

SAFEGUARD

Safeguarding European wild
pollinators

***Urban greening for
pollinators: from policy to
practice.***

**Background to the workshop &
the Safeguard project**



Dr Adam Vanbergen

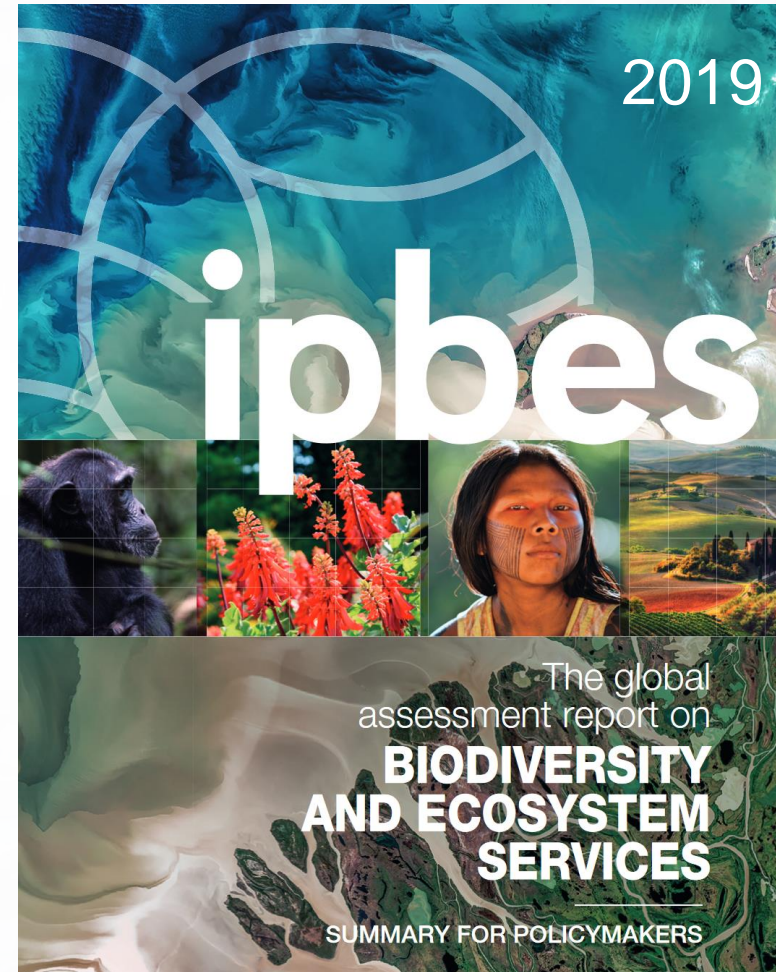
8 December 2022 9:30 – 14:20 (Brussels, UTC+1)



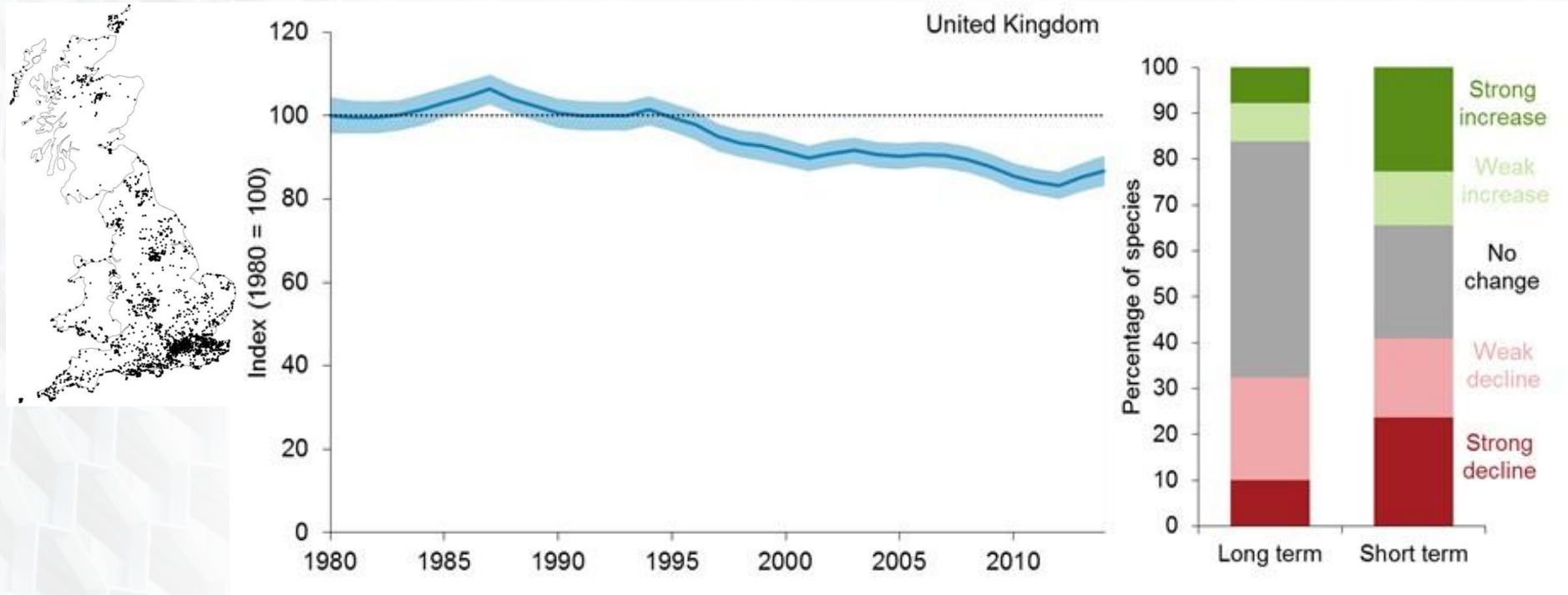
This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003476.

There is a global biodiversity crisis....

- Severe decline of biodiversity.
- Interactive effects of global change drivers might accelerate biodiversity loss.
- Loss of nature's benefits to human societies.
- Past efforts to halt biodiversity declines have largely been unsuccessful (although a few wins).



Pollinator decline: example UK



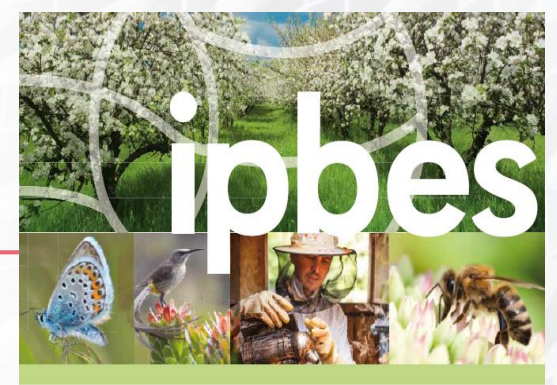
Isaac et al (2014)
Methods in Ecology and Evolution

Powney et al (2017) UK
Biodiversity Indicators 2017: D1c pollinating insects. JNCC/ CEH.

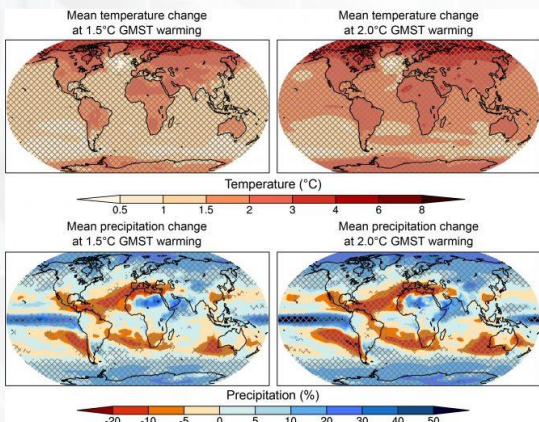
Pollination Indicator (2017): Mean relative change in the distribution of 389 species of wild bees and hoverflies from 1 km occurrence records.

