BIOGEA
Testing BIOdiversity Gain of European Agriculture with CAP greening

CAP Greening: Learning from the Local Level

Case study report:

Tauberbischofsheim, Germany



2019

BIOGEA Project

BIOGEA aims to examine how the implementation of CAP greening measures introduced in the 2014-2020 period impact land use and in turn change Green and Blue Infrastructure (GBI) in the agricultural landscape. Through policy analysis on the EU and national level and biological monitoring and modelling in six case study areas in 3 Member States (Germany, Spain and Bulgaria), the impacts of policy on GBI and GBI on biodiversity are examined.

Funding

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BIOGEA Case study report: Tauber, Germany

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Photo on front cover: Anja Eirich, IFAB 2016

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1. Introduction to BIOGEA project

The BIOGEA project investigates the impact of land use change on the Green and Blue Infrastructure (GBI) in the agricultural landscape. GBI includes landscape structures and habitats, essential for ensuring connectivity between habitats and allowing the movement of species, thus contributing to preserve biodiversity in agricultural landscapes. GBI also provides a range of ecosystem services, which are necessary for meeting environmental policy objectives. Hence, BIOGEA Biogea also aims at analysing how GBI relate to biodiversity and associated ecosystem services.

The research approach is a combination of policy analysis on the EU and national levels and local level implementation as well as biological monitoring and modelling in six case study areas in 3 three Member States (Germany, Spain and Bulgaria). Collaborative work with stakeholders (farmers, advisors, administrators, researchers, experts and NGOs) across scales (EU, national and local) ensured that different opinions and experiences were integrated throughout the project's implementation.

Policy analysis

The policy analysis was carried out both vertically and horizontally: a top-down analysis, from an EU-wide scale to a local scale examining the EU targets for GBI and CAP Greening and their translations into national law. The policy research was based on literature reviews and document analysis at the EU and national levels. Interviews and meetings with EU and national policy experts provided additional views on relevant CAP measures.

Case studies

Targeted case studies were done in six paired intensive/extensive sites in Bulgaria (Plovdiv-Pazardzhik region and Western Stara Planina), Germany (Tauber and Albstadt) and Spain (dry cereals croplands in Castilla-La Mancha and Dehesas in Extremadura).

Biodiversity and GBI monitoring and modelling in case study areas

Biodiversity and habitat (GBI) field surveys were carried out in each case study area in order to evaluate how the implementation of different CAP Greening schemes impact on biodiversity. An area survey approach was used to obtain information at landscape scale on GBI as well as on specific biodiversity parameters. In plots of 500 x 500 m landscape elements were mapped, Key plant species and species groups were recorded via transect walks in arable land and grassland at up to 4 different points. Bird species were recorded at up to 5 points with a point-count method. Generalized linear models (GLM) were used to analyze the relationships between biodiversity (i.e., plant and bird species richness and Shannon's diversity index of birds) and habitat metrics across plots within each study region. Additionally, we used historical imagery to map changes on GBI occurrence in LTS from 2012 to 2018.

Analysis of CAP Greening implementation in case study areas

The local level implementation of CAP Greening scheme was analysed in participatory manner by involving farmers and local experts, farm advisors, and decision makers. Two structured questionnaires (containing both open and closed questions) were developed for farmers and local stakeholders in each case study area. The questionnaires had similar structure and content to allow comparison between farmers' and stakeholders' results. Their experiences and views on changes in local land use practices and impacts of the CAP on green and blue infrastructure are integrated throughout this case study report.

Tauber is the semi-intensive land use case study area in Germany under the BIOGEA project. Case study agriculture and policy data for and from the region was collected in the period April – May 2018. Biodiversity data was collected in the period May 2017 and April to mid-June 2018.

Meetings and interviews with local farmers, administrators, advisers and NGOs' representatives in Tauber were organised in the period June – August 2018. A stakeholders' round-table to discuss the preliminary findings of the two German case studies was organized in October 2018. The current report systemizes the findings and conclusions from these activities.

- **Interviewed stakeholders**

The local stakeholders and experts were interviewed in the period 11 June – 23 July 2018. Thirteen local stakeholders represent the diversity of local institutions and non-public organisations: local/regional agriculture authorities (n=2), local/regional environmental authorities (n=4), farm advisors (n=1), farmers' organisations (n=2), local environmental NGOs (n=2) and local expert (n=2).

- **Interviewed farmers**

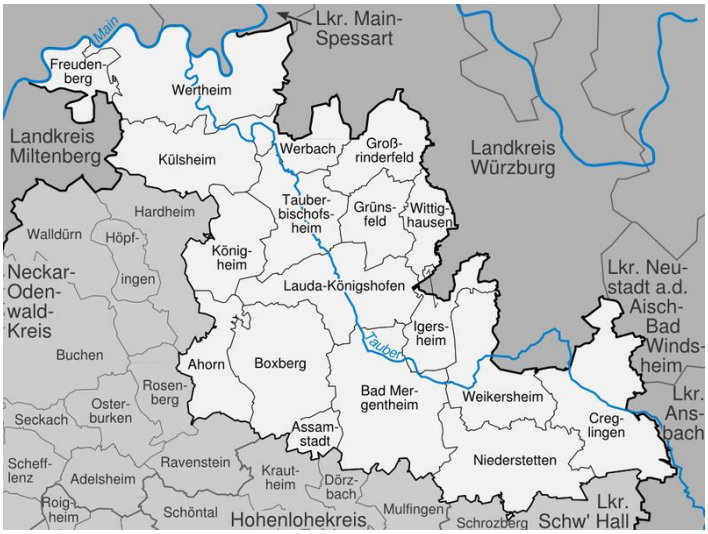
Sixteen farmers were interviewed in the period 13 June – 14 August 2018. Ten farmers are in arable farming with varying farm sizes – one in the group 10-30 ha, six in the group 30-100ha, and three with over 100 ha of land. The other interviewed farmers are two each in mixed farming, livestock farming and perennial crops. Their farm size is over 100 ha of land.

2. Tauber case study area

The case study region Tauberbischofsheim is located in the south of Germany, in the federal state of Baden-Württemberg (NUTS level 1). It encompasses two distinct NUTS 3 areas: Main-Tauber-Kreis and Neckar-Odenwald-Kreis ("Landkreise" or districts). The case study area is located in the environmental unit "Tauberland", an area characterized through the river Tauber.



Neckar-Odenwald-Kreis



Main-Tauber-Kreis

Figures 1 and 2. Location of the case study areas

The total area of the case study region is 2,430 km^2, with an average population density of 113 people/sq.km. There are 45 municipalities and seven cities with population above 10,000 inhabitants. In the Main-Tauber-Kreis only 1% of the population still works in the agricultural or forestry sector.

Table 1. Main characteristics of the case study area

NUTS 3 area *(districts = Landkreise)*	**Area (sq.km)**	**Population (numbers)**	**Population density (people/sq.km)**
Main-Tauber-Kreis	1,304	132,274	101
Neckar-Odenwald-Kreis	1,126	143,278	127
Total	**2,430**	**275,552**	**113**

Data source: [1] Statistisches Bundesamt – Anzahl der Einwohner in den Kommunen am 31. Dezember 2016

The altitude of the area Taubersbischofheim ranges mostly from 168 m to 372 m a.s.l.. The climate is typically humid with more precipitation than evapotranspiration. The mean annual temperature is 9.8°C. The annual rainfall amounts to around 580 mm, with the driest month February and the wettest month June. The average slope ranges between flat in the river

valley (< 3°) up to 12° at the edges of the valley. The characteristic soil types are Rendzina with Loess, very fertile and useful for crop cultivation.

The main land use in the case study area based on CORINE Land Cover is agriculture (57.8%), followed by forests (36.2%). Natural grasslands, and wetlands and water bodies, cover 0.2% each. The artificial surfaces represent 5.6% (Figure 3).

