182,190
Total Operating Expenses			

Other Annual Costs			
Annual Production Loan	180,230	x .06	10,813,80
Real Estate Loan			44,414
Planter Loan			
New Loan			
Taxes			15,000
Insurance			6,000
Family Living			30,000
Total Other Costs			106,227.80
Net Farm Income			6,004.20
Savings Account Balance			21,349

15,345
- 1960
13,445.60

YR-1 - 9,622
YR-2 - 24,016
YR 3 = 6,004

Net Worth Statement

ASSETS	Value	Year 1	Year 2	Year 3
Farmstead, Shop, Swine Operation	$200,000			
Cropland	$700,000			
House	$100,000			
Swine	$67,500			
Feed and Supplies	$15,000			
Tractor	$90,000			
Cultivating/Harvest Equipment	$200,000			
Planter	$10,000			
Farm Cash/Checking/Savings	$5,000			
Accounts Receivable	$0			
Prepaid Expenses	$0			
Total Assets	**$1,387,500**			
LIABILITIES	**Value**			
Real estate Loan	$500,000			
Planter Loan	$10,000			
Total Liabilities	**$510,000**			
NET WORTH	**$877,500**			
Credit Line	$100,000			
Debt Load	37%			

Help Sheet:

Income and Expense Statement

From: "Spin of the Wheel" each year

Farm Sales

Enterprise	Acres/#	Yield	Unit	$/Unit	Returns
Winter Wheat	500	50	Bu	$3.50	$87,500
Barley	0	1	Ton	$90	$0
Flood Irr. Hay**	140	2	Ton	$70	$19,600
Border Irr. Hay	0	4	Ton	$70	$0
Sprinkler Hay	0	4	Ton	$70	$0
Potatoes	20	300	Cwt	$8	$48,000
Calves	118	5	Cwt	$115	$67,850
Cull Cows	26	12	Cwt	$50	$15,600
Cull Bulls	1	15	Cwt	$65	$975
Off-Farm Income					$0
Other (Farm Program)					$12,500
Total Farm Income:					**$252,025**

From: Your Farm Plan

Farm Expense

Enterprise	Operating Service Materials*	Acres-Number	Production Cost
Winter Wheat, Conventional	$65.92	500	$32,960
Winter Wheat, Reduced Tillage	$58.17	0	$0
Summer Fallow, Conventional	$27.06	500	$13,530
Summer Fallow, Chemical	$25.82	0	$0
Barley	$49.68	0	$0
Alfalfa Hay - Flood	$58.97	140	$8,256
Alfalfa Hay - Sprinkler	$197.89	0	$0
Alfalfa Hay - Border	$150.02	0	$0
Seed Potatoes	$1,787.58	20	$35,752
Cows (livestock)	$458.72	130	$59,634
Other	$0.00		$0
Family Living (Labor)*			$14,140
Total Operating Expense:			**$164,271**

Do the Math

Side Calculations (may not change)

From: Crop Budgets, they do not change.

Farm Mortgage*	$18,736
Machinery Payment (ownership)*	$16,747
Operating Interest*	$13,963
Taxes	$4,000
Insurance	$2,000
Utilities/Phone	$2,400
Other Loans	$0
	$57,846

Total Operating Expense * % Interest

Total Farm Expense:	**$222,117**

Income - Expenses

Net Returns:	**$29,908**

* See side calculations
Variable Costs = Total Costs - Ownership Costs - Labor Costs

AMORTIZATION TABLE

COST PER YEAR

Example: 4 year loan at 6% interest = .289 * $10,000 = $2,890/Year.

LIFE YEARS	% INTEREST RATE												
	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0.523	0.530	0.538	0.545	0.553	0.561	0.568	0.576	0.584	0.592	0.599	0.607	0.615
3	0.354	0.360	0.367	0.374	0.381	0.388	0.395	0.402	0.409	0.416	0.424	0.431	0.438
4	0.269	0.275	0.282	0.289	0.295	0.302	0.309	0.315	0.322	0.329	0.336	0.343	0.350
5	0.218	0.225	0.231	0.237	0.244	0.250	0.257	0.264	0.271	0.277	0.284	0.291	0.298
6	0.185	0.191	0.197	0.203	0.210	0.216	0.223	0.230	0.236	0.243	0.250	0.257	0.264
7	0.161	0.167	0.173	0.179	0.186	0.192	0.199	0.205	0.212	0.219	0.226	0.233	0.240
8	0.142	0.149	0.155	0.161	0.167	0.174	0.181	0.187	0.194	0.201	0.208	0.216	0.223
9	0.128	0.134	0.141	0.147	0.153	0.160	0.167	0.174	0.181	0.188	0.195	0.202	0.210
10	0.117	0.123	0.130	0.136	0.142	0.149	0.156	0.163	0.170	0.177	0.184	0.192	0.199
11	0.108	0.114	0.120	0.127	0.133	0.140	0.147	0.154	0.161	0.168	0.176	0.183	0.191
12	0.100	0.107	0.113	0.119	0.126	0.133	0.140	0.147	0.154	0.161	0.169	0.177	0.184
13	0.094	0.100	0.106	0.113	0.120	0.127	0.134	0.141	0.148	0.156	0.163	0.171	0.179
14	0.089	0.095	0.101	0.108	0.114	0.121	0.128	0.136	0.143	0.151	0.159	0.167	0.175
15	0.084	0.090	0.096	0.103	0.110	0.117	0.124	0.131	0.139	0.147	0.155	0.163	0.171
16	0.080	0.086	0.092	0.099	0.106	0.113	0.120	0.128	0.136	0.143	0.151	0.160	0.168
17	0.076	0.082	0.089	0.095	0.102	0.110	0.117	0.125	0.132	0.140	0.149	0.157	0.165
18	0.073	0.079	0.086	0.092	0.099	0.107	0.114	0.122	0.130	0.138	0.146	0.155	0.163
19	0.070	0.076	0.083	0.090	0.097	0.104	0.112	0.120	0.128	0.136	0.144	0.153	0.161
20	0.067	0.074	0.080	0.087	0.094	0.102	0.110	0.117	0.126	0.134	0.142	0.151	0.160
25	0.057	0.064	0.071	0.078	0.086	0.094	0.102	0.110	0.119	0.127	0.136	0.145	0.155
50	0.039	0.047	0.055	0.063	0.072	0.082	0.091	0.101	0.111	0.120	0.130	0.140	0.150
100	0.032	0.041	0.050	0.060	0.070	0.080	0.090	0.100	0.110	0.120	0.130	0.140	0.150

AMORTIZATION TABLE

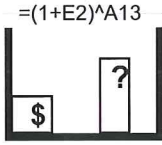
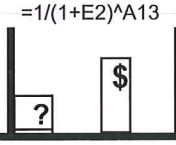
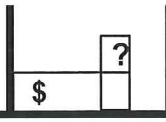
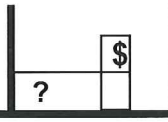
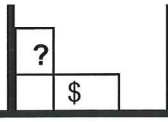
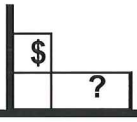
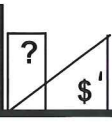
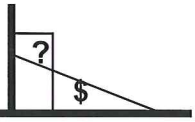
COST PER MONTH

Example: 48 month loan (or 4 years) at 6% interest = .0235 * $10,000 = $235/Month.

LIFE MONTHS	LIFE YEARS	% ANNUAL INTEREST RATE												
		3	4	5	6	7	8	9	10	11	12	13	14	15
12	1	0.0847	0.0851	0.0856	0.0861	0.0865	0.0870	0.0875	0.0879	0.0884	0.0888	0.0893	0.0898	0.0903
24	2	0.0430	0.0434	0.0439	0.0443	0.0448	0.0452	0.0457	0.0461	0.0466	0.0471	0.0475	0.0480	0.0485
36	3	0.0291	0.0295	0.0300	0.0304	0.0309	0.0313	0.0318	0.0323	0.0327	0.0332	0.0337	0.0342	0.0347
48	4	0.0221	0.0226	0.0230	0.0235	0.0239	0.0244	0.0249	0.0254	0.0258	0.0263	0.0268	0.0273	0.0278
60	5	0.0180	0.0184	0.0189	0.0193	0.0198	0.0203	0.0208	0.0212	0.0217	0.0222	0.0228	0.0233	0.0238
72	6	0.0152	0.0156	0.0161	0.0166	0.0170	0.0175	0.0180	0.0185	0.0190	0.0196	0.0201	0.0206	0.0211
84	7	0.0132	0.0137	0.0141	0.0146	0.0151	0.0156	0.0161	0.0166	0.0171	0.0177	0.0182	0.0187	0.0193
96	8	0.0117	0.0122	0.0127	0.0131	0.0136	0.0141	0.0147	0.0152	0.0157	0.0163	0.0168	0.0174	0.0179
108	9	0.0106	0.0110	0.0115	0.0120	0.0125	0.0130	0.0135	0.0141	0.0146	0.0152	0.0158	0.0163	0.0169
120	10	0.0097	0.0101	0.0106	0.0111	0.0116	0.0121	0.0127	0.0132	0.0138	0.0143	0.0149	0.0155	0.0161
132	11	0.0089	0.0094	0.0099	0.0104	0.0109	0.0114	0.0120	0.0125	0.0131	0.0137	0.0143	0.0149	0.0155
144	12	0.0083	0.0088	0.0092	0.0098	0.0103	0.0108	0.0114	0.0120	0.0125	0.0131	0.0137	0.0144	0.0150
156	13	0.0077	0.0082	0.0087	0.0092	0.0098	0.0103	0.0109	0.0115	0.0121	0.0127	0.0133	0.0140	0.0146
168	14	0.0073	0.0078	0.0083	0.0088	0.0094	0.0099	0.0105	0.0111	0.0117	0.0123	0.0130	0.0136	0.0143
180	15	0.0069	0.0074	0.0079	0.0084	0.0090	0.0096	0.0101	0.0107	0.0114	0.0120	0.0127	0.0133	0.0140
192	16	0.0066	0.0071	0.0076	0.0081	0.0087	0.0092	0.0098	0.0105	0.0111	0.0117	0.0124	0.0131	0.0138
204	17	0.0063	0.0068	0.0073	0.0078	0.0084	0.0090	0.0096	0.0102	0.0109	0.0115	0.0122	0.0129	0.0136
216	18	0.0060	0.0065	0.0070	0.0076	0.0082	0.0087	0.0094	0.0100	0.0107	0.0113	0.0120	0.0127	0.0134
228	19	0.0058	0.0063	0.0068	0.0074	0.0079	0.0085	0.0092	0.0098	0.0105	0.0112	0.0118	0.0126	0.0133
240	20	0.0055	0.0061	0.0066	0.0072	0.0078	0.0084	0.0090	0.0097	0.0103	0.0110	0.0117	0.0124	0.0132
252	21	0.0054	0.0059	0.0064	0.0070	0.0076	0.0082	0.0088	0.0095	0.0102	0.0109	0.0116	0.0123	0.0131
264	22	0.0052	0.0057	0.0063	0.0068	0.0074	0.0081	0.0087	0.0094	0.0101	0.0108	0.0115	0.0122	0.0130
276	23	0.0050	0.0055	0.0061	0.0067	0.0073	0.0079	0.0086	0.0093	0.0100	0.0107	0.0114	0.0122	0.0129
288	24	0.0049	0.0054	0.0060	0.0066	0.0072	0.0078	0.0085	0.0092	0.0099	0.0106	0.0113	0.0121	0.0129
300	25	0.0047	0.0053	0.0058	0.0064	0.0071	0.0077	0.0084	0.0091	0.0098	0.0105	0.0113	0.0120	0.0128
312	26	0.0046	0.0052	0.0057	0.0063	0.0070	0.0076	0.0083	0.0090	0.0097	0.0105	0.0112	0.0120	0.0128
324	27	0.0045	0.0051	0.0056	0.0062	0.0069	0.0075	0.0082	0.0089	0.0097	0.0104	0.0112	0.0119	0.0127
336	28	0.0044	0.0050	0.0055	0.0062	0.0068	0.0075	0.0082	0.0089	0.0096	0.0104	0.0111	0.0119	0.0127
348	29	0.0043	0.0049	0.0054	0.0061	0.0067	0.0074	0.0081	0.0088	0.0096	0.0103	0.0111	0.0119	0.0127
360	30	0.0042	0.0048	0.0054	0.0060	0.0067	0.0073	0.0080	0.0088	0.0095	0.0103	0.0111	0.0118	0.0126

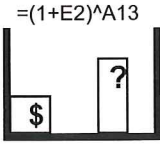
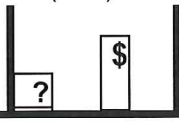
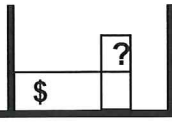
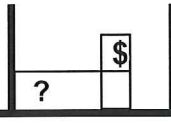
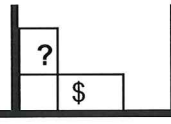
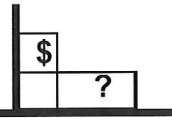
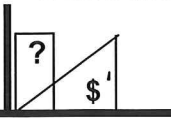
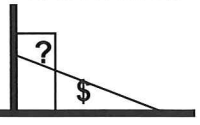
INTEREST AND ANNUITY TABLES

ANNUAL INTEREST RATE: 6.0%

EFFECT:	FUTURE VALUE OF 1	PRESENT VALUE OF 1	FUTURE VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR FUTURE VALUE	PRESENT VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR A PRESENT VALUE	PRESENT VALUE OF INCREASING ANNUITY	PRESENT VALUE OF DECREASING ANNUITY
EXCEL:	=(1+E2)^A13	=1/(1+E2)^A13	= - FV	= - 1 / FV	= 1 / PMT	= PMT	SPREADSHEET	SPREADSHEET
GRAPH:								
MATH	$(1+i)^n$	$1/(1+i)^n$	$\frac{1/(1+i)^n-1}{i}$	$\frac{i}{1/(1+i)^n-1}$	$\frac{1/(1+i)^n-1}{i(1+i)^n}$	$\frac{i}{1-1/(1+i)^n}$	$\frac{(1+i)^{n+1}-(1+i)-n(i)}{(1+i)^n(i)^2}$	$\frac{n(i)-1+1/(1+i)n}{(i)^2}$
PERIOD								
1	1.060	0.943	1.000	1.000	0.943	1.060	0.943	0.943
2	1.124	0.890	2.060	0.485	1.833	0.545	2.723	2.777
3	1.191	0.840	3.184	0.314	2.673	0.374	5.242	5.450
4	1.262	0.792	4.375	0.229	3.465	0.289	8.411	8.915
5	1.338	0.747	5.637	0.177	4.212	0.237	12.147	13.127
6	1.419	0.705	6.975	0.143	4.917	0.203	16.377	18.045
7	1.504	0.665	8.394	0.119	5.582	0.179	21.032	23.627
8	1.594	0.627	9.897	0.101	6.210	0.161	26.051	29.837
9	1.689	0.592	11.491	0.087	6.802	0.147	31.378	36.638
10	1.791	0.558	13.181	0.076	7.360	0.136	36.962	43.999
11	1.898	0.527	14.972	0.067	7.887	0.127	42.757	51.885
12	2.012	0.497	16.870	0.059	8.384	0.119	48.721	60.269
13	2.133	0.469	18.882	0.053	8.853	0.113	54.816	69.122
14	2.261	0.442	21.015	0.048	9.295	0.108	61.008	78.417
15	2.397	0.417	23.276	0.043	9.712	0.103	67.267	88.129
16	2.540	0.394	25.673	0.039	10.106	0.099	73.565	98.235
17	2.693	0.371	28.213	0.035	10.477	0.095	79.878	108.712
18	2.854	0.350	30.906	0.032	10.828	0.092	86.185	119.540
19	3.026	0.331	33.760	0.030	11.158	0.090	92.464	130.698
20	3.207	0.312	36.786	0.027	11.470	0.087	98.700	142.168
21	3.400	0.294	39.993	0.025	11.764	0.085	104.878	153.932
22	3.604	0.278	43.392	0.023	12.042	0.083	110.983	165.974
23	3.820	0.262	46.996	0.021	12.303	0.081	117.004	178.277
24	4.049	0.247	50.816	0.020	12.550	0.080	122.932	190.827
25	4.292	0.233	54.865	0.018	12.783	0.078	128.757	203.611
26	4.549	0.220	59.156	0.017	13.003	0.077	134.472	216.614
27	4.822	0.207	63.706	0.016	13.211	0.076	140.071	229.824
28	5.112	0.196	68.528	0.015	13.406	0.075	145.548	243.231
29	5.418	0.185	73.640	0.014	13.591	0.074	150.900	256.821
30	5.743	0.174	79.058	0.013	13.765	0.073	156.124	270.586
35	7.686	0.130	111.435	0.009	14.498	0.069	180.241	341.696
40	10.286	0.097	154.762	0.006	15.046	0.066	201.003	415.895
45	13.765	0.073	212.744	0.005	15.456	0.065	218.565	492.403
50	18.420	0.054	290.336	0.003	15.762	0.063	233.219	570.636
60	32.988	0.030	533.128	0.002	16.161	0.062	255.204	730.643
70	59.076	0.017	967.932	0.001	16.385	0.061	269.712	893.591
80	105.796	0.009	1746.600	0.001	16.509	0.061	279.058	1058.181
90	189.465	0.005	3141.075	0.000	16.579	0.060	284.973	1223.688
100	339.302	0.003	5638.368	0.000	16.618	0.060	288.665	1389.7(

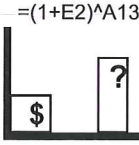
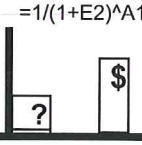
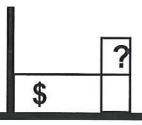
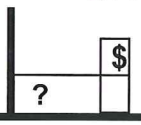
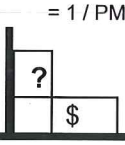
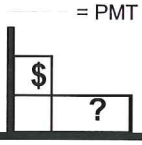
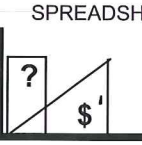
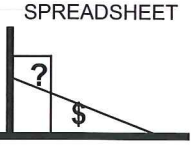
INTEREST AND ANNUITY TABLES

ANNUAL INTEREST RATE: 8.0%

EFFECT:	FUTURE VALUE OF 1	PRESENT VALUE OF 1	FUTURE VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR FUTURE VALUE	PRESENT VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR A PRESENT VALUE	PRESENT VALUE OF INCREASING ANNUITY	PRESENT VALUE OF DECREASING ANNUITY
EXCEL:	=(1+E2)^A13	=1/(1+E2)^A13	= - FV	= - 1 / FV	= 1 / PMT	= PMT	SPREADSHEET	SPREADSHEET
GRAPH:								
MATH	$(1+i)^n$	$1/(1+i)^n$	$\frac{1/(1+i)^n-1}{i}$	$\frac{i}{1/(1+i)^n-1}$	$\frac{1/(1+i)^n-1}{i(1+i)^n}$	$\frac{i}{1-1/(1+i)^n}$	$\frac{(1+i)^{n+1}-(1+i)-n(i)}{(1+i)^n(i)^2}$	$\frac{n(i)-1+1/(1+i)n}{(i)^2}$
PERIOD								
1	1.080	0.926	1.000	1.000	0.926	1.080	0.926	0.926
2	1.166	0.857	2.080	0.481	1.783	0.561	2.641	2.709
3	1.260	0.794	3.246	0.308	2.577	0.388	5.022	5.286
4	1.360	0.735	4.506	0.222	3.312	0.302	7.962	8.598
5	1.469	0.681	5.867	0.170	3.993	0.250	11.365	12.591
6	1.587	0.630	7.336	0.136	4.623	0.216	15.146	17.214
7	1.714	0.583	8.923	0.112	5.206	0.192	19.231	22.420
8	1.851	0.540	10.637	0.094	5.747	0.174	23.553	28.167
9	1.999	0.500	12.488	0.080	6.247	0.160	28.055	34.414
10	2.159	0.463	14.487	0.069	6.710	0.149	32.687	41.124
11	2.332	0.429	16.645	0.060	7.139	0.140	37.405	48.263
12	2.518	0.397	18.977	0.053	7.536	0.133	42.170	55.799
13	2.720	0.368	21.495	0.047	7.904	0.127	46.950	63.703
14	2.937	0.340	24.215	0.041	8.244	0.121	51.717	71.947
15	3.172	0.315	27.152	0.037	8.559	0.117	56.445	80.507
16	3.426	0.292	30.324	0.033	8.851	0.113	61.115	89.358
17	3.700	0.270	33.750	0.030	9.122	0.110	65.710	98.480
18	3.996	0.250	37.450	0.027	9.372	0.107	70.214	107.851
19	4.316	0.232	41.446	0.024	9.604	0.104	74.617	117.455
20	4.661	0.215	45.762	0.022	9.818	0.102	78.908	127.273
21	5.034	0.199	50.423	0.020	10.017	0.100	83.080	137.290
22	5.437	0.184	55.457	0.018	10.201	0.098	87.126	147.491
23	5.871	0.170	60.893	0.016	10.371	0.096	91.044	157.862
24	6.341	0.158	66.765	0.015	10.529	0.095	94.828	168.391
25	6.848	0.146	73.106	0.014	10.675	0.094	98.479	179.065
26	7.396	0.135	79.954	0.013	10.810	0.093	101.994	189.875
27	7.988	0.125	87.351	0.011	10.935	0.091	105.374	200.810
28	8.627	0.116	95.339	0.010	11.051	0.090	108.620	211.862
29	9.317	0.107	103.966	0.010	11.158	0.090	111.732	223.020
30	10.063	0.099	113.283	0.009	11.258	0.089	114.714	234.278
35	14.785	0.068	172.317	0.006	11.655	0.086	127.747	291.818
40	21.725	0.046	259.057	0.004	11.925	0.084	137.967	350.942
45	31.920	0.031	386.506	0.003	12.108	0.083	145.841	411.145
50	46.902	0.021	573.770	0.002	12.233	0.082	151.826	472.081
60	101.257	0.010	1253.213	0.001	12.377	0.081	159.677	595.293
70	218.606	0.005	2720.080	0.000	12.443	0.080	163.975	719.465
80	471.955	0.002	5886.935	0.000	12.474	0.080	166.274	844.081
90	1018.915	0.001	12723.939	0.000	12.488	0.080	167.480	968.903
100	2199.761	0.000	27484.516	0.000	12.494	0.080	168.105	1093.821

