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Global Partnership
on Nutrient Management

GLOBAL TOOLBOX FOR NUTRIENT MANAGEMENT

East Asian Seas Congress 2015

CY JONES



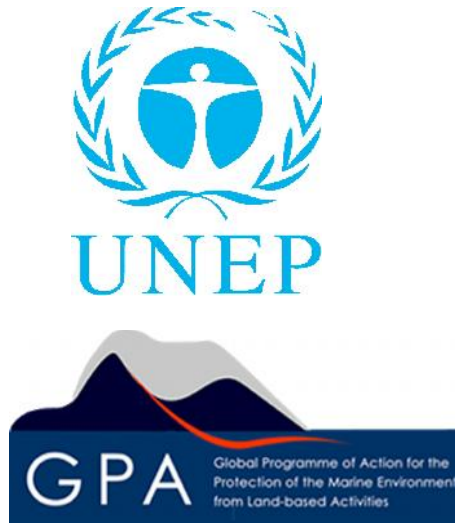
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WRI WORKS AT THE INTERSECTION OF PEOPLE AND THE ENVIRONMENT

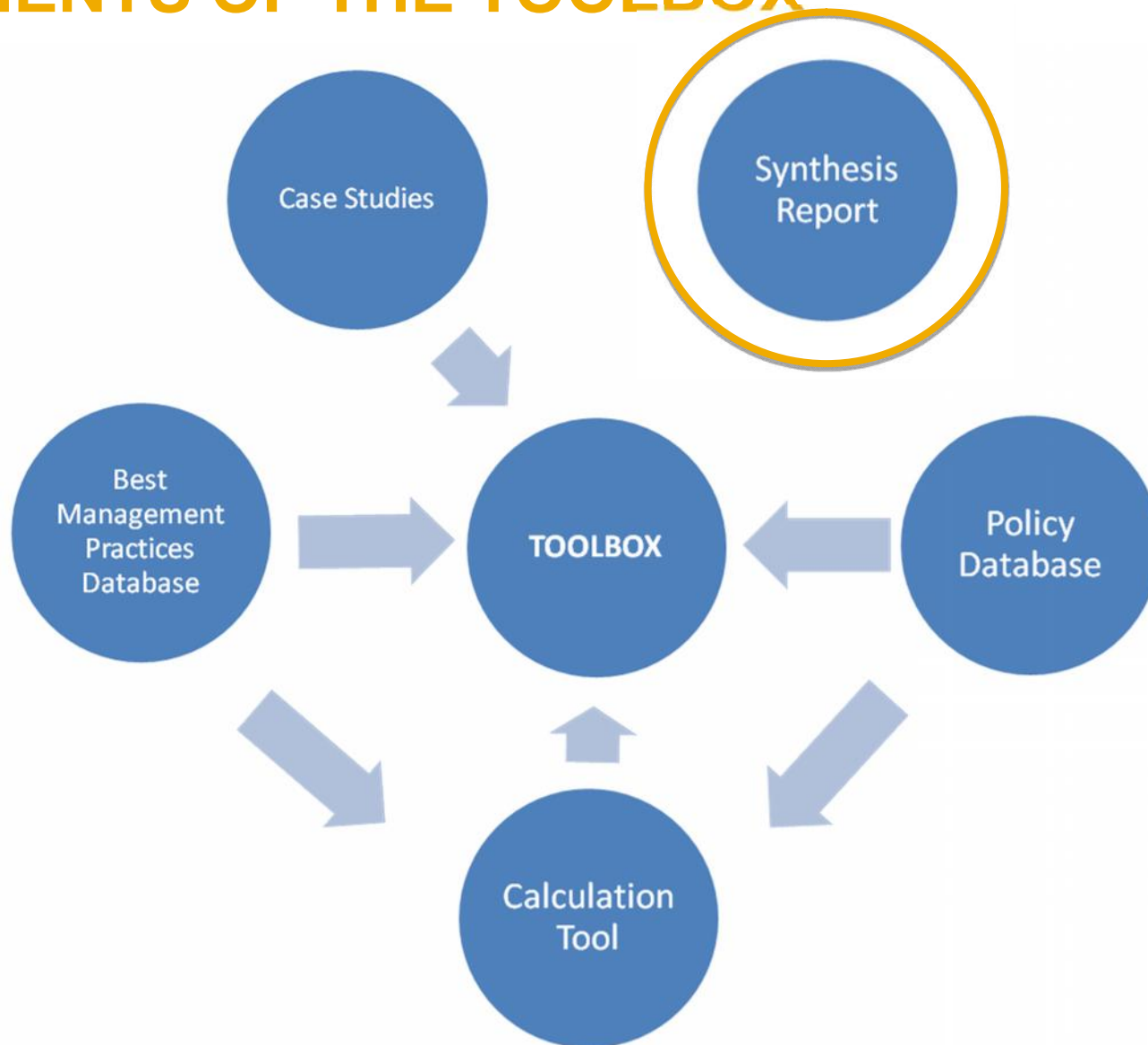
PHOTO: N. SIGTIA FLIKR/CGIAR CLIMATE

INTRODUCTION TO THE TOOLBOX

The purpose of the toolbox is to demonstrate policy and technology options, which offer potential solutions for managing nutrients to decision makers and practitioners alike.