Pressures on Pollinators

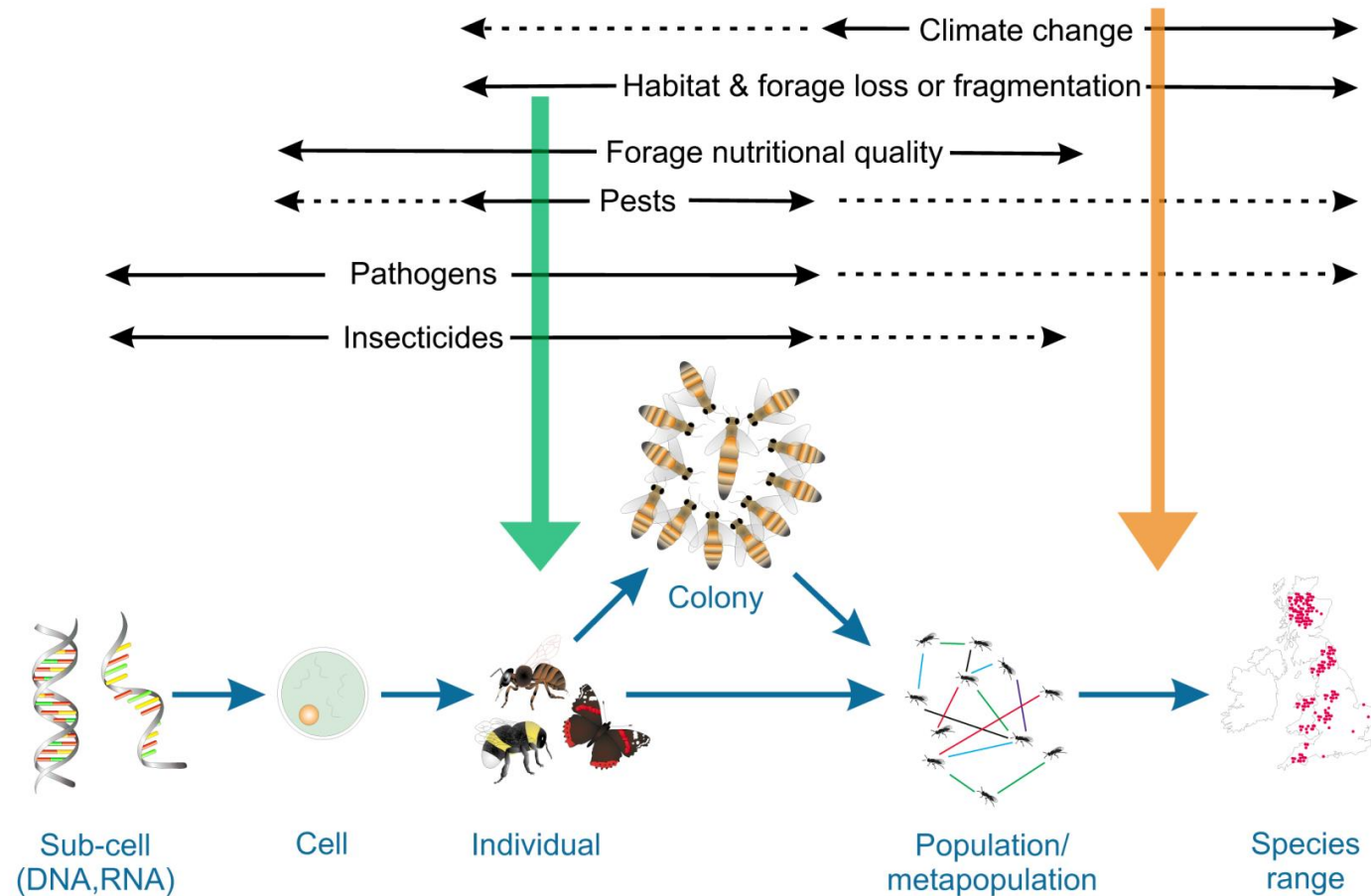
- Land use change
- Land management (type, intensity, etc.)
- Insecticides, herbicides, fungicides
- Pollinator diseases & bee husbandry
- Climate change
- Invasive alien species.



The assessment report on
**POLLINATORS,
POLLINATION AND
FOOD PRODUCTION**
2016
SUMMARY FOR POLICYMAKERS



Multiple, interactive impacts across biological scales?

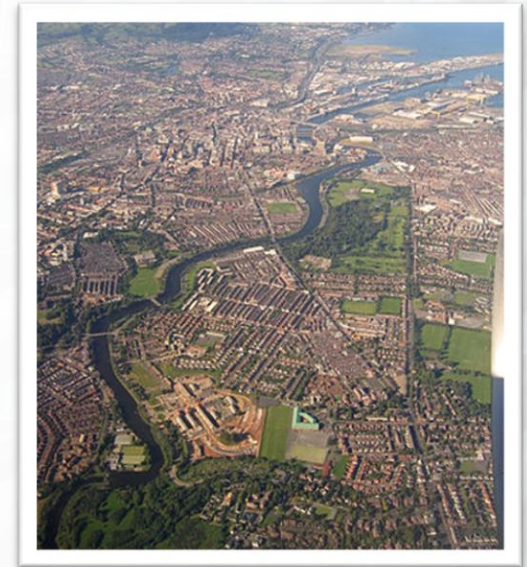


Source: Vanbergen et al (2013). Threats to an ecosystem service: pressures on pollinators. *Frontiers in Ecology and the Environment*
Also see: Goulson et al 2015 *Science* ; Potts et al 2016 *Nature*

Urban Pressures on Pollinators



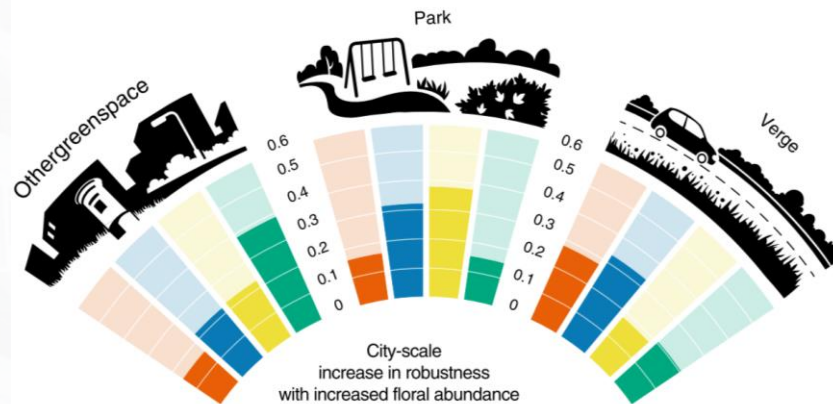
- Reduction in **food, nesting or other resources** for pollinators by:
 - **Habitat Loss, Fragmentation or Degradation**
 - **Intensive land management** (cutting, mowing)
- **Pesticide use** (lethal & sublethal)
- Ecosystem **pollution** (chemical, metal, nitrogen, vehicle emissions)
- **ALAN** (Artificial Light At Night)
- Urban **honeybee keeping** (disease & competition risks)



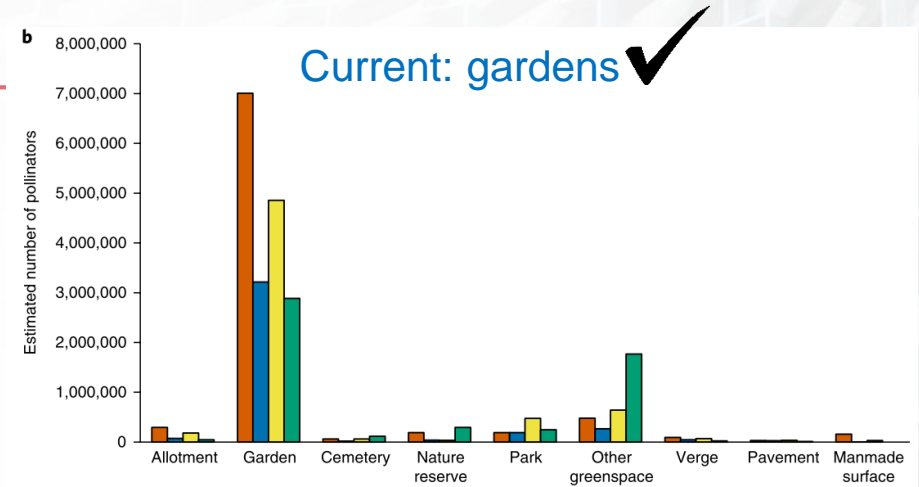
Urban can be good for pollinators

- Urban areas are highly heterogeneous
- Pollinators will move according to availability of nest sites and flowers
- Pollen & nectar sources most of the year
- ‘Waste lands’ provide weeds & bare ground
- Urban conservation strategies need to consider the extent and diversity of urban land uses

