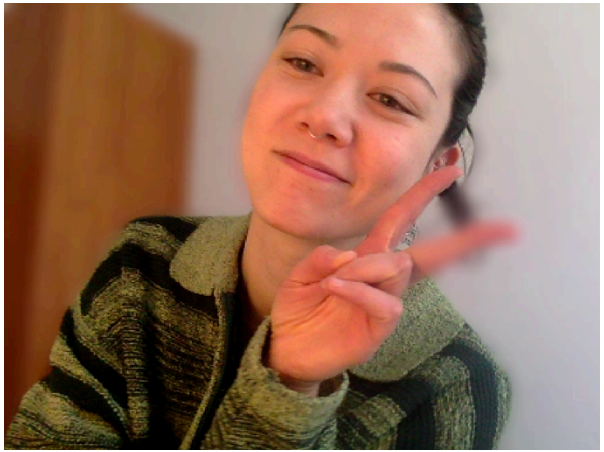
Photo source: https://www.gartenjournal.net/wiese-pflegen

Strategies to Protect Biodiversity in Agricultural Landscapes of Germany

GCM - Strategies for Change and Transformation 03.04.20
Munich Re Foundation

Tinène Belakhdar , Elisabeth Denzel, Cäcilia Hagenow, Violet Henderson, Stefan Träger, Mathilde Wilkens,

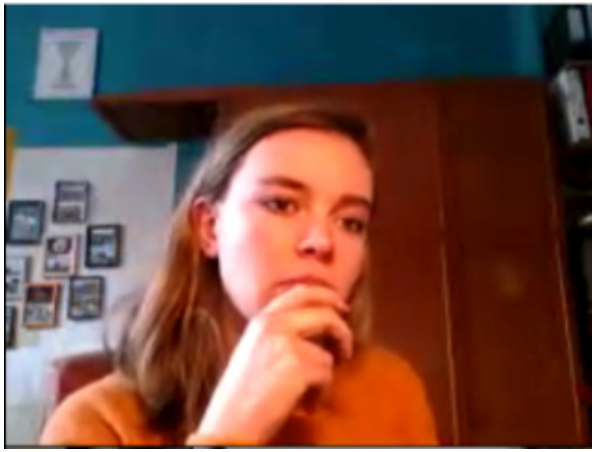
Violet Henderson



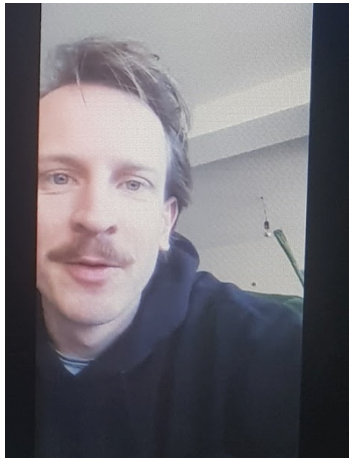
Cäcilia Hagenow

Tinène Belakhdar

Elisabeth Denzel



Mathilde Wilkens



Stefan Träger

Contents

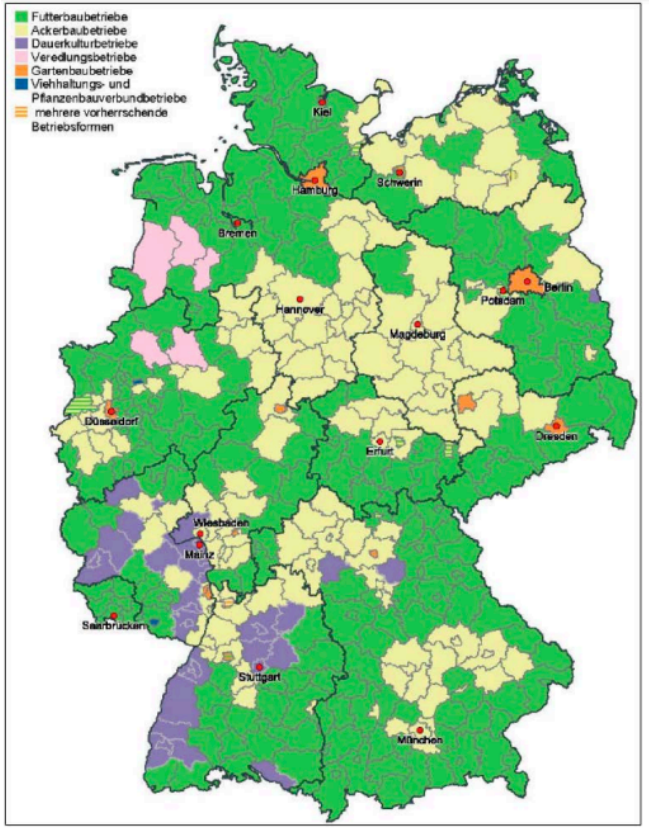
- Biodiversity Loss due to Agriculture (Violet)
- Measures against Biodiversity Loss due to Agriculture (Cäcilia)
- Conventional and ecological farming in regards to biodiversity (Tinène)
- The Biodiversity-Referendum in Bavaria (Elisabeth)
- EU Policies for Protection of Biodiversity (Mathilde)
- Evaluation and critique of measures and policies (Stefan)

Biodiversity Loss due to Agriculture in Germany

- 51% of Germany used for agriculture (1)
  - 60% Feed for livestock (green)
  - 20% Food crops (purple and part yellow)
  - 20% Biofuel (part yellow)

