Bees *for* Development

PO Box 105 Monmouth
NP25 9AA, UK
Tel +44 (0)16007 13648
info@beesfordevelopment.org
www.beesfordevelopment.org
Bees *for* Development Trust UK Charity 1078803

Report of the Sustainable Beekeeping Discussion Day 21 July 2009

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1. Background

B*f*D is interested to define sustainable and natural beekeeping, in the belief that this will enable these approaches to be more widely discussed, accepted and promoted. With the aim of moving the debate forward, we invited a number of UK proponents of natural beekeeping to join with us for a day in summer 2009, to discuss and explore this subject. A list of those who participated either by joining us for the day, or contributed remotely, is shown in Annex 1. We thank everyone who shared their time, wisdom and insights with us. We could not attempt to invite everyone interested in this field, and we surely have missed people with much valuable information to share, however with limited time and resources, we invited a small number of UK people active in this field.

2. Introduction and Bees for Development overview

This report is a record and summary of discussions held at **Bees *for* Development** (**B*f*D**) on 21 July 2009. Discussions were wide-ranging and a variety of views and positions were put forward. We have attempted to capture as much of the discussion as possible – in recognition of the richness of knowledge and experience which made the event stimulating - even if this means that some of the contributions remain in note form.

Ten point summary of the Discussion Day

1. **B*f*D** believes that it is no coincidence that in Africa, where *Apis mellifera* is managed in extensive and 'close to nature' systems, honey bee populations are healthy and beekeeping is sustainable.
2. Consideration of whole populations of honey bees is essential for sustainability.
3. Local adaptation is the key to genetic fitness, resilience, health and vitality.
4. It is misleading to use the term 'feral' in the UK and this undermines an important aim of sustainable management of honey bees *i.e.* the restoration of wild, indigenous populations.
5. Definitions may be useful but not always essential for progress – a number of key principles were considered during the Discussion Day.
6. There exists a group of skilled and knowledgeable advocates of natural beekeeping, with considerable collective experience.
7. Social and economic aspects of sustainability were not discussed in detail during the discussion day, and yet it is increasingly clear that questions such as "Why do people keep bees?" and "How much does it cost?" must be considered within the sustainability debate.
8. All bees are important, but honey bees have a particularly unique relationship with people based around the harvesting of their products – this relationship determines many aspects of their current status.
9. Bringing honey bees, and all bees, into the remit of wildlife conservation would be an important development. It would be good to see bee boxes (as in bird boxes) in gardens and nature reserves – nesting sites for wild colonies.
10. The debate about sustainable beekeeping and natural beekeeping will continue to become more relevant and important provided stakeholders continue to discuss and share ideas and experiences – and all participants agreed to do this.

3. Record and summary of the day – presentations and discussions

Introductions

See Annex 1 for contact details.

Origin and purpose of the meeting

Nicola Bradbear introduced the origin and purpose of the meeting.

Since its inception in 1993 **B*f*D** has been promoting sustainable apiculture and has endeavoured to define what this means. **B*f*D** has considered sustainability primarily within the context of developing countries. With recent serious honey bee losses elsewhere, the question of sustainability is becoming more pertinent – and yet are we nearer to understanding what it means?

What does sustainable mean? Sustainable for what? It means different things to different people, and goes far beyond hive types. Definitions of sustainable concern issues of bee health, the environment and social and economic issues.

We hope to gain from this discussion day:

- A consensus on the meanings of sustainability
- Progress in knowing research that is available, and further research needed

- Evidence for statements on sustainability
- Network of sustainable beekeepers for advice and information
- Demonstrations of sustainable beekeeping techniques
- Profile and credibility of alternative – sustainable - approaches
- Can we agree upon the best name for our concerns?

B*f*D is increasingly asked to comment on sustainability in the UK context. DH has written a series of articles on sustainability. It seemed an appropriate time to tackle this issue further.

Bees for Development's experience of beekeeping around the world

There are many different techniques of beekeeping throughout the world, so why is only one way accepted in the UK and other industrialised countries?