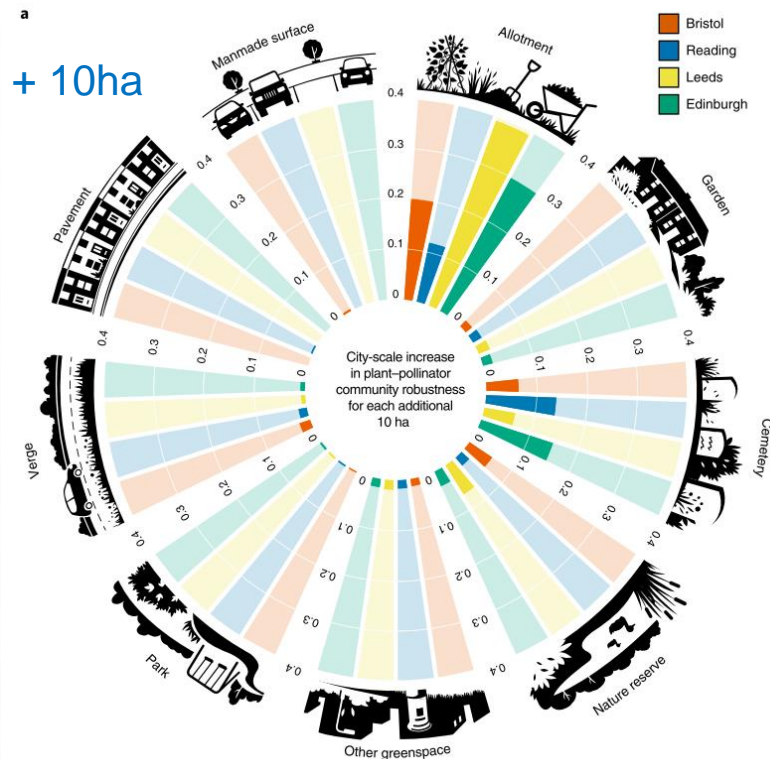
Baldock, et al 2019. A systems approach reveals urban pollinator hotspots and conservation opportunities. *Nature Ecology & Evolution*, 3, 363-373.



Simulation + *Trifolium repens*, *Taraxacum*, *Bellis perennis*



Simulation + 10ha

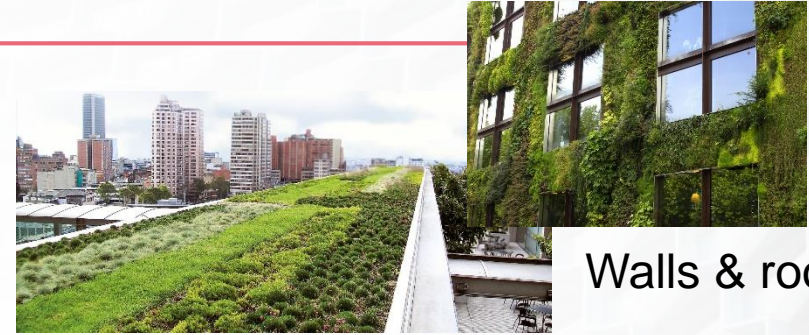


'Greening' Responses to Restore Pollinators

Parks & public space



Cemeteries

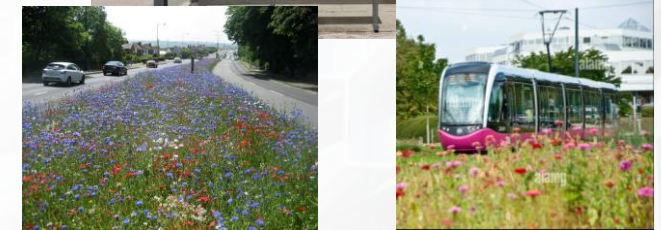


Walls & roofs



Flowers & nest sites

Transport infrastructure



Allotments



Private gardens



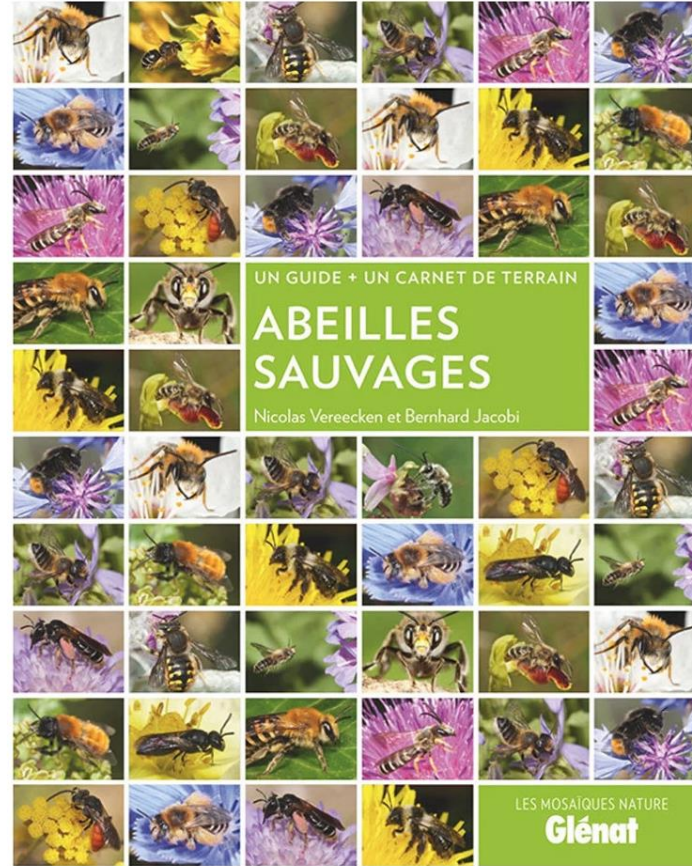
Brownfield sites



Europe: One managed honey bee, many wild bee, fly and other insect species...



1 x Managed honey bee
Apis mellifera



Wild social and solitary bees > 1000 species
9% threatened; 56% data lacking

Hoverflies, other flies, wasps, butterflies, beetles....



EU SAFEGUARD project



- **Our ambition: make a significant contribution tackling major challenges to reverse pollinator declines, inspire the development of management and policy guidelines to safeguard wild pollinators and the benefits they provide**

<https://www.safeguard.biozentrum.uni-wuerzburg.de/Project/About.aspx>



EU SAFEGUARD project

- European Union's Horizon 2020 research and innovation programme (GA 101003476).
- 25 institutions
- 14 European countries + China
- Budget 5.3 €M
- 2021-2025
- 48 Deliverables



- Safeguard partner
- Other Member State
- Non EU country

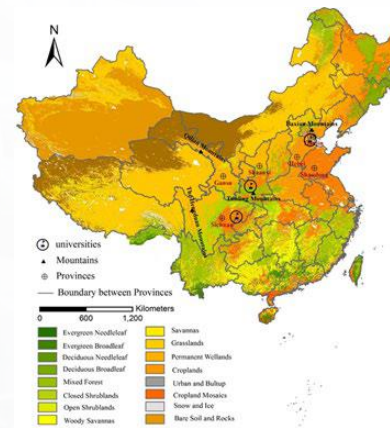
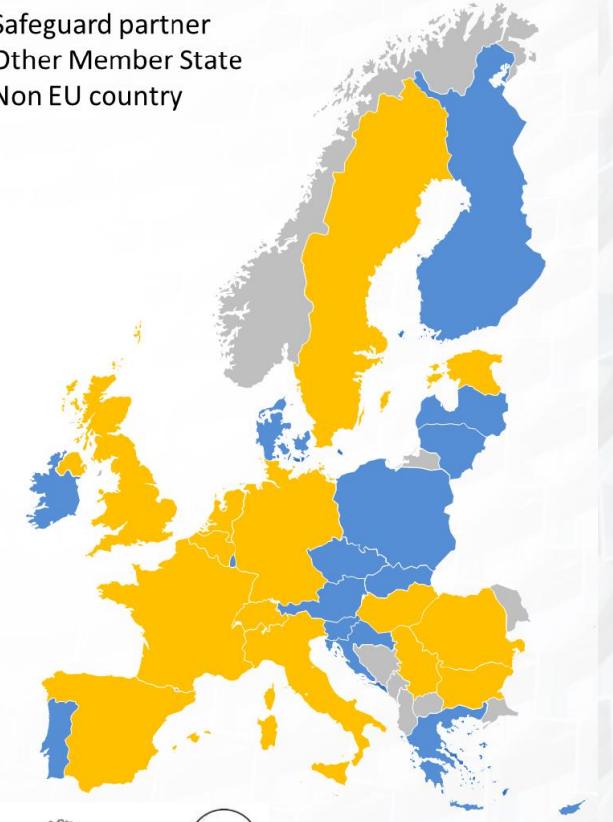
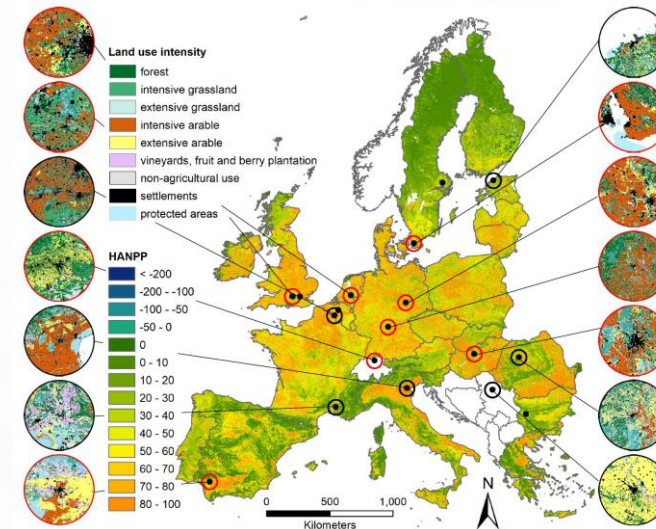


