Testing business-led solutions to the pollinator decline problem on a regional scale

The Tevi Challenge Network on local seed for plants, pollinators and people

sweep

Tevi

Growing Your Business,
Growing Our Environment.

European Union
European Regional
Development Fund

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Tevi (Cornish for 'grow') is an EU-funded programme which aims to create both economic and environmental growth in Cornwall and the Isles of Scilly.

The initiative, which runs until 2021, provides small and medium-sized enterprises across the county with expert consultation, opportunities for recognition and certification, and grant funding. Our objective is to help enterprises make the most of the prized asset upon which they rely – our beautiful natural environment – by helping them grow their business.

We support enterprises to play a proactive role in growing and protecting the region's unique natural environment, while also becoming more efficient with their natural resource use and minimising their waste in smart and innovative ways, as part of the global transition towards a circular economy.

Tevi's Challenge Networks bring organisations together to collectively identify, and bring to market, solutions to environmental challenges that no one organisation can solve alone. Over the course of the three year programme Tevi will run a number of Challenge Networks, of which local seed for plants, pollinators and people, is one.

Tevi is led by the University of Exeter, and is delivered in partnership with the Cornwall Wildlife Trust, Cornwall Council and the Cornwall Development Company. Find out more about the programme at **www.tevi.co.uk.**

University of Exeter

Cornwall Wildlife Trust

Cornwall Council
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Cornwall Development Company

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Photo 1. (front cover) *Bombus terrestris*. Photograph taken by Daphne Wong.

Summary

Tevi[1] (Cornish for 'grow') is a collaborative project between the University of Exeter, Cornwall Council, Cornwall Wildlife Trust and Cornwall Development Company with the aim to simultaneously create both economic and environmental growth in Cornwall and the Isles of Scilly. The Tevi Challenge Network on Local Seed for Plants, Pollinators and People is a regional multi-stakeholder initiative (MSI) launched in early 2019 to facilitate innovative business-led solutions to mitigate against the main causes of the pollinator decline problem on a regional scale, contribute towards Cornwall's Environmental Growth Strategy[2] and the UK's National Pollinator Strategy[3].

Pollinators provide critical environmental, economic and social services by maintaining biodiversity for a healthy environment, providing services worth £Billions to the global economy and keeping our human population healthy. However, there is international scientific consensus that wild pollinators are in decline.

The main cause of pollinator declines is the loss of high quality flower-rich habitat, followed by pesticide use, climate change, invasive species and disease. These causes combine and interact which means that finding solutions is often overwhelmingly complex, especially when tackled by one sector alone. Therefore, tackling the pollinator decline problem requires an integrated approach across sectors, with businesses playing a key part of the solution. Multi-stakeholder initiatives like this Challenge Network can be an effective approach to successfully implementing solutions to environmental challenges at a regional scale.

This Tevi Challenge Network brings together businesses to explore emerging markets around local wildflower seed products and services to find solutions to the main driver of pollinator declines – habitat loss. It places Cornwall and the Isles of Scilly within the frontrunners of an increasingly international drive to integrate economic and environmental growth.

This report summarises current scientific knowledge of pollinator declines, overall business response to the problem and the increasing role of multi-stakeholder initiatives in facilitating appropriate, coordinated and successful action. Case studies of the businesses involved in this Challenge Network are detailed to inform recommendations for business and policy, to find local solutions to a global problem.

This report was created as a collaboration between Tevi and the South West partnership for Environmental and Economic Prosperity (SWEEP)[4] projects.

sweep

Photo 2. Wildflower seeds. Photograph taken by John Freddy Jones.

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1. Engaging regional businesses in environmental growth innovation

The Tevi[1] partnership identified a significant demand for advice, services and products to support the enhancement of local habitats and pollinator populations. There is a growing demand for locally sourced wildflower seed to assist in this across many sectors including private, conservation and Government organisations. However, the majority of wildflower seed used in recent projects has been either harvested from a limited number of donor sites in an ad hoc fashion or bought from national commercial seed companies. Additionally, Cornwall has a unique climate where many recommended seed mixtures from national companies may not necessarily be relevant to the local flora and fauna or adapted to local conditions. Given high and increasing demand, there is opportunity for business growth around products and services derived from regional and/or local wildflower seed.

Finding business-led solutions to the pollinator decline problem is an exciting opportunity for Cornwall to be the forerunner in business growth around regional and local wildflower seed. The **Local Seed for Plants, Pollinators and People Challenge Network** brings together key businesses in the region that have an interest in products and services around locally grown wildflower seed. It aims to deliver huge benefits across the County by increasing the area of flower-rich habitat in Cornwall, supporting the wildlife that relies on such habitats, engaging local communities and tourists alike and expanding the range of products and services offered by our local businesses that can directly enhance our environment. Together we can provide support towards Cornwall's Environmental Growth Strategy[2], Cornwall's Pollinator Action Plan[3] and the National Pollinator Strategy[4].

Structure of the Challenge Network:
Coordinated by Dr Grace Twiston-Davies (Research Fellow interested in pollinator ecology) and academic lead Professor Stefano Pascucci (Business school academic interested in business sustainability and circular economy), the Challenge Network was structured as interrelated workshops, events, meetings
and one-to-one mentoring for environmental growth innovation business development. These were co-designed with stakeholders to run as a programme of general activities providing overall advice and guidance, with 'Deep Dives' into specific challenges and opportunities for the businesses involved, and expert advisors internal and external to the Tevi project. Together we tested the multi-stakeholder initiative approach as a method to find local solutions to a global problem.

This Challenge Network brings together businesses to explore emerging markets around local wildflower seed products and services to find solutions to the main driver of pollinator declines- habitat loss. The Tevi Challenge Network places Cornwall and the Isles of Scilly within the frontrunners of an increasingly international drive to integrate economic and environmental growth.

Photo 3. Lethytep Wildflower Meadows, Cornwall. Photograph taken by Grace Twiston-Davies.

Photo 4. Inspiration for the Tevi Challenge Network on Local Seed for Plants, Pollinators and People. Photograph taken by David Rymer.

