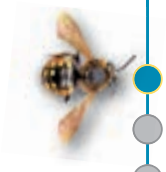

EXTENSION OF KNOWLEDGE BASE

ADAPTIVE MANAGEMENT

CAPACITY BUILDING

MAINSTREAMING

HANDBOOK FOR PARTICIPATORY SOCIOECONOMIC EVALUATION OF POLLINATOR-FRIENDLY PRACTICES

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HANDBOOK FOR PARTICIPATORY SOCIOECONOMIC EVALUATION OF POLLINATOR-FRIENDLY PRACTICES

Maryanne Grieg-Gran
International Institute for Environment and Development, London, United Kingdom

Barbara Gemmill-Herren
Food and Agriculture Organization of the United Nations, Rome, Italy

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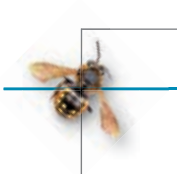

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PREFACE

In agro-ecosystems, pollinators are essential for orchard, oilseed crop, horticultural and forage production, as well as the production of seed for crops. Pollinators such as bees, birds and bats boost 35 percent of the world's crop production, increasing outputs of 87 of the leading food crops worldwide, such as coffee, cocoa, chilies, apples, palm oil, tomatoes, papaya, mango, avocado, cardamom, vanilla, pigeon pea, most spices, most vegetable seeds, plus many plant-derived medicines in the world's pharmacies.

Just as the agricultural community is appreciating the contribution of pollination to crop production, populations of managed pollinators (the Western honey bee *Apis mellifera*, the Eastern honey bee *Apis cerana* and their Asian relatives) are facing new and poorly understood threats such as pests and diseases. The most critical form of insurance for managed pollinators are the services provided by wild pollinators that work in agricultural landscapes.

Within the context of its lead role in the implementation of the Initiative for the Conservation and Sustainable Use of Pollinators (also known as the International Pollinators Initiative-IPI) of the United Nations Convention on Biological Diversity adopted in 2000 (COP decision V/5, section II), FAO has established a "Global Action on Pollination Services for Sustainable Agriculture". FAO has also developed a global project, supported by the Global Environment Facility (GEF) through the United Nations Environment Programme (UNEP) entitled "Conservation and management of pollinators for sustainable agriculture, through an ecosystem approach". Seven countries (Brazil, Ghana, India, Kenya, Nepal, Pakistan and South Africa) have worked together with FAO to identify and carry out targeted activities that can address threats to pollinators in agricultural landscapes. The outcomes of the global project are expected to expand global understanding, capacity and awareness of the conservation and sustainable use of pollinators for sustainable agriculture.

As a contribution to the IPI, FAO and its partners have collaborated with the International Institute for Environment and Development (IIED) to develop guidelines for a participatory approach for farmers, forest dwellers, and other agroecosystem managers to distinguish, evaluate, appreciate and demonstrate the positive impact of pollinator-enhancing practices on their livelihoods. Field testing and adaptation of the protocol as applied to variable cropping systems in different countries was made possible through a grant from the International Fund for Agricultural Development (IFAD) and the UNEP/GEF/FAO project in 2009 and 2010. This document thus presents a handbook for the application of the guidelines, as it may be used in farmer-field school formats, community meetings with farmers, or other instances where farmers can benefit from keeping records to better assess the value of specific practices. As the guidelines are applied, FAO and its partners will facilitate sharing information on the results from farmer-led evaluations of the wider impacts of pollinator-enhancing practices in a crop production system.

Peter Kenmore
Principal Officer
Plant Production and Protection Division
Food and Agriculture Organization of the U.N
Rome, Italy

INTRODUCTION

AIM OF THE HANDBOOK

The aim of this handbook is to provide guidance on how organizations can work with farmers to evaluate the impact of pollinator-friendly practices on their livelihoods. Pollination is a service that traditionally has been provided by nature, serving farming communities at no explicit cost to them, so long as agriculture remained small-scale and inherently diverse. But as production in many parts of the world has intensified and the use of agricultural chemicals that impact beneficial insects such as pollinators along with plant pests has increased, pollination services are showing declining trends in a number of instances.

