

Chamberlain, Anne

From: jody spear
Sent: Saturday, December 10, 2016 10:59 AM
To: Chamberlain, Anne
Subject: Fwd: Scientists propose ten policies to protect vital pollinators

For Friday's packet

<https://www.sciencedaily.com/releases/2016/11/161124150203.htm#.WEwlnAH37RI.email>

Scientists propose ten policies to protect vital pollinators

Date: November 24, 2016

Source: University of East Anglia

Summary: Pesticide regulation, diversified farming systems and long-term monitoring are all ways governments can help to secure the future of pollinators such as bees, flies and wasps, according to scientists.

FULL STORY

Pesticide regulation, diversified farming systems and long-term monitoring are all ways governments can help to secure the future of pollinators such as bees, flies and wasps, according to scientists.

In an article published in the journal *Science*, a team of researchers has suggested ten clear ways in which governments can protect and secure pollination services -- vital to the production of fruits, vegetables and oils.

A recent global assessment by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) confirmed that large-scale declines in wild pollinators are happening in north Europe and North America.

The ten policies report, led by Dr Lynn Dicks at the University of East Anglia who also took part in the assessment, expands on its findings to provide clear suggestions on how to tackle the problem.

Dr Dicks said: "The IPBES report has made it very clear that pollinators are important to people all over the world, economically and culturally. Governments understand this, and many have already taken substantial steps to safeguard these beautiful and important animals. But there is much more to be done. We urge governments to look at our policy proposals, and consider whether they can make these changes to support and protect pollinators, as part of a sustainable, healthy future for humanity.

"Agriculture plays a huge part. While it is partly responsible for pollinator decline, it can also be part of the solution. Practices that support pollinators, such as managing landscapes to provide food and shelter for them, should be promoted and supported. We also need to focus publicly funded research on improving yields in farming systems like organic farming, which are known to support pollinators."

"Pressure to raise pesticide regulatory standards internationally should be a priority. The World Health Organisation and the Food and Agriculture Organization of the United Nations have worked for many years to develop a global code of conduct on pesticide management, but there are still many countries that don't follow it. This means pesticides are in widespread use that are unacceptably toxic to bees, birds, even humans."

The report stresses the need to develop more in-depth knowledge about the status of pollinators worldwide. Dr Dicks said: "We need long-term monitoring of pollinators, especially in Africa, South America and Asia, where there is little information about their status, but the processes driving declines are known to be occurring."

The ten suggested policies in full are:

1. Raise pesticide regulatory standards
2. Promote integrated pest management (IPM)
3. Include indirect and sublethal effects in GM crop risk assessments
4. Regulate movement of managed pollinators
5. Develop incentives, such as insurance schemes, to help farmers benefit from ecosystem services instead of agrochemicals
6. Recognize pollination as an agricultural input in extension services
7. Support diversified farming systems
8. Conserve and restore "green infrastructure" (a network of habitats that pollinators can move between) in agricultural and urban landscapes
9. Develop long-term monitoring of pollinators and pollination
10. Fund participatory research on improving yields in organic, diversified, and ecologically intensified farming

Prof Simon Potts, co-author and research professor in Agri-Environment at the University of Reading, said: "The definitive UN report is a sign that the world is waking up to the importance of protecting these vital pollinators. We hope that by going a step further and implementing these top policy opportunities, we can encourage decision-makers to take action before it's too late.

"Three quarters of the world's food crops benefit from animal pollination, so we must safeguard pollinators to safeguard the supply of nutritious foods."

Story Source:

Materials provided by **University of East Anglia**. *Note: Content may be edited for style and length.*

Journal Reference:

1. L. V. Dicks, B. Viana, R. Bommarco, B. Brosi, M. d. C. Arizmendi, S. A. Cunningham, L. Galetto, R. Hill, A. V. Lopes, C. Pires, H. Taki, S. G. Potts. **Ten policies for pollinators**. *Science*, 2016; 354 (6315): 975 DOI: 10.1126/science.aai9226

Cite This Page:

MLA	APA	Chicago
-----	-----	---------

University of East Anglia. "Scientists propose ten policies to protect vital pollinators." ScienceDaily. ScienceDaily, 24 November 2016. <www.sciencedaily.com/releases/2016/11/161124150203.htm>.