'Melliferisation'[1] of international beekeeping is underway. During the past half century almost all of Asian beekeeping has been globalised and '*Apis melliferised'*. One of the drivers for this is that EU trade legislation recognises only honey from *Apis mellifera*; the pernicious effects of this extend through terminology and methodology.

Bees are precious all over the world; however, beekeeping tends to be ignored in policy and practice.

In Africa, bees are managed in extensive systems. Beekeepers own many local style hives (for example log hives) and do not plan for 100% colonisation. They rely on bees' natural processes and interfere minimally – usually only to place and harvest hives. Manipulations of the colony, such as splitting, uniting, swarm control and queen replacement rarely form part of extensive beekeeping systems.

Top-bar hives were researched by **B*f*D** in the 1990's at Njiro Wildlife Research Centre, Tanzania, as a hive type intermediate between log hives and frame hives. Factors such as angle of slope, entrance positions, landing boards etc. were all researched. One outcome was our understanding that these details of hive design had little bearing on whether beekeeping ultimately provides worthwhile livelihood. There are many other factors that determine the success of a project – for example market access, and the resources and options available to people.

B*f*D encouraged the use of top-bar hives in Tobago because subsidised importation of frame hive equipment will end eventually.

Top-bar hives in Africa work well, but for many groups local style hives are still best, cheapest and most appropriate. These hives should not be named 'traditional' - they are constantly being updated – in addition to which the term traditional carries additional connotations. People prefer to use something named 'modern'.

However frame hives (usually referred to as 'modern' hives in Africa) do not work well in tropical Africa – factors such as lack of access to materials, insufficient protection from

[1] The introduction of *Apis mellifera* to places where it is not indigenous, together with standard 'global' methods and the diseases and treatments that are now ubiquitous wherever *Apis mellifera* is managed according to these standard methods.

local predators, large capital outlay, and the mobility of tropical African bees, all combine to make them inefficient and inappropriate.

There is little incidence of bee disease in sub-Saharan Africa. Bees always start afresh in an empty hive. Local bees and local methods enable retention of disease-free bees. Beekeeping elsewhere is also sustainable, for example in El Salvador, indigenous *Melipona beecheii* are managed sustainably and remain disease free. By contrast, it is becoming clear that in many countries *Apis mellifera* beekeeping is becoming unsustainable.

The map of *Varroa destructor* distribution worldwide shows that the only major part of the original range of *Apis mellifera* that remains free of *Varroa* is sub-Saharan Africa. Australia, which has no native *Apis mellifera*, is also currently *Varroa*-free[2], although small hive beetle has been introduced recently.

BfD's concept of sustainable beekeeping

Sustainability of beekeeping needs to be considered within a wide framework. **B*f*D** presented a framework to help discuss practical issues of sustainability (see Annex 2).

The **B*f*D** framework suggests that we need to think about three dimensions:

- environment;
- genetics and populations;
- husbandry.

The continuum between these will vary according to place. For example, in Africa harvesting methods are sometimes destructive and to a UK beekeeper can seem hardly sustainable or bee friendly. However, the population as a whole has sufficient reproductive capacity to replace lost bees and one consequence of destructive harvesting is that new colonies always start afresh in clean hives, with new wild comb – this combats disease, contributes to the health of the population and is ultimately highly sustainable. Sustainability cannot be understood only at colony level, or even at apiary level, and must be considered as part of the wider population.

Sustainability needs to be considered in the context of the relationship between people and bees – in light of each of these dimensions. For example – how do people affect the wider environment of the honey bee, how do people affect the genetics of the honey bee and the global distribution of honey bee species, how do people keep and manage bees in the apiary? Some interventions are positive, for example planting bee plants, others are negative. All interventions can be weighed and questioned in terms of sustainability.

The participants discussed a number of topics.

Discussion Topic 1 Feral, wild or domesticated?

B*f*D suggested it was important to clear up some of the confusion about the status of the honey bee. Compared to other animals exploited by people, honey bees are unusual as they remain wild animals the same as, or very close to, the wild type, (i.e. where indigenous such as in the UK, but not USA) and yet have a close relationship to humans.