ELEMENTS OF THE TOOLBOX



SYNTHESIS REPORT



Analysis, Synthesis and Interpretation

Improving Yields and Net Income for Small Landholders and Limited Resource Farmers

Prepared for GETF as part of the Global Programme on Nutrient Management
Thomas Simpson, Ph.D. and Ronald Korcak, Ph.D.
December 2013

Executive Summary

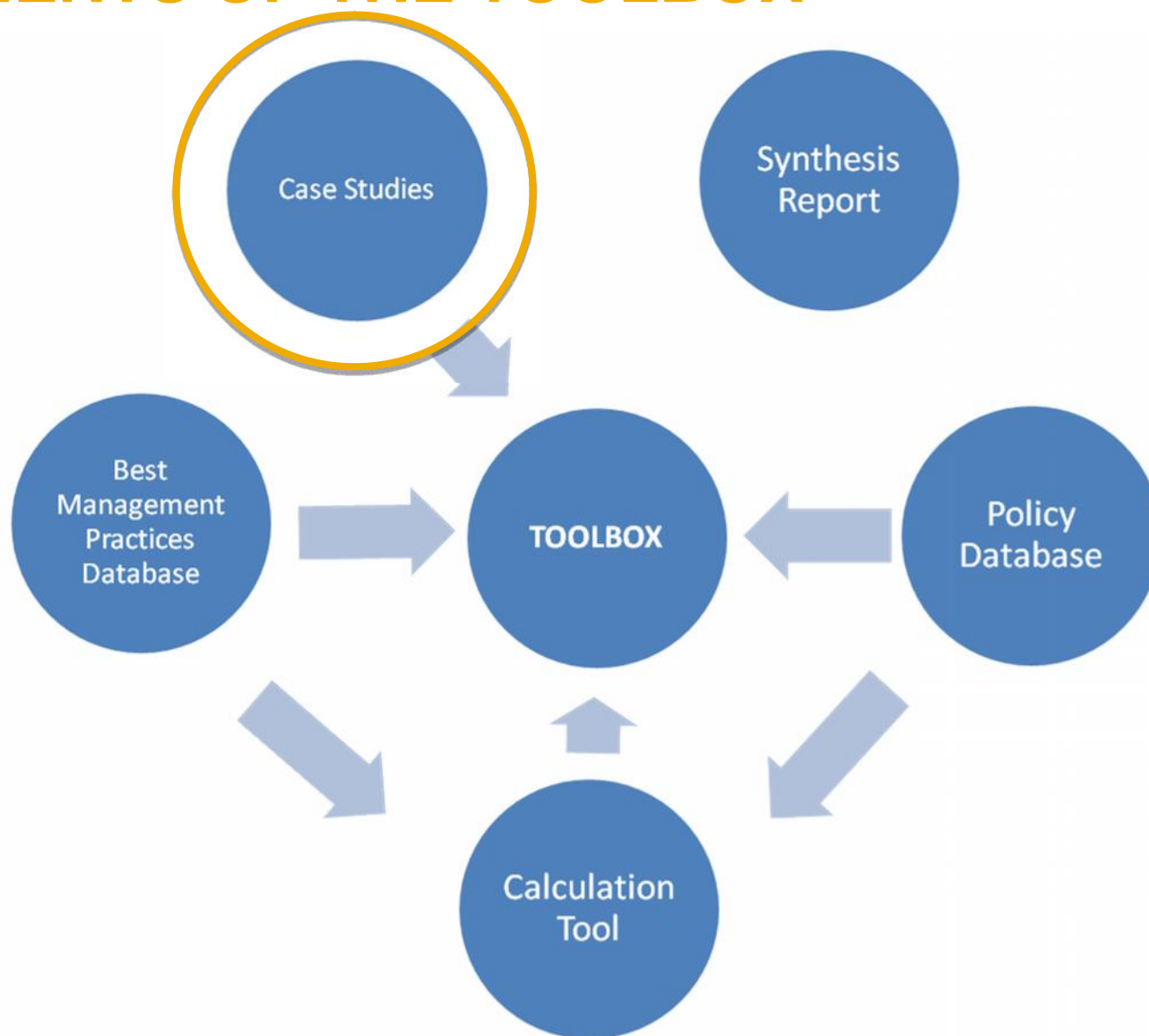
The two primary project tasks were to develop an initial synthesis of the current global best practices and experiences and projects in key nutrient “Hotspot” regions and utilize these findings to update the nutrient management learning module¹.

Previously, Water Stewardship recognized eight priority Best Environmental Practices (BEPs). These practices were determined under the Global Environment & Technology Foundation’s (GETF) execution of Component C: Policy Toolbox Development of the Full Size Global Environment Facility project “Global foundations for reducing nutrient enrichment and oxygen depletion from land-based pollution, in support of Global Nutrient Cycle.” The priority BEPs include:

1. Nutrient Management
2. Manure Management
3. Wetland Restoration/Creation
4. Riparian Buffers
5. Conservation Tillage/Erosion Control
6. Cover Crops
7. Grazing Management

¹ The training module will not be completed until after this synthesis report has been reviewed, finalized and accepted by the project team. However, an update of the training module was partially completed during development of a training session for the International Waters Conference – 7 held in late October 2013. The presentation can be downloaded from the Water Stewardship website at: http://www.waterstewardshipinc.org/downloads/Simpson_IW-7_Training_module_10-31-13.pdf

ELEMENTS OF THE TOOLBOX



CASE STUDIES

GLOBAL PARTNERSHIP ON NUTRIENT MANAGEMENT BMP Case Study

Overview

Name: Nutrient Expert (NE) Improves Grain, Profitability and Efficiency for Maize

Location/Terrain: North China

Crop(s): Maize

Nutrient(s): N, P and K

Rationale: A new fertilizer recommendation method based on yield response and agronomic efficiency for hybrid maize, Nutrient Expert (NE), was tested to increase yields and optimize profits.