- High losses of plants, insects and birds

- Issue of food security for humans vs biodiversity loss due to agriculture



Source: https://www.umweltbundesamt.de/themen/boden-landwirtschaft/umweltbelastungen-der-landwirtschaft
Diagram: https://www.umweltbundesamt.de/sites/default/files/medien/378/publikationen/texte_28_2015_umweltprobleme_der_landwirtschaft.pdf

Fragmentation of Landscapes by Agriculture

Forest habitat for amphibians in autumn and winter

The amphibians need to migrate through agricultural fields (and under the road) to the kettle ponds to breed in spring

Photos: Violet Henderson

Grassland loss → Croplands

Losses of/gains in grassland in Germany between 1999 and 2013, by state

very minor (up to 0,5% of the state area)

minor (> 0,5% to 1%)

intermediate (> 1% to 2%)

very large (> 3 % of the state area)

Losses

Gains

No changes in grassland area come under the 'large' category (> 2% to 3%).

Source: TU Dresden 2016; presentation modified; base data: VG250 – Federal Agency for Carthography and Geodesy, analysis of Federal Statistical Office and Bundesländer Statistical Offices 2014 farm structure survey (agricultural land)

Data as of: 12/2015

- More than half of all plant species in Germany rely on grasslands
- Between 2003 and 2018 there was a 5% decrease of grasslands in Germany - biofuel being a key factor

Photo source: https://www.eea.europa.eu/highlights/populations-of-grassland-butterflies-decline/european-grassland-butterfly-indicator-pictures/flower-rich-semi-natural-grasslands/view
Source:https://www.bfn.de/en/activities/agriculture/grassland-conservation-in-germany.html
Diagram source: https://www.bfn.de/en/service/facts-and-figures/the-utilisation-of-nature/agriculture/loss-of-valuable-grassland.html

Intensive Agricultural Practices

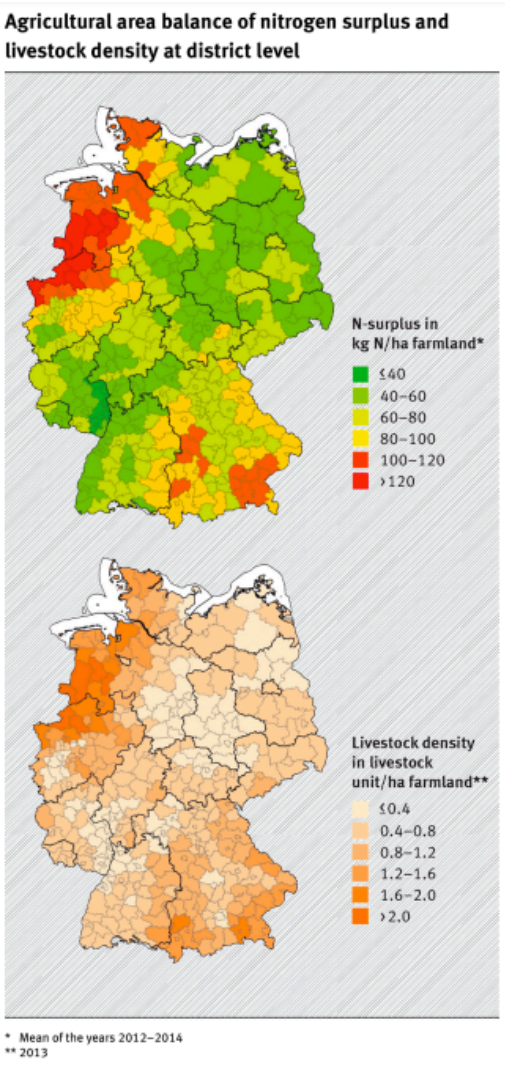
- Monoculture - lack of diversity of habitats
- Conventional ploughing and heavy machinery - disrupts and compacts soil
- Drainage and irrigation
- Use of Pesticides and Artificial Fertilisers

Photo source: https://geneticliteracyproject.org/2018/01/19/no-set-date-end-glyphosate-herbicide-use-germany-says-agriculture-minister/

Agricultural runoff

- Excess fertiliser use for crops and excess manure from livestock
- In Germany, agricultural nitrogen surpluses are regionally different
  - high livestock density are particularly problematic i.e. north-western Germany
- Agricultural runoff leads to polluted groundwater and surface waters → eutrophication → biodiversity loss in water based ecosystems

(Souce: https://www.umweltbundesamt.de/sites/default/files/medien/421/publikationen/180608_uba_fl_umwelt_und_landwirtschaft_engl_bf_neu.pdf)