[2] It is not the frame hive (the box) which prevents the process of adaptation; it is the style of management that is usual with frame hive beekeeping, for example retention of colonies with large bee populations against swarming, and replacement of queens with queens from outside the local area.

Some people dismiss the honey bee as non-indigenous. Understanding of ownership of bees differs from ownership of other stock. Can we own bees? The British Beekeepers' Association (BBKA) thinks not[3]. Traditionally a beekeeper could claim a swarm if he/she remained in pursuit of it.

The population of honey bees living in the wild in the UK is much depleted – nevertheless the questions remain.

- Are honey bees wild and beekeepers have chosen to house a proportion of this wild population in their apiaries, for their own benefit?
- Is the honey bee domesticated, so that colonies in the wild should all be regarded as having escaped from apiaries and can thus be called 'feral'?

Participants discussed this issue.

DW pointed out that the relationship between man and honey bee is long and intense, making it difficult to refer to honey bees as wild animals. PC suggested that referring to the honey bee as wild is acceptable where the populations are indigenous – but he suggested that because so much of the UK stock is descended from imported stock, it was now questionable whether UK honey bees could be referred to as wild. NB suggested this was misleading and that *Apis mellifera* is an indigenous species and should be considered as any other indigenous animal, whose conservation we should seek to ensure.

Terminology is important. For example some blame feral colonies for the spread of disease – and by putting these two concepts together 'feral' and 'disease', suddenly the wild populations are thought of as a 'bad thing' (and yet re-establishing wild populations may be the best indicator that UK honey bee management is sustainable) Strictly speaking, feral refers to escapes into the wild of non-natives (for example wallabies in the UK), so in the USA, where there are no native *Apis mellifera*, colonies nesting in the wild may be rightly regarded as 'feral' colonies. In the UK there may be feral colonies of Italian imports, separate races (*carnica*, *ligustica*) although all of the same species. We agree that the word feral does not do us any favours.

The question about wild *versus* feral promoted further discussion about the relationship between bees and humans. Are bees always in symbiotic relationships with people? (DW, BJ). DW suggested that because so many bee colonies are hived in African Miombo[4] forests (where beekeeping is well established), even there, the population is not truly wild. There may be no such thing as a purely wild colony: humans may have induced many adaptations through the long history of exploitation and management of honey bees.

GJ offered a different view. Bees do have a strong relationship with people, but they are not bred to their current state by man; they are the same as they were 70 million years ago. The pressure on the global bee population because of man's activities is not the same as domestication of the bee. If we had not interfered with bees they may have evolved to live with *Varroa* (PM), and the British bee may have survived acarine (Isle of Wight disease).

[3] *BBKA Policy and Guidelines No 2* on abandoned hives states that 'bees are regarded in law as wild, and not domesticated animals'. Page 2.

[4] A type of dry forest or open woodland occurring in a belt across the middle of Africa dominated by *Brachystegia* and *Julbernardia* species.

Whatever we call them, there are unmanaged colonies in the UK – but what do we know of them? Where are they? Do they survive and are they healthy? Are swarms all from managed hives? All our information is anecdotal. What is the natural history of the honey bee in the UK, untouched by people – especially concerning mobility, a common feature of African honey bees?

Discussion Topic 2 Swarming

Bees must swarm. The entire life process depends on swarming, yet we are always suppressing this behaviour:

- public outrage if bees are allowed to swarm;
- conflict if beekeepers are making their living from honey: there is a requirement to retain bees.

Participants agreed that swarming contributes to sustainability within the wider honey bee population.

Discussion Topic 3 Disease

All participants agreed that pathogens 'out of control' are a symptom of an unbalanced situation. This is seen in other agricultural systems – for example foot and mouth disease in cattle. Wild populations are better able to resist succumbing *en masse* to pests and diseases – genetic fitness allows for adaptability to new threats. The UK honey bee population is managed in a way that does not allow it to adapt to new threats. The North American situation is worse – there is lack of genetic material. In the packaged bee industry, a few queens breed millions of colonies. In the UK, there is broad genetic diversity but management practices are not allowing this diversity to respond to the current threats.

