Plan of Action
of the

# African Pollinator Initiative

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# The Plan of Action of the African Pollinator Initiative

## Contents

mission statement of the African Pollinator Initiative:

*To promote pollination as an essential ecosystem service for sustainable livelihoods and the conservation of biological diversity in Africa*

## EXECUTIVE SUMMARY

Informed by an increasing world-wide recognition that pollinators play a key role in ecosystem health, both in farmers' fields and in wild landscapes, the African Pollinator Initiative was formulted by an Africa-wide group of people interested and committed to protecting, understanding and promoting the essential process of pollination for sustainable livelihoods and the conservation of biological diversity in Africa.

As wild ecosystems are increasingly converted to more human-dominated uses to meet the compelling demands of food security, it is critical to understand how we can preserve the basic ecosystem functions which fostered tremendous diversity in the first place. Among the most critical of these is pollination. Pollination precedes fertilization in plants, which results directly in seed and fruit production. Apart from reproduction, seeds comprise the dormancy and dispersal phase of many plants. Seed and fruit are also food for many animals and people. The loss in biodiversity, and the ecological impact that would follow a broad spectrum loss of pollinators is inconceivable. Yet emarkably little is known about pollinators, in Africa. Virtually nothing is known about the effectiveness of pollinators of wild plant species. The bulk of research on both crop plants and wild ecosystems resides in South African studies, while the rest of the continent has been unevenly covered in the scientific literature. We risk losing not just particular pollinators, or plants with fragile pollination systems, but critical ecosystem interactions and long-evolved linkages which underpin African ecosystems.

Pollinators have real, commercial values, though this is not always appreciated, as is evidenced by the $150 million-plus per year service that West African beetles provide to oilpalm plantations in southeast Asia. The contribution of pollinators to food security in Africa may have both tangible values, and intangible values in reducing wide disparities in production levels and dependence on imported foods.

This document outlines the steps which the API believes must be taken to secure the future of pollinators in Africa, for the benefit of this and future generations. The inaugural meeting of the initiative in February 2002 identified three components of an action plan, which has been further elaborated through the development of this Action Plan. These three components: public awareness, education and mainstreaming; conservation and restoration, and capacity building, have been designed to interact and reinforce each other, and to be applicable at both regional and national levels.

The Action Plan of the African Pollinator Initiative has benefited from a wide circle of supporters and friends, not the least of which has been the United Nations Food and Agriculture Organisation, and members in other regions of the International Pollinator Initiative who have contributed enthusiasm and ideas. But it remains, at heart, a locally-developed solution to conserving what Nature has provided, and is thoroughly endorsed by the members of the initiative.

## Introduction

The African Pollinator Initiative is an Africa-wide group of people interested and committed to protecting, understanding and promoting the essential process of pollination for sustainable livelihoods and the conservation of biological diversity in Africa. Informed by an increasing world-wide recognition that pollinators play a key role in ecosystem health, both in farmers' fields and in wild landscapes, a group of biologists, extension agents, educators and conservationists met in Kenya in early 2002 to formulate a continent-wide initiative to conserve pollinators in Africa. The meeting endorsed a declaration (below), identified three components of an action plan, and appointed an initial steering committee. This document outlines the steps which the API believes must be taken to secure the future of pollinators in Africa, for the benefit of this and future generations.

### The Kasarani Declaration

We, theparticipants of the first African Pollinator Initiative workshop, met at Kasarani in Nairobi, Kenya, during 18-22 February 2002 and:

- Agreed on a common purpose: to promote pollination, as an essential ecosystem service, for sustainable livelihoods and the conservation of biological diversity in Africa.
- Developed a Plan of Action to realize this purpose.
- Committed ourselves to working together to carry out the Plan of Action.
- Call on the good office of the United Nations Food and Agriculture Organization (FAO) to support API in this endeavor.

## Why conserve pollinators in Africa?

Conservation of pollinators is essential for food security and conservation of biodiversity in general. The continent of Africa is reknowned for its biological diversity, from its "bulldozer herbivores" of elephants and rhinos to its equally spectacular bird and plant life. Though less recognised, sub-Saharan Africa also houses a highly diverse fauna of insects, and a spectacular flora. In the past, this diversity has persisted, and even been encouraged by Africa's peoples, from the nomadic pastoralists of the savannah to forest dwellers in the Congo Basin. Presently, the continent is under

threat for a widespread poverty, growing populations, and diseases which challenge people in the most productive periods of their lives, such as HIV/AIDS. As wild ecosystems are increasingly converted to more human-dominated uses to meet the compelling demands of food security, it is critical to understand how we can preserve the basic ecosystem functions which fostered tremendous diversity in the first place.

Pollination is the transportation of pollen to a receptive floral stigma. It takes place by means of animals (pollinators), wind and water. Pollination precedes fertilization in plants, which results directly in seed and fruit production. Apart from reproduction, seeds comprise the dormancy and dispersal phase of many plants. Seed and fruit are also food for many animals and people. The loss in biodiversity, and the ecological impact that would follow a broad spectrum loss of pollinators is inconceivable.

