BIOGEA
Testing BIOdiversity Gain of European Agriculture with CAP greening

CAP Greening: Learning from the Local Level

Case study report:

Plovdiv-Pazardzhik area, Bulgaria



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.

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BIOGEA Case study report: Plovdiv-Pazardzhik region, Bulgaria

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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.

Plovdiv-Pazardzhik region is the (semi-) intensive land use case study area in Bulgaria under the BIOGEA project. Biodiversity data was collected in the period April 2017 – September 2018. Case study agriculture and policy data for and from the region was collected in the period November 2017 – April 2018.

Meetings and interviews with local farmers, administrators, advisers and NGOs' representatives in Plovdiv-Pazardzhik region were organised in the period April-May 2018. A stakeholders' round-table to discuss the preliminary findings of our case study was organized in October 2018. The current report systemizes the findings and conclusions from these activities.

- **Interviewed stakeholders**

The local stakeholders and experts (N=15) were interviewed in May 2018. The respondents that shared their views and experiences represented local/regional agriculture authorities (n=5), local/regional environmental authorities (n=3), farmers' organisations and local experts (n=4), local or environmental NGOs (n=2), and farm advisors (n=1).

- **Interviewed farmers**

Farmers (N=23) were also interviewed in May 2018. Their main farming systems were perennial crops (n=12), mixed farming (n=4), arable farming (n=3), horticulture (n=3) and livestock farming (n=1). Respondents' farm size varied: farms with land up to 10 ha were 10; three had land between 10 and 30 ha; four had between 30 ha and 100 ha; and six had over 100 ha.

2. Plovdiv-Pazardzhik case study area

Plovdiv-Pazardzhik case study area is located in South-Central Bulgaria (NUTS II level). It covers 1,118 km^2 and five municipalities (LAU 1 level) – Bratsigovo, Peshtera, Pazardzhik, Krichim and Stamboliiski from two NUTS III regions – Pazardzhik and Plovdiv. The nearest urban centers are the city of Pazardzhik (within the CS area) and the city of Plovdiv (20 km from Stamboliiski). Pazardzhik municipality is an urban area, while the other four municipalities are rural areas according to the national definition[1].

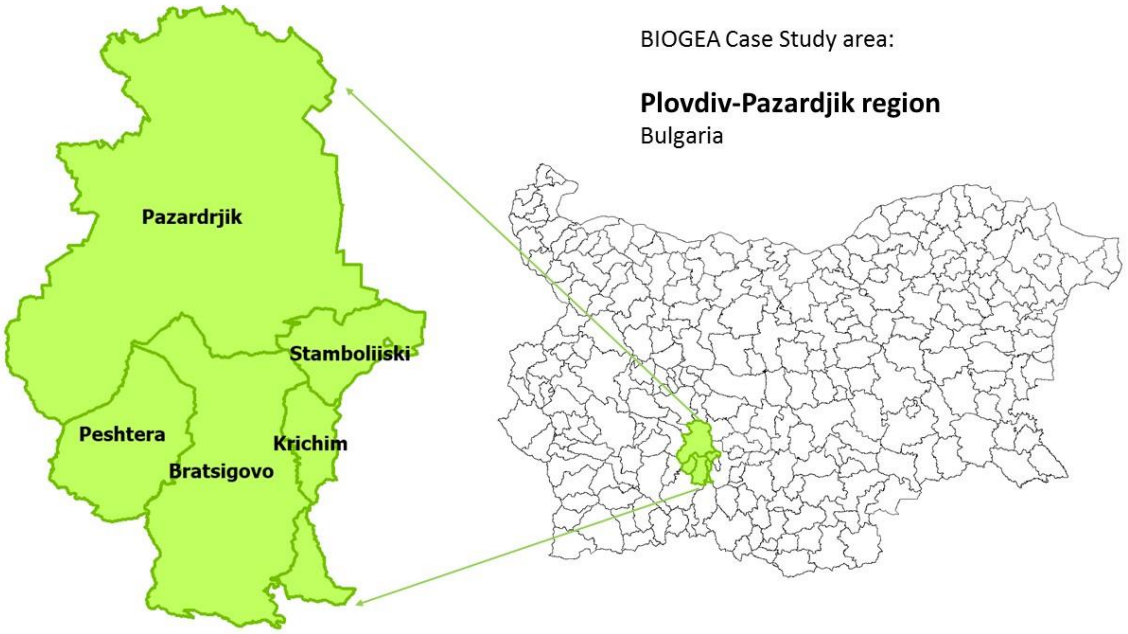


Figure 1. Location of Plovdiv-Pazardzhik case study area in Bulgaria

In 2017, the population was 162,798 people. The population in the four rural municipalities was one third of all (NSI, 2018). The population density in the CS area was 145.6 people/km^2 in 2017. The rural municipalities had a population density of 113.1 people/km^2, which was almost double the national average for rural areas.

The importance of the agriculture sector is represented by the high share of agriculture land and by the number of people engaged in agricultural activities – 17,868 in 2010[2] (11.7% of the people in working and above-working age in the same year). The share of people engaged in agricultural activities varies from 7.7% to 29% in the five municipalities, with 11% in the urban municipality.

The area is a transitional territory from the Thracian valley (CS area northern part) to the Rhodopi Mountains (CS area southern part). The main land cover in the CS area is agriculture land (55.8%) (Figure 2) located mostly in the lowlands (CS area central and northern parts). Forest and scrubland cover 30.6% and natural grasslands – 4.3%, both located mostly in the

[1] Rural areas in Bulgaria are defined as "municipalities in which there is no settlement with more than 30 000 people".
[2] Agriculture Census 2010 data.

southern mountainous areas. Wetlands and water bodies cover 1.4%. Artificial surfaces represent 7.8%, given the present of an urban centre.