In an evolved system, pathogens do not kill their host, as this could ultimately lead to extinction of both host and pathogen. Pathogens become less virulent when they multiply within populations vertically (i.e. through successive generations of the pathogen), rather than are transmitted 'horizontally', when each pathogen has identical genetic material. Natural beekeeping, in which honey bee colonies and pathogens are able to reproduce through successive 'vertical' generations, allows host and pathogen species to be shaped by evolution. In beekeeping management techniques that propagate colonies 'horizontally' (i.e. without successive, different generations), these will tend to have the consequence of keeping pathogens virulent, and preventing possibilities for sustainable host-pathogen relationships to develop. Natural selection enables healthy populations of bees to survive, but they cannot do this when their reproduction is controlled or 'managed'.

Discussion Topic 4 What sustainable beekeeping means

What are the defining features of sustainable beekeeping? Ask most beekeepers and they will say they practise sustainable beekeeping. Do they? If we look at the three dimensions.

Environment Most beekeepers understand that a healthy, bee friendly environment is necessary – and yet there are some stunning departures from this principle.

Genetics The genetics debate is complicated. Many people are opposed to imports but it continues, and many people discuss breeding better bees – even though acquiring a strain of bee from outside your local area locks a beekeeper into non-sustainable practices (because subsequent generations will not breed true).

Husbandry This debate is the least well understood. What are the key principles of natural beekeeping? Does it mean no foundation, no sugar or no manipulation? As frame hive beekeepers, we all believed we were natural beekeepers (most participants used frame hives before changing to methods that are more natural). Now we understand the bee colony is a super organism and cannot be broken open repeatedly. The public perceives all beekeeping to be natural and sustainable. This is an opportunity for different approaches.

BfD proposed a vision for sustainability "The aim is healthy populations of locally adapted indigenous bees living in the wild and in apiaries of beekeepers". The word indigenous may be too much of a trigger in the UK. We need to make the point about where the bee is indigenous: in Europe at the subspecies level, and in the world at species level.

We are driving the debate about natural and sustainable beekeeping, yet this has only happened in the last decade. Where are we going?

PC emphasised the point that we do not want a manual of rules, rather some fundamental principles, such as:

- *Working with the natural processes of bees*
- *Respecting the bee colony as a super organism*

Discussion Topic 5 Selection: natural or human-induced
The participants discussed the issue of selection at length.

Imports – everyone was against importation of bees because the imported genes have an impact on beekeepers endeavouring to adopt an approach of focusing on local adaptation. The imported genes interfere with this. The beekeepers who import also become locked into a non-sustainable practice. Yes – we have *Varroa* – but no, we do not have every virus of bees – and yet we get more as imports continue. It would be good to persuade beekeepers not to import – however would it be also possible for beekeepers to develop practices and norms against importing? This would require leadership within the beekeeping fraternity.

Natural beekeepers are against the idea of breeding bees in one location and moving them to another – they will not be locally adapted. Natural beekeepers are interested in sustainable populations, resilient and able to cope with their local conditions. This can be achieved (if no imports interfere) if any beekeeper simply increases from their own stock, from wild swarms, or from neighbours who are adopting the same approach.

Local adaptation implies that over generations some colonies will do better than others – those that thrive do so because they are well suited to their environment (and their pathogens). The process of adaptation (again in the absence of imports) can happen naturally (natural selection) or can be influenced by the beekeeper. The human

interference here is not totally at odds with local adaptation – the beekeeper steers, influences and changes the course of adaptation with particular aims in mind. The risk is that humans influence this process in different ways – and sometimes make decisions that may seem to serve the beekeeper, but ultimately damage the genetic fitness of populations to retain good health.

Further discussion

Breeding our way out of our problems is part of the same thought process that got us into the mess. We can select (from colonies with fewest mites) but cannot guarantee breeding. We do not know what traits we are deselecting. Uncontrolled selection has led to a loss of vitality (DW). Could we try survival of the fittest? 90% may die off but after five years, we would have survivors. To do that we need isolation and a vast number of colonies to support those losses, and all beekeepers would have to agree.

Are current problems the result of human selection, because the bees have not made their own choices (PM)? Most of our work is based on the idea that we know best. What are the variables? (PC) Infinite number of variables – a good queen, no *Varroa*, *etc*.

