



Purpose. To explain the process of developing economic case studies on the implementation of conservation practices for inclusion in Section 5 of the FOTG.

Effective Date. Effective upon receipt.

Explanation. The technical note was developed to explain what case studies are used for and provide guidance on the process of developing economic case studies for inclusion in the FOTG and other uses, to illustrate the impacts of conservation practices on the producer's business operation and society.

Distribution. This directive is available on the NRCS Electronic Directives System website at <http://directives.sc.egov.usda.gov/>.

Filing Instructions. Due to printing and distribution costs, the availability of this information is limited to electronic format. If a paper copy is retained, file it sequentially under the Nutrient Management subheading within Title 190 of the Technical Note binder.

Contact. Contact Julie Suhr Pierce, National Economist, Ecological Sciences Division, or Lynn Knight, Agricultural Economist, East National Technology Support Center, with questions regarding this directive.

NOLLER HERBERT
Deputy Chief for Science and Technology

Attachment – TN 200-ECN-6, Developing Conservation Case Studies for Decision-Making

DIST: Insert distribution code

ECONOMICS TECHNICAL NOTE

Developing Conservation Case Studies for Decision-making

By
Lynn Knight, ENTSC Economist

Case studies or “Producer Experiences” are actual stories developed to present social, economic, and environmental information on the conservation effects of implementing NRCS conservation practices. Typically, field conservationists will make observations of conservation treatments applied by one or more land user(s) and record the effects. Case study information may also be available from conservation field trials, Conservation Innovation Grant projects, university research plots, or other field demonstration sites. Case studies are a tool to document producer experiences, and a practical method for improving our planning, prioritizing assistance, and reaching out to new agricultural producers. These experiences provide a practical source of information that shows how a prescribed treatment can work.

Case studies are not required to follow any specific formatting although they are readily developed from information gathered during the nine steps of planning or other scientific methods. Case studies are used to evaluate the effects of conservation and do not require the degree of detail, or the rigor of analysis used in university level research. They should be much more insightful, however, than casual observation and help us gain a better understanding of the ecological implications of change from current production systems to conservation treatments. Case studies may be used to complete the Conservation Treatment Information worksheet, which is stored in the Field Office Technical Guide (FOTG), Section V, titled “Producer Experiences” or “Case Studies” for use in future planning efforts and training activities. Different states’ FOTGs may place case studies in either “Producer Experiences” or “Case Studies” depending on state policy. For the purposes of this technical note, the term “Case Studies” will be used in lieu of “Producer Experiences;” this guidance, however, could apply to either section of the FOTG.

Potential Problems with Case Studies

Attributing change to a conservation treatment is potentially the most complex and uncertain aspect a producer may experience. Predicting future results from a single observation is exceedingly difficult and typically lacks the scientific foundation necessary to identifying a trend. This is the main weakness of using this approach to predict the effects and impacts of conservation work.

Examples of the potential problems with case studies that could complicate our understanding of the effects of conservation are:

- Variability in weather conditions, time of growing season, and unusually low rainfall could cause yields to be lower than expected with the conservation system.
- Changes in crop varieties, fertilizers, modifications to tillage depth or timing.
- Measurement errors in inputs or outputs.
- Lack of control in the benchmark situation or other variables for comparison.
- Biological or chemical changes in the soil which might solely be a function of time and can be unrelated to the treatment.
- Normal statistical variation in crop or livestock yields.
 - Significant statistical variation provides low confidence in an outcome.
- Any number of other measurable outcomes can occur which may or may not be related to the treatment.

These weaknesses, however, do not destroy the usefulness of case studies. Above all, it must be made clear to land users that *case study results* achieved on one farm are an example of what can reasonably happen by implementing conservation practices or activities. The magnitude of change most likely will be different on different farms but should be similar to the case study results.

Paying close attention to details, objective planning, and collecting quality “after treatment” data will help minimize errors. In addition, data collected over several seasons will tend to minimize the environmental variability in responses to treatment.

There are five considerations for conducting effective case studies:

1. Identify **Goals** – what are your goals and objectives for conducting the case study?
2. Determine the level of **Detail**
3. Select the appropriate **Producer**
4. Define the **Content** of the case study
5. Select the appropriate **Format**

Goals

Case studies may have many purposes. Case studies can document producer success stories that are useful for helping others understand the impacts of implementing conservation measures. Other types of case studies focus on available research and contain detailed information. Whatever the strategy, the main purpose of any case study should be focused on a combination of communications and outreach to convince a producer of the benefits of conservation or at least help them understand the pros and cons associated with adopting specific conservation practices.

