### **Ecosystem service bundles**



## **Economics of biological control**

#### • Biopesticides

	Chemical control <sup>a</sup>	Biological control <sup>b</sup>
Number of "ingredients" tested	>3.5 million	3,500
Success ratio	1:140,000	1:10
Developmental costs	256 million US\$	2 million US\$
Developmental time	10 years	10 years
Benefit/cost ratio	2:1	2.5-20:1 *
Risks of resistance	Large	Nil/small
Specificity	Small	Large
Harmful side-effects	Many	Nil/few

#### Agroecology

- Economic benefits
  - US cotton: \$235 / ha
  - Indonesia cacao: \$917 / ha
  - Nicaragua cabbage: \$2,200 / ha
  - Australia citrus: up to \$7,396 / ha

#### Invasive pest mitigation

- In the Asia-Pacific, generates dividends of US\$ 14.6–19.5 billion/year
- Its economic benefits amply surpass those of Green Revolution rice germplasm

### Integrated pest management (IPM)

#### • IPM Farmer Field Schools FFS (1990s)

- From 1992 to 1997, FAO-led FFS training programs cut insecticide use by 50% (without yield loss) on 2 million rice farms in the Mekong Delta
- Cut pesticide use up to 82-92% in rice and 78% in cotton
- Enhanced crop yields by 13%
- Raised farmers' revenue by 19%
- Raise the bar
- Modern-day achievements: In the US Midwest, IPM reduces pesticide use by 95% while enhancing pollination by 129% and yield by 26%



# What is lacking?

- 1. Raise multi-stakeholder awareness
- 2. Involve farmers in networked field trials
- 3. Gauge its benefits in a multidimensional manner, including efficacy, One Health and socioeconomic outcomes
- 4. Devise enabling policies and regulations
- 5. Incentivize use of nature-based solutions
- 6. Boost funding & align this with desirable tactics