

From the Mountain Top and Back to the Great Plains

A Vision for Enhancing IPM in a National Network



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Washington DC elevation: 50 ft
Manhattan, KS elevation: 1350 ft



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IPM musings

- What's old – What's new
- What doesn't change – What needs to change
- Communicating and Messaging to our audiences
 - In training for implementation and a better life
 - In education of the general public
 - In advocacy to lawmakers
- Vision of the future



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Technology



- Technology drives the new millennium.
- Technology is in every phase of our lives.
- Recent lecture – Wes Bush of Northrup-Grumman.
 - CEO, Chief financial officer, President of space technology sector.
 - “... when you combine the technologies that have come out of the defense industry with technologies from other industries and from great universities like KSU, together these have made **incalculable contributions to the advancement of the human condition**: the mitigation of poverty through the creation of whole new industries; the expansion of health care access to people whom, a few short years ago, would have had little chance for it; and perhaps most impactful of all, at least as the betterment of mankind is concerned, the **democratization of knowledge by placing it at the fingertips of anyone with a smartphone or laptop** almost anywhere around the globe.”



Technology

- “And this is where... (land-grant universities) come in — not just KSU, but all universities and colleges. Institutions like this have been vital in contributing to the development of this technology. And one of the primary roles of places like KSU is as **creative disruptors**. Traditionally, you do this by creating synergies that wouldn't exist if left to develop one by one — that's sort of a classic way of approaching it. In this manner, institutions like KSU help build the intersections between the technologies — these combinations that I talked about earlier that actually make these systems work. And when universities do it right, the fears and reservations associated with new technologies are often calmed and their potential gets socialized and made more welcomed in our lives. **And the result can be an advance of the human condition.**”



Technology

- Innovators
 - Create new ideas.
 - **Sustaining innovation** does not create new markets or value networks but rather only evolves existing ones with better value, allowing existing firms to compete with each others innovations.
 - Often incremental change.
- Disruptors
 - Create businesses/enterprises, products and services that are better — less expensive and more creative, useful and impactful — and scalable.
 - Displaces an existing market, industry, or technology and produces something new and more efficient and worthwhile. It is at once destructive and creative – creates a new paradigm.
 - Often radical change.

Pest Scouting

- Scouting is important!
- Scouting shows what is really going on!
- Scouting assures wise management decisions.
- Some important issues:
 - Scouting comes at a cost.
 - Producers are operating on thinner margins.
 - Producers use technology in every other element of their operations.





- Sensors
- Deployment
- Data Collection
- Data Warehousing

- Data Analysis
- Data Interpretation
- Ground Truthing?
- Rapid Response



Photo credit (left): Constituent Works Outlook Series - The OUTLOOK Series focuses on the business value of technology which is driving that democratizing technological paradigm.

(right): School Pest News schoolipm.tamu.edu

(Roscoe): John E. McDonald, Atlanta Magazine



- How close are we?
 - LGU development?
 - Who Deploys?
 - Commercialization?

- Problems?

- Big Data
- Open Data
- Ownership of Data
- Cost of Aata



How do we get there?

- ... and where is there?
- ... and what is it that we are getting there?
- Dream BIG!
- Build relationships with engineering, with clientele... dream together!
 - Innovations and Disruptions
 - Sensors/Sniffers – what are the signatures of pests that we can key in on with new technology?
- We need to bring technology along.
 - To advance the human condition; To create synergies;
 - To democratize technologies; To quell fears and reservations.
- Two questions – funding future development & current implementation
 - AFRI-CARE (not novel, not critical, not engaged) and
 - AFRI-Exploratory (not innovative enough).