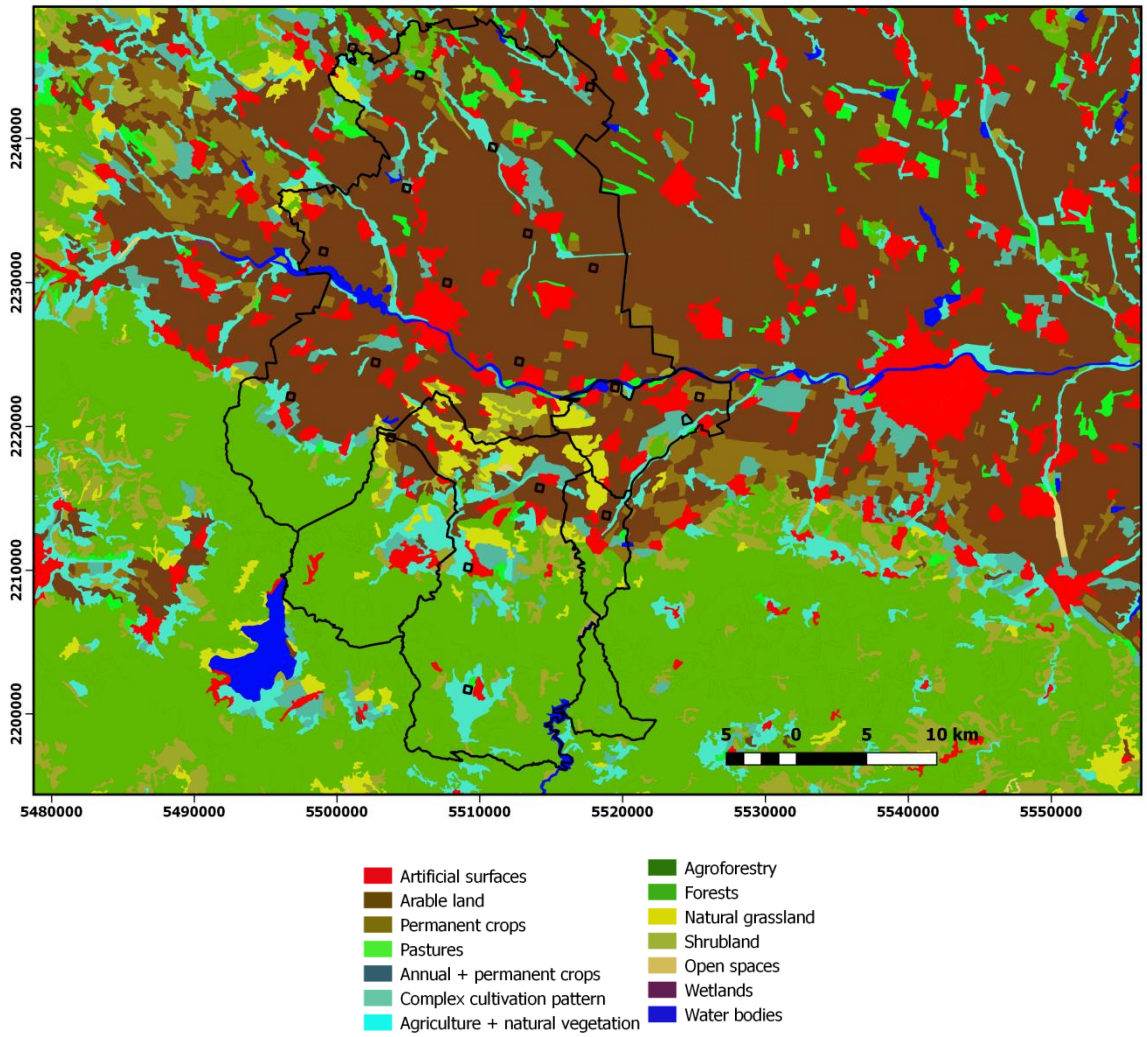


Figure 2. Location of study plots in Plovdiv-Pazardzhik region and CORINE land cover categories

2.1.Agriculture land use

Agriculture land in the case study area is dominated by arable land – 70.3% (CORINE Land Cover in 2012), which is located mostly in the Thracian valley. The semi-mountainous and hilly terrains host the majority of heterogeneous agricultural areas (16.4%) and pastures and natural grasslands (9.2%). Permanent crops represented by orchards and vineyards cover 4% of the territory.

Table 1. Agriculture land cover in Plovdiv-Pazadrjik case study area

Land use types	Share in all agriculture land (%)
Arable land	70.3
Permanent crops	4.0
Pastures and natural grasslands	9.2
Heterogeneous agriculture areas	16.4
-- *Complex cultivation patterns (mosaics)*	*6.1*
-- *Land principally occupied by agriculture with significant area not cultivated*	*10.3*
Total	**100**

Source: CORINE Land Cover, 2012

2.2.Farms and farming systems

Data about farms and farm size per municipality is available only from the Agriculture Census 2010, which is seriously outdated given the dynamic developments in the farming sector in Bulgaria after its accession to the EU. Furthermore, the farm size categories do not correspond to the farm size thresholds applied in the CAP Greening scheme, which makes analysis very difficult. Nevertheless, this same (and only) officially published dataset was available when the CAP Greening scheme was agreed in Bulgaria.

The Agriculture Census 2010 data (Table 2) reveals that over 70% of the farms in the case study area were not eligible for SAPS support either due to lack of UAA (3.9%) or small size (less than 1 ha – 67.8%). A quarter of the farms had a farm size up to 10 ha, thus were considered "green-by-definition"; they managed 14.5% of the UAA. However, the majority of the agriculture land (79.8% of the UAA) was managed in farms over 10 ha (3.6% of all farms). The CAP Greening scheme is applicable to them.

Table 2. Farms and utilised agricultural area per farm size

	Farms		UAA	
Farms	**number**	**% of all**	**ha**	**% of all**
without UAA	326	3.9	0	
0 to 0.99 ha	5,700	67.8	1,867.35	5.6
1 to 9.99 ha	2,087	24.8	4,798.62	14.5
10 to 49.99 ha	192	2.3	3,877.94	11.7
over 50 ha	107	1.3	22,539.24	68.1
Total	**8,412**	**100**	**33,083.20**	**100.0**

Source: Own calculation based on MAF, Agriculture Census 2010, 2012

Most of the active farms (82.5%) in 2010 had arable land (Table 3) with an average land size of 4.4 ha. Permanent crops were managed on 34.7% of the farms, and their average size was 0.7 ha. Permanent grasslands were used in only 8.5% of the farms with an average size of 2.4 ha/farm. The average size per farm is low, mostly because this data includes the 67.8% of farms up to 1 ha. Furthermore, this land use allocation considers all land used on farms, but excludes the use of common land. Thus, some farms use larger areas of grasslands.

Table 3. Farmland use on farms in the region (Agriculture Census, 2012)

	Farms		Farmland - UAA		Average size
Land use	**number**	**% of all**	**ha**	**% of all**	**ha**
Arable land	6,686	82.5	29,602.8	89.5	4.4
Perment grasslands	689	8.5	1,650.8	5.0	2.4
Permanent crops	2,802	34.7	2,089.2	6.3	0.7
ALL farms (with UAA)	**8,086**		**33,083.2**		**4.1**

Source: Own calculation based on MAF, Agriculture Census 2010, 2012

2.3.Farming systems intensity

There is no officially published data about the intensity of land use and mineral or organic fertizers use at LAU 1 municipal level in Bulgaria.

The grazing density in the CS area in 2010 is estimated at 5.07 LU/ha (Agriculture Census data). The estimation considers only grazing animals – cattle and buffalos, sheep and goats; only on permanent pastures, however, it excludes the used common grasslands. When the livestock density is re-calculated to consider all UAA, the figure becomes 0.25 LU/ha.

In 2017, grazing density on permanent pastures (including common pastures) decreases to 1.52 LU/ha, which is still intensive use of the pastures in the area. When recalculated on UAA-basis, the livestock density is reduced to 0.12 LU/ha UAA. The estimation considers all grazing animals, including horses; and all agriculture land eligible for CAP support, including common pastures.

The main decrease in the grazing density is due to the reduction in the number of sheep and goats – from 19,752 in 2010 to 1,705 in 2017; as well as the inclusion of common grasslands in the calculation. Nevertheless, 1.52 LU/ha is still an intensive use and reflects the in-door dairy farming practiced in the CS area.

3. Characteristics of the Green and Blue infrastructure in Plovdiv-Pazardzhik region

3.1. Green Infrastructure policy in Bulgaria

Bulgaria has no dedicated green infrastructure strategy or action plan. However, the objectives of the National Biodiversity Strategy 2020 are in line with the EU Green Infrastructure Strategy. Bulgaria aims to integrate its National Ecological Network into the EU and global ecological network and to launch trans-boundary protected areas, zones and corridors. The National Plan for the Most Important Wetlands in Bulgaria 2013–2022 includes measures for spatial and functional re-connection of wetland habitats in line with the Green Infrastructure concept. The strategic part of the Bulgarian Rural Development Programme 2014-2020 also refers to contributing to the EU GI Strategy.

There is no information about mapping of GBI elements and features in the case study area aside from the mapping of landscape features under the CAP Greening commitment done by the Ministry of Agriculture.