Amount of Detail

The amount of information presented in a case study depends upon the audience and may be formatted differently for each specific audience. It is important to note that it is not necessary to collect detailed information; the more information that is collected, however, the more ways the information can be presented.

The following table lists three types of case studies that can be used to illustrate the economic, social, and environmental impacts expected on a producer’s farm/ranch, along with the advantages and disadvantages of each.

Type of Case Study	Description	Pros	Cons	Examples
T-Charts	Brief descriptions of the qualitative and quantitative benefits and costs of a particular activity; only identifies “things that change” in the operation.	Relatively quick and easy to document “before” and “after” effects, typically 1-2 pages.	Lacks detail behind the assumptions.	Basic Economic Analysis Using T-Charts – NRCS Technical Note 200-ECN-1
Narrative Informational Sheet	Descriptive text information often in “newspaper” format; few quantity or dollar estimates.	Easy to read, especially for those that are not comfortable with economics or data. 1-2 pages. Meant to “whet the appetite”.	May not provide enough information for a producer to make a commitment to change. Easy to focus on “success” and to discount obstacles, which can negatively impact credibility.	Specific examples include Missouri Cover Crop Economics (NRCS): Adding Cover Crops to a Soybean Rotation ; Adding Cover Crops to Continuous Corn with Grazing ; and Adding Cover Crops for Seed Production to a Corn/Soybean Rotation .
Detailed Case Study	Detailed description of the farming operation(s) including social considerations, qualitative, and quantitative benefits and costs. Analyzes the “before” and “after” effects, or common effects of multiple case studies.	Provides information that can be used for a variety of products, including T-charts and narrative informational sheets. Informs producers of what they may be able to expect should they adopt the practices described in the study.	Time-consuming; may take effort to find producers willing to provide sufficient information. May require multi-year data collection.	Transition to Cover Crop for a Beginning Farmer

Selection of Case Study Producers

A case study begins by defining the resource concerns to study, identifying the goals and objectives of the land user and NRCS, and identifying the conservation treatment. The next step is to determine the number of producers needed for the study and which land users to select. The three criteria for selecting land users are: credibility, representativeness, and diversity of participants.

The producers selected need to be credible to the targeted audience. Can the audience relate to the case study subject? Are the results believable? Is the farmer someone that others would consider authoritative?

The case study farm needs to have representative experiences similar to the diverse farm types for the area being communicated to in an outreach context. If the targeted land users do not feel the subject farm or treatments are applicable to themselves, they will not look to it as a reference or guide.

Planners should begin by thinking about the resource base in their area (county resource and land-use situations). What resource settings are dominant in this county and what are the main associated problems and opportunities?

Answering these questions will help the person writing the case study to develop a strategic view of the area and will direct efforts to situations where the needs and opportunities are greatest. Some basic county level resource and land-use data will facilitate the initial part of the case study development process.

Once the dominant crop/livestock and resource settings for the county are identified, predominant treatments can be identified and aligned with the land-use situations. Then priorities can be established for developing case studies.

The key to success is to select resource situations with a broad applicability to many land-users; i.e., the studies should be developed for major resource concerns on soil mapping units and in resource use situations that represent a significant portion of the resource users in the county.

These data and a clear understanding of the resource condition, conflicts in use, current trends, and expected future changes can be viewed along with knowledge of the socio-economic groups in the area to help the writer select subjects and farmer candidates.

A cooperative, knowledgeable farmer is one of the most important elements for a successful case study. If the cooperating farmer is a respected member of the community, it will make it easier to convince other farmers to accept the results. Studies show that a farmer's most respected source of information about new crops, practices, and technologies is other farmers. If the results are obtained on the farm of a respected local resident, one of the key concerns of most farmers will be satisfied. For new and untested technology, an innovator is probably the best prospect.

Information to Include

Context—the “Who”, “Where”, “When”, “What” and “Why” of the case study—is important. The degree of detail may vary according to the overall purpose of the case study.

First, describe the farming operation, the farmer, the household, and other social considerations.

Next, describe where the farm is located, the headquarters, field and tract information, the crops or livestock grown, the biophysical resource setting (i.e., soil, slope, etc.), and other appropriate conservation effects information. Discuss the impetus for change that motivated the producer to alter their existing practices.

Specify when the farmer started the process of adopting new conservation practices and how long these practices have been used. Discuss the benchmark condition (before treatment) in terms of the resources of concern from the producer's point of view. These are the priority resource problems that the case study will focus on. Additional information may be added, if desired, regarding other concerns or concerns noted by the planner if that information helps describe the setting.

Next, describe the specific conservation treatments applied, the kinds, amount and timing of

actions undertaken, and the expected outcomes in terms of solving resource problems and meeting social, cultural, and economic objectives.