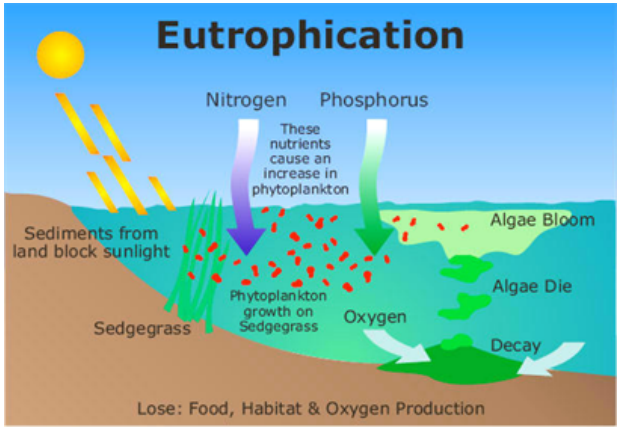
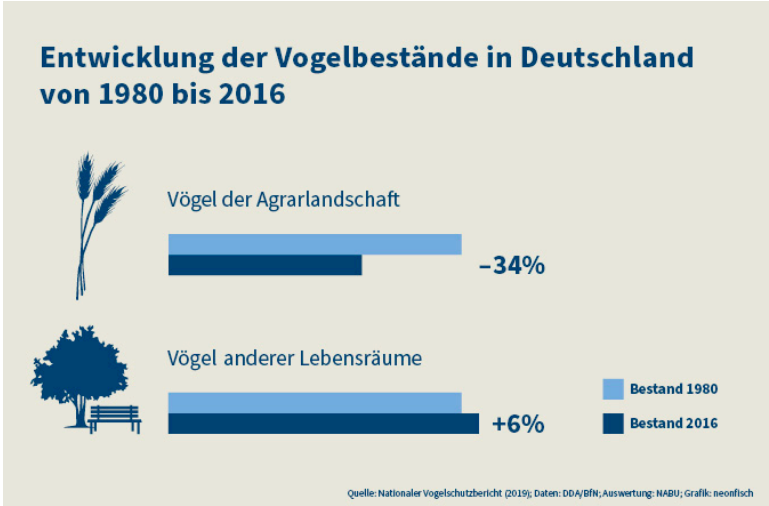
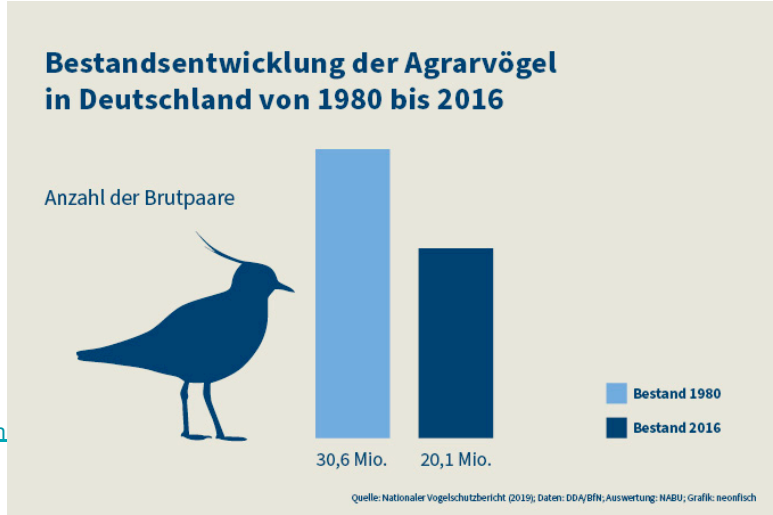


Diagram source: https://onlinesciencenotes.com/eutrophication-causes-effects-and-controlling-measures/
Photo source: https://www.conserve-energy-future.com/causes-effects-and-solutions-to-eutrophication.php

Bird decline

- In Germany there was a loss of 10 million breeding pairs of birds from agricultural landscapes (meadows, fields and pastures) between 1980 and 2016 (1)
- Main cause of the decline of birds is intensive agriculture:
  - Loss of habitat (bushes, hedges and tree loss, monoculture)
  - Loss food supply (both insects and wild plants) (2)
- 60% of birds are insectivorous → decline of insects = decline of birds (3)

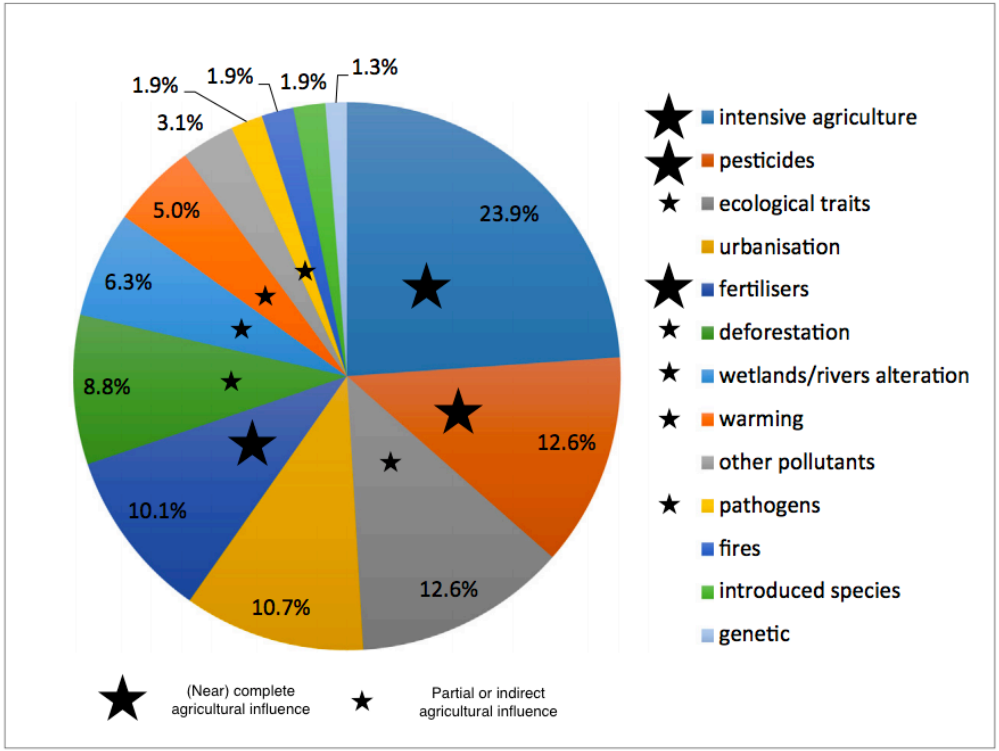




Source (1): https://www.dda-web.de/downloads/publications/statusreports/statusreport_uebersichten_bestandssituation
Source (2): https://www.nabu.de/news/2019/12/27405.html
Source (3) : https://www.annualreviews.org/doi/10.1146/annurev.es.02.110171.001141
Diagram source: https://www.nabu.de/tiere-und-pflanzen/voegel/gefaehrdungen/27503.html