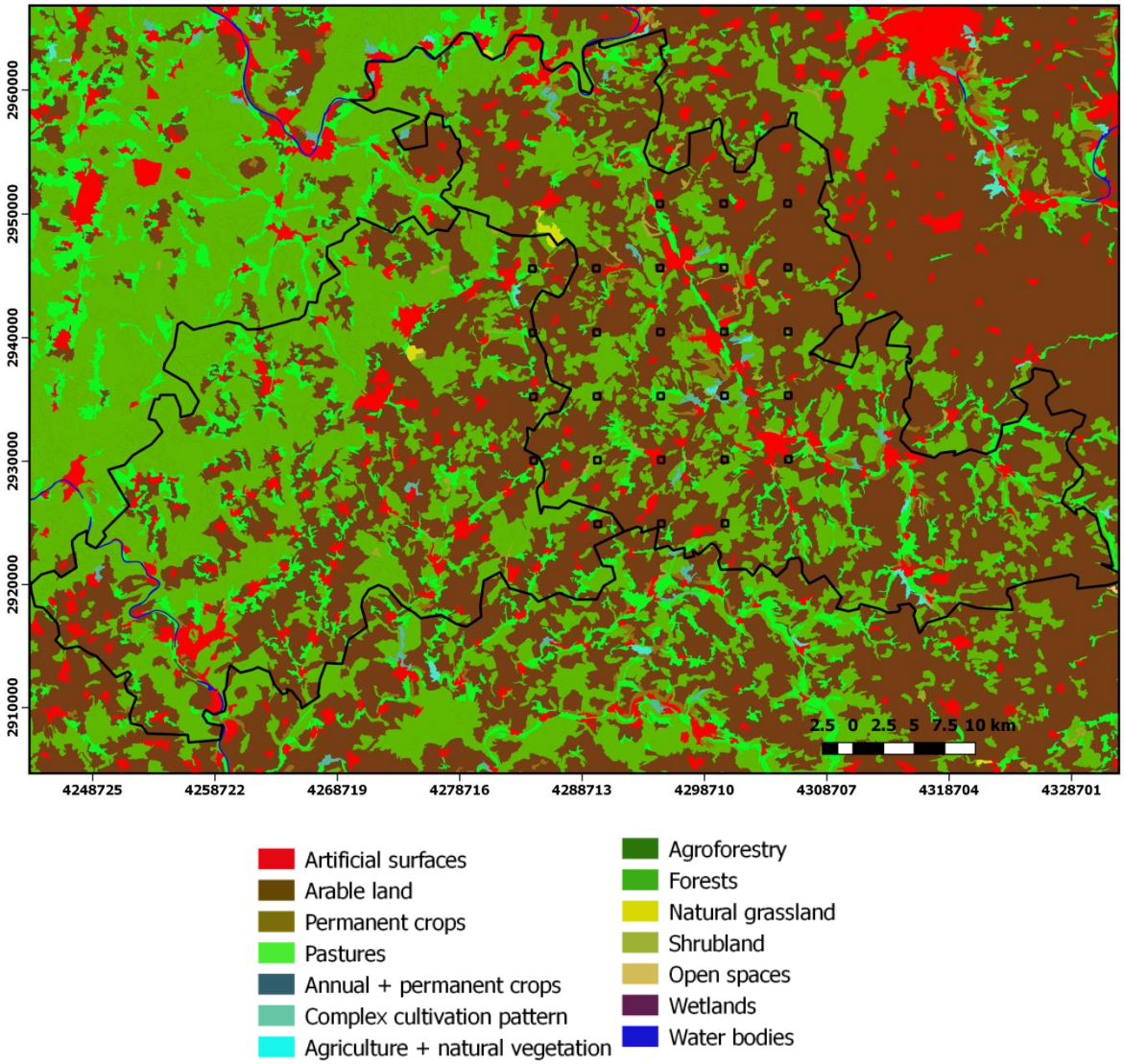


Figure 3. Location of Tauberbischofsheim (DE4) study plots and CORINE land cover categories

2.1. Agriculture land use

The utilised agricultural area (UAA) was 114,561 ha in 2016 (Table 1). Arable land is the major agriculture land use (81.2%), followed by permanent pastures (17.1%). Permanent crops have a minor share of 1.6%. In areas with fertile soils, agriculture has been quite intensive. The main cultures are wheat, sugar beet and potatoes. The poorer soils at the steeper slopes in the valley of the river Tauber are used for wine production. Some of the areas are today also cultivated with fruit trees. Areas with steeper slopes that would be prone to erosion if used for arable crops as well as the seasonally wet parts in the river valley are cultivated as grassland, mainly for hay and silage production.

Table 2. Agriculture land use types in Tauber case study area (2016)

Land use types	UAA (ha)	Share in total UAA (%)
Arable land	93,047	81.2
Permanent crops	1,881	1.6
Permanent pastures	19,611	17.1
Total	**114,561**	**100**

Source: Agriculture statistics

The CORINE Land Cover data for 2012 provides comparable distribution of the agriculture land in the case study area. Arable land covers 84.6% and pastures and natural grasslands cover 13.0% (Table 2, and Figure 3). Permanent crops cover 1.4%. The share of heterogenous agricultural area is very small (1.0%), formed by mosaic cultivation patterns and land principally occupied by agriculture.

Table 3. Agriculture land cover in Tauber case study area

Land use types	Share in all agriculture land (%)
Arable land	84.6
Permanent crops	1.4
Pastures	13.0
Heterogeneous agriculture areas	1.0
Total	**100**

Source: CORINE Land Cover, 2012

2.2. Farms and farming systems

The total number of farms in Tauber case study area was 2,185 in 2016 (Table 4). The dominant farming system is arable farming, followed by mixed farming, and perennial crops (Table 5).

Interpreting the data from a CAP Greening scheme perspective, the farms considered green-by-definition due to their farm size (up to 10 ha) irrespective of the farming system are 22.1% but manage only 2.1% of the agriculture land. Thus, the majority of farms (77.9%) and almost

all agriculture land (97.9%) have to respect the Greening requirements from farm size perspective.

Table 4. Farms and agricultural land per farm size in the case study area

Farm size	Number		Area (ha)	
	(no.)	(%)	(ha)	(%)
Up to 5 ha	209	9.6	329	0.3
5.1 - 10 ha	274	12.5	2,031	1.8
10.1 - 20 ha	404	18.5	6,061	5.3
20.1 - 50 ha	569	26.0	18,930	16.5
50.1 - 100 ha	395	18.1	28,411	24.8
Over 100 ha	334	15.3	58,799	51.3
Total	**2,185**	**100.0**	**114,561**	**100.0**

Source: Agriculture statistics

Table 5. Farms per farming system in Tauber case study area (2016)

Farming systems	Main-Tauber-Kreis	Neckar-Odenwald-Kreis	Total in CS area	
	(no.)	(no.)	(no.)	(%)
Arable farming[a]	668	359	1,027	47%
Horticulture[a]	8	9	17	1%
Perennial crops[a]	175	57	232	11%
Forage farms[a]	173	217	390	18%
Enrichment farming[a]	88	22	110	5%
Horticulture[b]	30	9	39	2%
Livestock farming[b]	32	9	41	2%
Mixed farming[b]	181	148	329	15%
Total	**1,355**	**830**	**2,185**	

[a] *Specialized farm: more than 2/3 of outputs are obtained through focusing on one output.*

[b] *'Verbundbetrieb': Main output of the production focus is less than 2/3 of the output, but more than 1/3.*

Source: Agriculture statistics[1]

2.3. Farming systems intensity

The information about the input and use of mineral and organic fertilizers in the case study area shows that in Main-Tauber-Kreis it is 97.3 kg/ha, and in Neckar-Odenwald-Kreis – 95.8 kg/ha (2008-2011)[2]. Both are above the national average of 93 kg/ha (2009-2010).

[1] https://www.statistik-bw.de/Service/Veroeff/Statistische_Berichte/346516001.pdf

[2] http://www.fachdokumente.lubw.baden-wuerttemberg.de/servlet/is/114102/U75-S7-N11.pdf?command=downloadContent&filename=U75-S7-N11.pdf

The livestock density was 0,39 LU/ha in Main-Tauber-Kreis and 0,48 LU/ha in Neckar-Odenwald-Kreis in 2016[3].

3. Characteristics of the Green and Blue infrastructure in Tauber

3.1. Green Infrastructure policy in Germany

Germany has a national concept for Green Infrastructure (Bundeskonzept Grüne Infrastruktur). It aims at implementing the EU-concept for GI, substantiating the national strategy for biodiversity and at providing guidance for planners and other stakeholders. It does not contain any specific actions related to farmland. Instead, it focuses on existing protected areas, floodplain landscapes, and peatland soils. Therefore, agriculture is only indirectly affected by this concept.

There is no information about mapping of GBI elements and features in Tauber case study area.

3.2. Biodiversity designations and management requirements in Tauber

Tauber hosts a number of protected areas, including Natura 2000 sites, nature reserves and a nature park (Table 6).

Table 6. Protected areas in Tauber

Type of protected areas	Units	Neckar-Odenwald	Main-Tauber	Total in CS area	% of CS area
Nature protection areas	Nr	27	36	63	
	Area (ha)	1,069.89 (0,95%)	1,093.85 (0.84%)	2,163.74 ha	0.9 %
SAC/SPA areas	Nr	11	12	20	
	Area (ha)	9,926.74 (8,81%)	10,987.1 (8,43%)	20,913.84 ha	7.37 %
Nature park	Nr	1	0	1	
	Area (ha)	73,218.75 (65,01%)	0	73,218.75	30.3 %

Natura 2000 network

There are 19 Natura 2000 sites in the region, and almost all of them have management plans. The SAC areas are very small-scaled with a mosaic of different habitat types and agricultural activities.

Farming related requirements in the Natura 2000 management plans

[3] https://www.regionalstatistik.de/genesis/online/data;jsessionid=3AF5C6485B4818C9B122ED04B6B85981.reg2?operation=statistikAbruftabellen&levelindex=0&levelid=1525441362433&index=3

The Natura 2000 areas cover agriculture land comprised of grasslands and orchards as well as arable land. In many cases, habitat conservation depends on agricultural practices (eg specific grazing practices to manage the *Wacholderheiden*, Juniper heathland).

The management requirements related to agriculture land are multiple depending on the habitat and the protected site. Examples of management requirements are the number and timing of mowing activities, grazing activities, grazing with different species, management of trees in line, etc. They underline the need either not to intensify grazing or in some cases to re-introduce grazing after preparation of the area (e.g. cutting of trees if a meadow is to be rehabilitated).

The permanent grasslands in Natura 2000 Special Conservation Areas are defined as environmentally sensitive grasslands.

Moreover, Baden-Württemberg supports specific habitats, e.g. juniper heaths and mountain hay meadows, through their support programme 'Landschaftspflegerichtlinie (LPR)' (Directive on countryside conservation) financed from EU, national and regional funds. Voluntary contracts with farmers are a common measure to protect sensitive habitats in the agricultural landscape ("Vertragsnaturschutz").

3.3. Water designations and management requirements

- **River-basin management plans**

The case study area falls within the boundaries of Rhine river basin, thus the territory is managed following the requirements of Rhine river basin management plan. Some of the major issues related to agriculture concern nitrate pollution and other nutrients' emissions.

- **Flood-risk maps**

The flood risk area of the River Neckar[4] is mapped and there is a corresponding management plan. Guidance and trainings for an adapted agricultural activity in flood risk areas is developed at Baden-Württemberg level and is disseminated at regional and local level. Activities on soils with specific erosion potential (based on existing soil maps with various erosion-potential-status) need to comply with good practice standards. The implementation and compliance is controlled within the framework of cross-compliance by the local agricultural authorities.