3.2. Biodiversity designations and management requirements in Plovdiv-Pazardzhik region

The case study area hosts four sites for the protection of wild birds (SPAs) in its central and Southern parts; and six sites for the protection of natural habitats (SCIs) mosaic-like spread throughout the CS area. Two of the SPAs and three pSCIs are situated along rivers and fishponds thus covering very little agriculture land. The overlapping SPA and pSCI Zapadni Rodopi in the southern part of the CS area cover mostly forested areas and natural grasslands. However, the Bessaparski Hills SPA and pSCI, situated in the centre of the CS area and one of the pSCI in its Northern part are dominated by agriculture land.

The main agricultural land use restriction introduced in the four Natura 2000 sites for the protection of wild birds prohibits the use of pesticides and mineral fertilizers in pastures and meadows. The removal of landscape elements and features such as field margins, individual trees and groups of trees is prohibited in two SPAs and the time of meadows mowing is a restriction only in one SPA.

Besides the Natura 2000 zones, there are also two reserves and 10 protected sites in the CS area. The reserves are in the strictest category of protected area and there is no agricultural production activities. The protected sites are limited to specific natural landmarks.

3.3. Water designations and management requirements

- **River-basin management plans**

The whole territory of the Plovdiv-Pazardzhik area falls within the East Aegean River Basin. The current management plan is for the period 2016-2021. Its Program of Measures includes 51 groups of measures, 124 key activities and 1,819 specific activities. The bigger part of the specific activities are investment measures – 1,033 and 786 are administrative measures.

The key measures related to agriculture focus on prevention or control of diffuse pollutants in water. They aims at improving the groundwater quality and reducing the nitrates and phosphates load caused by the diffuse pollution of agriculture.

- **Flood-risk maps**

The flood-risk areas in the East Aegean river basin and its catchments are analysed, mapped and priorities for future action are defined. The municipalities of Stamboliyski, Krichim, Pazardzhik and Peshtera fall within the area with potential future floods of Maritsa River.

- **Nitrate vulnerable zones**

The NVZ in the CS area covers Stamboliyski, Pazardzhik (up to 450 m a.s.l.) and Peshtera (up to 450 m) municipalities. The Good agricultural practices are compulsory for all farms within the NVZ and are voluntary for all farms beyond the limits of the NVZs. The cross compliance requirements relevant to NVZs are:

SMR 1. Limiting the water pollution in nitrate-vulnerable zones.

SMR 1 is applicable for farms with agricultural activity in nitrate vulnerable zones. It includes general measures for application of nitrogen fertilizers (organic and mineral/inorganic); additional measures for the use of nitrogen fertilizers (organic and mineral/inorganic) in inclined terrains; measures for storage of nitrogen fertilizers (organic and mineral/inorganic).

GAEC National Standard 5.Water protection and water use management.

National standard 5.2. Obligatory provision of buffer strips 5-m wide along surface water objects (rivers, dams, lakes, sea), except for the rice plots, via natural vegetation (grass, trees, shrubs) or maintained in sward. It is forbidden to apply mineral and organic nitrogen fertilizers in the buffer strips.

3.4.Climate mitigation and/or adaptation measures

There is no information about district (NUTS 2) or municipal (LAU 1) climate-related strategies or action plans.

3.5. Green and Blue infrastructure assessment in BIOGEA project

Plovdiv-Pazardzhik study area has a medium presence of Green and Blue Infrastructure (GBI) elements and features[3]. The main connectivity GBI elements are woody and, especially, grassy strips, with large amounts of ditches too. Semi-natural vegetation includes patches of scrubland and forests, as well as permanent pastures and grasslands. In-fields, N-fixing crops followed by fallow are the main GBI features. Agroforestry and perennial crops (orchards) are also abundant.

3.5.1. Biodiversity assessment

The preliminary results of the modelling[4] of GBI-biodiversity relationships in the case study area provide the following highlights:

- The number of isolated trees were negatively correlated to overall bird diversity, steppe, farmland and threatened birds, as well as main plant species richness.
- Tree groups, in contrast, benefitted overall, farmland and threatened bird species, including threatened farmland species, although were negative related to the richness of main plant species.
- Wetlands were negatively correlated to overall bird diversity and, marginally, to threatened bird abundance.
- Grassland was negatively related to overall bird richness, but benefitted the diversity of steppe, farmland and threatened birds, including threatened farmland species.
- Scrubland benefitted overall bird and plant diversity, as well as main plant species richness.
- Orchards benefitted diversity of threatened birds and, marginally, threatened farmland birds and overall bird diversity.
- Cereal crops were positively related to farmland and threatened bird diversity.
- Fallow land benefitted overall plant and bird diversity, but were negatively related to steppe and farmland bird abundance.
- Mean size of herbaceous crops benefitted richness of main plant species, as well as overall and farmland bird diversity, but affected negatively threatened farmland bird species.

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[3] 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

[4] 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

- Richness of herbaceous crops was detrimental for plant richness, both overall and of main species.
- Grassy strips benefitted overall, threatened, and, marginally, farmland bird diversity, as well as secondary plant richness.
- Woody strips specially benefitted threatened farmland birds and, marginally, threatened bird diversity, but affected negatively overall and main plant species richness.
- Streams and ditches also affected negatively overall and main plant species richness, as well as overall and threatened bird diversity.

The results of the biodiversity-GBI modeling showed mixed effects of GBI features on biodiversity indicators. Plants and overall birds would be benefitted by woody elements (isolated trees, perennial crops, agroforestry) and wetlands, but threatened and farmland birds were more dependent on grasslands and grassy strips. Therefore, promoting grassland to benefit threatened birds, including threatened farmland species, and maintenance of grassy strips and tree groups to support overall and threatened bird diversity, will be the best GBI option for the area. The surprising negative effects of fallow on biodiversity may be related to the specificities of fallow management in the area, that were not evaluated here[5].

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"**

The awareness about GBI terminology differs between interviewed stakeholders and farmers. Overall, an equal number of stakeholders were definitely aware about GBI terminology and not aware about it (Figure 3). Most environmental stakeholders were aware – definitely (n=3) or to some extent (n=1), and only one was not aware. The awareness of agriculture stakeholders was opposite – more were not aware (n=4), than definitely (n=1) or to some extent (n=2).

[5] 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

Interviewed farmers' awareness about GBI terminology was overall low – 17 respondents were not aware. Two farmers were aware and three to some extent only.

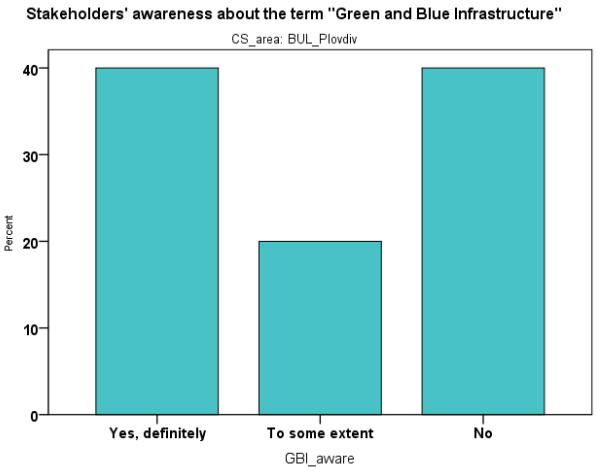


Figure 3. Stakeholders' awareness of GBI (N=15)

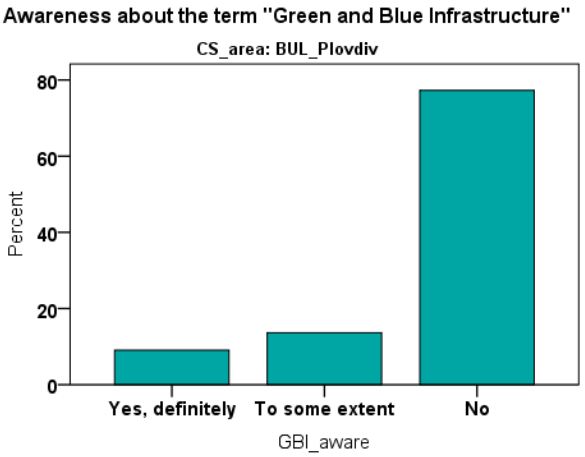


Figure 4. Farmers' awareness of GBI (N=23)

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

The interviewed stakeholders recognised between 9 and 20 (mean value of 17) GBI in the case study area as a whole. All of them indicated the presence of permanent pastures, scrubland, groups of trees, orchards, and land laying fallow. Most listed also individual trees and trees in lines, field margins, nitrogen-fixing crops and catch crops.