Figure 1.6. Location of Chinese partner institutions and planned study regions.





Thanks
for
listening
& enjoy
today!



SAFEGUARD

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pollinators

***Pollinators & Cities: framing
the issue for evidence-informed
decisions***



Dr Adam Vanbergen

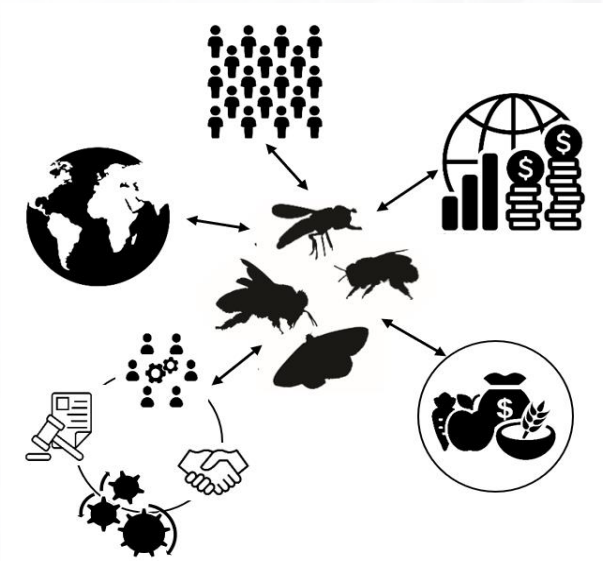
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SAFEGUARD: Main Objectives

1. Reassess **status and trends** of pollinator populations & communities
2. Predict the **impact of multiple pressures** on pollinators
3. Quantify the **diverse values** of pollinators & contributions to **ecosystem services**
4. Quantify the effectiveness of **interventions** to conserve pollinators
5. **Co-develop an integrated assessment framework**
6. Inform **policies and decisions** (national, EU, UN)
7. Increase **awareness and knowledge**



Task 5.1 Conceptualise an integrated assessment framework (IAF) of the separate and combined effects of DPSIR components on wild pollinators and pollination

Conceptual framework:

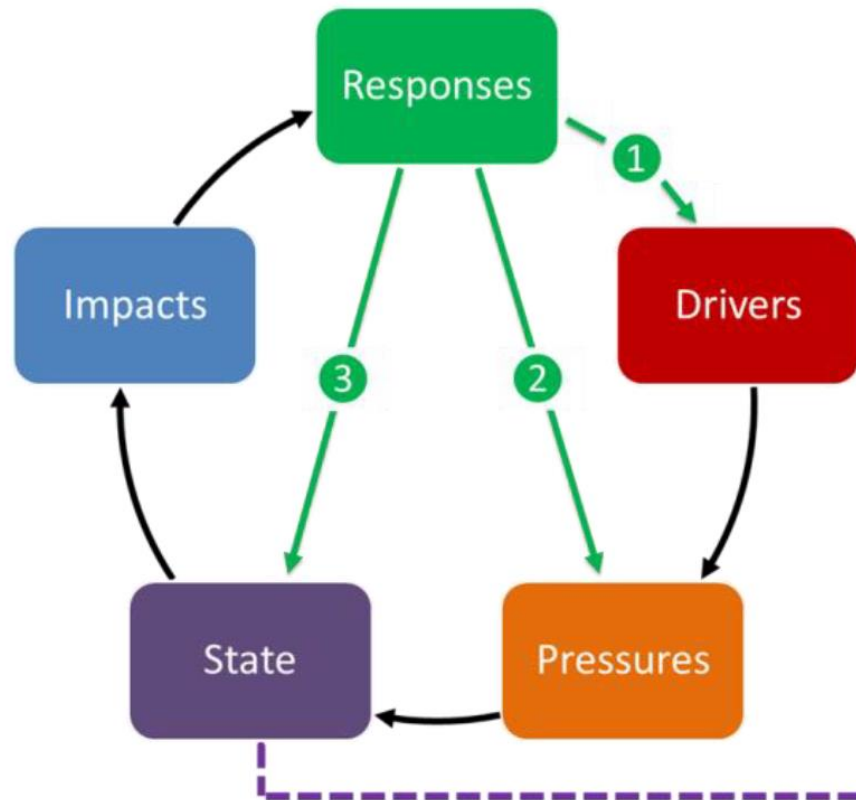
Drivers-Pressures-States-Impacts-Responses (DPSIR)

- **Drivers:** economic, social and institutional systems that trigger pressures on the environmental state (*e.g. human demography, global markets & demand, laws and regulations...*)
- **Pressures:** environmental pressures induced by humans (*e.g. land-use, land management, climate change, ...*)
- **State:** status of the environment (*e.g. pollinators, pollinator-dependent cultivated and wild plants, their interactions and their ecosystems*).
- **Impact:** changes in environmental functions affecting social, economic and environmental dimensions, (*e.g. crop yields, human health, livelihoods, cultural values of landscapes, effects on wider biodiversity through disrupted wild plant pollination*)
- **Response** : changes in policies or management actions, which are triggered by (the perception of) impacts and which attempt to prevent, compensate or reduce their consequences (*e.g. new policies or practices*)