- **Nitrate vulnerable zones**

There are 2,300 water protection areas in Baden-Württemberg covering 950,000 ha. They are protected by the water regulation "protection and compensation directive" (in German "Schutzgebiets- und Ausgleichsverordnung" SchALVO). Depending on the protection status of each area, there are different requirements for the agricultural sector. Some areas that are most problematic regarding nitrates and pesticides are declared as "problem areas for nitrates or pesticides". Stricter requirements are applied on them.

[4] https://www.hochwasser.baden-wuerttemberg.de/documents/43970/44031/HWRMP_Neckar_24112015.pdf

The management requirements are described in detail in the regulation ("protection and compensation directive – SchALVO[5]). Farmers can get financial compensation where their agricultural activities are impacted beyond the "normal" level of a sustainable/good practice[6] agriculture and if their income is consequently reduced.

The following water protection zones are defined:

- Zone I: mown grassland, mown grass should be transported away, no pesticides, no fertilizers (mineral fertilizer only in some cases)
- Zone II: no animal fertilizers, no manure, grazing should be only allowed where the cattle size and grazing duration are adapted to the fodder capacities of the area and the cattle drinking trough are regularly moved from one place to another.
- Zone II and III: no changes of land use (apart from plantation of orchards if adapted to the territory and not substantial area), no pesticides containing Terbuthylazin or Tolylfluanid, obligation to adapt any agricultural activity in order to reduce nitrate leaching/washing.
- Problematic areas for nitrates: additionally, all year round grass cover is mandatory, adapt any activities impacting soil and ground water percolation (such as tillage, irrigation) so as to avoid nitrate leaching, adapt the crop diversification to avoid nitrate leaching especially in autumn. Precise guidelines are elaborated on various aspects for different types of crops and season in the annex of the regulation.

There are 30 nitrate problem areas in the Tauber case study area - three in the district Neckar-Odenwald and 27 in the district of Main-Tauber.

More generally about policy process on nitrate pollution reduction: Driven by the alarming situation concerning nitrate pollution in Baden-Württemmberg, the state of Baden-Württemberg started a so-called "nitrate and ecological transformation"[7]. In the end of 2017 the decision to adopt a regional (at level of Baden-Württemberg) nitrate strategy was taken. Currently the nitrate surplus is around 100 kg/ha/year: it should be reduced in order to achieve less than 50 kg/ha/year. Targets: less fertilizers, higher nitrate efficiency, less phosphate and less pesticides.

3.4. Climate mitigation and/or adaptation measures

There is a regional adaptation strategy in Baden-Württemberg. It can support various measures[8] e.g. cities but also businesses, including training and information, studies of vulnerability and concrete mitigation measures.

At the case study area level, no specific mention of action plans on climate and/or energy can be found, and no concrete measures or points that could be relevant especially for agriculture.

[5] http://www.landesrecht-bw.de/jportal/?quelle=jlink&query=WasSchAusglV+BW&psml=bsbawueprod.psml&max=true&aiz=true

[6] "ordnungsgemäße Landwirtschaft" – this terminology is not well defined at a regulatory level and very probably subject to interpretation

[7] http://www.fachdokumente.lubw.baden-wuerttemberg.de/servlet/is/124541/?COMMAND=DisplayBericht&FIS=91063&OBJECT=124541&MODE=METADATA

[8] At regional level https://um.baden-wuerttemberg.de/index.php?id=14055

3.5. Green and Blue infrastructure assessment in BIOGEA project

The Tauber case study area in Germany has a low presence of varied Green and Blue Infrastructure (GBI) elements and features[9]. The main connectivity GBI elements comprise woody strips (hedges) and, especially, grassy strips, and ditches were also present. Main in-field elements were N-fixing crops followed by perennial crops, fallow and agroforestry. Solitary trees and groups of trees and field copses are abundant, as well as forest patches and permanent pastures and grassland.

3.5.1. Biodiversity assessment

The preliminary results of the modelling[10] of GBI-biodiversity relationships in the case study area provide the following highlights:

- Tree groups were positively correlated to overall and steppe bird diversity, but negatively to plant species richness.
- Number of isolated trees, in contrast, benefitted plant species richness and, marginally, threatened bird species.
- Grassland and cereal crops affected negatively plant species richness, but benefitted steppe birds and, in the case of cereals, also threatened farmland birds.
- Other herbaceous crops also benefitted steppe and threatened farmland bird species, but resulted detrimental for overall and threatened bird species, as well as for plant richness.
- Fallow land benefitted the diversity of steppe, farmland, threatened and threatened farmland birds.
- Mean size of herbaceous crops was negatively correlated to the diversity of steppe birds and, marginally, to overall bird species, so that field size reduction would benefit these groups of birds.
- Grassy strips benefitted steppe and threatened farmland bird species, while woody strips (i.e., hedges) benefitted overall bird and plant diversity.

The results of the biodiversity-GBI modeling relationships are somewhat coincident with studies carried out in central European farmland: positive effects of woody traits (isolated

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[9] Pardo, A.; Rolo, V.; Concepción, E.D.; Díaz, M.; Aneva, I.; Lukanov, S.; Oppermann, R.; Schraml, A.; Ullrich, B.; Moreno, G. 2019. Farmland biodiversity across diverse European agricultural systems: assessing the effect of Green and Blue Infrastructure. 1st Iberian Meeting on Agroecological Research, Évora, November 2018. https://www.biogea-project.eu/biogea-findings-presented-1st-iberian-meeting-agroecological-research-ibagreco

[10] Concepción, E.D.; Aneva, I.; Lukanov, S.; Moreno, G.; Oppermann, R.; Pardo, A.; Rolo, V.; Schraml, A.; Ullrich, B.; Díaz, M. 2019. Green and blue infrastructure and farmland biodiversity: Optimizing CAP greening as conservation tool. Oral presentation. 1st Meeting of the Iberian Ecological Society & XIV AEET Meeting. Ecology an integrative science in the Anthropocene. 4-7 February, Barcelona, Spain.https://www.biogea-project.eu/biogea-presentation-green-and-blue-infrastructure-and-farmland-biodiversity-optimizing-cap-greening

trees, hedges, etc.) on overall diversity, which is dominated by forest or ecotonic species, and need for open low-intensity uses such as grassland and fallow for endangered farmland and threatened species. On these basis, the most potentially valuable "greening" options are promoting fallow land, cereal crops and grassy strips to favour more specialist and threatened farmland birds, and maintenance of woody strips and grassland to support plant richness[11].

3.5.2. Assessment of stakeholders' and farmers' awareness on GBI

The BIOGEA project assessed stakeholders and farmers' awareness about the terminology "green and blue infrastructure". During the interviews, stakeholders and farmers were first asked about the term. When they stated their level of awareness, the definition was presented and examples were provided. After that respondents were asked about the recognition of the presence of GBI elements and features in the region (by stakeholders) or on farms (by farmers); as well as the knowledge about appropriate management practices for the GBI elements and features.

- **Awareness about the terminology "green and blue infrastructure"**

Overall, the awareness about the GBI terminology among the interviewed stakeholders (N=13) and farmers (N=16) was low (Figures 4 and 5).

Only one farmer (out of 16) was definitely aware about the terminology of GBI, coming from a livestock farming system. Among stakeholders, there were two definitely aware (both of them experts in the field) and two aware to some extent (one each from local agriculture and environmental authorities).

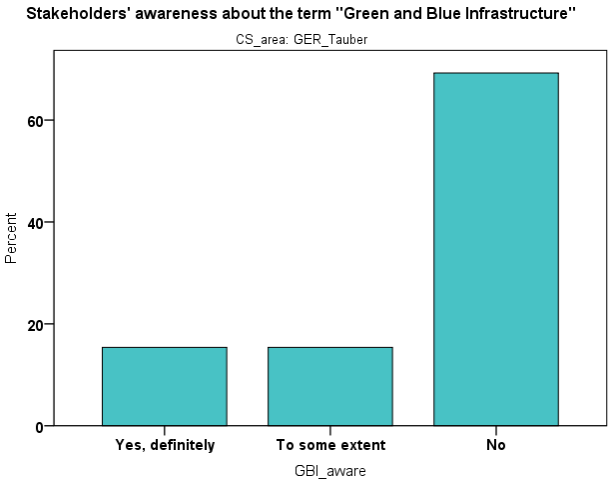


Figure 4. Stakeholders' awareness of GBI (N=13)

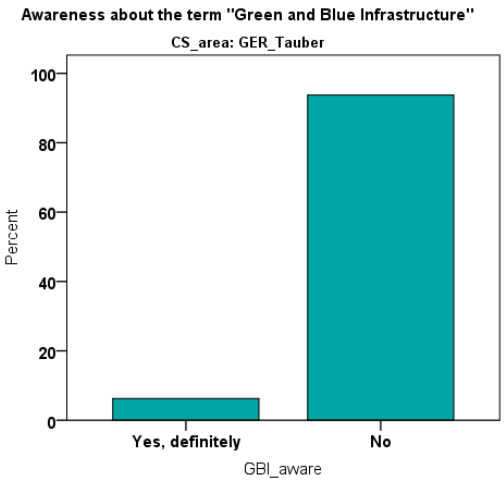


Figure 5. Farmers' awareness of GBI (N=16)

[11] Concepción, E.D., Aneva, I., Jay, M., Lukanov, S., Marsden, K., Moreno, G., Oppermann, R., Pardo, A., Piskol, S., Rolo, V., Schraml, A. y Díaz, M. 2019. Optimizing biodiversity gain of European agriculture through regional targeting and adaptive management of conservation tools. Biological Conservation, submitted

- **Recognition of the presence of GBI elements and features in the region by stakeholders**

Despite the low level of awareness about GBI terminology, when the specific elements and features were named, stakeholders recognised between 15 and 20 (mean value of 18) GBI in the case study area as a whole. All interviewed stakeholders indicated the presence of traditional stonewalls, individual trees, trees in line, groups of trees, permanent grasslands and pastures, orchards, field margins, buffer strips and strips along forest edges, land laying fallow, hedges and wooded strips, areas with catch crops and green cover, and areas with nitrogen fixing crops.