Thus, central to all ecosystem functions is pollination. There is a growing recognition, worldwide, that pollination is a service provided by nature which we tend to take for granted, and often do little to encourage, until we start to lose it. An estimated two-thirds of all flowering plants depend on animals, largely insects for pollination. For these plants, pollinator may be as critical as light and water. Pollination is a vital link in natural communities, connecting plants and animals in key and essential ways. Cross-pollination by insects has very likely been key to the radiation of flowering plants throughout the world, which are the cornerstone of most ecosystems. Because insects have become so adept at finding and identifying individual flowering plants, even rare plants may persist insofar as pollination occurs. In other words, they need not be close together- as is rarely possible in the many marginal environments of Africa that experience recurrent drought. The wealth of types of pollinators- from butterflies to bees to birds and bats- and the wealth of variety within flowering plants have stimulated each others' evolution, leading to a remarkable diversity and the often beautiful adaptations between flowers and pollinators. Conserving pollinators in an ecosystem means preserving the finely tuned links between plants and animals that permit the successful reproduction of plants. In turn, especially in the harsh environments found throughout Africa, plants offer a rich and critical resource to animals in the form of pollen, nectar, seed, fruit and foliage.
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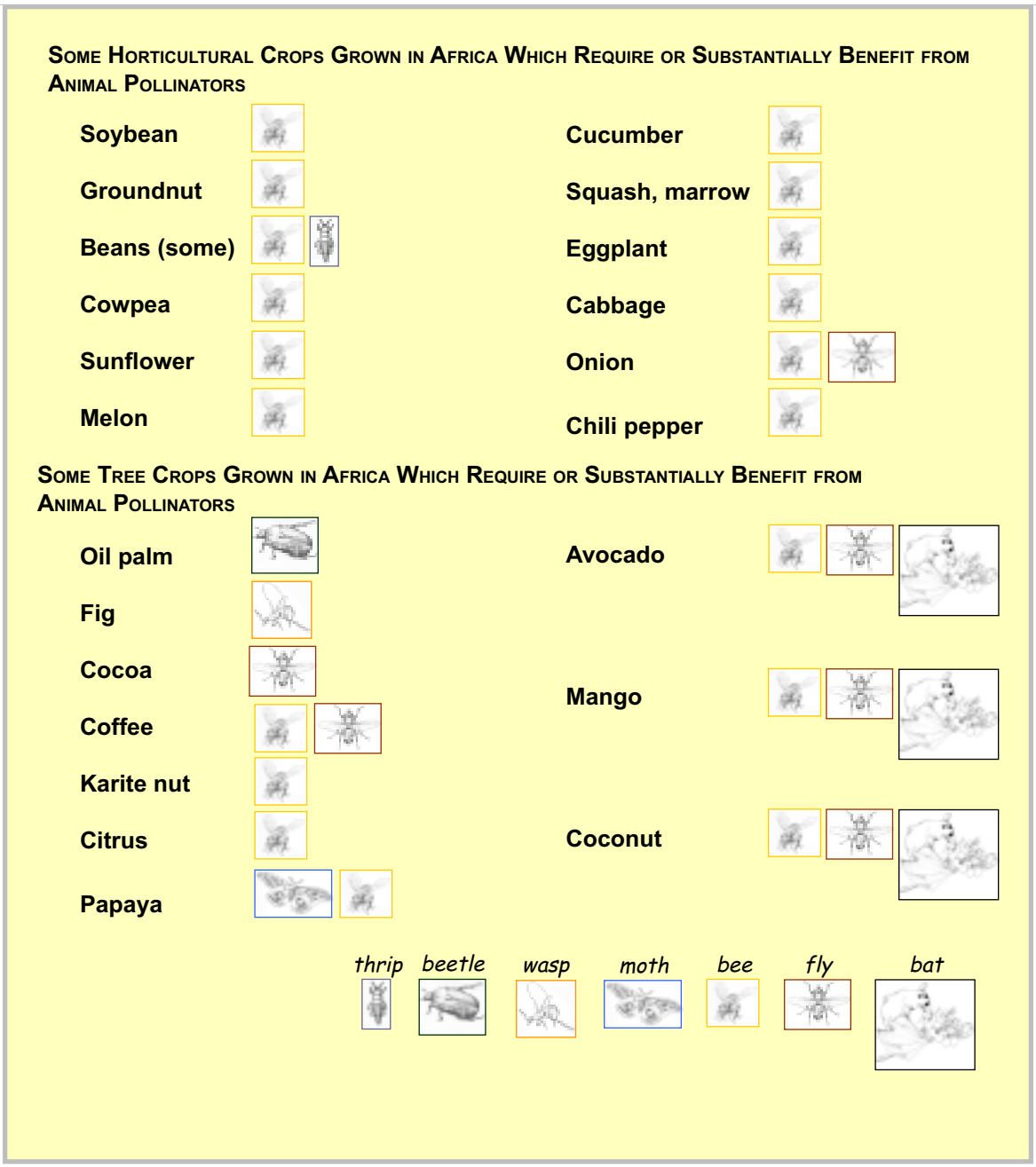
Pollination is a service that is key to agriculture as well. Insect pollinators are essential for many fruit and vegetable crops, and the demand for pollinators grows as the need for agricultural productivity increases. Unfortunately, by developing larger and larger fields and landscapes for agriculture, we also remove the habitat that may be needed by pollinators. Pollinators have real, commercial values, though this is not always appreciated. Consider the $150 million-plus per year service that West African beetles provide to oilpalm plantations in southeast Asia (see box on West African Oil Palm Pollination, page 13).

Studies on pollination have almost always shown that we should not rely on a single pollinator species. For many crops, the more pollinators, and the more different kinds of pollinators the better. For example, with cucurbits such as watermelon, theweight of the fruit is directly linked to the number of pollinator visits. Moreover, certain pollinators may fly when it is only warm and sunny, such as most bees, while others such as hawkmoths may fly in cooler and cloudier weather. It has




become apparent that the provision of pollinator services involves far more wild species and far more habitat types than have been considered in most discussions of agriculture's dependence on biodiversity.

To illustrate this range of diversity in pollinators, we have depicted the key pollinators of horticultural crops and tree crops grown in Africa. As can be seen, bees feature very importantly in horticultural crops; a wider diversity of pollinators are important among tree crops. Recent estimates of potential

## Estimated Global Value, Pollinator Services of Selected Crops

| TROPICAL TREE CROPS | FAO Production Year book Commodity "International Dollar" Price per ton | Annual Value World Production 1000s of "International Dollars | Southwick's % Crop Loss with No Replacement Polllinatoon | Value of Losses 1000s of "International Dollars" |
|---|---|---|---|---|
| MANGOES (% From J. B. Free) | 211.49 | 4,715,496 | 50% | 2,357,748 |
| COFFEE, GREEN (% from J. B. Free) | 958.96 | 5,286,733 | 50% | 2,643,367 |
| COCOA BEANS (% from J. B. Free) | 663.10 | 1,956,085 | 50% | 978,042 |
| PALM OIL (% from J. B. Free) | 165.05 | 2,629,554 | 20% | 525,911 |
| | Sub-total | 14,587,867 | 43% | 6,505,067 |
| **VEGETABLE AND SEED CROPS** | | | | |
| ARTICHOKES | 590.70 | 671,135 | 10% | 67,114 |
| ASPARAGUS | 1440.85 | 5,607,111 | 21.87% | 1,226,275 |
| CABBAGES | 100.24 | 4,502,052 | 0.63% | 28,363 |
| CARROTS | 162.87 | 2,648,771 | 1.68% | 44,499 |
| CAULIFLOWER | 183.92 | 2,333,767 | 3.87% | 90,317 |
| COTTONSEED | 174.69 | 6,450,614 | 30% | 1,935,184 |
| CUCUMBERS AND GHERKINS | 223.12 | 13,091,076 | 60% | 7,854,646 |
| SUNFLOWER SEED | 292.45 | 7,771,635 | 80% | 6,169,308 |
| | Sub-total | 43,076,161 | 26% | 17,415,706 |

yield losses of crops which could result from serious losses of pollinators is sobering.

Remarkably little is known about pollinators, in Africa. Virtually nothing is known about the effectiveness of pollinators of wild plant species. The bulk of research on both crop plants and wild ecosystems resides in South African studies, while the rest of the continent has been unevenly covered in the scientific literature (Rodger and Balkwill, in press). When pollinators become increasingly rare in ecosystem, there will usually be other species which fulfill the similar roles, even if at a less optimal level. Thus the losses may be very subtle and unnoticed at first, making any early warning systems for pollinator loss quite complex. When they start to take effect, loss or reduced seed set is the first obvious impact, and increased inbreeding within a crop or population- again, impacts which are not readily apparent to non-specialists. The primary threats to pollinators are habitat alteration, leading to loss of breeding sites, fragmentation, and pesticides.

### FORMATION AND GROWTH OF THE AFRICAN POLLINATOR INITIATIVE

The organisms responsible for pollination, and consequently pollination itself, are widely believed to be seriously threatened by a combination of habitat loss and indiscrimate use of agricultural pesticides. This has raised concern, and a need for a global approach to pollinator conservation was recognized, more or less simultaneously, from two different parties; the Convention on Biological

Diversity and the Forgotten Pollinators campaigners.

The Forgotten Pollinators Campaign, which coincided with a book of the same name by Buchmann and Nabham (1996), initiated a wide interest in pollinator conservation, mainly in the USA. In the same year, the Third Conference to the Parties (COP3) of the Convention on Biological Diversity (CBD) gave pollinators priority for the publication of case studies in its agro-biodiversity programme. This stimulated global interest in pollinator conservation, and the first major subsequent activity was an international symposium in Sao Paulo, Brazil. This resulted in the Sao Paulo Declaration, which called for an international pollinator initiative and documented many activities required for pollinator conservation (http://www.biodiv.org).