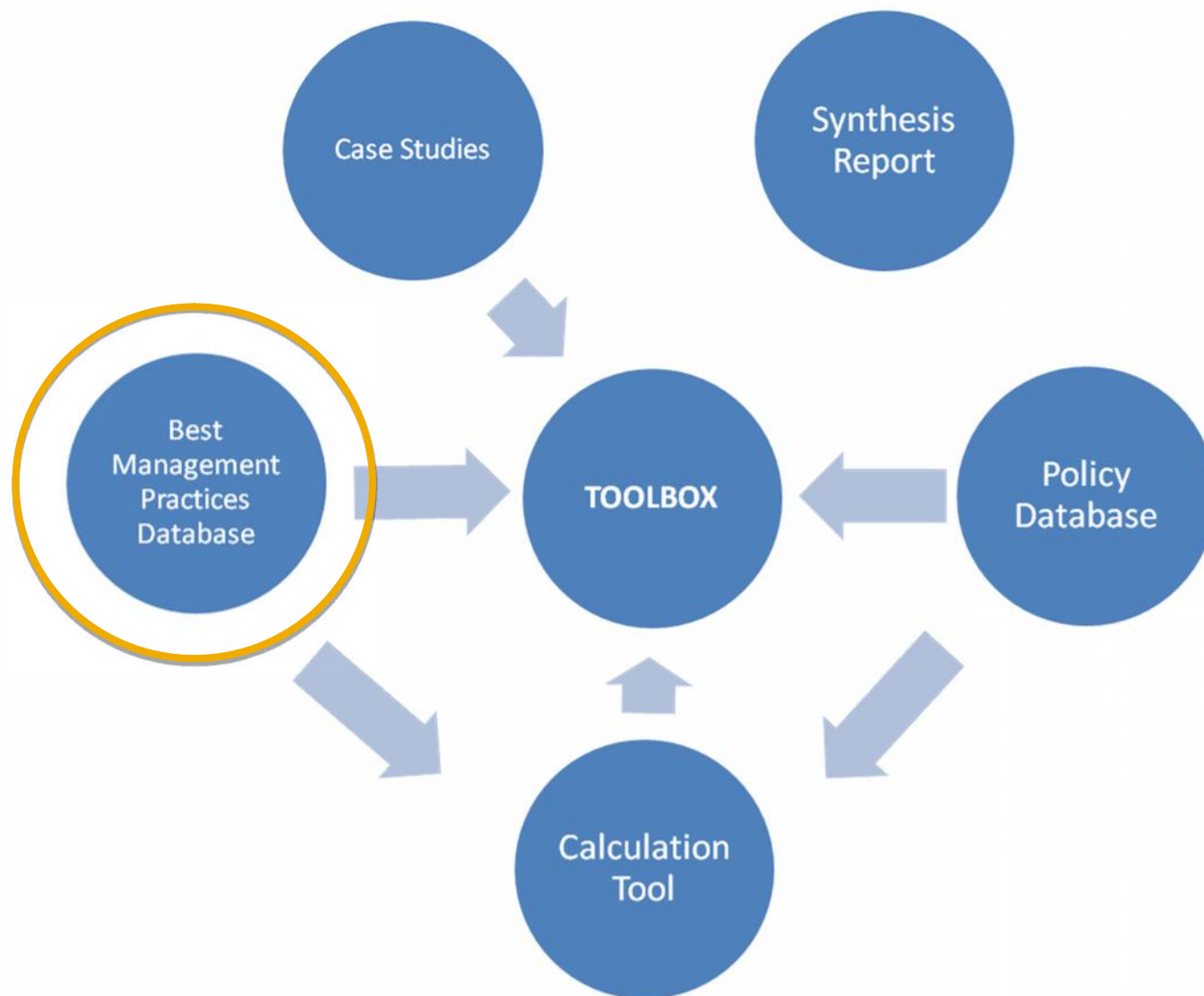
Issue(s) of Concern/Challenges:

A dynamic and robust nutrient management approach is essential to increase yields and optimize profits for smallholder farmers within intensified cropping systems.

Practice Description:

On-farm experiments were conducted from 2010 to 2012 at 408 sites in seven provinces to evaluate a

ELEMENTS OF THE TOOLBOX



BEST MANAGEMENT PRACTICES DATABASE

Practices searchable by: sector

Agriculture

Urban

Practices searchable by: category

- Conservation buffers
- Erosion control
- Drainage control
- Irrigation management
- Grazing management
- Wetland creation
- Etc.

- Detention
- Filtration
- Infiltration
- Septic management
- Urban erosion control
- Urban stream restoration
- Etc.