- **Recognition of the presence of GBI elements and features on farms by farmers**

The interviewed farmers (N=16) identified between 1 and 15 (mean value 9) GBI elements and features on their farms. Most interviewed farmers (88%, n=14) had isolated trees on their farms. Over 75% of respondents (n=12) stated the presence of permanent grasslands and pastures, areas with catch crops and green cover, trees in groups and field corpses and hedges and wooded strips. Five farmers had traditional stonewalls and three have terraces.

- **Farmers' knowledge about appropriate management practices of GBI elements and features from environmental point of view.**

Farmers' perspectives. Ten of the interviewed farmers (N=16) were definite that they were aware about the management of GBI elements and features from environmental perspective. Three farmers responded they were aware to some extent and one stated that he was not aware. Two did not answer the question.

The examples provided referred to cutting of hedges to prevent them from growing on productive fields. The practices, however, differed significantly. One farmer explained that he "cut them back by 10% every 10 years". Another farmer said, "I cut back my hedges and trees every 1-3 years, rose hips more frequently". All of them referred to the time slot, when it was allowed to do maintenance work on hedges and trees. Some maintained the buffer strips and grass under the trees/orchards by mowers, others by hand. Some referred to alternating fields that are mown, especially on "pastures that were contracted under the directive on contryside conservation/management: mowing only twice a year and always different areas". Some farmers mentioned the renovation of old stonewalls; others the maintenance of ditches.

Stakeholders' perspectives. In general, stakeholders' assessment of farmers' knowledge on GBI maintenance was positive – five said "definitely yes" and five "to some extent". Three stakeholders stated that farmers lacked knowledge on GBI management from environmental perspective.

The main reasoning behind the generally positive assessment was the link with the countryside conservation contracts and the work of the landscape conservation association in Main-Tauber-Kreis (operating since 2000). The 5-year duration of contracts and the trainings and instructions associated with them were all contributing to the increased farmers' knowledge. Another reason for farmers' knowledge on maintenance of landscape elements

were the official trainings organised by the agriculture offices for the recipients of agriculture subsidies. One respondent assessed that between “60% and 70% of the applicants participated in trainings about the official requirements, which was the reason they knew how to maintain the elements”. One of the stakeholders referred to the “information materials available for farmers with FFH meadows or with parcels in Natura 2000 areas”. However, he also indicated that “specific advisory services in this regard have been communicated but not implemented on a broader scale.”

Some stakeholders shared the opinion that “some farmers know, some don’t”, “but hardly anyone has profound knowledge”. While other stakeholders said that “farmers know how, but if they implement it – that’s another issue”. Stakeholders recognised that farmers assessed if “it fits their time availaibility and they choose the line of least resistance”.

4. Implementation of the CAP Greening scheme in Tauber case study area

4.1. CAP Greening scheme in Germany

The CAP Greening scheme in the EU has three main elements and respective requirements – diversifying crops and ensuring ecologically focused areas on arable land above certain size as well as maintenance of permanent pastures. The specific requirements and the implementation choices in Germany are summarized below.

- **Crop diversification**

  Crop diversification requires farmers with arable land of over 10 ha to grow at least two crops for the areas up to 30 ha, and at least three crops for the areas over 30 ha.

The diversity of crops on arable land has to be present on farms in the period between 1 June and 1 July each year.

- **Ecological focus areas**

  Farmers with arable land over 15 ha must ensure that at least 5% of their land is in an ecological focus area (EFA) among which are ecologically beneficial productive land uses and landscape features. National governments define the list of EFA, from which farmers can choose what to implement on their farms.

Germany has one of the most extensive lists of EFA options in the EU, comprising land laying fallow, nitrogen fixing crops, catch crops, buffer strips, short rotation coppice, agroforestry, afforested areas, strips along forests, terraces and landscape features. The list of landscape features includes all features included in cross compliance such as field margins; hedges or wooded strips, isolated trees, trees in line and trees in groups, ponds, ditches and traditional stonewalls.

- **Permanent pastures**

  There are two requirements for permanent pastures. The first one requires national or regional governments to maintain the ratio of permanent grasslands to the total agricultural area. The ratio may not be reduced by more than 5% compared to the reference year. The second one requires national governments to designate Environmentally Sensitive Grasslands in Natura 2000, in certain cases they may also be outside Natura 2000 areas. Environmentally sensitive grasslands cannot be ploughed or converted.

In Germany, farmers with permanent pastures that want to change their land use must request permission. The permission is not granted if there has been a regional loss of more than 5% of the permanent pastures compared to the status in 2005 at the federal level (Baden-Wuerttemberg).

The Environmentally Sensitive Grasslands in Germany cover all grasslands within the special areas for conservation (SACs) under the Habitats Directive, but excludes the grasslands in special protection areas (SPAs) under the Birds Directive.

- **Institutions and administrations**

Regional level.

Agriculture institutions. The district administrations are the regional administrative units for agriculture, which are subordinate to the regional councils. The district administrations are the institution for the submission of CAP funding applications and the control of measurements and farmers' commitments for both EU funding schemes such as Greening as well as for national/regional agricultural funds.

The district administrations offer online support and information on the different types of Greening measures and applications, and contact persons are named. Applications for EU funds are submitted through an online tool FIONA[12] (Flächeninformation und Online-Antrag [area information and online application]). It provides various information regarding the Greening and cross-compliance requirements.

Environmental institutions. Environmental administrations are also located in the district administrations. They control the implementation of the obligation in the protected areas, including on agricultural land. In general, the environmental administrations do not provide advice to farmers about on-farm environmental requirements. There are several environmental monitoring programs in Baden-Württemberg and the districts within the case study areas, such as the mapping of biotopes and habitats, including on agricultural areas. The effects on environmentally sensitive grasslands are assessed though mapping of FFH meadows since 2010.

Farm advisory services.

Public support on CAP Greening requirements and measures is available through the district administrations, including online tools. Advisory services at farm level are offered by different regional offices for agriculture and rural areas, e.g. the Landesanstalt für Entwicklung Landwirtschaft und der ländlichen Räume Schwäbisch Gmünd.

Advisory services on CAP Greening are available also from non-public sources: For example, the national farmer association (Deutscher Bauernverband) runs an online tool[13] to calculate the payment based on the measures chosen at farm level.

Further advisory services are offered at regional scale by the farmer associations at federal state level (Landesbauernverband Baden-Württemberg) through so-called consultants. They are associated with different farmer associations at district level. Within the case study area, consultants are available in the district Main-Tauber-Kreis. Advisory services by the regional farmer associations however is fee-based, the costs depend on the level of advice and range between 55€ per hour for control of payments and 215 € for filling of applications. If needed, a farm visit is possible to check that legal requirements of measures are met.

[12] http://www.fiona-antrag.de/
[13] http://www.bauernverband.de/praemienschaetzer

Other private advisory services are available through organic farming associations such as Beratungsdienste Ökologischer Landbau e.V., associated with the district administrations. These advisors focus on organic farming and give support with the online data entry tool FIONA as well as farm-based advices on payment schemes. This service is fee-based as well.

4.2. CAP Greening scheme implementation in Tauber case study

The elements of the CAP Greening scheme apply to arable land over certain size (crop diversification on farms with land over 10 ha, ecologically focus area on land over 15 ha) and to permanent pastures of any size.

Arable land covers the largest share (81.2%) of the UAA in Tauber case study area and the majority of it is in farms over 10 ha, indicating a high influence of the CAP Greening scheme on the management of arable land in the area.

Permanent pastures cover 17.1% of the UAA. Given that the main objective of the CAP Greening scheme about permanent pastures is to maintain its existing area and preserve them from ploughing or conversion, their territorial coverage should be protected.

Permanent crops cover only 1.6% of the UAA. They are treated green-by-definition under the CAP Greening scheme as there are no management requirements related to this land use group.

The total number of CAP Greening scheme beneficiaries in Tauber case study area was 2,439 in 2016[14].

4.3. Interviewed farmers' participation in CAP Greening scheme.

The interviewed farmers in Tauber case study area were 16. Eight had over 100 ha of UAA, and six had between 30 ha and 100 ha. One respondent had a farm size between 10 and 30 ha, and one under 10 ha. Thirteen farmers had arable land; ten had permanent pastures, and four permanent crops. Ten farmers defined their farming systems as arable. Livestock farming, mixed farming and perennial crops systems were represented by two respondents each. Respondents' livestock breeding systems comprised three dairy cattle farms and one beef cattle farm.

All of them were asked to state their participation in the different elements of the CAP Greening scheme.

- **Greening scheme: Permanent pastures**

Ten respondents implemented the permanent pastures element of the Greening scheme. None of the respondents stated that his farm's permanent pastures were designated as environmentally sensitive grasslands. One respondent explained that his grasslands were in a water protection zone.

- **Greening scheme: Crop diversification**

[14] https://www.agrar-fischerei-zahlungen.de/Suche

Twelve respondents implemented the crop diversification element. The number of crops grown on the farms was between three and seven (Table 7), with half of respondents growing three or four crops. Wheat, corn, barley, rapeseed and sugar beet seemed to be the dominant crops on respondents' farms.

Farmers' motivations for the crops' choice comprised a mixture of farm needs. Six respondents referred to profitability and economic gains, and six referred to the needs of crop rotation. Three farmers referred to compatibility with soil conditions and weed control, and three with the need to feed dairy cows.