Insect decline

- More than 75% decline of insects in Germany between 1989 and 2016 (1)
- Many of the drivers of insect decline are directly or in part due to agriculture
- Devastating for biodiversity
    - Insects are the structural and functional base of many of the world's ecosystems (2)
- Interestingly, aquatic insect communities remain stable or show lesser declines in pristine mountain streams and lakes (2)
- insect decline → less pollinators → **agriculture less resilient**



Source (1) : https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0185809&type=printable
Source (2) : https://www.sciencedirect.com/science/article/abs/pii/S0006320718313636?via%3Dihub

Direct Measures

- Organic Farming
- Cropland Measures
  - Diverse crop rotation, less intensive tillage, drill gaps, field weed protection, clover grass base, unmown clover grass strips, fallow land and flower strips
- Grassland Measures
  - Securing of permanent grassland, no/less rolling / dragging, no/less fertilization, longer resting time, and partial areas with late use
- Landscape elements
  - Hedges with hems, small water bodies, amphibian strips in fields, bird habitats in stables

sources:
https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/Handbuch-Landwirtschaft-fuer-Artenvielfalt.pdf
https://www.landwirtschaft-artenvielfalt.de/das-projekt/
https://www.ecosia.org/images?q=Biodiversit%C3%A4t+in+AgrarlandschFTEN#id=B17A75175C2AB39090AAA661464599E48BA329B6

What would be needed to implement these Measures?

- The profitability of the farm may not be harmed
- Continuity of the programs
- Flexibility in dates for field activities, measurements and the general shaping of the measure
- Goals and successes of the measures need to be strongly communicated by consultants and in public relations activities.
- The improvement of the image of the own farm and agriculture in general

F.R.A.N.Z.-Studie

– Hindernisse und Perspektiven für mehr Biodiversität in der Agrarlandschaft –

Effectiveness and Cost

- Loss of revenue as the most important point

  → Measures have to provide max. benefit for targeted species to a min. price

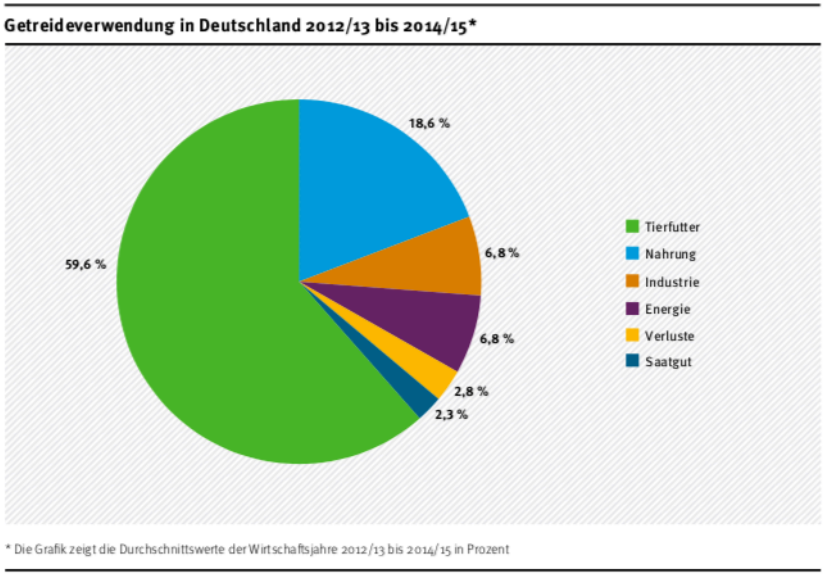
  → Different Evaluations Systems that compare price and benefit

  → political decision how to implement/fund the measures

Source: https://www.franz-projekt.de/forschung/sozio-oekonomische-begleitforschung
Picture: https://science.rmtmo.eu/de/neues/oekologie-und-oekonomie-zusammenbringen-zweite-foerderrunde-im-forschungsprogramm-biooekonomie-baden-wuerttemberg/

Indirect Measures

- Reducing pressure on agricultural land
  - Couple amount of Livestock to Land
  - Using less land for plants for Energy production

