Conservation Measures Working Paper No. 1[1]
A Collaboration of the Conservation Strategies &Conservation Programs Divisions
April 21, 2008

Evaluating the Conservation Work of the Nature Conservancy: Clarifying Questions and Establishing Terminology

Executive Summary

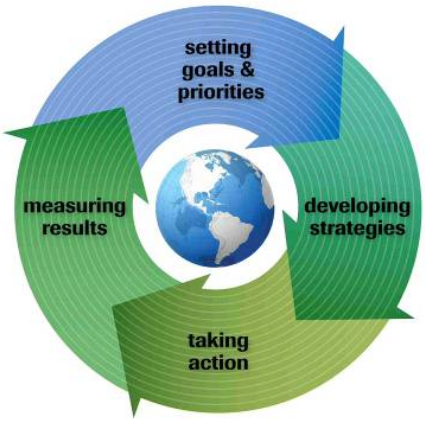
The Nature Conservancy is committed to measuring the results of our conservation work. New methods, tools and approaches are being developed across the organization, and important lessons are being learned. In this first of a series of working papers about our measures work, we clarify the questions we are addressing, the measures we are developing to address them, and the differences that these measures will make to our conservation work. We provide examples from across the Conservancy to illustrate how these various concepts, methods, and tools have been put into practice, and the benefits of these efforts.

We begin by dividing the world of conservation measures into two categories – *Status Measures* and *Strategy Effectiveness Measures*. *Status measures* address the general question: how is the biodiversity doing that we care about? More specifically, these measures evaluate the integrity and viability of biodiversity, threats, and conservation management at the multiple levels the Conservancy works: major habitat types, regions and ecoregions, and conservation projects. Status measures are central to generating estimates of effective conservation, which is used primarily to identify priorities for our actions and to evaluate overall progress toward broad goals, independent of our actions. This information has already been critical in establishing priorities for where we should work, and informing our relative investments in these priority areas. *Strategy effectiveness measures* are used to evaluate progress in achieving desired outcomes and results that stem from implementing our strategies and actions, made explicit by tracking progress toward measurable objectives and the actions associated with them. This is a newer emphasis for the Conservancy, and has stimulated the development of new methods for tracking progress in the implementation of a strategy. As we advance our implementation, managers and scientists must work together closely to identify the most important management questions, and the scientists and practitioners must identify the most appropriate measures and methods for answering these questions. Implementation of targeted *Status Measures* and S*trategy Effectiveness Measures* will enhance our ability to adaptively manage conservation efforts.

[1] This paper is the first in a series of working papers on conservation measures intended to communicate important issues on measuring and evaluating our work to scientists, conservation practitioners, and program managers across the Conservancy.

Introduction

For over a decade, The Nature Conservancy has taken a systematic approach to its work that we refer to as Conservation by Design. In recent years, we have turned our attention to a critical, yet under-addressed component of this approach – measuring results. Although the Conservancy is committed to developing a strong measures program, it has been difficult to establish traction for our measures efforts across the whole organization. One reason for this difficulty is that we have not ensured that the questions we are trying to answer with our work on measuring results are well understood and endorsed by managers, scientists, and project staff at various levels of the Conservancy. In this working paper, we focus on establishing definitions and explanations of the major ingredients of our measures program, pay special attention to the management questions we are addressing with our measures work, and highlight how we foresee measures helping us do better conservation.



The Nature Conservancy's *Conservation by Design* organizational framework for achieving mission success.

Why 'Measure'?