2. Understanding the science behind the pollinator decline problem

In 2017, an intergovernmental panel of scientific experts[1] gave the international community a clear message that pollinators are absolutely critical for functioning ecosystems[2] and food security[3]. An annual market value of 235-577 billion US dollars worldwide[1] (£600 million in the UK[4]) is directly attributable to animal pollination of crops. Pollinators also contribute directly to medicines, biofuels, fibres (e.g. cotton, linen), construction materials (e.g. timber) and cultural heritage (e.g. art, religion, literature)[2].

Research predicts large, non-intuitive, indirect negative impacts on non-agricultural sectors due to productivity shocks in the event of catastrophic pollinator decline[5]. In spite of this, not many UK businesses appropriately value pollination services; for example 70% of businesses in a regional study stated they were 'not at all dependent' upon pollinators[6]. Pollination services are highly valued by the UK public however, with households found willing to pay £43 per year toward a bee protection policy[7].

Ecosystem: a biological community of interacting organisms and their physical environment.

Ecosystem Services: the many benefits that humans get from the natural environment and healthy ecosystems e.g. pollination.

75% of crop species need pollinators[3]

>85% of flowering plants need pollinators[2]

Large adverse impacts on non-agricultural sectors projected in the event of catastrophic pollinator decline[5]

UK public willing to pay £43 per household per year for a bee protection policy[7]

Bees are generally accepted to be the main animal pollinators[8], but we are just beginning to understand the huge importance of flies, moths, butterflies, birds and bats among others[9]. 200,000 species of animal are thought to act as pollinators[10], and of over 20,000 bee species globally[2], humans commercially manage two honeybee species, several bumblebee species and several stingless and solitary bee species; mainly to provide pollination services for economically important crops such as almonds and blueberries. In the UK, there are at least 1,500 species of wild insect pollinator[11] and over 250 species of bee[12], with the honeybee managed by beekeepers and one species of bumblebee (out of 25) managed for commercial fruit production e.g. tomatoes[13], courgettes[14] and strawberries[15].

The vast majority of pollinator species are therefore wild. Managed bees are economically valuable pollinators but they cannot replace the services provided by wild pollinators. A diversity of pollinators is required to maximise yield and for a diversity of crops and wild-flowers to survive[16]. For example, honeybees cannot pollinate tomatoes, and solitary bees are best at pollinating apples[17]. Furthermore, bees are of no use at all when it comes to pollinating cocoa, figs or oil palm (which need midges, wasps and beetles respectively)[9]. There is a wealth of research demonstrating that wild pollinators are integral for optimising crop yield and therefore supporting supply chains in for example coffee, blueberry and watermelon[3], with rising appreciation of the need for pollinator efficiency and diversity as provided by wild pollinators.

Hundreds of thousands of pollinator species globally

Many crops are pollinated more effectively by wild insects than by managed honeybees[16]

Wild pollinators are in decline globally, with specialists and rarities in greatest decline[25]

Pollinator-dependent crops are increasing[20]; can pollinator supply satisfy demand[21]?

Globally, wild pollinators are declining where they have been measured, and there is urgent need for more data world-wide. In Europe, over 1/3 of bee species are in decline[18] and a US study found over 50% of bee species were lost between the late 1800s and 2010 at one site, largely due to agricultural conversion and associated loss of flower-rich habitat[19]. Conversely, the proportion of agricultural crops dependent upon animal pollinators was found to be increasing globally by 300%[20], and in Europe honeybee stocks have been found insufficient to supply >90% of demands in 22 countries studied[21]. Global managed honeybee numbers are volatile and depend upon political and socioeconomic systems[22] as colony losses can be mitigated by beekeepers[23]. Although managed honeybee colonies have increased globally since the 1960s (despite declines in Europe and North America)[24], beekeeping is becoming increasingly difficult and expensive.

Managed bees cannot replace wild pollinators

Habitat loss is the main cause of the pollinator decline problem[26]

97% of wildflower habitat lost since 1930s[27]

Recovery of some wild bee species indicate business-environment partnerships can work[25]

In the UK, around a third of wild bee and hoverfly species are declining; mainly specialist solitary bees and upland species[25]. Each pollinator feeds on different flowers and nests in different places so declines vary between species. A recent UK study found populations of wild bee pollinators of food crops (generalists) have increased[25], indicating that efforts government and business are undertaking to protect pollinators of food crops (such as agri-environment schemes) may be working; providing impetus for ongoing effort in this area. Overall however, our diverse wild pollinator populations may become dominated by a small number of widespread, generalist species[28], with huge loss of insect diversity[26]. Managed bees in large numbers can also outcompete wild species on flowers[29], exacerbating a move toward generalists and a loss of diversity, with subsequent implications for healthy ecosystem services.

The causes of pollinator declines are varied and interacting:

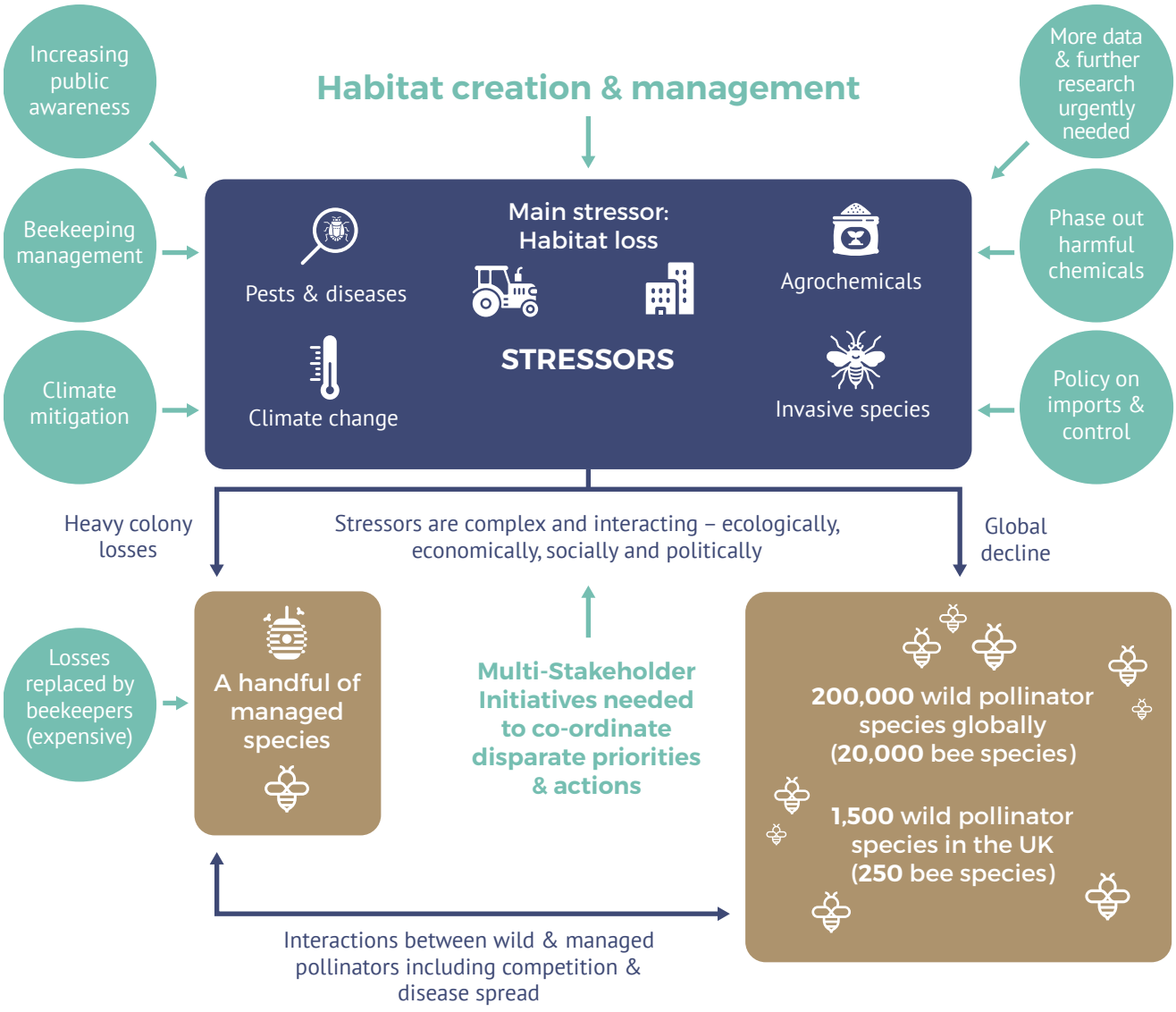
Habitat loss through intensive agriculture (monoculture) and urbanisation: 97% loss of UK wildflower meadows since the 1930s[27]; also loss of trees, shrubs and nesting habitat (dead wood, exposed banks, undisturbed grasslands). A diversity of habitats is needed for a diversity of pollinators. Thought to be the main driver of species declines[26].

Agricultural chemicals including pesticides: Different chemicals have different impacts, with complex synergistic associations leading to varied toxicity[30]. Correct in-field application is key to minimising impact upon pollinators but can be difficult to regulate[31].

Pests and diseases: The *Varroa* mite was introduced into the UK in 1992 and has decimated honeybee colonies in the UK. The mite and associated diseases can spread to wild pollinators[32,33]. Beekeeping practices and bee importation policies are key.

Climate change has different impacts on different pollinators. However, an overall trend suggests movement toward favouring generalist species over specialists[34,35].

Invasive species: Invasive animals such as the Asian hornet pose a direct risk through predation of pollinators[36]. Impact of invasive alien plant species upon pollinators has been found to be both positive and negative depending upon species and context[37].


Habitat creation & management
Increasing public awareness
Beekeeping management
Climate mitigation
More data & further research urgently needed
Phase out harmful chemicals
Policy on imports & control
Main stressor: Habitat loss
Pests & diseases
Agrochemicals
Climate change
Invasive species
STRESSORS
Heavy colony losses
Stressors are complex and interacting – ecologically, economically, socially and politically
Global decline
Losses replaced by beekeepers (expensive)
A handful of managed species
Multi-Stakeholder Initiatives needed to co-ordinate disparate priorities & actions
200,000 wild pollinator species globally (20,000 bee species)
1,500 wild pollinator species in the UK (250 bee species)
Interactions between wild & managed pollinators including competition & disease spread

3. Investigating national & international business response to the pollinator decline problem

The pollinator decline problem has resulted from varied and interacting causes which have complex and uncertain relationships. These relationships can shift over time as do the dynamics between them[1] making finding solutions to the problem extremely challenging and ever adapting. The negative changes to ecosystems and the resulting decline of wild pollinators poses both opportunities and risks for businesses[2]:

Pollinator decline opportunities for businesses:

- engagement with customers
- increasing brand trust
- improving commercial resilience
- building competitive advantage

Pollinator decline risks to businesses:

- non-compliance with new legislation
- losing investment
- left behind in the market
- threatened by supply chain instability[3]

'By 2030 we'll need 50% more food, something in the order of 50% more energy... and about 30% more fresh water. And we have to do that while mitigating climate change'

Sir John Beddington

Photo 5. Pollinators such as bumblebees need floral resources throughout the year. Photograph taken by Daphne Wong.

The projected global increase in the human population over the next thirty years[4] will increase the severity of the causes of pollinator declines as we place more pressure on our natural systems to provide vital ecosystem services. **Increasing wild pollinators is a necessity to ensure the long-term prosperity and resilience of our society and the viability of ecosystem services.**

However, the extent of the impacts of pollinator declines have not been sufficiently acknowledged by business. While a subset of businesses are aiming to increase biodiversity in their supply chains, which indirectly helps wild pollinators, they are in a minority for their sectors[5]. The main business sectors that have acted to address the pollinator decline problem are those directly associated with the production or retail of food, drink or flowers as well as those producing agricultural chemicals used to maximise productivity. However, as pollinator declines are predicted to have widespread and indirect effects across multiple sectors, there is a clear need for a range of businesses to play their part in finding solutions to the problem, thus safeguarding their commercial resilience and engaging with their customers.