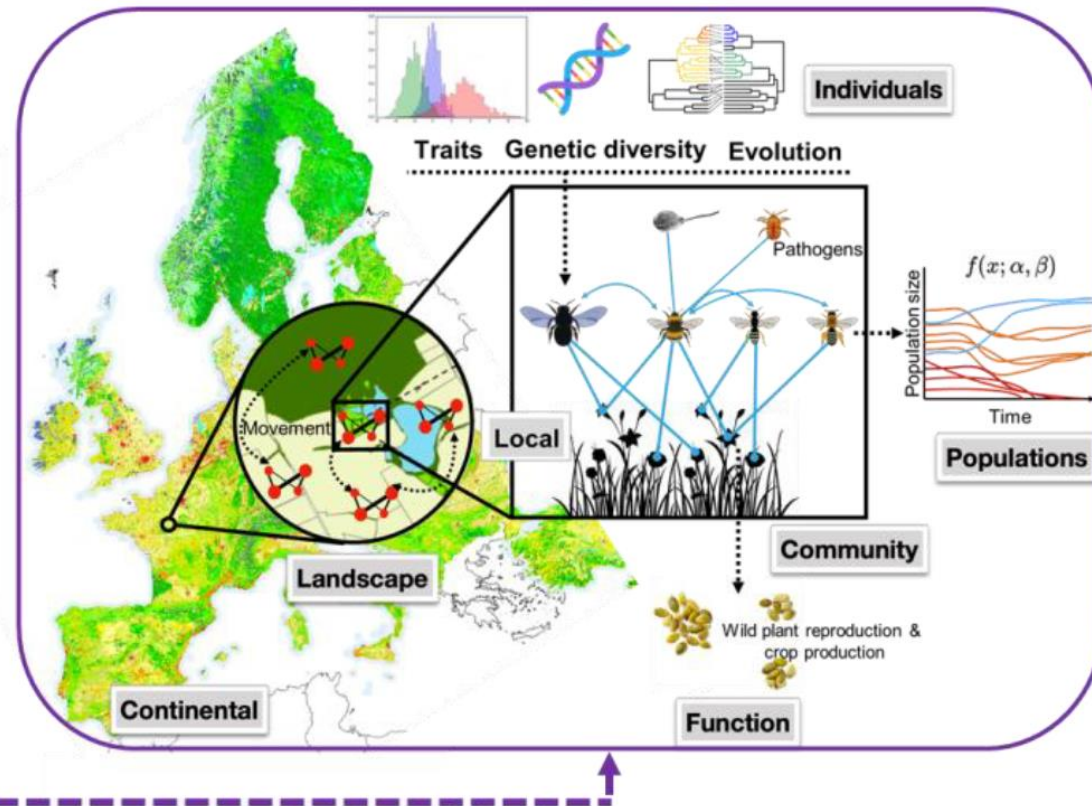


Linking socio-environmental and ecosystem concepts

A. Social-Environment DPSIR concept

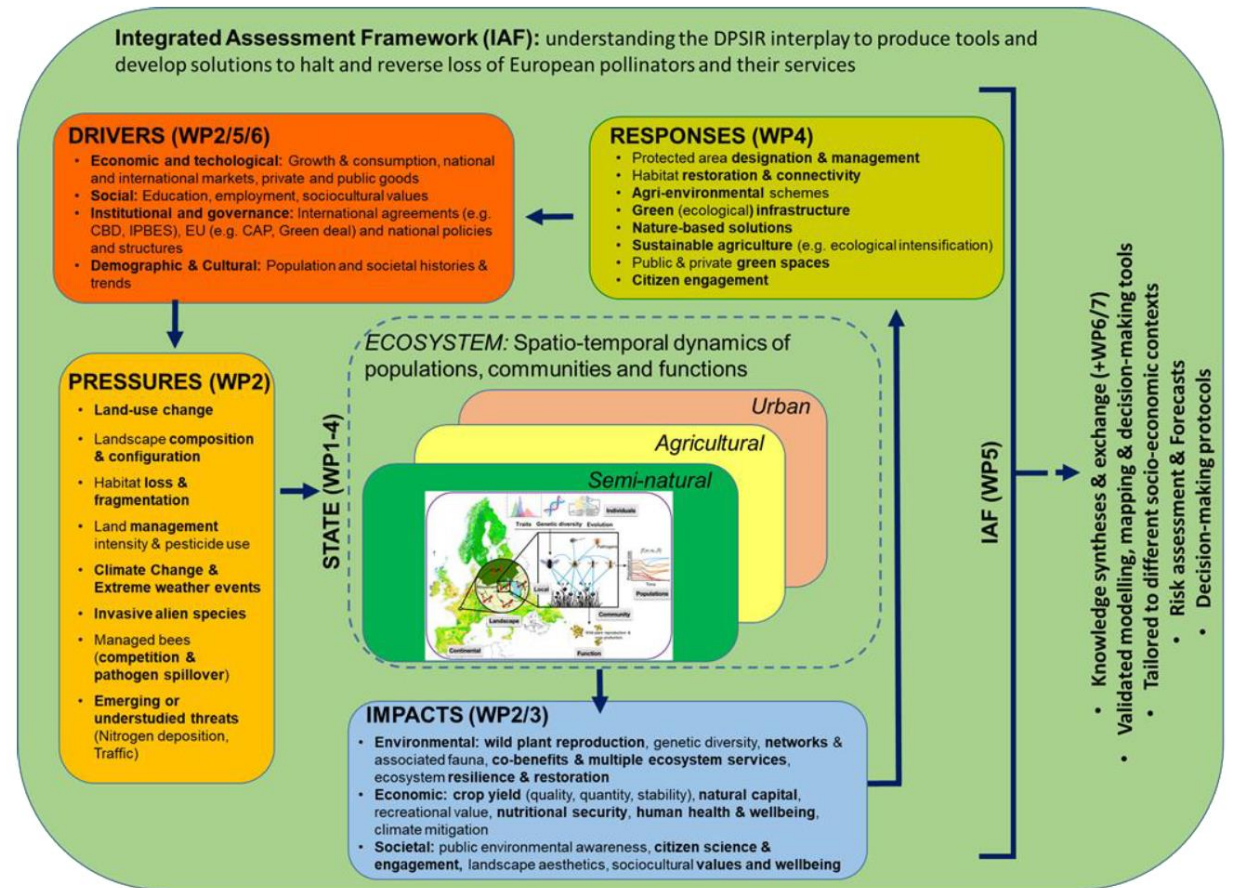


B. Dynamic multiscale ecosystem concept



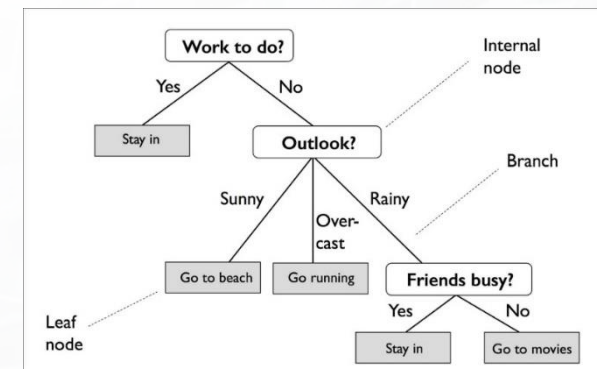
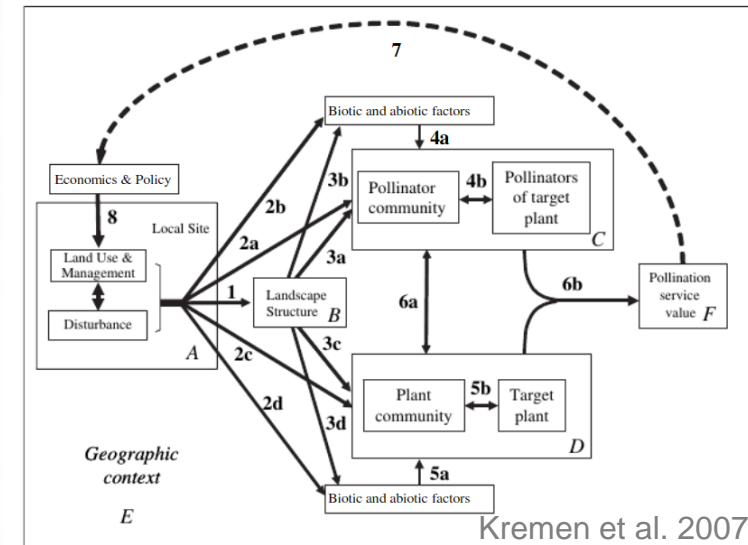
What is an Integrated Assessment Framework (IAF)?

- (i) accurately **framing** the specific problem/issue/aspect;
- (ii) integrating **different knowledge sources** (existing and new);
- (iii) experimentation and testing of **response options, decision-making** processes or tools.