BEST MANAGEMENT PRACTICES DATABASE

Practices searchable by: climatic zone

Arid	Tropical
Semiarid	Temperate

Practices searchable by: land use/agriculture type

Animal confinement	Rice
Fodder	Row crop
Palm oil	Small grains
Pasture	

Practices searchable by: scalability to small farms

Only show practices scalable to small farms? ☐

BEST MANAGEMENT PRACTICES DATABASE

BMPs Search Template

Sector Type

Agricu... ▾

BMP Category

× Nutrient Management

Climatic Zone

× Tropical

Agriculture Types

× Rice

Only show practices scalable to small farms?

☒

Text Search

Search

Reset

Download: [My Results](#) | [All BMPs](#)

← Previous

1

2

Next →

Ecological/Organic Production Systems

Category: Nutrient Management, Manure Mangement, Erosion Control

Practice Type: Management


Landuse/Agriculture Type: Row Crop, Pasture, Fodder, Rice, Small Grains

Climatic Zones: Temperate, Semiarid, Tropical

Regions: North America, Europe

Pollutants Treated: Nitrogen, Phosphorus, Sediment

Description: Ecological/organic production



Peppers grow in a high tunnel on an organic farm (Saucier, Miss.).

[Email this page](#)

BEST MANAGEMENT PRACTICES DATABASE

Ecological/Organic Production Systems

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Peppers grow in a high tunnel on an organic farm (Saucier, Miss.).
Photographer: Stephen Kirkpatrick. Photo Courtesy of USDA
NRCS.

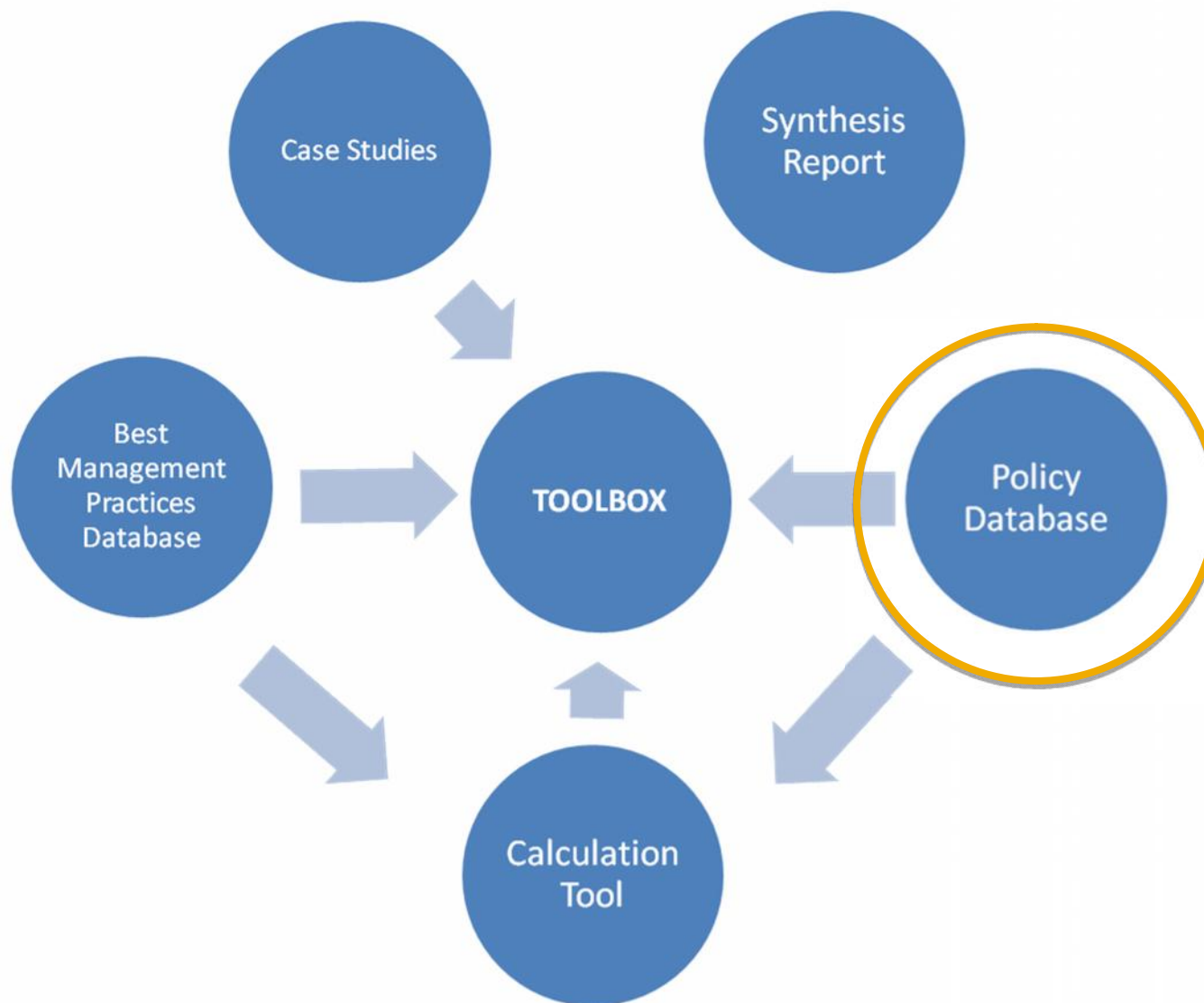
Description: Ecological/organic production systems use a systems approach that relies on organic inputs to manage nutrients in such a way that mimics natural ecosystems. Nutrient management and manure management should be standard requirements for ecological agriculture and many other practices, such as buffers, should be expectations. Organic farmers manage crop nutrients through a crop rotation that includes cover crops and the application of plant and animal organic matter, generally in the form of compost. Appropriate tillage and cultivation practices improve soil structure, organic matter content and soil microbial life. The procedures and approaches used to implement these types of systems will determine the ultimate benefit to reducing nutrient pollution.¹