Concern about pollinator conservation in Africa stimulated a proactive approach, and the African Pollinator Initiative (API) was founded in 1999 at the first symposium of the Southern African Society for Systematic Biology (SASSB), in Stellenbosch, South African. This preceded the formation of the International Pollinator Initiative (IPI), authoritatively known as the International Initiative for the Conservation and Sustainable Use of Pollinators, a cross-cutting issue within the CBD programme for Conservation and Sustainable Use of Agricultural Biological Diversity formed at the CBD's Fifth Conference of the Parties (COP5) (Decision 5/V, http://www.biodiv.org/decisions/default.asp?lg=0&m=cop-05&d=05). COP5 requested that the United Nations Food and Agriculture Organization (FAO) develop an IPI plan of action (IPI-POA) for submission to the Seventh meeting of the CBD's Subsidiary Body for Scientific, Technical and Technological Advice (SBSTTA7) and consider forming an IPI Co-ordination Mechanism.

This process has begun:

- An IPI electronic newsletter, Pollenbytes (http://www.ecoport.org/EP.exe$MetSearch) was initiated.
- Directories of IPI participants from different regions, and international organizations, have been published in Pollenbytes.
- Case studies have been published, and this process is continuing.
- A workshop, with regional representation, was held at FAO in November 2000 to plan the format and content of the IPI-POA.
- The IPI-POA was approved by the Six the Conference of the Parties of the CBD, and expanded to include natural areas.

Apart from these activities API has been highlighted at numerous meetings, congresses and workshops; it has been publicized widely through articles and brochures, and has been brought to the attention of many international activities, such as the Millennium Assessment and Diversitas. One member of the API steering committee is a lead author on the Millennium Ecosystem Assessment chapter on Biodiversity Regulation of Ecosystem Services, with respect to pollination services.

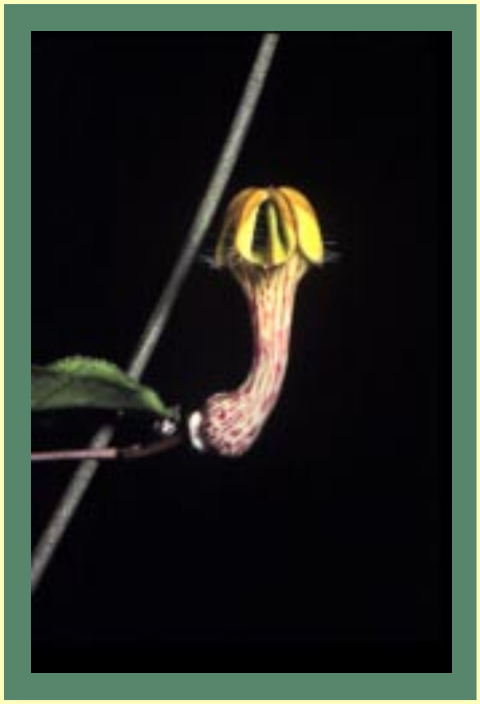
Capacity building will be achieved through institutional strengthening and not through the creation of new organizations. API has focused on the use of existing structures, such as BioNET-International's East, West and southern African networks, to achieve its objectives. API enjoys a

strong, if informal relationship with BioNET-International (http://www.bionet-intl.org/) in that BioNET has made its network structure available to API, and our principle outreach to countries at this initial point is through the SADC, East African, West African and North African Bionet focal points and frameworks. Networking is clearly an important tool for implementing a regional initiative such as API, yet the effective implementation of a network must be strategic and frugal. To make API an effective force among existing initiatives, some of which have overlapping fields of concern, it is prudent to create distinct nodes of activity, and to develop understanding between these nodes and other on-going intiatives. Among other initiatives which will benefit from mutal agreements with API are the Global Taxonomy Intitiave, the Global Biodiversity Information Facility, (both of which are under discussion with BioNET nodes in Africa) and the Global Invasive Species Programme.

API maintains a particularly strong link with the United Nations Food and Agriculture Organisation (FAO). FAO adopted API as the African region IPI network, and it has become a model for implementation of IPI elsewhere. They financed the first API workshop, held in Nairobi in 2002 which is also the first IPI regional workshop, with a goal to enable API to create a more formal, co-ordinated approach to pollinator conservation and sustainable use, and to establish specific regional activities upon which FAO can react.

## Focus on: *Ceropegias*

The diverse genus *Ceropegia*, with over 160 species distributed throughout the old world tropics, is well represented in Africa. Ceropegias are both strange and lovely. Members of the Milkweeds family, *Ceropegias* are mostly climbing, succulent herbs, with unique and distinctive flowers. The complex flowers are highly variable, but consist of a chamber with limited access, a fringe of hairs to the corolla (a typical trait of many fly-pollinated succulents) and a delighfully involved and complex pollination mechanism. Flies, drawn to the foetid colours and smells of the *Ceropegia* blossom, led through gaps and folds, are tricked into entering the chamber. Here they are duly trapped and find themselves drawn once again to the flower's reproductive structures. By means of clips, the pollinia are then attached to the hapless fly's proboscis or body. The fly is released as the flower wilts, and loaded with the very securely attached pollinia, eventually visits another blossom. As an educational poster, this case study, with its bright colours and interesting processes, could go a long way in fostering awareness amongst primary and secondary science students, amateur naturalists and other nature-enthusiasts.



*from Masinde 2003*

## Education, Awareness and Mainstreaming

The continent of Africa is graced with a wealth of highly unique pollinator syndromes, and a healthy level of pollinator diversity represented not just by insects and birds, but by reptiles and mammals as well. The suite of organisms providing pollination services to crop plants alone in Africa are estimated to increase productivity of outcrossing crop plants by an average of 31%, with a return to agricultural productivity of 23 billion dollars per year. Yet public awareness of this essential ecosystem service remains virtually nonexistent. Even farmers, who understand that bees provide honey, are often not aware of their other beneficial roles as pollinators.

When a workshop of primarily biologists met in Kasarani, Kenya in February 2002 to mobilise the African Pollinator Initiative, they recognized that while research to identify pollinators and document their roles is critically needed, no amount of scientific work will retain its value unless a campaign to increase public awareness of pollinator importance is placed at the highest level of priority.

### Public Education, Awareness and Mainstreaming: Plan of Action

| Who? | How or What? | Why? |
|---|---|---|
| Public | Media campaigns, including targeting the general public, and specialized publics through newsletters/brochures. | To inform the public, both general and specialized. |
| Schools, Universities | Lectures,curriculum development, posters | To interest younger generations and current science managers in the importance of pollination |
| Farmers, land managers | Information, demonstration “pollinator gardens”, simple management guides, posters | To increase the specific understanding of those most close to the resource |
| NGOs | Workshops, documents | To provide advocacy materials for modifying land management practices to support pollinator conservation |
| Consumers | Media campaigns, public information | To inform and influence consumer choices |
| Policy makers, Government ministries | Information, policy analysis . | To inform and influence policy decisions |

## Focus on: *West African Oil Palm Pollination*

Consider the oilpalm plantations of Malaysia, and how they have benefited by an African pollinator. Oil palm trees, native to West Africa, were taken to Southeast Asia and planted in vast plantations to satisfy the global demand for cheap, versatile palm oil. Production was disappointing until the plantation managers realized that it could be enhanced by hand pollination of the palm flowers. Yet hand pollination was laborious and inefficient. Plantation owners began to ask how the oilpalm got itself pollinated in its native habitat of West Africa's forests. Researchers studied the oilpalm in Cameroon, where they found that a tiny weevil, *Elaeidobius kamerunicus* travels from male to female flower parts and carries out effective pollination while feeding on the pollen. Start-up stocks of the weevil were taken back to Malaysia, where they were released into the plantations. (There was no problem of ecological complications with other species, since the weevil confined its attentions to the oilpalm.) The pollination is now entirely accomplished by the weevil, with savings that already amounted to $150 million per year in the early 1980s (Greathead 1983). Figures such as these should help to convince policy-makers of the importance of pollinator conservation.