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

Despite the low awareness about GBI terminology, the interviewed farmers (N=23) identified between 1 and 12 (mean value 6) GBI elements and features on their farms. Most interviewed farmers (over 15) have orchards, field margins and land left fallow. Over half of the respondents have isolated trees and ditches.

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

Farmers' perspectives. The interviewed farmers who were certain about the management of GBI elements and features from environmental perspective were 13. Five farmers responded they were aware to some extent and one stated that he was not aware. Four did not answer the question.

Farmers most often referred to maintaining landscape features and elements in good agricultural and environmental condition (GAEC). Some farmers explained that trees should not be cut down; the height of grasslands should be less than 50 cm; and field margins should be maintained in the right size. The Greening requirement for fallow land is to plough it at least once per year, and several farmers referred to this requirement too.

Stakeholders' perspectives. In general, stakeholders' assessment of farmers' knowledge on GBI maintenance was very positive - only one said farmers did not have knowledge. However, stakeholders' assessed it from administrative perspective rather than environmental one. They referred to GAEC and Greening requirements: "There are Declarations of information that farmers sign. These declarations form include obligations for farmers, not only rights to receive subsidies. The declarations are kept for 5 years." Stakeholders also indicated, "some farmers are interested (to learn), others are not" and "Currently they possess some knowledge but need more training". One stakeholder was concerned "farmers know how to support landscape features; the problem is that they remove the bushes".

4. Implementation of the Greening scheme in Plovdiv-Pazardzhik case study area

4.1.CAP Greening scheme in Bulgaria

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 Bulgaria 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 15 May and 15 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.

Initially Bulgaria offered 14 EFA options to farmers comprising land laying fallow; nitrogen fixing crops; catch crops; buffer strips; short rotation coppice; strips along forests; terraces and landscape features: field margins; hedges; isolated trees; trees in line and trees in groups; ponds and ditches. In 2017, five EFA options were removed from the list – buffer strips and terraces, isolated trees, ponds and ditches. Some of them (buffer strips, terraces, hedges and field boundaries, and standing trees) are protected by GAEC.

- **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.

The ratio of permanent pastures in Bulgaria is monitored at national level.

The Environmentally Sensitive Grasslands (ESG) in Bulgaria includes all grasslands within Natura 2000 areas designated in compliance with the Law on biodiversity. The identification of ESG is based on the permanent grasslands (PG) layer within the LPIS system. The area notified as ESG is 426,348 ha. There is also a High Nature Value layer in the LPIS system in Bulgaria. However, if a parcel of grassland falls within the HNV layer, but outside Natura

2000 area, currently it is not considered as ESG and can be ploughed with a written permission of the Minister of Agriculture.

4.2. CAP Greening scheme implementation in Plovdiv-Pazardzhik case study area

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.

The total number of CAP Greening scheme beneficiaries in Plovdiv-Pazardzhik case study area was 1,076 in 2016[6]. The project team calculations based on the published data of Greening beneficiaries reveal that 68% of the farms had under 10 ha of land. However, they managed only around 6% of the agriculture land. The farms with 10 to 30 ha were close to 15% of all, and managed around 7% of the land. Farms with more than 30 ha represented 17% of all but managed 87% of the land.

The farmers interviewed under BIOGEA project had a diversity of farming systems and farm sizes. Approximately half of them were in the group "green-by-definition" either due to their size (less than 10 ha) or due to the growing of permanent crops.

- **Greening scheme: Permanent pastures**

Four respondents implemented the permanent pasture element of the CAP Greening scheme. One had all pastures classified as environmentally sensitive grasslands (ESG) and one had around 20% of the pastures classified as ESG. Two did not know.

- **Greening scheme: Crop diversification**

Five farmers indicated that they implement the crop diversification element and one of them is organic farmer. The other respondents with arable land had farm sizes below 10 ha. The number of crops grown on the farms was between three and ten (Table 4). Wheat, barley and sunflower were present on those five farms. Farmers had also vegetables and tobacco, as well as orchards and some vineyards. They motivated their crops choice with tradition (the typical crops grown in the region), existing market demand (for cereals, fruits and vegetables) as well as policy requirements (legumes). Stakeholders observed an overall increase of nitrogen-fixing crops like lucerne and chickpeas in the region.

[6] Data calculated from the online information system on CAP beneficiaries. https://seu.dfz.bg/seu/f?p=727:8110:::NO::: Accessed on 29.05.2018

Table 4. Crops grown on respondents' farms (N=12)

Crops	Respondent					no. respondents
	1	**2**	**3**	**4**	**5**	
wheat	x	x	x	x	x	**5**
barley		x	x	x	x	**4**
sunflower	x	x		x		**3**
peas				x	x	**2**
corn				x		**1**
lucerne				x		**1**
vetch				x		**1**
fallow land			x			**1**
tobacco	x					**1**
cabbage					x	**1**
rose (for rose oil)		x				**1**
grasslands		x				**1**
permanent crops		x	8 crops			**2**
total no. of crops	**3**	**3 (6)**	**2 (10)**	**7**	**4**	

Source: Farmers' interviews

- **Greening scheme: Ecological focus areas**

Ten farmers said they implemented the EFA element. All of them had fallow land and five had also nitrogen-fixing crops. None had declared landscape features.

The ecological focus areas are 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 are 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.

The interviewed farmers in this case study area were mostly concerned about the agronomic aspects of introducing EFA options, and the way it would have affected the yields and production given their market orientation. However, they were interested in receiving the subsidies too, so they chose the options closest to their existing practices: "Keeping fallow land is a practice of mine I have always kept because it increases the yield in the following year". "We were concerned about the yields because we sell the products. Motivated by the subsidy we introduced new crop – chickpea, and got contracts for it too".

The interviewed farmers were least concerned about the environmental benefits of introducing EFA.