Implementation Considerations: Growing crops ecologically (organically) still requires nutrient management and erosion control. Marketing produce with an "ecological" label would require a level of practice verification which could increase the cost, but the farmer should receive a premium for the product.

Scalable to small farms? Yes

¹ "EU Database of Best Practices." Living Water Exchange: Promoting Replication of Good Practices for Nutrient Reduction and Joint Collaboration in Central and Eastern Europe. Web. Sept. 2013. <http://nutrient2.lwlearn.org/nutrient-reduction-practices/eu-database-of-practices/view>.

ELEMENTS OF THE TOOLBOX




POLICY DATABASE

Policies searchable by: category

- Environmental outreach & education
- Regulatory approaches
- Price-based instruments
- Market-based instruments
- Ecosystem restoration and protection
- Institutions & capacity
- Research, monitoring, & evaluation

POLICY DATABASE

Policies searchable by: type

- Environmental outreach & education
 - **Regulatory approaches**
 - Price-based instruments
 - Market-based instruments
 - **Ecosystem restoration and protection**
 - Institutions & capacity
 - Research, monitoring, & evaluation
- 
- The diagram uses blue curly braces to group sub-categories under two main policy types. For 'Regulatory approaches', the sub-categories are: -environmental bans and restrictions, -environmental standards, -environmental caps & limits, and -regulatory frameworks. For 'Ecosystem restoration and protection', the sub-categories are: -ecosystem restoration, -protected areas, -land purchases, -covenants & easements, and -stewardship agreements.
- environmental bans and restrictions
 - environmental standards
 - environmental caps & limits
 - regulatory frameworks
 - ecosystem restoration
 - protected areas
 - land purchases
 - covenants & easements
 - stewardship agreements