The main business sectors with policies and practices aiming to address the pollinator decline problem are food and beverage producers (exposure to risks depends on product), agricultural chemicals (producers of pesticides; have been identified as a contributor to pollinator decline), food retailers (nearly all agricultural crops are affected; pollinator declines pose a risk to supply chains) and luxury goods (e.g. perfumes use different parts of plants for their smell, particularly flowers[6]).

WAITROSE & PARTNERS

Organising the great British Bee count, developed a 7 point plan for pollinators, research, offering more organic product lines and purchasing from LEAF certified[7].

JORDANS SINCE 1855

Manage 5% of their farmed land to provide year-round habitat of food, nest sites and shelter for wild pollinators (1800 football pitches)[8].

WHOLE FOODS MARKET

Promoting 'best practice' in their supply chains[9].

LVMH MOËT HENNESSY • LOUIS VUITTON

Launched 'Bee School', an educational programme to raise awareness among school children[10].

Businesses are taking a variety of actions to mitigate any negative impacts of their operations, regardless of sector. We analysed the actions of 20 international and 7 UK companies to identify 'best practice'.

'Best practice' from international and national businesses in finding solutions to the pollinator decline problem

Creating dialogue in the supply chain: companies that engage their supply chain in dialogue typically assume the role of organiser in what is 'best practice' through their supply chain. This is best done in collaboration with an evidence-based certification scheme e.g. Waitrose[7] and Whole Foods Market [9].

Developing habitats for pollinators: starting initiatives to create, enhance and maintain biodiversity e.g. Jordans[8] manage 5% of their farmed land for wild pollinators.

Championing research into honeybee health: overall, wild and managed bee health can be supported through research into honeybee health e.g. such as into the *Varroa* mite to help stop the spread to wild pollinators[11].

Seeking to minimise the use of harmful agricultural chemicals: the main issue addressed is phasing out neonicotinoids from the supply chain whilst finding effective and safe alternatives. Many companies are collaborating with academia to achieve this[12].

Raising awareness with the public: public awareness campaigns have the added benefit to businesses of improving their Corporate Social Responsibility and Marketing e.g. Waitrose[7] and LVMH[10].

With regard to the key stressors on pollinators, these actions generally serve to tackle **habitat loss** and **agricultural chemicals**. Regarding the other stressors, **climate change** is increasingly incorporated within Corporate Social Responsibility (CSR) strategies. Stressors of **pests & diseases** and **invasive species** are generally tackled by specific industries through best practice and research. A broader range of businesses could however play a key role by ensuring supply chains also conform to best practice with regard to these stressors.

Businesses recognising that they can be part of the solution to the pollinator decline problem are mainly focused on measures targeted within their industries. Additionally, all pollinator decline solution measures that we analysed are sited within wide-ranging CSR and are not subject to external reporting; assessing their effectiveness is therefore difficult. The credibility of claims from these businesses relies on robust data management, something that is not necessarily actioned by them. An overriding problem is that the pollinator decline problem has become too defuse for any one business to manage alone. Therefore, the 'best practice' of a sample of companies highlighted above could be made more effective through collaboration and co-ordination across different businesses and sectors, with **actions continuously evaluated and improved through reporting[13].**

Global problems can be tackled on a regional scale because strategies can be tested, improved and adapted and bureaucratic barriers can be more easily overcome, therefore, effective solutions can be applied rapidly.

Photo 6. Understanding the benefits that wildflower habitats in Cornwall and the Isles of Scilly provide for businesses was the key first step in the Tevi Challenge Network. Photograph taken by Clare Lemon.

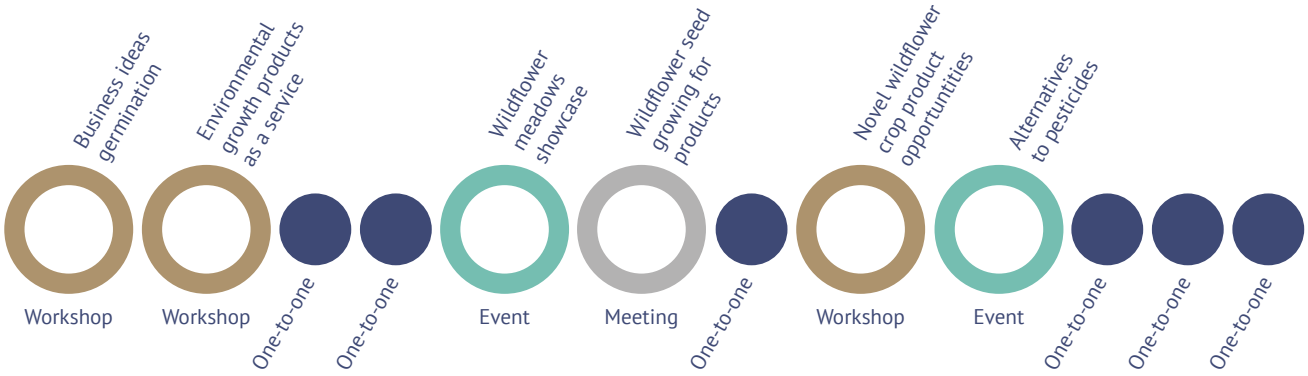
4. Showcasing regional, collaborative, business-led solutions to the pollinator decline problem, facilitated by Tevi

Habitat loss has been identified as the main driver of the pollinator decline problem (Chapter 2) and therefore the Challenge Network on Local Seed for Plants, Pollinators and People was set up as a regional multi-stakeholder initiative for small to medium sized enterprises in Cornwall and the Isles of Scilly to find business-led solutions directly.