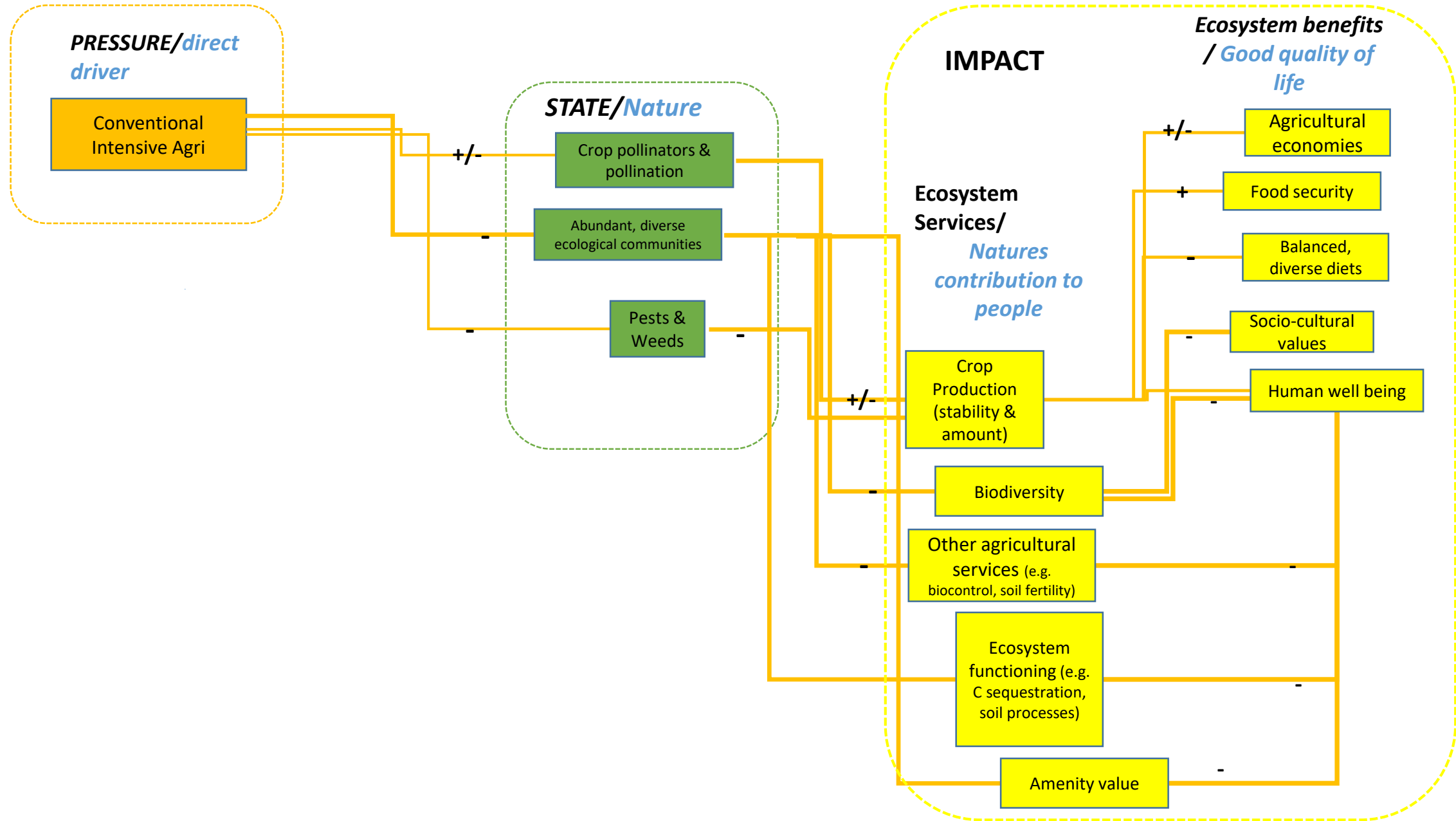
Integrative Assessment Framework (IAF): concepts, tools and solutions

- Assesses **existing knowledge and uncertainty** regarding the effects of **DPSIR** on wild pollinators and pollination
- **Co-development, testing and validating** of the IAF between **scientists** and **stakeholders** from **different sectors and governance levels**
- Identify **specific problems** (drivers, pressures, status, impacts) and **potential solutions** (responses) affecting pollinators and their values in different socio-ecological systems
- Facilitate **evidence-informed and mechanism-based decision making** for safeguarding pollinators at different scales, contexts and organisational levels



| |
|----------|
| Pressure |
| State |
| Impact |
| Response |

AGRICULTURE



AGRICULTURE

- Pressure
- State
- Impact
- Response

PRESSURE/direct driver

Conventional Intensive Agri

STATE/Nature

Crop pollinators & pollination

Abundant, diverse ecological communities

Pests & Weeds

IMPACT

Ecosystem benefits / Good quality of life

Ecosystem Services/ Natures contribution to people

Crop Production (stability & amount)

Biodiversity

Other agricultural services (e.g. biocontrol, soil fertility)

Ecosystem functioning (e.g. C sequestration, soil processes)

Amenity value

Agricultural economies

Food security

Balanced, diverse diets

Socio-cultural values

Human well being

RESPONSE

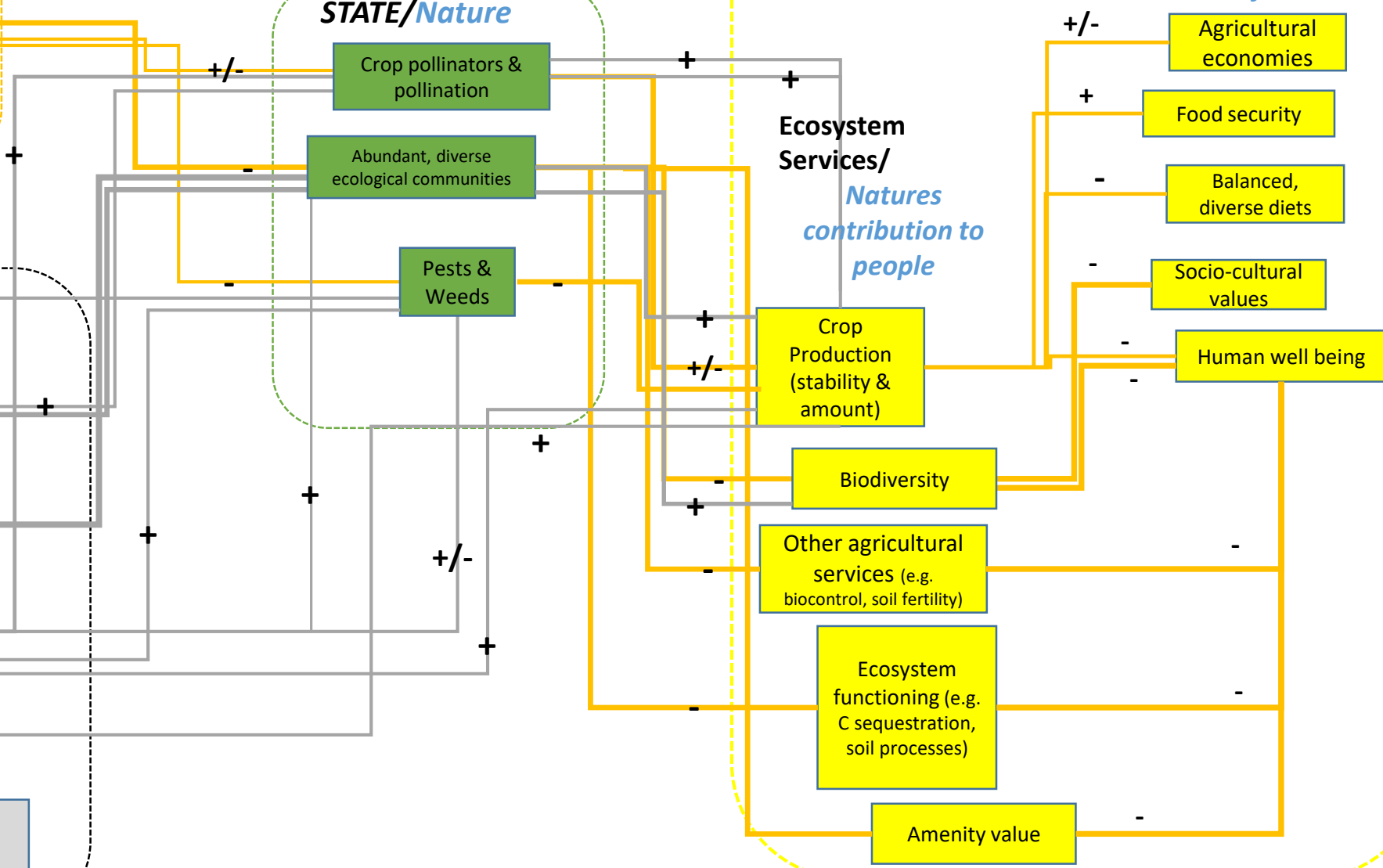
Ecological Intensification

Ecological restoration

Crop diversification (space x time)

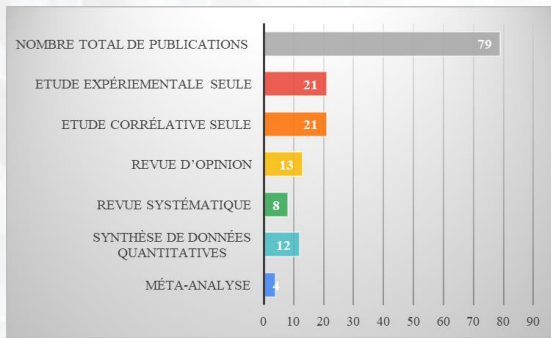
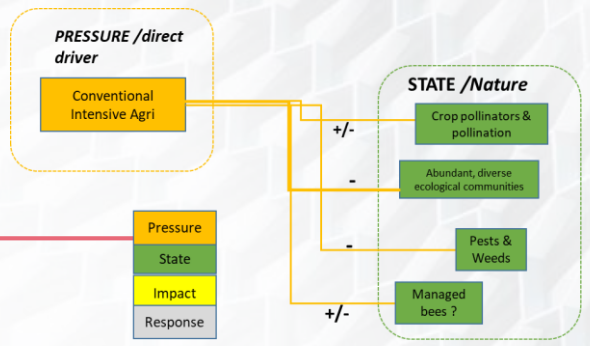
Managed bees