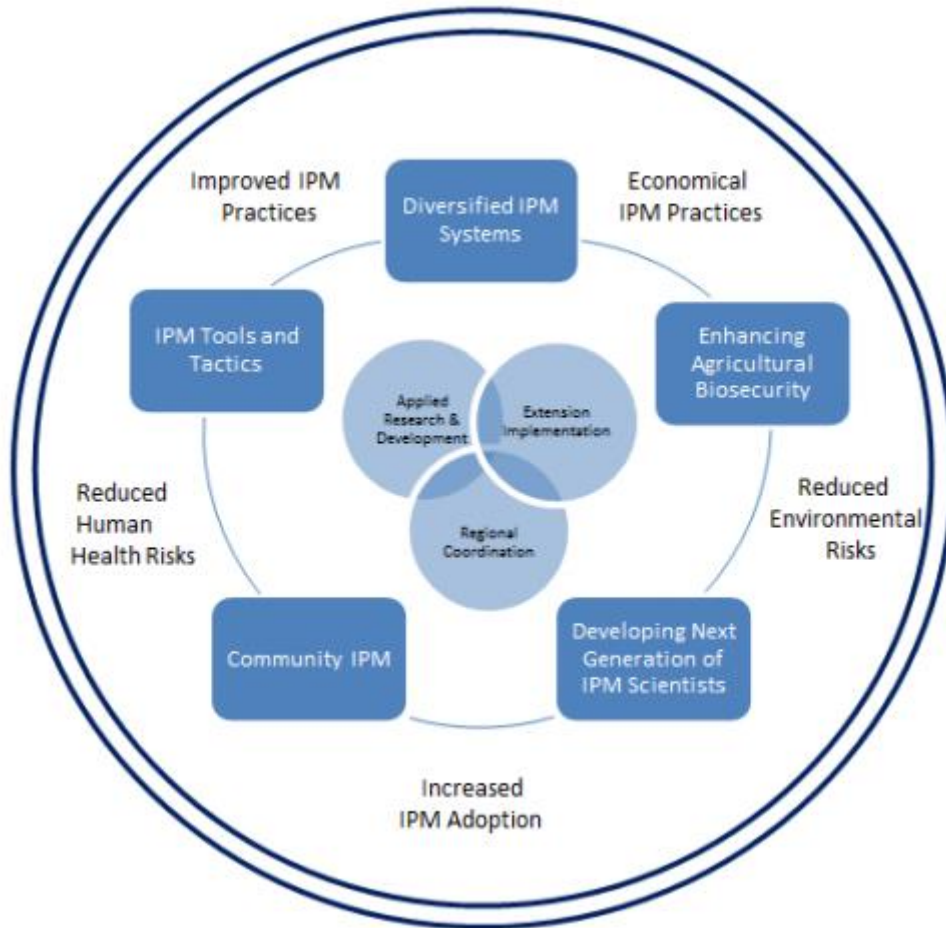


Show me the money!



- ... is IPM in crop budgets in your state?
- ... what is that number based on?
 - Money drives the farming (and every) equation!
 - No profitability → no production clientele; no consumer clientele.
 - IPM Roadmap principles:
 - Profitability
 - Human Health
 - Environmental Health

Sustainable Food Security Goals



IPM Roadmap Goals

Crop Protection and Pest Management

- What's missing?
 - Metrics
 - Communication
 - Probably other things too...

Communicating IPM

- Metrics and Evaluation
 - Can you prove your claims?
 - Are you modifying your approach?
 - Scale: large vs pilot/demo



Image credit: ClipartKid.com

Communicating IPM

- Collaborating with regulators
 - Agribusiness vs ag production
 - Corn bacterial stripe paradigm applied to School IPM



Image credit: (corn) – Tamra Jackson, UNL
(children): EECE, the College of New Jersey

Communicating IPM

- Knowing your audience
 - How to talk to growers and decision makers
 - Selling the reason for doing it
 - The right thing to do doesn't wash in today's paradigm
 - Economics sells in a tight market
 - Children's health works for schools – if there is an economic justification.