Table 7. Crops grown on respondents' farms (n=12)

Crops	Respondents												no. respondents
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
wheat	x	x	x	x		x	x	x	x	x	x	x	**11**
corn	x	x			x	x		x	x	x	x	x	**9**
barley (winter and summer)	x		x	x	x	x	x	x	x			x	**9**
rapeseed	x	x	x	x	x		x	x			x		**8**
sugar beet				x	x	x	x	x		x	x		**7**
spelt						x		x				x	**3**
lucerne									x			x	**2**
oats					x						x		**2**
peas							x					x	**2**
red clover												x	**1**
triticale					x								**1**
rye		x											**1**
sunflower								x					**1**
flower mixtures			x										**1**
total no. of crops	**4**	**4**	**4**	**4**	**6**	**5**	**5**	**7**	**4**	**3**	**5**	**7**	

Source: Farmers' interviews

- **Greening scheme: Ecological focus areas**

According to the size of arable land, eleven respondents implement the EFA element. Their main choices of EFA option are a mixture of non-productive and productive land uses – eight have fallow land, six have catch crops, and five have buffer strips. Three have strips along forests and two agro-forestry. Two others have nitrogen-fixing crops. There is one respondent with terraces and one with coppices. There are different combinations of the EFA options per farm in order to reach the required minimum share (5%) of the farm's arable land. Four respondents have chosen options from the landscape features – hedges, trees in groups, stonewalls and field margins.

The ecological focus areas were the element of the CAP Greening scheme expected to bring the highest new environmental benefits on arable land. Therefore, farmers' motivations for the EFA options choice was of particular interest for the assessment of the scheme effectiveness. Interviewed farmers were asked to assess seven statements about their motivations for EFA choice using Likert scale, where 5 stands for strongly agree; 4 – somewhat agree; 3 – neutral; 2 – somewhat disagree; and 1 – strongly disagree.

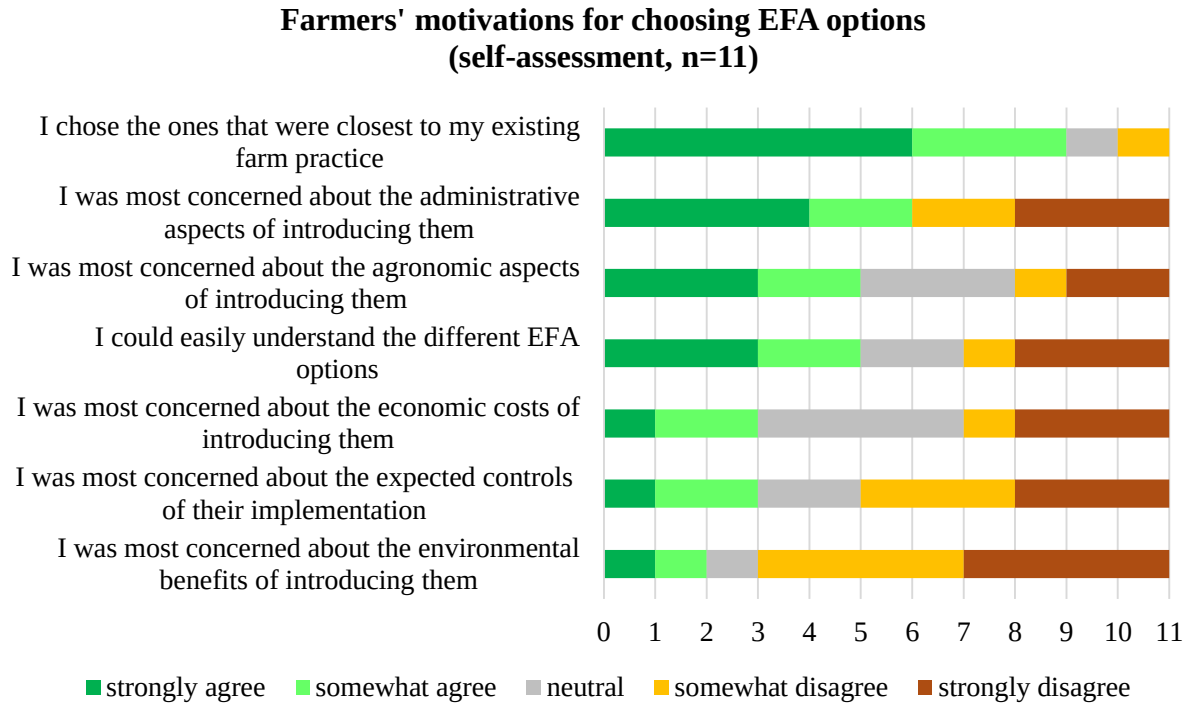


Figure 6. Farmers' self-assessment of motivations for choosing EFA options

Respondents' key motivation for choosing the EFA options was minimal disturbance of farming practices by choosing the options closest to the existing farming operations. Respondents made it explicit by stating that "catch crops represented the slightest compromise in the operational process" or "flowering strips were the most comfortable choice of EFA". Another benefit of flowering areas was that they made a good use of poor-quality soils or of smaller plots more difficult to reach.

The compliance with the administrative requirements of introducing the EFA options was another important aspect in EFA choice. Farmers needed to plan ahead what new crops or landscape features to introduce, what workload was required, what documentation, etc. One respondent that met the EFA requirement with catch crops explained "I would have liked to provide EFAs with hedges and so, but this was too complicated. You have to provide the information about the area with great precision which is incompatible with real-life".

Farmers (n=8) disagreed that the environmental benefits of the EFA options were their key concern. Some considered that the catch crops were "win-win choice – they benefit the farmer and the environment" (soil fertility).

Stakeholders' perspectives on farmers' motivations for EFA choice

Interviewed stakeholders were asked to assess the same seven statements, using the same Likert scale. The difference was that stakeholders assessed the EFA choice motivations of farmers in the case study area in general.

The results of stakeholders' assessment of farmers' motivations reflected farmers' self-assessment. The key was choosing the option closest to the existing practices as well as the compliance with administrative requirement and expected controls. Least concern was the environmental benefits from the EFA options. Stakeholders confirmed farmers' concerns about the risks of sanctions, including timely implementation of activities, loss of income from the loss of productive land and finding the best alternative for the use of land out of production.

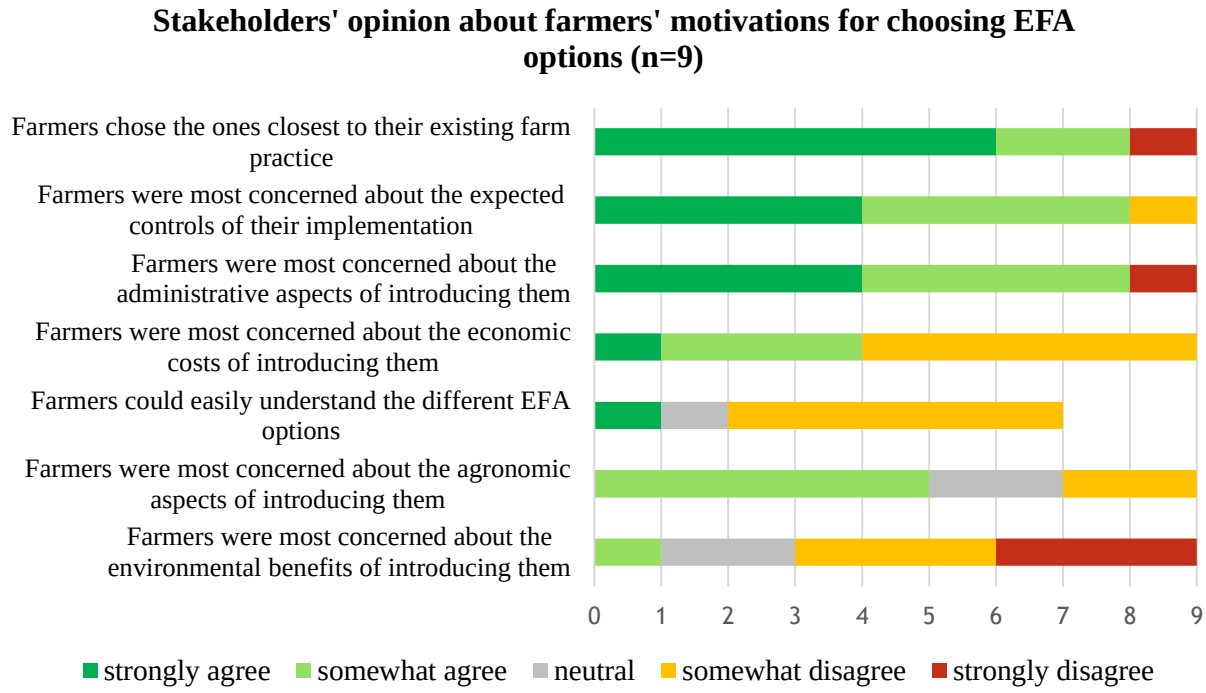


Figure 7. Stakeholders' assessment of farmers' motivations for choosing EFA options

4.4. Changes resulting from the implementation of CAP Greening scheme

Farmers and stakeholders were asked to assess potential environmental, economic and administrative improvements resulting from CAP Greening scheme implementation based on their experiences and observations. There were seven statements, which farmers assessed for their own farms and stakeholders for the case study area. Likert assessment scale was used: 5-strongly agree, 4-somewhat agree, 3-neutral, 2-somewhat disagree, 1-strongly disagree.

- **Farmers' assessment of Greening scheme implementation on farms**

Administrative implementation and controls. The top change from the beginning of Greening implementation on farms was farmers' increased understanding about the controls of the different elements (Figure 8). They knew what was being controlled and what needed to be done to meet all requirements. At the same time, meeting the administrative requirements and the bureaucracy related to them remained problematic for farmers. They

explained that “it is higher effort to plan which areas should be used as EFA and which need to be maintained as such” and “every year you have to make sure to comply with the declared area data”. This continued to be de-motivational for declaring landscape features as EFA because “the square measures have to be specified exactly” and even more “You need to stick to the measurements you indicated. It is an additional effort and an infringement of environmental freedom”. One respondent recommended that “it should become practicable. To date you need to provide every year details for the application. I would like to indicate my hedges, as I have some areas, but it is not feasible”. The administrative burden for fallow land was “very high effort, because for vegetation on fallow land you need to measure and outline your field sections. You need to keep all the labels. The efforts are disproportionate”.