ILM ??
Integrated landscape (habitat) management



Evidence-informed IAF

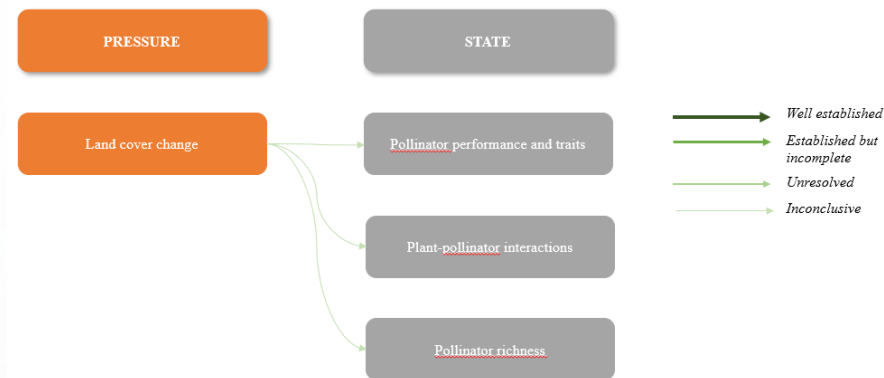
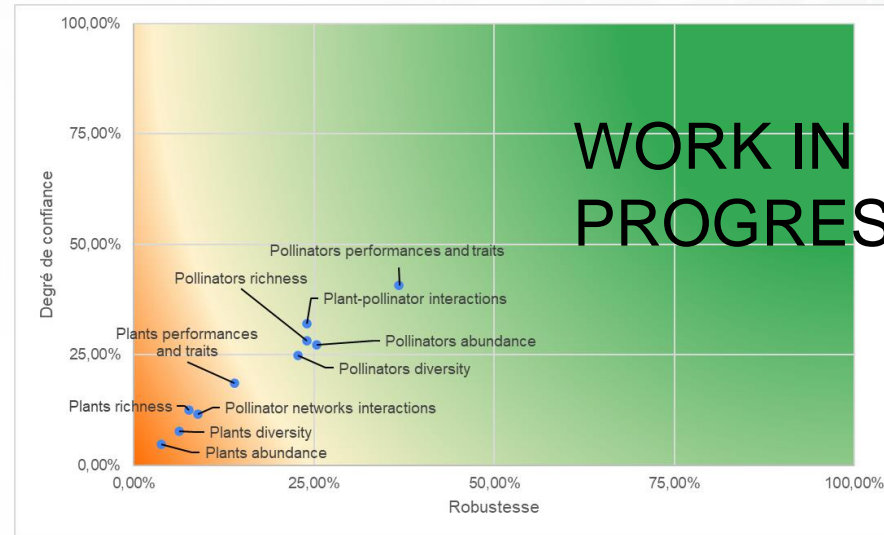
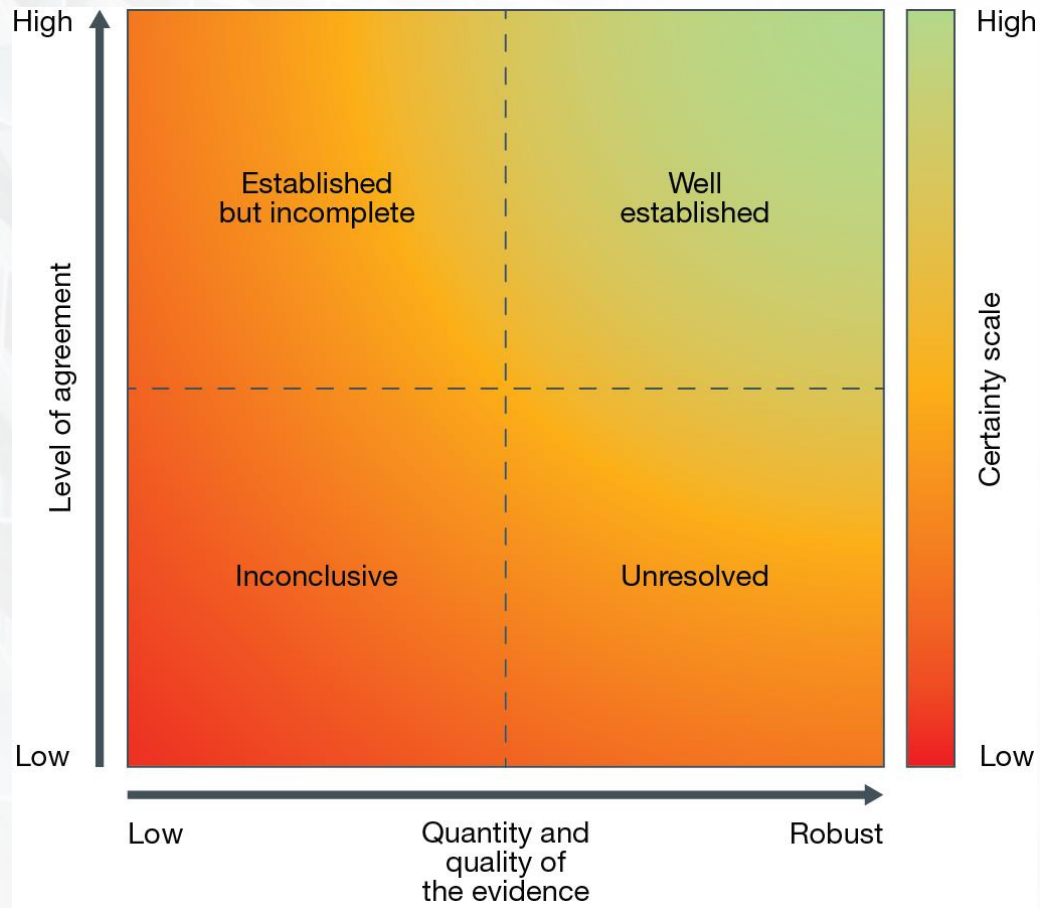
- Searching the scientific literature
- Creating a data base to support the IAF
- Ranking the type, direction (+/-) and strength of evidence for each DPSIR link