INTEREST AND ANNUITY TABLES

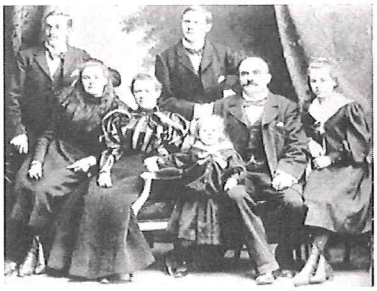
ANNUAL INTEREST RATE: 10.0%

EFFECT:	FUTURE VALUE OF 1	PRESENT VALUE OF 1	FUTURE VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR FUTURE VALUE	PRESENT VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR A PRESENT VALUE	PRESENT VALUE OF INCREASING ANNUITY	PRESENT VALUE OF DECREASING ANNUITY
EXCEL:	=(1+E2)^A13	=1/(1+E2)^A13	= - FV	= - 1 / FV	= 1 / PMT	= PMT	SPREADSHEET	SPREADSHEET
GRAPH:								
MATH	$(1+i)^n$	$1/(1+i)^n$	$\frac{1/(1+i)^n-1}{i}$	$\frac{i}{1/(1+i)^n-1}$	$\frac{1/(1+i)^n-1}{i(1+i)^n}$	$\frac{i}{1-1/(1+i)^n}$	$\frac{(1+i)^{n+1}-(1+i)-n(i)}{(1+i)^n(i)^2}$	$\frac{n(i)-1+1/(1+i)n}{(i)^2}$
PERIOD								
1	1.100	0.909	1.000	1.000	0.909	1.100	0.909	0.909
2	1.210	0.826	2.100	0.476	1.736	0.576	2.562	2.645
3	1.331	0.751	3.310	0.302	2.487	0.402	4.816	5.131
4	1.464	0.683	4.641	0.215	3.170	0.315	7.548	8.301
5	1.611	0.621	6.105	0.164	3.791	0.264	10.653	12.092
6	1.772	0.564	7.716	0.130	4.355	0.230	14.039	16.447
7	1.949	0.513	9.487	0.105	4.868	0.205	17.632	21.316
8	2.144	0.467	11.436	0.087	5.335	0.187	21.364	26.651
9	2.358	0.424	13.579	0.074	5.759	0.174	25.180	32.410
10	2.594	0.386	15.937	0.063	6.145	0.163	29.036	38.554
11	2.853	0.350	18.531	0.054	6.495	0.154	32.891	45.049
12	3.138	0.319	21.384	0.047	6.814	0.147	36.715	51.863
13	3.452	0.290	24.523	0.041	7.103	0.141	40.481	58.966
14	3.797	0.263	27.975	0.036	7.367	0.136	44.167	66.33
15	4.177	0.239	31.772	0.031	7.606	0.131	47.758	73.939
16	4.595	0.218	35.950	0.028	7.824	0.128	51.240	81.763
17	5.054	0.198	40.545	0.025	8.022	0.125	54.603	89.784
18	5.560	0.180	45.599	0.022	8.201	0.122	57.841	97.986
19	6.116	0.164	51.159	0.020	8.365	0.120	60.948	106.351
20	6.727	0.149	57.275	0.017	8.514	0.117	63.920	114.864
21	7.400	0.135	64.002	0.016	8.649	0.116	66.758	123.513
22	8.140	0.123	71.403	0.014	8.772	0.114	69.461	132.285
23	8.954	0.112	79.543	0.013	8.883	0.113	72.029	141.168
24	9.850	0.102	88.497	0.011	8.985	0.111	74.466	150.153
25	10.835	0.092	98.347	0.010	9.077	0.110	76.773	159.230
26	11.918	0.084	109.182	0.009	9.161	0.109	78.955	168.391
27	13.110	0.076	121.100	0.008	9.237	0.108	81.014	177.628
28	14.421	0.069	134.210	0.007	9.307	0.107	82.956	186.934
29	15.863	0.063	148.631	0.007	9.370	0.107	84.784	196.304
30	17.449	0.057	164.494	0.006	9.427	0.106	86.503	205.731
35	28.102	0.036	271.024	0.004	9.644	0.104	93.631	253.558
40	45.259	0.022	442.593	0.002	9.779	0.102	98.732	302.209
45	72.890	0.014	718.905	0.001	9.863	0.101	102.317	351.372
50	117.391	0.009	1163.909	0.001	9.915	0.101	104.804	400.852
60	304.482	0.003	3034.816	0.000	9.967	0.100	107.668	500.328
70	789.747	0.001	7887.470	0.000	9.987	0.100	108.974	600.127
80	2048.400	0.000	20474.002	0.000	9.995	0.100	109.556	700.049
90	5313.023	0.000	53120.226	0.000	9.998	0.100	109.810	800.019
100	13780.612	0.000	137796.123	0.000	9.999	0.100	109.919	900.00

Section 2

Sociology

Social Sciences - Working with People



Sociology

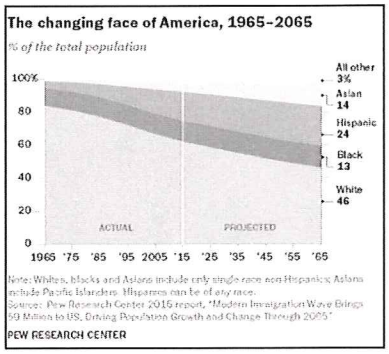
- WHAT people do.
- WHY they do it.
- Peoples' interactions.
- How communities influence behavior.

Who Will NRCS be Working With?

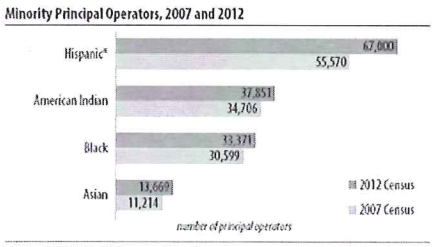
Society is Changing

- Demographics
- Agriculture
- Communities

US Demographic Changes

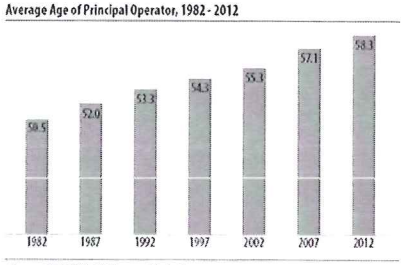


Agriculture Minority Principle Operators



Source: USDA NASS, 2012 Census of Agriculture.

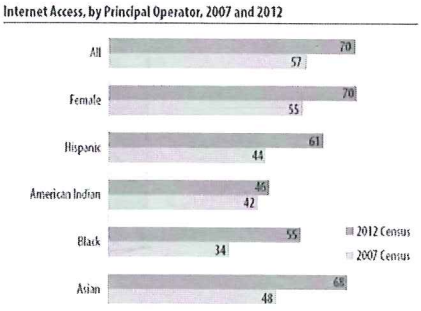
Average Age of Principal Operator



Source: USDA NASS, 2012 Census of Agriculture.

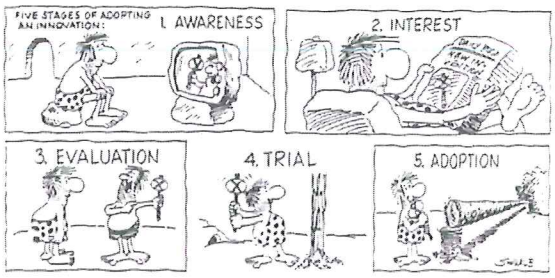
Social Media

Internet Access

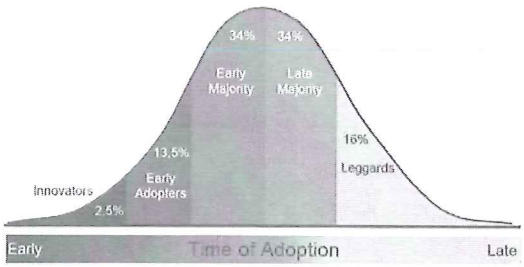


Source: USDA NASS, 2012 Census of Agriculture.

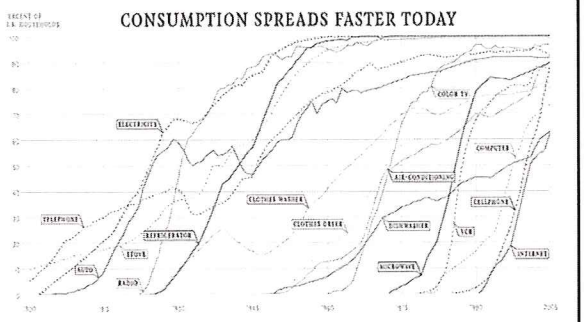
Individual Adoption Process



Adoption-Diffusion Curve



Adoption



Understand your Client

Willing but Unable	Able & Willing
Unable & Unwilling	Able but Unwilling

Assist your Client

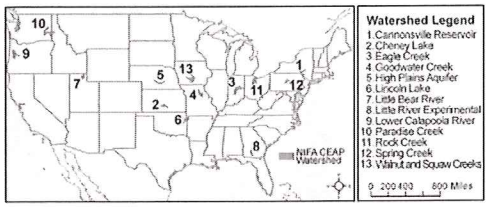
Willing but Unable	Able & Willing
Financial Assistance Technical Assistance	Technical Assistance
Unable & Unwilling	**Able but Unwilling**
?	Case Studies Field Tours Landuser Testimonials

How Do Farmers and Ranchers Make Decisions on Conservation Practices?

Hoag, D., A. E. Luloff, and D. L. Osmond. 2012. Lessons Learned from the NIFA-CEAP: How Farmers and Ranchers Make Decisions on Conservation Practices. NC State University, Raleigh, NC.

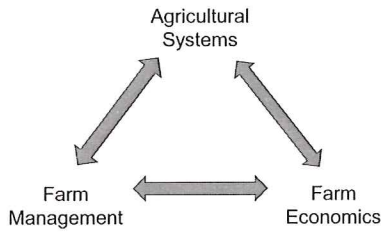
Conservation Effects Assessment Project (CEAP) Watershed Assessment Studies

Lessons learned about the social and economic factors that either facilitated or impeded implementation and proper maintenance of conservation practices.



What did the study find?

Conservation adoption involves difficult choices:



What factors increase the chance of conservation adoption?

What factors increase the chance of conservation adoption?

- Conservation practices that increase profits.
- Practices that have a farm benefit that is easy to observe
- Conservation practices that serve more than just a conservation role.

What factors increase the chance of conservation adoption?

- Trusted agribusinesses develops a new technology or machinery.
- Farmers that have strong stewardship or conservation ethics.
- Where a strong network of support (financial, technical and peers) is available.
- When the conservation practice solutions involve flexibility and inclusion.

How Important Is Profit?

How Important Is Profit?

"Conservation is important, but it has to be cost effective,"

"Conservation competes with the time a farmer could be using to make money."

Lesson: The most important factor in conservation practice adoption is that a practice makes the farmer money, directly or indirectly.

How Important Is Financial Assistance?

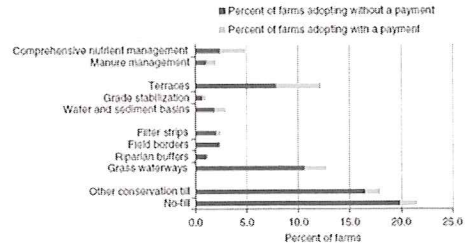
Financial Assistance

- Some farmers are simply not interested in conservation practices, even with cost sharing
- Some farmers adopted conservation without any need for financial assistance

Lesson: Economic incentives were often required for adoption of conservation practices not obviously profitable or fitting with current farming systems.

Is Financial Assistance Necessary?

Conservation practice adoption and payment rates for widely used conservation practices



Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service, Agricultural Resource Management Survey, 2009-11.

What are reasons Not to Adopt Conservation?

Reasons Not to Adopt Conservation

- Cost or Unprofitability
- Control
- Trust

Credibility and Trust with Public

Where does the public get their information?

1. The Media
2. Friends and Family
3. Environmental Groups
4. Educators
5. Community Leaders
6. Government and Industry

Reasons Not to Adopt Conservation

- Family obligations
- Awareness
- Disbelief
- Development pressures

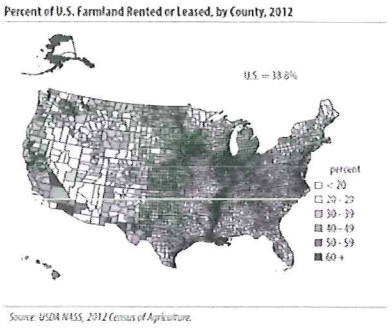
Lesson: Despite the importance of profit, noneconomic factors can affect adoption, too.

Other Factors to Consider: Rented/Leased Land

- Communication between landlord and tenant may be more important to adoption on rented lands than rent structure.

Lesson: Most watersheds have significant amounts of rented land in agriculture, and ownership can affect conservation practice adoption and implementation.

Rented or Leased Farmland



Other Factors to Consider: Market Forces

- What impact does outside market forces that result in farmers seeing more or less profitability have on conservation adoption?
- Financial security may increase conservation, but opportunities to gain income in the short run (through commodity price spikes) may work against conservation adoption.

Other Factors to Consider: Partnerships

- The impact of partnerships with farm organizations, non-profits, and state agencies on conservation implementation.

Lesson: Relationships between farm organizations, government agencies, and nonprofit organizations can greatly affect conservation practice adoption, especially when all groups have the same goal and deliver the same message.

Other Factors to Consider: Agency Challenges

- Some agency personnel that continue to only focus on soil erosion as the only resource of concern.
- Practice standards that are perceived as over-engineered and over-priced
- Farmers only interested in a specific practice and not a "suite" of practices
- Relationships between NRCS planners and farmers suffer because of budget cuts and special programs "conservation planning by laptop"

Conclusion

- Conservation adoption by famers may involve difficult choices about the agricultural system as well as farm economics and management.
- Because it is the farmer who ultimately adopts the conservation practices, they must work for the farmer by increasing revenue, lowering costs, reducing labor or time, or supporting other factors important to the farmer. Financial incentives may be necessary but are not sufficient for most adoption decisions.

Working Effectively With Private Landowners

A Guide for Conservationists

Steve Nelle began his career in 1976 and worked for the Soil Conservation Service and NRCS for 35 years as Range Conservationist and Wildlife Biologist working with landowners across Texas. Since 2011, he is involved in private range, wildlife and watershed consulting and assistance.

Part I - Building a Relationship

- Earning Their Trust
- Understand Your Responsibility and Privilege
- Who Do You Really Work For?
- Learn to Listen
- It is Their Land; Honor Their Objectives
- Learn to Read People
- Don't Tell People What They Should Do

Part II – Personal Character Qualities

- Humility
- Integrity and Trustworthiness
- Work Ethic
- Respect and Empathy
- Handling Disagreement

Part II – Personal Character Qualities

- Do not Improvise; Be Honest
- Learn from Mistakes
- Continual Self Improvement
- Confidence and Assertiveness
- Character Matters

Part III – Professionalism and Service

- Go Out of Your Way
- Give a Genuine Compliment
- Written Reports
- Always Thank Them; Always Be Gracious
- Professional Etiquette

Part IV – Technical Expertise

- Become Well Rounded in Natural Resources
- Learn to Read the Land
- Learn Plants
- The Tools of the Trade
- Appreciate Economic Realities
- No Simple Solutions
- Flexibility, Innovation and Creativity

Part IV – Technical Expertise

- Cultivate Your Gifts
- Become an Expert
- Don't Try to be the Soloist – Work With Others
- Seek Mentors
- Pursue Critical Thinking Skills
- Speaking and Writing
- Become a Great Teacher

Summary

Social Sciences can help you better understand <u>WHAT</u> people do and <u>WHY</u> they do it

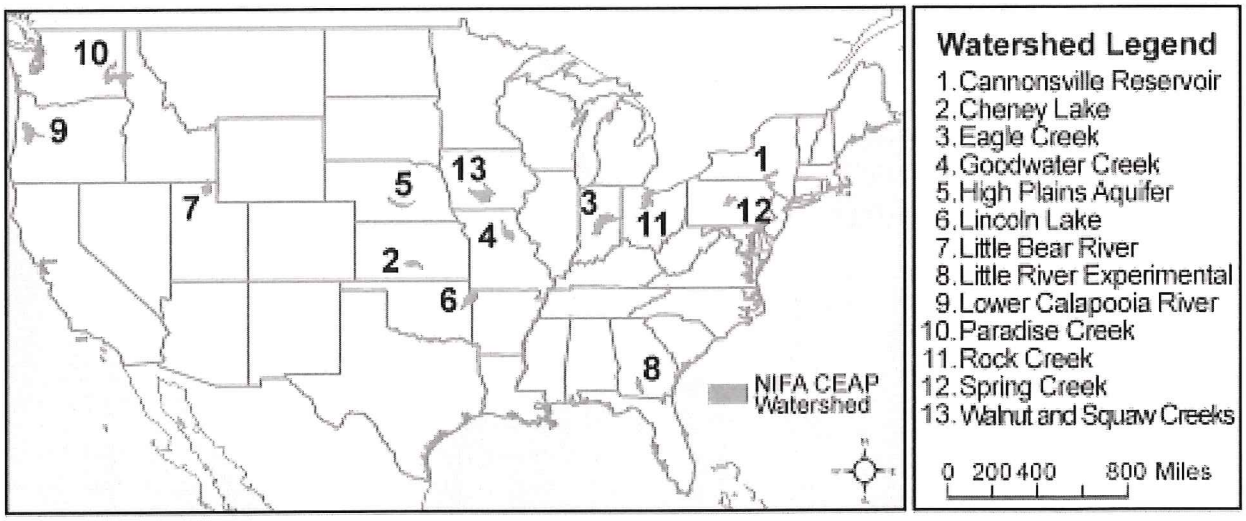
You need to be able to influence peoples' interactions and build support for conservation in communities

USDA United States Department of Agriculture National Institute of Food and Agriculture NRCS

NIFA Conservation Effects Assessment Project (CEAP)
Watershed Assessment Studies

How Farmers and Ranchers Make Decisions on Conservation Practices

Thirteen agricultural watershed projects were funded jointly by the USDA National Institute of Food and Agriculture (NIFA) and Natural Resources Conservation Service (NRCS) to evaluate the effects of cropland and pastureland conservation practices on spatial and temporal trends in water quality at the watershed scale. In some projects, participants also investigated how social and economic factors influence implementation and maintenance of practices. The 13 projects were conducted from 2004 to 2011 as part of the overall Conservation Effects Assessment Project (CEAP). The NIFA-CEAP projects were mainly retrospective; most conservation practices and water quality monitoring efforts were implemented through programs that occurred before the NIFA-CEAP projects began. By synthesizing the results of all these NIFA-CEAP projects, we explore lessons learned about ***the social and economic factors within the watersheds that either facilitated or impeded implementation and proper maintenance of conservation practices.***



NIFA-CEAP watershed locations.

Why Do Farmers Adopt Conservation?

Ultimately, conservation practices only work if they are adopted. As one farmer stated, "Farmers make conservation practices work, and if they [farmers] aren't interested, they [the practices] won't work, regardless of whether the land is owned or rented." Understanding how farmers and ranchers make decisions about conservation practices is essential for conservation practice adoption, implementation, and maintenance.

Based on experiences with farmers involved with NIFA-CEAP projects, the following factors increase the chance that a farmer will adopt conservation practices:

- Conservation practices that increase profits.
- Practices that have a farm benefit that is easy to observe, such as reduced erosion from conservation tillage. Practices that have less direct benefits, such as nutrient management, are adopted less frequently.
- Conservation practices that serve more than just a conservation role. Veal barns decrease pathogen spread in the New York project. But for farmers, the primary benefits are their calves' health and the greater profit the calves produce.
- Trusted agribusinesses develop a new technology or machinery, the product provides superior results, or both occur. For example, in the Rock Creek (OH) watershed, farmers more readily switched to minimum and conservation tillage the year after John Deere introduced its "green drill" because farmers trusted the manufacturer and the product. Genetic modification of a crop to produce much higher yield potential and tolerance to drought allowed farmers to shift production away from continuous wheat and plowing and implement conservation practices in the Cheney Lake watershed (KS).
- Farmers that have strong stewardship or conservation ethics. Some farmers in the NIFA-CEAP projects adopted conservation on their own, either for religious or spiritual reasons, or because they believed they had a responsibility to protect the environment.
- Where a strong network of support (financial, technical, and peers) is available. Farmers involved in the projects liked to have peers that they could discuss problems with and to have financial or technical help when they needed it.
- When the conservation practice solutions involve flexibility and inclusion. Farmers in the NIFA-CEAP projects often said that the government approach to conservation occurred in a "top-down manner" and often did not allow them flexibility to make adaptations they felt were appropriate at the local level.

Discussion with a Georgia farmer (photo by D. Osmond).

How Important Is Profit?

Two often heard comments were these: "Conservation is important, but it has to be cost effective," or "Conservation competes with the time a farmer could be using to make money."

Lesson: **The most important factor in conservation practice adoption is that a practice makes the farmer money, directly or indirectly.**

People expressed a willingness to adopt conservation and also a need for the government to offer more cost-sharing, particularly for practices that were not obviously profitable. There were, of course, exceptions. Some farmers were simply not interested in conservation practices, even with cost-sharing. On the other hand, some farmers adopted conservation without any need for financial incentives, which is addressed in the next lesson.

Lesson: **Economic incentives were often required for adoption of conservation practices not obviously profitable or fitting with current farming systems.**

Many farmers did not adopt conservation practices for the reverse of reasons to adopt, such as conservation practices being costly or unprofitable. Other factors included these:

- **Control.** Farmers were concerned they would lose control. For instance, conservation practices could require giving up land or decisions about what can be grown on that land, time, paperwork, and, worst of all, having the government tell them how to farm.
- **Trust.** Many farmers did not trust government agencies for one reason or another. They were concerned that reasonable interference would turn into unreasonable interference.
- **Family obligations.** Family and other social relationships can influence conservation practice adoption through the need to keep family members employed or to satisfy elderly parents' insistence that farming be conducted in a particular manner.
- **Awareness.** Farmers sometimes did not recognize landscapes in need of conservation practice adoption. In one of the watersheds, farmers stated that buffers, gulley plugs, and conservation tillage were only slightly more effective as slope increased, although research data demonstrated that the importance of these practices increased sharply as slope increased.
- **Disbelief.** Some farmers and their advisors did not believe university-based nitrogen rates were correct, and they did not like the regulatory requirements associated with nutrient management. Nutrient management was the second most disliked practice, after riparian buffers.
- **Development pressures.** In rapidly urbanizing watersheds, such as Eagle Creek (IN), development potential may discourage conservation practice adoption because of the encumbrance of long-term (e.g., 10-year) contracts.

Lesson: **Despite the importance of profit, noneconomic factors can affect adoption, too.**

Explanation of a no-till planter in Indiana (photo by D. Meals).

Other Factors to Consider

In a Midwestern watershed, landowners paid one-third of the production costs and received one-third of the commodity produced. As a result, many absentee landowners were reluctant to make even minimal investments in their land, such as purchasing lime, much less investing in conservation practices. In Georgia, however, where renters paid a per acre rental fee, tenants were willing to help pay for terrace construction as long as they could be assured of a long-term lease (5 years or greater). Communication may be more important to

adoption on rented lands than rent structure. If farmers and owners of rented land do not communicate, then conservation practice adoption may be inhibited. In another watershed, discussions with both renters and tenants revealed each thought the other would not want to implement the conservation practices.

Lesson: **Most watersheds have significant amounts of rented land in agriculture, and ownership can affect conservation practice adoption and implementation. Sometimes conservation practices increase, and sometimes they decrease.**

Because many conservation practices are installed with government agency cooperation, these agencies can have a significant influence on the impact a practice has on farm profitability. Depending on the conservation practice, standards on some practices in the NIFA-CEAP projects were not flexible enough for many farmers, which increased costs beyond what farmers were willing to pay—even with cost-share payments. In addition, government policies or market forces that increased commodity prices could curtail conservation efforts. A farmer in one project area and a dairy farmer in another felt they adopted more conservation when their incomes rose, but they were largely referring to farm financial security over time. Incomes increased when commodity prices rose, but typically this was a short-term gain. Most farmers told us they had to seize such short-term gains when they could. Financial security may increase conservation, but opportunities to gain income in the short run may work against it.

Radish cover crop in Missouri (photo by D. Osmond).

Lesson: **Government agencies influence conservation profitability, and therefore their policies are important determinants in agricultural conservation implementation.**

Not all conservation help came from traditional conservation programming. Three of the NIFA-CEAP projects had heavy outside influences that helped them gain better results (Arkansas, Kansas, and New York). In two of these watersheds (Kansas and New York), nearby cities infused money into two watershed systems to help keep drinking water clean and safe. The money provided by these cities and their cooperation with local farmer-led initiatives increased the use of conservation practices and generally improved the attitudes of farmers about conservation. In another site, the threat of a lawsuit motivated change. A lawsuit focused farmers in that region to conserve and brought in focused amounts of money and technical assistance.

Lesson: **Conservation adoption can be influenced by outside factors, especially when farmers are allowed to lead the solution.**

The mixtures of people, businesses, and agencies trying to influence outcomes in any one watershed had a profound impact. Groups can work together well, or they can send mixed messages. In one watershed, agency personnel and a local farm organization provided different messages to the farmers that undermined the conservation message, confused the farmer, and reduced the acceptance of an important conservation practice.

