README – literature cited in the presentation

Not everything cited is included in the folder as many are too large to include as attachments. However, they are linked in the text below.

1 – Aizen et al (2019)

This paper uses FAO data and the work of Klein et al (2007) to illustrate the demand for pollination services is growing globally much faster than the number of managed honeybees. A follow up study by Mashilingi et al (2022) (Item 23 in the folder) demonstrates that honeybees alone cannot supply pollination services (this is included in the additional materials folder).

2- Klein et al (2007)

This paper is a review of all crop pollinator dependence data to that point. The key information on pollinator dependence is in Appendix 1 (also included).

3 – FAOSTAT (2022) <https://www.fao.org/faostat/en/#data>

The FAOs statistical database. It has some issues but is the most comprehensive database on crop production, area and prices globally. Crop area and production data can be found in the “Crop and Livestock products” database under the Production tab. Prices per tonne can be found in the “Value of Agricultural Production” database.

4- Ollerton et al (2011)

This study reviewed the importance of pollination to global flowering plants, arriving at a figure of ~80% but with variation between tropical and temperate regions.

5 – Garibaldi et al (2013)

This study uses global datasets on crop pollination to explore the importance of honeybees relative to wild insects. They find that honeybees are often only minor contributors to pollination services, unless the system is heavily managed.

6 – Hutchinson et al (2021)

This study uses UK and European data to identify a list of bee species that are known or very likely to be key pollinators of four major UK crops. It is an example of what can be achieved with basic field and taxonomic data and provided a valuable list of key species for crop production.

7 - Powney et al (2019)

This study uses long-term occupancy data to model the diversity of bees and hoverflies across the UK over time. It is an example of what can be achieved with ad hoc collected data on pollinators over time.

8 – Van Swaay et al (2019)

This report uses data from several transects of butterflies over time to develop a measure of how grassland butterfly abundance has changed over time across several countries. It is an example of what can be achieved with systematic monitoring of species over time.

9 – Dicks et al (2021)

This study is a synthesis of expert opinions on what are the key drivers of pollinator decline across world by different regions. It highlights many of the uncertainties in data around the world.

10 – Garratt et al (2014)

This paper shows pollination service deficits in UK apple orchards and estimates their economic value. It also demonstrates the importance of using complete price data rather than just averages.

11 – Lautenbach et al (2012)

This paper estimates the global value of pollination in the year 2000. It uses crop mapping data to display hotspots of value across the world. The graphic in my presentation is an updated version of the main image from this paper that was produced for the IPBES pollinator assessment.

12 – Bourges et al (2020)

This paper examines the economic value of pollination services in Para state, Brazil. It shows how the value of pollination services is under-estimated if Acai, a crop that is only recorded in local data, is not accounted for and highlights the need for comprehensive crop data when evaluating the importance of pollinators.

13 – Hasnain et al (2021) <https://www.eci.ox.ac.uk/research/food/downloads/Mapping-the-UK-food-system-digital.pdf>

This is a report on mapping the UK food system, designed for more general reading. It details many of the aspects of the food system in the UK. Although it is not directly relevant to pollinators, it includes a lot of useful things to think about when discussing food systems in general (e.g. the amount of waste etc.) and is where the image of the % value of a banana to each actor comes from.

14 – Tremlett et al (2021)

This paper estimates the economic value of Bat pollinated Pittya cactus fruit in Mexico across the whole supply chain, demonstrating the impact of pollination on actors beyond the farmers themselves.

15 – Murphy et al (2022)

This paper estimates the economic value of pollination services to international trade, following losses of pollinators in groups of countries. It illustrates how highly developed countries are often dependent on less developed countries for pollinator dependent crops and argues for a more global approach to pollinator conservation.

16 – Chaplin-Kramer et al (2014)

This paper looks at the importance of pollinator dependent crops to the availability of key nutrients in the human diet. It highlights that many areas which are vulnerable to pollinator losses for nutrition are also likely to duffer deficiencies already.

17 – Sumner et al (2018)

This paper looks at the various social values associated with bees and other groups of insects in the UK using simple qualitative research methods. It is a great example of the cultural and social values associated with pollinators.

18 – UK National Ecosystem Assessment (2011) <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>

This is the UK’s national ecosystem assessment and the follow on report. Pollinators are included in Chapter 14 (regulating services) but the whole report may be a useful reference point.

19 – UK National pollinator Strategy (2014) <https://www.gov.uk/government/publications/national-pollinator-strategy-for-bees-and-other-pollinators-in-england>

This is the UK’s national pollinator strategy, a 10-year strategy committed to by DEFRA which covers a variety of fairly low cost, awareness focused efforts to support pollinators. Similar strategies are available in other countries, including Ireland, Korea and New Zealand.

20 – UK PoMS (2018) <https://ukpoms.org.uk/>

This is the website for the UK’s pollinator monitoring scheme. We developed the scheme using field trials which are detailed in a report to DEFRA in 2016, linked here <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=2&ProjectID=19259>

The publication Breeze et al (2021) (item 24 in the folder) makes a deeper economic argument for this scheme.

This scheme formed the basis for the EU Pollinator monitoring scheme, which is currently being trialled: <https://publications.jrc.ec.europa.eu/repository/handle/JRC122225>

21 – Countryside Stewardship (2022) <https://assets.publishing.service.gov.uk/media/6204fba08fa8f510a9eab3e2/CS_MT_and_WO_manual_1_January_2023_PRINT.pdf>

This is the most recent version of the UK’s agri-environmnet scheme which includes explicit provisions for pollinators. The scheme is soon to be retired and there are other, more demanding versions too. The scheme has been praised for its quality of actions, but criticised by farmers for being too complicated to apply for. The paper Cole et al (2020) (item 25 in the folder) reviews similar agri-environment schemes across Europe. These are all examples of paying farmer for actions that can promote ecosystem services but require significant financial and technical infrastructure to set up.

22 – Dasgupta Review (2022) <https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review>

This is a complete synthesis of the economics of biodiversity in the UK that builds upon the work done in the UK NEA. It demonstrates how biodiversity and ecosystem services have entered every level of policy and decision making.

If you would like any further references – please e-mail me at [t.d.breeze@reading.ac.uk](mailto:t.d.breeze@reading.ac.uk) and I’ll see what I can do.