Recommended Articles

Wild bees: Champions for food security and protecting our biodiversity

Pensoft Publishers, [ScienceDaily](#) , 2012

Pollination, land degradation: Top priorities for assessment by new UN intergovernmental body

Intergovernmental Platform on Biodiversity and Ecosystem Services, [ScienceDaily](#) , 2013

Pollinators Help One-third Of The World's Food Crop Production

University of California - Berkeley, [ScienceDaily](#) , 2006

Bee flower choices altered by exposure to pesticides

University of Guelph, [ScienceDaily](#) , 2016

Study puts a price on the help nature provides to agriculture

Washington State University, [ScienceDaily](#) , 2015

Initiative Launched to Sequence 5,000 Insects

GenomeWeb , 2011

Genomics Takes on Agriculture in the Developing World

GenomeWeb , 2013

US Premature Births Linked To Increase In Pesticides And Nitrates In Water

Catharine Paddock PhD, [Medical News Today](#)

US Government Not Promoting Healthy Living Says Cancer Panel

Catharine Paddock PhD, [Medical News Today](#) , 2007

Bird Flu Officials And Bernard Matthews Say Consumers Not At Risk

Catharine Paddock PhD, Medical News Today , 2007

Powered by



A bumblebee (*Bombus terrestris*) collecting pollen from a blueberry flower. Unregulated trade in bumblebees puts them outside their native range.

and the European Union's (EU's) Sustainable Use of Pesticides Directive (10). IPM combines pest monitoring with a range of pest control methods, such as crop rotation, field margin management, and biological control; pesticides are used as a last resort, only when other strategies are insufficient (11). IPM can decrease pesticide use and reduces risks to nontarget organisms, so it should be linked to pollinator health and pollination.

Genetically modified (GM) crops pose potential risks to pollinators through poorly understood sublethal and indirect effects (1). For example, GM herbicide-tolerant crops lead to increased herbicide use, reducing the availability of flowers in the landscape, but consequences for pollinators are unknown. GM crop risk assessments in most countries do not capture these effects. They evaluate only direct effects of acute exposure to proteins expressed in the GM plants, usually in terms of the dose that kills 50% of adults (LD_{50}), and only for honey bees, not other pollinators. International guidance to improve GM organism risk assessment is being developed under the CBD's Cartagena Protocol on Biosafety (12); this presents an opportunity to encourage inclusion of indirect and sublethal effects on a range of pollinator species.

There are substantial risks from movement of managed pollinators around the world (1). Managed pollinators, including newly domesticated species, offer opportunities to grow businesses and improve pollination services. Commercial bumble bee trade has grown dramatically, leading to invasions of *Bombus terrestris* beyond its native range and increasing the risk of disease transfer to native wild bee populations, potentially including other bee species (13). The issue of invasive species has been highlighted in the UN Sustainable Development Goals and the CBD's Strategic Plan for Biodiversity, which parties to the CBD are implementing in national strategies and action plans. This creates momentum and opportunity for regulators to consider limiting and better managing pollinator movement within and between countries.

SUSTAINABLE FARMING

Agriculture is a major driver of pollinator declines, through land-use change; intensive practices, such as tillage and agrochemical use; and declines in traditional farming practices. Agriculture also provides opportunities to support wild pollinators (1). We propose two complementary policy objectives: (i) promote ecological intensification of agriculture (14) and (ii)

BIODIVERSITY

Ten policies for pollinators

What governments can do to safeguard pollination services

By Lynn V. Dicks,¹ Blandina Viana,² Riccardo Bommarco,³ Berry Brosi,⁴ María del Coro Arizmendi,⁵ Saul A. Cunningham,⁶ Leonardo Galetto,⁷ Rosemary Hill,⁸ Ariadna V. Lopes,⁹ Carmen Pires,¹⁰ Hisatomo Taki,¹¹ Simon G. Potts¹²