Lesson: **Relationships between farm organizations, government agencies, and nonprofit organizations can greatly affect conservation practice adoption, especially when all groups have the same goal and deliver the same message.**

Researchers in one watershed found it was initially challenging to overcome traditional beliefs by farmers and agency personnel that soil erosion was the only resource of concern. This was not unique among the NIFA-CEAP projects; several other watersheds used primarily sediment-reducing conservation practices although nutrients were the principal problem. This may be related to other observations that locally visible environmental problems (such as gulley erosion) tended to be a greater concern to farmers than far-off site problems (such as nutrient enrichment of a distant reservoir) or simply that erosion abatement has been the primary focus of most government conservation organizations for decades.

Lesson: **Traditional conservation planning may be difficult to reorient in conservation agencies. Capacity building, such as training and new program focus, is needed.**

Even after decades of extension activity and cost-share programs to promote conservation tillage in one watershed, a few farmers still used conventional tillage and did not intend to change their system. Such systems may change only after the farmer retires.

Lesson: **It might take a generation to change conservation practices.**

In most watersheds, many farmers felt NRCS practices were overengineered and overpriced. The farmers suggested that less "bullet-proof" practices were needed. The NRCS plans were often criticized as broader than farmers wanted or were willing to accept. Acceptance of some conservation practices might increase if farmers could accept the practices they wanted rather than the current "take it or leave it" package of conservation practices promoted by the NRCS. On the other hand, farmer-selected conservation practices may be insufficient to protect water quality. Finally, it was reported during several site visits that the direct, on-site relationships between a farmer and an NRCS conservation planner had suffered because of budget cuts and the proliferation of special programs, resulting in more generic conservation planning "by laptop."

Lesson: **Farmers want NRCS programs that are more localized.**

Conclusion

Conservation adoption by famers may involve difficult choices about the agricultural system as well as farm economics and management. Because it is the farmer who ultimately adopts the conservation practices, they must work for the farmer by increasing revenue, lowering costs, reducing labor or time, or supporting other factors important to the farmer. Financial incentives may be necessary but are not sufficient for most adoption decisions.

Related Resources

Osmond, D., D. Meals, D. Hoag, and M. Arabi. 2012 (in press). How to Build Better Agricultural Conservation Programs to Protect Water Quality: The NIFA-CEAP Experience. Akeney, IA: Soil and Water Conservation Society. (Available Fall 2012)

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Information

For more information about the NIFA-CEAP Synthesis, contact Deanna Osmond, NC State University (deanna_osmond@ncsu.edu)

Lessons Learned from the NIFA-CEAP (http://www.soil.ncsu.edu/publications/NIFACEAP/)

NIFA-CEAP watershed information (www.eramsinfo.com/ceap/watershedstudies)

CEAP Homepage: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap

CEAP NIFA Watershed webpage: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/?&cid=nrcs143_014164

Acknowledgments

The authors are grateful for the funding supplied by the USDA National Institute of Food and Agriculture (NIFA) and Natural Resources Conservation Service (NRCS) (Agreement No. 2007-51130-18575). We want to thank all NIFA-CEAP project personnel for their help with this publication, our site visits, and our

information-gathering efforts. In addition, we greatly appreciate all the time spent by key informants during our interviews with them. We also wish to thank the USDA CEAP Steering Committee and USDA NIFA Committee for Shared Leadership for Water Quality for their comments, questions, and advice during this synthesis project, as well as a special thanks to Lisa Duriancik of NRCS.

This material is based upon work supported in part by the National Institute of Food and Agriculture and the Natural Resources Conservation Service, U.S. Department of Agriculture, under Agreement No. 2007-51130-18575. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture. USDA is an equal opportunity provider and employer.

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Citation

Hoag, D., A. E. Luloff, and D. L. Osmond. 2012. Lessons Learned from the NIFA-CEAP: How Farmers and Ranchers Make Decisions on Conservation Practices. NC State University, Raleigh, NC.

Working Effectively With Private Landowners

A Guide for Conservationists

Steve Nelle

Since 1976, it has been my privilege to work with hundreds of landowners across Texas. During a career with the Soil Conservation Service and the Natural Resources Conservation Service and afterward in private practice, I have enjoyed many opportunities to work with landowners for the purpose of conserving and managing natural resources. It has been and continues to be a very rewarding experience, both personally and professionally.

The author has also had the privilege of working with some of the very finest natural resource professionals. The individuals listed below have generously shared their perspectives on working with landowners. Each of these men has enjoyed successful careers in natural resource management, spending countless days working with landowners and their managers. Most of their work has been in Texas, but also includes experience with landowners in Oklahoma, Kansas, Nebraska, Louisiana, New Mexico, Arizona, Colorado and Mexico. Their ideas and philosophies are woven throughout each paragraph. Their experience and wisdom in working with landowners, and sharing their knowledge has greatly improved the content and usefulness of this paper. The combined professional experience of all of us put together is well in excess of 500 years. Some brief biographical information is provided at the end of the paper.

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This paper is a summary of the important elements necessary or helpful for effectively working with private landowners or their managers. The material contains general principles that are applicable to nearly every situation; however, it is not a cookbook approach since each landowner and each piece of land is different and unique. The material is divided into four parts with considerable overlap and dovetailing between the parts.

Part I	Building a Relationship
Part II	Personal Character Qualities
Part III	Providing Exceptional Service
Part IV	Developing Technical Expertise

Part I - Building a Relationship

One of the first things to understand is that you are in the people business. Your technical expertise may be in range management, agronomy, forestry, watershed management or wildlife management, but make no mistake – you are in the people business as much or more as the conservation business. Before any meaningful long-term conservation assistance takes place, a relationship of trust must be established. Trust and confidence is the cornerstone of landowner assistance.

Earning Their Trust

Landowners in general are not impressed by your title, your degree, or where you went to school. You will have to work hard to earn their trust. Landowners are impressed by someone who knows what they are talking about and who demonstrates that they are ready to help. Starting out on the right foot and making a positive first impression are important.

Earning the trust of landowners is not always easy and is usually is a slow process. If you work for a government agency, you have to understand that many landowners have a built-in distrust or skepticism about the government and government employees. They may have had a negative experience with your agency or another agency. You will have to work hard to prove that you are there to help them and not just carry out the mandates of your agency.

According to J. R Bell, *"good things on the land happen over time and are seldom the result of a single encounter."* Since earning the trust of a landowner is a slow and gradual process, patience and persistence becomes key elements for success. You must have a long-term outlook if you really want to be effective in working with landowners. Dalton Merz, of pureblood German descent, says, *"working effectively with landowners is a very slow process; in German, we would say; 'If it don't take much time, it's not worth much'".*

Understand Your Responsibility and Privilege

When you are invited out to a farm or ranch, it is important that you understand the magnitude of your responsibility. In many cases, their property is worth several million dollars, in some cases many millions of dollars. It is an extremely valuable asset. The things that you advise will affect the value of the property – not only the economic value, but also the ecological value of the land. Apart from the economic and ecological value, the land has a great deal of personal value to the landowner and his family, especially if it has been in the family for several generations. In the words of J. R. Bell, *"their land is sacred to them",* it is not just a piece of land. This is a great responsibility to know that your input has the capacity to either increase or decrease the value of their land.

It is also important to acknowledge that it is a privilege to be invited on to someone else's land. In addition to seeing their land, you will often get to know the family, share meals with them and hopefully over time, becomes a trusted advisor. You will see things that most people never see. Some natural resource professionals get it backward – they think it is a privilege for the landowner to have you come out on their land. Landowners will be able to sense if you appreciate the opportunity and privilege of being asked to be of service, and if they sense this, it will help build the relationship.

Who Do You Really Work For?

Another way to earn trust and build a relationship with landowners is to make sure they know who you are <u>really</u> working for. Your paycheck may come from a conservation organization, an

agency, or a private company, but the landowner must know that your job priority is working for them. Yes, you owe allegiance to your employer, your boss and your organization, but in order to gain the trust and confidence of the landowner, it is important to have the mindset that you are working for them. They will notice it.

Learn to Listen

Listening is a skill that must be learned. For many people, the ability to listen carefully does not happen naturally. For most of us, when we gain some expertise (or perceived expertise) in some area, our tendency is to talk too much and impress them with our knowledge. We have much we want to say that we think will help the landowner, but too often we speak too much and prematurely.

Nearly all of the contributors of this paper emphasized the importance of listening as a key to being able to work effectively with landowners. Rory Burroughs calls it the skill of *"critical listening"* meaning that it requires your full and undivided mental attention. Each landowner is different and each farm or ranch is different; therefore, each approach for assisting will be unique. Only by attentive listening and asking thoughtful questions will we be able to gain the proper insights and information. Before you can be of any real help to a landowner, you must invest the time and energy in listening to their story, their goals, their problems, their situation, their ideas, and you will probably have to ask some probing questions to get the information you need. Listening is a prerequisite for providing service and assistance and is essential for building a lasting relationship with landowners. Listening well is hard work and is absolutely necessary.

It is Their Land; Honor Their Objectives

When providing assistance to landowners, it is tempting to tell them what you would do if it was your land. Don't make this mistake – for the simple reason that it is not your land; it is their land and they have their own objectives. When landowners invite you for assistance, work hard to determine what their land management goals and objectives are, and then honor those objectives. You may or may not agree with their objectives for their land, but understand that your job is to help them achieve their objectives in a way that is consistent with conservation and sustainability. If they do not come right out and state their objectives, then you will need to work with them to help them define and develop what they really want for long range and short range objectives.

A common mistake of some advisors is to impose their own preferences, opinions and favorite practices into land management assistance. Some of this is natural and unavoidable, but diligently work to help the landowner achieve their objectives (not yours) in the best way possible. Your job is to help facilitate the process, not determine the outcome.

Stan Reinke tells the following story. *"I was working with a landowner in the coastal prairie. We were discussing brush control on his land and he stated that he wanted to restore the land back to it true original prairie condition. I questioned this since the ranch had a very viable hunting operation for deer, quail and turkey. I knew that the removal of the brush would severely impact these hunting enterprises. When I asked him why he wanted to do this, his answer was, 'Because I want it that way'. Even though I thought the decision was wrong, it is his land and he makes the decision and has to live with the consequences."*

Everyone who has worked with landowners has had similar experiences, and we might not always agree with the direction a landowner wants to go or the means to get there. But our job is not to set their objectives for them – it is to discern and then help them achieve their goals for

their land and to help them do so in a way that is consistent with long-term sustainability and conservation.

Learn to Read People
In addition to your technical and ecological skills, you will need to learn the skill of reading people if you are to be successful in working with landowners. There is no single approach that works well for all landowners; you will have to be flexible enough to work with all kinds of different people and to understand how best to communicate with them and gain their trust. Learning to read people requires the skill of critical listening mentioned above but it also requires the ability to discern what is unspoken. Poncho Ortega says, *"The most difficult part of working with landowners is to be able to get a clear idea of what they want in terms of stewardship, productivity, economics and the time and resources they want to devote to accomplish it. In many cases you need to be able to read between the lines in order to discern what they want."*

Kent Mills states, *"The most important element for working with landowners is to listen to them and be able to determine their goals, motivations, abilities, potential, desire, dedication and their financial capability."* They will usually not come right out and tell you these things directly and you will probably not want to come right out and ask, but your success in working with them will depend on your ability to discern these things. Learn to ask appropriate probing questions but be mindful not to cross the line and get nosey or probe too deeply before you have gained their trust. Reading people is an art that needs to be cultivated if we are going to be successful and effective.

Don't Tell People What They Should Do
Bill Eikenhorst says, *"Landowners by nature are most often contrarians, who pride themselves on independent actions and self-reliance."* Private landowners do not usually appreciate being told what they should do, especially by an outsider or a government agent. People want to make their own decisions. Our job as their advisor is not to tell them what they should do, but rather, to clearly present them all of the information necessary for them to make good decisions. We may think we know what they should do, but the best and most lasting adoption of ideas involves the ability to lead, guide, motivate and inspire people to consider all of the options so that they can make the best choices based on their unique circumstances. Avoid the mistake of being the big expert and telling landowners what they should do with their land. This approach does not work.

Part II – Personal Character Qualities

As you begin to build working relationships with landowners, there are some character qualities that will help you be effective and gain their trust and confidence. These character traits are like a catalyst in a chemical reaction – they make the process happen much faster and with a better outcome. If these traits are weak or missing, it will hinder or prevent you from being effective.

Humility
Genuine humility is a trait that will take you a long way with most landowners. Landowners usually do not appreciate arrogant people who think they know everything. They do appreciate someone who is knowledgeable yet humble. Humility involves the realization that you do not have all the answers and that you are always still learning. Humility acknowledges that other people often know a lot more than you know and have better insights.

Everyone has an ego, but the humble person has learned to suppress his or her ego. For some of us, it takes constant reminders that we are not nearly as smart or as good as we think we are. If you come across as if you are the big-shot expert on everything, landowners will usually take offense and you will usually not be invited back. Even when you are very good at what you do, a humble attitude will help people accept your ideas and input.

Integrity and Trustworthiness
Those who work most effectively with landowners tend to be people of high personal integrity and completely trustworthy. Most landowners possess these traits and they expect and appreciate these traits in others, especially their advisors. You will often live in the same small community as some of the landowners and your behavior and values away from work will become known in the community. Integrity and trustworthiness involves who you are 24 hours a day and seven days a week.

Work Ethic
Landowners and/or their managers are usually hard working people. You will gain a great deal of respect if they see that you have a great work ethic and if you work hard to help them. Too many people today believe that a job involves only 40 hours a week. Seldom will a successful person put in only 40 hours. In working with landowners, you must have the willingness to work long days when necessary, often 12 – 14 hours, and some long weeks. If you are in the 40-hour rut, your effectiveness will be reduced.

A prime example of a great work ethic comes from my Dad, George Nelle. When Dad had worked for his employer for 40 years, the boss recognized him for his exceptional service with a big dinner. During the dinner, the boss told the crowd *"if George were to get run over by a truck, we would have to hire three men to replace him."* Few people will ever match that level of performance and service, but having a great work ethic will help make you irreplaceable with landowners and your employer. Dad went on to work nine more years and greatly helped the company become successful and profitable. One of the core purposes of a work ethic in our profession is to help others to become as successful as possible.

Respect and Empathy
Always show genuine respect for the landowner, his family, his employees, his land, his animals, and his ideas. Even if you disagree with them on some things, showing respect will be noticed and will help you gain their respect. Learn to empathize with landowners by putting yourself in their boots. Being a landowner is not as glamorous as some people think; there are many hardships and difficulties to endure. Especially be mindful when people are going through calamities such as drought, wildfire, health problems, loss of loved ones, or other difficult times. Russell Stevens says, *"They need to know that you care about them, and can understand their needs. Showing them you care is paramount to building their trust."*

Handling Disagreement
In 1948, Aldo Leopold said that *"conservationists are notorious for their dissentions"* and this is still true today. There are many opinions and perspectives regarding the best land management practice and you will frequently be faced with disagreements both from landowners and from fellow professionals. There is not just one right way to do things, so be prepared for differences of opinion.

It is sometimes tempting simply to go with the most popular viewpoint and avoid disagreement. Renowned range ecologist E. J. Dyksterhuis offers these words of wisdom: *"The professional*

conservationist must often make an independent and even unpopular stand. The non-professional is content with promotion of that which is currently acceptable or popular."
In some cases, you will have to be thick skinned, enduring the criticism, but sticking with your convictions. In other cases, you will need to accommodate other viewpoints. In all cases, be gracious, professional and always willing to reevaluate your position.

Do not Improvise; Be Honest
There will be many occasions when you will not have an adequate answer or solution. Landowners appreciate honesty and the admission that you do not know the answer to all of their questions. Do not improvise or "wing it" when you are unsure of the best response to a difficult question, and do not speak beyond your level of knowledge. Landowners can generally spot a phony and it will immediately harm your credibility. Be quick to admit when you don't know something and be sure to research the question and get back to them promptly.

There will be other times when you inadvertently give a landowner bad information. Sometimes in our zeal to be helpful, we speak prematurely and give bad advice. As soon as you discover you have given bad information, be quick to fess up and tell the landowner of your mistake. Don't rationalize or make excuses, simply admit it and then work to find the right answer. Landowners are usually very forgiving when you demonstrate this kind of honesty and it can help build trust and credibility.

Learn from Mistakes
Each of us who contributed to this paper has enjoyed some success in working with landowners, but we have also each made plenty of mistakes. In fact, much of the advice presented can be traced to mistakes we have made and bearing the consequences of those mistakes. Mistakes can be very good teachers and character builders if you learn from them. Just remember the old adage – *"A person who makes no mistakes is a person who is not doing anything".* You will make mistakes if you are actively involved with landowners. The right response to mistakes is to acknowledge them and figure out how to avoid repeating them. By discovering our flaws, we can each learn how to overcome our weaknesses and turn them into opportunities for improvement.

Continual Self Improvement
The professional conservationist is always aware of his or her need for continual self-improvement. Never get to the point where you think you have all the right answers – this is arrogant and foolhardy. Nature and natural resources are far too complex for anyone to think they have it figured out. Dan Caudle offers these words of truth regarding complacency: *"Anyone who is completely satisfied with himself either has an enormous ego, a short memory or very low standards."*

Self-improvement should include improvement in technical skills, and improvement in people skills, especially communication (listening, speaking and writing). Make self-improvement a priority, even if you have to do it on your own time and own expense.

Confidence and Assertiveness
As you strive for excellence and self-improvement, and as your skills and abilities develop, you will naturally gain a degree of confidence. The proper degree and use of confidence and convictions will help your message be taken more seriously. Confidence is a positive quality when correctly expressed. However, false confidence and over confidence are negative qualities, so be mindful of the fine line that exists between confidence and arrogance.

After you have earned the trust of landowners and gained some confidence and credibility, there may be occasions when you will have to be more forcefulness in expressing your message. According to Russell Stevens, *"there are times and places where we need to be assertive in order to protect a resource or to ensure that the landowner is able to continue operating."*

Character Matters
Landowners are usually a good judge of character. They can tell if you are a person of sincerity, honesty, integrity, humility who is respectful and will work hard to help them. It is not good enough to have excellent ecological and natural resource skills – effective work with landowners requires many character qualities in addition to technical ability.

Part III – Professionalism and Exceptional Service

We are not just in the conservation business and the people business – we are also in the business to provide service. The highest standards of professionalism and service will help you achieve your goal of being able to work effectively with landowners. In the words of Jimmy Rutledge, *"Your reputation (good or bad) will quickly spread throughout the landowner network".*

Go Out of Your Way
In all facets of assistance, go beyond what is required; go out of your way to provide the very best service and assistance. This requires an intentional focus on excellence. Some organizations and agencies seem content with average, mediocre performance; but when working with landowners, the standard should be one of exceptional service. Landowners will take note of the extra effort you put forth and this will help build trust and confidence. The excellent advice of Bill Eikenhorst is straightforward: *"Undersell and over deliver – Always"*

Give a Genuine Compliment
During the course of your visits to the property, be observant and look for things that the owner or manager is doing well. Brag on them when you notice something that is noteworthy. Landowners like to know that you have noticed the good things they are doing. However, don't go too far and gush with false or insincere compliments. Landowners can tell the difference between flattery and genuine compliments.

Written Reports
When your day on the property has ended, your work is only half done. The professional will find the time to promptly develop a written report summarizing the discussions of the day. Landowner's usually appreciate this kind of extra effort and it helps reinforce and document the major issues. The report also gives you the opportunity to follow up on things that may need more research or investigation. Do not wait too long to develop the report – do it while everything is fresh on your mind. Take the time to write thoughtful, thorough, practical, and informative reports after each visit. The value of these reports is often greater than what we think, for both the landowner and ourselves.

Always Thank Them; Always Be Gracious
At the end of the day, always thank the landowner for the privilege of spending time with them on their property. Although this is just a common courtesy, it will also help reinforce your good character and help build the relationship. Likewise, always be gracious, not just to those who are kind and considerate, but also to the old belligerent hardhead. Being gracious means treating people better than they might deserve and going out of your way to be helpful even for those who are ungrateful.

Professional Etiquette
Several other items fall under the category of normal professional etiquette. These are the expected norm for a professional relationship and failure in any of these will hinder effectiveness:

- Always be on time and be well prepared.
- Promptly return all phone calls and messages.
- Don't check phone messages, texts or email while out with a landowner; doing so is a sign of disrespect.
- Be careful how you dress, how you speak, and with your mannerisms. You are trying to fit into their culture, not stick out like a sore thumb. Dress should be similar to the norm for landowners of the region and should generally be conservative and not drawing attention to yourself. Speak slowly and distinctly (many older landowner are hard of hearing). Men – leave you earrings at home; ladies – cover you tattoos; don't wear a "Save the Wolf" T-shirt or anything that might be offensive to their way of life.
- Don't invite yourself hunting, fishing, or even drop hints of such. If you do a good job with landowners, you will get plenty of invites. Don't hunt arrowheads. Ask permission before you take photos on their land.

Part IV – Technical Expertise

Parts I, II and III have to do primarily with people skills, providing service and building a relationship for effective working. These are vitally important. Developing technical expertise in your field is equally important and is the primary reason why you have been invited to a farm, ranch or piece of rural property. Your job is to have the necessary natural resource skills, knowledge and ability to help landowners set a course for their land management, conservation and stewardship.

In the digital age, natural resource workers have instant access to immense volumes of technical information that was not available a decade ago. This information can help us do our jobs better, however, Dan Caudle advises, *"Don't mistake access to information as an acceptable alternative for knowledge, understanding, or experience. Information is a supplement, not a substitute."* Nature and natural resources are one of the most complex disciplines, and those who provide assistance need to have technical skills and practical knowledge and be able to communicate it.

Become Well Rounded in Natural Resources
You may consider yourself a specialist in one field or another (agronomy, native plants, forestry, grazing management, wildlife, watersheds, prescribed fire, etc.), but in order to work effectively with landowners, you need to have a broad level of natural resource knowledge relevant for your region. Landowners often need and want assistance that involves more than your specialty. You can't be an expert in everything, but you need to have a basic working knowledge of the natural resource and agricultural resources of your area. Donnie Frels says, *"Be a good field biologist – plants, animals, livestock, soils, insects, birds and how they interact. Good field biologists, really good, are rare and always coveted by landowners, often resulting in successful programs."* Your title may not be "biologist" but in the world of agriculture and natural resources, we must all have excellent biological and ecological skills.

Learn to Read the Land
The ability to read the land is both an art and a science. It takes time to learn the ecological dynamics of a certain region; take the time to study and observe the interactions of plants, animals, soil, water and how they are affected by management. Rory Burroughs notes, *"The ability of reading the land will tell you a lot about the past management and the history of property."*

Learning to read the land starts with a keen sense of observation. Try to spend plenty of time alone, without distractions, observing what has happened and what is happening with the land. At the beginning in a new geographic area, it will be important to spend time with someone who has this ability to read the land. Reading the land starts with observation but goes much deeper. Dan Caudle says, *"Don't just observe, but learn to evaluate, investigate, analyze, and ask why".* Natural curiosity and the desire to understand how the land works, is an important element for successful natural resource professionals.

Learn Plants
One of the most fundamental aspects of reading the land and providing landowner assistance is the knowledge of plants. The "language" of the land is written with plants. The person who knows the plant life of a region will be in high demand – this is a skill that is highly respected and sought after among landowners. According to Rory Burroughs, *"Sharing your knowledge of plants is almost always a great icebreaker experience with landowners".* Plant knowledge begins by learning to identify and name plants and deepens as a person learns the ecological value and function of the plant, where it tends to grow and how it responds to management. No single skill is more important than a working knowledge of the plants of your area.

The Tools of the Trade
An imperative skill for those who want to be effective with landowners is a good working knowledge of the land management techniques and practices used in your region. These tools will vary from region to region and will vary by land use. For rangeland and wildlife habitat purposes, the tools will include the familiar axe, plow, cow, fire and gun espoused by Aldo Leopold along with all of the variations of these tools.

A common mistake for land management advisors is to promote only a few favorite practices, or in some cases, over-emphasize only one tool (such as prescribed burning or brush control), while ignoring other essential practices. Using the analogy of a woodworker's toolbox, each of the tools is needed and appropriate for certain jobs. No one tool does everything; hence, the craftsman needs to be adept at choosing and using the right tools in the right situation.