4. The spectrum of what is and what is not sustainable

We understand that sustainable beekeeping can be achieved when the needs of people can be balanced with the needs of honey bees. We explored where this balance may lie in relation to the three dimensions:

- Environment
- Genetics and populations
- Colony management or husbandry

In helping to find this balance, we look at the 'wilderness situation' as this can be an indication of what 'close to nature' beekeeping might comprise.

Environment

This discussion was the least contentious. It was widely agreed that human influenced landscapes could be welcoming for bees provided there is diversity and abundance of forage and sites for bees to nest – and not just bee hives. On this topic, a number of participants raised the idea that nature conservationists may be interested to provide nesting sites for bees in the same way that we provide bird boxes – and this might be within nature reserves.

Wild	**Sustainable**	**Unsustainable**
Natural wild environments Diversity and abundance of plants Indigenous plants Habitats and nesting sites for bees	Human informed and influenced landscapes with diversity and adequate bee forage Bee boxes (as in bird boxes) Appropriate bee hives	Green deserts Pesticides Chemicals GMOs Monocultures Poorly timed mowing (and too much)

Genetics and populations

Here it was observed that the 'wild' or '100% natural' end of the spectrum supports only pure, indigenous races of honey bee. Given the immense changes in the way honey bee races (and genetic material) have been moved around the world it was felt that if natural beekeepers were to position themselves at this end of the spectrum they would not be achieving sustainability. For example, this would mean the concept of sustainable beekeeping could not be applied in the USA (where *Apis mellifera* is not indigenous). In the UK, participants felt that the 'purist' approach taken by the International Association for the Protection of the European Dark Bee (SICCAM) and the Bee Improvement & Bee Breeders Association (BIBBA) was not necessarily consistent with sustainability – because their aims are exclusive of most of the UK's bees. Furthermore – we must accept that beekeepers inevitably have some selective influence on bees and that natural selection can truly occur only in the wild. We must understand and manage these influences to achieve sustainability.

Wild	**Sustainable**	**Unsustainable**
Indigenous bees	• Locally adapted bees • Achieving increase through natural reproduction of colonies or acquiring swarms • Human-orientated selection (and influence) must not compromise health, vigour and the ability of honey bees to adapt to local conditions • Genetic diversity • Considering the honey bee population as a whole	• Breeding and selection which erodes vitality and resilience • Imported queens • Breeding to produce strains of bees which can only be achieved through 'controlled' mating and which can be maintained only by repeatedly buying replacement queens

Husbandry

It is here that natural beekeeping comes to the fore and the greatest departure from most conventional beekeeping is seen. Natural beekeepers accept that beekeeping is not 'wildlife management' and that beekeepers play a role in managing apiaries of kept bees. However, their approach is 'close to nature'.

Wild	**Sustainable**	**In-between**	**Unsustainable**
• Uninhibited swarming • Wild comb • No intervention • No product removal • No supplementary feeding	• Treat the colony as a whole • Low colony density appropriate to forage • Fresh comb • Allow bees to maintain nest heat and scent • Non-invasive techniques • Hive type which allows bees to make a nest of	• Local migratory beekeeping, for example to heather moors • Organic acids • Feeding own apiary honey • Starvation	• US-style migratory beekeeping • Use of chemicals inside the hives • Feeding and medicating as a matter of course (and not when needed) • Repeated use of

	their own dimensions • Static beekeeping • Do not deprive bees of their own honey as food (even if beekeeper therefore harvests little)	feeding	drawn comb

5. Taking the debate forward

Beekeeping associations Local well established associations tend to be conservative concerning alternative approaches, but most of their members are interested. People need to see how it works, what natural comb looks like. They are curious. Many beekeepers want to hear about natural beekeeping

The market Buyers should know the difference between honey harvested from sustainably managed bees and those that are managed in conventional ways. However, this raises the question of what standards to use.

Organic beekeeping This subject is bigger than organics. How do we interface? Organic certification does not address the issue of sustainability. Soil Association regulations are too strict (three mile radius and uncultivated). Their standards do not cover our basic principles.