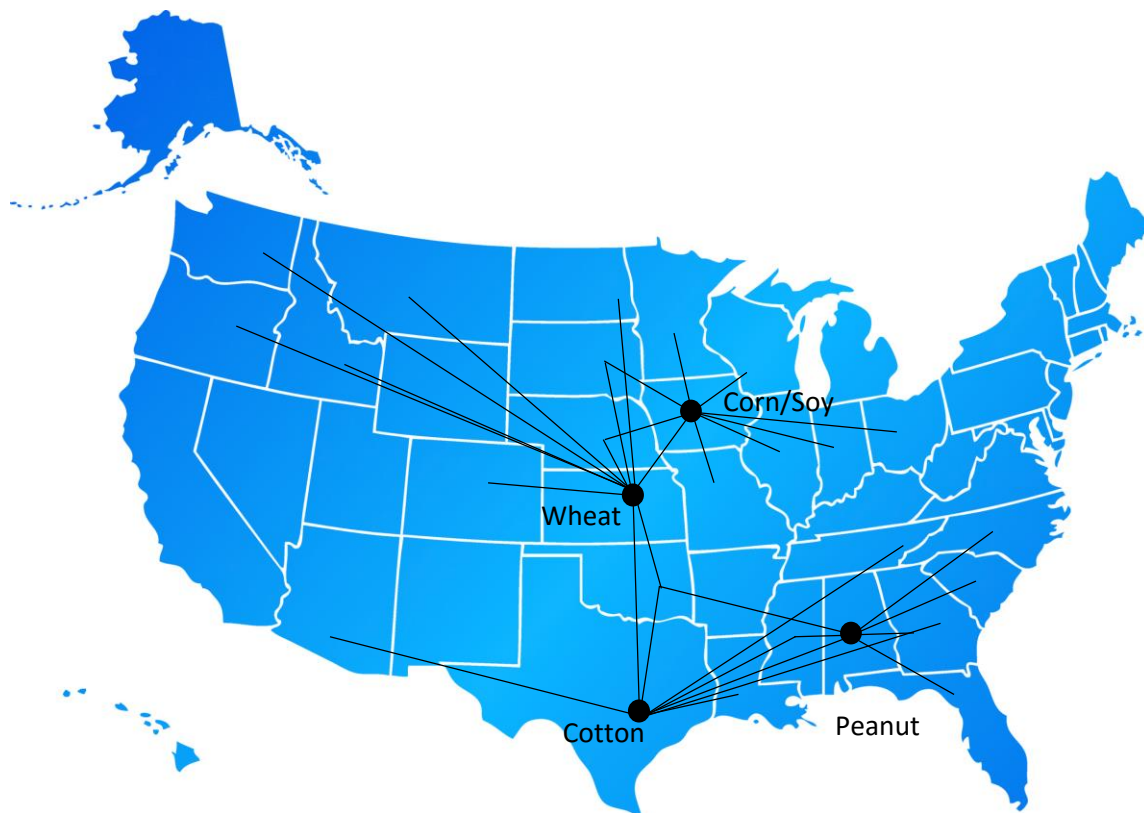
Communicating IPM

- A unifying message – common measures
- IPM is one side of a coin
- ICM is a principle that allows all systems to work (better):
 - Conventional ag
 - Sustainable ag
 - Organic ag
- Nuanced for dwelling spaces (schools and housing).

A New IPM Network?

- The goal of IPM in the competitive era was always to find new values, collaborations, efficiencies and leverage.
- Stumbling block of 'competitive'...
- Collaboration should increase competitiveness.
- Everyone has to contribute to a collaboration.
- Perhaps... Common metrics provides an opportunity?

A View of Collaboration



- Hypothetical webs develop from common needs.
- Programs focus on that clientele and intended outcome.
- Outcomes are measured from that common need and programming focus.