Another mistake to avoid is the badmouthing of certain tools that you may have a personal bias against (such as rootplowing, herbicides, summer burning, or high fences). All tools have their proper place and should be considered when they fit the need. Remember that the choice of which tools to use is up to the landowner. We may advise, but it is not our place to decide.

Appreciate Economic Realities
Those of us who provide assistance to landowners are often removed from the economic realities of owning and managing land. Poncho Ortega advises, *"The ability to relate recommended practices to economic investment and return is very important; we must remember that many of these ranchers are making a living from their operations."* Many of the things we discuss with a landowner are expensive and often will not result in an economic return. We must be aware of the initial up-front costs of all practices used in the area in addition to ongoing management and maintenance costs. Some landowners have outside income they

are willing to invest in the land without a direct economic return. Others, including most bona fide agriculture producers are on a tight budget and always carefully consider the financial ramifications of their plans. Economic constraints often trump even the very best conservation intentions.

No Simple Solutions

> ***"For every complex problem, there is a solution that is simple, neat, and wrong."***
>
> H. L. Menken.

Nature and natural resources are complex. On top of that, land management and landowners are complex. Simple solutions to complex problems will not work most of the time no matter how promising they seem. Practices and techniques that seem too good to be true usually fail and often backfire, actually making things worse. Instead of searching for and endorsing simple solutions, dig deeper to consider the ripple effects and unintended consequences of quick fix solutions. If a landowner is willing to take the risk to try new unproven techniques, a small scale test it can be a good opportunity to determine whether the new practice merits further consideration.

Flexibility, Innovation and Creativity

Things do not always turn out as planned. Murphy's Law seems to be the norm for natural resource management and agriculture. Being flexible will help accommodate the unexpected. If you are helping landowners develop a conservation plan, a grazing plan, a wildlife management plan, etc., realize that such plans may change the moment the ink dries. Landowners are often not in a position to make final absolute decisions and stick with them no matter what. Changes in the weather, markets, family situation, the economy, their goals, and a dozen other factors will alter plans. Landowners and their advisors must be flexible and creative to accommodate unforeseen changes. Conservation planning is a never-ending process, always changing and never finished.

Cultivate Your Gifts

Nearly everyone who ends up in this line or work has some special talents and abilities that have inspired your decision to work in natural resources. Whatever your innate interests and gifts may be, focus on these to develop special abilities and expertise. Cultivate what comes naturally and which you have a high ability and interest. This will often be the area in which you make the biggest impact and contribution.

As you cultivate and improve your abilities in these areas, make certain that you become a good steward of your gifts. Pass along your expertise to others, both landowners and fellow professionals with humility, generosity and enthusiasm. Learn to communicate your passion and ability in these areas of special interest.

Become an Expert (but Don't Get Tunnel Vision)

Although you will need to develop a broad range of knowledge about the natural resources of your region, most professionals also develop an area of expertise. Strive to become the recognized authority in your region in some aspect of your work. Developing this expertise and the reputation will take time and diligent effort, but it will pay off. As you become well known in your area for some special skill or ability, you will be in high demand, since landowners often

seek out the experts. Your expertise can be a great foot-in-the-door, and then you can use your other natural resource skills to provide well-rounded assistance.

The downside to having expertise in some area is the danger of getting tunnel vision and thinking only of your specialty and ignoring other important aspects. Landowners seldom think in only one dimension – they are thinking about many things simultaneously and they usually need multi-faceted assistance.

Don't Try to be the Soloist – Work With Others

With time, commitment and hard work you are likely to become well known in your region for your abilities, and your reputation may gain some notoriety. However, no matter how good you become, don't think that you can be a one-man show. There will always be areas outside of your skills where you need the input and expertise of others. Acknowledge your limitations and be willing to call on others for help. Work to develop a network of fellow professionals that have a wide range of skills in all facets of land management. Get to know them and avail yourself to them. Be willing to refer landowners to other specialists or call on them for advice and other perspectives. Gene Miller says, *"We must be willing to stifle our territorial tendencies for the greater good of serving private landowners."*

Seek Mentors

Most long time successful natural resource workers give a great deal of credit to the mentors that have helped them during their career. Seeking mentors and spending time with them will be an important part of your professional development and your self-improvement. In every area, there are people who are anxious to share what they have learned. Seek them out. Your mentors should include a combination of successful landowners as well as experienced natural resource professionals. From these mentors, you can gain wisdom, inspiration, enthusiasm and benefit from their experience. According to Jimmy Rutledge, *"A few key individuals will make a huge difference in your career and your effectiveness."* When they see that you are anxious to listen and learn, they will often take you under their wing and help you excel. When you have gained some degree of expertise and wisdom, then it will be your turn to be a mentor to the next generation.

Pursue Critical Thinking Skills

Developing critical thinking skills is one of the most important things that will help you to be effective with landowners. It is easy to recycle the same old solutions, answers and perspectives of the past; it is much harder to think independently without the common professional biases. Critical thinking forces you to separate your emotions, opinions, paradigms, wishful thinking and traditions from what is factually true. It involves the skill of thinking things through carefully, logically and without preconceived outcomes. Too often, in natural resource management, we see what we want to see, or we see what we have been programmed to see, rather than a true picture. Critical thinking can help separate good science from bad science and can help you develop sound interpretations, conclusions and applications of scientific studies.

Speaking and Writing

As you gain experience and expertise in your profession, you will want to develop the ability speak in public and write well. Although most of us would rather spend time individually with landowners, our efforts can be greatly multiplied through speaking and writing. You will be able to reach people that you would otherwise never meet. At first, your speaking may start with helping at field days and local landowner events, speaking to small groups informally. As you gain skill and confidence, you will probably be asked to speak at larger events. Start writing by

submitting articles to the local newspaper or various newsletters. Get the advice of a good editor to help you in your writing and do not get offended when they make suggestions for improvement. Learning to speak and write concisely, clearly, and convincingly will bear a great deal of fruit and will help many landowners. Photography will greatly enhance your ability to communicate; take your camera with you and use it often. A good picture is indeed worth a thousand words and photos will help landowners visualize and relate to your message of conservation and natural resource management.

Become a Great Teacher

Our profession requires the understanding of complex ecological relationships. Science based knowledge of nature, agriculture and natural resource management is what we deliver to landowners. The way in which we deliver this information is crucial and requires that we learn the skill of being a great teacher. A great teacher does more than transfer knowledge.

> ***"The mediocre teacher tells. The good teacher explains. The superior teacher demonstrates. The great teacher inspires."***
>
> William Ward.

Dalton Merz, who has the reputation of being a great teacher says, *"I am a show and tell teacher and landowners seem to learn well by this process."* Besides the important role of professional assistance, Merz has learned that "*landowners learn best from other landowners; it is always best to see it on the land and have the landowners tell their success or failure stories.*" Therefore, another facet of landowner assistance is to facilitate landowner-to-landowner learning through field days, informal ranch visits or other opportunities for landowners to learn from each other.

Our work with landowners and managers must go beyond telling, explaining and demonstrating natural resource information and ecological principles. We must also find ways to inspire and motivate landowners to incorporate the information we share into their everyday farming, ranching and land management activities. We must find ways to instill and encourage genuine and practical land stewardship ethics without being preachy and idealistic.

When landowners observe your skill, enthusiasm, professionalism and dedication to their cause and to the well-being of their land, they will value your assistance. As they gain confidence and appreciation of your abilities and expertise, they will be more likely to consider your message and adopt some of the ideas you have inspired.

Conclusion

As those who love the land and appreciate the vital role of private landowners and private land stewardship, the ideals presented here represent our best efforts to communicate the principles we have found important for working with landowners. The material, when properly understood and diligently applied will help you be a more successful conservationist, specialist, advisor, or consultant. The information will help you assist landowners and their managers as they endeavor to produce crops, livestock, timber, wildlife, water and other natural resource values on their land in a practical and sustainable manner.

Your work with landowners lies at the intersection of agriculture, ecology, natural sciences, sustainability, human nature and social dimensions. Your work is important to the individual landowner and their family and is likewise important to society who benefits from well-managed

private land. Give your utmost to this profession and strive for excellence each day. If you do so, you will find it to be a rewarding and stimulating vocation, providing an important service to present and future generations and to your community, state and country.

"If you want to be successful, it's just this simple. Know what you are doing. Love what you are doing. And believe in what you are doing."

Will Rogers

Contributors:

James R. Bell has 45 years of experience working with landowners. He is currently Rangeland Management Consultant in the private sector. From 2001 to 2010 he worked for DuPont as a consultant dealing with rangeland brush and weed control. He began career with the SCS/NRCS in 1969 and retired in 2000 having served as Rangeland Management Specialist working with private ranchers and training field office personnel in Texas.

Rory Burroughs is owner of Comprehensive Land Management, a private company specializing in mechanical brush treatments and other range improvement practices. He also provides real estate and wildlife management assistance to landowners, and is Manager of Hackberry Creek Ranch in Kent and Fisher County, Texas.

Dr. Larry Butler is Executive Producer & Host of *OUT ON THE LAND,* a weekly, half-hour television show dedicated to stewardship and conservation. He retired in 2007 from the Natural Resources Conservation Service after over 32 years assisting private landowners in numerous technical positions, serving throughout the United States and as State Conservationist in Texas.

Dan Caudle is a Rangeland Management Specialist and Natural Resource Management Consultant/Advisor with more than 45 years' experience providing technical assistance to ranchers, natural resource managers, agencies, and organizations on all aspects of range and pasture management. He has extensive work experience throughout Texas and the Gulf Coast Marsh and Prairie areas of Louisiana.

Bill Eikenhorst, DVM owns a large, successful veterinary practice in Brenham, Texas and is a multi-generational landowner in Washington Country. He uses his extraordinary knowledge of animal ecology to teach people about the relationship of people and animals to the land. He has been instrumental in helping Texas Brigades become an effective youth conservation movement and has served in leadership positions in several conservation organizations including Texas Wildlife Association and Quality Deer Management Association. Dr. Eikenhorst has also become well known for his skill in restoring native prairie habitat across several regions in Texas.

Kent Ferguson is retired Texas State Rangeland Management Specialist for the Natural Resources Conservation Service. He invested his 36-year public service range management career working with private landowners, and is currently involved in full-time ranching and consulting service.

Donnie Frels has been employed as a Wildlife Biologist for the Texas Parks and Wildlife Department since 1987. He currently serves as the Project Leader for the Edwards Plateau Ecosystems Management Project where he oversees daily operations, management and research on three wildlife management areas in Central Texas. He and his staff interact with and assist thousands of landowners annually to encourage sustainable conservation and land stewardship.

Dalton Merz is actively involved in ranching, consulting and teaching after his retirement from SCS and NRCS. For 35 years, he served as Range Conservationist at various levels including Texas State Range Conservationist. He is well known for his special skills of communication with landowners and his practical knowledge of livestock and range practices.

Gene T. Miller is a Certified Wildlife Biologist with 37 years of professional experience. He served as a Technical Guidance Biologist with Texas Parks and Wildlife Department, assisting private landowners. Currently, he is Regional Biologist with the National Wild Turkey Federation, working in West Texas and Oklahoma.

Kent Mills is a Range Nutritionist with Hi-Pro Feeds, and formerly with Ezell-Key Feeds. He has extensive practical knowledge and experience in rangeland forages and ruminant nutrition in Texas, and the Southwest. His unique forage sampling service has helped hundreds of ranchers make informed decisions about stocking rates, forage availability, supplemental feeding and livestock performance. Mills began his career in 1972 working on the Fuller Ranch near Snyder, Texas, then teaching Ranch Management courses at Western Texas College until 1982 when he began his work in the feed business.

Steve Nelle began his career in 1976 and worked for the Soil Conservation Service and NRCS for 35 years as Range Conservationist and Wildlife Biologist working with landowners across Texas. Since 2011, he is involved in private range, wildlife and watershed consulting and assistance.

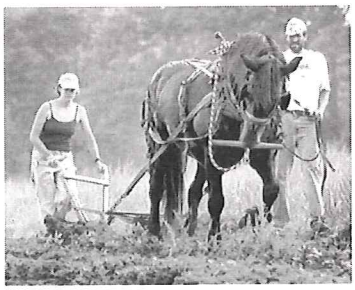
Dr. Poncho Ortega has been involved in ranching activities since he was a young boy growing up in Mexico. Following his formal education, Dr. Ortega directed agricultural and land management research at 82 experiment stations across Mexico. He is currently a Professor and Research Scientist at the Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville. His research interests include livestock-wildlife interactions and habitat management on private ranches. He is actively involved in ranching as well as consulting for cattle and wildlife operations in Mexico and Texas for the past 20 years.

Stan Reinke is currently Range and Pasture Specialist with DuPont Crop Protection. He has worked with private landowners in the natural resources business for 45 years. He previously served as a Range Conservationist for the USDA/Soil Conservation Service and Natural Resources Conservation Service and as a Range Specialist for the Environmental Defense.

Jimmy Rutledge has 34 years of experience working with landowners in natural resource management. He began his career as Range Conservationist with the Soil Conservation Service, then 22 years as a Wildlife Biologist for Texas Parks and Wildlife Department. He currently serves as a Wildlife Habitat Specialist and Wildlife Biologist for a large private organization. His work has focused on direct assisting landowners in developing plans to help them reach their land management and stewardship goals.

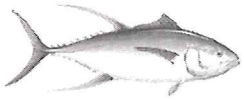
Russell Stevens is a Wildlife and Range Consultant with the Samuel Roberts Noble Foundation in Ardmore, Oklahoma. His work with landowners and managers includes wildlife and range management issues such as habitat improvement, prescribed fire, grazing management, plant identification, and feral hog impacts on agriculture. Stevens joined the Noble Foundation in 1989.

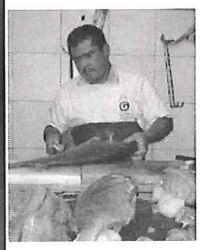
Client Objectives

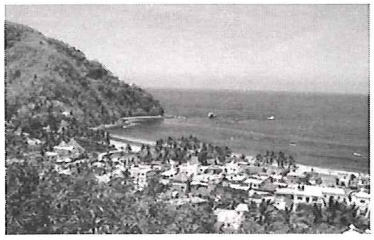


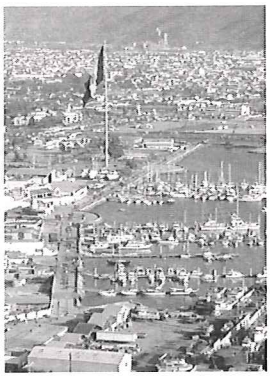
Hal Gordon
USDA - Natural Resources Conservation Service

Life's Values



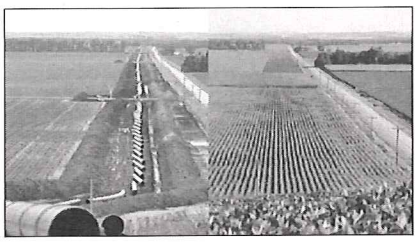






Life's Values

Objectives Are the Desired Future Status of Resources



…As Expressed by the Client and NRCS

Objectives Are Categorized Into:

Social

Objectives Are Categorized Into:

Economic

Objectives Are Categorized Into:

Environmental

Objectives in Planning:

Social

Economic

Environmental

Objectives

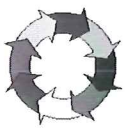
The Client's Objectives Help Determine the Basis for Providing Further Assistance

The Objectives are Documented in the Case File Planning Notes

Objectives

Refer to the Client's Objectives When Developing Conservation Systems

The Client's Objectives Generally Are Not Finalized Until After the Alternatives Are Developed and Evaluated.



Objective Example:

Social
Economic
Environmental

"I have highly erodible land, and I need a conservation plan to be eligible for USDA benefits..."

Objective Example:

Social
Economic
Environmental

"I received a letter from the State Department of Natural Resources, and they said my feedlot was causing a problem in Spring Creek."

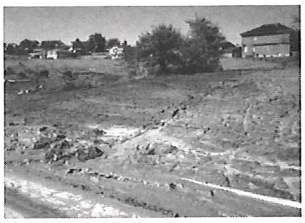
Objective Example:

Social
Economic
Environmental

"I'm very interested in increasing the stocking rate on my rangeland."

Objective Example:

Social
Economic
Environmental



"I live in an urban area, and I have a problem. A gully is working its way up the hill toward my neighbor's house..."

If We Can't Provide Assistance ...

If the Objective Is Not Consistent with the NRCS Mission, Direct the Client to Contacts Who Can Help Meet Their Resource Objectives

Sheriff	Fertilizer Dealer
Fish & Wildlife	Agriculture Co-op
Tax Accountant	Weed Board
Extension Service	Highway Dept.

The End

Life's Values

An American businessman was at the pier of a small coastal Mexican village where a small boat with just one fisherman docked.

Inside the small boat were several large yellowfin tuna. The American complimented the Mexican on the quality of his fish and asked how long it took to catch them.

The Mexican replied that it took only a little while. The American then asked why didn't he stay out longer and catch more fish? The Mexican said he had enough to support his family's immediate needs. The American then asked, but what do you do with the rest of your time? The Mexican fisherman said, "I sleep late, fish a little, play with my children, take siesta, and stroll with Maria into the village each evening and play guitar with my amigos. I have a full and busy life, señor.

The American scoffed, "I am a Harvard MBA and could help you. You should spend more time fishing and with the proceeds, buy a bigger boat.

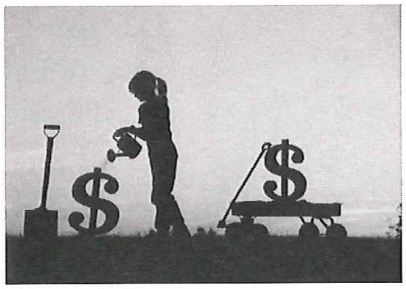
With the proceeds from the bigger boat you could buy several boats; eventually you would have a fleet of fishing boats.

Instead of selling your catch to a middleman, you would sell directly to the processor, eventually opening your own cannery. You would control the product, processing, and distribution. You would need to leave this small coastal fishing village and move to Mexico City, then to Los Angeles and eventually New York City where you will run your expanding enterprise."

The Mexican fisherman asked, "But señor, how long will this all take?" To which the American replied, "15 to 20 years." "But what then, señor?" The American laughed and said, "That's the best part. When the time is right you would sell your company to the public and become very rich. You would make millions." "Millions, señor? Then what?"

The American said, "Then you would retire. Move to a small coastal fishing village where you would sleep late, fish a little, play with your grandkids, take siesta, stroll to the village with your wife in the evenings where you would play your guitar with your amigos."

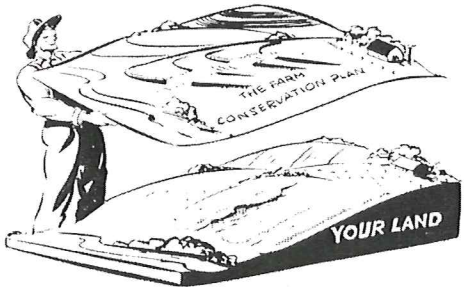
Economic Tools to Evaluate Farm Alternatives



Why evaluate the economics of conservation alternatives?

- Aid in evaluating alternatives and decision making
- Identify alternatives that may be profitable
- Help convince a producer that is "on the fence" about a conservation practice or system
- Knowing that an activity "does not pay" is as important as knowing that is "does pay"

The Goal: An Economical Conservation Plan



Economics:

"…the optimal allocation of scarce resources among competing uses"

Examples of Scarce Resources?

Examples of Competing Uses?

Human Element in Natural Resources

- Soil
- Water
- Air
- Plant
- Animal
- Energy
- Human

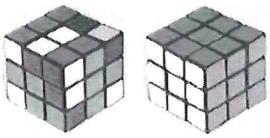
Economic Effects

What Changes?

- Land
- Capitol
- Labor
- Management
- Risk
- Profitability
- Public Health & Safety

Rubik's Cube

Solving natural resource problems is much like solving a "Rubik's Cube"…



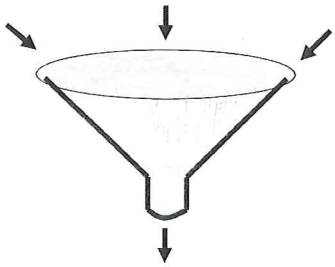
just as there are six sides to the "Rubik's Cube", there are six SWAPA+H resource concerns

Why Farm or Ranch?

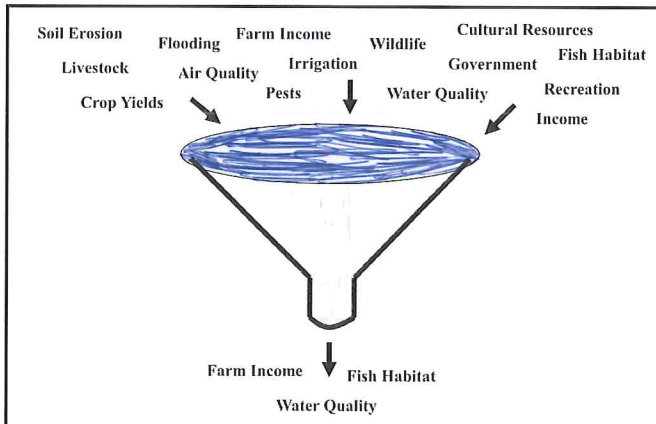
- Lifestyle
- Income Business
- Real Estate Market

Scoping

Identify all problems and opportunities



Focus only on those considered for planning



Scoping

- Identify significant issues to address
- Identify issues considered, but not significant
- Provide a record of NEPA compliance
- Reduces the number of alternatives

Developing Alternatives

Cause and Effect

Why? _____ Cause
Why? _____
Why? _____
Why? _____
Why? _____
Resource Problem _____
So What? _____
So What? _____
So What? _____
So What _____
So What? _____ Effect

Cause and Effect

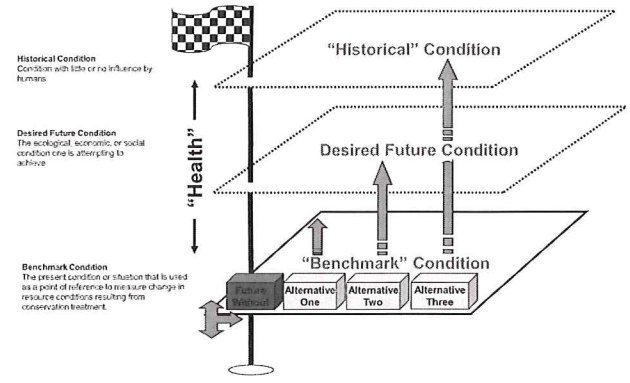
Most resource problems are caused by Humans

Farm Labor Shortage
Too busy managing cows and high cost
Need 120 days storage, only have 80 days
Not enough on-site animal waste storage
Applying excess dairy manure to cropland
Nutrients & organics in surface water
Algae Bloom in Lake
Lake stinks in the summer
Less fish in lake, no swimming
Community and neighbors are upset
Violate local water quality ordinance
County fines/regulation, less tourist dollars
Loss of income

Book: ~~1497~~ 1491 1493

Future With and Future Without

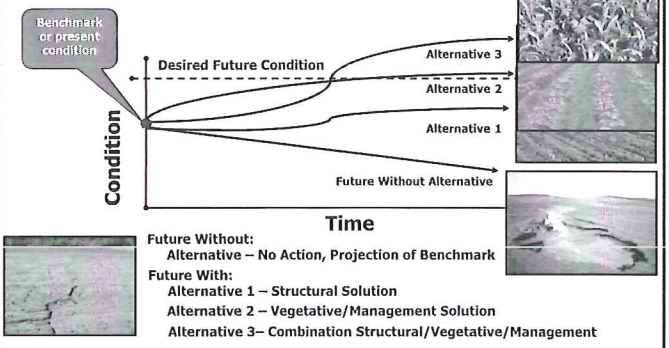
Planning Concepts



Formulate Alternatives

- Structural
- Vegetative
- Management
- Combination(s)

Evaluating Multiple Alternatives



Future Without:
Alternative – No Action, Projection of Benchmark

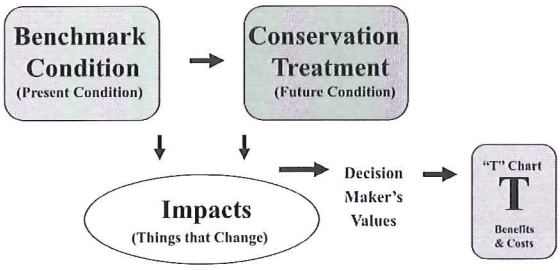
Future With:
Alternative 1 – Structural Solution
Alternative 2 – Vegetative/Management Solution
Alternative 3– Combination Structural/Vegetative/Management

Conservation Effects for Decision Making

Conservation Effects for Decision Making

- Framework to evaluate large amounts of data/resource information
- Flexible in capturing environmental, economic and social effects
- Focus on the client as the decision maker

Conservation Effects for Decision Making



"T" Chart

CONSERVATION TREATMENT EFFECTS INFORMATION	
NAME – LOCATION – DATE CONSERVATION MANAGEMENT UNIT	
CONSERVATION TREATMENT:	RESOURCE PROBLEMS:
"+" POSITIVE EFFECTS (Benefits)	"-" NEGATIVE EFFECTS (Costs)
+ + + + +	- - - - - -

Benefit Cost Analysis

Why do Economics?