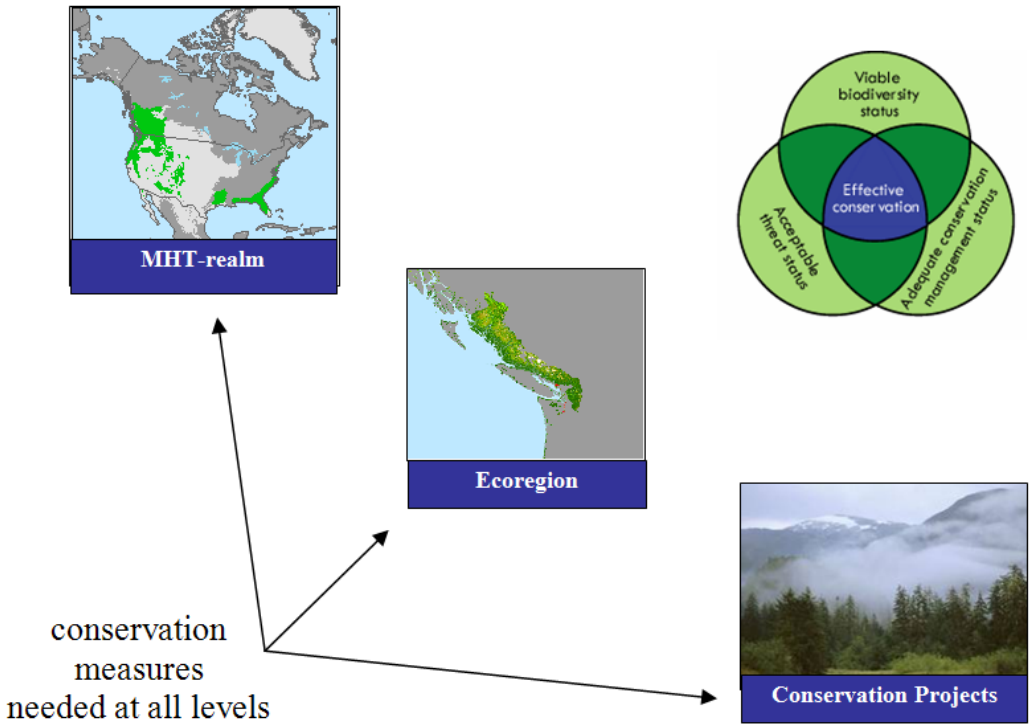
The business of The Nature Conservancy is to implement conservation strategies that are intended to maintain or restore biodiversity. To be successful in this business, we need to know whether the trends in the viability and integrity of biodiversity, the status of threats, and the ecological stewardship of conservation lands and waters are in a positive direction, holding steady, or declining. We also need to understand whether the strategies and actions that we are taking at a variety of scales through hundreds of conservation projects around the globe are having their intended effects.

We start by defining two types of conservation measures – Status Measures and Strategy Effectiveness Measures. For each of these types of measures, we articulate the types of management questions that these measures address, illustrate the application of these measures with examples, and provide links to more detailed guidance.

A. Status Measures

Generally speaking, *Status Measures* address the question: how is the biodiversity that we care about doing? These measures do not explicitly link the direct response of management actions with the ecological status of a conservation target. Applying these measures is similar to an annual medical check-up where the a doctor examines the usual vital signs – blood pressure, pulse, temperature, cholesterol - and asks the question: how's the patient doing? More specifically, these measures track 1) the viability and integrity of conservation targets (e.g., species, ecosystems), 2) the predicted impacts of threats to these targets, and 3) the degree to which lands and waters where these targets occur are being managed in a manner that is

consistent with biodiversity conservation. We collectively refer to these three individual measures as status measures. These measures can be combined to estimate the amount of land and water under effective conservation and the degree to which we are achieving conservation goals for biodiversity. We can ask questions about the status of biodiversity and use the resulting estimates of effective conservation to help set priorities for our work at three levels: Major Habitat Types and Realms (MHT-realm), Regions and Ecoregions, and Conservation Projects.