Avoid Alice's Fate



Alice to the Cheshire Cat: *“Would you tell me, please, which way I ought to go from here?”*

To which, the Cat responded: *“That depends a good deal on where you want to get to.”*

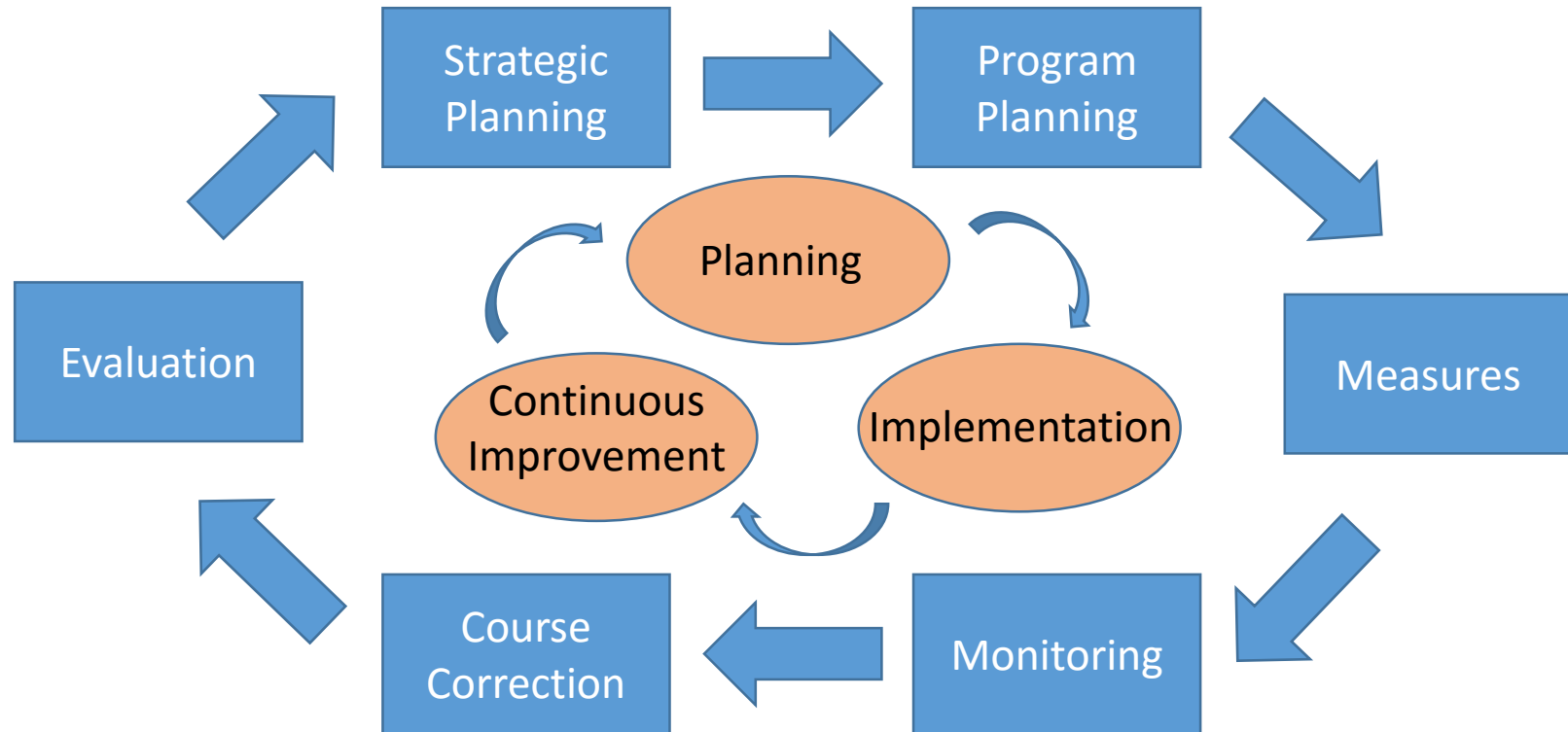
Alice: *“... I don't much care where –”*

Cat: *Then it doesn't matter which way you go*

Alice: *“So long as I get somewhere.”*

Cat: *“Oh, you're sure to do that, if only you walk long enough.”*

Rethinking Evaluation



Implementing IPM Measures

- How can we use measures to tell the story of IPM to our various audiences!
- What can we find that is overarching?
- What can we find that is meaningful?
- Can we identify five common measures that everyone will gather?
- Don't forget tools are available!