POLICY DATABASE

Practices searchable by: region

Asia	North America
Europe	Oceania
Middle East	South America

Practices searchable by: sector

Agriculture	Transport
Aquaculture	Urban
Fisheries	Wastewater
Mixed	

POLICY DATABASE

Policies Search Template

Category

Price-Based Instruments

Policy Type

x Tax Credits & Rebates

Region

x Asia

Sector

x Agriculture

Text Search

Search

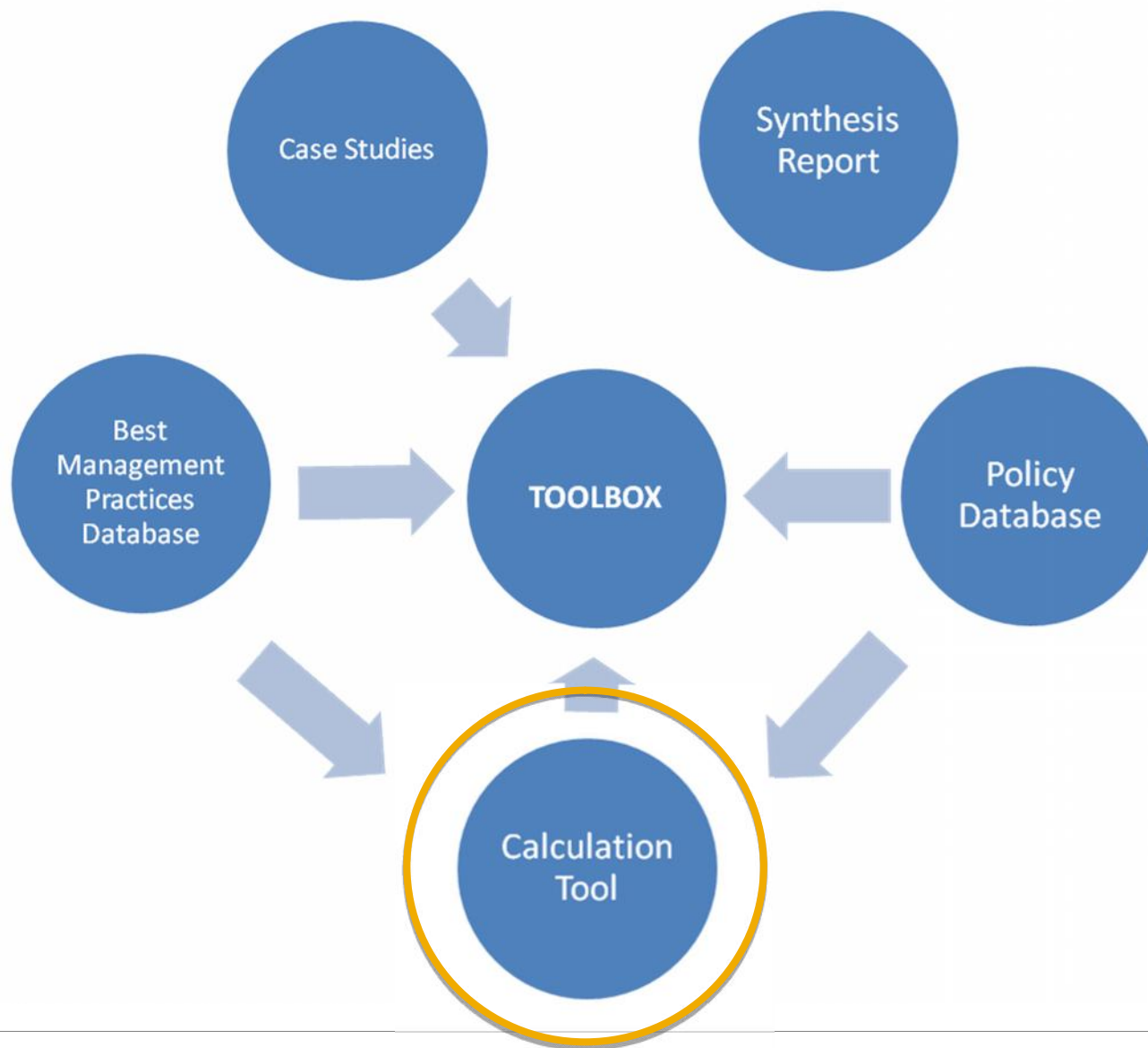
Reset

Download: [My Results](#) | [All Policies](#)

Eco-Farmer Certification

Category: Price-Based Instruments
Policy Type: Low-Interest Loans; Tax Credits & Rebates
Sector: Agriculture
Region: Asia
Country: Japan
Description: Based on Article 4-1 of the Law for Promoting the Introduction of Sustainable Agricultural Production Practices, prefectural governors certify eligible farmers as "Eco-Farmers" for promoting environmentally friendly agriculture. It benefits farmers by giving them access to a special allocation within the budget (preferential loans and tax breaks) for the implementation of sustainable agriculture practices, such as using composting systems and reducing the use of chemical pesticides and synthetic fertilizers on their farms.
Outcome: As of the end of March 2010, the number of certified eco-farmers in Japan stands at 196,692, an increase of 10,717 over one year. With the incentives, eco-farmers would improve soil, reduce chemical fertilizer and agrichemical consumption.
Reference: [Eco-farmer Certification](#)

ELEMENTS OF THE TOOLBOX



TOOLBOX CALCULATOR

Step 1

User defines area of interest:

- Continent
 - Ocean
 - Sea
 - Basin

TOOLBOX CALCULATOR

Toolbox Calculator Cockpit

This cockpit takes you in 3 steps through the Toolbox Calculator

Step 1: Select Basin

Select Continent

South Asia

Select Ocean

Pacific Ocean

Select Sea

Pacific Ocean

Select Basin

Mekong

Reset Selection

Step 2: Show Basin Information




Show Info

Step 3: Select Measures

Measures via Sliders

Measures via BMPs

EXIT



Toolbox
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TOOLBOX CALCULATOR

Step 2

- Based on geographic selection, tool provides data on:
 - Land area
 - Population
 - Gross domestic product
 - Agricultural activities
 - Wastewater

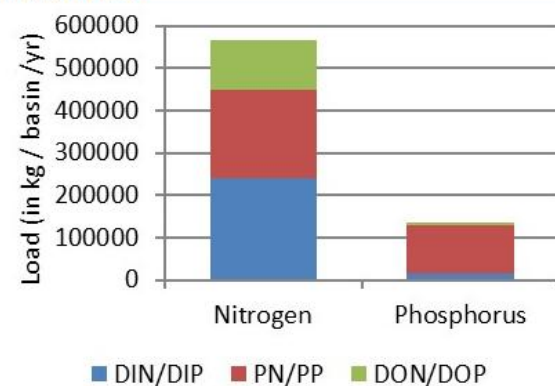
TOOLBOX CALCULATOR

Information for Mekong (38)

General Information

<i>Land</i>	Area	757	1000 km2
	Percentage Land	99.4	%
	Percentage Agri Land	34.8	%
<i>Population</i>	Population	67156	1000 cap
	Percentage Urban Pop.	28.5	%
	GDP	1344	US\$

NEWS Output (Standard Calculation)



Input Data

<i>Agriculture</i>	Fertilizer Application	1014	164	kg/km2/yr
	Manure Application	688	136	kg/km2/yr
	Removed via harvest and grazing	878	150	kg/km2/yr
	Biological Fixation by agriculture	427		kg/km2/yr
	Deposition on Agricultural land	355		kg/km2/yr
<i>Sewage</i>	Amount entering surface waters as N/P	3	0	kg/km2/yr
	Fraction anthropogenic non-point sources as DIN/DIP	0.52	0.08	-
	Fraction anthropogenic non-point sources as DON/DOP	0	0	-



TOOLBOX CALCULATOR

Step 3

User selects measures to run scenarios:

- Measures via sliders
 - increase/decrease agricultural inputs, sewage treatment, etc.