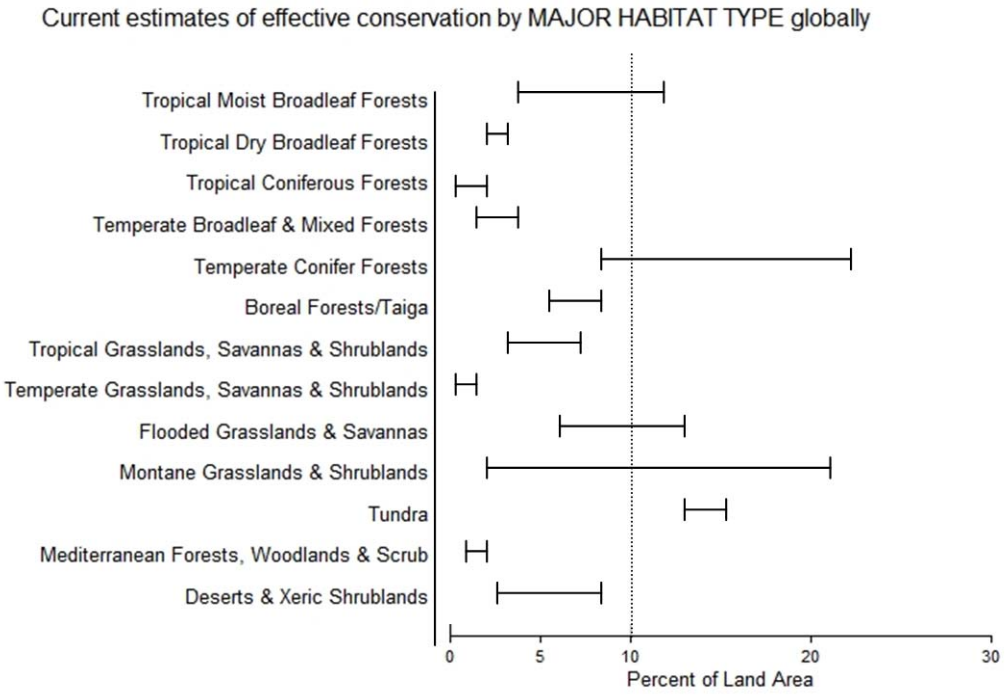
Conceptual representation of effective conservation and the three levels of conservation where it is applied by The Nature Conservancy. Generally speaking, as we move from the larger spatial scales of major habitat types to the relatively smaller spatial scales of ecoregions and most conservation projects, it is possible to estimate effective conservation with greater accuracy.

1. Major Habitat Type-Realm

Illustrative Measures Questions

- In which major habitat types globally are we falling significantly short of our 2015 organizational goal of achieving 10% effective conservation?
- What are the most important ecoregions within which to focus conservation actions to best achieve the 2015 goal?

To address these questions, the Conservancy undertook global analyses of effective conservation. The results of these analyses (see below), such as identifying a gap in conservation of temperate grasslands, were a major factor in shaping our capital campaign priority projects. Details on the results of the global habitat analyses are available in the 2006 Interim Report of the Habitat Analysis Team ((http://home.tnc/gcat/strategies/framework.html).



2. Ecoregions

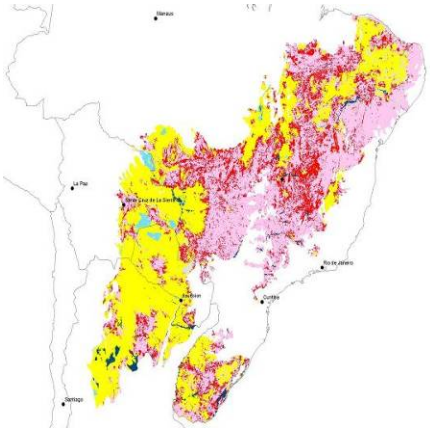
Illustrative Measures Questions

- Which areas in the ecoregion are currently thought to be under effective conservation? To what extent are conservation targets (e.g., ecosystem-level targets) being effectively conserved in the ecoregion?
- Where in the ecoregion should the Conservancy make future conservation investments?

We use data from Ecoregional Assessments to help answer these questions. Detailed guidance on the application of status measures within ecoregions is provided through the following link:

Higgins, J., R. Unnasch, and C. Supples. 2007. Ecoregional Status Measures Version 1.0: Framework and Technical Guidance to Estimate Effective Conservation.
http://conserveonline.org/docs/2007/08/ERSM_Framework_FINAL.pdf

The Nature Conservancy is currently developing and applying status measures in several ecoregions and regions. There is an art and science to generating these status measures and a future working paper will examine what we have learned about how to do this in a way that is commensurate with the needs of managers when making resource investment decisions. For the purposes of this working paper, it is useful to consider the progress that we have made to date in the application of these measures. For example, status measures have been applied at a regional scale in South America, as seen in this case study from the Central Savannas operating unit below. These analyses and the map below clearly reveal that the Central Savannas of South America are in a relatively poor and degraded ecological condition. The Conservancy's South America Region is using these analyses to set their own conservation priorities such as working on projects in areas where the integrity of ecosystems remains intact but there are serious threats that need abated or land-water management that needs improvement.