Businesses that were engaged with the Tevi program received tailor-made consultancy with Tevi environmental growth team members to create bespoke action points based on the interests and needs of the businesses. Those with actions relating to pollinators, their habitats or environmental growth in general were invited to join the Challenge Network. Many of these businesses received specific offerings from Tevi designed to increase their awareness of and engagement with environmental growth, such as a desk-based study by ERCCIS[1] (Environmental Records Centre for Cornwall and the Isles of Scilly) from Cornwall Wildlife Trust and a bespoke "Bee-Steward"[2] pollinator management report based on research from the University of Exeter.

Tevi facilitated a program of activities designed to look at different business solutions to the pollinator decline problem and facilitate links between businesses and organisations both within and outside of Tevi. These activities included meetings, events, workshops and one-to-one business mentoring for environmental growth innovation business development.

Tevi Local Seed for Plants, Pollinators and People programme of activities:



38 Businesses involved in the Local Seed for Plants, Pollinators and People Network

129 Hours of engagement for individual businesses

22 Bespoke 'Bee-Steward' Pollinator Management reports provided

Through this series of activities, Tevi was able to expand beyond the usual sectors that have typically looked at finding solutions to the pollinator decline problem. Tevi worked with businesses in an emerging **wellbeing / horticulture / environment sector** (32% of businesses in the network) who were promoting wellbeing and nature conservation through growing plants for people and / or wildlife, along with **tourism** (21%), **garden services** (16%), **hospitality** (10%), **education** (5%), **product development** (5%), **horticulture** (5%), **training** (3%), and **insurance** (3%) sectors in this regional approach to addressing pollinator declines.

Tevi provided support for the environmental growth aspects of businesses in the horticultural sector but not for aspects involving primary production due to funding regulations. Case-studies of three businesses involved are highlighted below.

Gardens of Eden UK[3]

Garden services

Zac, Gardens of Eden UK

- Developing habitats for pollinators
- Championing research
- Raising awareness with the public

Zac Harris started his independent garden design and creation business in Cornwall, specialising in edible and ecological garden design. He is passionate about using his skills to help tackle some of the current threats to society and biodiversity.

'I want Gardens Of Eden to use man made ecosystems to provide a sustainable alternative to some of today's contemporary issues.'

Zac Harris, Gardens of Eden UK

Zac is targeting a growing niche for edible and ecological gardens due to increasing public concern for pollinators and desire for nutritious, home-produced food. He was keen to get expert advice in his particular area, so Tevi compiled targeted scientific research to help him develop and justify his approach to his gardening business. Zac particularly appreciated this guided access to world-leading research into planting for pollinators and wildlife friendly gardening, which is usually not freely accessible or translatable to businesses. As a result, he feels confident to promote and market his business as science-based.

Zac appreciated advice through one-to-one mentoring on Environmental Growth Innovation business development with Prof Stefano Pascucci and Dr Grace Twiston-Davies regarding potential products, services and marketing. Through events and workshops, Zac has formed relationships with several other like-minded local businesses, referring clients to them and thus strengthening the network of influence for wildlife friendly actions.

'Science-based garden design... talking to Tevi and getting the advice has meant that I've formulated a coherent argument.'

Zac Harris, Gardens of Eden UK

Another key benefit for Zac has been inspiration gained through attending events and workshops organised by the network. His pre-existing motivation to combine his passion with his business is bolstered by meeting like-minded people actively working to facilitate change through business.

Zac was very positive about his experience with Tevi, in particular the targeted scientific advice and bespoke inspirational events. He felt Tevi could perhaps facilitate a 'book club' to share the latest scientific research along with how to critically analyse online information concerning plants, pollinators and circular economy, and for businesses to share knowledge and ideas; acting almost as a provider of Continued Professional Development.

The Lost Gardens of Heligan[4]

Tourism

Alasdair, Heligan

- Creating dialogue in the supply chain
- Developing habitats for pollinators
- Championing research
- Raising awareness with the public

Alasdair Moore is the Head of Gardens and Estate at the Lost Gardens of Heligan; a top 10 visitor attraction in the South West with 350,000 visitors per year. He has close ties with various organisations that worked together on previous bumblebee projects with Dr Grace Twiston-Davies, SWEEP and the Bumblebee Conservation Trust and so came to the Tevi project with a wealth of existing knowledge, ideas and contacts. Moving to Heligan from the Duchy of Cornwall Nursery in 2018, it became possible to realise the vision of creating a large-scale source of Cornish provenance wildflower seed products.

Heligan cultivated an 11.5 acre (15 football pitches) meadow of annual flowers in 2019 (poppies, cornflower, corn marigold and corn chamomile) with aims to:

- draw in visitors and revenue,
- communicate with the public about flowers and pollinators,
- produce saleable crop products e.g. wildflower seed bombs,
- act as a test-case / exemplar for the potential of local wildflower seed production.

A strong partnership was formed with the National Wildflower Centre based at the Eden Project who provided expert advice at one of the Network's workshops. Alasdair was particularly keen that business should work together to facilitate cultivation of flower meadows. Due to difficulties in accessing specialist equipment and skilled contractors, he suggested creation of a Cornish hub whereby businesses can access and share advice and equipment to enable them to create flower meadows and sell subsequent products.

'Cornwall's biggest industry is tourism ... make Cornwall the most beautiful, wildflower laden, glorious place to visit in the country.'

Alasdair Moore, The Lost Gardens of Heligan

Heligan received a bespoke 'Bee-steward' report from Tevi predicting the effects of permanent wildflower meadows on their bumblebee populations. They were also put in touch with Enviro Weed Control (a local business performing herbicide-free weed control) through a network event, and are utilising their services on-site to ensure a holistic approach to pollinator conservation across the business. Alasdair, like Zac, was also keen for scientific research into the best actions to take for pollinators, and the effectiveness of interventions such as flower meadow creation. Heligan is hoping to act as a mentor for other businesses to produce products from wildflowers in Cornwall.

Photo 7. Cornfield annual wildflower meadow at the Lost Gardens of Heligan in 2019. Photograph taken by Alasdair Moore.