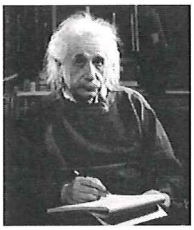
A Comparison of Benefits and Costs

Benefits > Costs = Good Investment

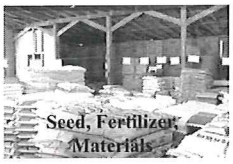
Benefit & Cost Analysis

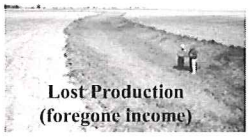
Economic analysis requires four simple steps:

1. **Estimate Costs**
2. **Estimate Benefits**
3. **Convert to "Like Terms"**
4. **Compare Costs & Benefits**



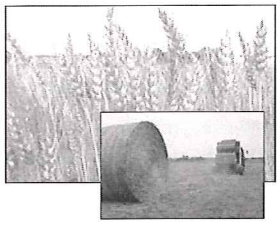
Estimate Costs



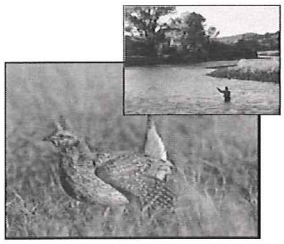


Estimate Benefits

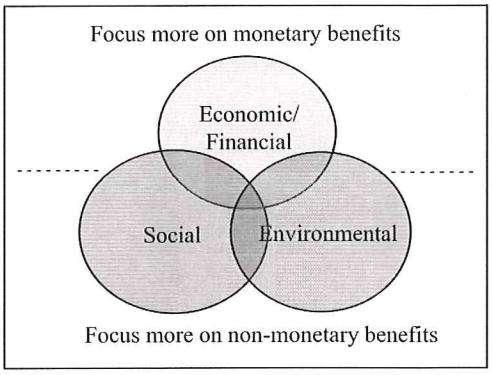
Monetary
(increase profits)



Non-Monetary
(improved habitat)



Estimate Benefits: Producer's Goals



Example: Improved Grazing System

Step 1: Estimate Costs: $93/Ac

Watering facilities, pipeline, fencing

Step 2: Estimate Benefits: $15/Ac/Yr

Increased stocking, reduced hay, etc.

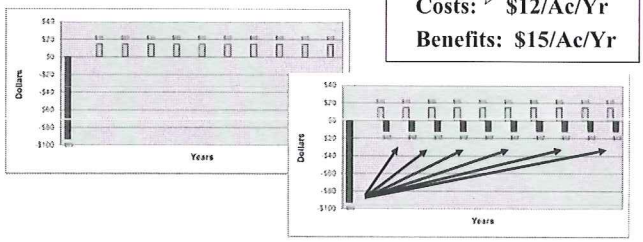
Example: Improved Grazing System

Step 3: Convert to "like terms"

Costs: $93/Ac

Benefits: $15/Ac/Yr

Amortization
10 year analysis
5% discount rate:
Costs: $12/Ac/Yr
Benefits: $15/Ac/Yr



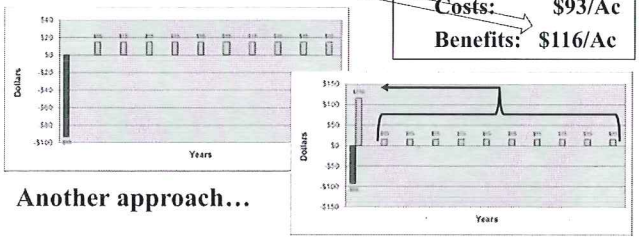
Example: Improved Grazing System

Step 3: Convert to "like terms"

Costs: $93/Ac

Benefits: $15/Ac/Yr

Present Value Analysis
10 year analysis
5% discount rate:
Costs: $93/Ac
Benefits: $116/Ac



Another approach…

Example: Improved Grazing System

Step 4: Compare Benefits and Costs

	Amortization	Net Present Value
Benefits:	$15/Ac/Yr	$116/Ac
Costs:	- $12/Ac/Yr	- $93/Ac
Net Benefit:	$3/Ac/Yr	$23/Ac

Benefits > Costs?

Benefit Cost Ratios

Measures the benefit of some activity per dollar cost

- Divide the benefits by the costs
- If the B/C is greater than 1.00 the project is economically worth doing

Benefit Cost Ratios

From the Grazing System example:

Benefits = $116/Ac

Costs = $93/Ac

The B/C ratio is $116 / $93 = 1.25

For every $1 invested in the grazing system the rancher receives $1.25/Ac in benefits

Benefit Cost Ratios

What if the benefits are not in "dollar" units ?

Think wildlife habitat benefits, or water quality benefits

- **Habitat improvement costs $100/year**
- **Receive 120 additional ducks/year**
- **B/C ratio is 120 Ducks / $100 = 1.20 ducks / $1**

The above results alone are not that useful for decision making. However… this type of B:C ratio becomes very useful when comparing different alternatives.

Cost Effectiveness

Cost Effectiveness Analysis

Used when the benefits of an alternative cannot be easily measured in monetary terms

Cost Effectiveness Analysis

What is the least cost method to install 1,000 feet terrace?

- **Tillage Equipment** **$3.00/ft**
- **Dozer** **$2.50/ft**
- **Road Grader** **$2.00/ft**

The Road Grader is the most cost effective

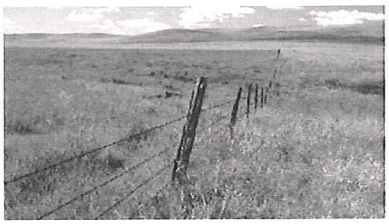
Marginality

"The rate of change in one variable when a small change is made in another variable"

Useful to show the most economically efficient level of inputs

Economics of Pasture Fertilization

Fertilizer Rate Lbs/Ac	AUMs per Acre
0	3.00
10	3.20
20	3.75
30	4.50
40	5.20
50	5.62
60	5.75
70	5.80
80	5.10
90	4.00



Economics of Pasture Fertilization

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60	5.75
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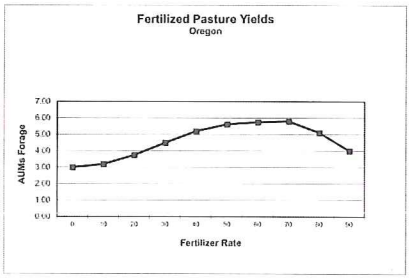
Production Function



Economics of Pasture Fertilization

Fertilizer Cost ($/Unit): $0.50
Value of AUM: $15.00

Fertilizer Rate Lbs/Ac	AUMs per Acre	Change in AUMs per Acre	Total Fertilizer Cost	Total Forage Benefit	Profit $/Ac
0	3.00	0.00	$0	$0.00	$0.00
10	3.20	0.20	$5	$3.00	($2.00)
20	3.75	0.75	$10	$11.25	$1.25
30	4.50	1.50	$15	$22.50	$7.50
40	5.20	2.20	$20	$33.00	$13.00
50	5.62	2.62	$25	$39.30	$14.30
60	5.75	2.75	$30	$41.25	$11.25
70	5.80	2.80	$35	$42.00	$7.00
80	5.10	2.10	$40	$31.50	($8.50)
90	4.00	1.00	$45	$15.00	($30.00)

10 Lbs X $.50/Lb = $5

1.5 AUMs X $15/AUM = $22.50

$39.30 - $25.00 = $14.30

Max Yield = ?
Max Profit = ?

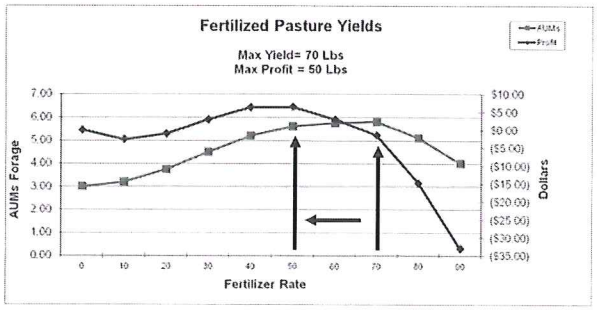
Economics of Pasture Fertilization

Fertilizer Cost ($/Unit): $0.50
Value of AUM: $15.00

Fertilizer Rate Lbs/Ac	AUMs per Acre	Change in AUMs per Acre	Total Fertilizer Cost	Total Forage Benefit	Profit $/Ac
0	3.00	0.00	$0	$0.00	$0.00
10	3.20	0.20	$5	$3.00	($2.00)
20	3.75	0.75	$10	$11.25	$1.25
30	4.50	1.50	$15	$22.50	$7.50
40	5.20	2.20	$20	$33.00	$13.00
50	5.62	2.62	$25	$39.30	$14.30
60	5.75	2.75	$30	$41.25	$11.25
70	5.80	2.80	$35	$42.00	$7.00
80	5.10	2.10	$40	$31.50	($8.50)
90	4.00	1.00	$45	$15.00	($30.00)

Max Yield = 70 Lbs Fertilizer
Max Profit = 50 Lbs Fertilizer

Economics of Pasture Fertilization



Partial Budgeting

Partial Budget Framework

The purpose of a partial budget analysis is to determine changes in benefits and costs resulting from the proposed alternative

Partial Budgeting

- Systematically displays the Benefits and Costs
- Only "things that change" are considered
- Simplifies data collection
- Use a "T" chart to display the "effects"

Partial Budget Example

What Changes??

Add Cover Crops to Rotation

Cover Crop Seeding	$35/Acre/Year
Equipment Adjustments	$1,000
Discount Rate	5%
Time Period	10 Years
Reduced N	$13/Acre/Year
Reduced Herbicide	$30/Acre/Year
Reduced Erosion (onsite)	2 Tons/Acre/Year
Improved Water Storage Value	$5/Acre/Year
Reduced Erosion (offsite)	2 Tons/Acre/Year
Wildlife Forage and Habitat	
Water Quality Improvement	

* "T" Chart *

Organize the Information into a "T" Chart

- Level I — Qualitative Statements
- Level II — Units of Measurement, Dollars
- Level III — Economic and Financial Analysis

CONSERVATION TREATMENT EFFECTS INFORMATION	
NAME – LOCATION - DATE CONSERVATION MANAGEMENT UNIT	
CONSERVATION TREATMENT:	RESOURCE PROBLEMS:
"+" POSITIVE EFFECTS (Benefits)	"-" NEGATIVE EFFECTS (Costs)

Level I

CONSERVATION TREATMENT EFFECTS INFORMATION	
NAME – Joe Farmer LOCATION – Bountyville, MO DATE – 2/3/2014 CONSERVATION MANAGEMENT UNIT – 250 Acres Cropland	
CONSERVATION TREATMENT: Add Cover Crop to Rotation	RESOURCE PROBLEMS: Soil Quality, Nutrient Cycling, Erosion, Profitability
"+" POSITIVE EFFECTS (Benefits)	"-" NEGATIVE EFFECTS (Costs)
Reduced N application Reduced Herbicide application Reduced Erosion (on site) Improved Water Storage Wildlife Forage and Habitat Water Quality Improvement Yields?	Cover Crop Seeding Equipment Adjustments Management? Yields?

Level II

CONSERVATION TREATMENT EFFECTS INFORMATION	
NAME – Joe Farmer LOCATION – Bountyville, MO DATE – 2/3/2014 CONSERVATION MANAGEMENT UNIT – 250 Acres Cropland	
CONSERVATION TREATMENT: Add Cover Crop to Rotation	RESOURCE PROBLEMS: Soil Quality, Nutrient Cycling, Erosion, Profitability
"+" POSITIVE EFFECTS (Benefits)	"-" NEGATIVE EFFECTS (Costs)
Reduced N application $13/Acre/Year Reduced Herbicide application $30/Acre/Year Reduced Erosion (on site) 2 Ton/Ac/Yr Improved Water Storage $5/Acre/Year Reduced Erosion (off site) Wildlife Forage and Habitat Water Quality Improvement Yields?	Cover Crop Seeding $35/Acre/Year Equipment Adjustments $1,000 Management? Yields?

Level III

CONSERVATION TREATMENT EFFECTS INFORMATION	
NAME – Joe Farmer LOCATION – Bountyville, MO DATE – 2/3/2014 CONSERVATION MANAGEMENT UNIT – 250 Acres Cropland	
CONSERVATION TREATMENT: Add Cover Crop to Rotation	RESOURCE PROBLEMS: Soil Quality, Nutrient Cycling, Erosion, Profitability
"+" POSITIVE EFFECTS (Benefits)	"-" NEGATIVE EFFECTS (Costs)
Reduced N application $13/Acre/Year Reduced Herbicide application $30/Acre/Year Reduced Erosion (on site) 2 Ton/Ac/Yr Improved Water Storage $5/Acre/Year Reduced Erosion (off site) Wildlife Forage and Habitat Water Quality Improvement Yields? Total Benefits = $48/Acre/Year	Cover Crop Seeding $35/Acre/Year Equipment Adjustments $1,000 $1,000 at 5% for 10 Years = $129.50/Year $129.50/250 acres = $0.52/Acre/Year Management? Yields? Total Costs = $35.52/Acre/Year

Net Benefits = $12.48/Ac/Yr

Investment Analysis

(Time Value of Money)

Time Value of Money

Farmers and ranchers want to know:

- Total installation cost
- Annual benefits
- The loan payments
- Years to "break-even"
- Change in yield
- Rate of return on investment
- Etc…

Time Value of Money

- "Value" depends on when you receive something
- "A bird in the hand is worth two in the bush"
- We prefer $100 today over $100 next year
  - ◆Invest and receive "interest"
  - ◆May not get $100 next year

Time Value of Money

The same is true for natural resources

We prefer 10 ducks today, rather than 10 next year:

- We may not be around next year
- Ducks may be gone because of drought, flood or someone else shot them
- Ducks could reproduce and we would have more than 10 ducks next year

Time Value of Money

Information needed to answer time value of money questions:

- Time Period (Years)
- Discount/Interest Rate (%)
- Present Value ($)
- Future Value ($)
- Payment ($)

Discount Rate vs. Interest Rate

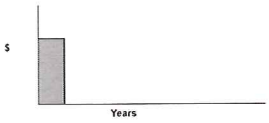
<u>Interest Rate</u>

- Cost of borrowing money, the rate charged against a loan
- Includes risk and inflation

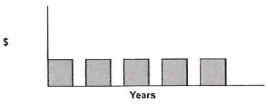
<u>Discount Rate</u>

- The "cost of capital" or the "market rate of return"
- Rate to determine the present value of future cash flows
- Includes risk and uncertainty of future cash flows
- Greater uncertainty increases discount rate

Present Value
- One-time value
- Today
- Installation Cost

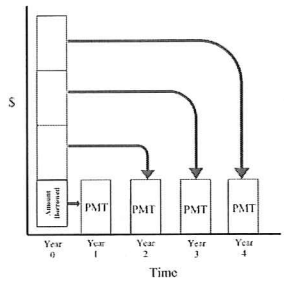


Annuity
- Average annual values
- Annual costs
- Annual benefits
- O&M costs



Future Value
- One-time value
- In the Future
- Replacement cost

Amortization



- Loan payment
- Spread to cost of an investment over its life
- "Periodic" can be in years, quarters, months
- Annualizing

Amortization Example

No-Till Planter

Time Period	15 Years
Interest Rate	6 Percent
Present Value	$20,000
Payment/annual cost	?

AVERAGE ANNUAL COST TABLE
PER $ OF INSTALLATION COST

LIFE	% INTEREST RATE							
YEARS	6	7	8	9	10	11	12	13
2	0.545	0.553	0.561	0.568	0.576	0.584	0.592	0.599
3	0.374	0.381	0.388	0.395	0.402	0.409	0.416	0.424
4	0.289	0.295	0.302	0.309	0.315	0.322	0.329	0.336
5	0.237	0.244	0.250	0.257	0.264	0.271	0.277	0.284
6	0.203	0.210	0.216	0.223	0.230	0.236	0.243	0.250
7	0.179	0.186	0.192	0.199	0.205	0.212	0.219	0.226
8	0.161	0.167	0.174	0.181	0.187	0.194	0.201	0.208
9	0.147	0.153	0.160	0.167	0.174	0.181	0.188	0.195
10	0.136	0.142	0.149	0.156	0.163	0.170	0.177	0.184
11	0.127	0.133	0.140	0.147	0.154	0.161	0.168	0.176
12	0.119	0.126	0.133	0.140	0.147	0.154	0.161	0.169
13	0.113	0.120	0.127	0.134	0.141	0.148	0.156	0.163
14	0.108	0.114	0.121	0.128	0.136	0.143	0.151	0.159
15	0.103	0.110	0.117	0.124	0.131	0.139	0.147	0.155
16	0.099	0.106	0.113	0.120	0.128	0.136	0.143	0.151
17	0.095	0.102	0.110	0.117	0.125	0.132	0.140	0.149
18	0.092	0.099	0.107	0.114	0.122	0.130	0.138	0.146

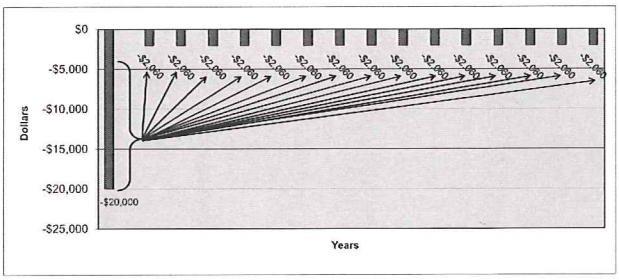
Amortization Example

No-Till Planter

Time Period	15 Years
Interest Rate	6 Percent
Present Value	$20,000
Payment/annual cost	$2,060/Year
	(.103 X $20,000)

Present Value	X	Amortization Factor (i, Yrs)	=	Payment

Amortization Example – No Till Planter



Amortization Example

Annual cost of the planter = $2,060/Year

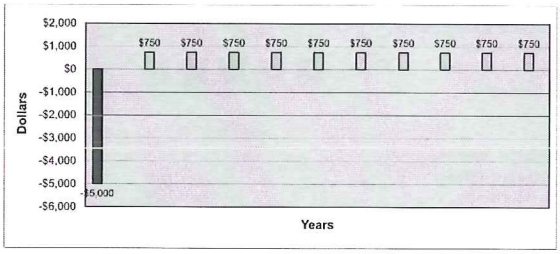
If the planter will be used on 500 Acres = $2,060/500 = $4.12/Ac/Yr

Can we identify at least $4.12/Ac/Yr benefits to off-set the costs?

One-Time Cost and Annual Benefits

How do you compare costs and benefits over different time periods?

For example: a $5,000 farm improvement creates $750/Year income benefit

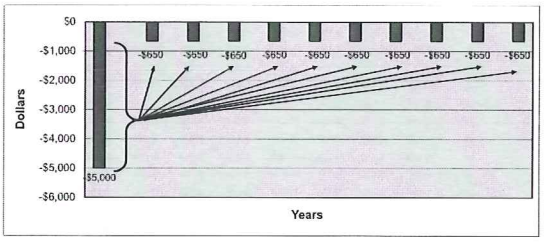


Amortize the One-Time Cost

$5,000 One Time Cost = $650 Annual Cost (10-Year, 5% Interest)

Amortization Factor for 10-Year, 5% Interest = 0.130

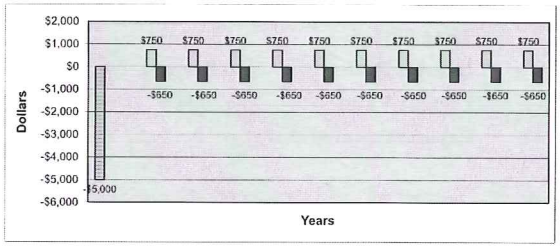
Annual Cost = $5,000 * 0.130 = $650/Year



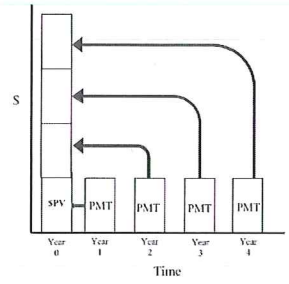
Compare Annual Benefits to Annual Costs

The Annual Benefits are Greater than the Annual Costs

$750 Benefit - $650 Cost = +$100/Year



Discounting



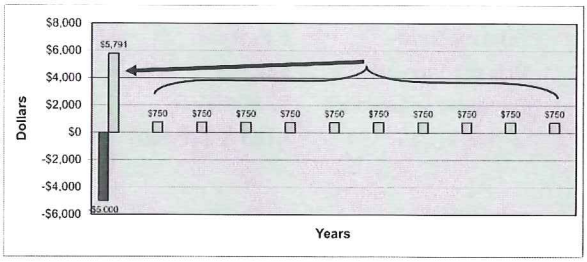
- **Converts future values to a one-time present value**
- **Present value is the value today, here and now**
- **Net Present Value analysis**

In other words… how much money would I need today, to be able to take X dollars out each year, over Y years at Z discount rate

Compared One Time Cost to One Time Benefit

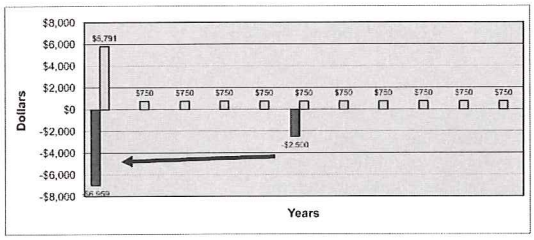
Discount $750 Annual Benefit to $5,791 Present Value (10-Year, 5% Discount Rate)

$5,791 Benefit > $5,000 Cost



Compare "One Time" and "Future One-Time" Costs to One Time Benefit

Discount $2,500 Cost in year 5 to Present Value (5-Year, 5% Discount Rate) = $1,959
$5,000 + $1,959 = $6,959



The Compound Interest and Annuity Table

Item:	No. of Periods	Present Value of One	Future Value of One	Amortization: Amt of an Ann for PV	Present Val. of an Increasing Annuity	Present Val. of a Decreasing Annuity	Present Value of an Annuity of One	Future Value of an Annuity of One	Amount of an Annuity for a FV
Graphic:	n/a	$?	? $	$?	? $	? $	? $	? $	$?
Formula:	n/a	$\frac{1}{(1+i)^n}$	$(1+i)^n$	$\frac{i}{1-1/(1+i)^n}$	$\frac{1+(n(i-1+1/(1+i)^n}{(1+i)^n(i)^2}$	$\frac{n(i)-1+1/(1+i)^n}{(i)^2}$	$\frac{(1+i)^n-1}{i(1+i)^n}$	$\frac{(1+i)^n-1}{i}$	$\frac{i}{(1+i)^n-1}$

"Farmers Tax Guide"
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Break Even Analysis

Break-Even Analysis

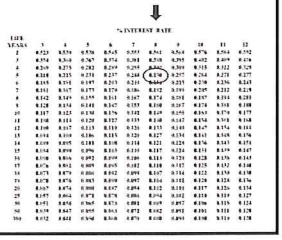
Question:	Solve for:
What is my annual cost?	Payment
How much can I afford to pay?	Present Value
How many years to break-even?	Years
Return on the investment?	Interest Rate
What net gain to pay expenses?	Payment

Payment = Present Value x (Years,% Factor)

Question: What is my annual cost? **Solve for:** Payment

Payment = Present Value x (Years,% Factor)
Payment = $10,000 x .250 (5 Yrs, 8%)
$2,500/Year = $10,000 x .250 (5 Yrs, 8%)

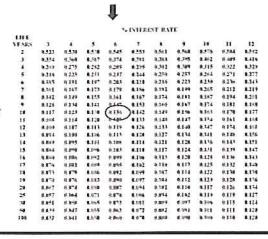
What is my annual cost for a $10,000 irrigation pump, that lasts 5 years, and I can get a loan for 8% interest?