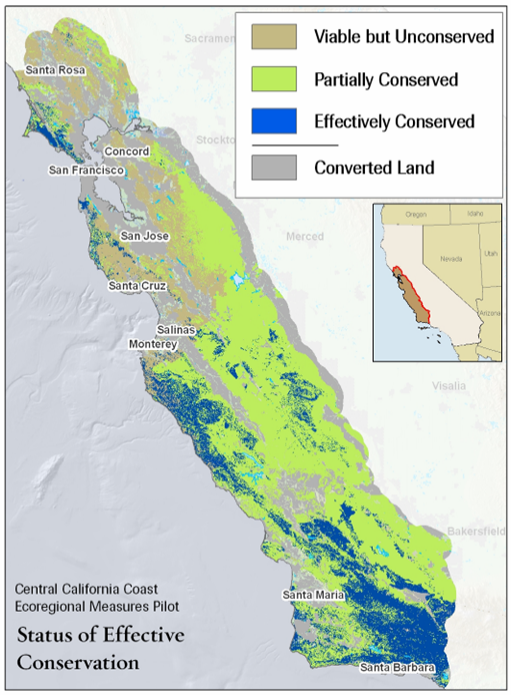


Central Savannas – South America

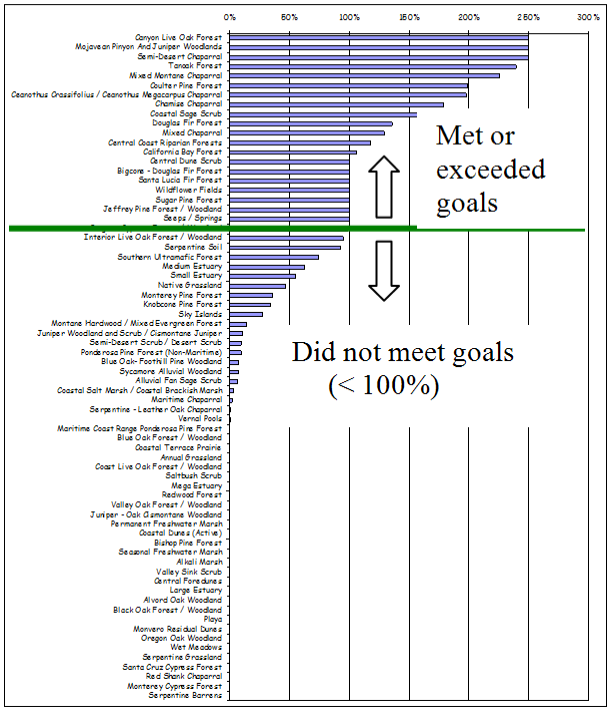
	Effective Conservation (EC)	Hectares	Percent
	Under EC (V. Good)	0	0
	Under EC (Good)	4,716,986	1
	Not Under EC (Fair)	171,074,639	37
	Not Under EC (Poor)	74,458,391	16
	Converted/Degraded	188,339,668	41
	Unknown	14,459,816	3
	Water	7,180,418	2
	Total	460,229,917	100

Similarly, estimates of effective conservation have been applied at a finer scale within ecoregions. In the Central California Coast ecoregion, their pilot study generated two ways to evaluate our progress in relation to: (a) the percentage of the ecoregion and the percentage of the ecoregional portfolio under effective conservation, and (b) the ecosystem-level conservation targets for that ecoregion and the degree to which they are under effective conservation. In this California example, what is most revealing is the large number of targets that fall either far below or substantially over their goals. Presumably, in this example the Conservancy would want to minimize its investments in ecosystem targets that exceed their goals (e.g., Canyon Live Oak Forests) and maximize them in targets that are far below (e.g., Annual Grasslands).

(A) Area of ecoregion



(B) Ecosystem Types



Biodiversity status measures for the Central California Coast ecoregion. These status estimates are reported in terms of (A) the area of the ecoregion or ecoregional portfolio under effective conservation

(shown in blue - 19.5% of the ecoregion, 26% of the ecoregional portfolio), and (B) the percentage of conservation target occurrences under effective conservation in relation to goals set for these targets in the ecoregional assessment (this graph is for ecosystem-level targets only).

Additional examples of the application status measures can be found at: http://conserveonline.org/workspaces/ersm.pilots

3. Conservation Projects[2]

Illustrative Measures Questions

- What conservation objectives should we be working to achieve?
- Which threats are the highest priority and will require conservation actions to abate?