Demeter standards are more consistent with the sustainability point of view – and yet there are no UK Demeter beekeepers (Germany, Switzerland only). For standards go to:

www.demeter.net/standards/st_bees_e08.pdf

Principles for bee-friendly beekeeping Ten principles were circulated by PM**:**

1. Treat the colony as a complete organism not as separate parts
2. Retention of nest scent and heat
3. Allow each colony to make all its own comb
4. Only use swarm bred queens or natural Supercedure
5. No suppression of the swarm process
6. Overwinter bees with sufficient quantities of their own honey
7. A colony density supportable by the forage within range and good flower diversity
8. A low colony density per acre
9. Locally adapted bees
10. Only natural breathable materials for the hive

To which we added on the day:

- Make many observations
- Know your bees
- Consider wider population benefit

Wholesome Food PC presented the Wholesome Food Association that originated in the late 1990's in North Devon. This group was established to label smallholders' produce from organic methods but uncertified (PC). The aim was to avoid another book of rules. Instead, three principles were promoted:

1. no artificial inputs
2. no synthetics (chemicals)
3. growing within the capacity of the land.

The same model has been used for *The Barefoot Beekeeper*.

Wholesome beekeeping?

- Do not put in anything that did not come from the bees.
- Do not take out anything the bees cannot do without.
- Be guided by the bees.

What else is happening and what can we do to further the theory and practice of sustainable beekeeping?

- The Natural Beekeeping Forum on the biobees website is a history and a work in progress towards principles.
- Warré beekeepers have a yahoo group, no annual conference.
- There are opportunities for mutual publicity for all our organisations
- Training videos would be useful. Biobees has YouTube videos.
- Possibility of a natural beekeeping conference at Embercome, where PC has his training apiary.
- PC and GJ want to find funding to run training courses.
- Can we interact usefully with the conventional world?
- Apimondia September 2009 – 'Natural beekeeping' will be talked about and discussed for the first time.
- 2010 First Organic beekeepers conference is planned to take place in Bulgaria. Can Natural beekeepers also have a voice?
- Is there a market opportunity for selling bee boxes (like bird boxes for bees).
- Beware the threat of registration with onset of Small Hive Beetle. UK beekeepers are not regulated. Be ready to defy the law?

Documentation

There is a publications/library section within the Natural Beekeeping Forum on the biobees website – international and an open space for all, whatever hive. DH's material is downloadable. Publishing is old technology and books ossify the principles. The discussion of sustainability is an ongoing conversation on website forum. New issues are constantly emerging.

A basic bee biology book is needed. PC informed the meeting that he is in the process of writing a new book and he will cover more on basic bee biology.

Names

Natural or sustainable or something else? We do not have to name it now or ever. We all understand that we are moving towards devising a set of general principles (PC). We welcome a broad church approach; problems and people and bees are all diverse. **B*f*D** want to promote the cause. Many more people are interested now (DW) but how can they find out about 'it' if it does not have a name? How can they get hold of the right information and the right bees? In the public arena, natural beekeeping is conspicuous by its absence.

Balanced	Foundation-free	Observational
Bee-friendly	Holistic	Organic
Close to nature	Let-alone	Sustainable
Ecological	Natural	Vernacular
Eureka	Non-interventionist	Whole population
Evolutionary	Non-surgical	Wild comb

Natural beekeeping has an inbuilt paradox. Bees are either natural or kept. Bee-friendly? Friends of the Bees and biobees have opted for 'natural beekeeping' – it gets people thinking. (What do you mean, is not all beekeeping natural?) Sustainable has been hijacked, but is nuanced and interpretable. We can list unsustainable practices.

B*f*D suggest that the topic of sustainable beekeeping is extremely broad and can cover issues to do with the wider environment, using indigenous bees, and social and economic issues. Natural beekeeping refers mainly to the practices that a beekeeper adopts at apiary level *i.e.* wild comb only, minimum manipulation and reproduction by 'natural means'.