Question: How much can I afford to pay? **Solve for:** Present Value

Payment = Present Value x (Years,% Factor)
$3,000/Yr Income = Present Value x .136 (10 Yrs,6%)
$3,000/Yr Income / .136 = $22,058 (to breakeven on improvement)

How much can I afford to pay for brush control that will last 10 years, increase my grazing income by $3,000/year, and I can get a loan for 6% interest?

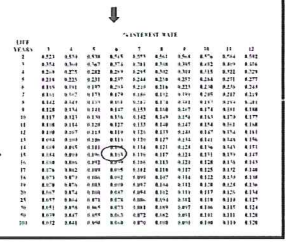


Question: How many years to break-even?

Solve for: Years

Payment = Present Value x (Years,% Factor)
$2,000/Yr = $20,000 x (Years, 6%)
$2,000/Yr / $20,000 = .100 (6% column) = 15 Years

How many years will it take to break-even on an irrigation system that costs $20,000, increases crop income $2,000/year, and I can get a loan for 6% interest? ➡

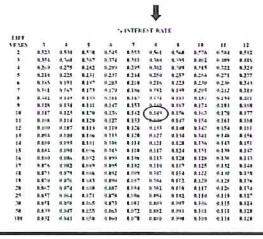


Question: Return on the investment?

Solve for: Interest Rate

Payment = Present Value x (Years,% Factor)
$750/Yr = $5,000 x (10 Yr,% Factor)
$750/Yr / $5,000 = .150 (10 Yr row) = 8%

What is my return on investment for a $5,000 livestock water facility, lasting 10 years, that increases grazing income $750/year? ➡



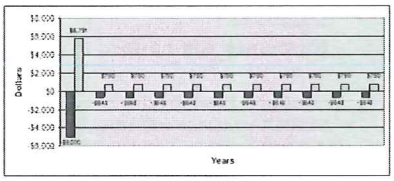
Financial versus Economic Analysis

Financial Analysis vs. Economic Analysis

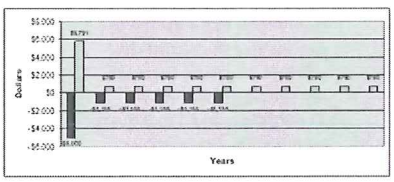
Economic analysis:
- Is it Profitable?
- Compare benefits & costs over the *project's life*

Financial analysis:
- Is it Affordable?
- Compare benefits & costs over the *loan period*

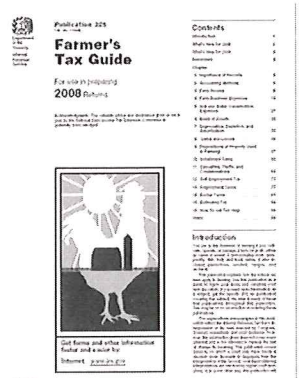
Economic Analysis:
Total Cost: $5,000
Annual Cost: $648/Yr (10Yr, 5%)
Annual Benefit: $750/Yr
Net Benefit: $102/Yr



Financial Analysis:
Total Cost: $5,000
Annual Cost: $1,155/Yr (5Yr, 5%)
Annual Benefit: $750/Yr
Net Benefit: -$405/Yr (Yrs: 1-5)
$750/Yr (Yrs: 6-10)



Tax Considerations


Publication 225

Farmer's Tax Guide

For use in preparing 2008 Returns

Get forms and other information faster and easier by:

Internet www.irs.gov

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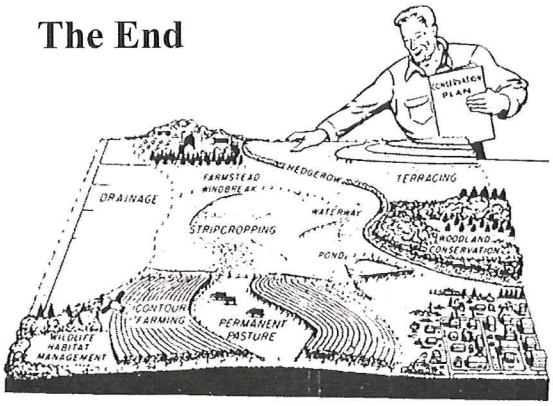
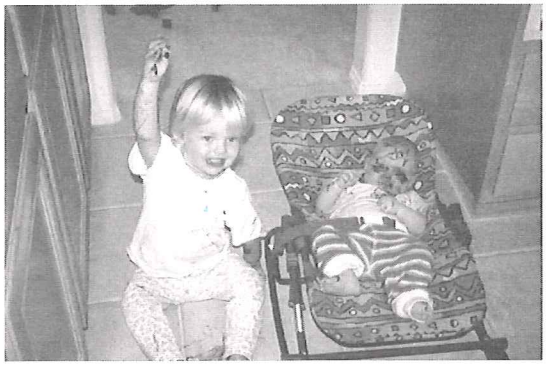
The End



Class Exercise



AMORTIZATION TABLE

COST PER YEAR

Example: 4 year loan at 6% interest = .289 * $10,000 = $2,890/Year.

LIFE YEARS	% INTEREST RATE												
	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0.523	0.530	0.538	0.545	0.553	0.561	0.568	0.576	0.584	0.592	0.599	0.607	0.615
3	0.354	0.360	0.367	0.374	0.381	0.388	0.395	0.402	0.409	0.416	0.424	0.431	0.438
4	0.269	0.275	0.282	0.289	0.295	0.302	0.309	0.315	0.322	0.329	0.336	0.343	0.350
5	0.218	0.225	0.231	0.237	0.244	0.250	0.257	0.264	0.271	0.277	0.284	0.291	0.298
6	0.185	0.191	0.197	0.203	0.210	0.216	0.223	0.230	0.236	0.243	0.250	0.257	0.264
7	0.161	0.167	0.173	0.179	0.186	0.192	0.199	0.205	0.212	0.219	0.226	0.233	0.240
8	0.142	0.149	0.155	0.161	0.167	0.174	0.181	0.187	0.194	0.201	0.208	0.216	0.223
9	0.128	0.134	0.141	0.147	0.153	0.160	0.167	0.174	0.181	0.188	0.195	0.202	0.210
10	0.117	0.123	0.130	0.136	0.142	0.149	0.156	0.163	0.170	0.177	0.184	0.192	0.199
11	0.108	0.114	0.120	0.127	0.133	0.140	0.147	0.154	0.161	0.168	0.176	0.183	0.191
12	0.100	0.107	0.113	0.119	0.126	0.133	0.140	0.147	0.154	0.161	0.169	0.177	0.184
13	0.094	0.100	0.106	0.113	0.120	0.127	0.134	0.141	0.148	0.156	0.163	0.171	0.179
14	0.089	0.095	0.101	0.108	0.114	0.121	0.128	0.136	0.143	0.151	0.159	0.167	0.175
15	0.084	0.090	0.096	0.103	0.110	0.117	0.124	0.131	0.139	0.147	0.155	0.163	0.171
16	0.080	0.086	0.092	0.099	0.106	0.113	0.120	0.128	0.136	0.143	0.151	0.160	0.168
17	0.076	0.082	0.089	0.095	0.102	0.110	0.117	0.125	0.132	0.140	0.149	0.157	0.165
18	0.073	0.079	0.086	0.092	0.099	0.107	0.114	0.122	0.130	0.138	0.146	0.155	0.163
19	0.070	0.076	0.083	0.090	0.097	0.104	0.112	0.120	0.128	0.136	0.144	0.153	0.161
20	0.067	0.074	0.080	0.087	0.094	0.102	0.110	0.117	0.126	0.134	0.142	0.151	0.160
25	0.057	0.064	0.071	0.078	0.086	0.094	0.102	0.110	0.119	0.127	0.136	0.145	0.155
50	0.039	0.047	0.055	0.063	0.072	0.082	0.091	0.101	0.111	0.120	0.130	0.140	0.150
100	0.032	0.041	0.050	0.060	0.070	0.080	0.090	0.100	0.110	0.120	0.130	0.140	0.150

AMORTIZATION TABLE

COST PER MONTH

Example: 48 month loan (or 4 years) at 6% interest = .0235 * $10,000 = $235/Month.

LIFE MONTHS	LIFE YEARS	% ANNUAL INTEREST RATE												
		3	4	5	6	7	8	9	10	11	12	13	14	15
12	1	0.0847	0.0851	0.0856	0.0861	0.0865	0.0870	0.0875	0.0879	0.0884	0.0888	0.0893	0.0898	0.0903
24	2	0.0430	0.0434	0.0439	0.0443	0.0448	0.0452	0.0457	0.0461	0.0466	0.0471	0.0475	0.0480	0.0485
36	3	0.0291	0.0295	0.0300	0.0304	0.0309	0.0313	0.0318	0.0323	0.0327	0.0332	0.0337	0.0342	0.0347
48	4	0.0221	0.0226	0.0230	0.0235	0.0239	0.0244	0.0249	0.0254	0.0258	0.0263	0.0268	0.0273	0.0278
60	5	0.0180	0.0184	0.0189	0.0193	0.0198	0.0203	0.0208	0.0212	0.0217	0.0222	0.0228	0.0233	0.0238
72	6	0.0152	0.0156	0.0161	0.0166	0.0170	0.0175	0.0180	0.0185	0.0190	0.0196	0.0201	0.0206	0.0211
84	7	0.0132	0.0137	0.0141	0.0146	0.0151	0.0156	0.0161	0.0166	0.0171	0.0177	0.0182	0.0187	0.0193
96	8	0.0117	0.0122	0.0127	0.0131	0.0136	0.0141	0.0147	0.0152	0.0157	0.0163	0.0168	0.0174	0.0179
108	9	0.0106	0.0110	0.0115	0.0120	0.0125	0.0130	0.0135	0.0141	0.0146	0.0152	0.0158	0.0163	0.0169
120	10	0.0097	0.0101	0.0106	0.0111	0.0116	0.0121	0.0127	0.0132	0.0138	0.0143	0.0149	0.0155	0.0161
132	11	0.0089	0.0094	0.0099	0.0104	0.0109	0.0114	0.0120	0.0125	0.0131	0.0137	0.0143	0.0149	0.0155
144	12	0.0083	0.0088	0.0092	0.0098	0.0103	0.0108	0.0114	0.0120	0.0125	0.0131	0.0137	0.0144	0.0150
156	13	0.0077	0.0082	0.0087	0.0092	0.0098	0.0103	0.0109	0.0115	0.0121	0.0127	0.0133	0.0140	0.0146
168	14	0.0073	0.0078	0.0083	0.0088	0.0094	0.0099	0.0105	0.0111	0.0117	0.0123	0.0130	0.0136	0.0143
180	15	0.0069	0.0074	0.0079	0.0084	0.0090	0.0096	0.0101	0.0107	0.0114	0.0120	0.0127	0.0133	0.0140
192	16	0.0066	0.0071	0.0076	0.0081	0.0087	0.0092	0.0098	0.0105	0.0111	0.0117	0.0124	0.0131	0.0138
204	17	0.0063	0.0068	0.0073	0.0078	0.0084	0.0090	0.0096	0.0102	0.0109	0.0115	0.0122	0.0129	0.0136
216	18	0.0060	0.0065	0.0070	0.0076	0.0082	0.0087	0.0094	0.0100	0.0107	0.0113	0.0120	0.0127	0.0134
228	19	0.0058	0.0063	0.0068	0.0074	0.0079	0.0085	0.0092	0.0098	0.0105	0.0112	0.0118	0.0126	0.0133
240	20	0.0055	0.0061	0.0066	0.0072	0.0078	0.0084	0.0090	0.0097	0.0103	0.0110	0.0117	0.0124	0.0132
252	21	0.0054	0.0059	0.0064	0.0070	0.0076	0.0082	0.0088	0.0095	0.0102	0.0109	0.0116	0.0123	0.0131
264	22	0.0052	0.0057	0.0063	0.0068	0.0074	0.0081	0.0087	0.0094	0.0101	0.0108	0.0115	0.0122	0.0130
276	23	0.0050	0.0055	0.0061	0.0067	0.0073	0.0079	0.0086	0.0093	0.0100	0.0107	0.0114	0.0122	0.0129
288	24	0.0049	0.0054	0.0060	0.0066	0.0072	0.0078	0.0085	0.0092	0.0099	0.0106	0.0113	0.0121	0.0129
300	25	0.0047	0.0053	0.0058	0.0064	0.0071	0.0077	0.0084	0.0091	0.0098	0.0105	0.0113	0.0120	0.0128
312	26	0.0046	0.0052	0.0057	0.0063	0.0070	0.0076	0.0083	0.0090	0.0097	0.0105	0.0112	0.0120	0.0128
324	27	0.0045	0.0051	0.0056	0.0062	0.0069	0.0075	0.0082	0.0089	0.0097	0.0104	0.0112	0.0119	0.0127
336	28	0.0044	0.0050	0.0055	0.0062	0.0068	0.0075	0.0082	0.0089	0.0096	0.0104	0.0111	0.0119	0.0127
348	29	0.0043	0.0049	0.0054	0.0061	0.0067	0.0074	0.0081	0.0088	0.0096	0.0103	0.0111	0.0119	0.0127
360	30	0.0042	0.0048	0.0054	0.0060	0.0067	0.0073	0.0080	0.0088	0.0095	0.0103	0.0111	0.0118	0.0126

United States Department of Agriculture
NATURAL RESOURCES CONSERVATION SERVICE
Technical Note No. 340-ECN-1
August 2013

ECONOMICS TECHNICAL NOTE

Basic Economic Analysis Using T-Charts

By
Hal Gordon, WNTSC Economist

The Natural Resources Conservation Service (NRCS) assists land owners in managing natural resources on private land. Our core "product" is a conservation plan which provides a roadmap to solve natural resource problems on private land. The most successful conservation plans address the landowner's resource concerns while maintaining farm or ranch viability. Therefore, it is the policy of the NRCS that economic principles are included in all planning and agency resource allocation activities (Title 200, General Manual, Part 400, Subpart A).

Most landowners want to know the benefits and costs of their conservation plan before they make important land use decisions. The level of economic detail depends upon the client, but basic economic information is something most NRCS employees can easily provide.

A good conservation plan utilizing the "nine steps" planning process clearly and concisely presents technical and economic information to the landowner. To fully inform the landowner of the potential benefits and costs of the plan, the conservation planner's responsibilities include:

- Document environmental, social and economic effects in the planning process.
- Identify physical and monetary benefits of implementing conservation systems.
- Identify negative impacts and costs of conservation systems.

Benefit & Cost Analysis

The goal of a conservation plan is for benefits to exceed costs. Benefits and costs can be quantitative and qualitative. If a monetary value cannot be assigned, the environmental or social benefit or cost should be quantified and included in the analysis. Economic analysis requires four steps:

1. Estimate Costs
2. Estimate Benefits
3. Convert to "Like Terms"
4. Compare Costs & Benefits

There are two benefit subcategories: *Increased Revenue* and/or *Reduced Costs*. Increased revenue may include increased crop yields, livestock production, and hunting fees. Reduced costs may include fewer passes over the field or less labor. There are two cost subcategories: *Increased Costs* and/or *Reduced Revenue*. Increased costs include purchasing equipment, materials, or hiring more labor. Reduced revenue may include land taken out of production or reduced crop yields. Be

aware that some nonmonetary values such as improved wildlife habitat or pretty landscapes may be a benefit to one individual and a cost to another. For example an increase in waterfowl may be a benefit to a bird watcher or duck hunter, but a cost to a farmer experiencing excessive crop losses, trespass or land lost to wetland. Once costs and benefits are estimated, convert them to the same units over the same time period. You cannot compare benefits and costs unless they are reduced to the same terms. Typically, benefits and costs are summarized as dollars per acre per year ($/acre/year).

Partial Budgeting

Partial budgeting is a method that systematically displays the benefits and costs of an alternative where only changes from the baseline (or current) condition are considered. This technique simplifies data collection. For example, only the costs and beneficial impacts of installing a conservation practice are considered in the analysis, rather than gathering information about the whole farm enterprise where the practice is installed.

T-Chart

A simple way to conduct economic analysis through partial budgeting is with a T-Chart. A T-chart systematically identifies only the benefits and costs that change, in each alternative. This technique simplifies data collection and analysis. The T-Chart also describes the resource setting, resource concerns and the conservation system. The best information used in the T-Chart comes from your client, a discipline specialist's recommendations, and technical references.

T-Chart

Name: **Location:** **Date:**	**Resource Concerns/Benchmark Condition:**
Conservation Treatment:	
Positive Effects	**Negative Effects**

There can be three levels of analysis using the T-Chart:

- Level I Includes only qualitative statements
- Level II Qualitative statement plus units of measurement and dollars
- Level III Complete economic or financial analysis

The conservation planner should complete as many T-Chart levels as they are comfortable with and then request assistance if the decisionmaker needs additional analysis. The planner only develops enough information for the client to make an informed decision. The decisionmaker may lose interest if too much irrelevant information is provided and waste planner's time. A T-Chart can be developed on whatever media the decision maker finds most useful.

T-Chart Example

The following example demonstrates how to use a T-Chart to analyze the benefits and costs of a conservation system. The Level I T-Chart below displays a list of benefits and costs without units of measure or dollars. The qualitative statements identify the "effects" of the conservation system on addressing the resource concerns. Level I may contain enough information for some decision makers to make a decision, but most land users ask for more information.

T-Chart, Level I, Cropland – Soil Quality Improvement

<table>
<tr><td>Name: Sandy Clayton
Location: Columbia Basin, Oregon
Date: 2008</td><td>Resource Concerns/Benchmark Condition:
600 acres of cropland producing 70 bushels wheat and 50 bushels barley per acre in a two year rotation. Conventional tillage, nutrient and pest management. Resource concerns include: Sheet & Rill Soil Erosion, Organic Matter Depletion, Compaction, Surface Water Contaminants, Plant Productivity, and Wildlife.</td></tr>
<tr><td colspan="2">Conservation Treatment:
Conservation Crop Rotation (Winter Wheat/Canola/Spring Barley)
Residue Management (Direct Seed/No-Till)
Pest Management (Annual Grasses and Aphids)
Nutrient Management (Fertilizer Management)</td></tr>
<tr><td><u>Positive Effects</u>

<u>Reduced Costs</u>
Change in Crop Rotation
Decreased fertilizer applied
Reduce six tillage passes over the field
Reduce fuel and labor

<u>Increased Revenue</u>
Wheat yield increase
Financial Assistance Payment

<u>Other</u>
Improved soil and water quality
Upland bird habitat improvement</td><td><u>Negative Effects</u>

<u>Increased Costs</u>
No-Till Drill
Pest Management
Nutrient/Fertilizer Management

<u>Reduced Revenue</u>
Possible lost grazing opportunities</td></tr>
</table>

Level II includes units of measure and dollar estimates of the conservation "effects." The decisionmaker may still not be able to make a decision because all the units are not in similar terms (same denominator). The cost of the No-Till Drill is in $/each while the other values are in $/acre/year.

T-Chart, Level II, Cropland – Soil Quality Improvement

Name: Sandy Clayton **Location:** Columbia Basin, Oregon **Date:** 2008	**Resource Concerns/Benchmark Condition:** 600 acres of cropland producing 70 bushels wheat and 50 bushels barley per acre in a two year rotation. Conventional tillage, nutrient and pest management. Resource concerns include: Sheet & Rill Soil Erosion, Organic Matter Depletion, Compaction, Surface Water Contaminants, Plant Productivity, and Wildlife.
Conservation Treatment: Conservation Crop Rotation (Winter Wheat/Canola/Spring Barley) Residue Management (Direct Seed/No-Till) Pest Management (Annual Grasses and Aphids) Nutrient Management (Fertilizer Management)	
Positive Effects ***Reduced Costs*** • Change in Crop Rotation = **$25/ac/yr** 2 -year Conventional Rotation — Net Returns Winter Wheat $100/ac/yr Spring Barley $50/ac/yr $75/ac/yr 3-year No-Till Rotation Winter Wheat $130/ac/yr Canola $100/ac/yr Spring Barley $70/ac/yr $100/ac/yr • Decreased fertilizer applied 20 Lbs N/ac • Reduce six tillage passes over the field • Reduce fuel and labor ***Increased Revenue*** • Wheat yield increase (no estimate available) • Financial Assistance Payment **$10/ac/yr** ***Other*** • Improved soil and water quality • Upland bird habitat improvement **Total Dollar Benefits = $35/ac/yr**	**Negative Effects** ***Increased Costs*** • No-Till Drill = $25,000/Drill (not included in crop budgets) • Pest Management $10.10/ac/yr • Nutrient/Fertilizer Management = **$2/ac/yr** ***Reduced Revenue*** • Possible lost aftermath grazing **Total Dollar Costs = $2/ac/yr plus $25,000/No-Till Drill**

Level III has converted all benefits and costs to similar terms. The cost of the No-Till Drill has been amortized from a one-time cost to an annual payment. Now all costs and benefits are in similar terms and can be compared by the decisionmaker.

T-Chart, Level III, Cropland – Soil Quality Improvement

Name: Sandy Clayton
Location: Columbia Basin, Oregon
Date: 2008

Resource Concerns/Benchmark Condition:
600 acres of cropland producing 70 bushels wheat and 50 bushels barley per acre in a two year rotation. Conventional tillage, nutrient and pest management. Resource concerns include: Sheet & Rill Soil Erosion, Organic Matter Depletion, Compaction, Surface Water Contaminants, Plant Productivity, and Wildlife.

Conservation Treatment:
Conservation Crop Rotation (Winter Wheat/Canola/Spring Barley)
Residue Management (Direct Seed/No-Till)
Pest Management (Annual Grasses and Aphids)
Nutrient Management (Fertilizer Management)

Positive Effects

Reduced Costs

- Change in Crop Rotation = **$25/ac/yr**

2-year Conventional Rotation	Net Returns
Winter Wheat	$100/ac/yr
Spring Barley	$50/ac/yr
	$75/ac/yr
3-year No-Till Rotation	
Winter Wheat	$130/ac/yr
Canola	$100/ac/yr
Spring Barley	$70/ac/yr
	$100/ac/yr

Decreased fertilizer applied 20 Lbs N/Ac
20 Lbs/Ac * $.75/Lb / 3 Yrs = $5/ac/yr
Reduce six tillage passes over the field:
$10/Pass * 6 Passes / 3 Yrs = $20/ac/yr
Reduce fuel and labor
(included in the reduced tillage passes)

Increased Revenue

- Wheat yield increase (no estimate available)
- Financial Assistance Payment **$10**/ac/yr

Other

- Improved soil and water quality
- Upland bird habitat improvement

Total Dollar Benefits = $35/ac/yr

Negative Effects

Increased Costs

- No-Till Drill = $25,000, amortized at 5 Yr. loan, 6% interest, 600 Acres = **$9.90/Ac/Yr.** (not included in crop budgets, amortization explained below)
- Pest Management $10.10/Ac/Yr.
- Nutrient/Fertilizer Management = $2/ac/yr

Reduced Revenue

- Possible lost grazing opportunities

Total Dollar Costs = $22/ac/yr

$35/ac/yr ***Total Benefits - $22/Ac/Yr Total Costs*** = *$13*/ac/yr ***Net Benefits***

Now that all the conservation "effects" are in similar terms, the decisionmaker can compare the benefits and costs and make an informed decision. In this case the monetary benefits are greater than the costs (net benefits are positive) and the decisionmaker should feel comfortable adopting the example conservation system from an economic perspective. However, economics is only one factor in decisionmaking. The land user should also consider environmental and social effects and how this conservation system fits into the overall agricultural operation before making a decision.