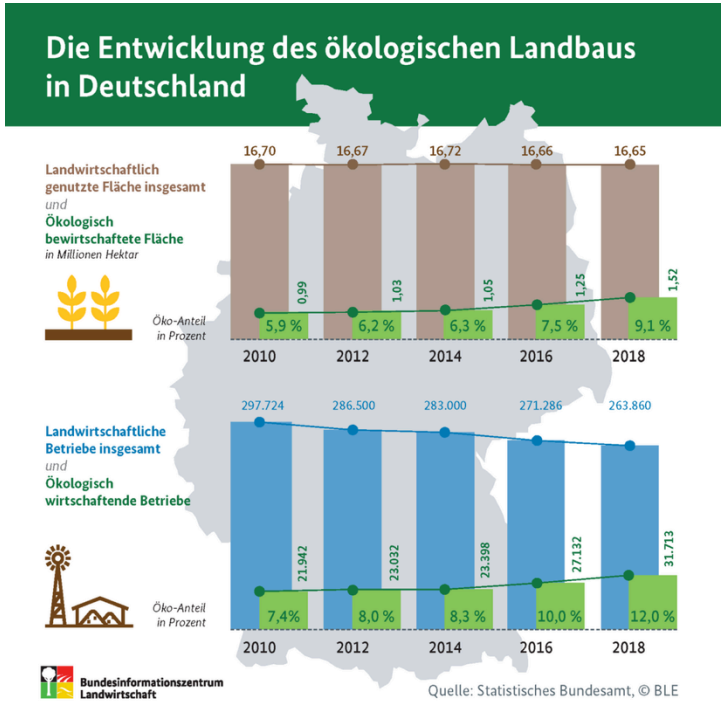


Source: UBA (2018): Daten zur Umwelt 2018 - Umwelt und Landwirtschaft

Conventional and ecological farming in regards to biodiversity

Research has shown that that ecological agriculture contributes to the long-term conservation of soil, water and air, and to the protection of wild plant and animal species habitats and their genetic diversity (Mander, 1999)

Question:
Is ecological/organic farming actually more beneficial than conventional farming in regards to biodiversity gains?

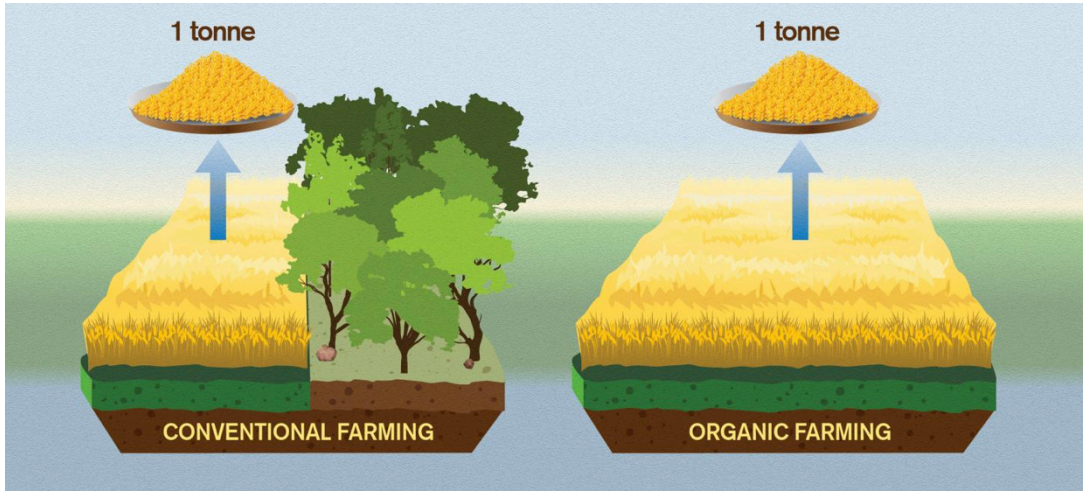


Source:https://www.landwirtschaft.de/landwirtschaft-verstehen/haetten-sies-gewusst/infografiken

Mander, Ü., Mikk, M., & Külvik, M. (1999). *Ecological and low intensity agriculture as contributors to landscape and biological diversity. Landscape and Urban Planning, 46(1-3), 169–177.* doi:10.1016/s0169-2046(99)00042-0

Environmental impacts of organic agriculture affecting biodiversity

In order to produce the same quantity of food, organic systems require a larger land area (Clark, 2017; Ramakutty, 2012; Gabriel, 2013)



Source: https://www.eurekalert.org/pub_releases/2018-12/cuot-ofw121318.php

Clark, M., & Tilman, D. (2017). Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice. *Environmental Research Letters*.

Ramankutty, N., & Rhemtulla, J. (2012). *Can intensive farming save nature? Frontiers in Ecology and the Environment, 10(9), 455–455.* doi:10.1890/1540-9295-10.9.455

Gabriel et al., 2013: Food production vs. biodiversity: comparing organic and conventional agriculture
Journal of applied ecology
https://doi.org/10.1111/1365-2664.12035

Possible solutions to balance biodiversity and production :

‘Land sharing’:

“wild-life friendly”

low intensity agriculture

‘Land sparing’

subdivision of agricultural and biodiversity areas

high intensity agriculture

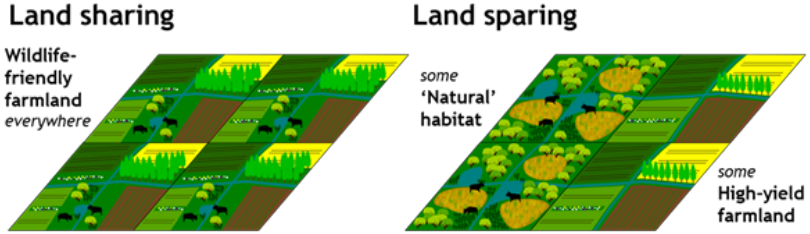
(Gabriel, 2013)