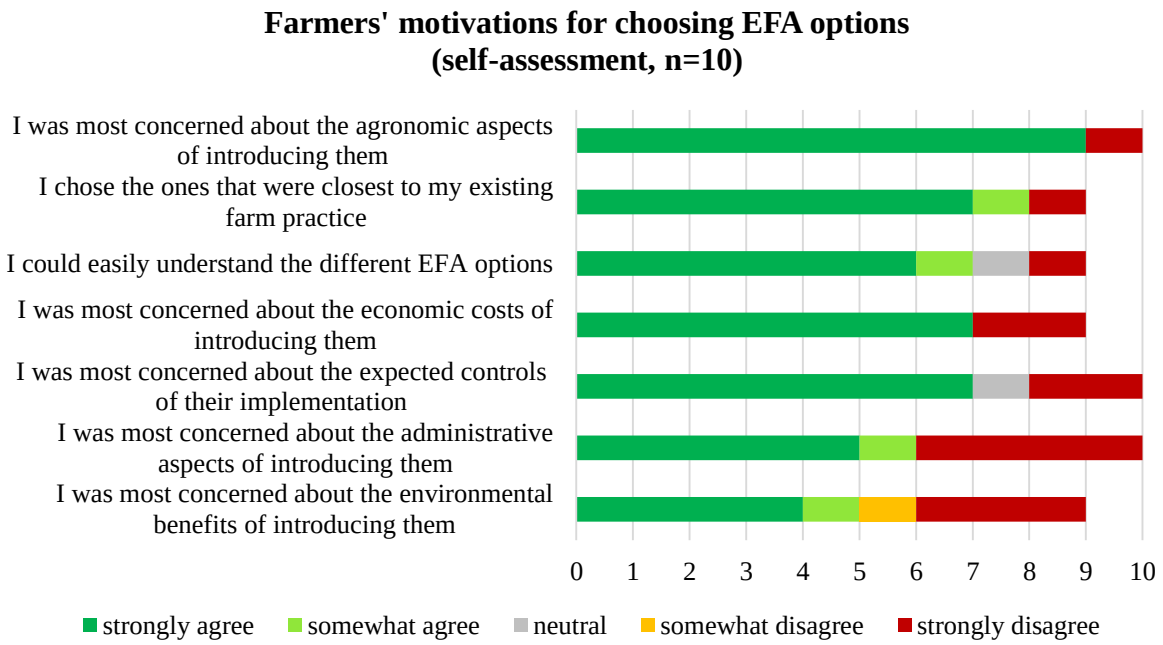


Figure 5. Farmers' self-assessment of motivations for choosing EFA options

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 is that stakeholders assess the EFA choice motivations of farmers in the case study area in general.

The interviewed stakeholders considered that farmers chose the EFA option that was closest to their existing farm practice as well as easiest to calculate and measure to avoid control risks. "Fallow land is easy to calculate and to control, and this is why everyone prefers to choose it for EFA". Another challenge from stakeholders' perspective was the understanding of how "to fulfil the requirement for the 5%, especially if the farm is above 30 ha" and "to estimate what share of the plot to be turned to fallow land".

Overall, most stakeholders thought that farmers were "interested in the payments and the necessary implementation" but "80% of the farmers don't have ecological interest. They are more interested in the controls – how many and when"; "who and when will control them and what could be the sanction if they failed to fulfil the Greening requirements".

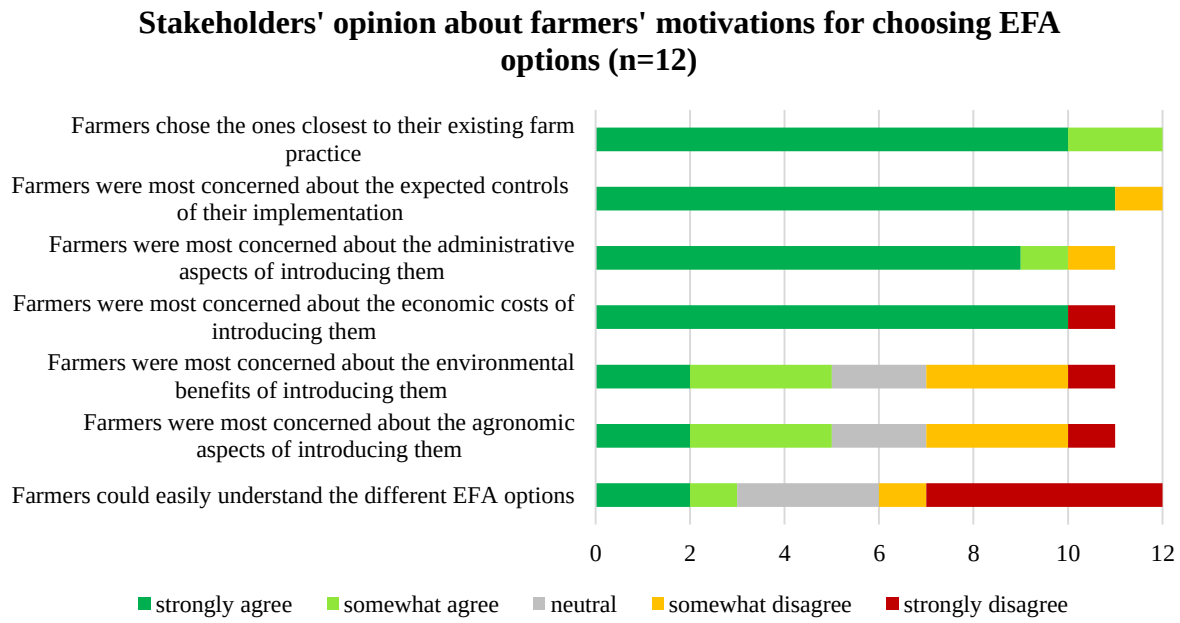


Figure 6. Stakeholders' assessment of farmers' motivations for choosing EFA options

4.3.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**

Environmental perspective. Over half of the farmers considered that the soil conditions and overall environmental situation on the farms was improved. The introduction of crop diversification and rotation was something that was assessed as beneficial. The use of less fertilizers and plant-protection products was also considered as beneficial. Some farmers saw the benefits in utilising formerly abandoned lands: "there were abandoned terrains that are arable and taken care of now".

However, there were also farmers that either saw "no improvements yet" or observed unwanted insects on the fields "there are creatures that haven't been seen here for 20-30 years, such as tomato moth".

Interviewed farmers were not so confident in the biodiversity improvements on farms - only 13 responded and only 8 were positive about biodiversity enrichment, but no examples were described.

Economic perspective. In general, farmers were positive about the economic returns of Greening implementation (n=15). One respondent referred to the indirect benefit of Greening

implementation: “Thanks to EFA and the diversification, in the following year we have better soil and use less fertilizers and plant protection products, which brings better production and results at reduced costs”.

However, they strongly disagreed that the costs of implementing the Greening schemes were reducing. They said either that “the costs are permanent” or that “the costs increase”; “the maintenance costs for the fallow land are high – we pay for fuel, rented land and labour for the ploughing of the plot in the summer“.

Administrative implementation and controls. The majority of farmers (n=17) agreed that 3 years after the start of Greening implementation, the on-farm controls were clear and transparent. One respondent explained that “the municipal agriculture office helps a lot and we have no problems with it”. There were two respondents who disagreed: “the controls are not clear to me; there is no warning when State Fund Agriculture officers come to control. And when there is a sanction - again we don't know what is the reason - we receive a letter stating that we are sanctioned but without an explanation of the reason.”

There was less agreement on the bureaucracy – some said it was “awful”, for some “it depends on the point of view” and for some “there is no change”.