| Let Author Last Name | Let Author First Name | Title | Year | Abstract | Keywords | Journal | Volume | Issue | Pages | doi | WoS citation (03/2022) | Article type | World geographic region | Sample size | Bumble bee /Bumblebee | Solitary bee | Osmia | Megachilidae | Halictidae | Andrenidae | Colletidae | Honeyfly /Psyllid/ps | Lepidoptera /Butterfly/moth | Drivers | Biological responses | Biological scale | Agriculture | Wild plant reproduction | Bee performance | Human responses | Comments | Questions | | | | |
|----------------------|---------------------------------|--|------|----------|-----------|----------------------------|----------------------------|-------|-------|-----|------------------------|--------------|-------------------------|-------------------------------|-----------------------|--------------|-------|--------------|------------|------------|------------|----------------------|-----------------------------|---------|----------------------|------------------|-------------|-------------------------|-----------------|-----------------|----------|-----------|--|--|--|--|
| Agren | Jon | Pollinators, 2019 Floral charac | 2019 | 6436 | 122-123 | 10.1126/science.aan1556 | 364 | | | | | Review/Opini | | | | | | | | | | | | | | | | | | | | | | | | |
| Aizen | Marcelo | Global agri: 2019 The global in agricultural | 2019 | 10 | 3516-3527 | 10.1111/gcb.14792 | 25 | | | | | 85 | Quantitative | Worldwide | 151 | | | | | | | | | | | | | | | | | | | | | |
| Aizen | Marcelo | Invasive bee: 2020 Increasing the African lion | 2020 | 63 | | 10.1093/nhe/naaa003 | 10 | | | | | 15 | Correlative st | Americas, New Zoa | | | | | | | | | | | | | | | | | | | | | | |
| Alexa | Cedric | Piling wild: 2019 Biodiversity frontiers in E | 2019 | 7 | 1-4 | 10.1380/rev.2019.00060 | 7 | | | | | 38 | Single experie | N. America (incl. Me | | | | | | | | | | | | | | | | | | | | | | |
| Anderson | Nicholas | Chronic con: 2019 The urban bee | 2019 | 5 | 1-9 | 10.1038/s41586-019-0802-9 | 5 | | | | | 14 | Quantitative | Worldwide | | | | | | | | | | | | | | | | | | | | | | |
| Arcevo-Gómez | Genaro | Global prog: 2019 Species inter | 2019 | 9 | 1-9 | 10.1038/s41586-019-0426-9 | 9 | | | | | 245 | Quantitative | Worldwide | | | | | | | | | | | | | | | | | | | | | | |
| Balock | Katherine | A systems in: 2019 Urban areas | 2019 | 3 | 363-373 | 10.1038/s41586-019-0369-9 | 3 | | | | | 119 | Large-scale st | Europe (incl. Russia & Cuba), | | | | | | | | | | | | | | | | | | | | | | |
| Davies | Faith | Wildlife alt: 2019 Wildlife and landscape | 2019 | 23 | 10 | 1882-1893 | 10.1111/1365-2415.13388 | | | | | 19 | Correlative st | Europe (incl. Russia & Cuba), | | | | | | | | | | | | | | | | | | | | | | |
| Barragán-Fonseca | Katherine | Use of virus: 2020 1. Pollinating colour | 2020 | 45 | 1 | 45-55 | 10.1111/evo.13775 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bergamo | Paolo | Pollination & 2020 Pollination is also | 2020 | 21 | 1 | 129-139 | 10.1111/evo.13415 | | | | | 23 | Correlative st | U. America (incl. Me | | | | | | | | | | | | | | | | | | | | | | |
| Brause | Theo | Translating: 2019 Translating the | 2019 | 22 | 1 | 109-113 | 10.1111/evo.13172 | | | | | 9 | Single experie | Europe (incl. Russia) | | | | | | | | | | | | | | | | | | | | | | |
| Paulo | Experiment: 2019 Species extinc | 2019 | 9 | 1 | 1-13 | 10.1038/s41586-019-0355-4 | 9 | | | | | 20 | Single experie | Europe (incl. Russia) | | | | | | | | | | | | | | | | | | | | | | |
| Brauherr | Ben | Impact of n: 2019 Honeybees & | 2019 | 1 | 1-11 | 10.1038/s41586-019-0464-9 | 1 | | | | | 27 | Correlative st | U. America (incl. Me | | | | | | | | | | | | | | | | | | | | | | |
| Brown | Tom | Pollinator in: 2021 Beekeeping pollinators | 2021 | 56 | 1 | 44-52 | 10.1111/1365-2415.13555 | | | | | 13 | Quantitative | Europe (incl. | | | | | | | | | | | | | | | | | | | | | | |
| Brown | Julian | Global-scale: 2019 Understanding | 2019 | 286 | 1515 | 10.1098/rstb.2019.2039 | 286 | | | | | 12 | Meta-analysis | Worldwide | | | | | | | | | | | | | | | | | | | | | | |
| Bushell | Sasha | Urbanisation: 2019 Pollination in | 2019 | 9 | 1-9 | 10.1038/s41586-019-0288-4 | 9 | | | | | 5 | Correlative st | Europe (incl. | | | | | | | | | | | | | | | | | | | | | | |
| Byrne | Frank | The effect o: 2019 Large-scale | 2019 | 35 | 28-33 | 10.1038/s41586-019-01104-0 | 35 | | | | | 5 | Correlative st | Europe (incl. | | | | | | | | | | | | | | | | | | | | | | |
| Caruso | Christina | A meta-anal: 2019 Floral traits | 2019 | 73 | 1 | 4-14 | 10.1111/evo.13529 | | | | | 58 | Meta-analysis | Worldwide | | | | | | | | | | | | | | | | | | | | | | |
| Casati | Enrico | Field quant: 2019 Animal pollin | 2019 | 275 | 122018 | 14-21 | 10.1038/s41586-019-01003-0 | | | | | 18 | Correlative st | Europe (incl. | | | | | | | | | | | | | | | | | | | | | | |
| Centrella | Mary | Over divers: 2020 Threats to bee | 2020 | 6 | 1031-1042 | 10.1111/1365-2415.13500 | 6 | | | | | 4 | Correlative st | Asia & Pacific | | | | | | | | | | | | | | | | | | | | | | |
| Chakrabarti | Pradyumn | Pesticide in: 2019 Pesticide and | 2019 | 230 | 51-56 | 10.1038/s41586-019-00067-2 | 230 | | | | | 9 | Correlative st | Asia & Pacific | | | | | | | | | | | | | | | | | | | | | | |
| Chakrabarti | Pradyumn | The impact o: 2019 Background | 2019 | 15 | 1-10 | 10.1038/s41586-019-01006-6 | 15 | | | | | 9 | Single experie | U. America (in | | | | | | | | | | | | | | | | | | | | | | |
| Chakraborty | Vandana | Do insects e: 2019 Insect plants | 2019 | 220 | 125-134 | 10.1111/evo.13500 | 220 | | | | | 106 | Review/Opini | Worldwide | | | | | | | | | | | | | | | | | | | | | | |
| Chaplin-Kramer | Rebecca | Global model: 2019 The magnitude | 2019 | 366 | 6462 | 250-254 | 10.1111/evo.13512 | | | | | 106 | Review/Opini | Worldwide | | | | | | | | | | | | | | | | | | | | | | |
| Chen | Mia | Impact of b: 2020 Canadian | 2020 | 9 | 1-8 | 10.1038/s41586-020-06272-2 | 9 | | | | | 3 | Correlative st | Asia & Pacific | | | | | | | | | | | | | | | | | | | | | | |

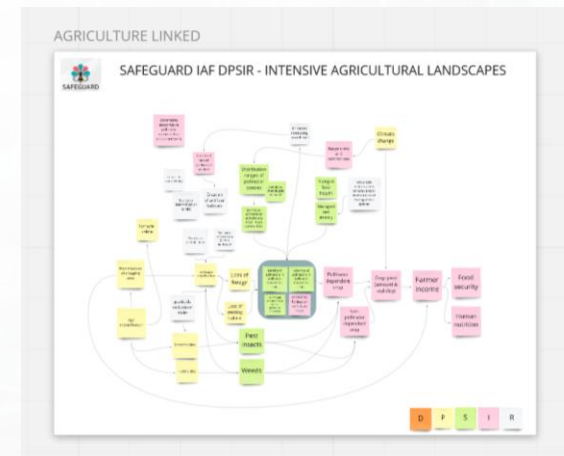


Communicating certainty in simple ways



Today's Activity 1115 – 1200 :

- **Co-developing a tool to do strategic urban planning for pollinators**
 - 45 minutes
 - 3 break out groups
 - Miro White Boards (post-its and links)
- **Co-design of the 'Urban' DPSIR Conceptual framework**



Drivers-Pressures-States-Impacts-Responses (DPSIR)

- Drivers: economic, social and institutional systems that trigger pressures on the environmental state (e.g. *human demography, global markets & demand, laws and regulations...*)
- Pressures: environmental pressures induced by humans (e.g. *land-use, land management, climate change, ...*)
- State: **PREDETERMINED FOR YOU** *and wild plants, t*
- Impact: **PREDETERMINED FOR YOU** *onmental es, effects on dimensions wider bi*
- Response : changes in policies or management actions, which are triggered by (the perception of) impacts and which attempt to prevent, compensate or reduce their consequences (e.g. *new policies or practices*)



Today's Activity 1115 – 1200, specifically :

1. Short demo of MIRO by each facilitator & Ethics of engagement : raise hands for questions
2. Each participant practices by creating a post-it with their name, affiliation and 1-3 key words describing their job/interest (**2 mins max**)
3. (D)**PSIR** – rapid list key words on post-it for **P** (pressures) for 5 minutes followed by 5 minutes of the facilitator leading a discussion (clarify, grouping together, and ranking the importance...) of different aspects. Then repeat for **R**esponses (10 min total) = **20 min** for (3).
4. Discuss and draw as a group the logical links between P-S-I-R (**15 min**)
5. **3 mins** plenary wrap up & next steps by Adam.