In North America and Europe farmers commonly bring colonies of honey bees (*Apis mellifera*) or purchase colonies of bumble bees (e.g., *Bombus terrestris* in Europe) to insure the pollination service of their crops (Carreck *et al.* 1997, Velthuis & Van Doorn 2006). However, the domesticated honey bee, *Apis mellifera (*and its several Asian relatives) are often not as effective as wild pollinators. Recent studies show that pollinator diversity is essential to achieve optimal pollination and that in some instances pollinator diversity may be even more important than the abundance of pollinators. The presence of wild pollinators has also been shown to increase the efficiency of managed honey bee foragers (Figure Intro.1).

Figure Intro.1

PRESENCE OF WILD POLLINATORS MAY INCREASE THE EFFICIENCY OF MANAGED HONEY BEES

© S. Greenleaf

In sunflower (*Helianthus annus* L.) grown for hybrid seed production, the pollination efficiency of honey bee foragers was enhanced up to 5 times by the presence of wild bees. When wild bees landed on a flower head occupied by a honey bee, the honey bee was more likely to move onto the next flower head, thus promoting greater cross-pollination (Greenleaf & Kremen 2006).

There is thus a keen interest in identifying practices that will encourage the presence of diverse wild pollinators on farms growing pollinator-dependent crops.

Losses of pollination services are difficult to perceive; unlike pests which damage crops, pollinators leave no immediate traces of their beneficial work. The benefits of their work, moreover, do not become evident for weeks if not months, as reflected in crop yields at the time of harvest. It is quite understandable that farmers may not readily link the presence of pollinators to much later improved yields.

It could be argued that all that is needed is to show evidence of improved pollination in side-by-side demonstration trials in agricultural research centres; however there are two major difficulties with this form of evidence.

Pollination is the flagship example of a "positive externality"; bees kept or encouraged by one person will provide a benefit to many fruit growers within their flight range, without the growers recognizing or paying for the costs to maintain the bees. In the same sense, the service of pollinators, whether wild or managed, cannot be constrained to one field, to show a comparison with the adjacent field – comparisons between high and low levels of pollination service need to situated at least one kilometre apart (Vaissière *et al.* 2011).

More generally, demonstration sites highlighting improved agricultural practices at agricultural research centres often show significant advantages compared to conventional practices. But agricultural innovations that give promising results in research centre trials do not always work out as expected when farmers apply them in their own plots, for example requiring greater effort and giving lower yields (de Groote *et al.* 2010). For this reason, and because of other constraints such as lack of cash to cover initial investment, perceived risk and time gap before benefits materialize, adoption rates for new agricultural practices can be low (Sain and Zurek 2002).

Increasingly it is recognized that farmers themselves need to be at the center of testing and adapting any proposed improved practices. "Farmer Field Schools" is a form of extension and farmer-led research that supports ecologically-informed decision-making by farmers (Braun *et al.* 2006). Farmer field schools are based on learner-centered curricula for experiential learning, taking place in farmers' fields, allowing producers to observe, measure, analyze, assess and interpret key agro-ecosystem relationships as the basis for making informed management decisions.

With respect to pollination services, farmers may best come to appreciate the role of pollinators by seeing for themselves in their own farms, the effects, over one or more cropping seasons, of introducing practices that encourage pollinators to visit their crops. This handbook starts from the premise that if farmers evaluate these practices for themselves – by comparing with their farming experiences before introducing pollinator-friendly practices, or with control

fields at a sufficient distance - and find them positive they will be more likely to adopt them than if they are shown only the results from research centre trials or from economic feasibility analyses. They will also be more equipped to explain the impacts to other farmers and motivate them to adopt these practices as well.

TARGET AUDIENCE FOR THE HANDBOOK

This handbook is targeted at organizations working with farmers and farmers' groups to help them improve their production systems and practices so that they better meet their livelihood needs. This could include extension services, Farmer Field Schools, producer organizations and cooperatives.