Finally, it is important to discuss the farmer's motivations for adopting the conservation treatments so that the audience can relate to the reasons why the farmer made a particular decision. The reasons why producers want to adopt or maintain the practices included in the case study may have changed over time, so a "before and after" discussion of motivating factors can be useful.

Documentation to Include

Documentation for a case study can be developed as part of ongoing conservation planning work with little extra time needed during the review of the farm operation and while developing and evaluating alternatives. In addition, follow-up evaluation is needed after the conservation plan has been implemented. It will serve to either verify or invalidate planning expectations and the results that the decision-maker had hoped to achieve.

Existing conservation plan notes may contain some or all of the information needed to produce an adequate case study document. Include the type, amounts, and timing of actions taken to implement conservation treatments.

Common sense and professional judgment should guide the degree of detail and selection of input and output factors on which to collect data. For example, planners can ask themselves the question: "What should I observe in order to gauge results and judge "successes?" Such efforts will help the to prioritize system variables and to streamline data collection and analysis.

The outline for a conservation treatment information sheet can include the major headings below with brief descriptions. Photographs and quotes from the producer are also helpful. The sections of the information sheet can include:

1. **Resource Setting:** this could include headquarters, field and tract information, crops or livestock grown, social considerations, and so on.
2. **Current (Benchmark) Condition:** explain current or benchmark condition (before treatment) in terms of the resources of concern from the producer's point of view. These are the priority resource problems that the case study will focus on. Additional information may be added if desired regarding other concerns or concerns noted by the planner if that information helps to describe the setting or benchmark conditions.
3. **Changing Directions:** explain what motivated the land user to alter their existing practices or business model.
4. **Alternate Condition:** explain the change in treatment and how it addressed the priority resource problems. It is important to address the producer's perspective on how the change impacted the farming operation in addition to how the change impacted the natural resources.

Alternative Types of Case Studies

Case Studies can be based on a:

1. Comparison of the "before and after treatment" conditions on a single farm;

2. Comparison of two separate but comparable resource or land use situations on different farms or even on the same farm, i.e., “with and without treatment”; or the “before” treatment condition and an “after” treatment condition.
3. Simple record of the results a farmer experiences “with treatment” on a single site regardless of the “before” treatment conditions.

The first and second options require data collection on the “before treatment” or benchmark situation and the “after treatment” condition arising from the conservation option adopted.

The main advantage of the first two methods over the third method is the easy identification of conservation impacts or change. Another advantage over the third approach is the data from “before and after” or “with and without” treatment help to assure that all important issues and planning steps have been followed. The conservation effects and associated impacts provide an abundance of information for new clients to begin evaluating the appropriateness of the case study to their specific situation and then to build their own conservation plans.

The third alternative represents the simplest, easiest approach, but it inherently has the greatest risk for misunderstanding of the cause-and-effect relationships because it focuses on “with treatment” conditions only. Interpreting specific changes attributable to conservation treatments with this method can be misleading because important considerations may be overlooked or left out.

In summary, the results of any case study must be described within a context that identifies the resource situation and the actions taken to achieve expected treatment outcomes in addition to the timing of those actions.

How to Handle Multi-year Rotations

Information from each of the years of a multi-year rotation must be collected and kept separate. If a multi-year rotation is the conservation option being evaluated and compared to a continuous crop benchmark condition, then one needs to do some summarizing and averaging over those years to make comparisons.

Planning assistance from the area or state office may be needed for case studies. The point to remember is that information must be collected regarding the kinds, amounts, and timing of actions and the resulting effects for each year of the treatment rotation so the overall outcome can be compared to the benchmark or “before treatment” condition.

Developing Case Studies in a Group Setting

One of the most productive ways to develop materials is when a group of employees within a specified geographic area work together. Group interaction could greatly facilitate both development of case studies and training in their development and use.

In order to gain the most from group interaction, specific resource concerns or land use could be assigned to individuals; participants could all work on the same resource/land use situation or on completely different situations. Working on different aspects of a single conservation project individually or in small groups can facilitate a broader understanding of multiple situations and avoid duplication of efforts.

Case Study Guidance Summary

1. Select a priority resource problem.
2. Select a typical resource use system such as a crop rotation and/or livestock enterprise. Identify the benchmark or before-treatment resource and land use situation, problems, and/or opportunities.
3. Select a cooperative land user.
4. Describe basic information about the client's operation and demographics (age, level of farming experience), the farming operation itself (type of operation, acres, crops and/or livestock produced, etc.), the client's objectives, concerns, and understanding of their resource condition, and the outcomes they desire.
5. Describe the benchmark or before-treatment resource and land use situation, problems, and opportunities. Include soils crop rotation, etc. in describing the benchmark.
6. Describe the treatment in terms of what was changed in term of the kind and amounts of inputs and the timing of actions.
7. Describe the conservation effects relevant to the resource concerns and on-going farm operations. The effects measured will be physical and biological. Dollar values for the effects might also be included.
8. Add comments about other observations, lessons learned, or information gaps and research needs.
9. File final case study both in Section V of your state's FOTG under "Case Studies" or "Producer Experiences" and on your state's economic webpage.