Annex 1. Participants

Bees *for* Development

Name	Introduction	Contact
Nicola Bradbear	**B*f*D** Director Professional experience of apiculture worldwide, with particular interest in sustainable, locally appropriate methods	nicolabradbear@beesfordevelopment.org
Monica Barlow	Volunteers with **B*f*D**. Works with environmental charities and permaculture groups. Beekeeper of several years. Interested in permaculture.	monica@gn.apc.org
Janet Lowore	**B*f*D** Project Co-ordinator Worked in forestry in Malawi – learned about the value of beekeeping in Africa as a sustainable forest activity	janetlowore@beesfordevelopment.org
Elaine Spencer	Trustee of **B*f*DT** Interested in beekeeping and overseas development	elainespencer@beesfordevelopment.org
Juliet Wright	**B*f*D** Information Co-ordinator Works in conservation and the role of beekeeping as a sustainable alternative to the bushmeat trade in West Africa	BfDoffice@beesfordevelopment.org

Visitors

Phil Chandler	Came to beekeeping through GM awareness. Spent time in commercial beekeeping, then moved to top-bar hives. Now focuses on natural beekeeping with bee-friendly and low-tech approach. Established the Natural Beekeeping Network two years ago and it has been increasing. Set up Friends of the Bees – a new charity. Hopes to fund research into natural beekeeping methods	phil@biobees.com www.biobees.com
Gareth Jones	Trustee of Friends of the Bees Natural Beekeeping Forum Moderator Keeps colonies in top-bar hives	www.biobees.com
Bernard Jarman	Director of Biodynamic Agriculture Association, UK Works to promote biodynamic agriculture, including beekeeping	bjarman@biodynamic.org.uk
Jessie Jowers	Director of Global Bee Project New organisation – concerned with raising	www.theglobalbeeproject.com

	awareness of all bees and not just honey bees	
Carlo Montesanti	Global Bee Project Beekeeper since aged 10, in Sicily Interested in insects and global awareness of all bees	www.theglobalbeeproject.com
Patrick Moulsdale	As a child had bees- then a gap. Came back to beekeeping and looked into different ways of keeping bees. Interested in biodynamic – read and learned about it. Was introduced to Warré hive beekeeping by David Heaf. Has top-bar hives and Warré hives – considers these methods more sustainable for bees	patrick@clear-resolution.co.uk
David Wainwright	Buys and sell honey, including African honey harvested from log hives. Commercial UK beekeeper Interested in natural and sustainable beekeeping	mail@tropicalforest.com

Interested but unable to attend the meeting

Mike Bispham	Beekeeper interested in natural honey bee disease control	MikeBispham@aol.com
Robin Dartington	Beekeeper interested in making beekeeping more accessible. Designed the Dartington hive. Founder of Buzzworks, a community bee initiative	dartingtonbees@btinternet.com
David Heaf	Warré hive beekeeper. Translated *The People's Hive*, which can be downloaded freely. Wrote series of articles for *Beekeepers Quarterly* on Sustainable Beekeeping	david@dheaf.plus.com
Robin Morris	Yatton Bee Project. Working to use a sustainable approach to achieve an increase in healthy populations of all bees in the local area.	followmechaps@hotmail.co.uk www.yabeep.blogspot.com