Evaluation Resources

IPM Planning and Evaluation

- [Home](#)
- [More on Logic Models](#)
- [Glossary/Acronyms](#)
- [Other Resources](#)
- [About This Site](#)

Phase II site

The current version of this site is designed for use in both Planning and Evaluating IPM projects/programs. In the future, we hope to add additional evaluation tools, third party data citations and additional information in the "Other Resources" section as they become available.

What defines a successful integrated pest management (IPM) program? How can we develop programs that will achieve our IPM goals? And how do we assess the true worth of an IPM program? These questions can be answered by careful *planning* and by conducting a *program evaluation*. This website includes resources that can help you plan an IPM program that you will be able to evaluate, so that you can determine its value.

[Why is evaluation of IPM programs important?](#)

[What is the relationship between planning and evaluation?](#)

This site contains 14 detailed examples of planning and evaluation models (also called *logic models*) to illustrate the relationships among desired

- Targeted audiences
- Short-Term impacts—changes in *knowledge*
- Intermediate-Term impacts—changes in *behavior*
- Long-Term impacts—changes in *condition*

Each example includes possible measures that can help you know how well you have achieved each short-, intermediate-, and long-term impact.

The links below provide examples of impacts and possible measures in different interest areas.



Production Agriculture	Residential and Public Areas		Natural Resources and Recreational Lands
	Indoor pesticide use	Outdoor pesticide use	
<ul style="list-style-type: none"> • Environmental impacts <ul style="list-style-type: none"> ▪ Nontarget organisms ▪ Water quality • Health impacts • Economic impacts 	<ul style="list-style-type: none"> • Health impacts <ul style="list-style-type: none"> ▪ Non-school Buildings ▪ Schools • Economic impacts 	<ul style="list-style-type: none"> • Environmental impacts • Health impacts • Economic impacts 	<ul style="list-style-type: none"> • Environmental impacts <ul style="list-style-type: none"> ▪ Water quality ▪ Nontarget organisms ▪ Rights of Way Water • Health impacts • Economic impacts



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www.ipm.gov/LogicModels/index.cfm or
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IPM Planning and Evaluation

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[Logic Model Template \(Word\)](#)
[Logic Model Template \(Fillable PDF\)](#)
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Evaluation and Planning >

Example Planning and Evaluation (Logic) Models

Interest Area:

Production Agriculture

Desired Long Term Impact

Economic

Choose whether to follow a planning or an evaluation example:

[Examples of Planning a Program for Later Evaluation](#)

To **plan** think about what you want to achieve in the long term first, then work backward to decide what actions to take and ways to know whether you've accomplished the goals.

1. Identify the desired long-term impacts--changes in *economic, environmental or social condition*-- and the possible measures to show whether the impacts have occurred.
2. Identify the intermediate-term impacts--changes in behavior, actions or decisions--that can lead to the long-term impacts. What possible measures will show whether these impacts have occurred?
3. Identify short-term impacts--changes in *knowledge, skill or attitudes* --that can lead to the intermediate-term impact. What possible measures will show whether these impacts have occurred?
4. What activities will result in the identified short-term impacts?
5. What inputs (investments) are required to carry out the activities?

[Examples of Evaluating an Existing Program](#)

To **evaluate** an existing program, as you engage in activities toward the desired long-term impact, gather data to measure the knowledge, behavioral, and condition changes that are occurring in the short term, intermediate term, and the long term.

1. Identify inputs (investments) used to carry out the activities.
2. Identify all activities designed to generate impacts.
3. Identify and measure short-term impacts--changes in knowledge, skill or attitudes that can lead the intermediate-term impact.
4. Identify and measure intermediate-term impacts--changes in behavior, actions or decisions--that can lead to the long-term impacts. .
5. Identify and measure long-term impacts--changes in economic, environmental or social condition.

www.ipm.gov/LogicModels/index.cfm or
<http://www.ipmcenters.org/LogicModels/index.cfm>