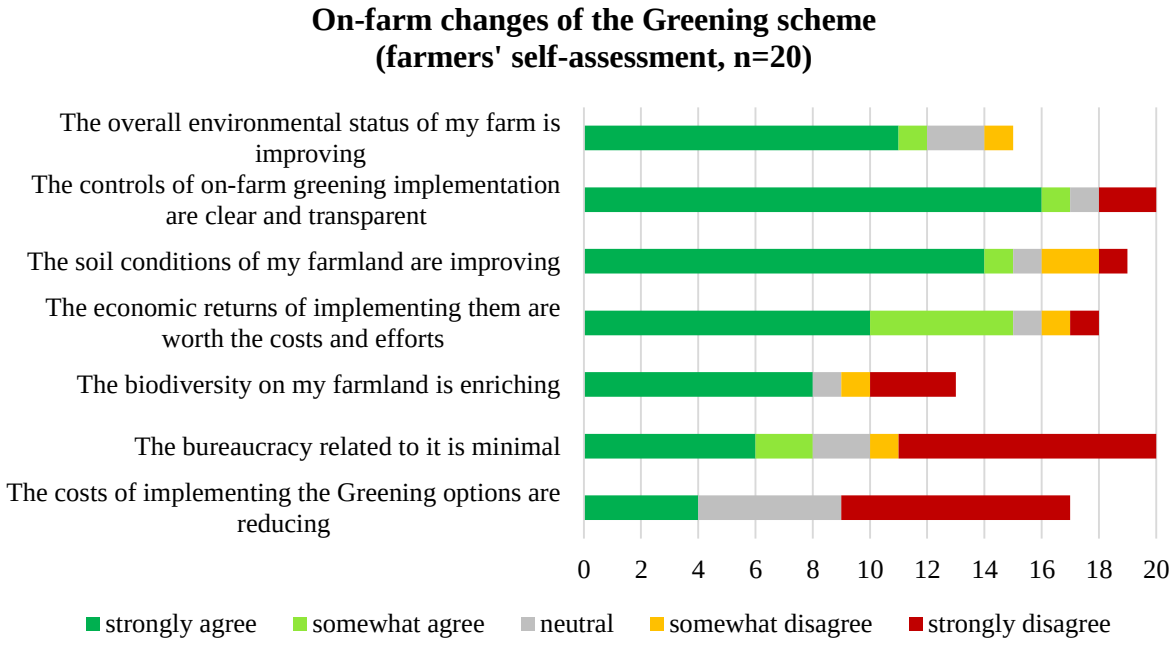


Figure 7. Farmers’ assessment of on-farm changes resulting from Greening scheme

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

Environmental perspective. Overall, stakeholders’ assessment of the environmental changes since Greening implementation was positive. Some were definitive that “the diversification of crops led to soil improvements” and that the “Environmental friendly practicies and increase of EFA must have affected the biodiversity - there should be increase in the number of

beneficial species". Others were conditional – "The soil must be improving due to the fallow land and nitrogen fixing crops" and "If the biodiversity has really improved, the soil must have improved as well - structurally, mechanically and in terms of fertility".

There were also respondents that considered the lack of data: "I cannot comment this. Probably there is an effect caused by the crop rotation" and requested, "soil monitoring must be done for this".

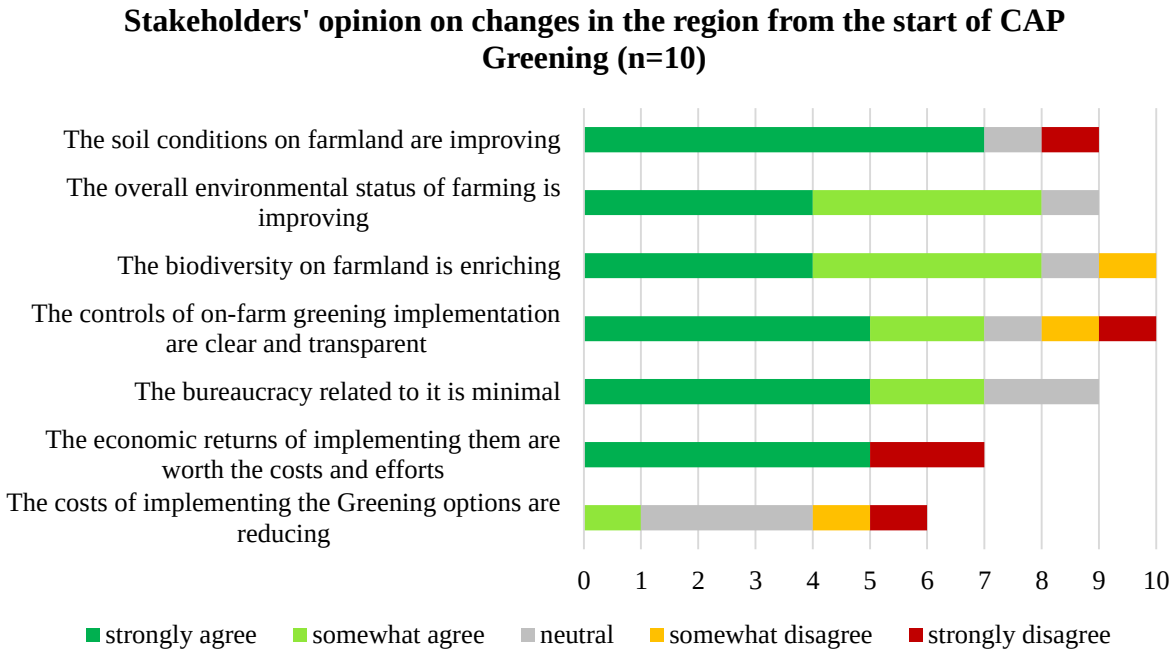


Figure 8. Stakeholders' assessment of Greening scheme implementation in the region

Administrative implementation and controls. Stakeholders considered that "controls are clear – the sanctions methodology is available and the municipal agriculture offices provide support to farmers in the delineation of their land". At the same time, some stakeholders explained: "The submission of applications is an adventure - sometimes there are very long queues and this is a problem for the livestock breeding farmers"; "There has to be a way to reduce the administrative burden for farmers by keeping the level of control unaffected. E.g. the outlining of EFA and landscape features on IACS - if it is the same each year, it can be skipped. This is a difficulty for the smaller farmers. The bigger ones have the practice of hiring a legal advisor or assistant to do this for them".

Economic perspective. Half of the interviewed stakeholders agreed that the economic returns were worth the efforts and costs: "I believe the economic returns are worth the efforts considering the subsidies and the market for lucerne"; "In economic terms there should be economic returns having in mind that this scheme is intended for protection and regeneration of the environment. However, such measures need much longer period to bring the planned effect"; and "The production is of better quality and therefore, better price".

One respondent had a longer-term historical perspective "I don't think that the Greening scheme has provided additional support to the farmers as in fact the overall amount for SAPS was split and this is how the Greening scheme got funds".

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

Farmers were asked if Greening implementation leads to long-term changes on their farms (Figure 9); stakeholders had to respond about all farms in the case study area (Figure 10).

Farmers' perspectives. Over half of the interviewed farmers said they would keep some of the greening practices in the long-term. "We did crop rotation before, but now we pay more attention to it". The link to the payments was made evident in this discussion too "to have new activities, there must be payments intended for them"; "you receive money, work more, and fulfil certain requirements"; and "if it wasn't for the payment, I wouldn't keep the fallow land and the diversification".

Stakeholders' perspective. The interviewed stakeholders were less definite about the long-term changes because of Greening, yet they believed that some practices would be maintained: "Probably (there will be some changes), although a long-lasting change needs more time. To answer this question it will be better to ask farmers and see if a change in the way of thinking has occurred". "There are some changes, e.g. the lucerne appeared. However, not much time has passed - we need 3 more years to be able to answer"; "Should have led to changes but it is too strong to say they are long-term".

Some respondents also thought, "There is no visible change in the landuse type and production practices. The goal continues to be the intensive landuse".