Summary and Conclusions

Gathering data to document a case study need not require significant efforts beyond normal conservation planning activities. Properly structured, case studies will provide valuable insights on actual results from conservation treatments experienced by producers in the area. These insights will provide know about outcomes experienced by area farmers. Thus, recommendations for treatments are more credible because of a greater "product" knowledge and understanding. Farmers will recognize this expertise, and planning effectiveness should increase accordingly. One should be better able to apply "professional selling skills" and other conservation marketing concepts to identify and target priority resource problems and potential cooperators.

Case Studies will also help build a permanent record of treatment results that are very useful for selling conservation and that won't disappear as employees retire or transfer. They should also serve technology transfer purposes when shared between field offices and with other interested parties. The information contained in case studies enables planners with various levels of

experience to have access to institutional knowledge from the past.

Finally, going through the process of developing and evaluating a case study through T-charts, case studies, or Conservation Effects for Decisionmaking (CED) worksheets could be an excellent training exercise for new employees. It could help them to refine their knowledge of planning and to enhance their measurement skills and use of predictive models.

Additional Resources:

CASE STUDY RESEARCH/OUTREACH INTERNET RESOURCES

Literature on Case Studies in Extension Programming

- Oxarart and Monroe (2012) – JOE 50(1): 1FEA8. “Using interesting text to communicate complex NR issues” http://www.joe.org/joe/2012february/pdf/JOE_v50_1a8.pdf
- Journal of extension article on use of real-farm case studies as part of water quality extension program (Hudson & Harrison, 2006; JOE 44(5). Case studies used in workshop to introduce complexity and concrete focus to group discussions <http://www.joe.org/joe/2006october/iw7.php>
- As teaching tool – can help adult learners apply/engage complex concepts (Ota et al JOE 44(6) Dec 2006. <http://www.joe.org/joe/2006december/tt5.php>

Guides to Case Study Research Methods

- Gunderson 2011 (Developing and Using Case Studies – in classes or courses as a teaching tool) http://www.afaas-africa.org/media/uploads/publications/meas_tn_developing_and_using_case_studies_-_gunderson_-_uf_-_aug_2011.pdf
- Overviews of Case Studies as a Research Method
 - RA Palmquist UT Class resource <https://www.ischool.utexas.edu/~ssoy/usesusers/1391d1b.htm>
 - RK Yin book: Cast Study Research: Design & Methods (<http://www.amazon.com/Case-Study-Research-Methods-Applied/dp/1452242569>)
 - RE Stake book: The Art of Case Study Research (<http://www.amazon.com/The-Art-Case-Study-Research/dp/080395767X>)
 - Comparative Case Study methods in Impact Evaluation: http://devinfo.live.info/impact_evaluation/ie/img/downloads/Comparative_Case_Studies_EN_G.pdf

USDA/NRCS Resources (also available by searching for titles)

- “Using Case Studies to Facilitate Farmer Conservation Decisions” webinar: <http://www.conservationwebinars.net/webinars/using-case-studies-to-facilitate-farmer-conservation-decisions>
- NRCS FOTG material
- NRCS Economic Case Studies:
 - <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/econ/data/?cid=nrcseprd1298423>
- Farms of the Future (participating in environmental markets or payment for ecosystem services); 2-page fact sheet overview of project, lessons learned, & poster: http://www.usda.gov/oce/environmental_markets/case_studies.htm
- CREP projects in PA (mostly description and itemization of wildlife benefits): http://www.state.nj.us/dep/fgw/pdf/mgtguide/ch11e_pa_crep.pdf

- Rio Grande Community Farm:
https://prod.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_067770.pdf
- Know Your Farmer Know your Food Case Studies (success stories, exemplars):
http://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=KYF_Compass_Case_Studies.html
- Creating wildlife habitat through federal farm programs – objective driven approach through case studies:
 - http://www.deltafarm.org/files/Creating_Wildlife_Habitat_Federal_Programs.pdf
- Missouri Cover Crop Economics Case Studies:
 - <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/mo/soils/health/?cid=nrcseprd352825>
- American Farmland Trust/NRCS Soil Health Economic Case studies:
 - <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/health/?cid=nrcseprd1470394>, or
 - <https://farmland.org/soil-health-case-studies/>