

Economic Valuation of Bee Pollination Services: Implications for Farm Management and Policy

Adam G. Drucker
a.drucker@cgiar.org

International Livestock Research Institute
(ILRI) –Ethiopia

Workshop on Solitary Bees: Conservation, Rearing and Management for Pollination
Beberibe, Ceará April 26-30, 2004

Outline

- Conceptual background to environmental economics
- Why value pollination services?
- What values need to be considered?
- How do we know pollination services are likely to be economically important?
- What methods exist for valuing pollination services and what are the constraints to carrying this out?
- Results and main findings of existing valuation studies
- Conclusions and ways forward/next steps



Conceptual Background I (Economics)

- Economics is about the efficient allocation of scarce resources with diverse alternative uses
- Can provide insight into the desirability of incurring environmental costs and benefits given the objective of increasing “satisfaction”/social welfare



Conceptual Background II (Externalities)

- Efficient allocation of resources requires consideration of EXTERNALITIES (both positive and negative)
- Process of agricultural modernisation results in the loss of natural pollination services (negative externality)



Why value pollination services?

- Determine whether the loss of pollination services is economically significant
- CBD 2000 International Initiative for the Conservation and Sustainable Use of Pollinators. Action plan recognises need for improved understanding of economics of pollination (SBSTTA-7)



Conceptual Background III (Values)

- Direct Use Values (honey, wax, etc.)
- Indirect Use Values (ecosystem services - pollination of domesticated and wild plants, maintenance of ecosystems and landscapes)
- Non-use values (option and existence values)



Importance of Pollinators

- 30% of 1,500 crop plant species depend on bee and other insect pollination (Buchmann, 1996)
- Production of bee wax, honey and other products
- Wild plant species depend on bee and other insect pollination
- Maintenance of agro-ecosystems and landscapes



Approaches to Pollination Service Valuation

- Market value of all insect pollinated crops
- Market value of main insect pollinated crops
- Only those crops pollinated by honey bees
- Include the value of crops grown from seed derived bee-pollinated plants
- Include legume crops and livestock products derived from bee-pollinated plants
- Include bee-pollinated legume crops that reduce nitrate fertiliser requirements
- Consumer surplus approach (as above but accounting for price changes and substitutes)



Constraints to Valuation of Pollination Services

- More precise information is required with regard to
 - Pollination needs of species and varieties of crops (and wild plants)
 - Effectiveness of particular pollinators
 - Value of locally marketed crops (usually ignored in national accounts)
 - Clearer understanding of farm-level costs and benefits of different crop and pollination systems



Methods used by Existing Pollination Valuation Studies

- Majority focus on contribution made by honey bees (pollination of 73% of world's crops)
- Majority use the following formula
$$\text{Pollination Service Value} = V \times D \times P$$
 - V = Annual value of the crop
 - D = Dependency of the crop on insect pollinators (assumption: D= 0.9 or 0.5 or 0.1)
 - P = Proportion of (effective) insect pollinators that are honey bees (assumption



Results of Existing Pollination Valuation Studies

- Global: US\$ 65-70 billion
- UK and England: GBP120m-138m (honey bees). GBP172m in total
- USA: US\$1.6 - \$8.3 billion (honey bees).
US\$4 billion increase 1987 - 2000
\$4.1-\$6.7 billion (other pollinators)
- Yucatan, Mexico: US\$1.1-\$9.6 million p.a.
- Canada: C\$444 (1990) - C\$782 million (1998)
- Australia: A\$1.2- 1.7 billion
- New Zealand: NZ\$3.1 billion



Main Findings of Valuation Studies I

- Value of pollination services are significant
 - Many times the value of bee products
 - Value of commercial services small compared to that provided by nature
- Benefit/cost ratio of using commercial services is high
- Overall value of pollination services has grown significantly over past decade




Main Findings of Valuation Studies II

- In addition to crops, seed production, livestock/pasture production and soil fertility are also significantly influenced by pollination
- Aesthetic/existence values for pollinators and the agroecosystems they maintain may be substantial but have not been calculated to date.
- Incidence of costs may fall equally on consumers and producers



Conclusions I (Why value pollination?)

- Identifying the economic value of pollination services can provide
 - *decision-makers* with an effective argument for conservation
 - *farmers* with a better understanding of the relative costs/benefits of certain agricultural practices



What needs to be done I (How can we value pollination services?)

- Overcome information constraints through:
 - Research
 - Awareness-raising
 - Capacity building

specifically with regard to:

- pollination needs of crops species/varieties
- effectiveness of particular pollinators
- farm-level costs/benefits of crop and pollination systems



Conclusions II (“Weitzman” Approach)

- Economic valuation of pollination services can support
 - the identification of conservation priorities
 - the design of cost-efficient bee diversity conservation programmes




What needs to be done II (“Weitzman” Approach)

- Measure of genetic diversity/distance between bee species
- Index of extinction probabilities
- (Net) conservation costs per species



Conclusions III (Policy Instruments and Mechanisms)

- Need to support design of policy instruments and mechanisms that promote sustainable use of bee pollinators



What needs to be done III (Policy Instruments and Mechanisms)

- Pollination as integral component of sust. agric. systems & cropping practices
- Maintenance/management of natural areas for pollinators
- Restoration of pollinators and habitats
- Internalisation of costs of current agricultural practices
- Enforcement of existing environmental management laws



What needs to be done III (continued)

- Income support for farmers for environmentally-friendly practices
- Change in national accounts compilation
- Development of niche markets for sustainably produced farm products (certification, trade policies, legal and economic measures)



Muito Obrigado