Halving the land use difference by:

increasing nutrient application

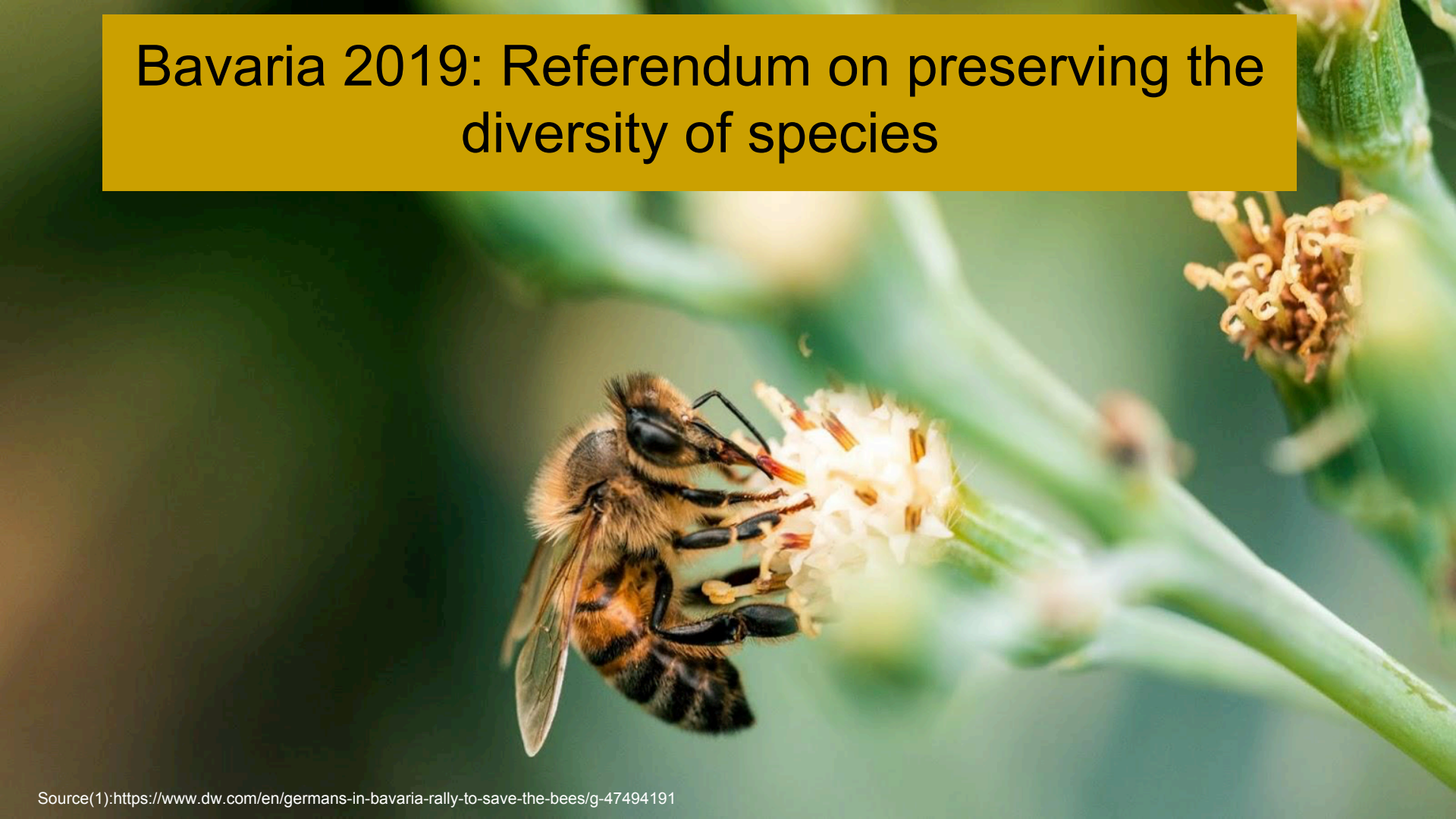
techniques such as rotational farming, cover cropping, multi-cropping, and polyculture

(Clark, 2017)



Mitigation strategies against increased production demand:
Reduction in food waste
Improvement in infrastructure and transport
Change in human diet
(Gabriel, 2013)

Bavaria 2019: Referendum on preserving the diversity of species



Source(1):https://www.dw.com/en/germans-in-bavaria-rally-to-save-the-bees/g-47494191

Claims of a Referendum

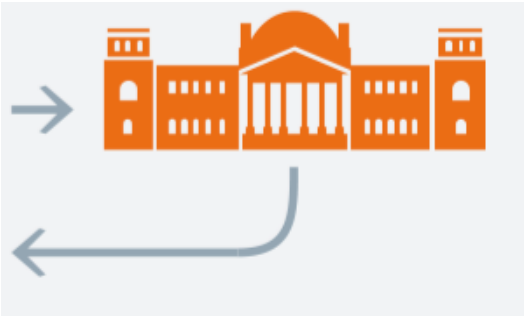
- ➔ Management of at least **20% of agricultural land by 2025 and at least 30% by 2030** with the principles of **organic farming**, as well as the organic management of **public land from 2020**
- ➔ **Creation of a biotope** network covering 13% of the area in open land
- ➔ **Ban on pesticides in nature reserves** and other protected areas
- ➔ Conservation and protection of **forest biodiversity** as a priority objective in state-owned forests
- ➔ ...