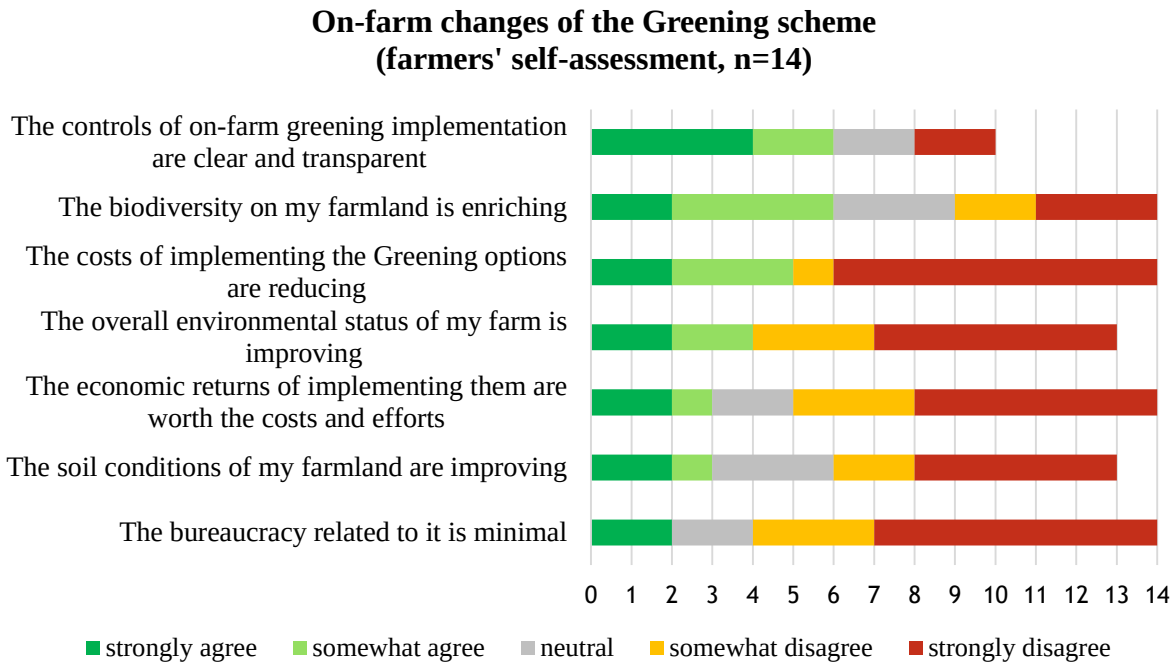


Figure 8. Farmers’ assessment of on-farm changes resulting from Greening scheme

Environmental perspective. The key benefits expressed by respondents from environmental perspective were the “increased biodiversity due to the flowering areas” as well as soil improvements resulting from “deep-rooting cover crops”, erosion protection and nitrogen fixing in the soil.

At the same time, respondents observed a variety of on-farm worsened conditions. The unwanted weeds (thistle, dock, etc.) that grew on fallow land and the inevitable use of chemicals for preparing the soil for next crops were a significant concern for farmers, which also reduced the environmental benefits from their perspective:

- ✓ “On EFAs it is not allowed to use any mineral or animal fertilizers. Therefore the soil, especially of bee pastures, impoverishes as the soil is deprived of nutrients. After 4 years, the flower mixtures do not flower that much anymore and weeds resistant to poor soil quality grow: thistles *Cirsium* sp. and dock *Rumex* spp.. At the end I will have to use a lot of pesticides. I doubt that this is environmentally friendly. This is why I use mostly poor-

quality-soils as EFAs to not run down any other acres. I mulch my flowered area every year to reduce the weed burden".

- ✓ "Unwanted weeds grow on fallow land. When growing the next crop, an increase in fertilizer use and time is necessary".
- ✓ "Thistle surpresses other sowed plants".
- ✓ "Dock continues to prosper. It will be difficult to get rid of it and a lot of chemicals will be necessary".
- ✓ "You have to clear your soils. Due to these flowering mixtures, when growing afterwards a crop, the seeds of the flowering mixtures germinate also in the following years. A higher pesticide input is needed".

Economic perspective. The Greening payment was considered necessary for the efforts invested in the implementation of the different options. Some farmers referred to "financial benefit due to ecological benefits" and despite the increased costs of seeds for catch crops "their effect is also higher, thus it will pay off. It has an ecological added value".

In fallow land, the biggest increase in costs and respectively reduction in economic benefits from farmers' perspective was the need to combat weeds in the years following the flowering mixtures.

One farmer estimated that "in locations with marginal agricultural yields, the turnover with or without Greening is more or less the same. But on areas with fertile soils, Greening has worsened the (economic) situation". At the same time, another farmer said that "Greening and CAP should be abbolished. Huge agricultural holdings receive huge sums of subsidies. Why aren't they competitive on their own? In my opinion it is pointless to give subsidies for humus depletion."

- **Stakeholders' assessment of Greening scheme implementation in the region**

Administrative implementation and controls. Stakeholders' assessment of changes as a result of Greening implementation mirrored farmers' assessment. "After three years the scheme is well-established". "In the beginning it was an incredibly high effort but in the course of time, they (farmers) need less time". Farmers knew what was controlled but for most of them, it was "a heavy burden". At the same time, the respondents added "It is also a huge effort for the administrations, because control teams control with great precision". One stakeholder explained, "the application for agricultural subsidies doesn't get worse every year but with every (CAP) reform. The number of requirements are increasing and the normal farmer does not understand it anymore. The farmers' association has even been blamed to support the complication of the application because their consultations are fee-based."

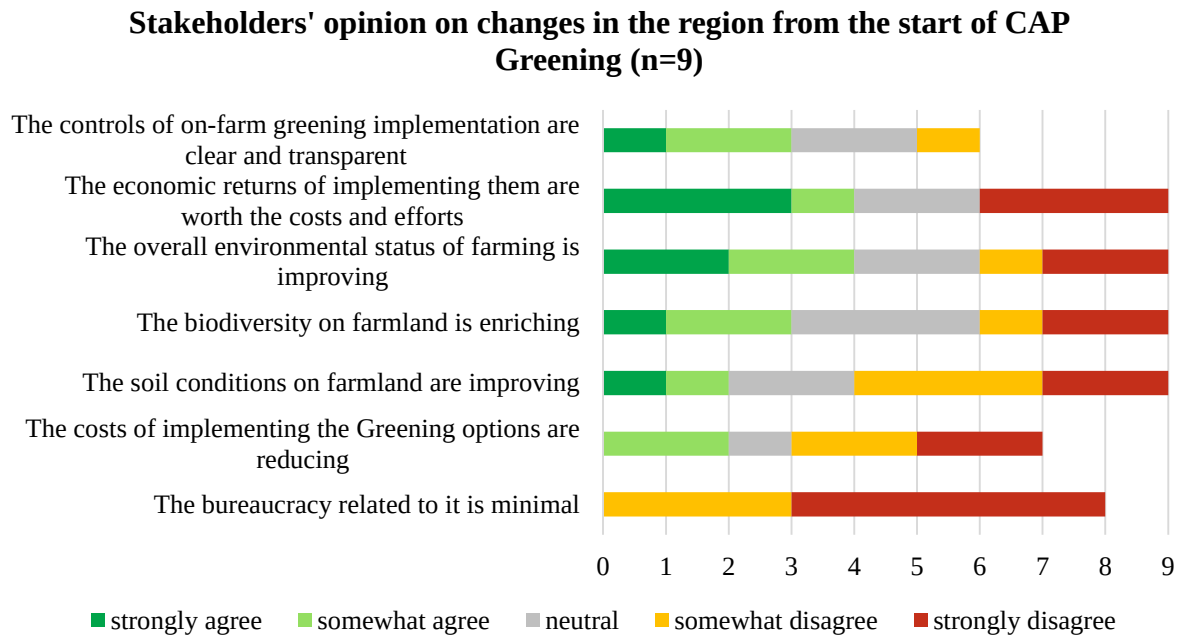


Figure 9. Stakeholders' assessment of Greening scheme implementation in the region

Economic perspective. Stakeholders saw both benefits and worsened conditions from economic perspective. Some stakeholders explained that in general "the Greening payment is a reward, but from the agricultural perspective it is seen negatively. You have to render a service to receive the same income as before". "Farms used to receive the whole amount of subsidies without extra efforts". They assumed that "farms on areas with marginal agricultural revenues are most probably better off with Greening". Furthermore, stakeholders recognised that there were "greater efforts and no yields on fallow land, but weed pressure on the adjoining areas".

Environmental perspective. Stakeholders considered that the flowering areas benefit insects (bumblebees, bees), birds ("flocks of birds", "birds of prey", "partridges") other wild animals (hares). "Legumes and green cover in autumn is positive for the general environmental conditions" and "Green cover is very beneficial for erosion protection". Furthermore, "the consumers can observe visually an improvement which leads to a positive perception of agriculture".

The downsides and negative perceptions from environmental perspective could be summarised by the following stakeholders' comments: "Flowering areas which have to be cultivated once per year are not good from ecological point of view"; "The seed composition of flowering mixtures is not able to compete with weeds. Results in weed abundance. Greening worsens weed abundance as you are not allowed to intervene"; and "The EU flowering mixtures are not regional mixtures. Regional seeds would be much more expensive, but many species adapted to dry grasslands don't find alternatives. It has been shown that Greening has no ecological benefit. The commitments are so low and scattered around. Only 5% of the arable land is maintained under Greening requirements. On fallow land the soil

quality is improving. A bit more flowering strips and buffer strips appeared due to Greening, but in comparison to the administrative efforts, it is much too little."