Fortunately, pollination can sell itself, with a little help from its friends and advocates. The many intricate and fascinating systems of plant-pollinator interactions, throughout the continent, are our best source of tools for capturing the popular imagination and communicating the value of pollination as a service to be protected.

We recognize that we will need to relay and disseminate information on pollinators through a number of avenues, each one specially tailored for the targeted audience. Among the critical target audiences to reach will be children, the general public, farmers and extension workers, and government policy-makers. In this last respect, we will seek means to have pollination recognized and valued as a critical ecosystem service in African countries, in national planning and accounting.

Strategic interventions to promote public education and awareness of pollination include:

**Producing stimulating documentaries and informational material.** API, like many other bodies, when approaching the general public and exploiting media time and space, will be competing for attention with a wide range of causes and ideas. While it would be wonderful if everyone stopped and read a whole book on pollinators, most people don't have the time or inclination to do so. However, with colourful images, a catching slogan, logos, branding, websites, etc., API can become

part of the wider societal conscience. Other groups have managed to do this, e.g. the WWF logo of a Panda bear, despite it being an obscure and rare animal, is as familiar and recognizable as Coca-Cola the world over. With pollinators we have the advantage that everyone already knows bees, and all societies have stories, proverbs etc that honour and value them. API should use this as a

## Provisional Budget: Public Education and Awareness

| Activity | Level | Unit Cost | No. of Units |
|---|---|---|---|
| 1. Production of pollination documentaries for radio and television. | Regional | $50,000 Television, $20,000 Radio | 2 Television, 5 Radio |
| 2. Production of quarterly newsletters/brochures with network of pollination biologists, botanical garden managers, farmer groups, other specialists. | Regional | $500 | 12, over 3 years |
| 4. Demonstration "pollinator gardens" in national research centres and botanical gardens. | National | $3000 | per participating countries |
| 5. Extension materials for agents and farmers. | National | $3000 | per participating countries |
| 6. Civil society awareness raising workshops on pollinator conservation in sustainable agriculture and rural development. | National | $3000 | per participating countries |
| 7. Consumer campaigns for "pollinator friendly" commodities | International | $100,000 | 3 commodities |
| 8. Guidebooks developed for policy makers on pollinator- supportive policy frameworks | Regional | $30,000 | 1 |
| 9. Create an agro-biodiversity web site, in collaboration with the CBD focal point in each country | National | $10,000 | per participating countries |

starting point. Moreover, pollinators visiting colourful flowers is a visually appealing process, full of surprises and twists in the ways pollinators and plants have evolved to manipulate each other's performance. Pollination biology in an African context (including the dramatic stories of cycad pollination, ceropegia flowers and their emprisoned flies, sunbirds sipping at aloes, and bats hanging from *Parkia* flowers) can be a door to children and adults alike learning about the broader ideas of science and conservation. The process of science within pollination is dynamic and interesting, and many new and interesting mechanisms are discovered every year. Telling this story to the general public, through radio and television and print media, will be both a challenging opportunity to convey the beauty of subtle ecological interactions to the general public. Our present API coordinator, Dino Martins, was awarded the Peter Jenkins Conservation Journalism award of 2002 for just such reportage: a series of articles in Swara magazine which focused on pollinators, insect mimicry, and other insect-related stories.

**Foster information exchange among key stakeholders.** Active networking and exchange of information among pollination practioners and those interested in pollination services (including farmer groups and sustainable agriculture groups) will lead to a more informed, engaged group of stakeholders on pollination issues in Africa. Exchange of preliminary research information, and experiences to conserve pollinators will build informal capacity among a wide range of stakeholders interested in pollination services.

Information exchange between API and global initiatives are important too. Pollination biologists are well placed to assess harmful trends in the environment; pollinators have been identified as "canaries in the mine" - giving early warning of the break down in critical environmental services. The African Pollinator Initiative will seek to inform initiatives such as the as the Millenium Ecosystem Assessment of its observations on pollinator declines within Africa, to keep conservation and ecosystem services sufficiently prominent on the global agenda.

**Demonstration gardens.** Seeing is believing, and pollination is a process that is a pleasure to observe. Establishment of demonstration "pollinator gardens" in existing public spaces, such as arboreta, museums, botanical gardens and national agricultural research stations will provide places where the public can see, first hand, an ecosystem service that they may never have focused on before. Pollinator conservation may hinge on the establishment of just such small reserves. Demonstration gardens can serve both to the educate people and to promote pollinator conservation. **API will also work to draw people's attention to their private flower and vegetable/kitchen gardens, and the pollinatrion that occurs there.**

**Community groups and extension officers** will need specific, practical information on how their management decisions can serve to conserve pollinators. Crop yield loss and fragile pollination relationships in wild ecosystems need to be pinpointed and highlighted. Scientific information on threats to pollinators, from diseases, land degradation, pesticide use, and habitat loss needs to be made relevant and accessible to resource managers. Specific interventions, such as timing of pesticide sprays and conservation of alternate resources for pollinators, need to be conveyed to farmers and land managers.

**Actively engaging support groups and communities working on the nexus of sustainable livelihoods and the conservation of biological diversity.** API recognizes and seeks to establish memoranda of understanding with other public interest institutions and bodies that are actively engaged in the community based conservation and sustainable agriculture. These societies, such as Nature Kenya, or PELUM (a network of sustainable agriculture non-governmental organisations in southern and eastern Africa) should also be educated on the importance of pollinators and moreover of the necessity to include pollinators as part of any biodiversity conservation or sustainable agriculture campaign.

**Informing consumers.** Interesting possibilities for valuing ecosystem services are opening up with new "ecolabeling" schemes, such as "bird-friendly" shade-grown coffees produced in Latin America and marketed through coffee shops in the United States. Such schemes can serve to provide premium prices to farmers for environmentally-friendly production practices, benefit the local ecosystem, inform consumers about how their food is produced, and assure them that the food is safe and healthy. "Pollinator-friendly" coffee from the highlands of Ethiopia or cocoa from Ghana may ultimately be a marketing force to harness in support of pollinator conservation. Stingless bees often have specialised relationships with trees which produce frankincense, a commodity valued by green marketers such as the Body Shop.

**Formally engaging governments.** API recognizes that policy makers and legislators are extremely busy and under pressure from many sectors. As part of the broader conservation strategies, a special subset of relevant, current and critical information must be made available to educate the policy makers- documents produced for this audience need to be terse but accurate. Specific policy interventions that can serve to enable the conservation of pollinators should be developed and presented to policy makers to guide their decisions appropriately. One example might be the incorporation of ecosystem services- such as watershed values and pollination services- into national accounting practices, so that these functions receive visible valuation. Another may be reviewing agricultural and land use policies to explicitly provide for pollinator conservation.

Each country that is signatory to the Convention on Biological Diversity has agreed to developing means of sharing biodiversity data with the public on a national basis, through a "clearing house mechanism". Often, countries have found it difficult to readily identify and produce such data. The African Pollinator Initiative will be well placed to share the data it generates with a national clearinghouse mechanism, and to help governments make the first steps toward proferring such data in a web-based interface.

## Conservation and Restoration

The campaign to conserve pollinators globally arose from greater attention to monitoring information, and the realization that wild plant reproductive failures, and agricultural loss through insufficient pollination

## Focus on: *Unique Pollination Systems of Southern Africa*

Southern Africa, with a tenth of the world's plant species, has the richest flora for any equivalent-sized region in the world. This is matched by a remarkable range of pollination systems, many of which have been discovered only in the past few decades. Some of these are described below.