Source: https://volksbegehren-artenvielfalt.de/wp-content/uploads/2018/06/Antrag-auf-Zulassung-des-Volksbegehrens-Artenvielfalt.pdf

Procedure of a Referendum

1. Petition for a referendum: 25 000 are obligatory

13.11.2018: 94,700 citizens signated

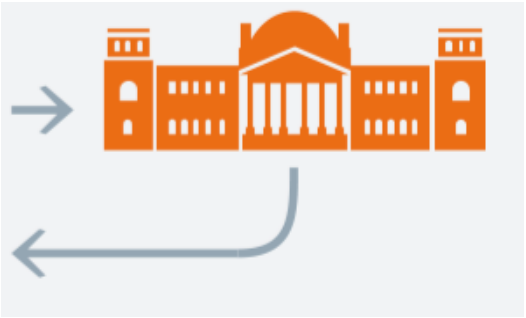


2.) Referendum: 10% Signatures, ca. 1 Mio

13.02.2019: 1.7 Mio signatures were collected (18.4 %)

3.) Bundestag: Majority of voters

17.07.2019: Prime Minister adopted the law by 167 votes in favour, 25 against and five abstentions. Valid since 01.08.2019



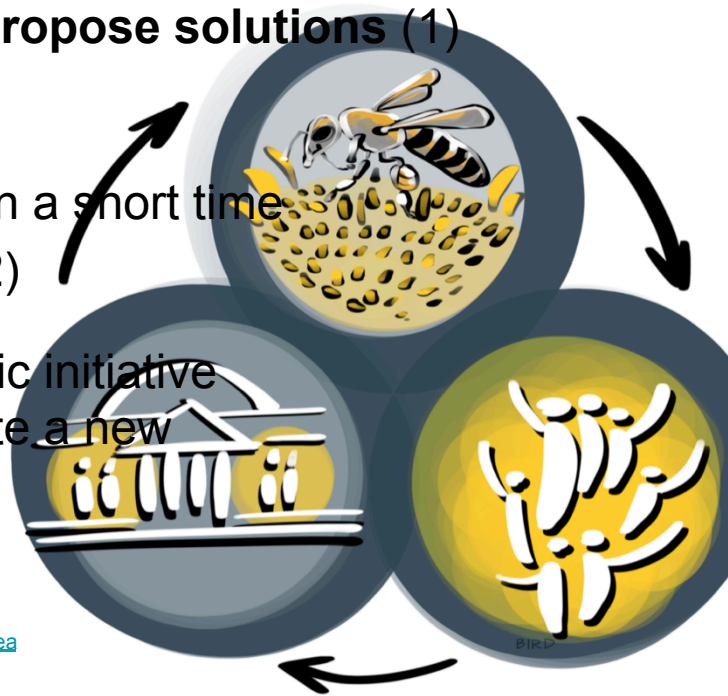
Source(1): https://www.dw.com/en/referenda-a-defense-against-populism/a-36641070

The Power of direct and dialogic Democracy

- ➔ Powerful mechanism for **countering the influence of dominant special interest groups**
- ➔ Purpose is to study **key challenges and then to propose solutions** (1)
- ➔ Imitation effect:

Baden-Württemberg: Open working process led in a short time to a legislative draft about biodiversity protection (2)

Brandenburg: Ongoing process between the public initiative for insect protection and the government is to create a new legal framework for biodiversity (3)



Source(1) https://medium.com/presencing-institute-blog/global-climate-action-ii-the-power-of-direct-democracy-df71d33868ea
Source(2) https://volksbegehren-artenschutz.de
Source(3) https://artenvielfalt-brandenburg.de

Conflict of interest

Initiator: ÖDP(Ecological Democratic Party)
Sponsors: Green Party, LBV

- ➔ Missing financial compensation in the Bavarian environmental programmes
- ➔ Negative effect on the organic market (oversupply)
- ➔ Farmers are presented as culprits

Source: https://www.bayerischerbauernverband.de/themen/landwirtschaft-umwelt/nein-zum-volksbegehren-5600

Critics: Bauernverband (Farmers' Association) or Freie Wähler

Effectiveness and Cost of the Referendum

- ➔ Tool of **articulating and asserting political interests**
- ➔ A possibility for the citizens of a federal state to bring their political will directly into parliament **outside of the elections and fast** (2)

  - but not on European or National Level

- ➔ Costs about 400 000€ (1) - fully borne by the Initiators

Source (1): https://www.sueddeutsche.de/bayern/bayern-volksbegehren-bienen-bilanz-1.4794789
Source (2): https://www.jbn.de/die-jbn/nachrichten/die-jbn-macht-euch-bereit-fuers-volksbegehren-artenvielfalt-heute-wie-wir-ein-gesetz-aendern-wollen-um-die-bienen-zu-retten/
Source (3): https://mw.hdm-stuttgart.de/werbung-und-marktkommunikation/portfolio/rettet-die-bienen/

EU Policies for Protection of Biodiversity

http://sustaineration.com/biodiversity-balanced-scorecard-biodiversitat-strategisch-verankern /

CAP (Common Agricultural Policy) in the EU

- launched in 1962
- currently annually cost: around 58 Billion Euro
- in practice:
  - income support
  - market measures
  - rural development measures

https://iegpolicy.agribusinessintelligence.informa.com/PL217316/Stakeholder-reactions-to-the-new-CAP-proposals-for-202127

(https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en 31.03.2020)

The Two Pillars of CAP

In Germany 80% of budget

In Germany 20% of budget

1st Pillar

Direct Payments if conditions (cross-compliance) fulfilled

per hectar

“Greening”

1) diversifying crops

2) maintaining permanent grassland

3) ecological focus areas on 5 % of the arable land

Röder, Norbert et.al. (2019) Evaluierung der GAP-Reform aus Sicht des Umweltschutzes, Abschlussbericht. Ed. Umweltbundesamt.