OR

- Measures via BMPs
 - increase/decrease BMP implementation

TOOLBOX CALCULATOR

Select measures via sliders

Reset

Close

Nitrogen

Phosphorus

	-100	0	100	%
fertilizer N application	<input type="range"/>			-34
manure N application	<input type="range"/>			22
N removed from agricultural lands via harvest and grazing	<input type="range"/>			0
biological N fixation by agriculture	<input type="range"/>			0
biological N fixation by non-agricultural (natural) systems	<input type="range"/>			0
N deposition on agricultural lands	<input type="range"/>			0
percent of basin area used as agricultural land	<input type="range"/>			0
N deposition on non-agricultural lands	<input type="range"/>			0
fraction of total sewage N exported as DIN	<input type="range"/>			0
amount of sewage N entering surface waters	<input type="range"/>			-40
fraction of anthropogenic non-point sources of N entering surface waters as DIN	<input type="range"/>			0
fraction of non-anthropogenic non-point sources of N entering surface waters as	<input type="range"/>			0
fraction of total sewage N exported as DON	<input type="range"/>			0
fraction of anthropogenic non-point sources of N entering surface waters as DON	<input type="range"/>			0
percentage of total suspended solids (TSS) occurring as PN	<input type="range"/>			0
river DIN retention	<input type="range"/>			0
river DON retention	<input type="range"/>			0