***Flies:*** Long-tongued flies (Nemestrinidae, Tabanidae, Bombyliidae) are known to be flower specialists and feed mostly on nectar ((Fig A). Particularly long proboscides have evolved in the Nemestrinidae and Tabanidae, with the nemestrinid *Moegistorhynchus longirostris* having the longest proboscis (6-10 cm) of any fly worldwide. The long proboscides of these flies serve to extract nectar from deep tubular flowers and research in the past decade has shown that dozens, if not hundreds, of plant species in southern Africa rely exclusively on these flies for pollination. Within any particular geographical region, there are guilds of plants that, in some cases, rely on a single long-proboscid fly species for pollination. Such specialization by plants is very rare worldwide and was hitherto known only in plants such as figs and yuccas that offer specific brood sites for pollinators.

***Moths:*** Moth pollination is very well developed in the African flora. Some 50% of African orchids, for example, are pollinated by moths. Data on moth-pollination is hard to acquire because of the difficulty in making nocturnal observations. However, there have been several studies of pollination by both settling moths (Noctuidae and Geometridae) and hawkmoths (Sphingidae) in the past decade. Interestingly, moth pollination is rare in the Cape floral region where nutrient-poor soils render vegetaion unpalatable to most moth larvae, but relatively common in the summer rainfall region.

***Beetles:*** The classical beetle-pollinated flower has long been characterised as being usually pale, and bowl shaped, with a strong fruity odour; this applies mainly to plants pollinated by fruitchafer beetles (Cetonidae). In South Africa, most documented beetle-pollination systems involve plants with bright (red, orange or yellow) odourless flowers visited by monkey beetles (Scarabaeidae: Rutelinae: Hopliini) (Fig B).

***Pollen Wasps:*** Southern Africa has the richest fauna of masarid wasps worldwide. These wasps feed their larvae on pollen and nectar, like bees, and not on insects and arachnids like other wasps. These insects appear to play a particularly important role in the pollination of plants in the semi-arid Karoo region Sexual deception of male wasps by Cape *Disa* orchids has recently been recorded.

***Vertebrates:*** Bird pollination is well-known in Africa, with sunbirds, sugarbirds and several other taxa visiting flowers regularly. But there are other vertebrate pollinators, as well, some of which are known only on the continent. Pollination by rodents is an oddity that was first discovered in Cape Proteas in the 1970's and later found to also occur in Cape lilies (Fig C). Flowers adapted for rodent pollination are situated close to the ground, are dull coloured and produce a yeasty scent during the evening on account of the nocturnal activities of rodents. Flowering usually occurs in winter when rodents experience food shortages and alternative pollinators, such as insects, are less active . Bats are also pollinators, and the baobab tree, which provides shelter and food for an abundance of animals is bat pollinated.

*adapted from Johnson 2003*

was becoming more common. Yet we have little of this type of information for Africa. While there has been a long history of agricultural and botanical research in Africa, and some groundwork has been laid with respect to pollination, the scientific understanding of pollination in Africa is weak and uneven.

Pollinator conservation provides a tremendous opportunity to operationalise the ever- elusive "Ecosystem Approach" in fine-grained, human-scaled landscapes such as farm and field edges. With appropriate research, we must develop simple specific recommendations to land managers to conserve pollinator habitat, and publicise and lobby against bad agricultural and land use practices. We must systematically identify key pollinator interactions and population dynamics in natural and agroecosystems, including forest, savannas, grasslands, arid and semi-arid lands, wetlands and afromontane ecosystems. In agricultural systems, we need to assemble all existing information on crops which depend upon pollinators- including indigenous knowledge, and identify the key pollinators in prioritised crop systems. From an assessment exercise, we should be able to identify

## Focus on: *Bottle Gourd Pollination in Kenya*

The use of the cucurbit fruit, known as "bottle gourd", as a container straddles across many African cultures. The classic African bottle gourd, *Lagenaria spp.* comes from strong-growing annual climbers with ancient pan-tropical distributions. It 's believed that the gene center of the bottle gourd is Africa but wild species have not been confirmed; the plants seem to grow naturally around human settlements. What is remarkable about bottle gourds is their amazingly high diversity of fruit size and shape as well as shell color, texture and thickness. The diversity is different in different ethnic groups with some forms being found only in certain community groups where the cultivars are maintained by the local customs. It is now known that culture has played a significant role in maintaining this diversity. The bottle gourd is however grown in traditional systems where pollination is left to natural factors. As the species is dependent on insects for pollination it makes sense to believe that insects are also crucial in maintaining this diversity. Unfortunately very little is documented about its biological diversity and little is known about its reproduction mechanisms in Africa. A recent study in Kenya looked at the mechanism of pollen transfer in several species of bottle gourd. Four groups of flower visitors comprising hawkmoths (*Hippotion celerio*, *Agrius convolvuli*), moths (Noctuidae spp.), skipper butterfly (*Gorgyra johnstoni*) and honeybees (*Apis mellifera*) were considered active flower visitors. Night-visiting hawkmoths were suspected to be the major pollinators of this plant in the locations surveyed.

*from Morimoto et al., 2003*

## Conservation and Restoration: Plan of Action

| Who? | How or What? | Why? |
|---|---|---|
| 1. A network of insect ecologists, research site directors and specialists in long-term monitoring, databasing, and taxonomy. | Develop and implement standardized monitoring methodology in a network of sites, to monitor pollinator trends in diverse and threatened ecosystems. | To develop both an early-warning system to detect pollinator trends, and simple reference guides to pollinators and their distribution patterns. |
| 2. African universities and research institutions | Create a database on important crops and biomes in Africa dependent on pollination; assess existing knowledge on pollination biology and taxonomy; carry out focused case studies on major gaps. | Compilaiton of existing knowledge will guide targeted research designed to fill in the major gaps. |
| 3. Specialists in environmental economics | Assess the economic value of pollination, with evaluations of the economic impact of the decline of pollination services in agriculture, and in natural ecosystems | Critical and compelling information for public education and awareness, and policy decisions will be provided. |
| 4. Network of national universities and NARCS, backed up by regional research institutions | Carry out case studies of pollinator decline for pollinator conservation and restoration interventions. | Management interventions should be based on knowledge, both scientific and traditional. |
| 5. NGO partners with restoration capacity, backstopped by research institutions | Carry out pollinator conservation interventions, based on knowledge of causes of pollinator decline and of pollinator habitat requirements, monitor and document effects of interventions and identify and publicise best practices in pollinator conservation and restoration, through application of the Ecosystem Approach of the Convention of Biological Diversity. | Successful strategies must be identified and documented for replication in other areas. Pollination services are a good application of the ecosystem approach and can illustrate its value to a wide constituency modifying land management practices to support pollinator conservation |
| 6. Regional and national research institutions. | Develop specific recommendations to land managers to conserve pollinator habitat, and Publicise and lobby against bad agricultural and land use practices which are detrimental to pollinators. | Pollination conservation must be translated into clear management terms for farmers and wild land managers. |

and prioritise vulnerable systems, and those in which explicit pollinator management practices can have the most beneficial impacts.