- **Long-term changes on farms as a result of CAP Greening scheme**

Farmers were asked if Greening implementation leads to long-term changes on their farms (Figure 10); stakeholders had to respond about all farms in the case study area (Figure 11).

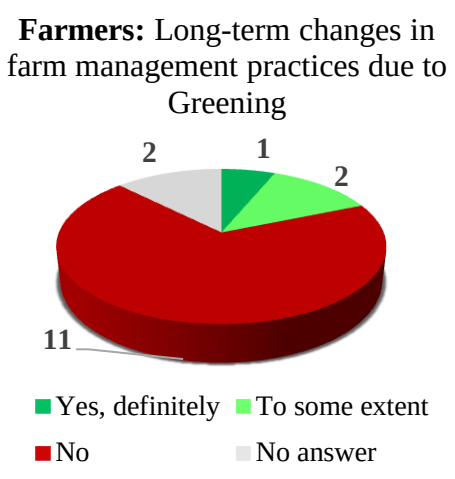


Figure 10. Farmers assessment of long-term changes on their farms due to Greening (N=16)



Figure 11. Stakeholders assessment of long-term changes on farms in the CS area due to Greening (N=13)

Farmers' perspectives. The majority of interviewed farmers (n=11) stated that they had no long-term changes in their farm management practices: "I have to do it, but it did not change my management practices. (I would not continue implementing these measures if it would not be compulsory)". Furthermore, they explained, "under new regulations we have to adapt again", indicating that policy measures influence farm management practices.

At the same time, some farmers adopted the positive elements for their farms: "Farmland management itself has not changed, but some details: if you see that in the long-term some measures make sense, you will stick to them". "I will stick to the cultivation of lucerne. I will also continue to cultivate catch crops, but not with the same number of varieties. I will use several grasses, but only the ones which are not resistant to winter and therefore will be worked into the soil. I will continue to use mustard".

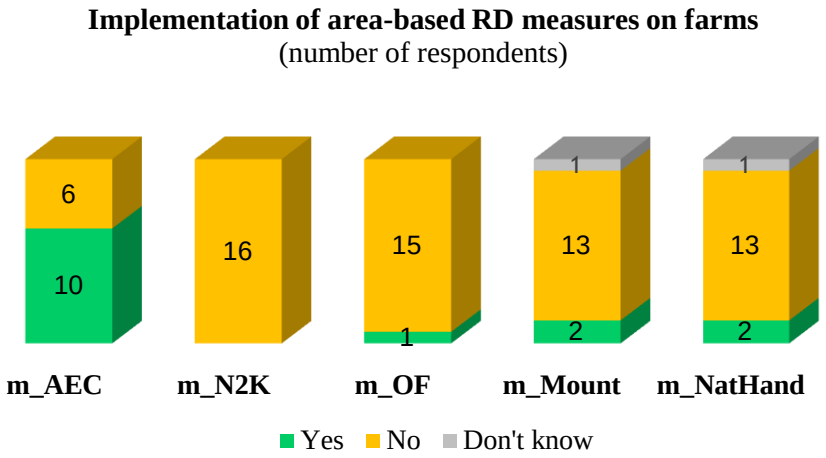
Stakeholders' perspectives. Stakeholders were less negative about the long-term changes. Some still thought that "without Greening farmers would not implement these measures" but others considered that "legumes can stay also due to climatic reasons with a positive benefit for the previously grain-dominated areas".

4.5. Implementation of other CAP environmental measures

We asked farmers if they participated in other environment-related CAP measures and the similarities and/or differences they found between Greening and the other measures.

- **Rural development measures**

Ten farmers participated in the agri-environmental and climate measure (FAKT); two received compensatory payments for areas with natural handicaps and two for mountainous areas; one was in the organic farming measure (Figure 12).



Legend: **m-AEC**: agri-environment and climate measure; **m_N2K**: Natura 2000 compensatory measure; **m_OF**: organic farming measure; **m_Mount**: Compensatory payments for mountainous areas; **m_NatHand**: Compensatory payments for areas with natural handcaps

Figure 12. Respondents participation in environment-related area-based rural development measures (N=16)

The similarities that farmers observed between the Greening scheme and the rural development environmental measures referred to the similar aims (both aim to protect the environment) and some similar requirements. Catch crops as well as fallow land were supported under Greening and FAKT (the agri-environmental measure). "EFA and crop rotation in FAKT complement each other". Another similarity added by stakeholders was the application process via the common application submission.

The differences from farmers' perspective were related to the requirements, efforts and administration:

- ✓ "Catch crops under Greening cannot be fertilized, while under FAKT it is allowed".
- ✓ "FAKT is voluntarily. Greening is mandatory if you want to receive your direct payments".
- ✓ "Greening: you receive compensation and you have nearly no efforts. FAKT: more money, but also more efforts".
- ✓ "They are paid differently. Cost-effectiveness more favourable with FAKT: more flexibility".
- ✓ "Natural handicaps: you are paid automatically because of disadvantages. No additional efforts. Greening: you need to implement something".

✓ "Deadlines are different for the different measures".

The differences explained by stakeholders comprised:

- ✓ "Greening is annual commitment, while FAKT is multi-annual".
- ✓ "Higher risk in Greening, which affects 100% of the direct payment in case of sanctions".
- ✓ "Greening pays for the whole farm although the farmer implements the measures only on some land", while in the agri-environmental measures payment is received only for the committed areas.
- ✓ "Agri-environmental measures are much more outcome-oriented (e.g. indicator species). Payments are also much broader: not only for arable land, but also for animal husbandry, e.g. to preserve old domestic breeds".

- **Assessment of CAP schemes or measures appropriateness to address the environmental objectives on farmlands in the case study area**

Both farmers and stakeholders were asked to assess from their own perspective which CAP scheme or measure was most appropriate to address the environmental objectives on farmland in the case study area (Table 8).

Table 8. Respondents' ranking of the CAP schemes or measures that are most appropriate to meet environmental objectives on farmland.

Farmers' ranking		**Stakeholders' ranking**
1. Agri-environment measure (AE)		1. Organic farming measure (OF)
2. Greening scheme		2. Agri-environment measure (AE)
3. Organic farming measure (OF)		3. Greening scheme
4. Basic Payment Scheme (BPS)		4. Cross Compliance
5. Cross Compliance		5. Basic Payment Scheme (BPS)

Farmers' comments on ranking. Farmers' opinions varied a lot from "none of them is really useful" to statements of preferred measure (either FAKT, BPS or OF). However, there was a predominant agreement that the agri-environmental measure (FAKT) together with the Greening scheme were most appropriate to address environmental objectives, despite the weaknesses identified. At the same time, one respondent explained "Agri-environment-climate payments makes sense, but should be applied in a limited form. It is difficult for intensive farming to participate".

Some farmers (n=2) expressed the opinion that organic farming was less environmentally efficient due to the "need to plough and move the soil a lot. This leads to erosion and humus depletion. Organic farms also need more machinery to protect their crops, which results in a higher need of energy"; "more CO_2 emissions and use of steel, and more erosion". Another farmer said "we cannot all convert to organic farming; FAKT brings organic and conventional farmers closer". One farmer had the opposite opinion that "only organic farming supports

useful nature protection measures" recognising that "there are also negative exemptions such as organic factory farming".

The BPS was assessed both as "it doesn't have any ecological influence" and "it is the most appropriate to meet the environmental objectives, in combination with the FAKT measures. All the others are gimmicks".

Cross-compliance came last on farmers' ranking, probably due to the "heavy controls" but lower sanctions: "everyone fears it. The audits are terrible, but they only verify if you manage your farm properly".

Stakeholders' comments on ranking. Stakeholders assessed the schemes and measures both for their environmental objectives but also from administration and control perspective. The organic farming and agri-environmental measures were very close at the top of the rank. As stakeholders explained it: "organic farming is good for achieving the environmental goals, but not all of them. Certain specialized agri-environmental measures protect certain species" and "no chemical benefit the environment".

In terms of administration and controls, stakeholders shared: "the funding measures of the 1st and 2nd Pillars are more frequently controlled by the agricultural authorities, while direct payments (BPS) and cross-compliance have no controls" as well as "basis payments is based on a scattergun approach".

4.6. Training and advice on CAP Greening scheme

CAP Greening scheme introduced both new requirements about farmland management and new approach to claiming Pillar I subsidies. We asked farmers whether they received training on Greening or EFA option, which were their sources of information and advice about the CAP schemes and measures, and the environmental aspects of farming. Stakeholders were asked if their organisations provide training and/or advice on environmental aspects of farming and Greening to farmers.

Farmers' perspectives. Eight farmers stated they received training or advice on Greening or EFA options from the agricultural office either "when Greening was introduced, then once a year" or during the "meeting for joint application". Seven responded that they had "no event specifically about Greening or EFA".

Farmers' main source of information both on CAP schemes and measures and environmental aspects of farming were the agriculture offices (n=15). The other sources were the newsletters of farmers' associations or specialised journals. Agriculture advisors and Internet were third and fourth on respondents' preference list. Farmers relied also on the landscape protection association and NABU for the environmental aspects of farming (n=2 each).

Their preferred type of advice was farm visits (n=11) and telephone contacts (n=6). Other forms of preferred advice included email/social media/online advices, exchange of experience and training, direct contact, agriculture offices, and technical journals.

Some respondents differentiated the preferred type of advice per measure: "For compulsory measures: farm visit of skilled consultants; for optional measures on what has to be

implemented: by phone, agricultural office or technical journals". In either case "consultants need to know your farm"; provide "independent" and "neutral consultations"; and "need to be able to interpret politics on the local level".

Stakeholders' perspectives. Five stakeholders responded that their organisations provided training and/or advice about Greening and EFA – local agriculture and environmental institutions, farm advisors and local experts.