Alasdair Moore (The Lost Gardens of Heligan) started to realise his vision of creating a large-scale source of Cornish provenance wildflower seed products.

Adam Parnall (Trelonk) had good harvests of sunflower, borage and Calendula seed for the nutraceuticals market.

Photo 8. Calendula and wildflowers across Trelonk Farm, Cornwall 2019. Photograph taken by Grace Twiston-Davies.

Trelonk[5]

Product development

Adam, Trelonk

- Developing habitats for pollinators
- Championing research
- Raising awareness with the public
- Seeking to minimise the use of harmful agricultural chemicals

Adam Parnall is Director and Farm Manager at Trelonk; a historic estate in mid Cornwall in mid tier Countryside Stewardship. He took control of the estate in 2018, which is situated within the Cornwall Area of Outstanding Natural Beauty, and was very keen to reduce chemical usage to restore the farm's historical beauty. He seeks cutting-edge science to inform a "progressive, regenerative, creative" approach to land management, whilst remaining a firmly practical man.

Adam attended sessions on circular economy and pollinators; networking with academics, landowners and managers with whom to share ideas and inspiration for managing land in a different way. He received a bespoke 'Bee-Steward' management report and an ERCCIS desk-based study to assess the ecological baseline of the farm and model projected impact of farm management changes upon pollinators in order to help him decide upon management options. After intensive independent research and 'Bee-Steward' reports from Tevi and SWEEP, he decided to grow nutraceutical crops; cultivating flowers to harvest seeds oils for the health market. Wishing to retain as much profit as possible, with a grant from Tevi he was able to invest in an oil press to allow processing on-site in the first year, to work toward own-brand nutraceuticals.

'It was just an incredible sight - 20 acres of borage in full flower. And the wildlife ... you've never seen so many bees and butterflies in all your life - just incredible.'

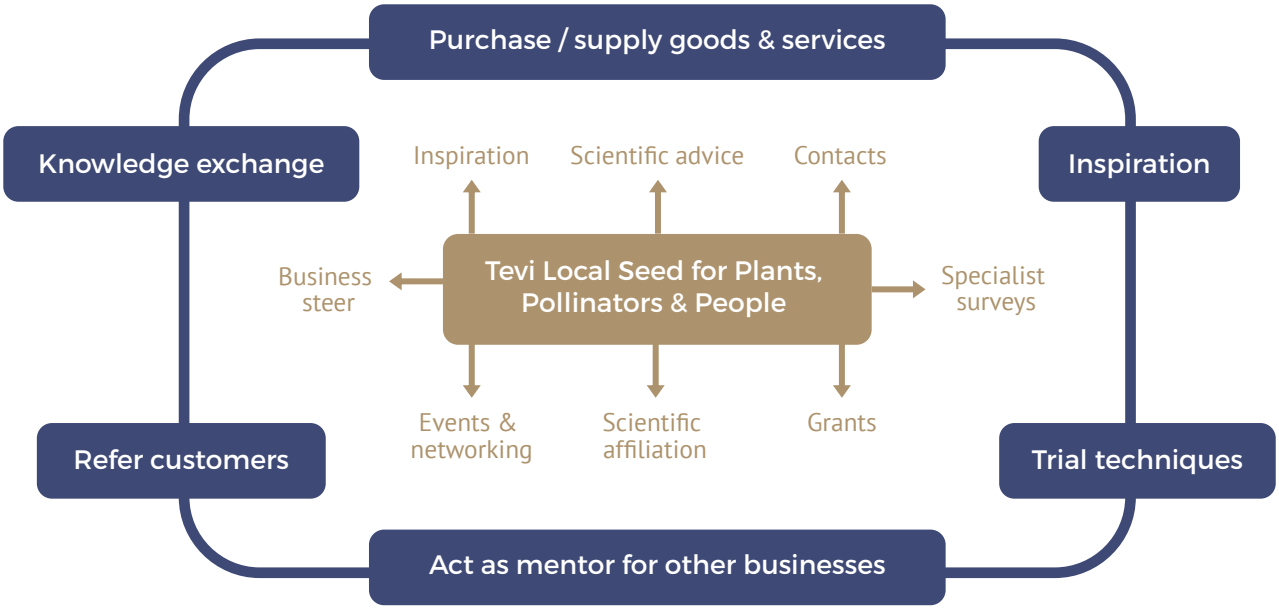
Adam Parnall, Trelonk

He feels Trelonk has the platform to experiment and pave the way for other businesses that may have less capacity for initial risk-taking. Over 150 acres (210 football pitches), he has grown and harvested sunflower, borage and Calendula (marigold) for seed. Many practical lessons have been learned; notably about availability of specialist equipment for harvest, along with contacts gained and imaginations captured.

Adam has good harvests of sunflower, borage and Calendula seed for the nutraceuticals market and is exploring local buyers. He is itching to apply lessons learned in the coming growing season upon crops that "grew fantastically well". He greatly appreciates the business contacts and scientific affiliation that Tevi has delivered; providing outward-facing materials to promote his brand. In common with Alasdair, Adam feels there is real potential for greater information and equipment-sharing among landowners and managers around creation of a local wildflower product market, so long as there is a barbecue over which to discuss such matters!

It is clear that the network of businesses involved in the Tevi Local Seed for Plants, Pollinators & People Challenge network have been able to further their businesses and forge productive relationships through collaboration.

Business-to-business support network created from central Tevi facilitation



The businesses Tevi works with are **small to medium in size and therefore agile and able to iterate ideas rapidly,** something that large businesses can be held back from attempting. Small to medium sized enterprises are unique in their ability to be able to lead innovative solutions and adaptively respond to evolving environmental challenges.

Through the Challenge Network on Local Seed for Plants, Pollinators and People, we have been able to improve and refine 'best practice' measures whilst developing the ways different stakeholders are represented and brought together through an organising body such as Tevi. Using this methodology, stakeholders are able to **provide guidance to each other** and **feed back to the Tevi project** on how to address environmental challenges at a regional scale.