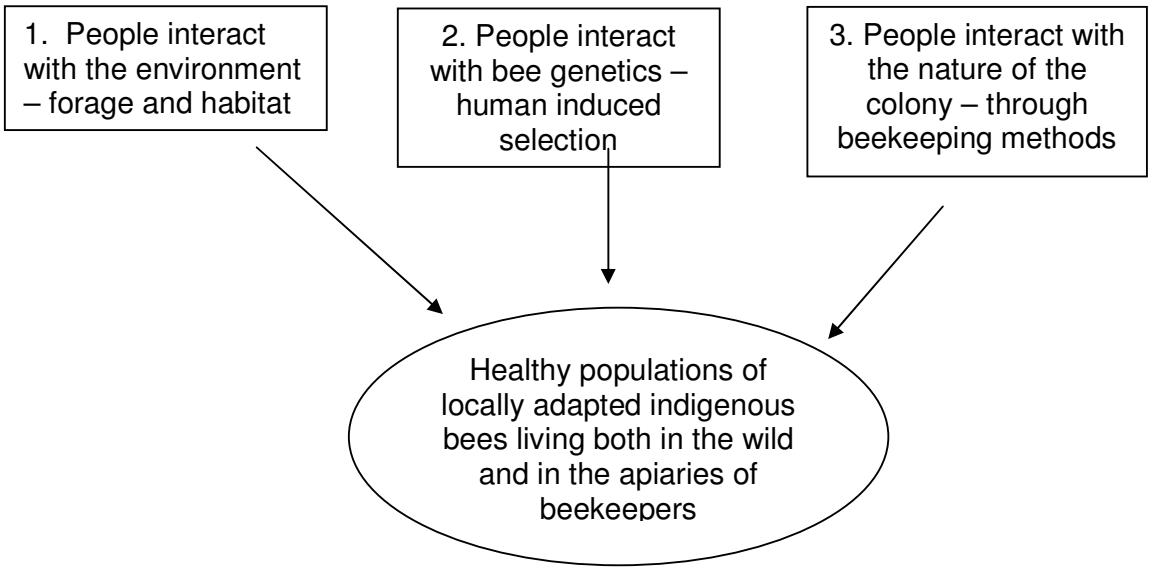
Annex 2 Sustainable beekeeping – concept offered by Bees *for* Development

The nature of the close relationship between honey bees and people lies at the heart of the sustainability discussion. We can consider this relationship in three dimensions

1. People have an impact on honey bees through the way we manage the wider environment, their habitat for nesting and feeding [dimension 1]
2. People have had an impact on the genetic diversity and natural distribution of the honey bee – through moving bees outside their natural range, breeding, selection and queen importation [dimension 2]
3. People have an impact on the welfare of bees at colony level through colony management and manipulation, hive technology and apiary management practices [dimension 3].

Sustainable beekeeping refers to the nature of this relationship and the outcome.

Beekeeping is sustainable when the nature of human and honey bee interactions contribute positively to the desired outcome of a healthy population of locally-adapted indigenous honey bees, living both in the wild and in the apiaries of beekeepers.



It may be that these dimensions of interaction vary in their importance towards achieving sustainability

Annex 3 Bees *for* Development additional notes

Genetic fitness

B*f*D is leaning towards the idea that local adaptation may be key towards achieving sustainability and this is one area where we may focus further attention. Bee populations, suited to their environment and adapted to their pathogens are resilient, survive and thrive. Humans have a role and an impact on the process of local adaptation – and this must steer the evolution process towards health, co-existence with pathogens, good over-wintering and reasonable honey yield. It must not lead to genetically unsustainable populations of honey bees, dependent on artificial chemicals, feeding and the purchase of replacement queens.

Consistent with many of the participants of the Discussion Day, we would be in favour of bees multiplying through swarming or supercedure only. Beekeepers can achieve increase through their own multiplication, acquiring swarms or colonies from neighbours – with succeeding generations, bees would become more fit for their local environment. Two outstanding issues:

1) We do not believe that this process can rely totally on natural selection – probably not practical or achievable. Within apiaries, the process of local adaptation will be affected by the beekeeper – and yet herein lies the difficulty. How can the beekeepers influence this process with positive outcomes for resilience and health, without undermining the local adaptation process: propping up poor genes, selecting one trait inconsistent with another (non-swarming for example), de-selecting against valuable traits? In other words, how can a beekeeper be sure they are acting to contribute positively to this process and not working against it?
2) Beekeepers cannot succeed in this process when imported queens are brought into their neighbourhood.

Social and economic aspects

Generally, we felt that during the Discussion Day we neglected important discussions about social and economic aspects of sustainability. This was inevitable as the framework that was presented by BfD did not include these dimensions and we felt that it was not possible to discuss all aspects of sustainability in one day. However, it is becoming increasingly clear that cost is a very important factor. Low-cost enables more people to keep bees, and this means that there are more bees (a good thing). However, more crucially, the higher the honey bee populations in any location, the more effective and feasible it is to adopt and pursue a process of local adaptation. The importance of social and economic aspects was also raised by Robin Dartington who sent comments and resource materials, as he was unable to attend: these are attached here as Addendum 1.