Amortization

The process of amortization is simply converting a one-time value to an annual value. Four pieces of information are required for amortization: 1) initial cost, 2) interest (bank loan) rate, 3) life of the loan (years), and 4) an amortization table (or equation). In our example the No-Till Drill cost $25,000. If the farmer could get a loan for $25,000 from the bank at 6 percent interest, over 5 years, the amortization factor would be 0.237 (from the amortization table below where the interest column intersects with the year row). Multiplying 0.237 by $25,000 results in an annual cost of $5,940/year. Dividing the $5,940 by 600 acres gives the No-Till Dill a cost of $9.90/acre/year. (Note: this table is for "yearly" payments, a similar table is available for "monthly" payments).

Amortization Table - Yearly

LIFE	% INTEREST RATE												
YEARS	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0.523	0.530	0.538	0.545	0.553	0.561	0.568	0.576	0.584	0.592	0.599	0.607	0.615
3	0.354	0.360	0.367	0.374	0.381	0.388	0.395	0.402	0.409	0.416	0.424	0.431	0.438
4	0.269	0.275	0.282	0.289	0.295	0.302	0.309	0.315	0.322	0.329	0.336	0.343	0.350
5	0.218	0.225	0.231	0.237	0.244	0.250	0.257	0.264	0.271	0.277	0.284	0.291	0.298
6	0.185	0.191	0.197	0.203	0.210	0.216	0.223	0.230	0.236	0.243	0.250	0.257	0.264
7	0.161	0.167	0.173	0.179	0.186	0.192	0.199	0.205	0.212	0.219	0.226	0.233	0.240
8	0.142	0.149	0.155	0.161	0.167	0.174	0.181	0.187	0.194	0.201	0.208	0.216	0.223
9	0.128	0.134	0.141	0.147	0.153	0.160	0.167	0.174	0.181	0.188	0.195	0.202	0.210
10	0.117	0.123	0.130	0.136	0.142	0.149	0.156	0.163	0.170	0.177	0.184	0.192	0.199
11	0.108	0.114	0.120	0.127	0.133	0.140	0.147	0.154	0.161	0.168	0.176	0.183	0.191
12	0.100	0.107	0.113	0.119	0.126	0.133	0.140	0.147	0.154	0.161	0.169	0.177	0.184
13	0.094	0.100	0.106	0.113	0.120	0.127	0.134	0.141	0.148	0.156	0.163	0.171	0.179
14	0.089	0.095	0.101	0.108	0.114	0.121	0.128	0.136	0.143	0.151	0.159	0.167	0.175
15	0.084	0.090	0.096	0.103	0.110	0.117	0.124	0.131	0.139	0.147	0.155	0.163	0.171
16	0.080	0.086	0.092	0.099	0.106	0.113	0.120	0.128	0.136	0.143	0.151	0.160	0.168
17	0.076	0.082	0.089	0.095	0.102	0.110	0.117	0.125	0.132	0.140	0.149	0.157	0.165
18	0.073	0.079	0.086	0.092	0.099	0.107	0.114	0.122	0.130	0.138	0.146	0.155	0.163
19	0.070	0.076	0.083	0.090	0.097	0.104	0.112	0.120	0.128	0.136	0.144	0.153	0.161
20	0.067	0.074	0.080	0.087	0.094	0.102	0.110	0.117	0.126	0.134	0.142	0.151	0.160
25	0.057	0.064	0.071	0.078	0.086	0.094	0.102	0.110	0.119	0.127	0.136	0.145	0.155
50	0.039	0.047	0.055	0.063	0.072	0.082	0.091	0.101	0.111	0.120	0.130	0.140	0.150
100	0.032	0.041	0.050	0.060	0.070	0.080	0.090	0.100	0.110	0.120	0.130	0.140	0.150

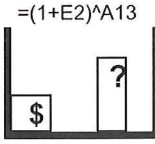
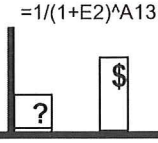
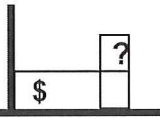
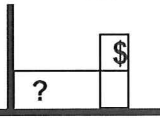
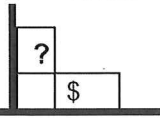
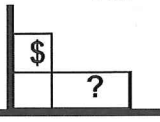
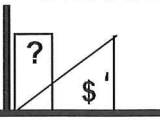
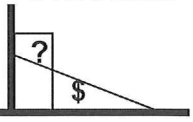
Economic Analysis versus Financial Analysis

Economic analysis answers the question: Is it profitable? Financial analysis determines if it is affordable. This distinction is important. An activity may be economically justified but not financially a wise thing to do. Economic analysis compares the benefits and costs over the life of the alternative, where financial analysis compares the benefits and costs over the life of the finance period (such as a bank loan).

For example, if a No-Till Drill has a useful farm life of 20 years and the farmer can get a bank loan (discount rate) at 6 percent (amortization factor = 0.087), then the "economic" cost of the drill is $2,175/year (or if divided by 600 acres in crop production $3.63/acre/year). If the bank offered a 5-year loan, the "financial" cost of the drill would be $9.90/acre/year (recognizing that the drill will continue to provide benefits for 15 years beyond when the loan is paid). If the No-Till Drill created benefits of $8.00/acre/year, the purchase of the drill would be "economical" but fall short "financially", and possibly create a "cash flow" concern until the 5-year loan is paid. Conservation program financial assistance may be available to minimize "cash flow" problems while adopting conservation activities.

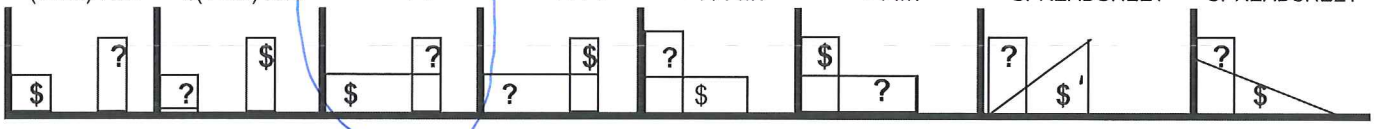
INTEREST AND ANNUITY TABLES

ANNUAL INTEREST RATE: 6.0%

EFFECT:	FUTURE VALUE OF 1	PRESENT VALUE OF 1	FUTURE VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR FUTURE VALUE	PRESENT VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR A PRESENT VALUE	PRESENT VALUE OF INCREASING ANNUITY	PRESENT VALUE OF DECREASING ANNUITY
EXCEL:	=(1+E2)^A13	=1/(1+E2)^A13	= - FV	= - 1 / FV	= 1 / PMT	= PMT	SPREADSHEET	SPREADSHEET
GRAPH:								
MATH	$(1+i)^n$	$1/(1+i)^n$	$\frac{1/(1+i)^n-1}{i}$	$\frac{i}{1/(1+i)^n-1}$	$\frac{1/(1+i)^n-1}{i(1+i)^n}$	$\frac{i}{1-1/(1+i)^n}$	$\frac{(1+i)^{n+1}-(1+i)-n(i)}{(1+i)^n(i)^2}$	$\frac{n(i)-1+1/(1+i)n}{(i)^2}$
PERIOD								
1	1.060	0.943	1.000	1.000	0.943	1.060	0.943	0.943
2	1.124	0.890	2.060	0.485	1.833	0.545	2.723	2.777
3	1.191	0.840	3.184	0.314	2.673	0.374	5.242	5.450
4	1.262	0.792	4.375	0.229	3.465	0.289	8.411	8.915
5	1.338	0.747	5.637	0.177	4.212	0.237	12.147	13.127
6	1.419	0.705	6.975	0.143	4.917	0.203	16.377	18.045
7	1.504	0.665	8.394	0.119	5.582	0.179	21.032	23.627
8	1.594	0.627	9.897	0.101	6.210	0.161	26.051	29.837
9	1.689	0.592	11.491	0.087	6.802	0.147	31.378	36.638
10	1.791	0.558	13.181	0.076	7.360	0.136	36.962	43.999
11	1.898	0.527	14.972	0.067	7.887	0.127	42.757	51.885
12	2.012	0.497	16.870	0.059	8.384	0.119	48.721	60.269
13	2.133	0.469	18.882	0.053	8.853	0.113	54.816	69.122
14	2.261	0.442	21.015	0.048	9.295	0.108	61.008	78.417
15	2.397	0.417	23.276	0.043	9.712	0.103	67.267	88.129
16	2.540	0.394	25.673	0.039	10.106	0.099	73.565	98.235
17	2.693	0.371	28.213	0.035	10.477	0.095	79.878	108.712
18	2.854	0.350	30.906	0.032	10.828	0.092	86.185	119.540
19	3.026	0.331	33.760	0.030	11.158	0.090	92.464	130.698
20	3.207	0.312	36.786	0.027	11.470	0.087	98.700	142.168
21	3.400	0.294	39.993	0.025	11.764	0.085	104.878	153.932
22	3.604	0.278	43.392	0.023	12.042	0.083	110.983	165.974
23	3.820	0.262	46.996	0.021	12.303	0.081	117.004	178.277
24	4.049	0.247	50.816	0.020	12.550	0.080	122.932	190.827
25	4.292	0.233	54.865	0.018	12.783	0.078	128.757	203.611
26	4.549	0.220	59.156	0.017	13.003	0.077	134.472	216.614
27	4.822	0.207	63.706	0.016	13.211	0.076	140.071	229.824
28	5.112	0.196	68.528	0.015	13.406	0.075	145.548	243.231
29	5.418	0.185	73.640	0.014	13.591	0.074	150.900	256.821
30	5.743	0.174	79.058	0.013	13.765	0.073	156.124	270.586
35	7.686	0.130	111.435	0.009	14.498	0.069	180.241	341.696
40	10.286	0.097	154.762	0.006	15.046	0.066	201.003	415.895
45	13.765	0.073	212.744	0.005	15.456	0.065	218.565	492.403
50	18.420	0.054	290.336	0.003	15.762	0.063	233.219	570.636
60	32.988	0.030	533.128	0.002	16.161	0.062	255.204	730.643
70	59.076	0.017	967.932	0.001	16.385	0.061	269.712	893.591
80	105.796	0.009	1746.600	0.001	16.509	0.061	279.058	1058.181
90	189.465	0.005	3141.075	0.000	16.579	0.060	284.973	1223.688
100	339.302	0.003	5638.368	0.000	16.618	0.060	288.665	1389.708

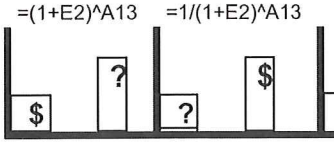
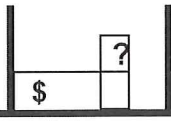
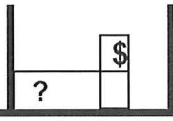
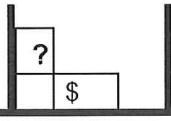
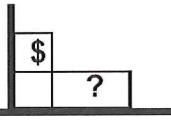
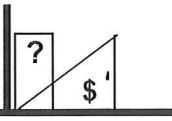
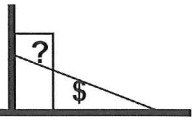
INTEREST AND ANNUITY TABLES

ANNUAL INTEREST RATE: 8.0%

EFFECT:	FUTURE VALUE OF 1	PRESENT VALUE OF 1	FUTURE VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR FUTURE VALUE	PRESENT VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR A PRESENT VALUE	PRESENT VALUE OF INCREASING ANNUITY	PRESENT VALUE OF DECREA ANNUITY
EXCEL:	=(1+E2)^A13	=1/(1+E2)^A13	= - FV	= - 1 / FV	= 1 / PMT	= PMT	SPREADSHEET	SPREADSHEET
GRAPH:								
MATH	$(1+i)^n$	$1/(1+i)^n$	$\frac{1/(1+i)^n-1}{i}$	$\frac{i}{1/(1+i)^n-1}$	$\frac{1/(1+i)^n-1}{i(1+i)^n}$	$\frac{i}{1-1/(1+i)^n}$	$\frac{(1+i)^{n+1}-(1+i)-n(i)}{(1+i)^n(i)^2}$	$\frac{n(i)-1+1/(1+i)n}{(i)^2}$
PERIOD								
1	1.080	0.926	1.000	1.000	0.926	1.080	0.926	0.926
2	1.166	0.857	2.080	0.481	1.783	0.561	2.641	2.709
3	1.260	0.794	3.246	0.308	2.577	0.388	5.022	5.286
4	1.360	0.735	4.506	0.222	3.312	0.302	7.962	8.598
5	1.469	0.681	5.867	0.170	3.993	0.250	11.365	12.591
6	1.587	0.630	7.336	0.136	4.623	0.216	15.146	17.214
7	1.714	0.583	8.923	0.112	5.206	0.192	19.231	22.420
8	1.851	0.540	10.637	0.094	5.747	0.174	23.553	28.167
9	1.999	0.500	12.488	0.080	6.247	0.160	28.055	34.414
10	2.159	0.463	14.487	0.069	6.710	0.149	32.687	41.124
11	2.332	0.429	16.645	0.060	7.139	0.140	37.405	48.263
12	2.518	0.397	18.977	0.053	7.536	0.133	42.170	55.799
13	2.720	0.368	21.495	0.047	7.904	0.127	46.950	63.703
14	2.937	0.340	24.215	0.041	8.244	0.121	51.717	71.947
15	3.172	0.315	27.152	0.037	8.559	0.117	56.445	80.50
16	3.426	0.292	30.324	0.033	8.851	0.113	61.115	89.35
17	3.700	0.270	33.750	0.030	9.122	0.110	65.710	98.480
18	3.996	0.250	37.450	0.027	9.372	0.107	70.214	107.851
19	4.316	0.232	41.446	0.024	9.604	0.104	74.617	117.455
20	4.661	0.215	45.762	0.022	9.818	0.102	78.908	127.273
21	5.034	0.199	50.423	0.020	10.017	0.100	83.080	137.290
22	5.437	0.184	55.457	0.018	10.201	0.098	87.126	147.491
23	5.871	0.170	60.893	0.016	10.371	0.096	91.044	157.862
24	6.341	0.158	66.765	0.015	10.529	0.095	94.828	168.391
25	6.848	0.146	73.106	0.014	10.675	0.094	98.479	179.065
26	7.396	0.135	79.954	0.013	10.810	0.093	101.994	189.875
27	7.988	0.125	87.351	0.011	10.935	0.091	105.374	200.810
28	8.627	0.116	95.339	0.010	11.051	0.090	108.620	211.862
29	9.317	0.107	103.966	0.010	11.158	0.090	111.732	223.020
30	10.063	0.099	113.283	0.009	11.258	0.089	114.714	234.278
35	14.785	0.068	172.317	0.006	11.655	0.086	127.747	291.818
40	21.725	0.046	259.057	0.004	11.925	0.084	137.967	350.942
45	31.920	0.031	386.506	0.003	12.108	0.083	145.841	411.145
50	46.902	0.021	573.770	0.002	12.233	0.082	151.826	472.081
60	101.257	0.010	1253.213	0.001	12.377	0.081	159.677	595.293
70	218.606	0.005	2720.080	0.000	12.443	0.080	163.975	719.465
80	471.955	0.002	5886.935	0.000	12.474	0.080	166.274	844.081
90	1018.915	0.001	12723.939	0.000	12.488	0.080	167.480	968.903
100	2199.761	0.000	27484.516	0.000	12.494	0.080	168.105	1093.821

INTEREST AND ANNUITY TABLES

ANNUAL INTEREST RATE: 10.0%

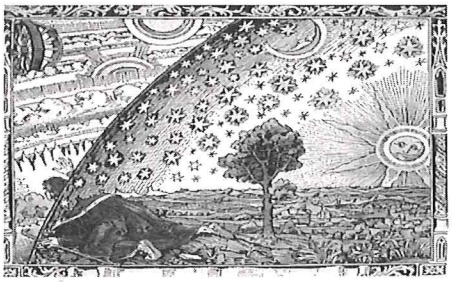
EFFECT:	FUTURE VALUE OF 1	PRESENT VALUE OF 1	FUTURE VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR FUTURE VALUE	PRESENT VALUE OF ANNUITY OF 1	AMOUNT OF ANNUITY FOR A PRESENT VALUE	PRESENT VALUE OF INCREASING ANNUITY	PRESENT VALUE OF DECREASING ANNUITY
EXCEL:	=(1+E2)^A13	=1/(1+E2)^A13	= - FV	= - 1 / FV	= 1 / PMT	= PMT	SPREADSHEET	SPREADSHEET
GRAPH:								
MATH	$(1+i)^n$	$1/(1+i)^n$	$\frac{1/(1+i)^n-1}{i}$	$\frac{i}{1/(1+i)^n-1}$	$\frac{1/(1+i)^n-1}{i(1+i)^n}$	$\frac{i}{1-1/(1+i)^n}$	$\frac{(1+i)^{n+1}-(1+i)-n(i)}{(1+i)^n(i)^2}$	$\frac{n(i)-1+1/(1+i)n}{(i)^2}$
PERIOD								
1	1.100	0.909	1.000	1.000	0.909	1.100	0.909	0.909
2	1.210	0.826	2.100	0.476	1.736	0.576	2.562	2.645
3	1.331	0.751	3.310	0.302	2.487	0.402	4.816	5.131
4	1.464	0.683	4.641	0.215	3.170	0.315	7.548	8.301
5	1.611	0.621	6.105	0.164	3.791	0.264	10.653	12.092
6	1.772	0.564	7.716	0.130	4.355	0.230	14.039	16.447
7	1.949	0.513	9.487	0.105	4.868	0.205	17.632	21.316
8	2.144	0.467	11.436	0.087	5.335	0.187	21.364	26.651
9	2.358	0.424	13.579	0.074	5.759	0.174	25.180	32.410
10	2.594	0.386	15.937	0.063	6.145	0.163	29.036	38.554
11	2.853	0.350	18.531	0.054	6.495	0.154	32.891	45.049
12	3.138	0.319	21.384	0.047	6.814	0.147	36.715	51.863
13	3.452	0.290	24.523	0.041	7.103	0.141	40.481	58.966
14	3.797	0.263	27.975	0.036	7.367	0.136	44.167	66.333
15	4.177	0.239	31.772	0.031	7.606	0.131	47.758	73.939
16	4.595	0.218	35.950	0.028	7.824	0.128	51.240	81.763
17	5.054	0.198	40.545	0.025	8.022	0.125	54.603	89.784
18	5.560	0.180	45.599	0.022	8.201	0.122	57.841	97.986
19	6.116	0.164	51.159	0.020	8.365	0.120	60.948	106.351
20	6.727	0.149	57.275	0.017	8.514	0.117	63.920	114.864
21	7.400	0.135	64.002	0.016	8.649	0.116	66.758	123.513
22	8.140	0.123	71.403	0.014	8.772	0.114	69.461	132.285
23	8.954	0.112	79.543	0.013	8.883	0.113	72.029	141.168
24	9.850	0.102	88.497	0.011	8.985	0.111	74.466	150.153
25	10.835	0.092	98.347	0.010	9.077	0.110	76.773	159.230
26	11.918	0.084	109.182	0.009	9.161	0.109	78.955	168.391
27	13.110	0.076	121.100	0.008	9.237	0.108	81.014	177.628
28	14.421	0.069	134.210	0.007	9.307	0.107	82.956	186.934
29	15.863	0.063	148.631	0.007	9.370	0.107	84.784	196.304
30	17.449	0.057	164.494	0.006	9.427	0.106	86.503	205.731
35	28.102	0.036	271.024	0.004	9.644	0.104	93.631	253.558
40	45.259	0.022	442.593	0.002	9.779	0.102	98.732	302.209
45	72.890	0.014	718.905	0.001	9.863	0.101	102.317	351.372
50	117.391	0.009	1163.909	0.001	9.915	0.101	104.804	400.852
60	304.482	0.003	3034.816	0.000	9.967	0.100	107.668	500.328
70	789.747	0.001	7887.470	0.000	9.987	0.100	108.974	600.127
80	2048.400	0.000	20474.002	0.000	9.995	0.100	109.556	700.049
90	5313.023	0.000	53120.226	0.000	9.998	0.100	109.810	800.019
100	13780.612	0.000	137796.123	0.000	9.999	0.100	109.919	900.007

Economics
NRCS-WNTSC
Hal Gordon

The Landowner

The landowner is the best source of economic information

Economic Resources for Conservation Planners



USDA - Natural Resources Conservation Service

The Field Office Technical Guide

Section I	**Economic references**
	Cost data
	Payment schedule worksheets
Section III	**Conservation system guides**
	Effects/impacts data
Section V	**Practice effects**
	Case studies

Economic Data

- **Only use economic Data that is useful to farmers or ranchers**
- **It is more important to know "where" to get economic data, than to "have" economic data**

NRCS State Economist

- **Case studies**
- **Enterprise budgets**
- **Cost and benefit estimates**
- **Conservation practice cost estimates**
- **Developing economic "effects" information**
- **Financial assistance/program evaluations**
- **Other valuable services**

Cost Data

- NRCS Data:
  - Conservation Planning - Created locally, by state economist and state specalists, for state projects and activities
  - Financial Assistance Programs - Created nationally, unique to each state, for FA contracts only
  - Found in Section I of the FOTG
- University/Extension Service
- Agricultural supply companies, vendors, consultants
- Landowners

Payment Schedule *SharePoint* Site

https://nrcs.sc.egov.usda.gov/st/cost/default.aspx

Contains all Payment Schedule Workbooks for all States

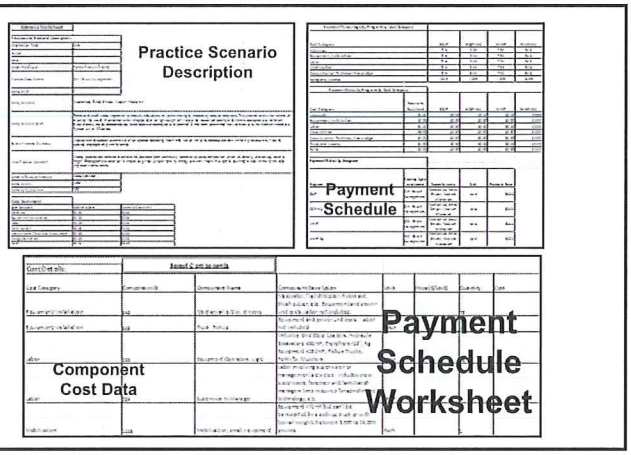
Sample Cost List, Oregon, 2004

Code	Conservation Practice	Units	Cost/Unit
393	FILTER STRIP		
	Seedbed prep and seeding	acre	$40.00
382	FENCE		
	Fence, Barbed Wire	foot	$1.70
	Fence, Electric Permanent	foot	$.80
	Fence, Smooth Wire	foot	$1.80
	Fence, Wooden	foot	$1.84
	Fence, Woven Wire	foot	$3.00
412	GRASSED WATERWAY		
	Grassed Waterway	acre	$65.00
521	POND SEALING OR LINING		
	Earth/Compacted	cu yd	$3.50
	Rock excavation/fill	cu yd	$35.00

Crop/Livestock Budgets

Detailed account of:
- Farming activities
- Tillage operations
- Chemical applications
- Machinery
- Labor requirements