Earlier this year, the first global thematic assessment from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) evaluated the state of knowledge about pollinators and pollination (1, 2). It confirmed evidence of large-scale wild pollinator declines in northwest Europe and North America and identified data shortfalls and an urgent need for monitoring elsewhere in the world. With high-level political commitments to support pollinators in the United States (3), the United Kingdom (4), and France (5); encouragement from the Convention on Biological Diversity's (CBD's) scientific advice

body (6); and the issue on the agenda for next month's Conference of the Parties to the CBD, we see a chance for global-scale policy change. We extend beyond the IPBES report, which we helped to write, and suggest 10 policies that governments should seriously consider to protect pollinators and secure pollination services. Our suggestions are not the only available responses but are those we consider most likely to succeed, because of synergy with international policy objectives and strategies or formulation of international policy creating opportunities for change. We make these suggestions as independent scientists and not on behalf of IPBES.

RISK REDUCTION

Pesticides are the most heavily regulated of the interacting drivers of pollinator declines (7). Risk assessment and use regulation can reduce pesticide hazards at national scales (2), yet such regulation is uneven globally. Many countries do not have national pesticide regulation and control systems or adhere to the International Code of Conduct on Pesticide Management (ICCPM), recently updated by the United Nations (8, 9). International pressure to raise pesticide regulatory standards across the world should be a priority. This includes consideration of sublethal and indirect effects in risk assessment and evaluating risks to a range of pollinator species, not just the honey bee, *Apis mellifera*.

Another priority is to capitalize on the profile of integrated pest management (IPM) in international policies, such as the ICCPM (9)

¹University of East Anglia, Norwich NR4 7TL, UK. ²Universidade Federal da Bahia, 40170-210 Salvador, Bahia, Brazil. ³Swedish University of Agricultural Sciences, 75007 Uppsala, Sweden. ⁴Emory University, Atlanta, GA 30322, USA. ⁵Universidad Nacional Autónoma de México, Tlalneantla, México 54090, Mexico. ⁶The Australian National University, Canberra, Australia Capital Territory 2601, Australia. ⁷Universidad Nacional de Córdoba, National Scientific and Technical Research Council (CONICET), Córdoba, Argentina. ⁸Commonwealth Scientific and Industrial Research Organisation (CSIRO) Land and Water, James Cook University, Cairns, Queensland 4878, Australia. ⁹Universidade Federal de Pernambuco, 50670-901 Recife, Pernambuco, Brazil. ¹⁰Embrapa Recursos Genéticos e Biotecnologia, CEP 70770-917 Brasília, DF, Brazil. ¹¹Forestry and Forest Products Research Institute, Tsukuba, Ibaraki 305-8687, Japan. ¹²University of Reading, Reading RG6 6AR, UK. Email: lynn.dicks@uea.ac.uk

support diversified farming systems (15).

Ecological intensification involves managing ecological functions, such as pollination and natural pest regulation, as part of highly productive agriculture. It can be as profitable and productive as conventional approaches at a farm level, even with up to 8% of land out of production to provide habitats that support beneficial organisms (16).

A major barrier to uptake of ecological intensification is uncertainty about ecological and agronomic outcomes. To tackle uncertainty, a promising option is to adjust crop insurance schemes to provide incentives, such as lower premiums or smaller loss thresholds, for farmers who take action to promote pollinators. Insurance is a key element in “climate-smart agriculture” (17) but has yet to be tested or adopted for more general agricultural sustainability.