2nd Pillar

Support programs for sustainable and ecological management

Decentralized

Divided into 6 priorities:

…4)restoring, preserving and enhancing ecosystems related to agriculture and forestry

https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/rural-development_en

European Agricultural Fund for Rural Development (EAFRD)

-funding instrument for 2nd pillar

-30% of funding to measures for environment and climate change

-in Germany AUKM (Agrarumwelt- und Klimamaßnahmen) and financial support of Ecological Farming

<- most efficient and important for tackling Biodiversity loss currently with local financed projects and measures

(https://www.bmel.de/DE/Landwirtschaft/Foerderung-Agrarsozialpolitik/AgrarUmweltmassnahmen/agrar-umweltmassnahmen_node.html#doc376646bodyText6)

EU Biodiversity Strategy 2011

Protect species and habitats - Target 1
By 2020, the assessments of species and habitats protected by EU nature law show better conservation or a secure status for 100 % more habitats and 50 % more species.

Maintain and restore ecosystems - Target 2
By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

Achieve more sustainable agriculture and forestry - Target 3
By 2020, the conservation of species and habitats depending on or affected by agriculture and forestry, and the provision of their ecosystem services show measurable improvements

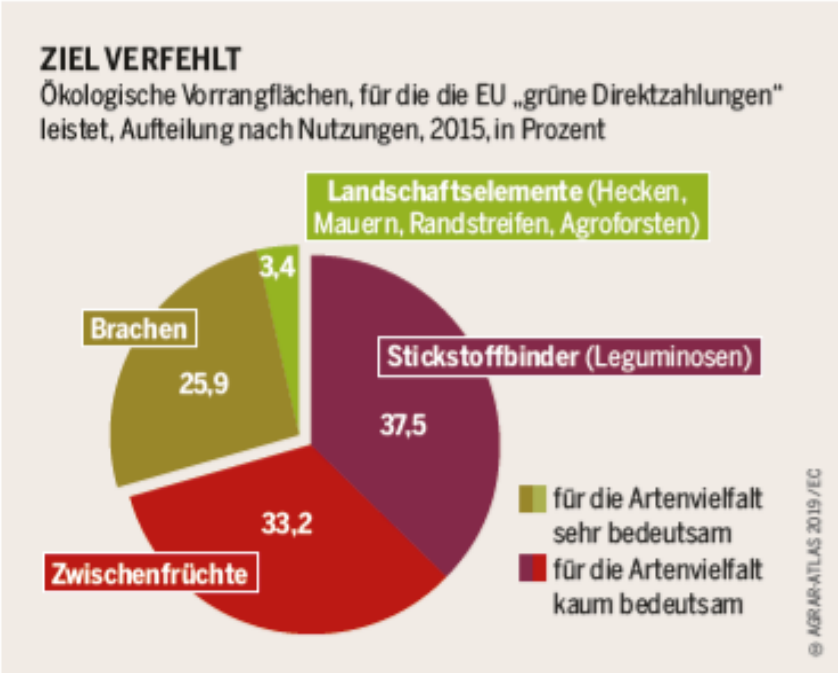
Make fishing more sustainable and seas healthier - Target 4
By 2015, fishing is sustainable. By 2020, fish stocks are healthy and European seas healthier. Fishing has no significant adverse impacts on species and ecosystems.

Combat invasive alien species - Target 5
By 2020, invasive alien species are identified, priority species controlled or eradicated, and pathways managed to prevent new invasive species from disrupting European biodiversity.

Help stop the loss of global biodiversity - Target 6
By 2020, the EU has stepped up its contribution to avert global biodiversity loss.

https://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm (2.4.2020)

Evaluation - Critique - Outlook



(4)

- no measures in policy to reduce pesticides
  → binding of subsidies on abandonment of pesticides?
  → restructuring conventional farming?
- only 1 % of subsidised farms have to be controlled
  → violation gets punished with 5 % less subsidies
- next reform period: more freedom to each nation to distribute subsidies
  → risk of subsidising less or wrong measures
- Planned reform for 2021 → cuts budget from 2nd pillar by 27%
  → massive critique

Research project ‘evaluation of the CAP reform from an environmental perspective’

Summary: measures or instruments good, but administrative effort and total costs very high → little impact → high costs with little or no impact on the trend of declining biodiversity

Unknown: from what area of extensively farmed land / grassland / refuge area on effects will be visible?

example Mecklenburg Vorpommern:

Status quo Oppermann IFAB	Recommendation of Dr. Rainer
2-3 % extensive farming	10 % extensive farming
2-3 % greening	10 % greening
9 % ecological farming	30 % ecological farming
Total 15 %	Total 50 %

→ to see significant effects!

Risk: what if those numbers are reached and there is no effect?
Problem: With even less money more than triple the area of extensive methods - impossible

Recommendations and outlook (expert interviews: Arne Bilau, BUND, EU Förderpolitik / Lukas Locher, hops farmer)

Ultima ratio: stricter policies like radical ban of herbicides -> restricting freedom of farmer
Better: training consciousness of producers and consumers

Training of farmers → interlinking nature and culture, raising awareness of interdependencies
(training of farmers widely still classical and conservative)

- Providing farmers with a stronger market position, better ways of marketing and distribution chains also on EU level / adjusting food regulation policies according to producers and not the industry
- Alleviate conversion to ecological farming methods with subventions and support structures

Training of consumers → raising awareness for products and their origin

- Establishing consciousness for appropriate pricing of products
- Working on image of ‘perfect’ or standardised products
- Opening the mind of the consumer who in the end decides what happens on the fields with consumption decisions
- Thinking in wide context and big picture and not fighting symptoms only → connecting the dots