Strategic interventions include:

**Monitoring the status and trends of pollinators in selected areas of Africa:** The African Pollinator Initiative has recognized that we must systematically identify key pollinator interactions and population dynamics in the natural and agroecosystems, including forest, savannas, grasslands, arid and semi-arid lands, wetlands and afromontane ecosystems. Establishing the status and trends of pollinators in Africa is among the most important activities of this initiative, as we need to understand the status of pollinators in Africa in order to plan for their conservation. In agricultural systems, we need to assemble all existing information on crops which depend upon pollinators- including indigenous knowledge, and identify the key pollinators in prioritised crop systems. From an assessment exercise, we should be able to identify and prioritise vulnerable systems, and those in which explicit pollinator management practices can have the most beneficial impacts.

**Assessing of state of knowledge of pollination biology and taxonomy.** The African Pollinator Initiative does not start from zero; in fact there is a respectable body of information on pollination in Africa which the initiative has begun to compile. Making known information on pollination biology and taxonomy of pollinators readily available to researchers and the interested public ensure that the initiative builds on past efforts.

**Developing tools for pollinator identification.** In addressing the taxonomic impediment which is a major barrier to pollinator conservation, the initiative will seek means, through databasing with photographic illustrations, to make collection information more broadly available. In this respect, API will build on existing institutions such as the Bio-NET network, and the Global Taxonomy Intitiative. We propose, in this respect, to build an Automated Bee Identification System (ABIS) within the continent, which can maintain computerised bee identification information for Africa, and process requests for identification from researchers working within the continent. Supplying taxonomic information in an easily accessible manner to non-specialists will also be addressed under capacity building.

**Identifying key pollinator interactions and population dynamics in natural and agroecosystems:** Plant dependence on pollinators can be determined by simple exclusion and inclusion studies; research that does not require sophisticated equipment, can be completed in a growing period, and is easily- but necessarily- replicated to determine local requirements. A valuable synergy of the initiative occurs when researchers share their protocols and procedures, allowing work to be replicated in many different sites. This sharing has already begun as the result of the first API workshop. The information that will be required by the African Pollinator Initiative can also serve as focus for capacity-building of African university students.

**Developing credible assessments of the economic value of pollination.** Pollination is an ecosystem service which is clearly and directly related to human livelihoods and food security, yet a credible

## Focus on: *The Stingless Bees of Bwindi Impenetrable Forest*

The Bwindi Impenetrable forest is located in western Uganda along the border with the Democratic Republic of Congo. The forest survives as an 'island' in the midst of dense agricultural settlement. Traditionally, the forest has been utilised by local peoples including the Batwa (Abayanda) pygmies. Batwa knowledge and exploitation of stingless bees is extensive and complex. Two genera of stingless bees occur in the forest: *Meliponula* and *Hypotrigona.*

Batwa peoples harvest stingless bee nests from the forest, using the honey and other nest products for a range of purposes including food and medicine. The Batwa classify the stingless bees of Bwindi into six distinct categories: maranga, obwiza, obuganza, obugashu, obuzagali and obuhumbamba. Characteristics such as body size and colouring are carefully observed in determining the kind of stingless bee. The shapes of the nests as well as the taste and qualities of the honey are also important factors. Batwa knowledge of forest ecology extends to the recognition of ant associations with stingless bees that engage in a mutualistic nesting within the ants nests.

Stingless bees are important pollinators of a range of forest plants throughout the tropics. The six different stingless bees recognised by the Batwa are also scientifically classified as distinct species. Batwa names for the stingless bees reflect their various characteristics, such as "obuhumbamba"- likes to nest in people's homes. Traditional folk taxonomic systems are vital indicators of forest use, that can be adapted to sustainable methods of harvesting, protecting both local enterprise and conserving pollinators.

*from Byarugaba 2003*

assessment of the economic value of pollination has yet to be carried. Developing such an assessment within Africa, with compelling demands for food production and security, could be a major contribution of the African Pollinator Initiative to global development goals.

**Identifying and implementing key pollinator conservation and restoration activities in natural and agroecosystems.** Pollinator conservation will require that we find ways to modify natural resource management to permit pollinators to persist. This may not be difficult; long term studies in the mid-western United States have shown that small areas of natural habitat in an agricultural

## Provisional Budget: Conservation and Restoration

| Activity | Level | Unit Cost | No. of Units |
|---|---|---|---|
| 1. Development and implemention of standardized monitoring methodology. | Regional National | $100,000 | 1 |
| 2. Creation of database on important crops and biomes in Africa dependent on pollination; assessment of state of knowledge on pollination biology and taxonomy. | Regional | $30,000 | 1 |
| 3. Development a center for the Automated Bee Identification System (ABIS). | Regional | $140,000 | 1 |
| 3. Focsused case studies on major gaps. | National | $50,000 | per participating countries |
| 4. Assessment of economic value of pollination, with evaluations of the economic impact of the decline of pollination services in agriculture, and in natural ecosystems. | Regional | $60,000 | 1 |
| 5. Case studies on pollinator restoration interventions. | National | $50,000 , | per participating countries |
| 6. Development of science-based African meliponiculture, with reference to traditional knowledge. | Regional | $250,000 | 1 |
| 6. Implementation of pollinator conservation interventions, monitoring and documention of effects of interventions | National | $50,000 | per participating countries |
| 7. Dissemination of best practices in pollinator conservation and restoration, including development and dissemination of specific recommendations to land managers to conserve pollinator habitat, and development of publicity and lobbying material against bad agricultural and land use practices which are detrimental to pollinator | Regional | $60,000 | 1 |

landscape (such as road verges and uncultivated fence lines) have permitted a remarkable persistence of wild bees over a 75-year period of agricultural development (Marlin and LaBerge 2001). For those systems most under threat, we need to know the specifics of the right habitat size, shapes and plant resource distribution needed for critical pollinator conservation. We also need to better understand "adaptive" management for pollinator conservation: what are the tools and principles that land managers should internalize, so that they can make appropriate decisions which incorporate

## Focus on: *The Bee Course*


About 80 people have subscribed to the African Pollinator Initiative (API) and only a few are taxonomists. Pollinator identification has been diagnosed as a major limitation in understanding pollinator biology and pollination systems. Two constraints merge to create this problem:

- Insufficient taxonomic research.
- Insufficient functional identification tools.

The American Museum of Natural History (AMNH) has since 1999 held a yearly course to teach people from a variety of biological disciplines (pollination biology, teaching, conservation, faunal survey etc.) how to identify North American (Mexico, USA and Canada) bee genera. Each course accommodates about 20 candidates. They have all been over subscribed and have attracted people from beyond the intended geographical range for the course; e.g., Africa and South America. The Bee Course's have become a model for other courses, such as an "Ant Course".

Among African pollinator researchers and teachers the frustration caused by a lack of expertise in bee identification has motivated scientists in Africa to travel to the USA to study North American bees, as there is a degree of similarity (e.g., Anthophora and Megachile occur on both continents). However, many North American bee genera do not occur in Africa (e.g. many eucerine genera). Five Africans and one European, who studies pollination in Africa, have attended the Bee Course (B. Gemmill, P. Kwapong, M. Gikungu, A. Ochieng, W. Kinuthia and T. Beldorf), and more would have attended if finance were available. They all reported the Bee Course to have been very helpful in understanding the higher classification of bees, recognition of cosmopolitan genera and in the use of identification keys. But they found the training incomplete and require an "African Bee Course". C. Eardley, the only resident African bee taxonomist, attended as a visiting scientists.

Lesson learned

From discussion with many African pollinator/pollination biologists, both candidates that attended the Bee Course and those that would like to attend, its clearly evident that:

- African pollinator/ pollination biologists are aware of the taxonomic impediment in pollinator conservation.
- Scientists in Africa go to great lengths to acquire additional skills to achieve their goals.
- The AMNH "Bee Course" is useful, but an African bee course is preferred.
- Customized keys and descriptions are needed.

pollinator conservation with other day-to-day practices?