The training/advice offered by the agriculture offices comprised "evening events once per year (seven dates offered) about the changes in the general application ("Gemeimsamer Antrag"). It reaches around 1,000 farmers (out of 1,700)"; "but if required, consultation on the application for agricultural aid. We also inform through the agricultural weekly paper (Wochenblatt)".

The environmental institutions offered "trainings on request about FFH with and also without the landscape protection authority".

4.7. Involvement in national level decision-making about CAP Greening scheme

Both farmers and stakeholders were asked if they were involved in the consultation or decision-making about Greening in 2014. Two of the interviewed farmers (N=16) said that they participated in local or sectorial meetings where Greening was discussed.

Further to the question of direct involvement, farmers were asked if they were aware of other organisations that have been involved in consultation or decision-making. Most farmers thought that farmers' associations (n=11) and environmental NGOs (n=9) have been involved (Figure 13). Some farmers (n=6) believed that local agriculture and environmental authorities or experts have been also involved in decision making about CAP Greening scheme. At the same time, none of the interviewed stakeholders (n=12) participated directly in the national level decision-making or consultations in 2014, but "the management board of local farmers' association can formulate requests to the federal state farmers' associations".

Farmers' opinion on participants in consultation / decision making about Greening in 2014

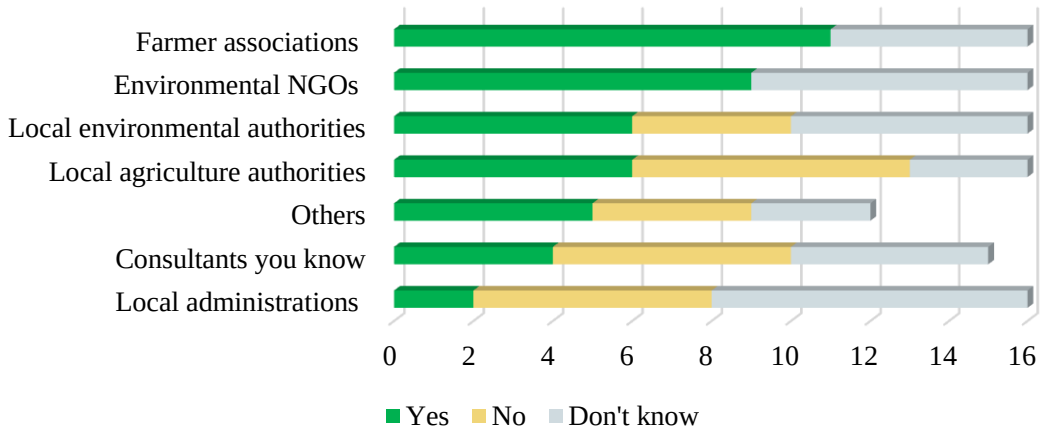


Figure 13. Farmers' awareness about local participation in the CAP Greening decision-making in 2014

5. Conclusions from BIOGEA findings in Tauber case study area

Tauber is the semi-intensive land use case study area under the BIOGEA project in Germany. Arable land (81.2%), permanent pastures (17.1%) and a small share of orchards and vineyards (1.6%) represent the agricultural land. The farming systems characterising the case study area are (mostly intensive) arable farming, livestock and mixed farming systems as well as perennial crops.

GBI features and elements in Tauber case study area

- Tauber has a medium to low presence of a wide variety of GBI elements and features according to the biodiversity monitoring under BIOGEA project. The main connectivity GBI elements types comprise woody strips (hedges) and, especially, grassy strips, and streams and ditches were also present. Main in-field elements were N-fixing crops followed by perennial crops, fallow and agroforestry. Solitary trees and groups of trees and field copses are abundant, as well as forest patches and permanent pastures and grassland.
- The results of the biodiversity-GBI modeling relationships suggest that the most recommend as potentially valuable "greening" options are: promoting fallow land, cereal crops and grassy strips to favour more specialist and threatened farmland birds, and maintenance of woody strips and grassland to support plant richness.**Farmers and stakeholders' awareness about GBI**
- The interviews with farmers and local stakeholder reveal that the awareness about the GBI terminology is low between both respondent groups, indicating that GBI policy and its terms have limited reach on local level so far.
- However, when the GBI elements and features are named, stakeholders recognise between 15 and 20 (mean value of 19) GBI in the case study area, which is high. This may be because a wide range of different GBI elements are present even if their extent is relatively small.
- Interviewed farmers identify between 1 and 15 (mean value of 9) GBI features on their farms, which is relatively low comparted with the total above, indicating that the different features are only present in select areas. Additionally to the main GBI elements specific to the area, farmers have areas with catch crops and green cover, hedges as well as stonewalls and terraces.

Environmental policy implementation concerning agriculture in Tauber case study area

- Tauber case study area has a number of European (over 80) and national protected areas (over 200) (some overlapping territorially), which represent the main element of the national GI strategy in Germany. Natura 2000 areas have management plans specifying the management measures recommended and/or required by farmers and other land users. Most of them are focused on grasslands, but also on arable land and orchards.
- The wider region, where Tauber is located, has a serious nitrate problem. The regional authorities address it by developing and implementing a targeted strategy. It lists different

requirements for the agriculture sector depending on the seriousness of the problem. They are mostly focused on arable land, but also on permanent grasslands and orchards.

- Flood risk areas are also identified and related farming management prescriptions are developed. They form part of the cross-compliance for farmers.
- Various environmental policy documents create a variety of requirements and management prescriptions for farmers. Sometimes they are integrated in the CAP implementation via the agri-environment measures, greening scheme or cross compliance; sometimes they are delivered as regional or national programmes. Administratively, the structure may be clear, but the interviews reveal that farmers find it increasingly confusing implementing the different policies on their farms.

CAP Greening scheme

- The requirements of the different elements CAP Greening scheme are applicable to almost the entire utilised agricultural area in Tauber case study.
- The "green-by-definition" areas are less than 4% of the UAA. The farms under 10 ha (irrespective of the farming system), which are exempt of Greening requirements cover only 2.1% of UAA. The perennial crops (irrespective of the farm size) for which they are no Greening requirements cover 1.6%, and most of them are on farms with less than 10 ha.

Permanent pastures.

- No special issues are raised in the discussion of the permanent pastures element of the Greening scheme. This is probably due to the well-established agri-environmental schemes and nature conservation contracts that farmers have for the biodiversity-valuable grasslands. The benefit of this Greening element is in the protection of the permanent grasslands from ploughing or converting.

Crop diversification.

- The main change from this Greening element is the inclusion of legumes in the respondents' crop rotation plans, which include between three and seven crops. This is assessed as beneficial for soil quality and some respondents consider maintaining them in the longer-term.

EFA element.

- The EFA element brings most changes in the farm management, as it requires the allocation of minimum 5% of the arable land to ecological focus areas. The respondents from Tauber implement a mixture of productive and non-productive EFA options. The most common are fallow land, catch crops and buffer strips, which are combined with agro-forestry, strips along forest, terraces, stonewalls, field margins, etc.
- The respondents' main concerns at the introduction of EFA element were related to minimum disturbance of existing farming practices and avoiding the risk of penalties in case of non-compliance.

- Interviewed farmers were least concerned about the environmental aspects of the EFA options. Probably they considered that all options were equally environmentally beneficial and thus were looking for the ones that were win-win solutions for their farms. For example, flowering areas (fallow land) that can utilise poor-quality soils or catch crops "benefiting the farm and the environment".
- Most farmers refrained from including landscape features in their EFAs due to the strict measurements (delineation precision) and the high risk of sanctions.

Implementation of the Greening scheme.

- The interviews with farmers and local stakeholders indicate that three years after the start of the Greening scheme, there is more clarity and understanding about the administrative and control issues.
- However, they are not getting easier or less bureaucratic. The biggest issues for farmers seem to relate to the fixed deadlines, the need to keep documentation and the strict measurements. At the same time, the procedure and controls creates additional efforts for the administration too.
- According to respondents, the key benefits from an environmental perspective relates to the increased biodiversity due to the flowering areas on fallow land, which is confirmed by the GBI-biodiversity modelling. However, this benefit can be rather short-term. Flowering areas are perceived to create problems with unwanted weeds from agronomic perspective, and the need to use chemicals in the preparation of soil for follow-up crops.
- The other environmental benefit is related to soil improvements resulting from "deep-rooting cover crops", erosion protection and nitrogen fixing in the soil. The limitation is that it is applicable to a bit more than 5% of the arable land.
- Economically, most farmers consider that the "efforts are disproportionate to the payments". However, they do not comment that the efforts are for approximately 5% of arable land, while the payment is for 100% of the farm's arable land. The opinion about disproportionate payment to effort is explained well by one of the stakeholders: "Farms used to receive the whole amount of subsidies without extra efforts"

Training, advice and consultation on CAP Greening scheme

- There are many institutions and organisations, from the public and private sector, at regional and local level, providing consultation, advice and training to farmers. However, interviewed farmers rely on the agriculture offices, newsletters of farmers' association and specialised journals.
- The information provided by the agriculture office is mostly focused on the application process, administrative records and control issues, rather than practical farm-related issues. At the same time, farmers can have more specific farm-related advice, including on-farm visits, upon request from the agriculture advisors and nature conservation institutions.
- Overall, farmers' preferred options for advice and consultation is on-farm visits and telephone contacts where they can discuss specific issues and targeted/adapted solutions relevant for their farms.

Participation in CAP Greening decision making.

- The participation in the CAP Greening decision making by the interviewed farmers and stakeholders is limited. Two farmers participated in local or sectoral meetings, where Greening was discussed.

- None of the local stakeholders was involved in decision-making on Greening. However, interviewed farmers believe that farmers' associations and environmental NGOs participated in the national level decision making as well as local agriculture and environmental authorities.