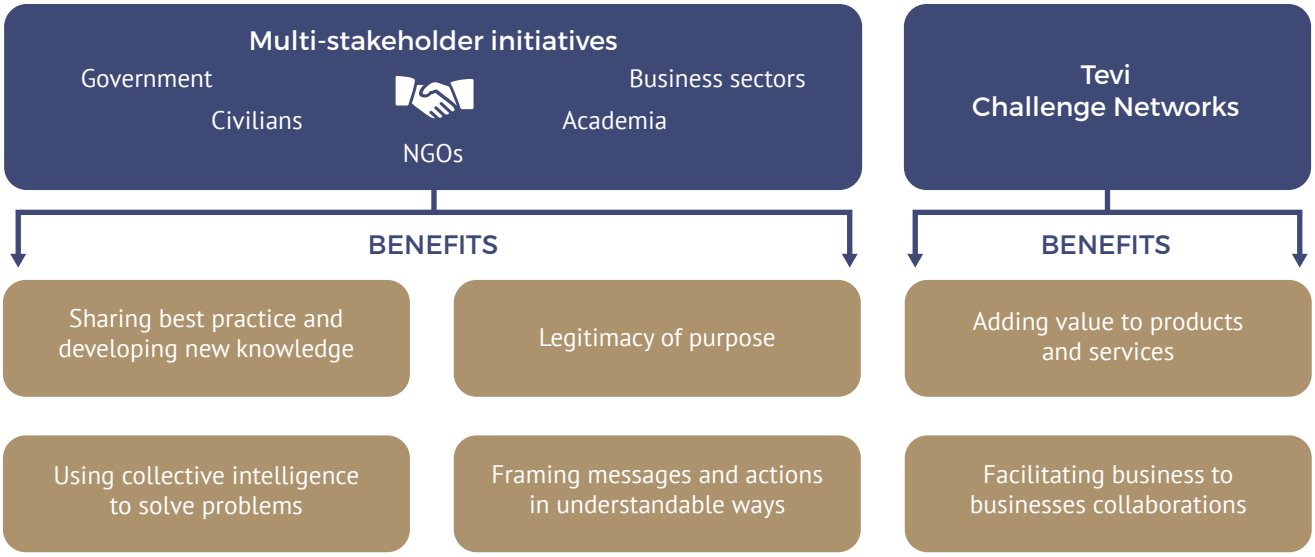
'A system wide response is needed: involving water utilities with large land reserves, food retailers with direct exposure in their supply chain, agro-chemical companies with product exposure, cosmetic firms and everything in-between.'

Schroders

5. A methodology for collaborative action against the pollinator decline problem

As the pollinator decline problem is complex and evolving, there are multiple stressors and there is not one simple solution[1]. The problem can become even more complicated if organisations look for only technical interventions[2] and it is too complex for businesses to find a solution on their own. In fact, some solutions can lead to other problems; for example increasing managed honeybee colonies to assist crop pollination may exacerbate declines in wild pollinators. Therefore, collaborative approaches through engaging different business sectors, government, public and academia can coordinate isolated responses, with diverse stakeholders creating new governance[3]. Multi-stakeholder initiatives help to find creative answers through flexible decision making in the face of uncertainty[4] which is essential for complex and ever evolving problems.

Photo 9. Workshop for businesses at Lethytep wildflower meadows. Photograph taken by David Rymer.



Multi-stakeholder initiatives offer the opportunity to set agreed goals between stakeholders[5], providing platforms to develop group actions whilst also negotiating conflicting values[6] which might become barriers to finding and implementing solutions.

Examples of multi-stakeholder initiatives operating to enhance wild pollinators include:

The Environmental Defense Fund have the objective of bringing stakeholders together to plant 1.5 million acres of monarch butterfly habitat in ten years[7].

LEAF Marque Certification is one of the few organisations offering certification to address pollinator decline[9].

The World Bee Project are using cloud computing with world-leading bee research, providing insights to beekeepers, farmers, academics and governments[8].

WWF are aiming to restore habitats through Multi-stakeholder initiatives[10].

The Tevi approach to supporting a multi-stakeholder initiative seeking local solutions to global environmental challenges has demonstrated how a co-ordinated approach in bringing 'best practice' together could be followed[11] by a wide range of businesses.

Tevi has advanced the role of facilitator in a multi-stakeholder initiative by helping participating businesses to develop products and services as part of the solution.

By focusing on innovation rather than emphasising regulation setting, ideas have been implemented to improve businesses overall response to the pollinator decline problem[12]. Additionally, Tevi has been able to assist with provision and interpretation of scientific research, administration and funding for initiatives as well as encouraging **business to business collaboration and mentoring** in developing new projects.

Photo 10. Green infrastructure for pollinators can be created in the most unlikely of places. Photograph taken by Grace Twiston-Davies.

6. Summary and recommendations

Pollinator decline is a complex, ever-evolving problem of contested definitions and solutions. Priorities vary widely among stakeholders, with some solutions (such as unsustainably increasing the use of managed pollinators) having the potential to exacerbate the problem. As pollinator declines have the capacity to cause wide-ranging, non-intuitive adverse impacts across a huge variety of sectors, it is clear that businesses must play a central role in mitigating the problem; not just as part of Corporate Social Responsibility (CSR) or customer engagement, but to protect themselves from future productivity shocks.

Five key stressors have been identified; **habitat loss, agricultural chemicals, pests & diseases, climate change and invasive species.** Businesses from the international to the local scale are undertaking action to tackle these stressors and should be applauded for this. However, such actions are often embedded within wide-ranging CSR strategies and not subject to external reporting (with a concomitant lack of robust data management). Businesses can also operate in relative isolation, which can lead to inappropriate and out-dated action.