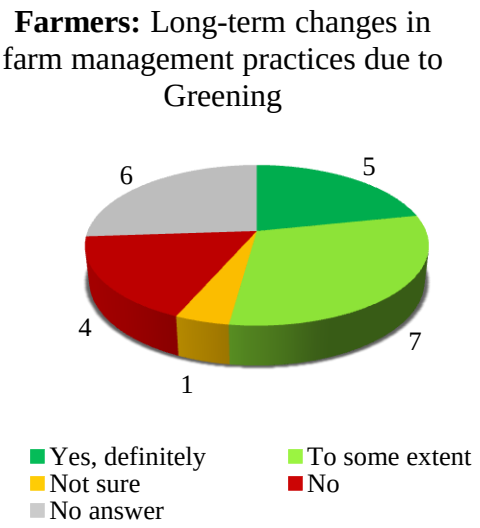


Figure 9. Farmers assessment of long-term changes on their farms due to Greening (N=23)



Figure 10. Stakeholders assessment of long-term changes on farms in the CS area due to Greening (N=15)

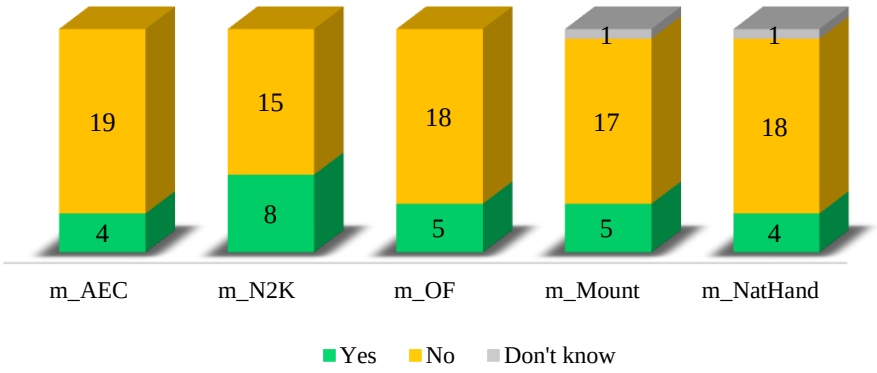
4.4. Implementation of other CAP environmental measures

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

- **Rural development measures**

The interviewed farmers participating in rural development measures were as follows: Natura 2000 compensatory payment measure (n=8), mountainous areas (n=5), organic farming (n=5), agri-environmental-climate (n=4) and areas with natural handicaps (n=4) (Figure 11).

Implementation of area-based RD measures on farms
(number of farms)



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 11. Respondents participation in environment-related area-based rural development measures (N=23)

The similarities that farmers observed between the Greening scheme and the rural development environmental measures referred to the similar application process.

The similarities that stakeholders observed were the annual application and the payment per hectare; the prohibitive approach for some farming activities such as no use of plant protection products or mineral fertilizers; the timing of mowing activities.

The main differences farmers saw were in:

- Natura 2000 measure, which had "higher requirements" ("later mowing dates") and "higher power".
- Organic farming measure, which had the requirement of a certificate. One respondent referred to the over-absorbed budget of the Organic farming measure, which prevented new applications after 2017.

- Agri-environment-climate measure required training certificate before the end of the third year of implementation.

Another difference shared by stakeholders was the duration of commitments – annual for Greening and Natura 2000 measure, and 5 years for the other measures.

- **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 5).

Table 5. Respondents' ranking of the CAP schemes or measures that are most appropriate to meet environmental objectives on farmland.

Farmers' ranking	Stakeholders' ranking
1. Greening scheme	1. Organic farming measure
2. Single Area-based Payment Scheme	2. Agri-environment measure
3. Natura 2000 measure	3. Natura 2000 measure
4. Agri-environment measure	4. Greening scheme
5. Organic farming measure	5. Single Area-based Payment Scheme
6. Cross Compliance	6. Cross Compliance

Farmers and stakeholders had different opinions about the measures' appropriateness for environmental objectives. Overall, farmers placed at the top the CAP Greening scheme, followed by SAPS. This is largely explained by the fact that all interviewed farmers received Greening and SAPS payments, hence, felt more confident in their assessment, while the rural development measures were implemented by a third of them (at most). Respondents shared "I don't apply these measures; I don't know."

In the comments explaining their ranking, five farmers referred to the organic farming measure "because of the strict control and certification system", but also recognised that it was "expensive", "yields are low", "not applicable to my land and plots, which are much spread".

The other comments referred to the low payments of Greening and SAPS schemes, Natura 2000 and Organic farming measures. The agri-environment-climate measure was only commented in view of "too high requirements".

Interviewed stakeholders placed organic farming and agri-environment-climate measure as most appropriate for achieving environmental goals, and then Natura 2000, which was "designed and is most favourable for the protection of certain species and habitats". Stakeholders placed Cross compliance at the bottom and commented that it was "an obligation and part of the direct payments".

4.5. 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 options, 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. Only two farmers (N=23) stated they have received training or advice on Greening. Farmers consider as training dedicated events such as the ones organised by the regional agriculture directorate or the agriculture advisory office where they are informed about the options and requirements of the schemes.

The main sources of information about CAP schemes and measures as well as on environmental aspects of farming were the municipal agriculture offices and Internet. Other farmers and the website of the Paying Agency were also an important source of information among the respondents, even before the agriculture advisory service.

The preferred form of advice is direct – either farm visits or telephone contacts. Farmers' preference for advisors is "to be competent". By "competent advisors" respondents understand "to have practical experience in agriculture, support measures and application conditions"; "to be competent for plant production"; "for soil treatment and plant protection products"; "to provide clear and up-to-date information" and "advice in relation to the delineation of land to avoid overlapping (with neighbours)".

Stakeholders' perspectives. Eleven stakeholders (out of 11) responded that their organisations provided training and/or advice about Greening and EFA – local agriculture institutions and farm advisors.

The training and consultations provided by the interviewed stakeholders' institutions include in-office consultations about the different schemes and measures; information days as well as joint meetings with representatives of the paying agency and the advisory service; annual information campaigns for CAP application period and measures. Nature conservation NGO "organizes different trainings and issues various publications (on our website) with focus on habitat protection for the biodiversity in the agricultural landscape. The trainings that we organize are in the regions mountain Sakar, Eastern Rhodopes, Western Strandzha or Southeastern Bulgaria". The river basin management directorate organizes "Sectoral meetings for Agriculture at which we invite various stakeholders and present the measures in the River Basin Management Plan, including the requirements for the permits, the Good agricultural practices, etc. We also organize meetings in all regional centers to present the River Basin Management Plan. We have participated in meetings organized by NAAS and have presented our measures there as well. And finally, we have a River Basin Council that has meetings twice a year. There we present the results of the EARBD, including the River Basin Management Plan and its measures to all stakeholders - farmers, NGOs, municipal agricultural services, Farmers' associations, etc."

4.6. 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. Four interviewed farmers and one stakeholders' representative stated that they had received information at meetings organized by the municipal, regional and national agriculture administration. However, none was directly involved.

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 were not aware which local institutions or organisations have been involved. Some farmers (n=6) and some stakeholders assumed that municipal agriculture authorities have been involved.