All budgets have three components
- Income
- Expenses
- Returns

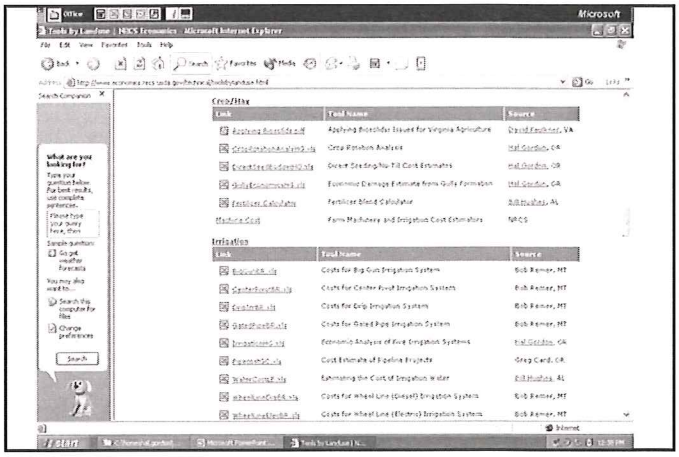


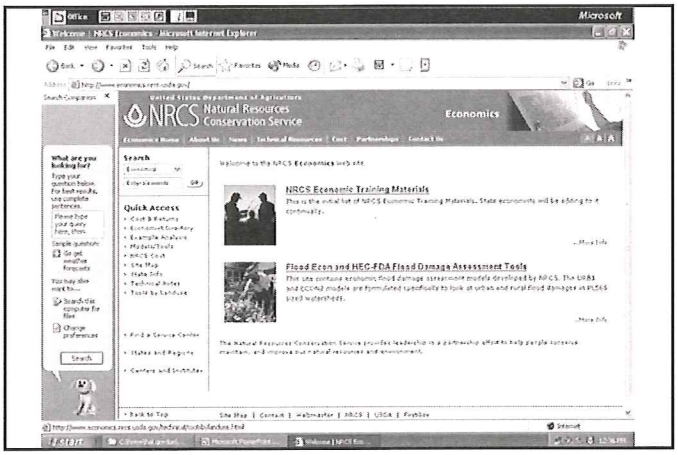
University, Extension Service, Other Agencies

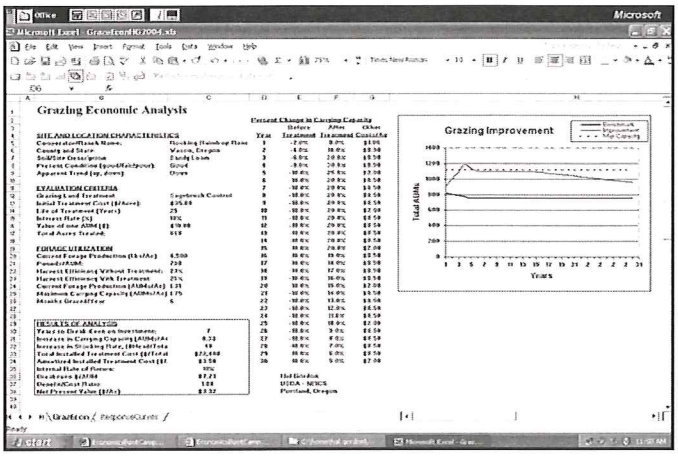
- Crop & livestock budgets
- Research data
- New technology
- Other reports

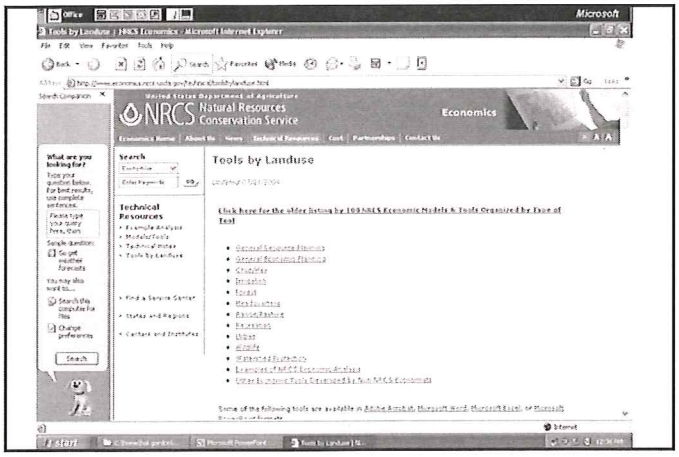
Economic Tools & Resources

Economics of Conservation Handbook
National Planning Procedures Handbook
Financial Calculator
Farm and Ranch Budgets
Cost Lists
Economic Computer Programs
NRCS Economic Tools Website

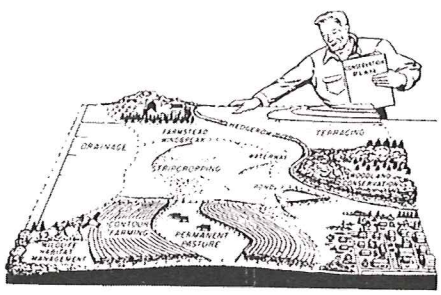








The End



Answer Sheets

Straight Creek Farm

Economics of Conservation Planning - Answer Sheet

Cropland

Present Situation

The current crop rotation is "conventional" corn-soybean, and yields could increase with better management. Soil tests have not been taken for some time. Crop fertilizer rates are based on local co-op and university standard recommendations. Animal waste is applied to crop land when the waste storage pit is full, and is not managed for plant productivity. Only anhydrous nitrogen is applied in the fall.

Fields 1 and 2 have been in a corn-soybean rotation for about 35 years. Corn is planted into soybean residue using spring mulch tillage leaving 10% residue and soybeans are planted into cornstalks using fall mulch tillage leaving 20% residue. The predominant slope is 7% with slope length of 200 feet. Sheet and rill erosion is 13 tons/acre and sediment deposition fills up about one mile of road ditch with 75 tons sediment each year. It costs the road department about $15.00/Ton to remove and dispose of the sediment. Ephemeral gullies are starting to form in the late winter.

Fields 3 and 4 have been in a corn soybean rotation for about 35 and 20 years, respectively. Tillage is the same as fields 1 and 2. The predominant slope is 5% with slope length of 200 feet. Sheet and rill erosion is 9 tons/acre. Ephemeral gullies are present with a moderate to severe ephemeral gully in the east end of field 3, and if not controlled in the next few years, about 2 acres of cropland will be lost to gully erosion and sediment deposition.

Fields 5 and 6 have been in a corn soybean rotation for about five years. It was converted to cropland from pasture after John's father sold his cow-calf operation. About five acres between the two fields had flooding in two of the five years. Tillage is the same as the other crop fields, but both fields are farmed cross-slope and grass waterways were left when the pasture was converted, but do not meet NRCS practice standards. The predominant slope is 9% with slope length of 150 feet. Sheet and rill erosion is 15 tons/acre.

There is an opportunity to sell tomatoes to the local farmer's market. Currently there are few tomato growers in the area because of the relatively short growing season, but it may be possible to grow tomatoes in a hoop house. There have been several workshops in the area to test local interest in tomato production.

Crop/ Terraces RMS Option #1

Mulch Till (329)
Terraces (500)
Contour Farming (330)
Filter Strip (393)
Nutrient Management (590)
Pest Management (595)

Mulch tillage will cost $7/Acre/Year more than conventional tillage. Terraces cost $2.00/Foot, about 3,000 feet are needed for a typical 40-acre field, last 20 years, and fields can be worked two weeks earlier in the spring. Contour farming requires a few more turns and increases fuel and labor costs about $.28/Acre/Year and reduces farm equipment maintenance costs by $500/year. A filter strip will prevent most the sediment and excess nutrients from entering the waterways, costs $100/Acre to install, $25/Acre/Year to maintain, lasts 5 years and will take about 1 acre out of crop production in each 40-acre field. Nutrient and pest management will cost $3/Acre/Year. Option #1 will increase crop income about 10% per year resulting from improved soil tilth and reduced agricultural chemicals and fertilizer use. 75 Tons of sediment will be kept out of the county ditch, which costs $15/Ton to remove each year. Use 8% interest rate.

Crop Rotation Net Returns ($/Acre)

			Average	
C-Corn	$276.63	$376.63	$326.63	
SB-Corn	$372.31	$472.31		
C-Soybeans	$105.58	$136.83		
	$238.95	$304.57	$271.76	
SB-NT Corn	$379.30	$479.30		
C-NT Soybeans	$112.27	$143.52		
	$245.79	$311.41	$278.60	Use: $275.00

Terraces

"+"	"-"
Cropland Average Net Income = $275/Ac/Yr **$275/Ac x .10 = $27.50/Ac/Yr**	**Terrace Costs = $2/Linear Foot** **20 years, 8%, .102 Annuity** **.102 * $2 * 3,000 Feet / 40 Acres = $15.30/Acre/Year**
Reduced Farm Machinery Costs = $500/200 Acres = $2.50/Acre/Year	**Filter Strips Costs = $100/Acre** **5 years, 8%, .250 Annuity** **((.250 * $100) + $25) / 40 Acres = $1.25/Acre/Year**
Reduced Soil Erosion **Improved Sol Tilth** **Improved Water Quality** **Wildlife Habitat**	**Mulch Tillage = $7.00/Acre/Year** **Contour Farming = $.28/Acre/Year** **Nutrient & Pest Management = $3.00/Acre/Year**
Sediment Kept out of County Ditch (Off Farm Benefit) **75 Tons * $15/Ton / 200 Acres = $5.63/Ac/Yr**	**Filter Strip Forgone Income (1 Ac/40 Ac Field) = $300/40 Acres = $7.50**
Total Benefits: $35.63/Ac/Yr	**Total Costs: $34.33/Ac/Yr**
Net Benefit: $1.30/Ac/Yr	

Crop/No-Till RMS Option #2

No-Till (329)
Contour Farming (330)
Field Border (386)
Nutrient Management (590)
Pest Management (595)

No-till will reduce fuel, oil and labor costs by $7/Acre/Year more than conventional tillage, but the no-till equipment will cost $35,000 and can be financed over 7 years at 8%. Contour farming requires a few more turns and increases fuel and labor costs abou $.30/Acre/Year and reduces farm equipment maintenance costs by $1,000/year. A field border will prevent some the sediment and nutrients from entering the waterways, costs $75/Acre to install, $5/Acre/Year to maintain, lasts 5 years and will take about 1 acre out of crop production in each 40-acre field. Nutrient and pest management will cost $4/Acre/Year. Option #2 will increase crop income about 15% per year resulting from reduced labor, improved soil tilth and reduced agricultural chemicals and fertilizer use. Use 8% interest rate.

	Corn	Soybeans	Net Returns $/Ac/Yr
Conventional	$372.31	$105.58	$238.95
Min-Till	$379.30	$112.27	$245.79

No-Till

"+"	"-"
15% Crop Yield Increase **Avg Net Income $240/Ac/Yr x .15 = $36.00/Ac/Yr**	**No-Till Equipment = $35,000/Each** **7 years, 8%, .192 Annuity** **.192 * $35,000 / 200 Acres = $33.60/Acre/Year**
Reduced Farm Machinery Costs = $1,000/200 Acres = $5.00/Acre/Year	**Field Border = $75/Acre** **5 years, 8%, .250 Annuity**
Reduced Fuel, Oil, Labor = $7/Acre/Year	**(.250 * $75 + $5/Acre) / 40 Acres = $.59/Acre/Year**
Reduced Soil Erosion	**Contour Farming = $.30/Acre/Year**
Improved Sol Tilth	
Improved Water Quality	**Nutrient & Pest Management = $4.00/Acre/Year**
Wildlife Habitat	
Salvage Value of Plow	**Filter Strip Forgone Income (1 Ac/40 Ac Field) = $300/40 Acres = $7.50**
Total Benefits: $48.00/Ac/Yr	**Total Costs: $45.99/Ac/Yr**
Net Benefit: $2.01/Ac/Yr	

Crop/Cover Crop RMS Option #3

Mulch Till (329)
Cover Crop (340)
Contour Farming (330)
Field Borders (386)
Nutrient Management (590)
Pest Management (595)

The winter cover crop will cost $40/Acre/Year. Mulch tillage in continuous corn will cost $12/Acre/Year more than conventional tillage. Contour farming requires a few more turns and increases fuel and labor costs about $.28/Acre/Year and reduces farm equipment maintenance costs by $500/year. A field border will prevent some the sediment and nutrients from entering the waterways, costs $75/Acre to install, $5/Acre/Year to maintain, lasts 5 years and will take about 1 acre out of crop production in each 40-acre field. Nutrient and pest management will cost $4/Acre/Year. Option #3 will increase crop income about 15% per year resulting from improved soil tilth and reduced agricultural chemicals and fertilizer use. Use 8% interest rate.

Cover Crop

"+"	"-"
Reduced Farm Machinery Costs = $500/200 Acres = $2.50/Acre/Year	**Cover Crop Costs = $40/Acre/Year**
	Mulch Tillage = $12.00/Acre/Year
Cropland Average Net Income = $275/Ac/Yr **$275/Ac x .15 = $41.25/Ac/Yr**	**Contour Farming = $.28/Acre/Year**
Reduced Soil Erosion **Improved Sol Tilth** **Improved Water Quality** **Wildlife Habitat**	**Field Border Costs = $75/Acre** **5 years, 8%, .250 Annuity** **(.250 * $75 + $5/Acre) / 40 Acres = $.59/Acre/Year**
	Lost Production = 1* $300/Ac / 40Ac = $7.50/Ac/Yr
	Nutrient & Pest Management = $4.00/Acre/Year
Total Benefits: $43.75/Ac/Yr	**Total Costs: $64.38/Ac/Yr**
Net Benefit: -$20.63/Ac/Yr	

Crop/No-Till, Grass Waterway RMS Option #4

No-Till (329)
Grass Waterway (412)
Nutrient Management (590)
Pest Management (595)

No-till will reduce fuel, oil and labor costs by $21/Acre/Year more than conventional tillage, but the no-till equipment will cost $35,000 and can be financed over 7 years at 8%. A grass waterway will prevent most of the sediment and nutrients from entering the waterways, costs $300/Acre to install, $6/Acre/Year to maintain, lasts 15 years and will take about 2 acre out of crop production in each 40-acre field. Nutrient and pest management will cost $4/Acre/Year. Option #4 will increase crop income about 15% per year resulting from reduced labor, improved soil tilth and reduced agricultural chemicals and fertilizer use.

Grass Waterway

"+"	"-"
Cropland Average Net Income = $275/Ac/Yr **$275/Ac x .15 = $41.25/Ac/Yr** **Reduced Fuel, Oil, Labor = $21/Acre/Year** **Reduced Soil Erosion** **Improved Sol Tilth** **Improved Water Quality** **Wildlife Habitat** **Salvage Value of Plow**	**No-Till Equipment Costs = $35,000/Each** **7 years, 8%, .186 Annuity** **.186 * $35,000 / 200 Acres = $32.55/Acre/Year** **Grass Waterway Costs = $300/Acre** **15 years, 8%, .117 Annuity** **(.117 * $300 + $6/Acre) / 20 Acres = $2.05/Acre/Year** **Nutrient & Pest Management = $4.00/Acre/Year** **Lost Production = 2* $300/Ac / 40Ac = $15.00/Ac/Yr**
Total Benefits: $62.25/Ac/Yr	**Total Costs: $53.60/Ac/Yr**
Net Benefit: $8.65/Ac/Yr	

$6.59/Ac/Yr 55.66/Ac/Yr

$35,000

.179 x 35,000 = 6,265

Crop/Land Conversion to Hoop House Tomatoes Option #5

Seasonal High Tunnel (798)
Micro Irrigation (441)
Nutrient Management (590)
Pest Management (595)

Converting cropland to hoop house may increase net income over time, but will require an investment of $5,570 to build each structure, install irrigation system and build planting beds. The building is 20 feet by 68 feet, about .3 Acre. Nutrient and pest management are included in the system. Operating and maintenance costs are $913/structure/year. The structure will last 10 years and you can borrow money for 8% interest. You can build up to three structures based on the demand for tomatoes. There is financial assistance that pays $1,000/hoop house.

Land Conversion to Hoop House

"+"	"-"
Tomato Average Gross Income = $1,672/House/Year **$1,672/House/Yr * 3 Houses/Acre = $5,016/Acre/Year**	**Lost Corn/Soybean Crop Net Income = $275/Ac/Yr**
Financial Assistance = $1,000 **$1,000/House/Yr * 3 Houses/Acre = $3,000/Acre/Year** **10 years, 8%, .149 Annuity** **.149 * $3,000/Each = $447/Each/Year**	**Hoop House Establishment Costs = $5,570/Structure** **10 years, 8%, .149 Annuity** **.149 * $5,570/Each = $830/Each/Year** **$830/Each/Year * 3/Acre = $2,490/Acre/Year**
	Operation & Management = $913/Each/Year **$913/Each/Year * 3/Acre = $2,739/Acre/Year**
Increase Real Estate Value	
Total Benefits: $5,463/Ac/Yr	**Total Costs: $5,504/Ac/Yr**
Net Benefit: -$41.00/Ac/Yr	

Swine

Present Situation

The swine enterprise is a confined grower/finisher open-lot operation. There are currently 900 head grown per year over two cycles. Each of 7 lots holds about 60 head of hogs, and lots measure 12 feet by 50 feet, with 25 feet of roofed area and 25 feet of outside lot. The lots drain manure and rainwater to a concrete apron and a settling area that holds most of the solids. Most years the settling area overtops before the manure can be spread. The storage capacity is only 80% of the needed capacity. Liquid and solid manure is applied to the surface of field 4 in the spring or fall, and occasionally tilled into the soil. Each hog requires 5-10 bushels of corn and ½ hour of labor. Use 8% interest rate.

Swine/Animal Waste Storage RMS Option #1

Waste Storage Facility 313
Waste Utilization 633
Roof Runoff Structure 558
Manure Transfer 634

Improvements to the waste storage facility will cost $20,000, and require an additional $500/year operation and maintenance over 20 years. Solid manure will be applied to cropland following a nutrient management plan, or hauled and treated off site. Manure transfer and waste utilization will cost $500 each year. The new facility will keep the manure out of surface and groundwater. Use 8% interest rate.

Waste Storage Structure

"+"	"-"
Improved Water Quality **Stay in Business** **Avoid Fines**	**Waste Storage Structure Costs = $20,000** **20 years, 8%, .10 Annuity** **.10 * $20,000 + $500/Yr = $2,600/Year** **Manure Management Costs = $500**
Total Benefits: $0/Ac/Yr	**Total Costs: $3,100/Yr**
Net Benefit: -$3,100/Ac/Yr	

Swine/Waste Treatment Strip RMS Option #2

Roof Runoff Structure 558
Waste Water Treatment Strip 635
Surface Drainage, Field Ditch 607
Waste Storage Facility 313
Manure Transfer 634
Waste Utilization 633
Roof Runoff Structure 558

Improvements to the waste storage facility will cost $10,000, and require an additional $200/year operation and maintenance over 20 years. A ditch and vegetative treatment strip will be used to control any waste water that leaves the improved storage facility at a cost of $2,000 to install, $250/Year to operate and maintain and will last five years. Solid manure will be applied to cropland following a nutrient management plan, or hauled and treated off site. Manure transfer and waste utilization will cost $500 each year The new facility will keep the manure out of surface and groundwater. Use 8% interest rate.

Waste Treatment Strip

"+"	"-"
Improved Water Quality **Stay in Business** **Avoid Fines**	**Waste Storage Structure Costs = $10,000** **20 years, 8%, .10 Annuity** **.10 * $10,000 + $200/Yr = $1,200/Year** **Waste Treatment Strip Costs = $2,000** **10 years, 8%, .15 Annuity** **.15 * $2,000 + $250/Yr = $550/Acre/Year** **Manure Management Costs = $500**
Total Benefits: $0/Ac/Yr	**Total Costs: $2,250/Ac/Yr**
Net Benefit: -$2,250/Ac/Yr	

Swine/Convert or Expand Existing Swine Operation to Hoop Structures Option #3

Maintain or increase existing herd size. The investment in hoop structures will be $55/head, and last 15 years. One hoop structure will house 300 hogs/structure/year (150 hogs over two cycles). The hoop house will allow the manure to be collected with the straw composted and applied to cropland. Additional straw bedding and manure management costs will be $2/Head/Year. Manure management costs will be reduced by $2,500 each year. Use 8% interest rate.

Hoop Structures

"+"	"-"
Reduced Manure Management Costs = $2,500/Year	**Hoop House Costs = $55/head * 150 Head = $8,250** **15 years, 8%, .12 Annuity** **.12 * $8,250 = $990/Year** **Straw/Bedding Costs = $2.00/Hd * 300 Hd = $600/Year** **Apply Manure to Cropland or Haul Offsite**
Total Benefits: $2,500/Yr	**Total Costs: $1,590/Yr**
Net Benefit: $910/Yr	

Swine/Increase Hog Production 1,000 Head/Facility/Year Option #4

Build a new confinement facility which contains 1,000 head/facility/year (500 hogs over two cycles). The building is 8,000 square feet, on 3 acres, will cost $250,000 to build and last 20 years. It will cost $25,000 to remove the existing swine structures. Manure storage, management and transfer facilities will cost an additional $100,000. Hauling excess manure solids offsite will cost $25/Head/Year. The new swine operation facilities operation and maintenance is reduced by $75/Head/Year. Use 8% interest rate.

New Confinement Facility

"+"	"-"
New Swine Facilities Reduce O&M = $75.00/Head/Yr	**New facility Costs = $250,000** **20 years, 8%, .102 Annuity** **.102 * $250,000/1,000 Head = $25.50/Head/Year** **Waste Storage Improvements = $100,000** **20 years, 8%, .102 Annuity** **.102 * $100,000/1,000 Head = $10.20/Head/Year** **Hauling Manure Offsite = $25/Head/Year** **Remove Existing Swine Facilities = $25,000** **20 years, 8%, .102 Annuity** **.102 * $25,000/1,000 Head = $2.55/Head/Year**
Total Benefits: $75.00/Head/Year	**Total Costs: $63.25/Head/Year**
Net Benefit: $11.75/Head/Year	

Swine/Composting Manure Option #5

The liquid and solid manure will no longer be surface applied, but will be composted with bedding material or other organic matter and spread on the field and incorporated into the soil following a nutrient management plan. The composting facility will cost $40,000 and last 25 years. Field application costs will be the same as the existing manure spreading costs. If the Hoop Structure are used there will be no increase in straw costs, if the existing facilities are used, straw composting costs will be $3/Acre/Year. Crop yields are expected in increase 7% and the manure odor will be significantly reduced. Use 8% interest rate.

Composting

"+"	"-"
Increase in Crop Yields = $320/Ac * .07 = $22.40/Ac/Yr	**Composting Facility = $40,000** **25 years, 8%, .094 Annuity** **.094 * $40,000 = $3,760/Year** **$3,760/200 Acres = $18.80/Acre/Year** **Straw/Bedding Costs = $3/Acre/Year**
Total Benefits: $22.40/Ac/Yr	**Total Costs: $21.80/Yr**
Net Benefit: $.60/Ac/Yr	

Swine/Injecting Manure #6

The liquid manure will no longer be surface applied, but will be injected following a nutrient management plan. The new injection equipment will cost $15,000 and last 25 years. The field application cost will increase $2/Acre over the current manure spreading costs. Crop yields are expected in increase 3% and the manure odor will be significantly reduced. Solid manure will continue to be surface applied and tilled in when possible. Use 8% interest rate.

~~**Hoop Structures**~~

"+"	"-"
Increase in Crop Yields = $320/Ac * .03 = $9.60/Ac/Yr	**Injector Cost = $15,000** **25 years, 8%, .094 Annuity** **.094 * $15,000 = $1,410/Year** **$1,410/200 Acres = $7.05/Acre/Year** **Field Application Costs = $2/Acre/Year**
Total Benefits: $9.60/Acre/Year	**Total Costs: $9.05/Acre/Year**
Net Benefit: $.45/Ac/Yr	

Example

Credit Limit = $100,000

Improvements:

Pasture	**$10,000**	
Timber	**$50,000**	
Filters	**$1,000**	
NT Drill	**$15,000**	
	$76,000	**- Below Credit Limit**
8%, 5yr	**$19,035**	**-Loan on Income/Expense Statement**