With conservation projects, status measures are typically reported as overall status of focal conservation targets and threats in the Conservancy's Conservation Action Planning (CAP) process (e.g., focal target "X" viability is *Good*, the overall rank of critical threat "X" is *High*). They are used to define project actions and track the cumulative impact of actions on the viability of focal targets and on the degree of threat abatement. Status measures resulting from CAPs can be used to inform those developed at ecoregional and regional scales. It is possible to produce estimates of effective conservation at the level of conservation projects, but this is not a common practice in the Conservancy at this time. Although the information for all three status measures (biodiversity, threat, management of land/water) is generally available for estimating effective conservation, that information has not been applied in a manner to develop an adequate measure for the conservation management status of lands and waters. Efforts are currently underway to apply to develop and apply that status measure to all conservation areas in the United States (the US Conservation Management Status project) and to improve the capability of CAP workbooks to manage this type of information.

TNC's Conservation Action Planning process yields a status summary table for Biodiversity Status and for Threat Status. These status summary tables are available for many of the 900 projects within the Conservancy's ConPro database (http://conpro.tnc.org), a web-based information system for the Conservancy's conservation projects. Methods to develop and report status measures within the context of conservation projects can be found at: www.conservationgateway.org/cap/resources/2/1/hdbk-ch7/download.

B. Strategy Effectiveness Measures

Strategy effectiveness measures are used to address several important and related questions at different management levels within the Conservancy. For example:

- Are individual strategies and associated actions that we take within a conservation project having their intended effect (conservation outcomes – abating threats, conserving targets)?

[2] We are defining Conservation Project broadly to mean a set of complementary strategies at any scale designed to accomplish a previously articulated set of outcomes.

- How effective is a particular cross-cutting strategy (e.g., conservation easements) at conserving biodiversity across multiple conservation projects?

We take actions within conservation projects at a variety of scales. Sometimes actions focus directly on affecting changes to biodiversity targets themselves (e.g., planting trees to restore a forest) but often actions are directed at abating threats or addressing issues further removed from the conservation targets or direct threats themselves (e.g., changing policies, building the capacity of partners). By setting measurable objectives for each strategy and the actions associated with it, and developing and tracking indicators associated with each objective, we can evaluate the degree to which our projects are achieving their desired results. These objectives and indicators can be established for both intermediate results (sometimes referred to as implementation results) as well as for more ultimate outcome results (abating a threat, improving the status of biodiversity targets). These objectives and indicators and their application are collectively referred to as *strategy effectiveness measures*.

There is a broad spectrum of information that can be used to measure strategy effectiveness. Depending upon a variety of factors such as uncertainty in outcomes, level of financial investment, available partnerships, or opportunities to learn, we can invest in varying degrees of scientific rigor when applying strategy effectiveness measures. Tracking strategy effectiveness using experimental designs with replicated treatments (i.e., the conservation actions) and controls (i.e., measurements where no action is taken) provides the greatest level of inference in asserting the effectiveness of particular strategies but is often impractical for many situations. For many situations, less intensive monitoring may suffice. Alternatively, collecting field data will not be practical in many cases.

In all situations, we need to think clearly and transparently about how our actions will be translated to conservation progress. One tool that we can use to sharpen our thinking is *results chains*, which are essentially a series of "if-then" statements that conceptually map strategies, actions, measureable objectives, and indicators for those objectives. See Boxes 1 and 2 for examples that use this method. Components of strategy effectiveness indicators are viewable for many of the 900 conservation projects within the Conservancy's Conservation Project (ConPro) database, accessible at: http://conpro.tnc.org. Methods for developing and reporting strategy effectiveness measures within conservation projects can be found at: www.conservationgateway.org/cap/resources/2/1/hdbk-ch7/download. For more examples and tutorials, visit: http://conserveonline.org/workspaces/strategy.effectiveness.

For information on a new conservation project strategic planning software program called Miradi which supports the development of strategy effectiveness measures, visit: http://conserveonline.org/workspaces/Miradi.

Strategy effectiveness measures can be applied to conservation projects that occur at a variety of spatial scales from a local population of a conservation target to the landscape and region. The Nature Conservancy is currently conducting pilot projects in each administrative region to test different approaches to the application of strategy effectiveness measures. The knowledge that we gain from these pilot projects will be used to inform the development and implementation of a broader measures program across the Conservancy.