Evaluation Resources

Inputs	Outputs		Short-Term Impacts (Knowledge Change)	Possible Measures
	Activities	Audiences		
<ul style="list-style-type: none"> • Money • People • Time • In-kind resources, including infrastructure for information delivery and support 	<ul style="list-style-type: none"> • Field days • Interagency Cooperation • Outreach • Print/Electronic materials • Research and demonstration • Training--Pesticide Safety Education Program • Websites • Workshops 	Implementers <ul style="list-style-type: none"> • Farmers/Ranchers Facilitators <ul style="list-style-type: none"> • Extension • Farm & Commodity Organizations • Pest Management Consultants 	<u>Target Audiences increase their knowledge of cost effectiveness and efficacy of IPM tactics (e.g., pest identification, biology, and scouting techniques)</u>	<ul style="list-style-type: none"> • Collect baseline data to help measure intermediate- and long-term impacts. • Use self-assessments, pre-test/post-test and follow-up measurement tools to assess changes in knowledge, attitudes, satisfaction, aspirations.
		Implementers <ul style="list-style-type: none"> • Farmers/Ranchers • Pesticide Applicators Facilitators <ul style="list-style-type: none"> • Farm & Commodity Organizations • Food Processors and Packers • Pest Management Consultants 	<u>Target Audiences increase their knowledge of the economic effects of externalities associated with pesticide use</u>	
		Implementers <ul style="list-style-type: none"> • Farmers/Ranchers • Food Processors and Packers • Government Agencies (Fed, State, Local) • Retailers (big box retailers and other retailers) Facilitators <ul style="list-style-type: none"> • Advocacy Groups • Extension • Farm & Commodity Organizations • Pest Management Consultants 	<u>Target Audiences increase understanding of economic thresholds for pests</u>	



Evaluation Resources



Step 2. Identify and Document Intermediate-Term Impacts (changes in *behavior*).

Intermediate-term impacts are changes in behavior, such as adoption of new IPM practices by members of the target audiences or changes in how current practices are carried out.

Intermediate-Term Impacts (changes in <i>behavior</i>)	Possible Measures
Target Audiences increase use of reduced risk IPM tactics (e.g. cultural, biological, physical controls, etc.)	<ul style="list-style-type: none"> • Document change in use of lower risk products and tactics • Document use of NRCS WinPST to measure change from higher to low risk materials • Measure farmer participation in certification programs (e.g., eco-apple, Food Alliance)
Target Audiences increase their use of externalities in cost/benefit analyses	<ul style="list-style-type: none"> • Measure increased use of externalities in cost/benefit analyses
Target Audiences transition from higher risk to lower risk products and tactics	<ul style="list-style-type: none"> • Document change in use of lower risk products and tactics • Document use of NRCS WinPST to measure change from higher to low risk materials • Measure farmer participation in certification programs (e.g., eco-apple, Food Alliance)

Evaluation resources

Other Resources

The [IPM Road Map](#) is the key document in defining the overarching goals of U.S. government-sponsored IPM programs. The Road Map identifies strategic directions for IPM research, implementation, and measurement for all pests, in all settings, throughout the nation.

Logic Models

- [NIFA - Strategic Planning and Accountability / Logic Models](#)
- [University of Wisconsin Cooperative Extension Self-study Module](#) University of Wisconsin Cooperative Extension provides a variety of resource materials and professional development offerings to help with the understanding and use of the logic model in planning, implementation, evaluation and communications
- [Logic Model Template](#)