Regionally, we are seeing a rise in **entrepreneurial ventures** seeking to tackle the pollinator decline problem directly, as new markets and business opportunities arise. The 'Local Seed for Plants, Pollinators and People' Challenge Network was launched in 2019 by the Tevi project and aimed to bring businesses together to explore an emerging market for local wildflower seed products and services. As the network developed it became clear that the Tevi model for business engagement has the capacity to create effective **multi-stakeholder initiatives** to co-ordinate adaptive responses to environmental challenges. The businesses involved are agile and able to iterate ideas rapidly. They provide a wide variety of support to each other and feed back to Tevi facilitators to allow evolution of the network and its facilitation. This sharing of knowledges and rapid feedback allows more discrete problems to be defined appropriately and tackled in a co-ordinated way without losing sight of wider complexities. A key aspect of Tevi facilitation is the focus on **innovation rather than regulation,** with businesses leading on problem definitions and solutions. Tevi facilitators provide services to action these solutions including interpretation of scientific advice, networking events, bespoke business advice and funding for initiatives.

Tevi is continuing to facilitate the integration of economic and environmental growth across Cornwall and the Isles of Scilly through a range of Challenge Networks and through bespoke business engagement and consultancy. For more information visit **www.tevi.co.uk.**

This model for business engagement was run as a pilot; an example of how to facilitate the collective working of businesses for both economic and environmental growth. Recommendations for business and policy are given below, with the hope that businesses across the UK and further afield will build on this example to work together with academia, policy-makers and NGOs and turn the pollination crisis and other major environmental issues around – into environmental and economic growth.

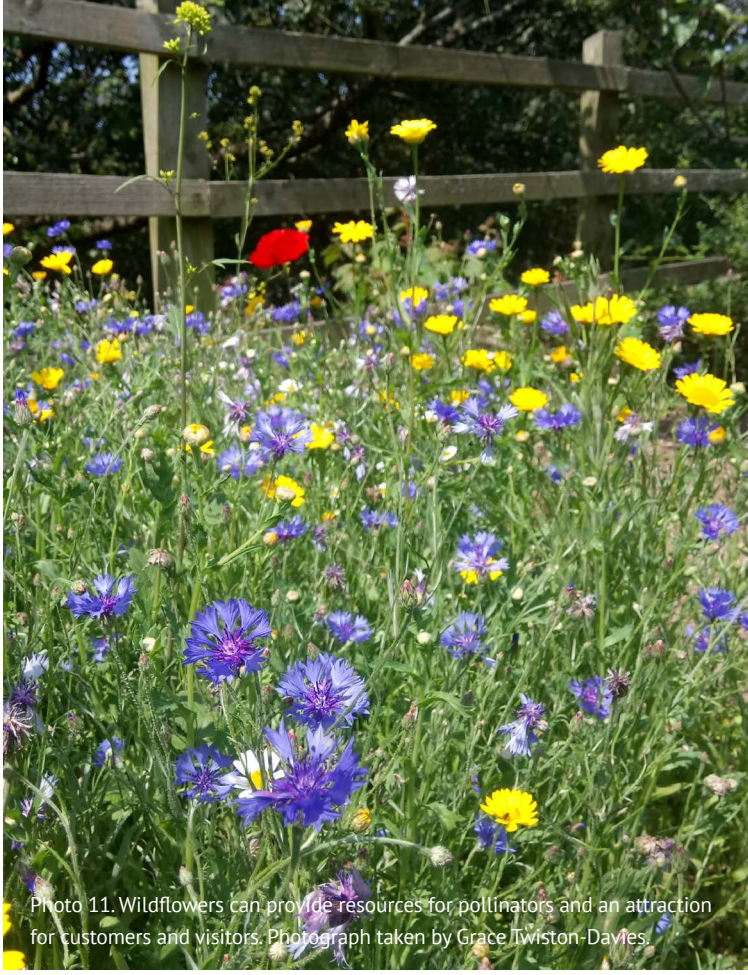


Photo 11. Wildflowers can provide resources for pollinators and an attraction for customers and visitors. Photograph taken by Grace Twiston-Davies.

'In the middle of difficulty lies opportunity'

Albert Einstein

Key Recommendations for Business and Policy

1. Seizing environmental growth as an entrepreneurial opportunity: finding solutions to environmental challenges can be the basis for innovation and extending your value proposition beyond traditional CSR and marketing strategies. Consider new business models and opportunities such as products as a service provider for environmental growth, applying innovative learning from other sectors and taking inspiration from large scale ecological processes and habitats. Focus on innovation not regulation.

2. Utilise and expand mechanisms for sharing knowledge, skills and equipment: collaborative and cooperative cross sectoral knowledge, skills and equipment sharing hubs for environmental growth are essential. Seek advice on existing opportunities or create your own. Inspire and mentor other businesses within and outside your sector.

3. Instigation of multi-stakeholder initiatives: to find solutions to complex environmental challenges. These need clear and shared objectives with tangible and measurable outcomes to enable progress to be measured and responses to be adaptive and rapid. Finding, applying and evaluating solutions needs to be an iterative process.

4. Creating dialogue and transparency within the supply chain: don't give up when looking for suppliers or materials that are sustainable, use the resources available to fill the gap and work on building those markets. Having transparency can mitigate risks.

5. Developing green infrastructure for pollinators: healthy pollinators indicate a healthy environment, therefore actions for pollinators can have wider environmental benefits. Even small steps towards environmental growth can have a big impact if scaled up across supply chains, sectors or regions. Opportunities for nature can be found in unexpected places: carparks, green roofs, edible planting in public and private spaces.

6. Championing and implementing evidence based actions: keep up with the science, implement evidence based actions and collaborate with knowledge institutes who are translating research into action and to providing answers to the questions faced by businesses. Practice robust data management to enable evaluation and adaptive response.

7. Seek to minimise use of harmful agricultural chemicals through sustainable land use: reduce use of chemicals throughout the supply chain. Actively seek those that practice / encourage sustainable land use. Look to align all practices with your core values.

8. Raising awareness with the public, customers and other businesses: the role of businesses is beyond just public awareness, you can provide accessible connections and engagement with nature thus providing authentic marketing and brand trust.

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Photo 12. Pollinators in the UK consist of honeybees, bumblebees, solitary bees, hoverflies, butterflies, moths and beetles. Photograph taken by Daphne Wong.

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