Additional Contact Information

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Future Working Papers in Conservation Measures

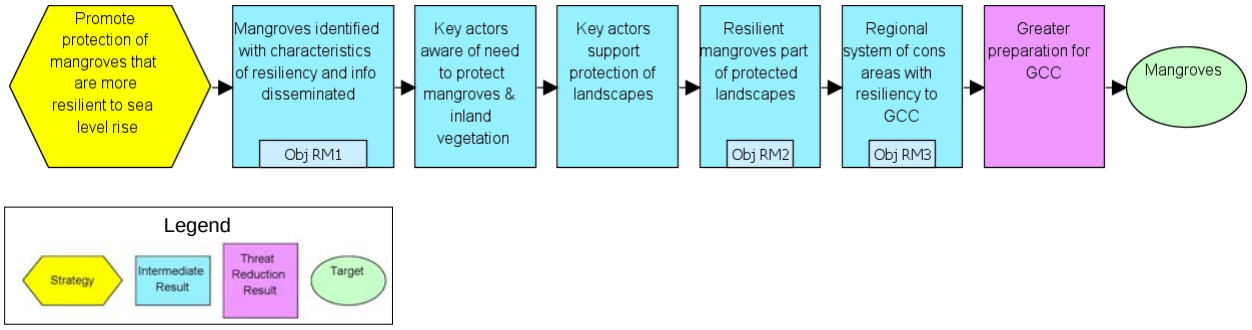
Future working papers in this series will address a number of important topics. Those topics currently under consideration include:

- Summaries of lessons learned in two upcoming peer review workshops on strategy effectiveness (June 2008) and status measures (fall 2008) and how those lessons are applied in the implementation of an organization-wide measures program.
- A how-to paper for considering if, when, how, and to what degree to invest in biological monitoring in a conservation project.
- How-to manuals for conducting biological monitoring for different types of conservation targets.
- Additional training opportunities and guidance material for applying status and strategy effectiveness measures at multiple scales.
- Scorecards and dashboards that managers can use at different levels of the Conservancy to track progress on priority projects and strategies and synthesize and present this information to various audiences.

BOX 1. Case Study: Strategy Effectiveness Measures and Results Chains in the Mesoamerican Reef.

Global climate change has been identified as one of the major threats to the Mesoamerican Reef ecoregion with coral reefs and mangroves being the two conservation targets most likely to be affected by global warming. We have identified four strategies to better prepare the reefs and mangroves for global climate change. We focus here on one strategy that emphasizes the adaptation and promotion of mangrove resilience.

In implementing this strategy, the MesoAmerican Reef Program will first identify resilient mangroves in the region, and then raise stakeholders' awareness of the importance of protecting these landscapes. The assumption is that if key stakeholders support the conservation of these landscapes, then resilient mangroves will be part of the protected landscapes included in the regional network of resilient conservation areas. This strategy is illustrated via the following results chain:



As part of this chain, a set of selected strategy objectives for promoting the protection of more resilient mangroves (e.g., RM1) and associated indicators are identified to assess shorter and longer-term progress for the strategy (see table below). These include the effectiveness of actions (i.e., intermediate results RM1-3) and biodiversity outcomes (i.e., indicators of mangrove viability).

Objectives	**Indicators**
RM1. By the end of 2011, mangroves in the MAR with characteristics of resiliency to sea level rise are identified and information is available about the projected economic impact of sea level rise on mangroves in the MAR.	• # of resilient mangrove forests identified. • # of reports on projected economic impacts of SLR on mangroves produced.
RM2. By 2015, 70% of the resilient "mangrove landscapes" (mangroves and adjacent natural areas) are included within a management regime. (current baseline = 54% of all mangroves)	• % of resilient mangrove occurrences under management regime.
RM3. By 2017, the no-take zones in the protected area system in the MAR includes 30% of the mangrove forests capable of adapting to predicted sea level rise.	• % of resilient mangroves included in MPA no-take zones and in special management regime zones.
Mangrove Goal of sustaining viable populations of mangroves within MAR.	• Aerial extent of mangroves • Degree of mangrove fragmentation • # km (or %) of mangrove landward edge with continuous natural vegetation.