Sample Logic Models

Sample IPM Adoption Surveys

- [Apple](#)
- [Bedding Plants](#)
- [Potato](#)
- Potato (printed reference) Zeigler, C.R., Donahue, D.W., Drummond, F.A. and S.N. Smith. 2002. The Ecological Economics of Insecticide Use Associated With the Maine Potato Industry, Based on a Producer Survey. *Am. J. Alt. Ag.* 17(4): 159-166.
- [Sweet Corn](#)
- [Wine Grapes](#)
- [Cotton](#) Robertson, M.J., Zehnder, G.W., and M.D. Hammig. 2005 Adoption of Integrated Pest Management Practices by South Carolina Cotton Growers. *Journal of Extension*. (<http://www.joe.org/joe/2005december/rb10.shtml>) **General IPM Impact**
- Wearing, C.H. 1988. Evaluating the IPM Implementation Process. IN. *Biological Control in Agricultural IPM Systems*. New York: Academic. 589 pp. 42. Hussey, N. W. 1980. Crop protection: A challenge in applied biology. <http://www.annualreviews.org/doi/abs/10.1146/annurev.en.33.010188.000313?journalCode=ento>
- [Cotton](#) - Sharma, O.P., Lavekar, R.C., Murthy, K.S., and S.N. Puri. 2009. Habitat Diversity and Predatory Insects in Cotton IPM. <http://ipmworld.umn.edu/chapters/sharma.htm>
- Biological control in agricultural IPM systems: a brief overview of the current statue and future prospects. In M.A. Hoy and D.C. Heroz (eds.)
- Day, E. and T. Greitens. 2003. IPM Impact and Assessment. 4th National Integrated Pest Management Symposium, Indianapolis, Indiana. April 9-10, 2003. <http://www.aftresearch.org/ipm/symposium/files/IPM%20Impact%20and%20Assessment%20Proceedings.pdf>
- Integrated Assessment of IPM Impacts: An Overview. John M. Antle and Susan M. Capalbo. Assessing IPM Impacts: Summaries of Selected Papers. <http://www.ers.usda.gov/publications/mp1542/MP1542c.PDF>
- Norton, G.W. 2009. Protocol for Economic Impact Evaluation of IPM Programs - Describes a protocol for economic assessment of IPM impacts that includes five tasks: (1) defining IPM measures, (2) measuring IPM adoption, (3) assessing user-level economic effects, (4) assessing market effects, and (5) estimating health and environmental (non-market) impacts. Includes an overview of Selected IPM Impacts from Previous Studies. <http://www.springerlink.com/index/h08n755770u212h0.pdf>
- National Management Measures for the Control of Nonpoint Pollution. In a review of 61 studies of IPM impacts on crop yield, pesticide use, and economics, pesticide use declined in seven of the eight commodities evaluated (see Norton and Mullen, 1984). <http://www.epa.gov/nps/agmm/chap4b.pdf>
- Economics of IPM. Norton G.W. and J. Mullen. Economic Evaluation of IPM Programs: A Literature Review. Report 448-120. Blacksburg, Virginia: Cooperative Extension, 1994. <http://www.ento.vt.edu/Fruitfiles/OliveProj/IPMPaper.html>

Sample Surveys

Evaluation Resources

Western IPM Center

We support the development, adoption and evaluation of integrated pest management to benefit the people, environment and economy of the West.

Search

Got Pests? ▶ Need Funding? ▶

- ▶ Home
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Home » Center Projects » Project Websites » Toolkit for Assessing IPM Outcomes and Impacts

Toolkit for Assessing IPM Outcomes and Impacts

The Western IPM Center's IPM Adoption and Impacts Assessment Work Group, a collection of natural and social scientists from across the country, created online resources showing IPM researchers how to conduct basic impact assessments.

The online resources include an introduction to impact assessment, and modules on surveys, economic analysis, focus groups, secondary data, case studies, interviews and social network analysis. Chapters within each module include when a measurement or method is appropriate, what to collect, how to collect it, how to analyze it and how to report it.

Access the toolkit

Read more

Watch a webinar

At the International IPM Symposium in March 2015, members of the workgroup conducted a professional development workshop. Here are resources from that event.

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([http://ipmimpact.ucanr.edu/About Us/](http://ipmimpact.ucanr.edu/About_Us/))

Evaluation Resources

A Toolkit for Assessing IPM Outcomes and Impacts

SKIP TO CONTENT SITE MAP



Welcome-Who Is This For And How Will It Help Me?