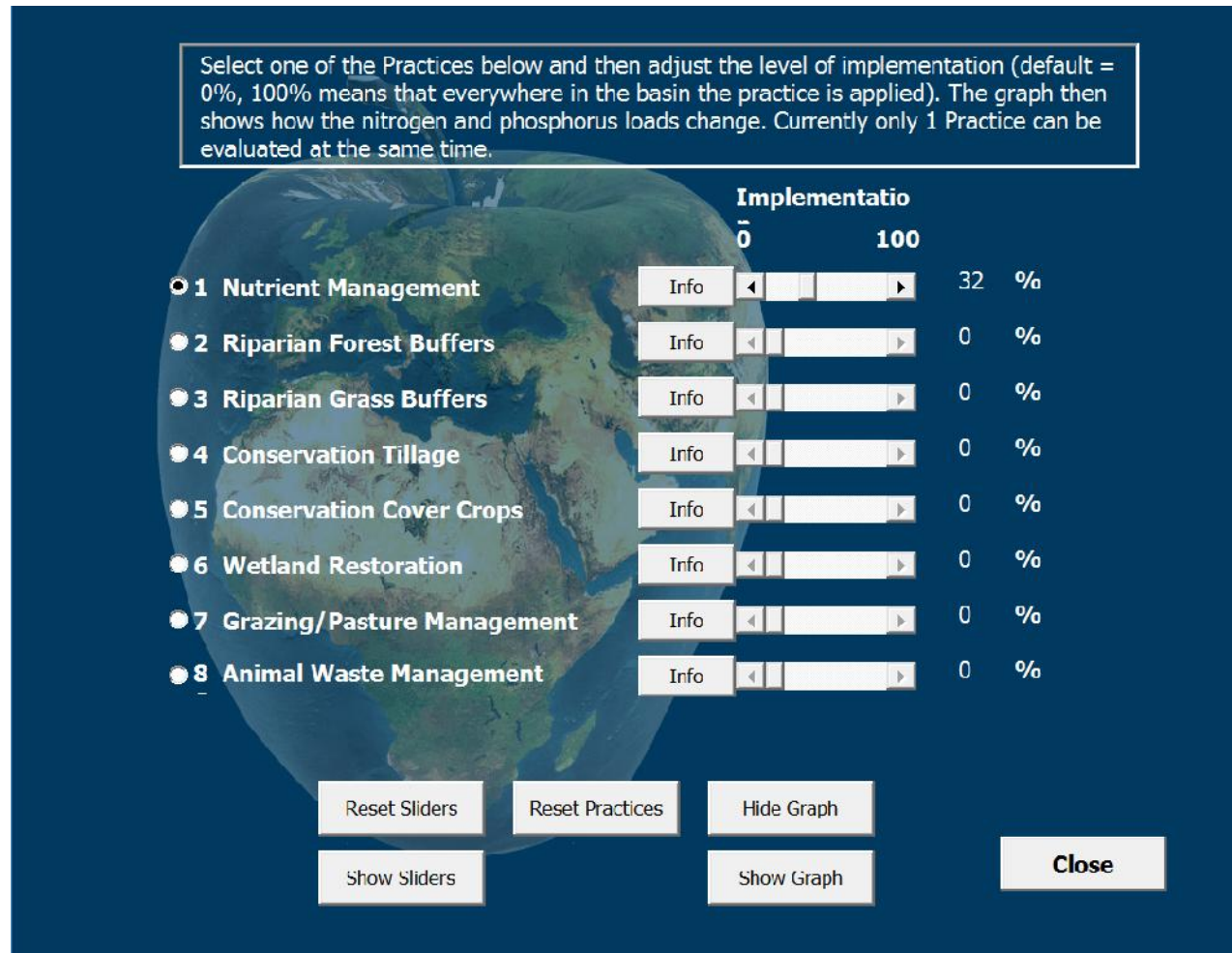
Show Graph

Hide Graph

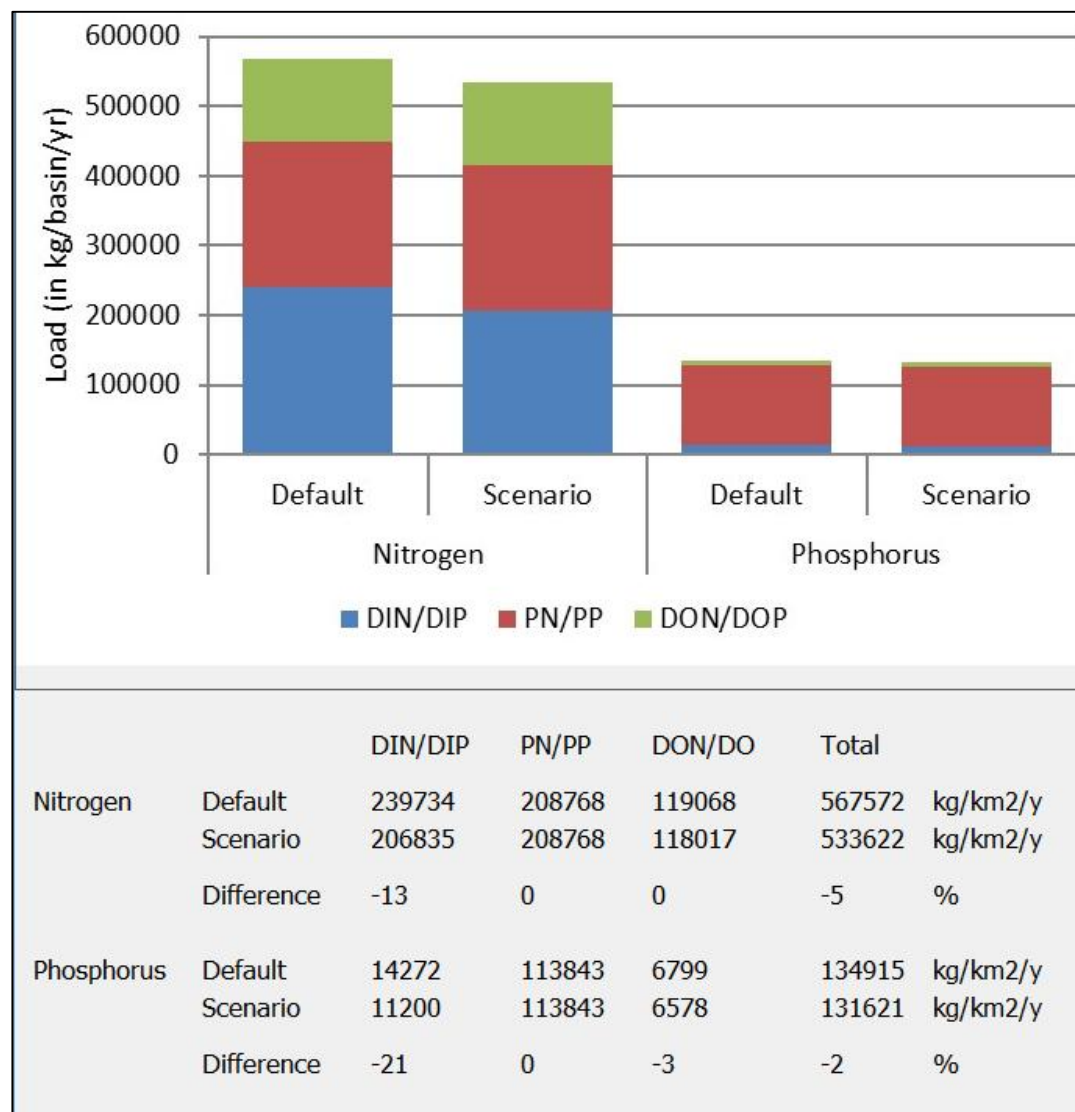
	-100	0	100	%
fertilizer P application	<input type="range"/>			-34
manure P application	<input type="range"/>			22
P removed from agricultural lands via harvest and grazing	<input type="range"/>			0
amount of sewage P entering surface waters	<input type="range"/>			0
fraction of total sewage P export as DIP	<input type="range"/>			0
fraction of anthropogenic non-point sources of P entering surface waters as DIP	<input type="range"/>			0
river DIP retention	<input type="range"/>			0
river DOP retention	<input type="range"/>			0
fraction of anthropogenic non-point sources of P entering surface waters as DOP	<input type="range"/>			0
fraction of total sewage P exported as DOP	<input type="range"/>			-40
percentage of total suspended solids (TSS) occurring as PP	<input type="range"/>			0
total suspended solid load	<input type="range"/>			0
total suspended solid yield	<input type="range"/>			0
Population	<input type="range"/>			0
Percentage Urban Population	<input type="range"/>			0
GDP	<input type="range"/>			0

TOOLBOX CALCULATOR

Select measures via BMPs



TOOLBOX CALCULATOR



SUMMARY

- Toolbox serves as a resource for information about nutrient reduction strategies
- Farmers and extension agents can use the practice database to learn about conservation practice options
- Decision makers can use the policy database and case studies to learn about programs and policies working in other areas

THANK YOU!

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Image: Chesapeake Bay Program



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