Figure Intro.2

TRAINING OF TRAINERS ON POLLINATION SERVICES, LAO PDR

Extension agents and trainers consider what might affect the pollination of jujube (*Ziziphus jujube Mill.*) in the People's Democratic Republic of Lao.

SCOPE

This handbook focuses on socioeconomic evaluation of pollinator-friendly practices. It addresses the impact of these practices on the inputs and outputs of crop production systems. To a lesser extent it suggests some ways in which farmers could take into account some less tangible impacts of these practices such as health (Figure Intro.3).

Figure Intro.3

LESS TANGIBLE IMPACTS: FAMILY HEALTH CONCERNS

Children near Fulbari, Chitwan, Nepal

Particularly where families live on or close to farms, concerns about exposure of family members to agricultural chemicals may motivate efforts to reduce toxic pesticide applications.

The procedures outlined here therefore propose a way for farmers to evaluate the 'total' impact of pollinator-friendly practices on their livelihoods and well-being. In the process, it is envisaged that farmers will identify adaptations to the practices subject to tests which might reduce observed negative impacts or enhance positive ones and could form the subject of further experiments. The emphasis is on impacts of pollinator-friendly practices which directly affect the farmers. External environmental impacts of such practices and of the resulting improved pollination are not the focus of this handbook as by definition they do not affect the farmers. For example, reducing the use of toxic pesticides may have positive impacts for the quality of water used by villages further downstream from the farmers. Likewise the conservation of threatened insect species may have biodiversity value for the global community. These values will not be captured in the evaluation approach outlined here. However, the evaluation of the impact on farmers may reveal situations where there are insufficient net benefits to the farmers for a practice to be adopted permanently. This will indicate the need to examine the external impacts and explore ways that the value of these can be captured and reflected in incentives for the farmers.

The handbook also does not aim to give guidance on how impact of the practices on pollination or the impact of pollination on yield can be measured. It is considered that other guidance may be available for this or that the socioeconomic evaluation will take place alongside application of the Pollination Deficit Protocol (Vaissière *et al.* 2011).

CONTEXT

The evaluation may start as a group-sponsored experiment with just a few trial and control plots as part of a Farmer Field School. Alternatively, it may be taken up by farmers on their own plots. A combination of a group plot initially and extending subsequently into farmers' own fields is also possible. In all cases it is presumed that there is already an active process of discussion with farmers about their production systems and the key constraints they are facing.

STRUCTURE OF THE HANDBOOK

The handbook is structured around a series of steps that facilitators and farmers can follow in evaluating pollinator-friendly practices. Each step is described briefly, followed by discussions of key issues. A number of examples are given from farmers' groups in the demonstration sites selected under the GEF-funded project. Resources that can aid facilitators are given in tables and templates for record-keeping. These are indicative and will need to be adapted by facilitators to their particular context.

Box Intro.1

STEPS TO FOLLOW IN EVALUATION OF POLLINATOR-FRIENDLY PRACTICES

STEP ONE

1. CHARACTERIZING CURRENT PRODUCTION SYSTEMS

- 1.1 Identify challenges that farmers face
- 1.2 Examine farmers' current use of pollinator-friendly practices
- 1.3 Collect baseline information

STEP TWO

2. IDENTIFYING APPROPRIATE POLLINATOR-FRIENDLY PRACTICES TO TEST

- 2.1 Draw up a shortlist of practices
- 2.2 Discuss implications of short-listed pollinator-friendly practices and make final selection

STEP THREE

3. SELECTING THE PLOTS WHERE THE POLLINATOR-FRIENDLY PRACTICES WILL BE TESTED

STEP FOUR

4. PLANNING THE TESTS OF SELECTED PRACTICES WITH FARMERS

- 4.1 Explore the impacts in more detail
- 4.2 Select indicators and determine how they will be recorded and tracked

STEP FIVE

5. ANALYZING AND EVALUATING THE PRACTICE

- 5.1 Analyze the quantitative information on the indicators
- 5.2 Draw comparisons between plots
- 5.3 Evaluate based on qualitative information