Things You Should Know Before Evaluation

Module 1: Getting Started with IPM Evaluation Planning

Module 2: Surveys

Module 3: Economic Analyses

- When Is It Appropriate to Conduct Economic Analysis?
- What to Collect
- How to Collect It
- How to Analyze It
- How to Report It
- How to Engage an Economist
- Resources

Module 4: Focus Groups

Module 3: Economic Analyses

Types Of Economic Analysis

Economic analysis provides a systematic approach to determining the best use of resources. In the context of IPM assessment, it **usually involves comparing two or more alternatives using measures** such as net grower returns. In IPM, economic analysis is commonly used to compare the user cost and/or the market value of yield or quality gains when implementing IPM practices relative to using conventional pest management practices.

The [types of economic analysis](#) that you might find useful include:

- **Cost effectiveness analysis:** evaluates which program or policy creates the desired result at the lowest cost
- **Cost-benefit analysis:** compares the economic pros and cons of policies and programs to help decision-makers identify the best or most valuable options to pursue.
- **Partial budget analysis:** determines the net benefit by only examining the costs and gains that change for a program (e.g., using different pesticides or practices)

How To Conduct An Economic Analysis

To conduct an economic analysis, you will need to complete a number of **logical steps**. If you use a [Logic](#)

Evaluation Resources

Outcomes and Impacts



Welcome-Who Is This For And How Will It Help Me?

Things You Should Know Before Evaluation

Module 1: Getting Started with IPM Evaluation Planning

Module 2: Surveys

Module 3: Economic Analyses

■ When Is It Appropriate to Conduct Economic Analysis?

■ What to Collect

■ How to Collect It

■ How to Analyze It

■ How to Report It

■ How to Engage an Economist

■ Resources

Module 4: Focus Groups

Module 5: Secondary Data

Module 6: Case Study

How to Analyze It

Partial Budget Analysis

Partial budget analysis is useful for documenting changes in financial positions resulting from changes in practice. It is widely advocated as a way for growers, facility managers and other decision makers, to keep track of the results of changes they make. It can readily be used for the same purpose in IPM impact assessment studies. Partial budget analysis can also be used in non-agricultural situations provided the items in the budget associated with pest management can be documented. The list below gives a sample of the tools and guides available for partial budget analysis.

For example, [this paper by Brumfield et al.](#) (2000) uses a partial budgeting approach to evaluate integrated crop management with conventional and organic production approaches in several fresh market vegetable crops.

For those who are completely unfamiliar with the idea of partial budget analysis, we suggest reading through this slide presentation by Dr. Paul Mitchell from the University of Wisconsin:

[Partial Budgeting P Mitchell UW-M](#)

The presentation deals with general **agricultural examples**, with some pest management examples, but the concepts should be readily transferable to other contexts. A wide range of other resources is also available to facilitate this sort of analysis for IPM projects:

- [Farm decision tools from Iowa State Extension](#)
- [UMD Partial Budgeting Guide](#)

Future vision of an IPM Network?

- IPM remains state-based.
- Broadly engaged in topics of state and regional importance.
- A network of networks – within and outside – inclusive of IPM.
- IPM programs are collaborative and measure success.
- All networks are collaborative, synergistic and outcome focused.

Future vision of an IPM Network?

- IPM remains state-based, but linked more broadly.
- A network of networks – within and outside – inclusive of IPM.
 - Networked predictive models, which requires...
 - Front-end innovation.
 - Capacity for big data.
 - No fear of “Big Brother”.
 - Greater adoption of community-based IPM...
 - Community-based IPM works, but requires...
 - Relationship
 - Trust
- When IPM wins, end users/customers/clientele win.

Why Changing Course Matters

- Because IPM matters...
- Because IPM works...
- Because we believe in IPM...
- Because you need facts to tell a convincing story...
- Because we need to be convincing across our audiences to continue and grow IPM...
- Because we can't get to the future by dwelling on today of today, holding our accomplishments tightly, and by being insular...

Thanks!

- For your interest...
- For your attention...
- For your friendship through the years...
- For your commitment to advance the principles of IPM and make it better for the people that use and benefit from it...