**Meliponiculture.** Possibilities for harnessing African pollinators for income generation must be underlain by appropriate research and experience sharing. Unique opportunities are possible in south-south sharing of expertise such as Meliponiculture, the culturing of stingless bees. Traditional knowledge of Meliponiculture in Africa most likely exists, in Ethiopia, Kenya and probably several other countries, but seems to be little practised today and risks being lost. Brazil has developed a scientific basis to meliponiculture, and is willing to assist African researchers to adapt this technology to local conditions and species.

**Developing sustainable strategies and policies for the maintenance of pollinator habitats and ecosystem services.** As with any resource, we can exploit pollination services in ways that may degrade the service, or we can develop sustainable strategies that benefit ecosystems. As an example, it has been proposed to import bumblebees to the continent of Africa to "buzz" pollinate greenhouse tomatoes, as they are used in Europe. But Africa has its own buzz pollinating insects. If we can learn to use these instead, we will not only avoid an alien introduction, but increase the economic value of an indigenous species.

**Disseminating best practices.** Best practice guidance in pollinator conservation and restoration, specific recommendations to land managers to conserve pollinator habitat, and compelling publicity and lobbyng material against deleterious agricultural and land use practices will be needed to assure that conservation research and practice is available to end users. Both the public awareness and capacity building components of this proposal will serve to extend this information to the public and to integrate it into training curricula, but we must assure that research and experience is codified into specific recommendations which can then form the "message".

## Capacity Building

Pollinators occupy keystone positions in both natural and agricultural ecosystem function, and are therefore important natural resources. But the skills to conserve them, and manage many aspects of sustainable pollination do not exist in Africa, except for honey bees. Some of these skills can be imported, but mostly they must be adapted locally to suite unique African conditions. This point was very strongly emphasized during the African Pollinator Initiative's Plan of Action development Workshop.

Capacity is needed for the conservation, sustainable use and taxonomy of pollinators, in pollination biology and the technology for managing pollination. Training programmes for farmers, scientists, technicians, extension officers, conservationists and naturalists are essential. Each stakeholder group requires unique training and customized support. The yellow box on the next page suggests possible provider and recipients of training.

## Capacity Building: Plan of Action

| Who? | How or What? | Why? |
|---|---|---|
| 1.Universities and other training and research organizations. | Degrees and diplomas | To produce teachers, extension officers, researchers, pollination biologists and taxonomists |
| 2. " | Research | To document customized conservation strategies for Africa, pollinator biology, pollination mechanisms, taxonomic monographs and keys. |
| 3. " | School certificates | To support inclusion of pollinator/ pollination conservation in school curricula. |
| 4. " | Short courses | To enhance bee keeping, insect and plant identification, pollinator-friendly land management, understanding of plant breeding systems, writing case studies, experimental design, collection and preservation of pollinator and plant material, culturing of non-honey bee pollinators. |
| 5. " | Information | To publish (in hard & soft copy) guides, hand books and posters, teaching materials, inventories of pollinators and their host plants, including crops. |
| 6. " | Institutional strengthening | To develop online identification services for pollinators and host plants, equip laboratories for processing of specimens, collect pollinators and theirhost plants. |
| 7. Research institutes, including museums and conservation agencies, including government and non-government agencies. | Research | As above, to produce teachers, extension officers, researchers, pollination biologists and taxonomists |
| 8. " | Training, including, short courses. | To provide on-the-job training for extension officers, researchers, pollination biologists and taxonomists, to enhance targeted interventions. |
| 9. " | Institutional | To provide information and identification services and servicing the Initiative |

## Capacity Building: Plan of Action, continued

| Who? | How or What? | Why? |
|---|---|---|
| | strengthening | |
| 10.Government departments concerned with land management, i.e., conservation, agriculture and forestry. | Agricultural Extension | To demonstrate strategies that enhance agricultural production through better pollination, mechanisms to conserve pollinators on private land. |
| 11. " | Land managers. | To implement pollinator-friendly conservation strategies. |
| 12. Farmers and conservationists. | Implementation of pollinator-friendly land management programmes. | To improve agricultural production and food security, preferably using indigenous pollinators, and to maintain diversity of indigenous pollinators in natural areas. |

Little is known about the biology of most pollinators and which plants, including the crops, they pollinate. Pollination, as an essential process for reproduction in wild plants and food for wild animals, is left to chance. Similarly, much pollination for crop production is fortuitous. Pollination management for commercial crop production is confined to honey bees. This is a case of "all ones eggs in one basket", and African honey bees face serious new nest pest problems. They are also not good pollinators of many crops and will not visit many wild flower types. Therefore the situation must change if African countries are serious about food security, and basing development on sustainable use of natural resources.

As with all natural resources there is a need to monitor change in the diversity and abundance of pollinators. This requires inventories, distribution maps and identification tools. Capacity must be built in maintaining natural pollinator populations, including recognizing pending disaster and rectification procedures. This requires knowledge of the multitude of needs, pollen and nectar flowers, nesting substrate, nesting materials, periods of activity and their parasites and diseases. Further, marketable byproducts of pollination should be investigated, such as stingless bee honey, which is medicinal, and edible larvae of moths.

For nature conservation diversity and abundance of pollinators is essential to maintain ecosystem diversity and function. Seeds and fruit are more than food for man and animals, they enable plants to adapt to new environmental conditions, diapause and disperse. These basic functions are also applicable to farmers: generic diversity in farmers seed stock helps to assure that they will have a

## Provisional Budget: Capacity Building

| Activity | Level | Unit Cost | No. of Units |
|---|---|---|---|
| 1. Training | National | $30,000 | per participating countries |
| 2. Institutional strengthening | National | $10,000 | |
| 3. Curriculum (at primary, secondary and teriary levels)and publication development | National | $25,000 | per participating countries |
| 4. Travel, skillshare meetings | Regional | $50,000 | 3 |
| | Regional | $100,000 | 1 |
| 5. Networking: Development of an African Node of the International Network for Expertise in Sustainable Pollination (INESP) | Regional | $100,000 | 1 |
| 6. Networking: Establish an Expert Centre for Taxonomic Information (ETI) node within Africa. | | | |

crop when unusual weather conditions prevail, diapause enables farmers to overcome dry or cold seasons. All farmers depend on natural vegetation because it consolidates soil, reduces soil erosion, and maintains watersheds, natural enemies of crop pests etc. Alternative wild food plants are needed to sustain pollinators when crops are not in flowers, and farmers should plant crops when they do not compete with wild flowers for pollinators. Understanding and managing this complexity of processes that enable pollination requires knowledge and a complexity of skills – building these is the objective of this programme.

We recognize that capacity building must include in its scope:

- Training at all levels, both formal and informal, that should address the needs of trainers (teachers), conservationists, extension services, farmers and public awareness.
- Partnerships / networks must be built within Africa and abroad. An important source of capacity is the involvement of teachers, and the transfer of technology, from regions with more experience in pollinator conservation.
- Institutional strengthening.
- Mechanisms to enable, and encourage, feedback from stakeholders.
- Measurement of the level of success (assessment of impact).

Thus, capacity building must occur at different levels – from the field level to the policy making level. The main objective of this component is to ensure that people have the intellectual and institutional resources available to empower them to make their own decisions and be in a position

to implement them, therefore moving towards the long-term sustainability of the pollination conservation in Africa. Additionally, building capacity will assist in bringing forward the implementation of country obligations to the CBD by providing people and institutions with the means with which to do so. This objective will be achieved through a number of activities, as discussed below.