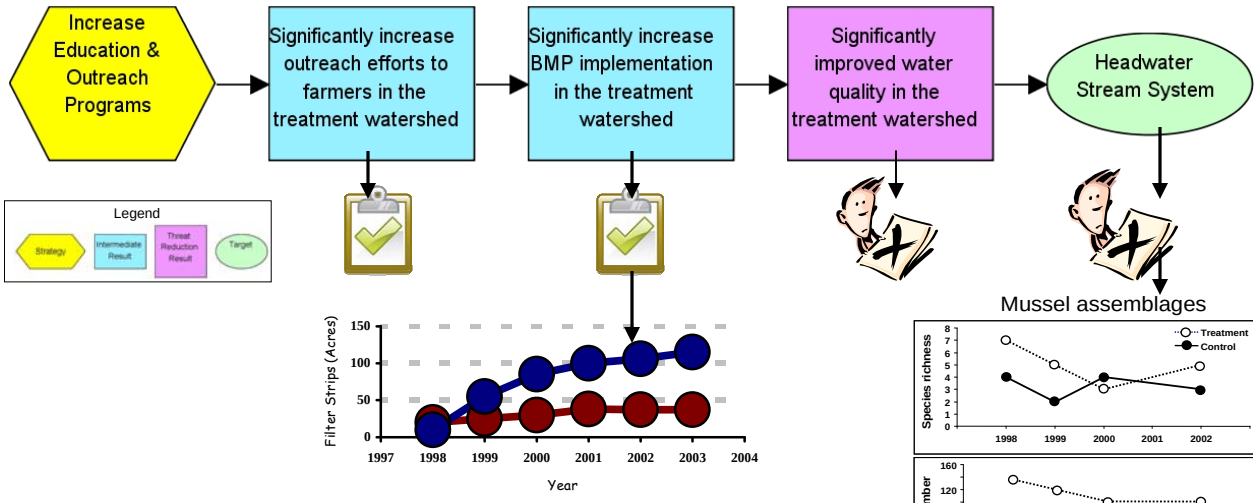
BOX 2. Case Study: Adaptive Management on the Mackinaw River, Illinois, USA.

The Mackinaw River is a 740,000 acre watershed that has attracted Conservancy involvement since 1990. It is one of Illinois' highest quality streams, selected as an ecoregional priority, particularly for freshwater species diversity (e.g., 100 fish and 32 mussel species). However, the Mackinaw River flows from a highly agricultural watershed, and this has led to high stresses to the system from agricultural practices.

Over seven years ago, the Conservancy – working with the local communities – agreed that increasing education and outreach efforts to promote existing government programs (known as agricultural Best Management Practices, or BMPs) was the most feasible way to improve water quality and the health of the river. The Conservancy established an experimental design, whereby one watershed received the benefits of the outreach program (called the treatment watershed), and one watershed of comparable size, location, and biological communities received no additional effort (called the control watershed).

The following results chain describes the objectives of the study. Since thresholds were not known for either how much BMP implementation was needed to result in detectable improvements in water quality in the tributary, or how much improvement in water quality was needed to see changes in stream biota, the objectives were to at least achieve statistically significant changes in the treatment watershed. Once these changes were detectable, determine if they resulted in biologically significant impacts.

The education and outreach program worked. Project staff significantly increased the number of farmers that were contacted, and this resulted in significantly higher BMP implementation (e.g., acres of filter strips below). However, they found no significant improvements in water quality, and no improvement in biological indicators – macroinvertebrate insects, fish, and mussels (in the graph below).



Filter Strip Implementation

Blue = Treatment Watershed

Red = Control Watershed

Based on this information, the project has adapted their strategy. The team is continuing the outreach but modifying the suite of strategies they are advancing. They have increased efforts to establish wetlands to intercept drain tiles running directly into streams within the treatment watershed and have initiated a modeling project to estimate how much wetland creation is needed to reduce nutrient runoff and soil erosion. As the Mackinaw is typical of agriculturally dominated watersheds, and agricultural watersheds are known to contribute significant amounts of nitrogen to the "dead zone" in the Gulf of Mexico, the potential importance of these new BMPs is significant. Until now, governmental agencies have relied on the types of traditional BMPs targeted in the initial outreach program. Created wetlands and experimental tile drainage systems were thought to be too risky when this project started, but are now being seen as playing an important role in improving water quality in agricultural watersheds.