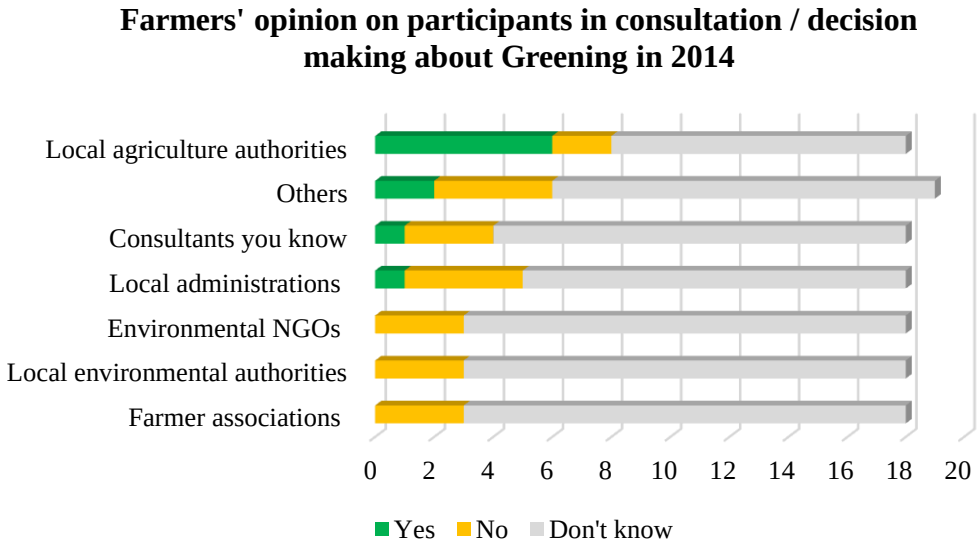


Figure 12. Farmers' awareness about local participation in the CAP Greening decision-making in 2014

5. Conclusions from BIOGEA findings in Plovdiv-Pazardzhik case study area

Plovdiv-Pazardzhik region is the semi-intensive land use case study area under the BIOGEA project in Bulgaria. Arable land dominates the utilised agricultural area, followed by orchards, vineyards and other permanent crops, and then by permanent grasslands. The farming systems characterising the case study area are (mostly intensive) arable farming, horticulture and perennial crops, dairy livestock and mixed farming systems. There is still a high number of small farms (less than 10 ha) that manage a small share of the land; and a small number of larger farms that manage most of the land.

GBI features and elements in Plovdiv-Pazardzhik case study area

- Plovdiv-Pazardzhik study area has a medium presence of Green and Blue Infrastructure (GBI) elements and features. The main connectivity elements are woody and, especially, grassy strips, with large amounts of ditches too. Semi-natural vegetation includes patches of scrubland and forests, as well as permanent pastures and grasslands. In-fields, N-fixing crops followed by fallow are the main GBI features. Agroforestry and perennial crops (orchards) are also abundant.
- Plants and overall birds would be benefitted by woody elements (isolated trees, perennial crops, agroforestry) and wetlands, but threatened and farmland birds were more dependent on grasslands and grassy strips. Therefore, promoting grassland to benefit threatened birds, including threatened farmland species, and maintenance of grassy strips and tree groups to support overall and threatened bird diversity, will be the best GBI option for the area. The surprising negative effects of fallow on biodiversity (it is usually positive, as found in many studies) may be related to the specificities of fallow management in the area, which were not evaluated here.

Farmers and stakeholders' awareness about GBI

- The awareness about GBI as terminology seems to be higher among environmental stakeholders, and very low among agriculture stakeholders and farmers. This suggests limited reach of GBI policy and terms in the agriculture sector in this CS area.
- However, when the GBI elements and features are named, stakeholders recognise between 9 and 20 (mean value of 17) GBI in the case study area. This is a high number of different GBI elements and features; however, their areal coverage is low.
- Interviewed farmers identify between 1 and 12 (mean value of 6) GBI features on their farms. Most interviewed farmers have orchards, field margins and land left fallow; over half of them have isolated trees and ditches.
- Farmers' knowledge about GBI management from environmental perspective is based on the GAEC and Greening management requirements. Stakeholders also link

farmers' awareness about GBI environmental management to GAEC and Greening; however, they comment it mostly from administrative perspective (declarations, information, etc.)

CAP Greening scheme in Plovdiv-Pazardzhik case study area

- The number of CAP Greening beneficiaries in Plovdiv-Pazardzhik CS area was 1,076 in 2016. This is less than half of the farms above 1 ha that were eligible for CAP support in 2010, indicating dynamic restructuring of the farms in the region (and in Bulgaria).
- The project team calculations (based on published Greening beneficiaries data) show that 68% of the farms were "green-by-definition" due to farm size of less than 10 ha.
- The farms above 10 ha were 32% and managed 94% of the land.

Permanent pastures.

- The share of permanent pastures in this CS area is low. Most of them are situated in Natura 2000 sites and are defined as environmentally sensitive grasslands. The rest are in the semi-mountainous and mountainous parts of the CS area and are classified as High Nature Value grasslands.
- Farmers raised no particular issues about permanent pastures management under the CAP Greening scheme. However, one stakeholder indicated the problem of scrub (bushes) removal from fields to make them eligible for CAP support. This is a potential management issue since the biodiversity modelling listed scrubland as potentially valuable greening option.

Crop diversification.

- The typical arable crop scheme in the case study area is wheat, barley and sunflower. Most of them had three crops before Greening.
- Farmers' motivated their crops choice with tradition (the typical crops grown in the region), existing market demand (for cereals, fruits and vegetables) as well as policy requirements (legumes).

EFA element.

- The EFA Greening element introduced fallow land and nitrogen-fixing crops mostly.
- Most of the interviewed farmers were concerned about the agronomic aspects of introducing EFA – their biggest issue was to minimise the loss of yields, while still receiving the full subsidy. Thus, they opted for the EFA options closest to their existing practices.

- Additionally, and especially for fallow land, some farmers explained that it helped them "take care of formerly abandoned arable land". The cumulative effect of formerly abandoned arable land included in rotation as fallow land may lead to intensified land use in the longer-term. The management requirement for fallow land in Bulgaria is that it is ploughed up at least once per year. Negative effects of amount of fallow land on biodiversity may be due to these inconsistent ways to manage fallow.
- Environmental benefits were farmers' least concern in the EFA options choice.
- Stakeholders added that farmers were very concerned about the expected controls and sanctions about the 5% minimum allocated to EFA.

Implementation of the Greening scheme.

- Most farmers and stakeholders agreed with the statement about environmental improvements because of Greening implementation. Stakeholders were more inclined to be conditional "if they implemented it for three years, there must be some improvements". However, several referred to the lack of monitoring data to prove it. Some farmers and stakeholders saw no change/improvement on the land.
- Interviewed farmers and stakeholders have not provided examples of biodiversity improvements as a result of Greening.
- Most farmers and stakeholders also agreed that the controls were clearer three years after the start of implementation. However, the overall bureaucracy continued to be a problem for most of them.
- The biggest disagreement was about the reduction of costs of Greening implementation. In general, farmers agreed that there were economic returns from Greening. However, they insisted that costs remained the same or increased – the payments for rented land, for fuel for ploughing, for labour were still there.

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. Nevertheless, few farmers referred to use these options – most said they had no training or advice on environmental matters or Greening implementation.
- At the same time, most interviewed farmers rely on the municipal agriculture offices both for agricultural and environmental aspects of farming. Their second option for information is Internet – various institutional and farming websites.
- Farmers prefer direct forms of advice – farm visits or face-to-face discussions.
- Farmers demand their advisors to be competent both in the practical and operational aspects of farming, to have up-to-date and relevant information about CAP support

measures and schemes, as well as to be experienced in technical application matters such as land delineation in the LPIS system.

Participation in CAP Greening decision making.

- The participation in the CAP Greening decision making by the interviewed farmers and stakeholders was limited. Some farmers participated in local or sectorial meetings, where Greening was discussed.
- Some interviewed farmers believed that municipal agriculture offices were involved. However, most interviewed farmers had no information about the participants in the CAP Greening decision-making.