API will promote capacity to appreciate the value of pollinator diversity and promote the multiple goods and services it provides for sustainable productivity amongst farmers, producer organisations, agricultural co-operatives and enterprises, and consumers and decision makers with a view to promoting and supporting responsible practices. Training will be provided to a wide range of stakeholders, including taxonomists, children, policy makers, farmers, farmer-led organizations, and local communities. Strengthening institutional capacities (equipment, specimen collections, self-organization for participatory research and learning), is preferred over the creation of new organizations, and sharing of experiences, *inter alia*, through support for conferences, and the publication of research results and capacity-building case studies. Constructive dialogue between, and representation of, the different stakeholders will be promoted and emphasized during all stages of the project development and implementation process.

Specific activities to be supported include:

**Training.** API will aim to train at least three specialists in pollinator taxonomy throughout the continent, and at least one postgraduate student in pollination biology per country, over a three year-period. We also propose to offer or arrange multiple short courses and attachments for personnel in positions to mainstream pollinator conservation (land-use planners, national agricultural researchers, extension personnel, conservation NGOs, etc.). Since capacity for offering both degree and short-term courses is limited within the continent, training itself will offer ample opportunities for sharing expertise across borders.

Institutional strengthening**.** In many participating countries, appropriate institutions to foster pollinator conservation already exist- such as national museums, botanical gardens and agricultural research institutions- but lack equipment to adequately serve as respositories of specimens and information. Rather than create any new institutions, API will strengthen these existing ones, both with equipment and with resources to formulate strategic plans for pollinator conservation.

**Curriculum and publication development.** Pollination is still a poorly understood ecological function, and we need to undertake some dramatic awareness raising activities to have it register in public awareness. Understanding and linking with existing structures and agencies will help, such as school biology curricula. Pollination biology is well suited to both secondary and tertiary curriculum. API will assist national level participants to develop and adapt pollinator conservation curricula at several levels within formal schooling. The production of simple guides and handbooks to pollinator conservation will be supported including researcher time, technical support, publication costs in hardcopy, CD and on the internet.

**Travel.** A limited travel budget to permit API participants to attend international meetings, and to permit annual API skill share meetings will build networking and mutual capacity building within the initiative.

**Networking with international expertise.** Capacity can be built far faster within Africa if we can successfully network with experts and cutting-edge technologies being developed in other reigons. Two networks are currently in existence that can immediately assist API to build capacity.

The first of these is ETI Expert Centre for Taxonomic Information. ETI is a non-governmental organisation (NGO) in operational relations with UNESCO. Its mission is to develop and produce scientific and educational computer-aided information systems, to improve the general access to and promote the broad use of taxonomic and biodiversity knowledge worldwide. The identification of species by trained taxonomists is a crucial link in the effort to protect the diversity of the Earths biosphere. By capturing and disseminating the knowledge of taxonomists, ETI is able through its special computer software tools to allow any one, regardless of their background, to identify species and find species related information. API will seek to establish an ETI node within Africa, which can produce easily-accessible electronic keys and information on key crop and plant pollination within Africa as scientific products published on CD.

The second initiative which welcomes interaction with API is the International Network for Expertise in Sustainable Pollination (INESP). INESP is a Guelph University, Canada, initiative. Its an Internet based network for making the global arena of expertise available for sustainable pollination in agriculture, and for natural resources. INESP pulls together interdisciplinary scientific expertise, from the fields of botany, zoology, ecology, ethology, environmental sciences, economics and social sciences in synthesizing and appraising information, relevant to pollinator conservation. It seeks to avail this in-depth expertise to practioners in the field working in extension and policy development to provide the scientific capacity by which sustainability of pollination systems can be achieved. Development of an African Node of the (INESP), making use of the expertise that can be marshalled by INESP, and sharing African experience in pollination research, will establish fruitful international collaborations.

## The Structure of the African Pollinator Iniitiative Network

Participants at the first regional workshop identified regional representatives and an interim steering committee as given in Table 1 below.

Table 1: Members of the Interim steering committee of African Pollinator Initiative

| | |
|---|---|
| West Africa | Dr. Peter Kofi Kwapong,<br>Lecturer. Department of Zoology.<br>University of Cape Coast. Cape Coast, Ghana. |
| East and Central Africa | Dr. Wanja Kinuthia, |

| | |
|---|---|
| | Entomologist, Head of Dept., Invertebrate Zoology, National Museums of Kenya. EAFRINET Coordinator. |
| Southern Africa | Dr. Connal Desmond Eardley, Specialist Scientist, Agricultural Research Council, South Africa |
| Northern Africa | (We are currently searching for a North African representative. Please direct all enquiries to the address on the back cover. If you are interested in filling this post, please contact us). |
| Scientific Advisor | Dr. Barbara Gemmill, Executive Director, Environment Liaison Centre International. Nairobi, Kenya. |

It should be recognized that while the steering committee was identified by participants at the workshop, as yet there have been little activities undertaken, in a coordinated manner, on pollinator conservation in Africa. Thus, it is prudent to regard identification of steering committee members as an evolving process in which the stakeholders will have opportunities to review them as the initiative gains more experience. As the initiative gets underway, there should be an opportunity to revisit the composition of the steering committee on a regular basis, every two years, and select or endorse regional representatives and co-opted members.

One mandate of the steering committe has been to reveiw appropriate network structures. They have found that the most appropriate types of network models for the initiative, at this time, is a collaborative network with flexible actions and/or information exchange channels, rather than an y rigid institutional formulation. As support for the network is developed, memoranda of understanding will need to be developed between institutions carrying out activities.

The governance structure of the African Pollinator Initiative is designed to facilitate coordinated networking within and between participatory countries, and with the global International Pollinator Initiative and other networks such as the International Network in Sustainable Pollination and IUCN Specialist Group on Declining Pollinators. Its procedural principles are aimed at promoting vertical and horizontal consultation, accountability, efficiency, transparency and harmony in purpose. The structure is deliberately designed to strengthen country-driven initiatives while at the same time providing for some regional responsibilities. The structure is action-oriented at the country level and allows for flexibility on entry point for countires as is deemed appropriate.

The focal point for the initiative at present is regional steering group of the API, in which regional representatives have taken guidance from the first workshop to design a plan of action with both regional activities and national activities. This plan of action has been reviewed and endorsed by workshop participants and other network members.

As this API Plan of Action identifies a number of national-level activities which would be desirable to be taken up at the country level, network members from different countries will be encouraged to develop national-level plans and proposals to take up these activities, and both the regional

steering committee and national network members should seek resources for national activities. Country members applying for funds through the regional structure should set up national steering committees to guide national-level activities.

At the regional level, funds permitting, an API coordinator will be engaged to operate in any one of the host steering committee institutions, under the guidance of the Regional Steering Committee (RSC).

The functions and procedural principles for the various governing bodies are elaborated in a document on the API website, http://www.elci.org/api.

## Conclusion

The three component of the action plan: public awareness, education and mainstreaming, conservation and restoration, and capacity building, are each important in their own right, but also have been designed to interact and reinforce each other, and to be applicable at both regional and national levels. We believe that undertaking the steps outlined within will **secure the future of pollinators in Africa, for the benefit of this and future generations.**

The Action Plan of the African Pollinator Initiative has benefited from a wide circle of supporters and friends, not the least of which has been the United Nations Food and Agriculture Organisation, and members in other regions of the International Pollinator Initiative who have contributed enthusiasm and ideas. Others who should be mentioned include ICIPE who provided the venue and logistics for the inaugural meeting, and Dino Martins who has ably served as the first API coordinator.

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