Another barrier, lack of knowledge among farmers and agronomists, can be addressed

Ten pollinator policies

1. Raise pesticide regulatory standards.
2. Promote integrated pest management (IPM).
3. Include indirect and sublethal effects in GM crop risk assessments.
4. Regulate movement of managed pollinators.
5. Develop incentives, such as insurance schemes, to help farmers benefit from ecosystem services instead of agrochemicals.
6. Recognize pollination as an agricultural input in extension services.
7. Support diversified farming systems.
8. Conserve and restore “green infrastructure” (a network of habitats that pollinators can move between) in agricultural and urban landscapes.
9. Develop long-term monitoring of pollinators and pollination.
10. Fund participatory research on improving yields in organic, diversified, and ecologically intensified farming.

by extension services. For example, national Farm Advisory Systems are obligatory for member states under the EU’s Common Agricultural Policy. The extent to which these provide information relevant to ecological management could be improved.

Diversified farming systems (including some organic farms, home gardens, agroforestry, mixed cropping, and livestock systems) incorporate many pollinator-friendly practices, such as flowering hedgerows, habitat patchiness, and intercropping (1). Support for these systems can be achieved through financial incentives, such as European agri-environment schemes (18), or market-based instruments, such as certification schemes with a price premium—both used to support organic farming. In at least 60 coun-

tries, these practices and farming systems depend on indigenous and local knowledge (2). To secure people’s ability to pursue pollinator-friendly practices, their tenures and rights to determine their agriculture policies (food sovereignty) must be recognized and strengthened (19).

BIODIVERSITY AND ECOSYSTEM SERVICES

Policy interest in pollinators stems largely from their role in food production (2). Historically, the most widely adopted policy approaches for biodiversity conservation have been to identify and protect threatened species and to create protected areas. These remain critical but are not sufficient to maintain the substantial global value of pollination services in agriculture, for two reasons. First, the spatial separations between protected areas, as well as between protected areas and croplands, are usually large relative to daily movements of most pollinators. Second, although pollinator diversity is important, the bulk of crop pollination is from relatively few common, widespread species rather than rare or threatened species (20). For crop pollination, the policy goal should be to secure a minimum level of appropriate habitat, with flower and nesting resources, distributed throughout productive landscapes at scales that individual pollinators can move between. This fits the definition of “green infrastructure” identified by the EU in 2013 (21). It involves a diverse range of land managers, with overview and coordination at regional scales. As examples, small patches of habitat on public lands might be conserved through regulation, whereas protection or restoration of habitat on private land might be achieved through incentive payments (18) or by encouraging voluntary action (22). To conserve wider pollinator diversity and functions not relevant to agriculture, this approach must be integrated within strategically planned habitat and species protection policies (20, 23).

INCREASING KNOWLEDGE

There are substantial knowledge gaps about the status of pollinators worldwide and the effectiveness of measures to protect them (1). Evidence is largely limited to local-scale, short-term effects and is biased toward Europe and North America. There is a need for long-term, widespread monitoring of pollinators and pollination services. Recent research funded by the U.K. government as part of the National Pollinator Strategy for England (4) compared ways to achieve this monitoring, with varying levels of professional and volunteer involvement (24).

Finally, we suggest funding research on how to improve agricultural yields in farming systems known to support pollinators.

This underpins several policies in our list. It also resonates with a global focus on improving food production and food security, especially on small farms (<2 ha), which represent more than 80% of farms and farmers, and 8 to 16% of farmed land (2, 25). To ensure that findings are considered credible, salient, and legitimate by agricultural communities, the research should prioritize knowledge co-production and exchange between scientists, farmers, stakeholders, and policy-makers. Such approaches can be supported through national and international research funding or institutional infrastructure. ■

REFERENCES AND NOTES

1. IPBES, “Summary for policymakers of the assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination, and food production” (Secretariat of IPBES, Bonn, Germany, 2016).
2. IPBES, “The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production” (IPBES, Bonn, Germany, 2016).
3. Pollinator Health Task Force, “National strategy to promote the health of honey bees and other pollinators” (White House, Washington, DC, 2015).
4. Department for Environment, Food, and Rural Affairs, “The National Pollinator Strategy: For bees and other pollinators in England” (Defra, Bristol, 2014).
5. Ministère de l’Écologie du Développement Durable et de l’Énergie, “Plan national d’actions « France Terre de pollinisateurs » pour la préservation des abeilles et des insectes pollinisateurs sauvages” (Ministère de l’Écologie du Développement Durable et de l’Énergie, Puteaux, France, 2016).
6. Subsidiary Body on Scientific, Technical, and Technological Advice of the CBD, “Implications of the IPBES assessment on pollinators, pollination and food production for the work of the Convention,” Twentieth meeting of SBSTTA, Montreal, Canada, 25 to 30 April 2016.
7. D. Goulson, E. Nicholls, C. Botias, E. L. Rotheray, *Science* **347**, 1255957 (2015).
8. G. Ekström, B. Ekbom, *Outlook Pest Manag.* **21**, 125 (2010).
9. Food and Agriculture Organization of the United Nations (FAO), World Health Organization, “The international code of conduct on pesticide management” (FAO, Rome, 2014).
10. European Commission, “Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides” (Official Journal of the European Union, Brussels, 2009).
11. G. Ekström, B. Ekbom, *Crit. Rev. Plant Sci.* **30**, 74 (2011).
12. CBD, “Report of the ad hoc technical expert group on risk assessment and risk management” (UNEP/CBD/BS/RARM/AHTEG/2015/1/4, CBD, 2015).
13. P. Graystock *et al.*, *J. Appl. Ecol.* **50**, 1207 (2013).
14. R. Bommarco, D. Kleijn, S. G. Potts, *Trends Ecol. Evol.* **28**, 230 (2013).
15. C. Kremen, A. Iles, C. Bacon, *Ecol. Soc.* **17**, 44 (2012).
16. R. F. Pywell *et al.*, *Proc. R. Soc. London Ser. B* **282**, 20151740 (2015).
17. FAO, *Climate-Smart Agriculture Sourcebook* (FAO, Rome, 2013).
18. P. Batáry, L. V. Dicks, D. Kleijn, W. J. Sutherland, *Conserv. Biol.* **29**, 1006 (2015).
19. C. Laroche Dupraz, A. Postolle, *Food Policy* **38**, 115 (2013).
20. D. Kleijn *et al.*, *Nat. Commun.* **6**, 7414 (2015).
21. European Commission, “Green infrastructure (GI)—Enhancing Europe’s natural capital” (COM/2013/0249 final, EC, Brussels, 2013).
22. A. Santangeli *et al.*, *Biol. Conserv.* **197**, 209 (2016).
23. D. Senapathiet al., *Curr. Opin. Insect Sci.* **12**, 93 (2015).
24. C. Carvell *et al.*, “Design and testing of a National Pollinator and Pollination Monitoring Framework. Final summary report to the Department for Environment, Food and Rural Affairs (Defra), Scottish Government, and Welsh Government: Project WC1101” (Defra, Bristol, 2016).
25. International Food Policy Research Institute, in *2016 Global Food Policy Report* (IFPRI, Washington, DC, 2016), chap. 1.

EXTENDED PDF FORMAT
SPONSORED BY



Ten policies for pollinators

Lynn V. Dicks, Blandina Viana, Riccardo Bommarco, Berry Brosi, María del Coro Arizmendi, Saul A. Cunningham, Leonardo Galetto, Rosemary Hill, Ariadna V. Lopes, Carmen Pires, Hisatomo Taki and Simon G. Potts (November 24, 2016)
Science **354** (6315), 975-976. [doi: 10.1126/science.aai9226]

Editor's Summary

This copy is for your personal, non-commercial use only.

- Article Tools** Visit the online version of this article to access the personalization and article tools:
<http://science.sciencemag.org/content/354/6315/975>
- Permissions** Obtain information about reproducing this article:
<http://www.sciencemag.org/about/permissions.dtl>

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published weekly, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. Copyright 2016 by the American Association for the Advancement of Science; all rights reserved. The title *Science* is a registered trademark of AAAS.